Combatting Global Health Threats In Africa
# Oral Sessions at a Glance

## Oral Session 1: New Technologies for Disease Control and Elimination

**CO-CHAIRS:** Debi Boeras, London School of Hygiene and Tropical Medicine, United States and Lesley Scott, National Health Service Laboratory, South Africa

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<tr>
<td>11:00</td>
<td><strong>Evaluation of the Cepheid Xpert HIV-1 Qual: A National Health Laboratory Services, US Centers for Disease Control and World Health Organisation Study</strong>&lt;br&gt;<strong>CO-CHAIR:</strong> Debi Boeras, London School of Hygiene &amp; Tropical Medicine, United Kingdom</td>
<td>L. Hans, M. Hurst, K. Steeman, G. Zhang, S. Nguyen, J.N. Nkengasong, Z. Mahlambu, S. Carmona, M. Gonzalez</td>
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<td>11:10</td>
<td><strong>Evaluation of Panther Aptima Hiv-1 Dx Quant Assay for Viral Load Testing</strong>&lt;br&gt;<strong>CO-CHAIR:</strong> Lesley Scott, National Health Service Laboratory, South Africa</td>
<td>M. Meuw, CIPDCR, P. Bvere, N. Saleri, E. Nyairo, S. Phillip, F. Ogollah</td>
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<td>11:20</td>
<td><strong>Comparative Results of A Novel Flow Cytometric Assay (FA) for Early Detection of Cryptococcal antigen (CrAg) Against LFA and EIA in HIV-infected Patients with a CD4 Count &lt;100cells/µl</strong>&lt;br&gt;<strong>CO-CHAIR:</strong> Lesley Scott, National Health Service Laboratory, South Africa</td>
<td>L.M. Coetzee, D.K. Gieniewski</td>
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<td>11:45</td>
<td><strong>Diagnosis of Sub-microscopic Plasmodium Carriage in Low Transmission Pre-elimination Contexts in Senegal</strong>&lt;br&gt;<strong>CO-CHAIR:</strong> Rosanna Peeling, London School of Hygiene &amp; Tropical Medicine, United Kingdom</td>
<td>M. Niang, F. Diop, A. Toure, V. Richard, J. Faye, A. Badiane, F.D. Sarr, C. Sokhra, N. Diaigne</td>
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<td>11:55</td>
<td><strong>Cost Effective Real-Time PCR Assay for the Detection of Occult Hepatitis B</strong>&lt;br&gt;<strong>CO-CHAIR:</strong> Rosanna Peeling, London School of Hygiene &amp; Tropical Medicine, United Kingdom</td>
<td>M. Anderson, B. Phinius, T. Nkhisang, S. Moyo, R. Musonda, S. Gaseitsiwe, T. Sibunyu, N. Mlopo</td>
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<td>12:05</td>
<td><strong>Availability of Viral Load (VL) Testing and Antiretroviral Therapy (ART) Switch Practices</strong>&lt;br&gt;<strong>CO-CHAIR:</strong> Rosanna Peeling, London School of Hygiene &amp; Tropical Medicine, United Kingdom</td>
<td>G. Ruiter, P. Onno, A. Kim, T.S. Boender, G. Zhang, S. Kroeze, J. Wiener, PASER Study Group, T. Rinke de Wit, J. N. Nkengasong</td>
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## Oral Session 1.2: Preparedness and Lessons Learned from Outbreaks

**CO-CHAIRS:** Rosanna Peeling, London School of Hygiene & Tropical Medicine, United Kingdom, and John Nkengasong, Centers for Disease Control and Prevention, United States

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<td>11:00</td>
<td><strong>In-country Molecular Characterization of Ebola Virus Evolution During the West African Outbreak</strong>&lt;br&gt;<strong>CO-CHAIR:</strong> Rosanna Peeling, London School of Hygiene &amp; Tropical Medicine, United Kingdom</td>
<td>E.G. Zekeng, G. Potakis, J.A. Hiscox, M.W. Carroll, PHE Porton Down, S. Günther, N.J. Loman, J. Quick, D. Matthews</td>
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<td>11:10</td>
<td><strong>Innovative Regional External Quality Assessment for the Molecular Diagnosis of Dengue, Chikungunya and Zika Virus in the Indian Ocean Islands Using Dried-Blood Blotted Spots on Filter Papers</strong>&lt;br&gt;<strong>CO-CHAIR:</strong> Rosanna Peeling, London School of Hygiene &amp; Tropical Medicine, United Kingdom</td>
<td>A. Orelle, H. Rasamoelina, I. Leparc-Goffart, A. Person, L. Flachet</td>
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<td>11:20</td>
<td><strong>Investigation and Response of Pertussis Outbreak in a Rural Community, Kano, Nigeria, December 2013</strong>&lt;br&gt;<strong>CO-CHAIR:</strong> Rosanna Peeling, London School of Hygiene &amp; Tropical Medicine, United Kingdom</td>
<td>S.A. Ibrahim</td>
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<td>11:45</td>
<td><strong>The Need for Adequate All-Hazards Laboratory Capacity for Timely Detection of Biological, Chemical and Radiological Agents:</strong> Results of an Assessment of the Status of Implementation of International Health Regulations (2005) Core Capacities in Malawi in 2015&lt;br&gt;<strong>CO-CHAIR:</strong> Rosanna Peeling, London School of Hygiene &amp; Tropical Medicine, United Kingdom</td>
<td>A.O. Mwalwima, E. Macdonald, A. Mthambala, D.F. Vestrheim, W. Kasambere, B. Chilima, M. Nyenje, C. Mtambwe, S. Kanyanda, C. Theka</td>
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<td>11:55</td>
<td><strong>Enhancing Biosafety and Biosecurity Across National Laboratory Systems</strong>&lt;br&gt;<strong>CO-CHAIR:</strong> Rosanna Peeling, London School of Hygiene &amp; Tropical Medicine, United Kingdom</td>
<td>C.N. Mangal</td>
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<td>12:05</td>
<td><strong>The First Mile of e-Surveillance</strong>&lt;br&gt;<strong>CO-CHAIR:</strong> Rosanna Peeling, London School of Hygiene &amp; Tropical Medicine, United Kingdom</td>
<td>M.D. Murray, M. Roelke</td>
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### Oral Session 1.3: Emerging Trends of Antimicrobial Resistance in Africa  
**CO-CHAIRS:** Peter Nsubuga, Global Public Health Solutions, United States, and  
Philip Onyebujoh, World Health Organization Regional Office for Africa, Zimbabwe  
**Room 2.4**  
**Tuesday, 6 December**

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<td>11:00 – 11:10</td>
<td>Multidrug-resistant Tuberculosis (MDR-TB) an Emerging Problem in West Africa</td>
<td>J.K. Otu, F. Gehre, K.A. Oludran, B. Diarra, A. Forson, M. Antonio</td>
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<td>11:20 – 11:30</td>
<td>Molecular Analysis of Rifampicin Resistance Mutations in Mycobacterium Tuberculosis and Nontuberculous Mycobacteria from Zimbabwe by rpoB Gene Sequencing</td>
<td>N. Chin’ombe</td>
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<td>11:30 – 11:45</td>
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<tr>
<td>11:45 – 11:55</td>
<td>Antibiotic Resistance Studies and Molecular Investigation of Sulfamethoxazole on Salmonella Species Isolated from Diarrhoeal Stools of Some HIV Patients in Kaduna Nigeria</td>
<td>T. Ibrahim</td>
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<td>12:05 – 12:15</td>
<td>Determining Vancomycin Susceptibility in Methicillin-resistant Staphylococcus Aureus Isolates from Clinical Specimens Obtained at a Tertiary Academic Hospital</td>
<td>B. Shy, N.M. Mbello, J. Antiuong, S. Atanda, S. Mahlangu, N. Maningi, B. Magazi</td>
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### Oral Session 1.4: Strategies for Scaling Up Diagnostics  
**CO-CHAIRS:** Wolfgang Preiser, Stellenbosch University, South Africa and  
Erin Rottinghaus, Centers for Disease Control and Prevention, United States  
**Room 2.6**  
**Tuesday, 6 December**

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<td>11:00 – 11:10</td>
<td>National Scale-up Trend and Test Outcomes for Viral Load Testing in Kenya</td>
<td>B.N. Muture</td>
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<td>11:20 – 11:30</td>
<td>HIV Dried Tube Samples: A Novel Approach for HIV Viral Load EQAs Provision in Both Laboratory and Community Settings</td>
<td>L.M. Cabuang, E. Wilson, S. Best, W. Dimech, S. Badman</td>
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<td>12:05 – 12:15</td>
<td>Diagnostic Accuracy Validation of Abbott m2000 for HIV Viral Load Testing on DBS Samples; Malawi Pilot Study</td>
<td>Z. Ndlovu</td>
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### ORAL SESSION 2

#### Oral Session 2.1: Emerging Epidemics of Silent Killers in Africa

**CO-CHAIRS:** Talkmore Maruta, African Society for Laboratory Medicine, Zimbabwe, and Wendy Stevens, National Health Laboratory Service, South Africa

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<tr>
<td>11:00 – 11:10</td>
<td>Comparison Between Hemocue Glucose Meters in Use at the Nairobi Hospital Wards and the Central Laboratory Auto Analyzer</td>
<td>F.K. Ndungu</td>
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<td>11:20 – 11:30</td>
<td>Comparison of Fructosamine and Glycated Haemoglobin (HbA1c) Results In Diabetic Patients at Inkosi Albert Luthuli Academic Hospital (IALCH)</td>
<td>A. Reddy, V. Gounden</td>
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<td>12:05 – 12:15</td>
<td>Comparison of Creatinine Clearance in HIV/AIDS Patients on Tenofovir and Two Non-Tenofovir- Based NRTIs After One Year of Therapy</td>
<td>F. Chabala, S. Nyirenda, N. Banda, A. Mweemba</td>
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#### Oral Session 2.2: Novel Approaches in Cancer Diagnostics and Surveillance

**CO-CHAIRS:** Martin Hale, National Health Laboratory Service, South Africa, and Andrea Kim, Centers for Disease Control and Prevention, United States

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<tr>
<td>11:00 – 11:10</td>
<td>Cervical Cytological Patterns Among HIV-infected Women on Antiretroviral Therapy at Kenyatta National Hospital</td>
<td>M.A. Odhiambo</td>
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<td>11:10 – 11:20</td>
<td>Comparison of CareHPV and Hybrid Capture 2 Test in a Population of HIV-1 Infected African Women</td>
<td>M.P. Mahlangu</td>
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<td>11:20 – 11:30</td>
<td>Proteins as Novel Biomarkers in Breast Cancer Detection</td>
<td>A.O. Obubo</td>
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<td>11:55 – 12:05</td>
<td>The Role of Anatomic Pathology in Improving Health Care in Sub Saharan Africa</td>
<td>J. Guaner, M. Wilson</td>
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### Oral Session 2.3: Solutions in the Fight Against Neglected Tropical Disease
**CO-CHAIRS: Jane Carter, Amref Health Africa, Kenya, and Christine Rousseau, Bill and Melinda Gates Foundation, United States**

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<td>11:00</td>
<td>The First Evidence for Possible Interruption of Onchocerciasis Transmission in Metema Area Focus, North Gonder, Ethiopia</td>
<td>S.M. Feleke</td>
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<td>11:10</td>
<td>A Survey of Schistosomiasis in Selected Schools in the Muea and Likomba Health Areas, South West Region, Cameroon</td>
<td>A.F. Ako</td>
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<td>11:20</td>
<td>Visceral Leishmaniasis in Selected Communities of Hamer and Benna-Tsemai Districts in South West Ethiopia; Sero-Epidemiological and Leishmanin Skin Test Survey</td>
<td>F.B. Tolossa</td>
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<td>12:05</td>
<td>The First Successful Confirmed Elimination of an Onchocerciasis Focus in Africa: Abu Hamed, Sudan</td>
<td>I. Zarroug</td>
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### Oral Session 2.4: Surveillance and Outbreaks: Containment of a Plague
**CO-CHAIRS: Jean-Bosco Ndihokubwayo, World Health Organization Regional Office for Africa, Congo, and Kevin De Cock, Centers for Disease Control and Prevention, Kenya**

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<tr>
<td>11:00</td>
<td>Building Capacity for Yellow Fever Diagnostics in Angola, 2016</td>
<td>J.T. Kayiwa</td>
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<td>11:20</td>
<td>Using a Point of Care Platform to Minimise Downtime for Viral Haemorraghic Fever (VHF) Testing at an Academic Laboratory in Johannesburg, South Africa</td>
<td>S. Moodly, N. Cassim</td>
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<tr>
<td>11:55</td>
<td>Factors Associated with Cerebrospinal Meningitis Outbreak in Kebbi State, Nigeria, February 2015</td>
<td>I.G. Enrieoka</td>
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<td>12:05</td>
<td>Epidemiological Pattern of Measles Case-Based Surveillance Data; Oyo State, Nigeria, 2008-2014</td>
<td>M.O. Anyanvu, A. Akinyode, G. Abass</td>
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### Oral Session 3

**Oral Session 3.1: Achieving International Targets and the Global Health Security Agenda**

**Co-Chairs:** Jane Mwangi, Centers for Disease Control and Prevention, Kenya, and Pascale Ondoa, Amsterdam Institute for Global Health and Development, Netherlands

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<td>11:10 – 11:20</td>
<td>Sustaining PEPFAR Initiated Laboratory Services in Nigeria: Experiences and Lessons from Implementing a Laboratory Revolving Fund (LRF) Program in a District Hospital (N.A. Ndulue)</td>
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<td>11:45 – 11:55</td>
<td>Reasons for Unpredictable Stockout of Laboratory Reagents in Cote D’Ivoire: Consequences for Diagnostics Access Initiative (DAI) Implementation (F. Umaru)</td>
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<td>11:55 – 12:05</td>
<td>Biosafety Training Program: The Process of Conducting Sustainable Biosafety Trainings and the Role of Management in Order to Minimize Occupational Exposures to Biohazards and Enhance Laboratory Quality (D.N. Bota)</td>
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<td>12:05 – 12:15</td>
<td>Learnings From a Public-Private Partnership to Provide High Quality, Efficient and Financially Sustainable Laboratory Services at the National Public Hospital in Tanzania (A. Magesa, L. Musuru, A. Wilson, N.N. LoBue, J. Kisyombe, F. Kayandabila)</td>
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**Oral Session 3.2: QMS in Improving Clinic Laboratory Interface**

**Co-Chairs:** Anthony Emeribe, Medical Laboratory Science Council of Nigeria, Nigeria and Tshaynesh Messele, African Society for Laboratory Medicine, Ethiopia

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<td>11:00 – 11:10</td>
<td>Performance of HIV Diagnostic Algorithms at 6 Sites in 5 Sub-Saharan African Countries (C. Kosack, L. Shanks, T. Benson, A. Ng’anga, B. André, J. Zahinda, A. Page)</td>
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<td>11:10 – 11:20</td>
<td>Rapid Improvement of Four Clinical Laboratories in DR Congo: the Accelerated SLMTA Approach (K.G. Mbensa)</td>
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<td>11:45 – 11:55</td>
<td>Monitoring and Evaluation of South Africa’s National ART Program Using Laboratory Based Data Dashboards (W.B. MacLeod, J. Bor, S. Carmona, S. Candy, W. Stevens, I. Sanne)</td>
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<td>11:55 – 12:05</td>
<td>Laboratory Quality Management System: Key Driver to Accreditation (J.M. Maragia)</td>
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<td>12:05 – 12:15</td>
<td>Diagnostic Accuracy of 8 HIV RDTs and 2 Simple Confirmatory Assays from 5 Sub-Saharan African Countries (C. Kosack, L. Shanks, G. Beelaert, K. Fransen, T. Benson, A. Savane, A. Ng’anga, B. André, J. Zahinda)</td>
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### Oral Session 3.3: Networking to Support Global Health

**CO-CHAIRS:** Ralph Timperi, African Society for Laboratory Medicine, United States, and Judith Shang, Centers for Disease Control and Prevention, Cameroon

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<td>11:20 – 11:30</td>
<td>Improving TB/HIV Case Detection Rate Through the integration of Private Health Facilities in the Network Controlled by the Health Zone: An Experience from the Bunia Health Zone in the DRC</td>
<td>J.S. Zkohodi</td>
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### Oral Session 3.4: Capacity Building and Sustainability

**CO-CHAIRS:** Andre Trollip, FIND, South Africa and Mackenzie Hurstison, Centers for Disease Control and Prevention, United States

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<tr>
<td>11:00 – 11:10</td>
<td>Impact of Decentralisation of ART Laboratory Services on TAT in Lusaka District – a Case of Capacity Building for Local Laboratories</td>
<td>D. Nsama, F. Zulu, E. de Gourville, C. Ndongo, J. McAuley, M. Phiri, I. Sikazwe, P. Sikatey, C. Phiri, K. Shen</td>
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<td>11:20 – 11:30</td>
<td>Strengthening the Quality Management Systems of Port Reitz Hospital Laboratory in Kenya through Laboratory Institutional Mentorship Programme</td>
<td>H.G. Gumba</td>
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### Late Breaker Oral Sessions at a Glance

#### Late Breaker Oral Session 1.1: Late Breaking News for Global Health Emergencies
**CO-CHAIRS:** Leonard Peruski, Centers for Disease Control and Prevention, United States, and Chikwe Ihekweazu, Nigeria Centre for Disease Control, Nigeria

- **Date:** Tuesday, 6 December
- **Time:** 15:30 – 16:30
- **Room:** 2.4

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<tr>
<td>15:35 – 15:40</td>
<td>Breaking the Ebola Virus Disease Chain of Transmission; the Role of Montserrado County Sectorial Surveillance System in Liberia</td>
<td>C.C. Dan-Awotar</td>
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<td>15:45 – 15:50</td>
<td>Survey of Influenza A Virus and Subtype (A/H5n1) Infection Among Poultry Workers Exposed to Infected Birds in Jos, Plateau State</td>
<td>C.C. Dan-Awotar</td>
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<td>15:55 – 16:00</td>
<td>Les Cas de Fievre Chez les Enfants Venus en Consultations Dans les Hopitaux au Cameroun Sont Dus a la Dengue S. Tchuandom</td>
<td>S. Tchuandom</td>
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#### Late Breaker Oral Session 1.2: Maximizing Public Health Impact Through Improved Diagnostic Access and Use
**CO-CHAIRS:** Robert Matiru, UNITAID, and Timothy Amukene, Makerere University-Johns Hopkins University Research Collaboration Core Laboratory, United States

- **Date:** Tuesday, 6 December
- **Time:** 15:30 – 16:30
- **Room:** 2.6

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<td>15:30 – 15:35</td>
<td>Field Evaluation of Point of Care Cepheid Genexpert HIV Qual for Early Infant Diagnosis</td>
<td>V.S. Opollo, E. Anyango, A. Nikuze, D. Mannman</td>
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<td>15:35 – 15:40</td>
<td>Measuring the Impact and Cost of Uganda’s Specimen Hub Transport System</td>
<td>C. Kyaga, K. Callaha, S. Phantseri</td>
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<td>15:45 – 15:50</td>
<td>Significantly Improved Antiretroviral Therapy Initiation Rates After the implementation of Point of Care Early Infant Diagnosis</td>
<td>R. Mwenda, L. Vojnov, E. Saka, T. Magombo, Y. Fong, J. Kandulu, D. Midian, C. Mwase, J. Sherman</td>
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<td>Use of a Centralized Laboratory Data Repository to Monitor the 2016 Scale-Up of the National HIV Viral Load (HVL) Program in Tanzania</td>
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<td>15:45 – 15:50</td>
<td>Implementation of a New Quality Assurance Program for HIV Rapid Tests in Cambodia</td>
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<td>15:50 – 15:55</td>
<td>Improving the Quality of Laboratory Services in Uganda Through SLMTA Implementation</td>
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<tr>
<td>15:55 – 16:00</td>
<td>Laboratory Mentoring Using the SLIPTA Process Results in First Ever ISO-15189 Accredited Medical Laboratory in Central Africa: The Case of the National Early Infant Diagnosis Reference Laboratory (NEIDRL) Mutengene, Cameroon</td>
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<tr>
<td>16:00 – 16:30</td>
<td>Question &amp; Answer</td>
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## Oral Posters at a Glance

### Oral Poster 1

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<th>Date: Tuesday, 6 December</th>
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<tr>
<td>Time: 12:30 – 13:30</td>
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<table>
<thead>
<tr>
<th>Oral Posters 1.1: Quality and Biosafety</th>
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<tr>
<td>Chair: Tom Chiller, Centers for Disease Control and Prevention, United States</td>
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<tr>
<td><strong>Tuesday, 6 December</strong></td>
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<td><strong>Ballroom East/West, Stage 1</strong></td>
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<tr>
<td><strong>12:30 – 12:40</strong></td>
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<tr>
<td>RDT Roadshow: Comprehensive and Country-Specific Training in Rapid Diagnostic Tests</td>
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<td><strong>12:40 – 12:50</strong></td>
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<tr>
<td>Assessment of Laboratory Capacity of Public Secondary Health Centres in Performing Assay of Selected Epidemic Prone Diseases in Oyo-State, Nigeria</td>
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<tr>
<td>O.T. Bankole</td>
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<tr>
<td><strong>12:50 – 13:00</strong></td>
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<tr>
<td>A Comprehensive Approach to Biosafety Cabinet Usage, Maintenance and Certification to Ensure Biosafety and Biosecurity of Medical Laboratories</td>
</tr>
<tr>
<td>K. Lewis, L. Maryejo-Brinson, M. Sondinii</td>
</tr>
<tr>
<td><strong>13:00 – 13:10</strong></td>
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<tr>
<td>Impact of External Quality Assessment for Tuberculosis In Eastern Province, Zambia</td>
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<tr>
<td>D.S. Mainza</td>
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<tr>
<td><strong>13:10 – 13:20</strong></td>
</tr>
<tr>
<td>HIV Serology Proficiency Testing Panel Production Automation – Kenya Success Story</td>
</tr>
<tr>
<td>S.W. Mwanyumba</td>
</tr>
<tr>
<td><strong>13:20 – 13:30</strong></td>
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<tr>
<td>Improving the Quality of Xpert MTB/RIF Testing Services: A Kenyan Experience on the Use of Dried Tube Specimen Proficiency Panels</td>
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### Oral Poster 1.2: Role of Laboratory Networks in Disease Detection and Outbreak Preparedness

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<tr>
<td><strong>12:30 – 12:40</strong></td>
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<tr>
<td>The Value of Modern Public Health Laboratories Against Emerging Threats and Epidemics in Africa</td>
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<tr>
<td>E. Tambo, C. Khayeka-Wandabwa, A. Kazienga, O.A. Oluwasogo, J.Y. Ngogang, A.A. Adedeji, E. Khater</td>
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<tr>
<td><strong>12:40 – 12:50</strong></td>
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<tr>
<td>Antimicrobial Resistance Baseline Survey Conducted Among 21 Facilities in Uganda by the Central Public Health Laboratories and Partners</td>
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<tr>
<td>I. Mugwena, G. Gaspard, S. Ikoba, A. Steven, R. Walwema</td>
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<tr>
<td><strong>12:50 – 13:00</strong></td>
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<tr>
<td>HIV Viral Load Laboratory Testing and Sample Networking in a Resource-limited Setting of Nyanza Province, Western Kenya</td>
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<td><strong>13:00 – 13:10</strong></td>
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<tr>
<td>Building the Capacity to Offer HIV Drug Resistance Testing as a Standard of Care in Kenya</td>
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<tr>
<td>M. Mwau, F. Ogallo, P. Bewara, N. Saleri, E. Ajema, Y. Scriver, A.D. Kwalallah</td>
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<tr>
<td><strong>13:10 – 13:20</strong></td>
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<tr>
<td>Prevalence of Minor HIV-1 Drug Resistant Variants in Antiretroviral-naïve HIV-1 Infected Patients in Botswana</td>
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<tr>
<td>D. Marupula, S. Gaseitsiwe, C. Rowley, M. Leteane</td>
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<tr>
<td><strong>13:20 – 13:30</strong></td>
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<tr>
<td>Has the Threshold of Case Detection with Xpert MTB/RIF Been Reached in South Africa?</td>
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<tr>
<td>K. Shearer, D. Dowdy, J. Golub, L. Scott, L. Bernie, W. Stevens, W.B. MacLead, M.P. Fox</td>
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<tr>
<td>Date: Wednesday, 7 December</td>
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<tr>
<td><strong>CHAIR:</strong> Jaya George, National Health Laboratory Service, South Africa</td>
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<td>12:50 – 13:00</td>
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<tr>
<th>Date: Wednesday, 7 December</th>
<th>Time: 12:30 – 13:30</th>
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<td><strong>CHAIR:</strong> Elizabeth Mayne, University of Witwatersrand, South Africa</td>
<td><strong>Wednesday, 7 December</strong></td>
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<tr>
<td>12:30 – 12:40</td>
<td><strong>Neonatal Haemolytic Anaemia- a Diagnostic Challenge</strong></td>
<td>L. Swart, K. Naiboo, E. Schapkaitz, T. Coetzer, J. Poole</td>
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<tr>
<td>12:40 – 12:50</td>
<td><strong>The Validity of HLA Antibody Testing in Designing Immunological Risk Stratification Strategies for Patients Awaiting Transplantation in Johannesburg, South Africa</strong></td>
<td>C.M. Worsley, E.S. Mayne</td>
</tr>
<tr>
<td>12:50 – 13:00</td>
<td><strong>The Clinical Utility of the Automated Fragmented Red Cell Count for Monitoring Patients with Thrombotic Thrombocytopenic Purpura</strong></td>
<td>E. Schapkaitz, M.H. Mozelbe</td>
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<tr>
<td>13:00 – 13:10</td>
<td><strong>Severe Elevations in Serum Alanine Aminotransferase is Correlated with Haemoglobin Concentration and Platelet Counts in HIV Infected Patients</strong></td>
<td>T.M. Akindigh, E.U. Ekeh, P. Ogoagwu, N. Sambay, A. Ani, M. Mohammed, P. Agaba, O. Agbaji, G. Imade</td>
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<tr>
<td>13:20 – 13:30</td>
<td><strong>Comparing the Glucose Metabolism Derangement in Human Immunodeficiency Virus Infection Patients on Antiretroviral Treatment With Drug Naive Patients at Lagos State University Teaching Hospital</strong></td>
<td>B.C. Basil, A. Dosunmu, I. Olatunji-Bello</td>
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**ORAL POSTERS 3**

### Oral POSTERS 3.1: The Role of Partnerships in Improving Global Health

**Chair:** Ndlovu Nqobile, African Society for Laboratory Medicine, Zimbabwe  
**Time:** Thursday, 8 December  
**Venue:** Ballroom East/West, Stage 1

- **12:30 – 12:40** Suboptimal Virological Suppression Among Children and Adolescents on Antiretroviral Therapy (ART) in Uganda  
  V. Bigira, B. Mirembe, V. Mulema, A. Kabbale, C. Kiyaga, I. Ssewanyana, E. Magongo, C. Katunsebe

- **12:40 – 12:50** Lessons Learnt Using a Point-of-Care Device to Monitor Viral Load in HIV+ Women Receiving ANC at a Primary Care Clinic in Cape Town, South Africa  
  L. Bunting, L. Ndlovu, L. Myer, N. Hsiao

- **12:50 – 13:00** Incidence and Predictors of Treatment Failure to Second-line Antiretroviral Treatment in a Young People Living with HIV/AIDS Clinic: A Retrospective Cohort Study  
  M. Matovu, G. Agaba, A. Kakikukwe, S. Kituka

- **13:00 – 13:10** Building an International Biorepository in a Resource Limited Setting  

- **13:10 – 13:20** Expanding Access to GenXpert Technology through Linkages of Peripheral TB Laboratory Service Delivery Networks in Northern Nigeria  
  N. A. Ndulue

- **13:20 – 13:30** Where Have All the Children Gone? High HIV Prevalence in Infants Attending Nutrition and Inpatient Wards  
  C. Kiyaga, L. Vojnov, B. Urick, Y. Fong, C. Okira, I. Ssewanyana, V. Bigira, T. Peter, A. Ghadrshenas

### Oral POSTERS 3.2: Approaches for Quality Management Systems and Diagnostics

**Chair:** Katy Yao, Centers for Disease Control and Prevention, United States  
**Time:** Thursday, 8 December  
**Venue:** Ballroom East/West, Stage 2

- **12:30 – 12:40** Piloting the E-SLIPTA Checklist in Kenya  

  T. Maruta, N. Ndlovu, J. Ndhokubwuyo, S. Coulbaly, A. Abroli, D. Turgeon

- **12:50 – 13:00** A Baseline Assessment of the Policy and Regulatory Environment for HIV Self-testing in Malawi, Zimbabwe and Zambia  

- **13:00 – 13:10** Using Quality Improvement Interventions to Improve Laboratory Services at Public Health Facilities in Uganda  

- **13:10 – 13:20** Significance of Standard Tools in Monitoring Adherence to Quality Standards at HIV Testing Sites in Malawi  

- **13:20 – 13:30** Sinnovative Approach to Improving Adherence to Quality Standards at HIV Rapid Testing Sites in Cameroon Using the Stepwise Process for Improving the Quality of HIV Rapid Testing (SPI-RT) Checklist  
Posters at a Glance
As of 15 November, 2016

TUESDAY, 6 DECEMBER

Global Health Security and Public Health Institutes Posters

>> Posters 1-76 will be shown in Jasminum

>> Posters 77-134 will be shown in Ballroom East/West Foyer

>> Posters 135 - 218 will be shown in Auditorium 1 Foyer

WEDNESDAY, 7 DECEMBER

Late Breaking Global Health Security Posters

>> Posters 219 - 290 will be shown in Jasminum

Non-Communicable Diseases and Neglected Tropical Diseases Posters

>> Posters 291 - 328 will be shown in Ballroom East/West Foyer

THURSDAY, 8 DECEMBER

Partnerships Posters

>> Posters 329 - 404 will be shown in Jasminum

>> Posters 405 - 436 will be shown in Ballroom East/West Foyer
## Posters Directory

*As of 15 November, 2016*

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| 2  | The Role of Procalcitonin in Neonatal Sepsis at The Nairobi Hospital-Kenya |
| 3  | Bacterial nosocomial pathogens and their antibiotic susceptibility pattern from intensive care units of the University of Maiduguri Teaching Hospital, Nigeria |
| 4  | Performance Evaluation of Malaria Microscopists Working at Malaria Slides Rechecking Laboratories for External Quality Assessment in Ethiopia. |
| 5  | Predictors of Tuberculosis treatment outcomes by HIV status in Western Kenya |
| 6  | Use of standardized electronic tools for harmonized data collection across multiple countries and projects |
| 7  | A Novel Quality-Focused Multi-Country Approach for Ministry of Defense Laboratory Systems |
| 8  | Addressing institutional barriers to improve access to Dry Blood sample in rural Northwestern Nigeria: a 12-month retrospective data review of Partnership with Nigeria Poster Service for sample transportation |
| 9  | Opportunities for TB/HIV collaboration during GeneXpert roll out in Nigeria — the NACA/KNCV experience. |
| 10 | Assessment of primary, secondary and tertiary health facilities across Four States in Nigeria: A cross sectional study on strengthening disease diagnostic network through laboratory service availability for integrated disease surveillance and response (IDS) priority diseases. |
| 11 | Nonfermenting Gram Negative Bacilli Clinical Infections in a Nigerian University Hospital |
| 12 | Performance Evaluation of TB smear Microscopists Working at TB Slides Rechecking Laboratories for External Quality Assessment in Ethiopia |
| 13 | Increasing trend of NTM isolated in Botswana: a need for NTM drug susceptibility testing? |
| 15 | Impact of mentoring and supervision on GeneXpert Laboratories- the NACA experience. |
| 16 | Antibiotic susceptibility of Mycoplasma hominis and Ureaplasma urealyticum collected from senegalese women in Dakar during 2015 |
| 17 | Re-occurring Crimean-Congo hemorrhagic fever outbreaks in Uganda; an investigational report of the 2015 outbreak. |
| 18 | Implementation of a Quality Management System at the Viral Hemorrhagic Fevers laboratory, Entebbe, Uganda |
| 19 | Assuring Quality of HIV Rapid Testing Performed by Lay Counsellor Testers in 2014 Integrated Biological and Behavioural Surveillance Survey (IBBSS) in Nigeria |
| 20 | Review of the Ebola Virus Disease (EVD) Laboratory Training of the Sierra Leone National Response Team |
| 21 | Lessons Learnt from National HIV Viral Load Implementation and Scale-Up in South Africa |
| 22 | CXCL10 Gene Promoter Polymorphism -1447 A>G Correlates with Plasma CXCL10 Levels and is Associated with Susceptibility to Malaria in Ghanaian Children |
| 23 | Role of Heme and CXCL10 in Malaria pathogenesis |
| 24 | PCR as an important tool for the estimation of the burden of malaria during pregnancy in women receiving IPTp-SP |
| 25 | Sero-prevalence and factors associated with rubella infection among pregnant women attending antenatal care services at Mulago National Referral Hospital in Kampala, Uganda. |
| 26 | Dynamics of Evolution of Poliovirus Neutralizing Antigenic Sites and Other Capsid Functional Domains during a Large and Prolonged Outbreak in Nigeria **CANCELLED** |
| 27 | Prevalence of Schistosomiasis Among School Children of Fatima Aloi Demonstration Primary School, Alebtong District |
| 28 | Influenza vaccine un- neutralized viruses associated with a specific seasonality pattern in Uganda: the HA/ HAI approach |
| 29 | Molecular epidemiology of carbapenem-resistant Acinetobacter baumannii isolates in a Senegalese teaching hospital |
30 Importance of immunological monitoring for municipalities identified as national development nodes
31 HIV treatment guideline changes: implications for predicting future national CD4 testing costs for South Africa
32 HIV treatment guideline changes: implications for and predicting network restructuring needs and distribution of CD4 testing platforms in laboratories across South Africa
33 Integrating South Sudan’s National Public Health Laboratory with East African Public Health Networks
34 Impact of sputum samples preservation and transportation on M. tuberculosis laboratory recovery for drug resistance surveillance
35 District and sub district analyses of CD4 counts <100 cells/µl identify areas with higher rate of late presentation for ART initiation and risk for opportunistic infections.
36 Comparison of the new fully automated volumetric Aquios flow cytometer PanLeucogate (PLG) platform for CD4-T lymphocyte enumeration to existing predicate technology in South Africa.
37 Site verification of the Aquios flow cytometer as replacement CD4 platform for outmoded XL cytometers across a national testing network.
38 Circulating Serotypes of Streptococcus pneumoniae responsible of meningitis of 2012 to 2015 in Mali
39 Determinants du Portage Nasal du MRSA a Bukavu
40 Prevalence of extended-spectrum beta-lactamase production and antibiotic susceptibility profile of clinical Escherichia coli isolates in Ibadan metropolis, South-Western Nigeria
41 Improving program efficiency through streamlining of routine clinical chemistry testing profiles for HIV patients in Nigeria
42 Measuring training effectiveness of African Centre for Integrated Laboratory Training (ACILT).
43 Efficacy Of Quality Management System In Improving The Reliability Of Rapid HIV Testing In Kwara State, North-Central, Nigeria
44 Ciprofloxacin resistance of Neisseria gonorrhea isolates obtained from genital samples at the Ethiopian Public Health Institute.
45 Should we have concerns about the accuracy of HIVST? A systematic review
46 The Risk factors of the prevention of mother-to-child transmission interventions in the Bamenda City, Cameroon.
47 A WHO performance evaluation of two HIV-1/2 rapid diagnostic tests for oral fluid specimens.
48 Kenya Laboratory Capacity Mapping: Design and implementation of tablet based survey system for laboratory network capacity for test services, surveillance, response and planning
49 Congenital cytomegalovirus infection and zero rubella IgM prevalence in newborns in St.Paul's Hospital Millennium Medical College
50 Antibiotic Resistance Patterns Of Common Gram-Negative Uropathogens In St. Paul’s Hospital Millennium Medical College
51 Effect of 1.5% sodium hydroxide final concentration on recovery rate of Mycobacterial Species and decontamination of Bacterial and Fungal contaminants from sputum collected in patients referred to the Ethiopian Public Health Institute
52 Characteristics and outcomes of HIV exposed infants receiving Early Infant Diagnosis for HIV in rural Kenya, 2015.
53 Sodium Hydroxide-N-acetyl-L-Cysteine (NaOH-NALC) and 0.7% Chlorhexidine Decontamination Method in Detection of Mycobacterium tuberculosis complex: A Comparative Analysis
54 New Options for HIV Viral Load testing: The Panther Aptima HIV-1 Quant Dx assay (Hologic®, Inc)
55 Failure to detect HIV-1 by PCR testing amongst infected infants receiving antiretroviral therapy
56 The Performance of BD FACSPresto for CD4 T-cell count in Ethiopia
57 Antimicrobial resistance in pathogenic aerobic bacteria causing surgical site infections in Mbarara Regional Referral Hospital, Southwestern Uganda
58 Reduced Antimalarial Total IGG Associated With Concurrent Ascariasis In School Aged Children Of Two Endemic Areas In Cameroon
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<td>Serotype distribution and Ampicillin susceptibility of Haemophilus influenzae associated with Non-invasive Infections.</td>
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<td>Evaluation of a Point-of-Care Test for Diagnosis of HIV at Birth</td>
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<td>Improving laboratory performance during Ebola Virus Disease outbreak in Sierra Leone - 2015</td>
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<td>63</td>
<td>Malaria and intestinal parasites coinfections and haemoglobin levels among school-aged children in Bebuatsuan clan, Obudu, Cross River State, Nigeria.</td>
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<td>Occurrence of Hepatitis B and C Viral Infections among Pregnant Women in Calabar, Cross River State, Nigeria</td>
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<td>Improve Awareness and Understanding Antibiotics Resistant Through Participation in Public Cultural Forums</td>
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<td>Field Evaluation of a Schistosome Antigen-Based Rapid Test Kit (CCA) At Point-Of-Care for Mapping Urinary Schistosomiasis Endemic Districts in The Gambia</td>
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<td>Performance comparison of pair of LJ media supplemented with pyruvate and glycerol (LJP/LJG) and a combination of both supplements in single LJ (LJPG) to assess the growth of Mycobacterium Tuberculosis Complex (MTBC)</td>
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<td>Surveillance Nationale de la Resistance aux Antibiotiques: Experience du Senegal</td>
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<td>Echec virologique et résistance au traitement ARV de première ligne en Guinée</td>
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<td>Developing tools for reporting laboratory data in real time</td>
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<td>Comparison of an in-house Quantitative Real Time PCR and COBAS AmpliPrep/TaqMan Roche for determination of Viral Load for HIV Type 1 non-B</td>
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<td>Correlation between Sequencing Results from Liquid Plasma and Dried Plasma Spot (DPS) for determination of HIV type 1 non-B subtypes</td>
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<td>UV Visible Spectrophotometric determination of the quality of Antiretroviral Drugs distributed in Kinshasa</td>
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<td>Audit Diagnostic Pilote des Laboratoires de Biologie Médicale du Togo.</td>
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<td>Antibiotics susceptibility pattern of Streptococcus pneumoniae isolated from sputum cultures of human immunodeficiency virus infected patients in Yaoundé-Cameroon</td>
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<td>Performance of Ethiopian Laboratories in Oneworld Accuracy Proficiency Testing program(2014-2015)</td>
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<td>Performance of PIMATM CD4 sites in Oneworld Accuracy Proficiency Testing program</td>
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<td>Fluorescence Microscopy deployment, the need for effective Training and Quality Assurance</td>
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<td>Evaluation of Faecal Occult Blood Testing Kits for Rapid Point-of-Care Diagnosis of Invasive Diarrhoeas in Young children</td>
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<td>81</td>
<td>Retrospective assessment of VIKIA® Rota-Adeno and Premier TM Rotaclone® tests compared to reverse transcription polymerase chain reaction for detection of group A rotavirus</td>
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<td>83</td>
<td>Mass Screening for Infectious Diseases Using Fluorescence Microscopy in Cameroon</td>
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<td>84</td>
<td>The role of Point of Care (POC) CD4 testing in accelerating newly identified HIV positive people enrollment in to ART services.</td>
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<td>Pediatric treatment of HIV in decentralized areas in the north of the country: the case of the Saint Louis, Senegal</td>
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<td>Evaluating Turnaround Time (TAT) For Early Infant Diagnosis (EID) At Blantyre Dream Laboratory: 1 Year of Achievements and Challenges</td>
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<td>The susceptibility of moxifloxacin and Capreomycin in XDR isolates over a 10 month period in Kwazulu-Natal, South Africa</td>
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<td>CMI et CMB de quelques antibiotiques sur les souches de Gardnerella vaginalis isolés au laboratoire central de l’Hôpital Général de Yaoundé</td>
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Note: The table contains a list of presentations and discussions from the ASLM 2016 International Conference.
Molecular typing of multidrug-resistant Candida auris strains in South Africa
Identification of non-tuberculous mycobacteria isolated from clinical specimens in a high volume diagnostics laboratory, South Africa, using the GenoType Mycobacterium CM/AS assay and 16S rRNA gene sequencing
Diarrheal outbreak among infants caused by Rotavirus infection in Swaziland, 2014
Characterization of disputed rpoB mutations in phenotypic and genotypic discordant Mycobacterium tuberculosis isolates
Update on the Implementation of the World Health Organization Regional Office for Africa Stepwise Laboratory Quality Improvement Process Towards Accreditation
Capacity of Potential POC EID Pilot Sites: Findings from site assessments in Lesotho
Site mapping approach to optimizing EID networks with POC EID platforms in Lesotho
Baseline Findings From Assessment of Quality Management Systems in Potential Sites for Point of Care Early Infant Diagnosis
Procurement and standardization model for laboratory equipment: The Swaziland Experience
MTBDRplus ver. 2.0 an effective method for recovering MTB in apparent contaminated samples
Four novel coronaviruses detected in multiple bat species from Cameroon
Diagnostic Performance of Direct Wet Mount Microscopy in Detecting Intestinal Helminthes among Pregnant Women Attending ante-natal Care (ANC) in East Wollega, Oromia, Ethiopia
Data from a proficiency testing program reinforces the need for effective quality management at Xpert MTB/RIF sites
Surveillance of Canine Rabies in the Central African Republic: Impact on Human Health and Molecular Epidemiology
Characterization of Non-tuberculous Mycobacteria, (NTM), from sputum culture isolates not specified by a commonly used commercial line probe assay in Pretoria
Seroprevalence of polio antibodies in adult laboratory staff in South Africa, 2009 to 2013
The Pima National Program — the cost of a Pima Point of Care (POC) CD4 test in Papua New Guinea (PNG)
SMS photograph-based external quality assessment of reading and interpretation of malaria rapid diagnostic tests in the Democratic Republic of the Congo
Human Pegi Virus (HPgV) Incidence and Factors Associated with Its Infection Among Blood Donors in Kano, Nigeria
Bacterial prevalence, Risk Factors and Antimicrobial Susceptibility Patterns of Ocular Infections in Tigray region, Northern Ethiopia
Improving access to CD4 testing using Point Of Care referral networks
Proficiency Testing of Xpert MTB/Rif Tests Using Dried Tube Specimens: Zimbabwe Pilot Experience
Measuring Annual Forecast Accuracies for Human Immunodeficiency Virus Diagnostic Commodities Using Mean Absolute Percentage Errors in Kenya
Implementing Routine Viral Load testing services at a Kenyan HIV Reference laboratory: Successes and challenges
HIV Serology Proficiency Testing Panel Production Automation —Kenya Success Story
Sero logical and virological evidence of Crimean-Congo Haemorrhagic Fever virus circulation in the human population of Borno state, Northeastern Nigeria
Effect of Plasma Dilution On HIV-1 Viral Load Results in Uganda
Countrywide Audit of Multidrug-Resistant Tuberculosis Cases Reported; Treatment Delay and Outcomes in Tanzania
120 Adherence to National Guidelines for Treatment Follow up of Patients Treated for Multidrug – Resistant Tuberculosis and Treatment Outcomes in Tanzania.

121 Mycobacteriology Data of Failures to 2RHZE/4RH Regimen

122 Selective antimycobacterial potential of selected medicinal plants

123 Assessing the impact of Early Infant Diagnosis and Viral Load Proficiency Testing programs in PEPFAR-supported countries

124 Analytical Evaluation of the Roche Free Virus Elution Protocol for HIV-1 Viral Load Testing on Dried Blood Spot

125 Standardized assessment of quality services in mini laboratories of Swaziland

126 Analysis of HLA genotypes in HIV-1-infected Ghanaians

127 Sustainable approach in the establishment and implementation of a national biosafety cabinet maintenance and certification program in Kenya: what are the outcomes?

128 Root Cause Analysis of Turn Around Time for Automated Full Blood Samples and Peripheral Blood Films Samples in Haematology Department at Mbeya Referral Hospital Laboratory

129 Quality control of lots of malaria rapid diagnostic tests (RDTs) with recombinant proteins as reference materials: implementation of a decentralized in-country programme

130 The role of technical assistance in expanding access to Xpert® MTB/RIF: experience in Sub-Saharan Africa

131 Outcome of adequate adherence to the prevention of mother to child transmission (PMTCT) programme in the control of HIV. A study conducted at Federal Medical center Abeokuta, Nigeria

132 How do authors of diagnostic test accuracy (DTA) reviews disseminate their findings after publication? A mixed methods study

133 Dissemination of integron-borne resistance cassettes in faecal Escherichia coli isolated from mother-child pairs in Ile-Ife, Southwestern Nigeria

134 The expression of SLAMF7 levels in malignant B cells: a novel therapeutic pathway for treatment of patients with CLL

135 Sustainable approach to improving the quality of HIV testing at Multi testing points in Nigeria using Dried Tube Testing as an alternate approach.

136 Fever cases associated with Plasmodium falciparum malaria infection among children attending a Secondary Health facility in Imo State, Nigeria

137 Antimicrobial Sensitivity in Three Counties in an Ongoing Widespread Cholera Outbreak in Kenya, 2015-2016


139 Tetanus Antibody Concentrations in School Aged Children in Calabar, Nigeria CANCELLED

140 The Effectiveness of a PMTCT Program in a Cohort of Nigerian HIV positive mothers: Data from the INFANT study.

141 The Role of Extended-Spectrum Beta-Lactamases in Antibacterial Resistance among Enterobacteriaceae in a Tertiary Hospital in Southwestern Nigeria

142 Comparison of genetic diversity of Plasmodium falciparum after DNA extraction from filter paper and Rapid Diagnostic Tests

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Performance of Microscopy for the Diagnosis of Malaria and Human African Trypanosomiasis by Diagnostic Laboratories in the Democratic Republic of the Congo: Results of a Nation-Wide External Quality Assessment

A New Approach to Setting Up and Continually Improving a QMS: The Ten-Re Model

Challenges in Attaining Accreditation in Public Health Laboratories

Building Capacity to Increase Access to and Uptake of Quality-assured HIV Laboratory Services in Eastern Uganda.

WHO Laboratory Standards Training in Haiti: A 5-year Journey

Implementation of a Mentored Professional Development Program in Laboratory Leadership and Management in Zambia

Evaluation of the Accuracy of Instrument Generated Flags for Automated Differentials

Reducing the error rate in HIV Viral load testing and does training on a national level provide any positive outcomes?

MOH – driven Strengthening Laboratory Management toward Accreditation exemplifies success in country ownership of Laboratory QMS in Kenya

Strengthening quality management systems in TB laboratories in Africa

Evaluation of The Impact of Periodic Monitoring of Non Conformities in Improving Efficiency of a Testing Laboratory

Management Review Meetings, an Impetus to Laboratory Quality Improvement: Case Study of Bungoma County Referral Hospital Laboratory.

Building Partnerships to Develop In-Country Biosafety Cabinet Training Programs CANCELLED

Collaboration is Essential; delivering Good Clinical Laboratory Practice training where it is needed the most

Impact of introducing an effective surveillance system for drug resistance tuberculosis in Tanzania

Biological Safety Initiatives in Africa: Gaps, Challenges and Improvements.

Evaluating Engineering World Health’s Program to Build Sustainable Training Programs for Biomedical Engineering Technicians in Low-Resource Environments

Productive partnerships: Kenya’s Experience in Implementing Individual-Based Proficiency Testing For Rapid HIV Testing

Systematic Research Capacity Building for Laboratory Personnel: Swaziland’s experience.

Strengthening the Kenya Rapid HIV Testing Quality Assurance Program through Utilization of the Standardized National HIV Testing Logbook

Using Health Commodity Management Platform (HCMP) Improve Laboratory Commodity Reporting Rates in Kenya

Improving Polymerase Chain Reaction (PCR) Supply Chain Performance in Nigeria through Collaborative Interventions

Effective implementation of the global health initiative, the 90-90-90 targets, and long-term forecast and quantification in developing countries — the Zimbabwe experience

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Survey of Laboratory Practices and Policies Guiding the Storage, Maintenance and Re-Use of Dried Blood Spot Samples Collected for Infant Diagnosis of HIV and HIV Viral Load Monitoring in Six Sub-Saharan Countries

Monitoring The Site Level Performance of Facilities Conducting HIV Rapid Testing Using Proficiency Testing

Introducing HIV self-testing to rural communities in Malawi: cognitive interviewing may alert implementers to the need for additional support beyond that provided by manufacturer’s instructions-for-use (IFU)

The Road to Excellence: The First Public Health Laboratory in West Africa to Achieve ISO 15189 accreditation.

Zimbabwe Integrated Sample Transportation System (ISTS) Case Study
425 Improving Quality Assurance in Malaria Diagnosis at Lodwar County and Referral Hospital Laboratory in Turkana County, Kenya.

426 A smartphone-based communication program for critical alert lab values within a Kenyan regional referral hospital

427 The Impact of QMS On Biosafety at Lodwar County and Referral Hospital Laboratory, Turkana County in Kenya.

428 Integrated External Quality Assurance in support of SLMTA implementation in Kenya.

429 Improving Patient’s waiting time using the challenge model at Bungoma County Referral Hospital Laboratory

430 Impact of East Africa Public Health Laboratory Network project interventions on laboratory staff motivation, relationship with clinicians, and disease outbreak preparedness in Kenya

431 Smashing the Glass Ceiling to ISO 15189 Accreditation:-the SLMTA experience in Kenya

432 Integrating Human Immune Virus and Tuberculosis Care in Kabarole District Uganda, 2009-2012.

433 Turnaround Time for Early Infant Diagnosis (EID) in North-Central Nigeria: A time quality evaluation of logistics

434 Evaluation of the BD FACSPresto near patient CD4 counter in Zambia

435 PMTCT service delivery and elimination of mother-to-child HIV transmission in North Central Nigeria

436 Introduction of a competency-based selection criterion for the WHO External Competency Assessment of Malaria Microscopists
Tuesday, 6 December

**ORAL SESSION 1.1**

**NEW TECHNOLOGIES FOR DISEASE CONTROL AND ELIMINATION**

**DATE:** Tuesday, 6 December  
**TIME:** 11:00 – 12:30  
**ROOM:** CTICC 1.4  
**CO-CHAIRS:** Debi Boeras, London School of Hygiene and Tropical Medicine, United States and Lesley Scott, National Health Service Laboratory, South Africa

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### 11:00

**Evaluation of the Cepheid Xpert HIV-1 Qual: A National Health Laboratory Services, US Centers for Disease Control and World Health Organisation Study**

**Background:** Early treatment of HIV infected infants is critical; yet only 32% of HIV exposed children are tested appropriately (UNAIDS 2014). Most early infant testing in resource limited settings (RLS) takes place in centralised laboratories. Molecular point-of-care devices may be the appropriate tools to fill the existing gap in HIV testing in RLS as they are small, robust, and easy-to-use. However independent verification is required before introduction into these settings. The WHO, NHLS and CDC performed this study to verify select Cepheid Xpert® HIV-1 Qual performance claims.

**Methods:** Clinical performance was assessed by testing 236 infant whole blood (WB) samples, 300 infant dried blood spots (DBS) and 100 adult WB samples. WB samples were tested within 72hrs of collection. The Roche CAP/CTM Qualitative Test, Version 2.0 was used as the reference standard. Subtype coverage, limit of detection (LOD) and carryover were assessed as follows: three replicates of each subtype (B, C, D, F, AE, AG) were diluted to 5,000 copies/mL in negative WB. LOD was verified by serial dilution of the WHO 3rd HIV-1 international standard and carry over was determined using viral supernatant titrated to 106 copies/mL and tested alternating with HIV negative WB. DBS were created from prepared WB dilutions and dried overnight.

**Results:** When compared to the reference standard, both the infant WB and DBS had 100% sensitivity and specificity. The adult samples had three discordant results with 97% sensitivity and 100% specificity. All subtype replicates were detected and no carryover was identified. Both LODs were verified by Probit analysis: WB LOD, 350 copies/mL (95% CI: 267 – 610 copies/mL); DBS LOD 634 copies/mL (95% CI: 480 – 1,015 copies/mL). Manufacturer’s stated LOD for WB and DBS, 278 copies/mL and 668 copies/mL respectively, are within this study’s confidence intervals.

**Conclusion:** Results from this independent study are consistent with manufacturer WB and DBS claims of the Xpert HIV-1 Qual assay. Further evaluation may be needed to assess appropriate placement and assay’s impact on patient care.

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**Evaluation of Panther Aptima HIV-1 Dx Quant Assay for Viral Load Testing**

**Background:** Since 2014, Kenya has delivered an average of 700,000 viral load tests per year. The actual demand exceeds 1,000,000 tests per annum. Current technologies are low throughput, prone to breakdown, have a large footprint, and require significant technical resources to operate.

Hologic’s Aptima HIV-1 Quant Dx assay is a fully automated system with random and continuous access along with high throughput and ease of use.

The objective of this study was to determine usability and performance characteristics of Aptima assay compared Abbott M200SP system for HIV viral load testing.

**Methods:** A methods comparison study was performed determining the sensitivity, reliability and precisioin of Aptima HIV-1 Quant Dx assay (Aptima) compared to the Abbott RealTime HIV-1 assay (Abbott). Plasma samples from HIV-infected individuals collected in EDTA tubes were tested with the Aptima and Abbott. Samples were also aliquoted in plasma tubes and frozen for subsequent freeze thawing and serial dilution analysis. In addition, Qnostics HIV-1 8-member panel representative of HIV-1 subtype B, C, and A/G isolates with known viral loads were also tested on Aptima an Abbott. Further, reliability and linearity of the two instruments was evaluated side by side.

**Results:** HIV-1 viral loads were determined for 1,000 clinical samples successfully. Aptima results strongly correlated with Abbott (r = 0.953; P<.0001). Although Abbott was able to quantify 99 LDL (77.3%) samples quantified by Aptima, 158 (69.9%) of the samples with LDL (<75 Cps/mL) could not be detected by Abbott (P<.0001). The mean viral load results for Aptima (4.5 log Cps/mL) were significantly higher than those of Abbott (4.1 log Cps/mL; P<.001). Similarly, viral loads of Aptima for the 8-member subtype specific panel (3.7 log Cps/mL) were significantly higher than Abbott (2.8 log Cps/mL; P<0.001) but similar to the target concentration (mean 3.6 log Cps/mL; P=0.259) with Abbott results being significantly lower than the target concentration (2.8 and 3.6 log Cps/mL respectively; P=0.001).

**Conclusion:** The Aptima HIV-1 Quant Dx assay can be used interchangeably with the Abbott Assay for viral load quantification.
Comparative Results of a Novel Flow Cytometric Assay (FA) for Early Detection of Cryptococcal Antigen (CrAg) Against LFA and EIA in HIV-infected Patients with a CD4 Count <100 cells/µl

**Background:** Reflexed cryptococcal antigen (CrAg) testing on CD4 samples is indicated for early detection of cryptococcal disease in HIV+ patients with CD4 counts <100 cells/µl. A CrAg flow cytometric assay (FA, Immy, USA) was developed to simplify integration with existing CD4 services. This study compared the performance of the CrAg-FA against a CrAg lateral flow assay (LFA) and two CrAg enzyme immunoassays (EIA).

**Methods:** Sixty-three remnant EDTA CD4 samples, with confirmed LFA CrAg results were analysed using the new FA according to the manufacturer’s instructions. Results were reported as mean fluorescence intensity (MFI), with pre-established positive and negative cutoffs. Plasma from the same samples were re-tested with 2 EIA assay kits (‘Alpha’ CrAg EIA, Immy, US and ‘Premier’ CrAg EIA kits) on the ThunderBolt platform (Gold Standard Diagnostics, USA) and results reported as positive:negative using optic density (OD) values @450nm with preset limits of detection (Immy EIA <0.1 negative, >0.265 positive; Premier EIA <0.07 negative, >0.07 positive). Sensitivity and specificity calculations were performed. A validation panel (n=20 spiked negative plasma samples) was analysed by EIA, LFA and FA for assay accuracy.

**Results:** LFA reported 21 negative vs. 42 positive. The negative:positive test results for EIA assays were 37: 26 (Immy EIA), 33:30 (Premier EIA) and 31: 32 with the FA. Sensitivity of the FA was 86% versus Immy-EIA: 94% versus Premier-EIA and 76% against LFA (due to 7/26 positive LFA samples testing negative with both EIA and FA tests). In total, 56/63 samples showed concordance across both EIA and flow assays (89%). Specificity of the FA was 100% against both LFA and Immy-EIA and 90% against Premier EIA. The validation panel yielded 100% accuracy across all assays.

**Conclusion:** The FA showed acceptable sensitivity and specificity and best performance against EIA, making it suitable for integration into routine CD4 services using existing equipment and infrastructure.

Diagnosis of Sub-microscopic Plasmodium Carriage in Low Transmission Pre-elimination Contexts in Senegal

**Background:** As malaria transmission declines and countries progress towards elimination, low-density sub-microscopic infections are particularly prevalent limiting therefore the utility of conventional diagnostics such as light microscopy (LM) and rapid diagnostic test (RDT). Sub-microscopic Plasmodium carriage can contribute to resurgence of malaria transmission; therefore representing a major challenge to malaria control and elimination.

In this study, the presence and prevalence of sub-microscopic Plasmodium carriage were explored using quantitative real time polymerase chain reaction (qPCR). The qPCR-based parasite prevalence was compared against microscopy as gold standard.

**Methods:** A total of 2,083 blood samples collected during cross sectional surveys prior the malaria transmission season in July 2013 (N=612), June 2014 (N=723) and June 2015 (N=748) from asymptomatic individuals living in Dielmo and Ndiop (Central Senegal) were used to determine the prevalence of Plasmodium carriage by microscopy and qPCR.

**Results:** Sub-microscopic Plasmodium carriage represented 3.75% (23/612), 12.44% (90/723) and 5.88 (44/748) in 2013, 2014 and 2015, respectively. Microscopy-based prevalence of Plasmodium carriage was null in 2013 while accounting for only 0.27% (2/723) and 0.26% (2/748) in 2014 and 2015, respectively. The 2 microscopy-positive diagnosed samples in 2014 and 2015 were positively confirmed by qPCR.

Plasmodium falciparum accounted for the majority of sub-microscopic infections representing 86.95% (20/23), 81.11% (73/90) and 95.45 (42/44) of infections in 2013, 2014 and 2015 respectively.

**Conclusion:** Low-density sub-microscopic Plasmodium malaria infection was common in the study areas highlighting the need for more sensitive diagnostic such as qPCR to accurately measure the burden of malaria. The infections missed by LM may represent a particular challenge when elimination is being envisaged in a given setting.
Cost Effective Real-Time PCR Assay for the Detection of Occult Hepatitis B

Background: Occult Hepatitis B (OBI), the presence of HBV DNA with undetectable surface antigen (HBsAg), is undetectable using standard serological assays and can be missed during routine blood donations screening. Molecular OBI screening is critical, however, expensive when using commercial HBV viral load assays which is not practical in most low resource settings. We evaluated a less expensive in-house real time PCR assay for detecting OBI.

Methods: We tested 80 samples from 54 OBI positive and 26 HBsAg positive individuals from a cohort of HIV infected adults initiating HAART in Botswana. HBV DNA levels were determined using COBAS® AmpliPrep/COBAS® TaqMan® HBV Test, version 2.0 (Roche Diagnostics, Mannheim, Germany) with a limit of detection of 20 IU/ml. For the in-house (IH) assay, samples were extracted using QIAamp® DNA Kit (Qiagen) and detected using ABI 7500 Real Time PCR System using TaqMan® Universal PCR Master mix (IH-TaqMan) and the Kapa Probe Fast qPCR Kit Master mix (IH-Kapa). We estimated agreement and compared sensitivity of the IH assay to the commercial assay in detecting HBV DNA.

Results: The amplification rate using IH-Kapa was 83.8% (67), compared to 58.8% (46) using the IH-TaqMan. A total 51.2% (27/54) of the occults were undetected with the IH-TaqMan whereas 13% were undetected using IH-Kapa. Of the 8 samples undetected by the commercial assay, IH-Kapa detected (6/8, 75%) and the IH-TaqMan detected (3/8, 37.5%). Agreement between IH-Kapa and the commercial assay was 78.8%. IH-Kapa had a sensitivity of 87% whereas the IH-TaqMan assay had 59.7%. The estimated cost for the commercial assay ($65/test) is at least twice the price of IH-TaqMan and at least three times the cost of IH-Kapa ($20/test).

Conclusion: The IH-Kapa is more accurate and less expensive for OBI detection compared to IH-TaqMan and commercial assays. The potential use of the IH-Kapa method for OBI detection warrants further investigation.

Availability of Viral Load (VL) Testing and Antiretroviral Therapy (ART) Switch Practices

Background: The World Health Organization recommends VL testing to monitor ART. Currently, access to VL remains limited. Test results might be underused for patient management, resulting in incorrect switch practices and poor treatment outcomes. The actual utilization of VL results for switch practices in Africa is poorly documented.

Methods: We retrospectively analysed HIV-1 patients initiating first or second-line ART and followed in the Pan-African Studies to Evaluate Resistance (PASER 2007-2015). Treatment failure was assessed at each visit based on clinical, immunological and/or virological criteria depending on accessibility to routine VL and CD4 testing in 13 participating clinics from 6 countries. Study VL (sVL) determined at yearly intervals and at time of switch was used to retrospectively validate documented reasons for switch. Switch was ‘late’, when no switch occurred after 2 consecutive virological failures (VF) results (sVL>1,000 HIV-RNA copies/mL) and ‘unnecessary’ when occurring during viral suppression (sVL<1,000 HIV-RNA copies/mL). Factors associated with time-to-switch and necessary switch after 2 consecutive VF results were identified using Cox proportional-hazards models adjusted for study clinics.

Results: Overall, 3,007 patients were followed for 99,331 person-months. Of 2,420 patients with ≥2 sVL results, 1,995 (82.4%) were virally suppressed at all follow-up visits and 273 (11.3%) had 2 consecutive VF results. Based on sVL, 41.3% of a total of 155 switches were unnecessary, and 8.1% of patients experienced late switches. Faster switches were experienced by patients with longer follow-up [HR=1.03 (95% CI=1.01-1.05); per 1 month increase] and from 3 clinics (one wit no on-site VL) [SA-1: HR=5.72 (95% CI=1.47-22.3); ZA-3: HR=2.93 (95% CI=1.11-7.73); UG-1: HR=2.85 (95% CI=1.29-6.27)]. Use of VL criteria in clinician’s decisions (but not on-site VL) correlated with necessary switches.

Conclusion: Interventions to increase clinician’s demand for VL and test result utilization in the clinical management of short and long-term ART are needed to accompany access to VL and ensure best switch practices.
In-country Molecular Characterization of Ebola Virus Evolution During the West African Outbreak

**Background:** Between April 2014 and January 2016, West Africa witnessed the largest Ebola outbreak, responsible for over 28,599 cases and more than 11,299 deaths. The first detailed in depth characterisation of the Ebola virus genome from RNA of Ebola positive samples was carried out by pre-dominantly institutes in the developed world. However, as the outbreak progressed new technological developments and the implementation of research in West Africa provided significant advances in the characterisation of Ebola in West Africa.

**Methods:** RNA extracted from blood samples obtained for diagnostic purposes and processed by the European Mobile Laboratory, which deployed to Guinea in April 2014 were sent to the University of Liverpool and RNASeq was conducted. Measuring the rate of evolution of Ebola virus was crucial to determine whether multiple zoonotic transmissions occurred and whether potential therapeutics were going to be effective. As the outbreak progressed, a new highly portable sequencer - MinION became available. This was deployed in country providing real-time molecular epidemiology.

**Results:** The MinIon sequencing applied in this study are versatile and could potentially be applicable to understanding the pathogenesis of various infectious diseases in real-time at the epicentre of an outbreak. High resolution approaches can elucidate the outcome of an infection, in the case of Ebola, this is the interlinking between genome evolution and host response.

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Investigation and Response of Pertussis Outbreak in a Rural Community, Kano, Nigeria, December 2013

**Background:** Globally, only 1 to 2 percent of pertussis are reported, and in 2014, there were about 140,000 cases and 89,000 deaths. However, vaccine preventable diseases account for approximately 22% of child mortality in Nigeria. On 18th December 2013, cases of pertussis were reported in Bunkure local government area of Kano State, Nigeria. We investigated to establish the presence, identify risk factors and agent for a pertussis outbreak and propose recommendations for control.

**Methods:** A case was defined as cough illness lasting 2 weeks with either paroxysms of cough, inspiratory “whoop” and or post-tussive vomiting without other apparent cause, between 9th to 23rd December, 2013 in Bunkure, Kano. We conducted an unmatched 1:3 case control study in the community using interviewer administered questionnaires. Data on demographic, clinical and risks factors were collected and analysed using Epi-info and SPSS. Ten nasopharyngeal swabs were sent for laboratory confirmation.

**Results:** We identified 96 cases with no case fatality, with an attack rate of 1.5%; highest among children less than 1 year, 30 % of blood samples tested positive for Bordetella pertussis. The factors associated with the occurrence of pertussis were children less than 5 years of age (OR=2, CI=1.3-4.5), mother’s unemployment status (OR= 2, CI= 2.4-9), more than 2 people living in a room (OR= 4, CI= 1.8-9), history of contact (OR= 2, CI= 1.2-3.6) and distance to vaccination centres of more than 2 km (OR= 2, CI= 1.4-04.3).

**Conclusion:** Mother’s proximity to vaccination centres, illiteracy and poverty are determinants of pertussis infection among children. Implementation of health education can mitigate pertussis infection in the community.
Enhancing Biosafety and Biosecurity Across National Laboratory Systems

Background: Post Ebola, significant gaps were revealed in laboratory systems and their ability to safely work with highly infectious pathogens. As a result, in the United States (US) and globally, significant investments were made to enhance Biosafety and Biosecurity which are key components of a strong national laboratory system. Across the US and in many countries, the Association of Public Health Laboratories (APHL) has provided extensive support to promote safe and secure laboratory practices. Globally, APHL is collaborating with partners to share model practices, conduct biological safety cabinet training, perform risk assessments and better integrate hospital or clinical laboratories with governmental public health laboratories.

Methods: In 2015, APHL formed a Biosafety and Biosecurity Committee and charged the group with providing leadership and guidance on policies and practices which impact biosafety and biosecurity in US state and local governmental laboratories. Comparably, in the international arena, APHL collaborated with its partners to foster a culture of leadership on safety, provide training and other tools to assist with strengthening laboratory safety and security.

Results: APHL will discuss its findings to strengthen biosafety and biosecurity, focusing on the value of: (1) Biosafety and Biosecurity Committee comprised of experts from various types of laboratories; (2) Community of Practice for Biosafety Officers; (3) Repository of Biosafety and Biosecurity tools and practices; (4) Collaborations with partners to design and deliver a core curriculum on biosafety and biosecurity; and (5) Public Policy initiatives to promote the importance of biosafety and biosecurity.

Conclusion: As countries recruit new talent and work to strengthen their national laboratory systems, fostering a culture of leadership on biosafety and biosecurity within laboratories will be of utmost importance to ensure safe lab operations, reduce the risk of occupational exposures and prevent the misuse of pathogens. This session will focus on sharing practices and resources for enhancing biosafety and biosecurity.

The First Mile of e-Surveillance

Background: The Global Health Security Agenda extends the IHR framework and requires timely capture and transmission of surveillance data. While countries have established tools to aggregate, analyze and present such data, challenges remain with data capture and transmission to the central level. Gaps in the First Mile of surveillance mirror those of the Last Mile in logistics, including human resources, power and connectivity, roads and weather. The following describes an evolution of free and open-source methods we have successfully explored to capture offline, and reliably transmit field data for near real-time decision support.

Methods: In 2012, we assessed Ugandan laboratory logistics using LimeSurvey with a self-hosted server stack on each canvasser’s notebook. Exported responses were periodically e-mailed and aggregated centrally. In 2014, we deployed the same methods on mobile devices, with extended battery life and reduced opportunity costs. In 2015, we conducted a survey of the emergency response capacity in Sierra Leone using Open Data Kit, an Android application to retrieve blank forms from a server for offline completion and subsequent upload. The kit needs third-party tools for form generation and server storage. Since mid-2015, we have field-tested wq, a server application that deploys questionnaires as offline-enabled web applications through standard browsers.

In all cases, end-to-end verification was done by double entry on paper forms.

Results: The Uganda survey proved that reliable electronic data capture and transmission is feasible using offline-enabled notebooks. Battery life was limited, but extended by hours on mobile devices. Each device requires installation of the server stack.

In Sierra Leone, Open Data Kit showed, in comparison, a less intuitive interface, limited question types, reduced scalability and random data losses, affecting 10% of form uploads. A less active user community resulted in slow bug fixes.

wq was the most streamlined solution, ready to run on ordinary mobile devices, hosting the entire data cycle from canvassing to aggregation and interfacing.

Conclusion: Unreliable power and internet demand offline-enabled mobile applications with verified data transmission to the central level. Our work highlights a promising trend towards simple, reliable, and free open-source technologies that may address gaps in sample and logistics tracking, antimicrobial resistance monitoring, HMIS and community care data submissions, and M&E scenarios.
Emerging Trends of Antimicrobial Resistance in Africa

**Background:** Multidrug-resistant tuberculosis (MDR-TB) remains a clear threat to TB control. There is a paucity of data on DR-TB for many countries especially in sub-Saharan Africa. The study was undertaken to measure the prevalence of DR-TB, including MDR-TB from West Africa.

**Methods:** Mycobacterial isolates were obtained from consecutive new and previously treated TB patients from Burkina Faso, Ghana, Guinea-Bissau, Mali, Nigeria, Senegal, Togo, and The Gambia from December 2012 to December 2014. Phenotypic Drug Susceptibility Testing to first and second-line anti-TB drugs were performed using BACTEC MGIT 960 system.

**Results:** Viable isolates from a total in 44% (416/950) new and 56% (534/950) previously treated TB patients were included. HIV results were available for 599 (63%) with estimated HIV-TB co-infection of 21% (95% CI: 18.2-24.9%). Pooled estimate of any DR-TB prevalence among new TB patients was 20% (95% CI: 16.4-24.4%) while for MDR-TB this was 6% (95% CI: 4.1-9.0%). Among previously treated TB patients, these were 53% (95% CI: 48.3-56.9%) and 34% (95% CI: 30.1-38.3%) respectively. Significant factor for the development of MDR-TB was the history of previous ant-TB treatment (Crude OR = 0.13; 95% CI: 0.08-0.20; P < 0.001). Mono-resistance was detected in 12% (95% CI: 10.2-14.5%) with the highest resistance to streptomycin 6% (95% CI: 4.8-7.9%). Pooled estimate of pre-XDR-TB prevalence rate among MDR-TB patients was 21% (95% CI: 15.2-26.9%). Estimated resistance to ofloxacin, kanamycin, capreomycin and kanamycin and capreomycin were 7% (95% CI: 3.5-10.9%), 2% (95% CI: 0.6-5.1%), 9% (95% CI: 5.8-14.5%), and 3% (95% CI: 0.8-5.8%) respectively.

**Conclusion:** The reported prevalence of MDR-TB and pre-XDR-TB are high compared to WHO estimates. Resistance to streptomycin may indicate a high risk failure for WHO standard regimen. MDR-TB patients with resistance to either the fluoroquinolone or injectables may have suboptimal response, thus the need for continuous surveillance of TB resistance.
Molecular Analysis of Rifampicin Resistance Mutations in Mycobacterium Tuberculosis and Nontuberculous Mycobacteria from Zimbabwe by rpoB Gene Sequencing

**Background:** Infection by Mycobacterium tuberculosis (Mtb) and nontuberculous mycobacteria (NTM) is now a public health threat in most countries in this era of HIV/AIDS. The problem has been worsened by the emergence of genetic resistance to some of the drugs used to treat tuberculosis and nontuberculous mycobacteriosis. The aim of the study was to investigate the prevalence of rpoB gene mutations in Mtb and NTM isolates from Zimbabwe.

**Methods:** This was a retrospective study. The study was conducted in Zimbabwe in 2015 using archived Mtb and NTM isolates previously isolated throughout the country during the National TB Survey of 2014. Genomic bacterial DNA was extracted from the archived Mtb and NTM isolates. The 81 bp region of rpoB gene that contains rifampicin drug resistance mutations was amplified by polymerase chain reaction. PCR products were sequenced and sequences analyzed using bioinformatics tools.

**Results:** RpoB mutations in 30 Mtb and 28 NTM isolates were analyzed. Out of the 30 Mtb isolates, 19 (63.3%) had at least one codon mutation in the rpoB gene that resulted in a change of amino acid. The commonest mutations were on codons 531 (S>L) and 526 (H>D) and were present in 20% and 10% of the isolates, respectively. The other 11 Mtb isolates (36.7%) did not have any mutations. Interestingly, none of the NTM isolates had any mutations in the rpoB protein.

**Conclusion:** Genetic mutations that code for rifampicin drug resistance are only common in Mtb, but not in NTM in Zimbabwe.

Antibiotic Resistance Studies and Molecular Investigation of Sulfamethoxazole on Salmonella Species Isolated from Diarrhoeal Stools of Some HIV Patients in Kaduna Nigeria

**Background:** Antibiotic resistance is a growing phenomenon and has emerged as a serious health hazard in both human and veterinary medicine, worldwide. There is an increasing evidence on the abuse of antibiotics which has led to development and widespread of antibiotic resistance between and within species of bacteria. Susceptibility testing remains an important diagnostic tool in the selection of effective antimicrobial drugs for Salmonellosis treatment.

**Methods:** A total of three hundred and ninety stool samples of HIV seropositive individuals were investigated for the presence of Salmonella using enrichment (selenite F broth) and selective (MCA, SSA and XLD) media. Biochemical Identification tests were carried out using both the conventional and rapid kit tests (Microgen Bio products identification system). Polyclonal anti- sera was used for the slide agglutination tests. The standardized Kirby-Bauer technique was used for the antibiotic susceptibility testing with thirteen antibiotics. Sulfamethoxazole resistance genes were investigated using some selected primers in a PCR-based assay.

**Results:** Three Salmonella typhi and eleven Salmonella typhimurium were isolated. Increased susceptibility of Salmonella typhimurium to chloramphenicol was observed where as Salmonella typhi was completely susceptible. Seventy three percent (73%) of Salmonella typhimurium isolated showed resistance to ampicilin and tetracycline respectively but Salmonella typhi was completely resistant. Three(21.4%) of Salmonella typhimurium exhibited multi drug resistance (MDR) while only 1(9.1%) Salmonella typhimurium exhibited the ACSSuT penta- resistance pattern typical of Salmonella typhimurium DT 104.

**Conclusion:** Ceftriaxone and ampicilin showed effective antimicrobial activity against the Salmonella serovars hence the drugs of choice for salmonellosis treatment. Phenotypic resistance observed by disk method was genetically confirmed by the PCR method for sulfamethoxazole. This suggests the reliability of PCR in molecular epidemiological studies. The emergence of MDR Salmonella typhimurium is worrisome, with respect to sulfamethoxazole which is used in the prophylactic medical management of opportunistic infections within the study group.
Methicillin Resistant Staphylococcus Aureus with GenoType MRSA among HIV Positive Pediatric Patients in Northwest Ethiopia: A Cross Sectional Study Design

Background: Increasing evidence suggests that Methicillin resistant Staphylococcus aureus (MRSA) infections are becoming more prevalent throughout the HIV infected community. This study was aimed to determine the prevalence of colonization by MRSA species among HIV positive pediatric patients in the Amhara National Regional State, Northwest Ethiopia.

Methods: Participants who attended the clinic from December 2013 through April 2014 were invited to participate in the study. Eligible participants were HIV-infected <18 years of age, receiving medical care at the Paediatric HIV clinics of Felege Hiwot, Dessie, and Debretabor Referral Hospitals. From each participant specimen for S. aurous culture were collected from the anterior nares, the skin of the back of the wrist and the perineum using sterile broth moistened swabs. Swabs were cultured and read according to standard microbiologic procedures. The GenoType MRSA VER 3.0 was used for characterization of S. aurous and S. epidermidis strains among 202 culture positive patients by detecting methicillin resistance-mediating mecA & mecC genes and the bicomponent cytotoxin virulence factor Panton-Valentine leukocidin (PVL) were detected. Data was analyzed by descriptive and logistic regression model using SPSS version 20. The P value of <0.05 was considered as statistically significant.

Results: Among 202 culture positive patients, 126 (62.4%) were also confirmed by GenoType MRSA as S. aurous and of these, 47(23.3%) and 15(7.4%) were mecA and Panton-Valentine leukocidin (PVL) were detected. Data was analyzed by descriptive and logistic regression model using SPSS version 20. The P value of <0.05 was considered as statistically significant.

Conclusion: High prevalence of pathogenic MRSA strains among HIV positive pediatric patients in the study area. From the PVL gene detection, most of MRSA type was HA MRSA. Hence, strict hygienic approaches by all healthcare workers in hospitals should be implemented to reduce the chance of hospital acquired MRSA infections. In addition, screening and treatment of MRSA for HIV positive pediatric patients is recommended.

Determining Vancomycin Susceptibility in Methicillin-Resistant Staphylococcus Aureus Isolates from Clinical Specimens Obtained at a Tertiary Academic Hospital

Background: Methicillin antibiotic is used against susceptible strains of Staphylococcus aureus, whereas vancomycin is used for methicillin-resistant Staphylococcus aureus (MRSA). However, vancomycin minimum inhibitory concentrations (MICs) between 0.5µg/ml and 1µg/ml are often associated with treatment failure in patients with MRSA infections. This study aimed at determining and comparing vancomycin MIC trends in MRSA isolates.

Methods: Vancomycin MICs for ninety-one isolates were determined using the standard Etest method. The macro Etest and Etest GRD methods were used to determine vancomycin hetero-resistant strains from 50 strains with MICs ≥ 0.5µg/ml. Pulsed Field Gel Electrophoresis was used to identify the clonal relatedness of 38 strains with vancomycin MICs ≥ 0.5µg/ml.

Results: Results for the standard Etest ranged between 0.25 and 1.5, where 4/91 (4.40%) samples had an MIC of 0.25, 33/91 (36.26%) had an MIC of 0.38, 46/91 (50.55%) samples had an MIC of 0.5, 3/91 (3.30%) samples had an MIC of 0.75 and 2/91 (2.20%) had an MIC of 1.5 while three showed no growth. No hetero-resistant strain was detected by both the Etest macro method and the Etest GRD method. Three major and five minor clusters at a 75% cut-off value were identified by PFGE. The three major clusters contained a total of twenty strains, two clusters containing seven strains each and one cluster containing six strains. Nineteen of the twenty strains were from infants within the age range of 0 days to 1 month while one strain was from a 24yr old.

Conclusion: Although methicillin resistance was detected in these strains, they were all susceptible to vancomycin, implying that this drug is still effective in patients attending the Steve Biko Academic Hospital; however, since hetero-resistance to vancomycin in Staphylococcus aureus is a gradual process, it is important to carry out prospective cohort studies in order to monitor vancomycin efficacy overtime.
ORAL SESSION 1.4

STRATEGIES FOR SCALING UP DIAGNOSTICS

DATE: Tuesday, 6 December
TIME: 11:00 – 12:30
ROOM: CTICC 2.6
CO-CHAIRS: Wolfgang Preiser, Stellenbosch University, South Africa and Erin Rottinghaus, Centers for Disease Control and Prevention, United States

11:00

Bernard N. Muture
Preventive and Promotive Health, National Public Health Laboratory Services, Nairobi, Kenya.

National Scale-up Trend and Test Outcomes for Viral Load Testing in Kenya

Background: In 2015, Kenya had an estimated 1,380,929 people living with HIV of whom 818,087 were on anti-retroviral therapy (ART). In June 2014, the country adopted routine viral load (VL) testing for treatment monitoring. Specimens were sent from ART sites across 47 Counties to seven reference laboratories for VL testing. By end of 2015, there were 31 VL testing equipments with an annual testing capacity of 1,443,454. We describe herein the access to VL testing, VL testing trends from June 2014 through December 2015 and associated challenges.

Methods: We analyzed data from the national VL database for the period June 2014 to Dec 2015. Data variables included ART facilities referring specimens, reason for test request, sample type, number of viral load tests performed, test results, specimen rejection turnaround time (TAT) and machine utilization.

Results: Viral load testing rose from 12,040 samples in 2014 to 637,158 in 2015 as referring ART sites increased from 713 to 3879. Routine viral load was the justification for test requests for (73.9%) of the samples. The proportions of specimen types collected at ART sites were 61.3% frozen plasma, 29.5% dried blood spots (DBS) and 9.2% whole blood in Ethylenediaminetetraacetic acid (EDTA) tubes. Overall, 82.4% of samples had <1000 copies/ml. Viral suppression rates were 68.3% among children and 84.2% among adults. Children <2 years had much lower viral suppression rates (59.5%). The median turnaround time between specimen collection and receipt at testing lab was 6 days, 23 days between receipt to testing and 2 days from test to result dispatch. A total of 14,586 samples (1.9%) were rejected. County VL coverage ranged from 20% to 90%. Machine utilization rates were 44% by end of 2015.

Conclusion: The Country has successfully scaled up viral load testing but gaps exist in VL testing uptake and suppression rates in some ART sites and counties. Pooling of samples at ART sites and cumulative testing backlogs have been a challenge for timely test results.

11:10

Grace E. Kushemererwa
CPHL, Ministry of Health Uganda, Kampala, Uganda.

Evaluation of the Stability of DBS Samples for HIV-1 Viral Load Testing in Uganda

Background: WHO recommended viral load as the preferred test for monitoring patients on ART. Dry blood Spot (DBS) sample is the preferred sample resource limited setting for Viral Load (VL) testing because of the ease transportation and does not require cold chain. However there limited information on DBS stability for reliable VL results either at room temperature or at fridge. There is need to determine the duration of stability of DBS samples at room and 2-8oC for VL testing program.

Methods: A cross sectional study is being conducted on 600 Remnant viral load DBS samples received from health facilities in Uganda at CPHL. Samples were stratified in 3 groups. 75 samples were stored at room temperature and 75 samples stores at 4-8oC for each of the periods; 4, 8, 12 and 24 weeks and retested for HIV viral load (outcome) using the Abbott Real time HIV-1 1ml DBS protocol Version 0.04. Data analysis was done using STATA 13. Student T test was computed to determine the difference between Viral Load at the 2 time points.

Results: Our preliminary results show that 51% (20/39) and 88% (22/25) samples whose viral load was below 2000cp/ml at 2 weeks were undetected (target not detected) at 4 weeks after storage at fridge and room temperature respectively. For samples that had detectable viral load after storage, there was a log difference of 0.16 log copies and p<0.0001 and a log difference of 0.16 log copies and p<0.0001 for the fridge and room temperature respectively.

Conclusion: Preliminary Results indicate that DBS samples are not stable after 4 weeks of storage for viral load below 2000cp/ml. However the difference in log copies is of no clinical significance for those with detectable viral load. Complete results will lead us to conclusive deductions.
**HIV Dried Tube Samples: A Novel Approach for HIV Viral Load EQAs Provision in Both Laboratory and Community Settings**

**Background:** Laboratory and community-based HIV viral load testing to monitor the efficacy of treatment of HIV infection is viewed as an important component in the delivery of quality health care in resource-limited settings. Whereas testing sites at the community level are encouraged to participate in External Quality Assessment Schemes (EQAS), access to traditional EQAS is difficult due to specialised sample handling requirements, overall cost or lack of infrastructure. NRL implemented a cost-effective HIV viral load EQAS (DTSI435) appropriate for both laboratory and community testing and compatible with a range of viral load assays.

**Methods:** Samples in the DTSI435 were produced as described by the CDC in 2013. Sample stability was performed over 52 weeks at four temperatures. The validated DTSI435 was released as two distributions containing five samples each. The DTSI435 were shipped to 13 countries in the African Region and Australia. Results were submitted to NRL using an internet-based application (OASYS, OneWorld Accuracy, Canada) and analysed by comparing results submitted for the same assay platforms (known as peer groups).

**Results:** Of the participants that received the DTSI435, fifteen participants submitted results for both distributions, one of which was a community testing site. Most participants reported similar performance between the two test events (Event 1: Median: 4.19, Range: 3.72-4.47, Event 2: Median: 4.06, Range: 3.93-4.34). Participants reported results for three commercially available assays (Abbott RealTime HIV-1 RNA PCR, Roche COBAS AmpliPrep/COBAS TaqMan HIV-1 Test V2.0 and Cepheid GeneXpert HIV-1 Viral Load) and two in-house designed assays. The reported viral loads were also similar between each of the different assays.

**Conclusion:** While the majority of participants in this study were laboratory-based, the community-based testing site performed similarly to the laboratories. This demonstrates that with correct training and use of EQAS, equivalent laboratory and community-based HIV viral load testing could be realised.

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**Clinical Performance of the Roche Free Virus Elution Protocol for HIV-1 Viral Load Testing on Dried Blood Spot**

**Background:** Dried blood spots (DBS) have been proposed as an alternative to plasma for HIV viral load (VL) monitoring in resource-limited settings. The previous version of the DBS VL protocol developed by Roche had low specificity in detecting virologic failure (VF) due primarily to cell-associated viral nucleic acid. The Free Virus Elution (FVE) Protocol was developed by Roche to improve assay performance.

**Methods:** Between Oct-Dec 2015, EDTA blood samples from plasma VL testing among patients on antiretroviral therapy in Côte d’Ivoire were used to prepare DBS on Whatman 903 cards. DBS specimens were stored at room temperature and tested with the Roche FVE protocol within 3 weeks. VL results obtained from DBS testing were compared to reference plasma VL values. A 0.3 log10 correction factor was added to DBS VL measurements, as FVE only measures the plasma component of whole blood.

**Results:** Of the 434 plasma-DBS pairs tested, using the WHO threshold of 1,000 copies/mL, DBS demonstrated 86.2% sensitivity (95%CI: 80.9%-90.4%) and 99.5% specificity (95%CI: 97.4%-100.0%) for detecting VF compared to plasma. The correlation between plasma and DBS VL was strong (R²=0.83) among samples with detectable VL. DBS VL was on average 0.43 log10 copies/mL lower than plasma after volume correction. When the threshold for VF for DBS was reduced to 400 copies/mL, the sensitivity of the FVE protocol increased to 93.3%, and specificity was 98.6%.

**Conclusion:** The correlation between DBS and plasma VL was significant. However, a reduced sensitivity of the FVE protocol was noted, which could be due to a lower input volume of blood sample and a suboptimal extraction efficiency. Our findings suggest the performance of the Roche DBS VL protocol would be considerably improved if either a bias correction factor was applied to the software calculations or if the cut-off value of FVE DBS VL for VF was reduced to 400 copies/mL.
Sindiswa Dlamini, Tesfay A. Nigusse, Gugu P. Maphalala, Anafi Mataka, Nomcebo Phungwayo, Rogers Kisame, Pido Bongomin

1. Swaziland Health Laboratory Services, Mbabane, Swaziland.
2. ICAP in Swaziland, Mbabane, Swaziland.
3. Laboratory, University Research Co.LL, Mbabane, Swaziland.

Dried Blood Spot Specimens for HIV-1 Viral Load Determination Using COBAS® AmpliPrep/COBAS® TaqMan® HIV-1 Test, v2.0 in Swaziland

Background: In 2015, Swaziland adopted routine HIV-1 viral load (VL) monitoring as a standard of care for the Anti-retroviral therapy (ART). Currently plasma, is used as a gold standard specimen for VL. However, separation and handling of plasma specimens is technically demanding and require cold chain facilities. Swaziland is looking into dried blood spots (DBS) as alternative specimen type. We present the preliminary results of VL results on DBS compared to paired plasma specimen.

Methods: A cross-sectional study at the ART clinic and VCT center of Mbabane government hospital was conducted between Dec, 2015 and April, 2016. VL results obtained by free virus elution method from both Venous Blood DBS and finger-prick DBS were compared to EDTA plasma VL results of same consenting patients measured using the COBAS® AmpliPrep/COBAS® TaqMan® HIV-1 Test, v2.0.

Results: Paired plasma & DBS (both venous & finger-prick) of 183 (145 pre-ART and 38 ART patients) specimens were obtained and tested. Plasma VL was detectable in 154, was below detection limit in 24 (<20 copies/ml), and non-detectable in 5 patients. Linear regression analysis for paired plasma and venous DBS VL resulted in a strong correlation ($R^2=0.91$) and for paired plasma and finger-prick DBS VL ($R^2=0.85$). Both venous and finger-prick DBS had strong correlation ($R^2=0.87$) and an almost perfect agreement (kappa=0.849, $P=0.000$) of reproducibility. Taking plasma VL of 1000 copies/ml as a cut off value, the sensitivity and specificity was calculated to be 81.3% and 100% for venous DBS and 76.1% and 100% for finger-prick DBS. The VL levels were higher in plasma than in both venous DBS (mean difference ± standard deviation [SD]) of 0.55 ± 0.23log10 copies/ml and finger-prick DBS (0.80 ± 0.47log10 copies/ml). All results from both venous & finger-prick DBS were within 1.96SDs (2.3 to 6.5log10 copies/ml) of plasma VL levels. Five venous (4.5%) & twenty finger-prick (18.7%) DBS samples yielded >1 log10 copies/ml difference between plasma VL levels.

Conclusion: Venous or finger-prick DBS are comparable to plasma VL test results. Therefore, DBS gives Swaziland an alternative means for expansion of VL testing services to more peripheral health facilities which otherwise do not have access to regular sample transportation, trained health workers or infrastructure for collection of whole blood and plasma processing.

Diagnostic Accuracy Validation of Abbott m2000 for HIV Viral Load Testing on DBS Samples; Malawi Pilot Study

Background: The strict requirements for storage and transport of plasma samples from clinics to laboratories for HIV viral load (VL) testing, limits access to HIV VL monitoring among patients on antiretroviral therapy (ART) in resource-limited settings. Dried blood spots (DBS) provide an alternative to plasma because there are no cold chain requirements and DBS can be stored at room temperature for up to 3 months. The Malawi Ministry of Health has adopted the Abbott m2000 system (Abbott) as the national standard for VL testing. As part of the switch from bioMérieux NucliSENS EasyQ/Easy Mag (NucliSENS) to Abbott, we did a study in Thyolo District Laboratory in Malawi to assess the diagnostic accuracy of the Abbott m2000 system for HIV VL testing on DBS samples.

Methods: EDTA venous blood was collected from 412 patients on ART in August and September 2015, and processed into DBS and plasma samples. Plasma samples were tested on NucliSENS, and DBS samples were tested on Abbott and NucliSENS. The diagnostic accuracy of DBS VL at a threshold of 1,000 cells/ml was assessed using the plasma VL result as the reference.

Results: Of the 412 study participants, 257 (62.4%) were females. DBS VL measured on Abbott had a sensitivity of 88.2% (95% CI: 72.5 – 96.7%) and specificity of 91.1% (95% CI: 87.8 – 93.7%) compared to plasma NucliSENS. DBS VL measured on NucliSENS had a sensitivity of 91.4% (95% CI: 76.9-98.2%) and specificity of 92.0% (95% CI: 88.8 – 94.6%) compared to plasma NucliSENS. Assuming a prevalence of VL >1,000 copies/ml of 10%, DBS had a positive predictive value (PPV) of 52.4% and negative predictive value (NPV) of 98.6% on Abbott, and a PPV of 55.9% and NPV of 99.0% on NucliSENS.

Conclusion: DBS had satisfactory diagnostic accuracy, making DBS samples suitable for VL testing on Abbott.
Comparison Between Hemocue Glucose Meters in Use at the Nairobi Hospital Wards and the Central Laboratory Auto Analyzer

**Background:** The availability of test results near the patient has increased the demand for point of care testing significantly. Although initially designed for home-based monitoring, point of care glucose testing is currently widely used in various units in hospitals.

There are concerns about reproducibility of point of care glucose tests with possible errors arising from end-users or inherent in the glucose meters. Such errors may affect diabetes management exposing patients to risks of poor glycaemic control or hypoglycaemia.

**Methods:** Three pools of blood samples with glucose values in hypoglycaemic, euglycaemic and hyperglycaemic ranges analyzed on 20 Hemocue glucose meters in use in emergency and critical care units at and wards at TNH. The same samples were also used for glucose estimation in the central laboratory on the Abbott Architect auto analyzer which served as the reference method.

To minimize errors, all analyses were done on the same day by an experienced technologist. The differences between Hemocue and Architect results were calculated using MedCalc 13.2.2 statistical software (Medcalc software bvba Ostend, Belgium). Comparison of the two methods was done using Bland and Altman graphs and Passing-Bablok regression.

**Results:** Plasma glucose from the three pools (A, B and C) measured 1.4 mmol/l, 4.82 mmol/l and 25.1 mmol/l respectively on the Architect c8000. Results from the 20 Hemocue showed a negative bias with average differences being -0.05, -0.58 and -3.2 mmol/l (p<0.0001) for pools A, B and C respectively (Figure 1). The Hemocue glucose concentrations were consistently lower than the Architect c8000 in all the three levels of testing. Furthermore, the difference increased with increasing glucose concentrations. The differences for euglycaemic and hyperglycaemic samples exceeded 10% of the Architect values. However, apart from a few outliers the results from the 20 Hemocue machines correlated well.

**Conclusion:** Blood glucose estimated on the Hemocue point of care machine are lower than those obtained from the central laboratory, with the biggest variance in hyperglycaemic sample. This variance should be considered when the two methods are used interchangeably in the clinical setting, and when clinical decisions are being considered based on point of care glucose results.
Comparison of Fructosamine and Glycated Haemoglobin (HbA1c) Results in Diabetic Patients at Inkosi Albert Luthuli Academic Hospital (IALCH)

Background: Haemoglobin (HbA1c) is recommended for the long-term glycaemic control in diabetic patients and evaluates control over approximately 3 months. Fructosamine is used as a substitute in situations where HbA1c cannot be reliably measured (rapid changes in glycaemia or red blood cell abnormalities). The aim of this study was to compare fructosamine and HbA1c values in the same diabetic patients in order to assess the degree of discordance.

Methods: The audit included samples received at NHLS chemistry laboratory at Inkosi Albert Luthuli Academic Hospital (IALCH) for both fructosamine and HbA1c in March 2015. Fructosamine samples were analyzed on Siemens Dimension EXL using Colorimetric assay and HbA1c on the Tosoh HPLC G8. Results for fructosamine and Hba1c were then classified as per reference intervals: fructosamine (202-282 controlled; >283 poorly controlled), HbA1c target levels (<7.5 controlled; >7.5 poorly controlled), and then compared.

Results: One hundred and twenty-four individuals had both tests performed on the same day during period of review. The correlation of HbA1c with fructosamine has an r value of 0.82 which is comparable to other studies with r ranging from 0.55 to 0.88. On analysis of classification of well vs poor control the findings were as follows: poor glycaemic control: 73 patients were identified as having poor control with HBA1c and fructosamine. Acceptable control: 36 individuals were identified as well controlled by both HbA1c and fructosamine. Discrepant patients: An additional 11 patients were classified as poorly controlled with HbA1c while their fructosamine was normal. Four patients had an elevated fructosamine with a normal HbA1c.

Conclusion: Our findings indicate that assessment of glycaemic control between fructosamine and HbA1c is comparable amongst the general diabetic population and suggests that fructosamine should only be used in those patients with conditions suspected to affect HbA1c results.

Prevalence of Diabetes and Abnormal Glucose Tolerance in Subjects with Tuberculosis in a South African Urban Center

Background: Sub-Saharan Africa has a major TB burden that is driven by the high prevalence of HIV. This same region is also experiencing an increasing prevalence of type 2 diabetes mellitus. Type 2 diabetes has been associated with an increased incident risk of TB, suggesting that diabetes may be another driver of the TB epidemic. The aim of this study was to determine the prevalence of diabetes in TB patients using glycated haemoglobin (HbA1c) and to compare the performance of laboratory-based with point-of-care (POC) HbA1c measurement.

Methods: This was a cross sectional study of 325 patients. Screening was done using point of care (POC) and laboratory HbA1c methods with diabetes confirmed by an oral glucose tolerance test (OGTT) on those with HbA1c ≥ 6.00 %. Multivariate regression analysis (MVR) was carried out to determine predictors of HbA1c.

Results: The mean laboratory-derived HbA1c was significantly higher than the mean POC HbA1c (p=0.007). Overall agreement between POC and laboratory HbA1c at 6.50% was 94%. Of eighty-three subjects who had OGTT, 2 (2.40%) were diagnosed with type 2 diabetes mellitus, 3 (3.60%) with impaired fasting glucose (IFG), 15 (18.1%) with impaired glucose tolerance (IGT). Twelve (14.5%) had an HbA1c ≥6.50% using POC HbA1c and 21 (25.3%) using laboratory HbA1c. In multivariate regression analysis, age and weight were positively associated with both laboratory and POC HBA1c while duration of TB treatment was negatively associated with both.

Conclusion: HbA1c levels drop with increased duration of TB treatment suggesting that the optimal time for screening for diabetes in this population is at least 6 months from that at which TB was first diagnosed.
Assessment of Renal Function and Electrolytes in Patients with Thyroid Dysfunction, in Addis Ababa, Ethiopia: A Cross Sectional Study

Background: Studies demonstrated that abnormal thyroid functions may result in decreased or increased kidney size, kidney weight, and affect renal functions. In this regard, studies on the association of abnormal thyroid functions and renal function tests are scarcely found in Ethiopia.

Methods: Cross sectional study was conducted from March 21/2015-May 27/2015 at Arsho Advanced Medical Laboratory. During the study period, 71 patients with thyroid dysfunction were eligible, and socio demographic data collected by structured questionnaire. Then blood sample was collected for thyroid function tests, renal function and blood electrolyte analysis. The collected data was analyzed by SPSS version 20. ANOVA and binary logistic regression were employed to evaluate the mean deference and associations of thyroid hormone with renal function and electrolyte balances.

Results: Among the renal function tests, serum uric acid, and creatinine mean values were significantly decreased in hyperthyroid patients; whereas, eGFR mean value was significantly increased in hyperthyroid study patients (P<0.05). Meanwhile, from the electrolyte measurements made, only the mean serum sodium value was significantly increased in hyperthyroid study participants. Binary logistic regression analysis on the association of thyroid dysfunction with electrolyte balance and renal function tests indicated that serum sodium, creatinine, eGFR values and hyperthyroidism have a statistical significant association at AOR 95% CI of 0.141(0.033-0.593, P=0.008); 16.236(3.481-75.739, P=0.001), and 13.797(3.261-58.67, P=0.001) respectively.

Conclusion: The current study reveals, thyroid abnormalities may lead to renal function alterations and also may disturb electrolyte balance. Knowledge of this significant association has worthwhile value for clinicians, to manage their patients’ optimally.

Comparison of Creatinine Clearance in HIV/AIDS Patients on Tenofovir and Two Non-Tenofovir- based NRTIs After One Year of Therapy

Background: Studies have suggested that Sub-Sahara Africans are prone to HIV-related renal dysfunction. A study done in Zambia showed increased deaths among HIV/AIDS patients who had renal dysfunction. Tenofovir Disoproxil Fumarate (TDF) one of the first line antiretroviral drugs in Zambia since 2007, has been associated with renal tubulopathy and nephrotoxicity in many studies. This study was set out to determine whether TDF had similar Nephrotoxic effects in patients receiving treatment at Zambia’s largest Antiretroviral Therapy (ART) Centre. It aimed at determining the likelihood of patients with normal creatinine clearance at initiation of therapy developing renal dysfunction after 1 year of treatment with TDF- based regimen compared to those on either Stavudine (D4T) or Zidovudine (AZT) - based regimen.

Methods: An analytical cross- sectional study was done. Data was obtained from 549 randomly selected files of HIV/AIDS patient that started ART between September, 2007 and January, 2013. 275/549 patients were on TDF- based regimen while 274/549 were on either of the two non- TDF- based regimens (D4T or AZT).

Results: Research findings showed a significantly larger number of participants on TDF developing renal dysfunction from having no renal dysfunction at baseline compared to those on non-TDF-based regimen; 51/ 180 verses 8/ 207, P< 0.001. Upon controlling for age and sex, logistic regression model showed that HIV/AIDS patients on TDF- based regimen were 8.77 times more likely to develop renal dysfunction after one year of therapy from having no renal dysfunction at baseline compared to those on the non-TDF- based regimen.

Conclusion: Tenofovir was strongly associated with developing renal dysfunction and severely increased odds compared to non TDF- based regimen; hence, consistent monitoring of creatinine clearance in patients on treatment is vital.
NOVEL APPROACHES IN CANCER DIAGNOSTICS AND SURVEILLANCE

DATE: Wednesday 7 December
TIME: 11:00 – 12:30
ROOM: CTICC 1.6
CO-CHAIRS: Martin Hale, National Health Laboratory Service, South Africa, and Andrea Kim, Centers for Disease Control and Prevention, United States

11:00
Monica A. Odhiambo
Human Pathology, University of Nairobi, Nairobi, Kenya.

Cervical Cytological Patterns Among HIV-infected Women on Antiretroviral Therapy at Kenyatta National Hospital

Background: HPV persistence and immunosuppression have been attributed to increased risk of developing cervical dysplasia and invasive cervical cancer. The introduction of cART has increased the life expectancy of HIV infection and opportunistic diseases.

Methods: A cross sectional study. Pap smears were collected from two hundred and ten (210) HIV infected women on cART during November 2015-March 2016. CD4 cell counts and HIV viral loads were obtained from patient records at Comprehensive Care Clinic. Bivariate analysis correlated the cervical cytological lesions with CD4 cell counts, HIV viral loads and long term use of cART.

Results: Out of 210 HIV infected women sampled; the mean age was 42 years (SD=8.3). Age range was 24-61 years. The prevalence of cervical cytological lesions was 9.9%. Commonest lesion reported was high grade squamous intraepithelial lesion (HSIL) with 6%, followed by atypical squamous cells of undetermined significance (ASCUS), low grade squamous intraepithelial lesions (LSIL) and squamous cell carcinoma (SCC) having 1%. The distribution of the cervical cytological lesions was 2 with LSIL, 16 with HSILs. Twenty three (23) patients had candida, seventeen (17) had bacterial vaginosis, ten (10) had co-infection, eighteen (18) had atrophic cervicitis, three (3) had atrophy and sixteen (16) which amounted to 41%. The average duration on cART was 5-9 years (38.9%), followed by 16% over 10 years. The mean distribution of CD4 cell counts in the positive cytological lesions was 492.9 cells per cubic millimetre, with five (5) 62.5% with HIV viral loads of less than 500. The women with positive cytological abnormalities with CD4 cell counts 200 cells per cubic millimetre and below were 12 (66.7%).

Conclusion: Serial cervical cancer screening is recommended especially in HIV infected women especially in antiretroviral clinics. Continued cervical cancer screening in HIV treatment clinics has a beneficial impact on regression and progression of cervical cytological lesions.

11:10
Mahlape P. Mahlangu
Center for HIV/STI (STI section), National Institute for Communicable Diseases, Johannesburg, Gauteng, South Africa.

Comparison of CareHPV and Hybrid Capture 2 Test in a Population of HIV-1 Infected African Women

Background: Cervical cancer is frequently the most common cancer and the leading cause of cancer death among women particularly in developing countries such as sub-Saharan Africa. Human papillomavirus (HPV) testing as a screening for cervical cancer is based on the findings that HPV DNA is present in almost all cervical cancers. The objective of this study was to compare the performance of careHPV and Hybrid capture 2 assays for the detection of high risk HPV (HRHPV) DNA in cervical samples among women living with HIV.

Methods: The comparison was done on samples collected from 149 unselected sequential HARP (HPV in Africa Research Partnership) study participants (75 in South Africa and 74 in Burkina Faso). Two cervical samples were consecutively taken from each woman. The first sample was collected using the careHPV sample collection devices and the second sample was collected using the Digene cervical sampler devices. The assays were performed according to the manufacturer’s instruction. Discrepant results between the two tests were assessed with INNO LIPA HPV genotyping Extra assay.

Results: The HRHPV prevalence was 37.6% by careHPV and 34.9% by HC2. The overall agreement between both tests was substantial at $\kappa=0.88$ (95% confidence interval [CI], 0.81 to 0.96), with a percentage total agreement of 94.6% (95% CI, 89.7% to 97.7%). Discrepant samples between the two tests were positive for HPV detection and typing by using INNO LIPA HPV genotyping Extra assay.

Conclusion: careHPV assay may be considered as appropriate as HC2 for the detection of HRHPV and may be used in primary cervical cancer screening among HIV-infected women.
Proteins as Novel Biomarkers in Breast Cancer Detection

**Background:** Early diagnosis of breast cancer has remained a significant challenge in Africa, Nigeria inclusive. Early detection and diagnosis of breast cancer are vital in its management, especially in subjects who have little or no symptoms. Therefore, the present study was designed to determine proteins that may be expressed in serum and urine of breast cancer subjects but not present in control subjects which can serve as novel biomarkers.

**Methods:** A total of fifty breast cancer subjects and fifty apparently healthy subjects without family history (control) were investigated. Blood and urine specimen were collected from the subjects for qualitative analysis of serum and urinary proteins using sodium dodecylsulphate polyacrylamide gel electrophoresis (SDS-PAGE) while serum Carcinoembrionic antigen (CEA) (ng/ml), Carbohydrate antigen (CA) 15-3(U/ml) were analyzed using Enzyme linked immunoassay technique.

**Results:** The results showed that some proteins were exclusively detected in the serum and urine of breast cancer subjects but not in control subjects. CA-15-3 and CEA were significantly higher in breast cancer subjects compared with control subjects (p<0.05). Significant positive correlations were observed between CA-15-3 and CEA (r=0.428, p=0.002). Two of the detected proteins (p11.25 and p34) showed significant positive correlation (p<0.05) with CA-15-3.

**Conclusion:** The use of the detected proteins that show significant correlations with classical markers CEA and CA 15-3 in breast cancer subjects may serve as better markers for breast cancer diagnosis. This in turn will minimize unnecessary biopsies since they can be detected in serum.

Monitoring CML in South Africa: Lessons Learnt

**Background:** The Somatic Cell Genetic (SCG) Unit based at Charlotte Maxeke Johannesburg Academic Hospital (CMJAH) receives blood and bone marrow samples for patients with chronic myeloid leukemia (CML) from regions covering sub-Saharan Africa. The unit is offering conventional cytogenetics analysis, fluorescence in situ hybridization, real time quantitative polymerase chain reaction (RQ-PCR), BCR-ABL1 mutation analysis and keeps a database of CML patients since 2006. Advances in CML treatment, especially regarding tyrosine kinase inhibitors (TKI) and the prospect of withdrawing therapy in patients with sustained remission, require highly sensitive and reliable molecular monitoring. Reviewing data over 10 years, we identified recurrent challenges that compromise patient’s treatment management in South Africa.

**Methods:** We retrieved RQ-PCR and sequencing data on 8000 samples. BCR-ABL1 to GUS ratios were obtained using an internationally standardized “in-house” TaqMan assay. Sanger sequencing analyses of the ABL1 kinase domain were obtained from 1060 samples, representing 638 patients referred for resistance or suboptimal response to TKI therapy.

**Results:** Twenty-nine percent of 638 patients referred for mutational analysis had ABL1 kinase domain mutations, of which, 25% were T315I, followed by E255K and G250E (14% each). Over the 10 years under study, we improved RQ-PCR sensitivity to reach a consistent depth of 4,5 to 5 log. Due to patients move, we were led to investigate discrepant results from other laboratories and found that differing levels of sensitivity of an assay can lead to significant differences in results. We therefore recommend that the sensitivity of the assay be included in the patient report, and include the number of control gene amplicons. Eleven CML patients had rare variants BCR-ABL1 breakpoints not detected by RQ-PCR, illustrating the importance of requesting both RQ-PCR and cytogenetic analysis at presentation.

Looking at the frequency of molecular monitoring at 3 months in the last 2 years, only 28% of CML patients had RQ-PCR follow up at 3 months post diagnosis.

**Conclusion:** Analyses of our local CML data highlights a number of issues that can be addressed through dissemination of knowledge and close communication with clinicians.
The Role of Anatomic Pathology in Improving Health Care in Sub Saharan Africa

Background: A transition from communicable to chronic diseases has occurred in many countries. As our knowledge of the pathogenesis of chronic diseases increases, the distinction between communicable and non-communicable disease blurs. A great example is cervical carcinoma being caused by human papilloma virus (HPV) for which we now have diagnosis and prevention before the cancer occurs. For cancer, one of the barriers to increase access to treatment is lack of diagnosis. Similarly, for childhood mortality, diagnosis is paramount to provide prevention strategies. In both examples, establishing anatomic pathology services is indispensable to provide patient diagnosis and reliable data so that public health officials can act accordingly.

Methods: Past efforts to improve and increase the capacity to provide these services have not had the attention or funding support that are needed. This has resulted in many gaps in our knowledge of which are the most frequent causes of childhood mortality and the neoplasias more frequently encountered in many countries in Sub-Saharan Africa. In addition, the integration of anatomic pathology and laboratory medicine is central to developing public health strategies related to non-communicable diseases.

Results: In this symposium we will discuss: 1. The need for clinical laboratory support in the care of patients with non-communicable diseases, particularly cancer, and how that needs to be integrated with anatomic pathology services; 2. The need to focus attention on the health care of women and children, with an emphasis on the need for anatomic pathology services for these populations; 3. The importance of pathology services for quality control of diagnosis and treatment, particularly as new forms of diagnosis and treatment are introduced; and 4. Approaches to teaching different tools that enhance pathologic diagnosis of cancer.

Conclusion: Those that attend the symposium will understand the importance of anatomic pathology for diagnosis of infectious and non-communicable diseases.

Mycobacterium Speciation from Formalin-fixed Paraffin Embedded Tissue Blocks

Background: Histological diagnosis of extrapulmonary mycobacterial infections depends on the presence of granulomatous inflammation, caseation necrosis and the presence of acid fast bacilli as demonstrated by a Ziehl Neelsen stain. Several challenges including reduced PCR yield due to cross-linking between DNA and protein, DNA fragmentation caused by formalin fixation of tissue samples are often encountered when detecting mycobacterial DNA from formalin-fixed paraffin embedded (FFPE) tissue blocks. To address this issue, a molecular test that is able to amplify small DNA fragments is necessary. Therefore, this study sought to evaluate the performance and the impact of MYCODIRECT 1.7 LCD array for the detection and speciation of mycobacteria from FFPE tissue blocks in a routine diagnostic histopathology laboratory setting.

Methods: A total of 70 samples were used, of which 60 samples were from FFPE tissue blocks: 30 Mycobacterium positive samples (results obtained with in-house PCR) and 30 non-Mycobacterium pathogens. The remaining 10 were from culture positive samples used for speciation confirmation. The sensitivity of the assay was assessed by comparing the MYCODIRECT 1.7 LCD Array results with those obtained using in-house PCR (Gold standard), and specificity assessed by including samples positive for pathogens other than Mycobacteria.

Results: The array yielded the detection sensitivity and specificity of 87% (26/30) and 100% (30/30) respectively. Speciation yielded a concordance rate of 90% (9/10).

Conclusion: MYCODIRECT 1.7 LCD array showed high sensitivity and specificity for detection and speciation of mycobacteria; and significantly reduced turnaround time versus in-house PCR. Therefore, it is a suitable assay for routine histological diagnosis of mycobacterial infections.
**ORAL SESSION 2.3**

**SOLUTIONS IN THE FIGHT AGAINST NEGLCED TROPICAL DISEASE**

**DATE:** Wednesday 7 December  
**TIME:** 11:00 – 12:30  
**ROOM:** CTICC 2.4  
**CO-CHAIRS:** Jane Carter, Amref Health Africa, Kenya, and Christine Rousseau, Bill and Melinda Gates Foundation, United States

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**11:00**

Sindew M. Feleke  
Department of Microbiology and Parasitology, University of Buea, Buea, South West Region, Cameroon.

**The First Evidence for Possible Interruption of Onchocerciasis Transmission in Metema Area Focus, North Gonder, Ethiopia**

**Background:** Onchocerciasis is a neglected tropical parasitic disease (NTD) caused by a filarial nematode worm called onchocerca volvulus and transmitted by the bites of simulium flies. The national onchocerciasis control programme started in 2001. In 2012, the programme objective changed from control to elimination by interruption of transmission until 2020. The main strategy for the elimination is the annual or semiannual community based treatment using the drug ivermectin. The Metema focus is one of the oldest area received the annual community based ivermectin treatment using the drug ivermectin. The Metema focus is one of the focus with 20-30 km far apart from each other. The study participants were community residents above the age of 5 years for skin microfilariae survey and children’s born during the period of mass treatment with age less than 10 years.

**Methods:** This cross sectional study was conducted in 2014/15 in selected communities of Metema focus based on high endemicity before intervention, proximity to the breeding sites and representativeness of the focus with 20-30 km far apart from each site. The study participants were community residents above the age of 5 years for skin microfilariae survey and children’s born during the period of mass treatment with age less than 10 years for Ov-16 IgG4 antibody exposure test. Skinsnip sample collected from left and right iliac crest of 2986 individuals with sterilized biopsy punch and examined under a microscope after 24 hours incubation. Whereas, finger prick samples collected from 3136 children and dried blood spot (DBS) prepared for Ov-16 ELISA laboratory analysis.

**Results:** All 2986 skin samples examined under a microscope found to be negative. About 8 children’s sample out of the total 3136 became confirmed antibody positives. And skin snip PCR carried out for those 8 sero-reactive children’s to check whether they are carrying the infective parasite or just exposed and the PCR result for all 8 samples turn out negative(0%), [95%CI: 0-0.1%].

**Conclusion:** The skin microfilarial survey results revealed absence of onchocerca volvulus from the community skin and the serology results implied that children’s born during the period of the intervention are protected from acquiring infection. Entomological assessment has to be carried out to determine absence of infectious flies in the focus and confirm interruption of focal transmission.

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A Survey of Schistosomiasis in Selected Schools in the Muea and Likomba Health Areas, South West Region, Cameroon

**Background:** Cameroon is endemic to schistosomiasis (SCH) and control is by treating communities at risk with Praziquantel. Unidentified communities at risk won’t benefit from this policy. Although studies have identified some loci of SCH in the Mount Cameroon Region, no data exist for SCH in the Muea and Likomba Health Areas.

**Methods:** A cross sectional survey of SCH involving 418 School children aged 9 to 12 years, 208 from the Muea Health Area (MHA) and 210 from the Likomba Health Area (LHA) was carried out to determine the prevalence and intensity of SCH in stool and urine by the formal-ether concentration and urine filtration techniques respectively. Equally, questionnaires were administered to the participants to assess their awareness on SCH and determine the associated risk factors of SCH, and malacology of snail intermediate hosts was also carried out.

**Results:** Results obtained showed that the overall prevalence of urinary and intestinal SCH was 5.74% (24/418). Urinary SCH had a prevalence of 4.55% (19/418) with mean egg count of 7.5±6.5eggs/g urine while intestinal SCH had a prevalence of 1.2% (5/414) with mean egg count of 15.8±3.2eggs/g of stool. The MHA had more cases 17/208(8.2%) of SCH than the LHA 7/210(3.3%), (p=0.026). Thirty nine and half percent of the pupils had heard of SCH. Children using streams and springs were more exposed to SCH than those using tap water [OR=3.6, 95% CI: 1.5-8.4]. Children of the LHA were less at risk than those in the MHA [OR=0.4, 95% CI: 0.2-0.9]. Females were more exposed to SCH than males [OR=1.96, 95%CI: 0.8-4.8] and pupils who had not heard of SCH were more exposed than those who had heard of the disease [OR=1.09, 95%CI: 0.5-2.6]. Bulinus spp, Biomphalaria spp and Lymnaea spp were collected and identified and their populations diminished as the rains intensified. No snail shed cercae.

**Conclusion:** These health areas are of low endemicity and we recommend treatment be twice during the primary school age of children following the World Health Organisation’s guidelines.
Visceral Leishmaniasis in Selected Communities of Hamer and Benna-Tsemai Districts in South West Ethiopia; Sero-Epidemiological and Leishmanin Skin Test Survey

Background: Visceral leishmaniasis [VL] is among the neglected tropical diseases. It is known to be endemic in numerous foci in all IGAD (The Intergovernmental Authority on Development member countries in east Africa) member countries. The aim of this study was to determine the prevalence of asymptomatic and Symptomatic VL and also to determine the level of exposure (infection) to Leishmania parasites in the study areas.

Methods: A community based cross-sectional survey was conducted between 25th of July and August 14th of 2013 in 15 selected villages of Hamer and Benna-Tsemai districts which are found in southern Ethiopia, employing multi stage sampling technique. Venous blood was collected for the detection of antibodies using DAT (Direct Agglutination Test) and LST (Leishmanin Skin Test) was also performed to detect the exposure to the parasite. Data was analyzed using SPSS-16 and a P-value of < 0.05 was considered indicative of statistical significance.

Results: 1760 individuals 975(55.3%) females and 785(44.7%) males were included. 44.1% of the study subjects were less than 10 years of age. statistically significant variation in the rate of exposure to the parasite was observed in different study sites and age groups. Positive LST response has also shown an increasing trend with age. High DAT positivity was observed in lower age groups. The overall LST and DAT positivity were 8.6 and 1.8% respectively.

Conclusion: Asymptomatic VL infection in the area is not negligible and could have a great contribution for anthroponotic transmission of the disease; thus, concerned bodies should take into consideration the implementation of prevention and control strategy for VL. As the area is widely in habited by pastoralists who travel long distance crossing borders in search of food and water for their cattle, IGAD member countries specifically Ethiopia and Kenya should act bilaterally against this deadly disease.

Prevalence, Haematological Parameters and Comparative Evaluation of Three Diagnostic Methods for Malaria in Awka, Nigeria

Background: Malaria diagnosis is a major challenge in endemic areas because of other disease complications and technical expertise of the Medical Laboratory staff. Microscopic method using Giemsa stained blood film has been the mainstay of diagnosis of malaria. However, since 1993 when Rapid Diagnostic Test (RDT) kits were introduced, they have proved to be effective in the diagnosis of malaria. This study was aimed at comparing the accuracy of microscopy and RDTs in the diagnosis of malaria using nested PCR as the reference standard.

Methods: Four hundred and twenty (420) venous blood specimens were collected from patients attending Anambra State University Teaching Hospital, Awka who had clinical symptoms of malaria. The samples were tested with Giemsa stained microscopy and three RDTs (Carestart, SD Bioline PF and SD Bioline PF/PV). Fifty specimens were randomly selected for molecular analysis.

Results: The prevalence of malaria among the subjects studied was 25.95% as detected by microscopy, prevalence found among the RDTs was 22.90%, 15.20% and 54.80% for Carestart, SD Bioline PF and SD Bioline PF/PV respectively. Molecular assay yielded a prevalence of 32%. The major specie identified was Plasmodium falciparum; there was co-infection of P. falciparum with P. malariae and P. ovale. The sensitivity and specificity of microscopy was 50.00% and 70.59% while those of the RDTs were (25.00% and 85.29%), (25.00% and 94.12%) and (68.75% and 52.94%) for Carestart, SD Bioline PF and SD Bioline PF/PV respectively. Cohen’s kappa coefficient was used to measure the level of agreement of the methods with nested PCR. Microscopy showed a moderate measure of agreement (k = 0.491), Carestart showed a good measure of agreement (k = 0.611), SD Bioline PF showed a fair measure of agreement (k = 0.226) while SD Bioline PF/PV showed a poor measure of agreement (k = 0.172).

Conclusion: This study recommends that the policy of malaria diagnosis be changed such that the routine diagnosis of malaria is done by a combination of both microscopy and a RDT kit of high sensitivity and specificity so as to complement the errors associated with either of the methods.
Sero-epidemiology of Rubella in Mozambique, 2006-2014: Implications for Rubella Immunization in Settings with High Fertility Rates

Background: Rubella and congenital rubella syndrome (CRS) are highly underreported and neglected in most sub-Saharan countries and vaccination has not yet been incorporated into their national immunization schedules. In this study we investigated the frequency of IgM antibodies against rubella and examined correlations with fertility rates during the period from 2006 to 2014 in Mozambique.

Methods: We conducted a retrospective analysis of data collected through the routine case-based surveillance system for measles in Mozambique.

Results: A total of 7312 serum samples from suspected cases of measles were tested between 2006 and 2014. The median age was 4 years old, (IQR: 1 – 8 years). Of these, 1331 (18.2%) were positive for IgM anti-rubella. The highest frequency of rubella was observed within the 5-9 year old age group, (32.6%). The frequency in the age groups <1 years old, 1-4, 10-14, 15-19, 20-29, and ≥30 were 4.5%, 13.1%, 28.7%,18.7%, 5.2% 5.1% respectively.

Conclusion: In conclusion, our data show that rubella is highly endemic in Mozambique, providing a strong argument for the introduction of the rubella vaccination into the routine immunization schedule. Moreover, the frequency of IgM antibodies against rubella among adolescent is high, poses a risk for the development of CRS, since early pregnancy in Mozambique is very common and fertility rates are high in this age group. Altogether, our findings suggest that vaccination strategies in Mozambique should also include campaigns targeting older children and adolescents.

The First Successful Confirmed Elimination of an Onchocerciasis Focus in Africa: Abu Hamed, Sudan

Background: The Abu Hamad onchocerciasis focus (Sudan) the Northern most focus in the World is an Isolated site associated with active breeding in the River Nile as it winds through the rocks and sands with the Nubian Desert to the North and east.

Control program begin in 1998 using Ivermectine annually in 1998 with 37% infection rate.

For The first time in Africa Sudan government switch from annual to biannual treatments in order to Eliminate the disease in Dec 2006.

In 2007 Entomological assessment for more than 29000 files by 0 – 150 PCR based Elisa showing 0.17 (95% CL 0.817 -1.88 ) L3 larvae / 2000 black flies indicating ongoing transmission according to WHO guideline 2001 (less than1 L3 /2000 ) it is also support by ov16 antigen in children less than 10 years old and parasitological skin snip.

In 2011-2012 after 5 years of biannual treatment the examine shown no infection for more than17000 flies screened by 0 -150 PCR antibodies to OV16 antigen In 6756 children less than10 years and no sign of infection in 556 adult individual from same communities within the focus.

Mass treatment with Ivermectine for onchocerciasis was stopped in 2012 in Abu Hamad, A three years post – treatment surveillance (PTS) ensued at the end of which an evaluated was conducted in 2015 following the current WHO guidelines for verification of elimination.

Methods: Vector black flies were collected from sentinel breeding sites and finger prick samples bloodspots were collected from children less than 10 years old resident in 35 communities within the focus.

Results: 0-150 PCR screening of 19,191 filed from 4 sites found no flies carrying O. volvulus larvae (0%, 95% Upper confidence limit = 0.08), and serological testing of 5266 children identified only OV16 seropositive child (0.019%, 95% UCL= 0.074) ; who was negative when screened by 0-150 PCR assay.

Conclusion: These results indicate that for the first time in Africa, onchocerciasis elimination has been verified following a successful PTS in Abu Hamed
Building Capacity for Yellow Fever Diagnostics in Angola, 2016

Background: Sufficient laboratory capacity is essential for effective infectious disease surveillance and control. However, laboratory services for both patient care and disease surveillance remain among the neglected components of the overall health system.

A Yellow Fever (YF) outbreak was detected in Angola in December 2015, and confirmed by the Regional Reference Laboratory, Instituto Pasteur Dakar (IPD) on 20 January 2016. At the time the outbreak was confirmed, Angola lacked local WHO accredited laboratory capacity to perform serologic or molecular testing to confirm suspect cases and to support the outbreak response. Establishment of local laboratory capacity was needed to reduce the turn-around-time (TAT) for laboratory confirmation of suspected YF cases.

Methods: On 15 February 2016, a 7 person CDC team, including 2 laboratoryians, arrived in Luanda, Angola to assist with the Yellow Fever (YF) outbreak response activities. Ten laboratory technicians from the Angolan National Public Health Institute (NPHI) were trained in YF diagnostic testing using a newly developed rapid CDC IgM enzyme linked immunosorbertent assay (ELISA) YF MAC HD kit and real time reverse transcriptase polymerase chain reaction (rRT-PCR) techniques. The formal training included a pre-test to measure current knowledge of arbovirus diagnostics of the staff prior to training and a post-test to measure acquired knowledge following training.

Results: All ELISA and rRT-PCR results from 239 samples from suspect YF patients meeting the WHO case definition were submitted to the laboratory. These represented the first rRT-PCR results available from INSP laboratory and first anti-YFV IgM ELISA results reported using the rapid YF MAC HD kit. The average TAT was reduced from approximately 2 days using Institute Pasteur – Dakar (IPD) protocol to 1 day using the newly established local laboratory diagnostic capacity at INSP. The reduced TAT provided more timely information to inform epidemiologic investigation and vaccination efforts. The reduced TAT provided more timely information to inform epidemiologic investigation and laboratory diagnostic capacity at INSP.

Conclusion: With continuous supervision and use of internal and external quality panels, efforts could be undertaken to re-accredit the laboratory to ensure confidence in results reporting. This will provide the laboratory with the capacity to report timely, on-going laboratory diagnostic testing to support emergency outbreak responses.

Viral Etiology of Acute Febrile Jaundice in Suspected Cases of Yellow Fever in the Democratic Republic of Congo

Background: Etiological exploration has not been done for more than 99% of acute febrile jaundice identified through the surveillance of yellow fever in the Democratic Republic of Congo (DRC). This study investigated the presence of hepatitis A (HAV), B (HBV), C (HCV), D (HDV) and E (HEV) viruses, herpes viruses and other arthropod-borne viruses that can induce the same symptoms in patients enrolled in the yellow fever surveillance in DRC.

Methods: Of 652 patients included in the yellow fever surveillance from January 2003 to January 2012, 498 were screened for IgM antibodies (Ab) against HAV and HEV and for antigens and antibodies against HBV (Ag HBs and anti-HBc Ab), HCV and HDV using ELISA techniques. Viral loads and genotypes were determined for HBV and HDV viruses. Real time PCR was performed for the detection of dengue, West Nile, Chikungunya, O’Nyong Nyong, Rift Valley fever, Zika virus, yellow fever virus, cytomegalovirus (CMV), herpes simplex viruses (HSV), human herpesvirus 6 (HHV6) and varicella-zoster virus (VZV).

Results: The average age of patients was 24 years. Seroprevalence was 16.6% HAV, 24.6% HBV, 2.3% HCV and 10.4% HEV. The frequency of HBV and HDV co-infections was 25%. The median viral loads were 4.19x10^5 IU/ml for HBV (range: 769 to 9.82x10^9 IU/ml) and 2.62x10^5 IU/ml for HDV (range: 56-5.15x10^7 IU/ml). Genotypes A, E and D of HBV and genotype 1 of HDV were identified. Sixteen cases of dengue (serotypes 1 and 2) and two cases of Chikungunya were found. The frequency of herpes viruses was 13.0% for CMV, 6.2% for HHV6, 2.4% for HSV and 2.4% for VZV.

Conclusion: These results highlight the need to enhance routine diagnostic facilities in DRC.
**Background:** Viral haemorrhagic fever (VHF) is a general term used for severe illnesses associated with bleeding which may be caused by a number of viruses, including Ebola, Crimean-Congo and Rift Valley fever. South Africa also sporadically experiences VHF outbreaks. Additionally, suspected VHF cases often seek medical care in South Africa. Subsequently, blood samples from suspected VHF cases are routinely tested at the Charlotte Maxeke Johannesburg Academic laboratory. The standard procedure for known VHF cases includes conducting testing within the routine laboratory using automated analysers. The laboratory is closed off to minimise staff exposure. Following testing, a vigorous decontamination procedure is required resulting in significant downtime. The aim of this study is to compare laboratory downtime for automated analysers and point of care (POC) VHF testing.

**Methods:** A time and motion analysis was conducted to assess the time required to test 5 samples from a VHF suspect with automated analysers and using the iStat™ POC system. The analysis included identifying the POC steps and assessing a competent medical technologist to assess the time taken to process the 5 samples. Additionally, downtime experienced for a recent VHF suspect at the routine laboratory was assessed using the Advia210TM and Advia1800TM analysers from Siemens.

**Results:** With conventional laboratory testing, downtime of 4 hours was reported. This resulted in a 17% loss of testing capacity over 24 hours (2400tests/13700 tests per day =17%). In comparison, the POC platform required only 60 minutes with minimal impact on the routine laboratory (265 tests/13700 tests per day =2% loss). 24 hours (2400 tests/13700 tests per day =17%).

**Conclusion:** Introducing POC systems to handle VHF samples would reduce staff exposure, limit sample movement and reduce downtime. Additionally, it would also avoid testing delays for hospital wards, i.e. intensive care units, paediatric oncology, etc., that are crucial at an academic centre.

**Sero-prevalence of Rift Valley Fever Virus in Animal and Humans Following an Outbreak of Rift Valley Fever Virus in Kabale District Uganda 2016**

**Background:** Uganda has recently experienced an outbreak of Rift Valley Fever (RVF) in Kabale district, Southwestern of the country in border with Rwanda. Three human cases were confirmed by RT-PCR and serology in March 2016. We conducted an assessment to determine the burden of RVF in Kabale and surrounding districts and associated risk factors.

**Methods:** The assessment targeted abattoir workers, people and livestock living in villages with confirmed or probable RVF cases, low and high lying areas and villages without reported RVF cases. purposive sampling was used for high-risk groups and random sampling for control groups. For participants who consented, a risk factor questionnaire was administered and blood samples collected from both human and livestock (cattle, goats and sheep). 1050 samples were tested by for RVF by serology at the Uganda Virus Research Institute, Entebbe, Uganda.

**Results:** Preliminary results indicate a 15.4% (124/804) seroprevalence in cattle and goats; cattle were 4 times as likely to be seropositive compared to goats (AOR=3.0; 95%CI 1.7 – 5.4). Other risk factors for RVF seropositivity include exotic or cross breed animals (AOR=2.8, 1.5 - 5.4), animals in villages with confirmed/probable cases (AOR=3.0, 1.5 – 5.8) and adult animals (AOR=3.3, 1.4 – 7.6). There was low community awareness about RVF disease and is confused with other viral hemorrhagic fevers such as Ebola and Marburg virus diseases. Additional testing of remaining animal and human samples is ongoing.

**Conclusion:** These findings suggest a high seroprevalence of RVF disease in Uganda than previously known or expected. It also suggests the extent RVF transmission in animal populations is widespread in Kabale district and may extend into neighboring districts. We propose to extend this serosurvey countrywide in order to estimate the true burden of RVF in Uganda to aid in the control and prevention measures of RVF disease.
Factors Associated with Cerebrospinal Meningitis Outbreak in Kebbi State, Nigeria, February 2015

**Background:** Cerebrospinal Meningitis (CSM) is an epidemic prone disease and remains a major public health challenge in the African meningitis belt. In February 2015, Kebbi State Ministry of Health reported outbreaks in four local government areas (LGAs). We investigated to establish, confirm the epidemic, and to assist the state to strengthen surveillance for CSM in the affected LGAs and institute appropriate control measures.

**Methods:** We carried out advocacy visit, data collection, active case search, public enlightenment, cerebrospinal fluid (CSF) sample collection and analysis. Using World Health Organisation’s criteria, we defined a suspected case of CSM as any person with sudden onset of fever and one of the following signs – neck stiffness, altered consciousness or other meningeal signs from the 30th January 2015 till date and residing in any of the affected LGAs in Kebbi State. Descriptive study was conducted to identify the risk factors of the infection. Statistical analyses were performed using Epi-info 7 Software.

**Results:** From Epidemiology week 1 to 7, the state recorded a total of 92 cases with 13 deaths (Case Fatality Rate: 14.13%) in 4 LGAs of the state (Cumulative Attack Rate: 28.4%). Majority (95%) of cases were in age group 6-15 years. Males were more affected (61.3%). While 81.1% of cases shared rooms with >3 persons, 48% slept in rooms that had <2 windows. Only 12.1% of cases had received CSM vaccination in the last 2 years. Aleiro LGA was mostly affected (64%). Of the 29 CSF samples collected from suspected cases, 12 (41%) were confirmed positive for Neisseria meningitides (Serogroup C). Age < 16 years was found to be a significant predictor of contracting CSM (OR: 13; 95%CI: 6.1-29; P<0.001). The affected LGAs were yet to commence mass vaccination campaign due to unavailability of vaccine for N. m type C.

**Conclusion:** The outbreak of CSM in Kebbi State was confirmed and the associated risk factors were age <16 years, overcrowding and poor vaccination coverage. We recommended intensified surveillance, continued health education on compliance with vaccination and housing standards, adequate logistics, and mass vaccination campaign.
Thursday, 8 December

ORAL SESSION 3.1

ACHIEVING INTERNATIONAL TARGETS AND THE GLOBAL HEALTH SECURITY AGENDA

DATE: Thursday 8 December
TIME: 11:00 – 12:30
ROOM: CTICC 1.4
CO-CHAIRS: Jane Mwangi, Centers for Disease Control and Prevention, Kenya, and Pascale Ondoa, Amsterdam Institute for Global Health and Development, Netherlands

11:00

Vincent Habiyambere1, Meghan Wareham2, John Stover3, Daniel Low-Beer1, Farouk Umaru1, Paolo Maggiore2

1. HIV, WHO, Geneva, Switzerland.
2. Diagnostics, Global Markets Team, Clinton Health Access Initiative (CHAI), Boston, MA, United States.
3. Avenir Health, Glastonbury, CT, United States.

The 90-90-90 Targets: Implications on Global CD4 and VL Testing Demand Forecasts for 2015-2020

Background: UNAIDS 90-90-90 targets recommend that by 2020, 90% of PLWHA know their serostatus, 90% of those tested HIV positive are on ART and 90% of those on ART achieve viral suppression. A multi-partner working group on diagnostic forecasts meet annually to monitor progress and forecast global demand. These forecasts are intended to inform advocacy for increased access to diagnostics so that the 90-90-90 targets can be met. Forecasts are shared with manufacturers so that they anticipate future demand, and with procurement organizations so that they plan future funding.

Methods: Data from WHO global surveys on diagnostic use 2012-2015, procurement data from GPRM, PEPFAR, and CHAI forecasts and consumptions from high burden countries were used to forecast future demand for CD4 and viral load tests. The forecasts take into account national guidelines and plans. The global consolidated demand forecasts result from a combination of CHAI forecasts for high-burden countries and linear extrapolations of past consumptions of countries not covered by CHAI. They are compared to the 90-90-90 fast track scenario for CD4 and VL tests.

Results: The consolidated forecast demand for CD4 tests indicates that the market will grow up to 23 million CD4 tests per year in 2019 before beginning to decline. Projected demand for VL tests will increase to reach 23 million VL tests per year in 2020 as the number of people on ART expand and as more countries adopt VL testing for monitoring people receiving ART. Under the 90-90-90 scenario, the number of VL tests is expected to reach 30 million per year in 2020.

Conclusion: Access to VL tests will increase but unless governments and partners work together to change the current demand trajectory, we are likely not going to reach the third 90-90-90 target. CD4 testing will grow through 2019 based on the projected increase in patients on ART, prolonged limited access to viral load testing in some countries, and the continued use of CD4 for testing at initiation and in the case of failure per WHO guidelines.

11:10

Nwokedi A. Ndulue
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Sustaining PEPFAR Initiated Laboratory Services in Nigeria: Experiences and Lessons from Implementing a Laboratory Revolving Fund (LRF) Program in a District Hospital

Background: With the cessation of PEPFAR funding support for chemistry and hematology investigations in Nigeria in October 2014, it became a challenge for HIV+ clients to access chemistry and hematology tests. In some HIV clinics, HIV-positive clients were required to pay as high N5000 ($45) for these tests to be performed, resulting in poor patient care, and high default rates. This study aims to evaluate the impact of implementing an innovative Laboratory Revolving Fund (LRF) program to sustain access to laboratory services in a secondary level care facility.

Methods: Since 2013, the USAID funded ProACT project implemented by MSH, has supported the delivery of HIV services at the Sir Yahaya Memorial Hospital Birnin-Kebbi, and has enrolled a total of 3012 patients. To sustain access to chemistry and hematology tests, technical assistance was provided by MSH to the hospital management in the redesign of the existing LRF program elements such as financial management, competitive vendor selection and development of a business case.

Results: 18 months post implementation, the LRF revenue base significantly improved and as a direct result, the facility procured laboratory reagents and consumables worth N4,859,500 ($24,694) and continued to provide laboratory services at no cost to over 378 newly diagnosed HIV+ clients in the post transition period. Planned preventive maintenance (PPM) which was hitherto the full responsibility of MSH was proactively initiated, and repairs and hematology investigations in Nigeria in October 2014, it became a challenge for HIV+ clients to access chemistry and hematology tests. In some HIV clinics, HIV-positive clients were required to pay as high N5000 ($45) for these tests to be performed, resulting in poor patient care, and high default rates. This study aims to evaluate the impact of implementing an innovative Laboratory Revolving Fund (LRF) program to sustain access to laboratory services in a secondary level care facility.

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Successful Implementation of External Quality Assessment for GeneXpert and Its Impact on Quality of Testing in Vietnam

**Background:** Xpert MTB/RIF proficiency testing (PT) has been challenging due to lack of validated procedures for PT panel manufacture and high cost of commercial PT schemes. PT is an important component of external quality assessment (EQA) and should be implemented in conjunction with feedback, corrective actions, and supervisory visits. We report our experience implementing an Xpert MTB/RIF EQA program in Vietnam.

**Methods:** During 2013–2015, 5 rounds of PT were conducted using dried-tube specimen (DTS) panels from CDC-Atlanta. Complementary EQA strategies included establishment of a technical working group, rapid review of PT reports, annual meetings to address PT results and nonconformity issues, monitoring of quality indicators region-wide, supervisory visits to nonconforming laboratories using a structured checklist, and feedback to the laboratories to enable corrective actions.

**Results:** In round one, 86% (18/21) of participating laboratories reported satisfactory PT results (≥80% concordance with expected results). Interventions to laboratories with <80% concordance included phone and email support and site visits. Satisfactory performance increased to 90% (18/20) in round two; 91% (20/22) in round three; 94% (32/34) in round four; and 100% (36/36) in round five. The following challenges were identified: 1) Transfers of trained staff and lack of new staff training and competency assessment, 2) High error rates (>7%; primarily codes 5006/5007), 3) Reagent stock-outs, 4) Instrument module errors and improper functioning or failure of equipment, and 5) Lack of timely calibration and maintenance.

**Conclusion:** EQA improves the quality of testing in participating laboratories, and the establishment of PT panel production in-country is underway to increase coverage and strengthen sustainability of the EQA program in Vietnam. Rapid provision and review of PT reports, regular monitoring of quality indicators, prompt technical support, and implementation of corrective actions are essential to enable Xpert MTB/RIF continuous quality improvement.
Bota D, Bunyasi A, Amayo A, Wachira J, Okello J
1. Management Sciences for Health, Kenya
2. National Public Health and Laboratory Services (NPHLS), Kenya

Biosafety Training Program: The Process of Conducting Sustainable Biosafety Trainings and the Role of Management in Order to Minimize Occupational Exposures to Biohazards and Enhance Laboratory Quality

Background: With the increased estimates of laboratory acquired infections generated from the clinical (diagnostic) and research laboratories, there have been national and county efforts to improve awareness of modern practices with regard to safe pursuit of clinical diagnosis and research innovations through emerging biosafety, biosecurity and bioethical considerations that arise from biological pathogens and other health hazards. The SPHLS-Kenya Project, which came to a closure on 29th September 2015, was funded by CDC-PEPFAR and supported a training model to improve infection prevention and control practices and emergency preparedness in Kenya.

Methods: A biosafety technical working group was formed. Sensitization meetings (one day) were carried out with health managers for buy in. The managers then developed training approaches, strategies and identified their managerial role. The county/national team then selected the laboratory officers to be trained and provided the overall coordination and leadership for ownership of the training program. TOTs were trained and biosafety trainings conducted. Site visits were carried out for mentorship and monitoring of the biosafety practices.

Results: Five sensitization meetings were carried out with 257 health managers. The 48 TOTs trained, conducted 40 trainings workshops with 1044 Laboratory HCWs in 44 counties. The facilities trained were drawn from the Ministry of Health 941 (90%), faith based organizations 65 (6%), and others 38 (4%). Biosafety Improvements included improvised eye wash stations 16 (80%), availability of Biological/chemical spill kits 17 (85%), Fire extinguishers 12 (60%), Hepatitis B vaccination 14 (70%), Bucket of sand 15 (75%), Separation of patient reception & testing areas 18 (90%), Development of material safety data sheets 18 (90%), Documentation of PEP procedures 16 (80%) and proper Waste segregation 17 (85%)

Conclusion: For a successful biosafety training program, the management needs to be engaged through sensitization meetings, with their coordination and administrative roles clearly defined for buy in purposes. Notable improvements in biosafety practices, including innovations indicate that the training approach enabled the learners to understand biosafety principles, and motivated them to apply the same to address biosafety challenges.

Learnings From a Public-Private Partnership to Provide High Quality, Efficient and Financially Sustainable Laboratory Services at the National Public Hospital in Tanzania

Background: In 2002 a Ministry of Health/CDC assessment in Tanzania found that laboratory services were one of the weakest links to provision of quality health care. Since 2001, Abbott and its foundation, the Abbott Fund, have partnered with the Government of Tanzania to strengthen the country’s healthcare system including Muhimbili National Hospital (MNH) and the Central Pathology Lab (CPL); this abstract focuses on improvements at the CPL.

Methods: Initially the partnership focused on strengthening the CPL by improving infrastructure, providing equipment service and facility maintenance, donating equipment, reagents and providing over 3000 hours of direct mentorship by Abbott experts. In 2012 the partners recognized the need to develop a financial and professional sustainability strategy, based on the premise that public institutions can attract paying patients to subsidize the costs of all care by offering high quality, in-demand services. Two years into this strategy, Abbott experts conducted an assessment and developed recommendations to further improve the quality and efficiency of the CPL by maximizing equipment and staff efficiency by consolidating 90% of workload into a core lab.

Results: The partnership has resulted in improved quality and efficiency of service, increased revenue and a significant culture change. The Clinical Chemistry and Blood Transfusion units are ISO-15189 accredited. The volume of tests at CPL has increased from 109,071 tests in 2004 to 1,580,912 tests in 2015. Turnaround time for most automated tests is under 90 minutes. Revenue exceeded 2.5 million USD in 2014-2015, allowing over 60% of samples to be processed for free or subsidized while making progress towards covering operating costs. Additionally CPL is generating revenue by processing samples from private clinics.

Conclusion: The CPL’s progress illustrates the strength of a long-term partnership to create a compelling model for sustainably improving laboratory services in a resource-constrained setting.
Performance of HIV Diagnostic Algorithms at 6 Sites in 5 Sub-Saharan African Countries

**Background:** In resource-constrained settings, HIV testing algorithms are based on the use of rapid diagnostic screening tests, allowing high accuracy HIV diagnosis in decentralized testing sites by non-skilled personnel and same day results. Local design and evaluation of the testing algorithm performance is recommended, but rarely performed.

**Methods:** We compared the on-site performance of the HIV testing algorithms at 6 sites in 5 sub-Saharan African countries. In each site, at least 220 positive and 220 negative clients by the on-site algorithm had a specimen sent to the HIV reference laboratory at Institute of Tropical Medicine, Belgium, for testing by a state of art testing algorithm for resource rich settings.

**Results:** Between August 2011 and January 2015, more than 14,000 clients were tested for HIV at the 6 HIV counseling and testing sites and 2786 were included in the study. HIV positivity rate at the testing sites ranged from 8.0% in Baraka (DRC) to 63.7% in Conakry (Guinea). When adjusted to account for the under-representation of negative results by the study design, the sensitivity of the testing algorithms ranged from 89.5% in Arua (Uganda) to 100% in Douala (Cameroon) and Conakry (Guinea). The specificity of the algorithm used was lowest in Douala (98.3%) and highest in Conakry (100%). Overall, 24 (1%) clients would have been misclassified, ranging from 0-8 per site (0-1.7%), with 16 false positive and 8 false negative results. Six false negative specimens were re-tested on-site with a back-up sample and were found positive. Thirteen false positive specimens were similarly re-tested and 9 remained positive.

**Conclusion:** Several sites showed performance below the expectations, with unacceptably high false positive and negative results. Lot validation, respecting incubation time, correct labelling, testing on plasma versus whole blood can reduce the risk of false results. Beside all the quality issues, careful selection of HIV RDTs and algorithms should be conducted regularly in order to keep misclassification as low as possible. Strategies such as retesting at the start of antiretroviral therapy are needed to identify false positive individuals in existing HIV positive cohorts.

**Rapid Improvement of Four Clinical Laboratories in DR Congo: the Accelerated SLMTA Approach**

**Background:** Improving the quality of clinical laboratories in resource-limited settings is an important way to achieve better health outcomes. Prior ICAP preliminary assessments showed that baseline quality standards in laboratories in DRC are very low. ICAP, with the support of the U.S. President’s Emergency Plan for AIDS Relief (PEPFAR) and in partnership with U.S. Centers for Disease Control and Prevention (CDC), therefore conducted an assessment of four general hospital laboratories in Kinshasa, DRC after implementing an accelerated pre-SLMTA process involving intensive mentorship and frequent qualitative evaluation of each laboratory’s technical and managerial performance based on the WHO’s SLIPTA check-list as of July 2015 with the aim of improving baseline statuses at start of SLMTA-proper.

**Methods:** An initial evaluation identified non-conformities in laboratory operating procedures, practices, and performances in each laboratory and plans for improvement were developed. The implementation of these plans was guided by three monthly assessment and mentoring visits to each laboratory. At each visit, WHO SLIPTA checklist and the WHO/AFRO rating system (0 to 5 stars) were used to describe the changes.

**Results:** At the initial evaluation, all four laboratories had 0 stars. At the final month 3 evaluation, two laboratories received two stars, 1 laboratory received one star and the other one remained without a star. Initial performance ratings for all four labs were low (~20%) in three categories of the SLIPTA checklist: document and records management, management review and internal audits. After three months of mentoring, two labs improved in two categories (internal management, management review and internal audits). After three months of mentoring, two labs improved in two categories (internal management, management review and internal audits). After three months of mentoring, two labs improved in two categories (internal management, management review and internal audits). After three months of mentoring, two labs improved in two categories (internal management, management review and internal audits). After three months of mentoring, two labs improved in two categories (internal management, management review and internal audits). After three months of mentoring, two labs improved in two categories (internal management, management review and internal audits). After three months of mentoring, two labs improved in two categories (internal management, management review and internal audits). After three months of mentoring, two labs improved in two categories (internal management, management review and internal audits). After three months of mentoring, two labs improved in two categories (internal management, management review and internal audits). After three months of mentoring, two labs improved in two categories (internal management, management review and internal audits).

**Conclusion:** The use of the accelerated SLMTA approach during each of three monthly evaluations and mentoring improved the technical and managerial performance of four low-performing general hospital laboratories in a short period of time giving a head start for SLMTA implementation.
Near-patient Access to Laboratory Results by Clinicians at a Tertiary Hospital in Zambia

Background: The US Centers for Disease Control and Prevention (CDC) through the Association of Public Health Laboratories supported the implementation of an electronic laboratory information system (LIS) at the University Teaching Hospital (UTH) Laboratory in Zambia in 2013. The LIS has enhanced operations and streamlined laboratory tasks including among others, tracking of specimens, monitoring turnaround times of tests, easy archiving of results and patient information, access and retrieval of laboratory results, and easy collation of test statistics. Despite these improvements, timely access to results by clinicians remained a challenge as results were printed in batches at specific times (06:00 AM and 11:00 AM), sorted and subsequently hand-delivered to wards and clinics approximately 2-3 hrs after printing. Furthermore, some of the results delivered to the wards/clinics could not be traced. To address this challenge, UTH Laboratory linked wards and clinics to the LIS to enable instant near-patient access to authorised laboratory results.

Methods: The hospital did a gap analysis of the needs to connect all the wards and clinics to the LIS. Through collaboration with various partners that included CDC, funds were secured to extend the Laboratory local area network to all the wards and clinics. The laboratory provided computers to some wards while others were bought by clinical departments themselves.

Results: The Main Intensive Care Unit (MICU) and Adult Medical Emergency Unit (AMEU) were successfully linked to the LIS and are accessing results as soon as they are authorised without depending on laboratory couriers and medical clerks. The remaining 52 wards including clinics were expected to be connected to the LIS by June 30, 2016.

Conclusion: Linking of the MICU and AMEU to the LIS has facilitated access to laboratory results by clinicians immediately as they are authorised. These benefits are currently being expanded to all the clinical areas.

Monitoring and Evaluation of South Africa’s National ART Program Using Laboratory Based Data Dashboards

Background: South Africa has over 6.0 million HIV(+) individuals of which over half are on ART. Monitoring patients on ART is a crucial element of quality patient care. Managers lack timely and accurate information on diagnostic and treatment outcomes in their jurisdictions. Information on the proportion of patients not virally suppressed, not receiving a viral load test according to guidelines or being alerted to CD4 count < 100 cells/mm3 is critical for quality improvement. Furthermore, with the implementation of the new paediatric guidelines, enhanced monitoring of birth testing will be essential to improve early initiation and reduce early infant morbidity and mortality. We report on the development of data dashboards using a national laboratory database to monitor South Africa’s national treatment program.

Methods: The National Health Laboratory Service (NHLS) Corporate Data Warehouse (CDW) maintains a repository of the public sector CD4 counts and viral load tests results since April 2004. As of March 2015 there were 26,916,857 CD4 count tests and 13,394,501 viral load tests stored in the CDW as well as over a million early infant diagnosis (EID) PCR results. While this data has value for long-term retrospective analysis, it is also useful for close to real-time monitoring of testing in with the ability to improve individual patient care. We have created a unique patient identifier using probabilistic matching to longitudinally track patient lab results.

Results: Figure 1 (System won’t allow figure to be included.) shows the landing page of the dashboard with summary national indicators for Q1 2015. The dashboards show the % of CD4 count tests 500 (69%), 350 (46%), 200 (23%), and 100 (11%) cells/mm³, % of viral load tests < 1,000 copies/ml (82%), % of HIV+ persons in care and on ART who have a VL done at least annually (72%). Similarly, a paediatric dashboard has been develop to address the specific needs of the PMTCT programme. These metrics are calculated at the national, provincial, district level and facility level.

Conclusion: This activity has highlighted the enormous value in using the centralized data stored at the NHLS CDW for M&E for public health purposes. With a moderate investment in the development of the dashboards a new source of M&E data of the CCMT program has been created with the possibility that this information can be used at the individual patient level in the future.
Laboratory Quality Management System: Key Driver to Accreditation

Background: Since 2014, the laboratory quality management system has been the driving force toward accreditation at Lodwar county and referral hospital. The laboratory supports 172 bed capacity referral facility which receives patients from Uganda, Ethiopia and Southern Sudan. Due to this influx, the county referral laboratory has embraced Strengthening Laboratory Management toward Accreditation (SLMTA) program through actively utilizing and appreciating Stepwise Laboratory Quality Improvement Process towards Accreditation (SLIPTA) checklist in preparation of ISO 15189 accreditation.

Methods: The laboratory department started the quality improvement through carrying out a baseline assessment by trained laboratory quality internal auditors both from National Public Health Laboratory Services (NPHLS) and Becton Dickson (BD) in 2014. The identified gaps were addressed by involving the hospital management, clinicians, laboratory staff, and maintenance staff towards the mission of sustainable quality practices. The laboratory manager and quality officer were trained and mentored on how to implement the quality system essentials. Improvement projects were initiated which included but not limited to, creating personnel files, equipment maintenance, safety audit, sample rejection rate, documentation (Quality Manual, Biosafety Manual and SOPs) and personnel competency. The follow up action was done by use of SLIPTA checklist.

Results: The laboratory moved from zero stars to two stars. There was overhauling renovation and reorganization of laboratory floor plan to avoid spaghetti movement. One Quality and Biosafety manual was developed. In total 48 out of 74 SOPs were developed and approved for use. Twelve updated personnel files were created, and staff competency was done on 10 out of 12. Sample rejection rate reduced from 22% to 2%. Equipment down time reduced from 10% to 3%. Environmental temperature reduced from 37°C to 20°C through installation of five functional air-conditioners, and staff punctuality increased from 20% to 74%.

Conclusion: Laboratory quality management system gradual implementation has been realized at Lodwar county and referral hospital laboratory through SLMTA process. Tremendous positive changes have taken place due to hospital management buy-in and laboratory staff teamwork. Continuous quality improvement through the support of management will lead to accreditation.

diagnostic accuracy of 8 HIV RDTs and 2 Simple Confirmatory Assays from 5 Sub-Saharan African Countries

Background: WHO-pre-qualified HIV rapid diagnostic tests (RDT) showed very good performance in initial evaluations on an international panel of specimens, however reports from several African countries highlight performance issues that seem to vary geographically. We aimed to evaluate the performance of eight HIV RDTs and two simple confirmatory assays individually using specimens from 5 sub-Saharan African countries.

Methods: Specimens collected in 6 sites in 5 sub-Saharan African countries were tested at HIV reference laboratory at the Institute of Tropical Medicine, Antwerp, with state of the art reference tests and with 8 RDT and 2 confirmatory assays. Weighted analysis was carried out to adjust for sampling strategies.

Results: A total of 2785 samples collected from August 2011 to January 2015 in the 6 sites were tested at the ITM. All RDTs showed very high sensitivity, ranging from 98.9% for First Response HIV 1-2.0 to 100% for Determine HIV 1/2, SD Bioline HIV 1/2 3.0 and INSTI HIV antibody test. Specificity varied from 90.4% for First Response HIV 1-2.0 test to 99.7% for HIV 1/2 STAT-PAK. The specificity also varied greatly with the origin of specimens. The level of concordance between the users was high. For confirmatory assays, the total sensitivity and specificity was 100% and 98.2% for ImmunoComb II HIV 1&2 CombFirm (IC) and 99.9% and 97.5% for Geenius HIV 1/2. Indeterminate rates were 8.9 % for IC and 9.4% for Geenius HIV 1/2.

Conclusion: Overall, the performances of individual RDTs were lower than in the WHO evaluations and only HIV 1/2 Stat-Pak would have passed the suggested thresholds of >99% sensitivity and >98% specificity. However, acceptable RDT-based algorithms could be found when combining them according to WHO-recommended algorithms. These results confirm the geographical differences in HIV RDT performance and highlight the importance of designing locally-adapted algorithms following the latest WHO recommendations, particularly in a context of increasing testing coverage with the test and treat strategy.
**ORAL SESSION 3.3**

**NETWORKING TO SUPPORT GLOBAL HEALTH**

**DATE:** Thursday 8 December  
**TIME:** 11:00 – 12:30  
**ROOM:** CTICC 2.4  
**CO-CHAIRS:** Ralph Timperi, African Society for Laboratory Medicine, United States, and Judith Shang, Centers for Disease Control and Prevention, Cameroon

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**11:00**

Robert N. Maina, Doris M. Mengo  

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**Most Common Nonconformities Reported from Medical Laboratories Assessments by Kenya Accreditation Service (KENAS) Using ISO 15189:2012 Standard**

**Background:** The current edition of ISO 15189 standards was published in the year 2012. The standard which is based on ISO 9001 (Management requirements) and ISO/IEC 17025 (Technical requirements) is largely used by the accreditation bodies worldwide in assessing the technical competencies of medical laboratories. Some requirements of this standard are more difficult to meet for most laboratories seeking accreditation. Highlighting the problematic areas of this standard is needed to help the laboratories prepare adequately for accreditation.

**Methods:** Nonconformity reports were retrieved from the Q-pulse software at KENAS offices for 10 accredited laboratories assessed between January 2014 and December 2015. Nonconformities included in this study were from the initial assessment (pre-accreditation) and the surveillance assessment conducted 6 months post accreditation. Nonconformities raised in the 10 laboratories in the initial and surveillance assessments were compared to identify common gaps and the trends over the period of 2 years. Assessments were conducted using ISO 15189:2012 checklist.

**Results:** A total of 117 nonconformities were reported in the initial assessment compared to 72 reported in the surveillance assessment. There was a significant reduction (p=0.0197) in the number of nonconformities reported in surveillance assessment compared to the initial assessment. Ten most common nonconformities were related to: document control, evaluation of referral laboratories, internal audit (management requirements) specimen transportation, method validation, uncertainty of measurement, proficiency testing, quality control, equipment calibration and reagent handling (technical requirements). These nonconformities occurred in all 10 laboratories at the initial assessment. Nonconformities related to internal audit, quality control and proficiency testing recurred in 6 laboratories at the surveillance assessment.

**Conclusion:** Common nonconformities identified in this study reveal that technical requirements present the biggest challenge for most laboratories. Laboratories improved substantially by reducing the nonconformities at surveillance assessment. This could be attributed to ISO 15189 driven continuous quality improvement.

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**Standardizing Laboratory Quality Services in Swaziland: Strengthening Laboratory Quality Improvement Process Towards Accreditation (SLIPTA) Through Embedded Mentorship**

**Background:** Swaziland has 22 major laboratories and 38 mini-laboratories supported under the network of Swaziland Health Laboratory services (SHLS). In partnership with Columbia University-ICAP, SHLS introduced an embedded mentorship framework for Strengthening Laboratory Quality Improvement Process Towards Accreditation (SLIPTA) in the major laboratories to improve quality laboratory services and patient management.

**Methods:** In November 2015, a baseline audit of major laboratories was conducted by certified auditors using SLIPTA Checklist. A phased implementation approach of embedded mentorship was designed and operationalized starting in January 2016. Review meetings of the embedded mentorship were conducted on a biweekly basis followed by additional supportive supervision. At the end of 6 weeks of mentorship, interim audits were conducted and laboratory performance was scored.

**Results:** 21 of the 22 major laboratories were audited with a score ranging from 24% to 72% with a median of 46%. Three labs (14%) scored 2 star levels (>65%), 5 (24%) scored 1 star level (>55%) & the remaining 13 (62%) laboratories scored 0 star level (<55%). Nine laboratories received the first 6 weeks of embedded mentorship between January and April 2016. Five biweekly review meetings were conducted. Interim audits were conducted in 8 facilities where 5 facilities improved from baseline: National TB reference laboratory (70% to 73%), National Molecular Reference laboratory (54% to 58%), Mbabane Government Hospital (31% to 51%), Sithobela Health Center (24% to 43%), and Phocweini clinic (30% to 50%). However, 3 facilities showed a decrease from baseline: Central Reference Laboratory (61% to 47%), National TB hospital (58% to 55%), & Good Shepherd hospital (62% to 51%). Weakest areas of performance were in Management Reviews, Evaluation & Audits, Identification of non-conformities, corrective & preventive actions, and signing & approval of developed documents.

**Conclusion:** Embedded mentorship is a tool that may contribute to improved performance of laboratories through promoting the awareness of laboratory personnel and other health providers and instituting a culture of laboratory quality management systems. Root cause analysis of weakest areas will help facilities to reinforce the quality improvement process.
11:20

Jean Pierre S. Kahodi
TB/VIH, MSH, Kinshasa, Kinshasa, Congo (the Democratic Republic of the).

Improving TB/HIV Case Detection Rate Through the Integration of Private Health Facilities in the Network Controlled by the Health Zone: An Experience from the Bunia Health Zone in the DRC

Background: HIV/AIDS and Tuberculosis (TB) are major contributors to the burden of disease in sub-Saharan Africa. Many cases are missed when people living with HIV (PLHIV) are not screened for TB, and TB patients are not tested for HIV. This is a crucial intervention in DRC because of the high TB/HIV co-infection rate. Bunia is among the health zones selected in the Province Orientale at East of The DRC. This study aimed to assess the impact of HIV/TB case detection at Bunia Health zone co-infection service delivery points.

Methods: 26 providers of 12 new private health facilities were trained in the detection and management of TB/HIV co-infection in June 2015. TB/HIV data validation meetings were held regularly in August 2015 with the participation of all trained staff to ensure that tasks were performed as intended by the trainings. It was also an opportunity to correct data errors.

Results: The results showed that from July to December 2015, HIV-TB co-infection activities in 12 health centers enabled confirmation of 60 TB cases among new HIV patients, and 48 confirmed HIV positive cases among new tuberculosis patients. This is a considerable increase from 24 combined TB and HIV cases detected in the same period in 2014. In addition, 202 PLHIV who were not co-infected were promptly put on INH preventive treatment at the 12 co-infection TB/HIV sites in the Bunia health zone.

Conclusion: The integration of private health facilities in the network of care controlled by the health zone making structures has increased case detection and improved management of TB/HIV cases in 12 TB/VIH co-infection sites in the Bunia health zone.

11:45

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Using a Quality Indicator Dashboard to Track Laboratory Performance at a Tertiary Hospital in Zambia

Background: The US Centers for Disease Control and Prevention through the Association of Public Health Laboratories supported the implementation of an electronic laboratory information system (LIS) at the University Teaching Hospital Laboratory in 2013. The LIS has enhanced operations and streamlined laboratory tasks including among others, tracking of specimens and monitoring turnaround times (TAT). Using information from the LIS, the laboratory created a dashboard for easy visualisation of quality indicator data and analysing it for continual improvement.

Methods: Laboratory managers retrieve test statistics from the LIS and submit it to the Quality Officer on a monthly basis. The Quality Officer collates the data and inputs it into the dashboard built in Microsoft Excel®. Cells on the dashboard are automatically shaded green or red depending on predefined cut-offs for each quality indicator. Green denotes acceptable performance while red denotes unacceptable performance. Quality improvement projects are undertaken to correct poor performance. In this abstract we present TAT data for TB culture and full blood count (FBC) as examples of how the dashboard was used to foster quality improvement. The quality indicator used was the proportion of results reported within target TAT. Effectiveness of the corrective actions taken was reviewed and tracked on the dashboard in subsequent months.

Results: After root cause analysis and interventions, the proportion of TB culture results reported within TAT improved from 40.4% (505/1,259 results reported) during January – August 2015 to 83.1% (580/698) during September 2015 - March 2016, exceeding the target of 80%. Despite being below the target of 80%, proportion of FBC results reported within established TAT improved from 52.5% (16,773/31,974) recorded during August - December 2015 to 76.7% (5,855/7,630) in January - April 2016 after intervention.

Conclusion: Tracking of quality indicators enables management to review laboratory performance and make evidence-based decisions for continual improvement.

Background: CD4 lymphocyte levels among HIV positive persons are used in clinical management. There is evidence that CD4 lymphocyte reference intervals are different in African settings compared to non-African settings. Locally-relevant CD4 lymphocyte reference intervals are important to provide a clearer understanding of patient care in local populations. We describe a sub-analysis of the 2º- Kenya AIDS Indicator Study to establish national ranges of CD4 lymphocyte subsets in HIV+ and HIV- adults in Kenya.

Methods: This was a national population-based household survey conducted from October 2012 to February 2013. Data on socio-demographics was collected using a structured questionnaire administered to consenting eligible participants aged 15-64 years. Blood was collected and tested for HIV in a central laboratory. All HIV positive samples and 10% of HIV negative samples were tested for CD4 lymphocyte using a flow cytometer. Median CD4 counts and reference ranges, calculated as 2.5th and 97.5th percentiles of the distribution of reference values were determined, using the Clinical and Laboratory Standards Institute guidelines. Wilcoxon rank sum test was used to test for differences in rank values of the raw scores. Data were weighted to account for sampling probability and adjusted for non-response.

Results: Among 10,963 HIV- and 648 HIV+ survey participants, 832 (7.5%) and 310 (48.0%) respectively, had CD4 counts available. No significant differences were noted in sex, age, and geographic region between persons with and without CD4 test results. The median CD4 count and 95% reference range was 940 cells/mm³ (range 226-1,770) for HIV+ persons and 543 cells/mm³ (range 104-1,557) for HIV+ persons. The sex distribution among HIV+ persons was 49.8% female vs. 50.2% male and among HIV+ persons was 62.1% female vs. 37.9% male. HIV- males (860 cells/mm³ (range 239-1,636) had significantly lower CD4 reference range compared to HIV- females (1014 cells/mm³ (range 189-1,871) (p<0.001). Among HIV+ persons, 31.0% (95% CI 23.8-38.2) had CD4<350 cells/mm³, the national threshold for ART initiation, and 45.7% (95% CI 38.5 – 52.9) had CD4<500 cells/mm³.

Conclusion: Reference ranges for the lymphocyte subsets among HIV- persons in Kenya were wider and lower than international reference ranges. This finding should be used to inform clinical management of HIV infection and other immune-based diseases in Kenyan populations.

Impact of the Laboratory Information Management System for ISO 15189 Accreditation of the National TB Reference Laboratory in Mozambique

Background: The National Tuberculosis Reference Laboratory (NTRL) of Mozambique was established in 1987 to provide diagnosis, treatment and monitoring of patients with tuberculosis. In 2011, the NTRL under its Continuous Quality Improvement plan decided to improve data management and achieve accreditation. NTRL was using a paper-based system for all forms and records, which is inefficient, requires timely checking to assure accuracy and retrieve information and adds to test turn-around time (TAT).

Methods: NTRL implemented the SLMTA (Strengthening Laboratory Management System Towards Accreditation) program as part of its overall Quality Management System. In 2012, the NTRL received support from Association of Public Health Laboratories (APHL) for SLMTA and to introduce a Laboratory Information Management System (LIMS) for workflow improvement and data management. Retrospective review of laboratory notebooks was done and compared with the post-LIMS implementation for simplicity of methods, data quality, retrieval and storage, acceptability by the laboratory staff and general benefits to the laboratory.

Results: The quality of data and information management at the NTRL after LIMS implementation (2012-2015) improved significantly compared to 2008-2011 and supported accreditation to ISO 15189 standard. In post-LIMS, retrieval of patient data was timely, workflow TAT including result reporting was improved, transcription errors were minimal. New technologies and mHealth tools have been introduced in the laboratory algorithm allowing measurement and assessment of testing.

Conclusion: LIMS is a key component of a laboratory quality management systems and enables improve quality, monitoring, retrieval and accurate documentation, which supports accreditation to ISO 15189 standard.
Impact of Decentralisation of ART Laboratory Services on TAT in Lusaka District – A Case of Capacity Building for local laboratories

Background: Lusaka is the capital city of Zambia with a population of about 2 million people. Healthcare services in Lusaka including antiretroviral therapy (ART) to about 180, 369 patients (89%) of those on ART are provided through Ministry of Health (MOH) in 40 health facilities. Before October 2014, ART laboratory services (CD4 monitoring, Full Blood Count – FBC and Clinical Chemistry) were centrally provided by a partner called Centre for Infectious Diseases Research in Zambia (CIDRZ) which collected specimens in health facilities, transported them to their laboratory for analysis and returned results within five (5) working days. This left a declined district capacity to provide ART laboratory services onsite. Hence, MOH and its partners embarked on an initiative to transition ART laboratory services back to facilities where patients were being seen.

Methods: The US Centers for Disease Control and Prevention (CDC), through the Association of Public Health Laboratories (APHL) supported the capacity building for laboratory services at selected facilities (Kamwala, Kanyama and Matero Reference Health Centres). Automated analysers (FACS Count for CD4, ABX Micros for FBC and ABX Pentra C200 for Clinical Chemistry) were procured, installed and facilities integrated to draw reagents and supplies from MOH Central Medical Stores.

Results: Three health facilities were strengthened to provide onsite ART laboratory services by October 2014 resulting in reduction in turnaround time (TAT) for CD4, FBC and alanine aminotransferase (ALT) from 5 days in December 2013 to 24hrs by December 2015.

Conclusion: The impact of decentralization of the laboratory services through the provision of laboratory equipment was evident with local capacity to provide onsite ART laboratory services, reduction in TAT and full integration of operations with the MOH structures thereby guaranteeing sustainability of ART laboratory services provision even after partner support is withdrawn.
Strengthening the Quality Management Systems of Port Reitz Hospital Laboratory in Kenya through Laboratory Institutional Mentorship Programme

Background: Kenya is home to high-performing research laboratories accredited to international standards; well-funded by various donor organizations and equipped with the state-of-the-art facilities, equipment and competent staff. However, very few public clinical laboratories have been accredited to international standards due to lack of functioning quality management systems. In 2014 during the SLMTA roll-out in Kenya, Port Reitz Hospital Laboratory was enrolled in the Strengthening Laboratory Management Toward Accreditation (SLMTA) programme with the aim of quality improvement and accreditation. To address the few mentors issue, Port Reitz Hospital Laboratory was twinned with KEMRI-Wellcome Trust research laboratories to provide institutional mentorship and accelerate SLMTA uptake.

Methods: The KEMRI Wellcome Trust Research Laboratories is a GCLP accredited donor research laboratory, while Port Reitz Hospital Laboratory is an un-accredited public clinical laboratory. Three SLMTA workshops were interspersed with three-month periods of improvement project implementation and mentorship through exchange visits and facility based trainings. To evaluate the progress, assessments were conducted at baseline, mid-term and exit using Stepwise Laboratory Quality Improvement Process Towards Accreditation (SLIPTA) audit checklist. The scores were recorded as points and converted into a zero- to five-star scale to examine the results of laboratory quality improvement through the institutional mentorship.

Results: At baseline assessment, the laboratory was at zero star level with 26 points (10%) out of the total 258 points. At mid-term, the laboratory was still at zero star level, but greatly improved by 40% to garner 126 points (50 %) out of the total 258 points. At exit, the laboratory achieved two stars level with a score of 174 points (67%) out of the total 258 points. This remarkable improvement from 10% to 67% within 9 months was attributed to the institutional mentorship.

Conclusion: The partnership of institutional mentorship is a model that holds promise for future collaborations between public clinical laboratories and donor research laboratories in their regions for laboratory quality improvement. Where they exist, such laboratories may be valuable resources to be used judiciously so as to accelerate sustainable quality improvement initiated through SLMTA.
Establishing National Malaria Slide Bank: Key Strategy for Implementing Reliable Proficiency Testing External Quality Control and Microscopy Training Programs

Background: Despite the provision of microscopy trainings for health workers and implementation of proficiency testing (PT) external quality assurance (EQA) programs implemented in most countries, few countries have the capacity to produce and use validated blood film slides to ensure the sustained reliability of the trainings and EQA programs. ICAP, with support from the U.S. President’s Malaria Initiative (PMI) has partnered with the Ethiopian Public Health Institute (EPHI) and MalariaCare for mass production of validated malaria blood film slides with the aim of establishing the nation’s first malaria slide bank.

Methods: Plasmodium falciparum (Pf) and Plasmodium vivax (Pv) positive slides were prepared at Adama Malaria Control Center from blood specimens collected from consenting adult patients. Negative slides were prepared from blood collected from volunteer visitors from non-malaria endemic countries with no history of malaria and travel to malarious areas. Between 200-400 blood film slides were prepared from each donor. The blood film slides were examined by WHO-certified expert microscopists for species identification and then characterized and validated by Polymerase Chain Reaction (PCR). The slides were archived using a custom-made slide bank database and storage cabinets with capacity for 10,000 slides.

Results: A total of 10,742 (9,045 Pf and Pv positive; 1,697 negative) validated blood film slides were collected from 35 donors. Validated malaria slides sets containing blood films slides of negative, Pf, Pv, mixed Pf/Pv and Borrelia spp will be used during in-service and pre-service malaria microscopy trainings at regional reference laboratory training centers and pre-service laboratory teaching universities, respectively. In addition, 995 facilities that are currently enrolled in regional PT EQA programs in 5 regions will receive the validated malaria PT slides.

Conclusion: Establishment of the slide bank enabled the national malaria program to use standardized and validated slides for quality in-service and pre-service malaria microscopy trainings, competency assessment of microscopists, laboratory mentorship programs, and regional malaria microscopy proficiency testing EQA programs.
Validation of the Cepheid GeneXpert for Detecting Ebola Virus in Semen

Background: After the period of sustained Ebola virus (EBOV) transmission during the 2013-2016 epidemic, sporadic clusters of EBOV were reported in West Africa. The persistence of EBOV in body fluids other than blood, including semen, and the documentation of at least one case of sexual transmission led the World Health Organization (WHO) to recommend that male Ebola virus disease (EVD) survivors refrain from unprotected sexual intercourse for at least 12 months following recovery or until their semen is confirmed to be EBOV-free. Given the public health implications of viral persistence in the semen of male survivors we have validated the detection of EBOV RNA in semen using the Cepheid Xpert Ebola assay.

Methods: Whole semen samples were obtained from uninfected donors and spiked with inactivated EBOV virus to generate a series of samples containing 100-100,000 copies/mL of EBOV. Each 100uL sample was lysed in the 2.5mL lysis buffer provided in the test kit, incubated for 10 minutes, and then treated with dithiothreitol (DTT) followed by another 10-minute incubation.

Results: The Cepheid Xpert Ebola assay had a limit of detection of 1,000 copies/mL in semen and 275 copies/mL in blood. Limits of detection increased with longer intervals between collection and testing. However, acceptable results were obtained up to 72 hours after specimen collection. Un-spiked blood and semen donor samples were all undetected and all commercial controls controls were valid.

Conclusion: Similar to its performance characteristics in blood, the Cepheid Xpert Ebola assay is accurate and precise for detecting EBOV in whole semen. Testing of these fluids conducted within 72 hours of specimen collection was acceptable for all samples down to the limit of detection, and specimen-specific extraction controls are necessary. A validated assay for EBOV RNA detection in semen informs the care of male survivors of Ebola, as well as recommendations for public health.

Breaking the Ebola Virus Disease Chain of Transmission: the Role of Montserrado County Sectorial Surveillance System Liberia

Background: World Health Organisation (WHO) declared Ebola virus disease (EVD) a Public Health Event of International Concern (PHEIC) in August 2014. This followed the largest West Africa EVD epidemic both in magnitude and geographic spread with morbidity and mortality exceeding all previous outbreaks combined. Montserrado county sectorial EVD surveillance system initiative in 2015 was aimed to achieve a more effective and rapid response to EVD control in Liberia through decentralisation of the response structure. The objectives of the evaluation were to assess the attributes of the system, evaluate the distribution and spread of EVD and communicate findings to key stakeholders for appropriate actions.

Methods: The 2001 CDC updated guidelines for evaluating public health surveillance system, was used for the evaluation. A suspected case of EVD was defined as “any person with an illness characterized by a history of acute fever and three or more acute clinical symptoms or signs of hemorrhage or death of a person with such a history or any unexplained death”. Sector 3 surveillance data from January to March, 2015 was reviewed and analysed, and stakeholders were also interviewed.

Results: A total of 108 suspected cases were captured by the system. The median age of suspected cases was 37 years, range (0 – 91) with more cases recorded among males 58 (54%) with Zone 1300 recording the highest no of cases 41(38%), 88 (82%) of the suspected cases were dead cases.

Conclusion: The system was adjudged useful, simple, acceptable, flexible and sensitive. More dead suspected cases was captured by the system implying improved burial practices, decreased secret burials and decline in community resistance as a result of effective, holistic community engagement and psychosocial support. The surveillance data generated serve to guide decision making at the sector and national levels regarding planning, implementation and coordination of EVD control strategies. Sustainability of Montserrado of the EVD surveillance continues to pose a challenge since it is donor driven, holistic ownership of the system by the Liberian ministry of health and social welfare remains the eminent solution.

Background: Measles epidemic usually occurs during the dry season from November to May. It has its greatest incidence below 2 years of age in the developing countries. A suspected measles outbreak in Otodogbame community, Eti-Osa Local government was reported. We investigated to confirm the outbreak, describe the outbreak, and institute measures to control the current outbreak and prevent a future re-occurrence.

Methods: Case definition of measles was given as any person with fever and maculopapular generalized rash and cough, coryza or conjunctivitis or any person in whom clinician suspects measles from Dec to Feb 2016 residing in Otodogbame community. We line listed cases and did a descriptive analysis of the outbreak, we collected data on age, date of onset of rash, outcome of infection, vaccination status and others. We calculated attack rate (AR) and Case fatality rate (CFR). Twenty blood samples were collected and sent to the laboratory for confirmation.

Results: Eighty-two cases were line listed, 92.68% (76/82) were under five, of these 59.76% (49/82) were 2 yrs and below. Male constituted 58.54% (48) of the cases. Age specific attack rate was 134/100000 population for below 5yrs and 15/100000 for five years and above. CFR is 30%, 20 out of 25 deaths were 2 years and below (80% of total death) and the 20 had zero doses of measles. All the blood samples were measles IgM positive.

Conclusion: The high proportion of unvaccinated resulted in increased accumulation of susceptible leading to the fatal outbreak and late response of health workers. Public health measure implemented during the outbreak were essential in containing the transmission and working with the community led to a collaborative effort. There is need to strengthen routine and supplemental Immunization to hard to reach slums area of Lagos State.

Survey of Influenza A Virus and Subtype (A/H5N1) Infection Among Poultry Workers Exposed to Infected Birds in Jos, Plateau State

Background: Highly pathogenic avian influenza (HPAI) virus H5N1 is known to cause considerable damage to the poultry industry and poses a threat to human health. This work was design to determine the prevalence of influenza A IgG antibody and subtype /H5N1 virus among poultry workers in Jos, Plateau State, Nigeria.

Methods: Eighty six (86) blood and 100 throat swabs samples were collected from consented poultry workers in farms confirmed to be affected with avian influenza A virus. Enzyme Linked Immunosorbent Assay (ELISA) and Polymerase Chain Reaction (PCR) methods were used for testing. Data were analyzed using SPSS Version 21.0 for Chi square and values of P < 0.05 were considered significant.

Results: Results showed that 59.3% of the poultry workers were positive for influenza A IgG antibody. The highest prevalence rate of 45.1% was observed in age group 14-23 years. Female poultry workers had higher prevalence of influenza A IgG (52.9%) compared to male workers (47.2%). Hired poultry workers had 94.1% prevalence of influenza A virus, while farm owners had 5.9% prevalence. Higher prevalence of 76.5% of influenza A virus was observed in those who had contact with dead birds than those with sick birds 23.5%. Coverall was the best personal protective equipment that protected the poultry farmers. All throat swabs of poultry workers analyzed using PCR were negative for influenza subtype A/H5N1 virus.

Conclusion: The prevalence of 59.3% of influenza A virus reflects endemicity in Jos. The negative PCR result for H5N1 does not imply the absence of human infection with H5N1. The coexistence of human flu viruses and avian flu viruses (especially H5N1) could provide an opportunity for genetic material to be exchanged, possibly creating a new virulent influenza strain that is easily transmissible and lethal to humans.
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Dengue Virus Antibodies in Patients Presenting with Pyrexia Attending the Jos University Teaching Hospital, Plateau State, Nigeria

Background: Dengue virus infection is one of the major global public health challenges. The virus is transmitted by Aedes mosquitoes. Despite the public health relevance, there is paucity of data on the prevalence of DENV infections in Jos. The study was aimed to determine prevalence of Dengue virus infection among febrile patients at Jos University Teaching Hospital (JUTH).

Methods: The study is a cross-sectional that consecutively recruited 118 participants presenting with pyrexia at JUTH. Participants who were malaria negative using rapid diagnostic tests (mRDT) with specific symptoms defined as probably dengue by WHO (fever and symptoms such as headache, rash, nausea/vomiting, joint pain, fatigue, retro-ocular pain and haemorrhage) were screened for dengue IgG and IgM using Dengue NS1 Antigen and IgG/IgM antibody duo panel RapiCard TM InstaTest and ELISA-based kit.

Results: Out of a total of 118 participants recruited for the study, 27.9% were found to be positive for anti-DENV antibodies. Among the 33 dengue positive cases; anti-DENV IgM (11.0%), IgG (14.4%) while IgM/IgG was 2.5%. The highest prevalence was among aged 21-30 years (4.3%) of IgM, IgG (9.5%), and IgM/IgG (4.8%). The least observed frequency was aged 1-10 years (8.3%), Higher prevalence was observed in male (19.0%, 21.4% and 2.4%) for IgM, IgG and IgG/IgM respectively, P = 0.045. Both IgM and IgG were common among male (19.0% and 21.4%) than female (6.6% and 10.5%). Febrile symptoms were associated with anti-DENV and was statistically significant except for body rash and retro-ocular pain.

Conclusion: The study showed that dengue virus infections accounted for significant cases of acute undifferentiated fever among febrile patients. Further larger studies are needed including the use of molecular methods to investigate the dengue virus infection.

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Les Cas de Febrilite Chez les Enfants Venus en Consultations Dans Les Hopitaux au Cameroun Sont Dus a la Dengue

Background: Au Cameroun, il existe peu de données sur la circulation du virus de la dengue et ses conséquences sur les enfants. Pourtant, les symptômes de la dengue sont similaires à plusieurs pathologies des pays tropicaux. Il s’avère difficile de poser un diagnostic différentiel entre la dengue, paludisme et fièvre typhoïde sans faire appel à des tests au laboratoire. Notre travail vise à montrer l’implication de la dengue dans les cas de fébrilité chez les enfants de 0-15 ans.

Methods: Nous avons mené au cours de la période allant de Février à Mars 2016, une étude épidémiologique, observationnelle et transversale dans huit structures hospitalières de quatre régions du Cameroun (Centre, Extrême-Nord, Littoral et Ouest). Chaque parent ayant consenti à faire participer son enfant à fournir des informations le concernant. Des échantillons sanguins et selles ont été prélevés. La détermination de l’infection palustre a été réalisée par l’observation microscopique de la goutte épaisse et du frottis sanguin colorés au May Grunwald Giemsa en plus du test de diagnostic rapide. La recherche des salmonelles s’est faite par hémoculture, sur du plasma et par coproculture. Le plasma collecté a été aliquoté puis conservé à -20°C. La recherche de la dengue s’est faite par la détection des anticorps spécifiques anti-virus de la dengue et l’antigène de la protéine non structurale NS1 par immuno-chromatographie tell me fast® puis confirmés par la méthode ELISA.

Results: Chez les 761 enfants présentant un syndrome fébrile et dont le clinicien avait pour impression diagnostique le paludisme et/ou la fièvre typhoïde, 256 cas (33,7%) étaient dus au paludisme, 15 (2,0%) à la fièvre typhoïde et 108 (14,2%) dus à la dengue en plus des cas de co-infections.

Conclusion: Il ressort de cette étude que la dengue est responsable des syndromes fébriles chez les enfants vus en consultation dans les formations sanitaires du Cameroun.
Wednesday, 7 December
LATE BREAKER ORAL SESSION 1.2
MAXIMIZING PUBLIC HEALTH IMPACT THROUGH IMPROVED DIAGNOSTIC ACCESS AND USE

DATE: Wednesday 7 December
TIME: 15:30-16:30
LOCATION: CTICC 2.6
CO-CHAIRS: Robert Matiru, UNITAID, and Timothy Amukele, Makerere University-Johns Hopkins University Research Collaboration Core Laboratory, United States

15:30

Valerie S. Opollo1, Emily Anyango1, Alliance Nkuze2, David Mammani2
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Field Evaluation of Point of Care Cepheid GeneXpert HIV Qual for Early Infant Diagnosis

Background: The POC GeneXpert for EID offers a positive direction towards ensuring that the high morbidity and mortality rates are minimized through decentralization of testing, at the same time ensuring that results are given back to patients within the shortest time possible thus facilitating prompt linkage of HIV-infected children to treatment. We evaluated the GeneXpert HIV Qual EID POC in Homabay County against the conventional platform at the HIV research laboratory, Kisumu, using dried blood spots (DBS).

Methods: Performance of the POC was evaluated against the Roche CAP/CTM HIV-1 qualitative PCR for EID using DBS samples collected from HIV-exposed children. Samples were collected from children of women who were known HIV positive (KP) and those who were newly diagnosed (ND) as HIV positive. The women were accessed at four different service points; the immunization clinic, outpatient and in-patient department and the maternity. Repeat testing was performed to confirm any discrepant results between the two platforms.

Results: A total of 968 women with children aged <18 months of age were included in the study; ND women comprised of 4.1% (n=40) while 95.9% (n=928) were KPs. Out of the 968 POC tests performed on children, 34 (3.5%) were concordantly positive using both platforms. GeneXpert yielded a sensitivity of 97.1% and specificity of 99.9% with an overall machine error rate of 2.1%. After repeat testing to exclude any discrepant results, the POC assay had a sensitivity and specificity of 100%.

Conclusion: POC GeneXpert performs well when compared with the conventional CAP/CTM using DBS therefore indicating promising results of a technology that can be adopted in the laboratory as a near POC and used in the quick diagnosis and linkage to care of children who are found to be HIV exposed; at the same time supplementing the progress of EID in the region.

15:35

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Measuring the Impact and Cost of Uganda’s Specimen Hub Transport System

Background: Many countries in Africa face challenges ensuring that people have access to HIV laboratory services, particularly in hard-to-reach areas. 84% of Uganda’s population lives in rural communities. With viral load (VL) now the standard of care for monitoring the success or failure of antiretroviral therapy, Uganda has taken the decision to use one laboratory, the Central Public Health Laboratory (CPHL) in Kampala, supported by a national specimen hub transport system, to scale up VL testing in the country. A hub is a hospital laboratory that provides diagnostic services to lower level facilities and serves as a conduit for VL samples and other specimens to be referred to CPHL.

Methods: Between January and July 2016, in collaboration with CPHL and the Clinton Health Access Initiative, Pangaea collected quantitative and descriptive data from 5 hubs and 15 lower level facilities, linked to 5 the hubs, using direct observation at the facilities, interviews with key stakeholders, clinic record and patient chart reviews. Data collection focused on testing turnaround time (TAT - blood collection to return of results) and cost.

Results: 100 hubs support 2550 facilities (about 90% country coverage) each with a motorcycle rider who performs daily routes collecting specimens and returning results. The system currently transports 8,000 early infant diagnosis (EID) samples and 15,000 VL samples per week. TAT for EID testing decreased from an average of 69 days before the hub system to 14 days, and VL TAT decreased from an average of 90 days to 28 days in the first year of operation. The all-in cost for specimen transportation and return of results per VL test was USD1.58. Further reductions are expected when VL testing is fully scaled up. If 2017 program targets are met, the cost of transporting one VL sample up to return of results is expected to drop to USD 0.73.

Conclusion: The Hub system is providing unprecedented access to critical HIV diagnostic services in a cost effective way.
Point-of-Care Versus Laboratory-based Screening for Diabetes and Hypercholesterolemia Amongst People Living with HIV: Findings From a Comparative Study in Swaziland

Background: In sub-Saharan Africa, the prevalence of cardiovascular disease risk factors (CVDRF) such as hypertension (HTN), diabetes (DM) and hypercholesterolemia (HC) is rising. Compared to the general population, persons living with HIV (PLWH) have elevated risk of DM and HC, yet routine screening for CVDRF within HIV programs in low-resource settings is rare. We assessed the performance of point-of-care (POC) versus laboratory-based (LB) screening for HbA1c and nonfasting total cholesterol (TC) among adults on antiretroviral therapy (ART) at an urban HIV clinic in Swaziland.

Methods: A convenience sample of 1,826 PLWH ≥40 years on ART was screened for CVDRF, including POC testing of HbA1c for DM and TC for HC. Ten-year CVD risk was estimated using WHO/ISH risk stratification tables. Patients with HTN and/or ≥10% 10-year CVD risk received confirmatory LB testing of whole blood for HbA1c and plasma for TC. Using LB tests as the gold standard, we assessed POC misclassification for diagnosis of DM and HC (using pre-specified cutoffs of HbA1c ≥ 6.5% and nonfasting TC > 6.2 mmol/L), and for CVD risk stratification. We also compared mean differences of POC versus laboratory measures for HbA1c and TC using paired t-tests.

Results: 240 participants had both POC and LB assessment of HbA1c and TC. Based on LB tests, 40 (17%) had HC and 35 (15%) had DM. POC testing correctly classified the presence/absence of DM in 230 participants (96%) and the presence/absence of HC in 227 participants (97%). The use of PO in place of LB misclassified 10-year CVD risk for 18/240 participants (8%). Although POC underestimated TC (mean difference, [95% CI]: -0.22 [-0.30, -0.13] mmol/L) and overestimated HbA1c (0.22% [0.17, 0.26]), the absolute differences were small.

Conclusion: POC testing performed well for DM and HC screening, and may be a viable alternative for rapid CVDRF screening in low-resource settings.

Significantly Improved Antiretroviral Therapy Initiation Rates After the Implementation of Point of Care Early Infant Diagnosis

Background: In Malawi in 2014, less than 20% of HIV-exposed infants received an early infant diagnosis test (EID) in the first two months of life. Further, only 30% of HIV-infected children are on life-saving antiretroviral therapy (ART). We sought to understand the potential patient impact of implementing Point Of Care (POC) EID technologies in Malawi.

Methods: POC EID devices were placed at seven health facilities across Malawi in September 2015. These technologies had national regulatory approval for use within the standard of care in Malawi. Infants between six weeks and 12 months of age and requiring an EID test were included. Data were collected for the six months prior to POC EID implementation for the comparator conventional laboratory-based-group and for six months after POC EID implementation for the intervention group. The Fisher exact test was used to determine the difference between groups.

Results: Over six months, nearly 800 POC EID tests were performed at the seven health facilities. The error rate was 15%. The turnaround time from sample collection to result received by the patient decreased significantly from 57 (IQR: 30 – 84) days using the conventional laboratory-based system to less than one day with POC EID testing (p<0.000). Ninety-nine percent of results were returned on the same day as testing with POC EID compared to none with the conventional laboratory-based group. Of the HIV-infants, the turnaround time between sample collection and ART initiation was reduced from a median of 40 (IQR: 34 - 74) days in the conventional laboratory-based group to less than one day in the POC EID group (p<0.0000). Furthermore, the proportion of infants initiated on to ART increased significantly from 45.8% to 91.1% after the introduction of POC EID (OR: 12.1, p<0.000).

Conclusion: ART initiation rates were significantly improved with the implementation of POC EID testing compared to conventional laboratory-based testing, suggesting that wider decentralization of POC EID would allow for wider access to EID testing, support increased ART initiation, and improve patient outcomes. Furthermore, POC EID testing can be successfully implemented and performed at health facilities by non-laboratory staff.
**Rate of Viral Suppression Among HIV Patients on Antiretroviral Therapy in North Central Nigeria**

**Background:** Scale-up of viral load (VL) testing as a means of monitoring the effectiveness of antiretroviral therapy (ART) is being implemented by the US government agencies, as part of US PEPFAR through Institute of Human Virology Nigeria (IHVN) in the context of UNAIDS 90-90-90 targets, which aims to achieve 90% suppression in persons receiving ART. We examine the rate of VL suppression from patients receiving ART in priority states in North Central Nigeria.

**Methods:** Whole blood samples from patients on ART were collected at 52 healthcare facilities supported by IHVN, processed and sent to Asokoro Laboratory Training Centre (ALTC) for VL assay using COBAS® Ampliprep® / Cobas® TaqMan® Analyzer. VL suppression was defined as HIV-1 RNA < 1,000 copies/ml after 6 months of ART.

**Results:** A total of 11,125 samples from the Federal Capital Territory (FCT) and Nasarawa State were assayed at ALTC between January and August 2016. Out of the assayed samples 9,874 and 1,251 samples returned valid with conclusive results in FCT and Nasarawa States respectively. In FCT, the viral load copies/mL were as follows <1000 = 7,163 (72.5 %) and ≥1000 = 2,711 (27.5 %). For samples from Nasarawa state, the viral load copies/mL are as follows <1000 = 995 (79.5 %) and ≥1000 = 256 (20.5 %).

**Conclusion:** Our study reported that 72.5% and 79.5% suppression rate has been attained in FCT and Nasarawa respectively. The observed rates in Nasarawa may be attributed to direct relationship between the ratio healthcare workers and patients, as well as proximity to facility which may be lacking in a densely populated area as FCT. Challenges associated with viral load scale up include human resource, forecasting and documentation issues. Adherence counselling should be intensified for patients with VL >1000 cp/ml to reduce poor adherence and virologic treatment failure.

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**HIV Early Infant Diagnosis and Testing Turnaround Time in Malawi, 2012-2015**

**Background:** Globally, 50% of children in need of HIV treatment were not accessing it in 2015. Without treatment, many perinatally infected children die within first year. Implementation of ‘Test and Start’ [starting antiretroviral treatment (ART) immediately upon diagnosis] requires improvements in uptake of early infant diagnosis (EID) services to identify undiagnosed infants. Delayed turnaround time (TAT) in testing delays initiation of ART, leading to poorer health outcomes. Using the Malawi national Laboratory Information Management Systems (LIMS), we examine trends and factors associated with HIV-positivity and summarize TAT.

**Methods:** We conducted a retrospective analysis of LIMS EID data (including patient demographics, sample transportation and laboratory test outcomes) routinely collected between 2012-2015. HIV-positivity was assessed among HIV-exposed infants aged 0-36 weeks via HIV virologic testing. TAT was defined as time between sample collection at health facility to dispatch of results from laboratory. Logistic regression analyses were used to identify factors associated with HIV-positivity.

**Results:** Between 2012 and 2015, 76,288 samples from HIV-exposed children were tested. HIV-positivity decreased from 5.86% in 2012 to 3.20% in 2015 (p<0.001). In multivariate analyses, factors associated with HIV-positivity were older age at testing (>3 months), infant not on ART at birth, mother alive and not on ART or mother not alive, infants with presumed severe HIV disease, and residents of central or southern regions. Median TAT between sample collection to dispatch of results was 19 days in 2012 but increased to 34 days in 2015; however, the volume of testing did not increase.

**Conclusion:** HIV-positivity among infants decreased by 45%; whereas TAT increased by 79%. Factors associated with positivity included testing at an older age and no care and treatment for HIV-positive mothers and infants, highlighting the need of strengthening healthcare systems. Reducing the current TAT will lead to earlier availability of results at the clinic enabling potential earlier start of treatment.
PARTNERSHIPS IN ACHIEVING GLOBAL HEALTH SECURITY

DATE: Wednesday 7 December
TIME: 15:30 – 16:30
LOCATION: CTICC 2.4
CO-CHAIRS: Clement Zeh, Centers for Disease Control and Prevention, Ethiopia, and Alash‘le Abimiku, Institute of Human Virology, Nigeria

Progress Toward Prevention of Transfusion-Transmitted Hepatitis B and Hepatitis C Infection—Haiti, 2005—2014

Background: The World Health Organization has called for the global elimination of viral hepatitis (VH) by 2030. Data on VH prevalence are limited in Haiti; consequently, the epidemiology is poorly described. This study aims to provide a descriptive analysis of Hepatitis B virus (HBV) and Hepatitis C virus (HCV) seroprevalence among blood donors in Haiti.

Methods: Using Haiti’s National Blood Safety Program and Haitian Red Cross reports from 2005 to 2014, we analyzed donor serum samples screening test results to assess HBV and HCV seroprevalence. Cox Proportional Hazard regression models, with constant time at risk for all samples, were used to estimate Prevalence Ratios (PRs) for changes in relative seroprevalence between 2005, 2010 and 2014. HBV was screened according to minimal international standards for hepatitis B surface antigen and HCV using ELISA with reported sensitivity and specificity of 100% each.

Results: During the studied period, 198,758 donor samples were screened in Haiti, of which 3.80% were positive for HBV and 0.56% for HCV. The seroprevalence of HCV increased significantly from 0.66% in 2005 to 0.86% in 2014 (PR: 1.30, 95%CI: 1.00-1.70) and between 2010 and 2014 (PR: 1.62, 95%CI: 1.26-2.08); conversely, HBV exhibited a significant decrease in seroprevalence from 3.95% in 2005 to 3.42% in 2014 (PR: 0.87, 95%CI: 0.77-0.97). Annual and regional data demonstrate that the seroprevalence of HBV remained variable across the regions and the years. HCV significantly increased in the Northern region from 2010 to 2014 (PR: 1.69, 95%CI: 1.04-2.73).

Conclusion: Despite Haiti’s intermediate endemicity for chronic HBV infection, the reported significant decrease in HBV seroprevalence among blood donors may represent the positive impact of public health interventions in preventing the transmission of blood borne infections. The significant increase in HCV may indicate possible health care-associated infections or unsafe injection practices; however, further investigations are needed.

Expanding Viral Load through Partnerships: Performance Evaluation of Cepheid GeneXpert HIV-1 Viral Load Assay in Botswana

Background: With the UNAIDS target to reach 90% HIV viral suppression of those on treatment by 2020, demand for viral load (VL) testing and new VL technologies are increasing. The Xpert HIV-1 VL assay conducted on the Cepheid GeneXpert system is targeted for use at sites with limited laboratory infrastructure. This collaborative study between the Botswana Ministry of Health, University of Botswana, Centers for Disease Control and Prevention (CDC) Botswana, and CDC Atlanta evaluates the performance of Cepheid’s Xpert HIV-1 VL assay.

Methods: In this multi-site cross-sectional study, people living with HIV, including those currently on antiretroviral therapy (ART) and ART naïve patients, were enrolled beginning in May 2016 from four sites in Botswana. Plasma samples from consented patients were prepared and tested on Xpert HIV-1 VL and the reference assay, Roche COBAS AmpliPrep/COBAS TaqMan HIV-1 v2.0 (CAP/CTM HIV-1 v2), according to manufacturers’ recommendations. Correlation was assessed via linear regression. Sensitivity and specificity were determined at the WHO suggested virological failure cut-off of 1000 copies/mL and the Botswana National Guideline’s cut-off of 400 copies/mL.

Results: To date, 292 plasma samples were tested on both the reference and the Xpert HIV-1 VL assays. Sensitivity and specificity of Xpert HIV-1 VL was 91.5% and 99.1% at 1000 copies/mL and 92.3% and 98.7% at 400 copies/mL, respectively. Linear regression analysis demonstrated good correlation between Xpert HIV-1 VL and CAP/CTM HIV-1 v2 (R2=0.91). Five GeneXpert instrumentation errors have occurred, yielding an error rate of 1.7%.

Conclusion: Preliminary findings indicate that at both the WHO virological failure cutoff of 1000 copies/mL and the Botswana cutoff of 400 copies/mL, the Xpert HIV-1 VL performs well compared to the CAP/CTM HIV-1 v2 in a setting of intended use. More data is needed to draw further conclusions concerning correlation and operational feasibility of this platform; enrollment is ongoing.
Use of a Centralized Laboratory Data Repository to Monitor the 2016 Scale-up of the National HIV Viral Load (HVL) Program in Tanzania

Background: In Tanzania, HVL testing for routine monitoring of antiretroviral therapy is being scaled-up according to the 2015 national clinical guidelines and as recommended by the World Health Organization. Plasma samples are collected from patients in treatment centers and are then referred to a PCR laboratory for testing. As a result of the scale-up, machine and human capacity at PCR laboratories have been strained. Consequently, HIV early infant diagnosis (HEID) testing, which is conducted by the same PCR laboratories, has been impacted. Using a centralized laboratory data repository (OpenLDR), we tracked the time required for referral and testing during the HVL scale-up.

Methods: We extracted HVL and HEID sample data from four HIV PCR laboratories. All samples were received during April 4, 2016 – July 3, 2016. Transportation time is the time between sample collection and sample reception at the laboratory. Testing time is the time between sample reception and results authorization.

Results: In total, 18,300 HVL and 11,947 HEID samples were received. The weekly number of HVL samples received progressively increased from 103 to 4,386; the weekly number of HEID samples remained relatively stable (averaging 919 weekly). Most samples (82.6% and 93.8%) were tested though some had no documentation (16.9% and 5.8%) or were rejected (0.5% and 0.5%). Median transportation time for HVL and HEID remained constant at 1 day (IQR: 0–3) and 14 days (IQR: 8–25). However, HVL and HEID median testing time increased substantially from 6 days (IQR: 4–7) and 10 days (IQR: 7–15) in the first week to 21 days (IQR: 17–44) and 36 days (IQR: 18–50) in the last week.

Conclusion: The scale-up of HVL testing has driven delays in both HVL and HEID testing, potentially impacting patient outcomes. OpenLDR has allowed rapid monitoring of zonal laboratories to address challenges from the HVL scale-up.
Improving the Quality of laboratory services in Uganda through SLMTA implementation

**Background:** Quality laboratory services are critical to effective disease diagnosis and patient management, but compromised by deficiencies in Laboratory Quality Management Systems (LQMS). In an effort to improve LQMS to attain accreditation by international (ISO 15189) standards, the USAID funded Strengthening Uganda’s Systems for Treating AIDS Nationally (SUSTAIN) project supports 18 public health laboratories in Uganda, to participate in the WHO/AFRO Strengthening Laboratory Management Towards Accreditation (SLMTA) program.

**Methods:** The 18 laboratories were enrolled on the SLMTA program through different cohorts; 5 on cohort 1 (2011), 9 on cohort 2 (2013) and 4 on cohort 3 (2015). For each cohort, baseline data was collected from the laboratories using the WHO/AFRO SLIPTA checklist, after which laboratory staff from each laboratory were supported to attend a series of 3 structured SLMTA workshops. Onsite mentorships and training follow-up visits were conducted between the workshops. The project targeted to achieve a minimum of 3 Stars for all laboratories, by September 2016. Cohort 1 and 2 laboratories that had not attained the target Star by end line assessment for their cohort were re-enrolled in cohort 3. All the 18 laboratories were assessed in February/March 2016, for “continuous” assessment (cohort 1), end line assessment (cohort 2) and midterm assessment (cohort 3).

**Results:** At Midterm, end line/continuous assessment, 1 laboratory attained 5 Stars, one laboratory attained 4 stars, 5 laboratories attained 3 stars, 5 laboratories; 2 stars, 3 laboratories; 1 star, while 2 laboratories were at Zero star, but with progression on the total SLIPTA audit score (Fig.1). Fig.1:Baseline/Midterm/End line Star status for the 18 SUSTAIN project supported laboratories under different cohorts

**Conclusion:** The SLMTA model improved the quality of laboratory services at the 18 health facilities. Although some of the laboratories have not attained the target Star status, there is progressive improvement towards international accreditation standards. The Star progression has a positive correlation with customer satisfaction for laboratory services.

Laboratory Mentoring Using the SLIPTA Process Results in First Ever ISO-15189 Accredited Medical Laboratory in Central Africa: The Case of the National Early Infant Diagnosis Reference Laboratory (NEIDRL) Mutengene, Cameroon

**Background:** Accreditation of a medical laboratory to ISO 15189 standards is proof that the laboratory has the capacity and competence to provide quality services and participate in quality health care delivery and disease surveillance. This has been a critical challenge in Cameroon and the Central African Region as a whole. The NEIDRL was one of the fourteen cohorts of laboratories enrolled into the Strengthening Laboratory Quality Improvement Process Towards Accreditation (SLIPTA) program in 2013.

**Method:** A baseline audit was conducted in July 2013, followed by three SLMTA workshop sessions involving hands-on activities and implementation of improvement projects by lab personnel. Onsite mentorship and supervisory visits were employed to facilitate the process. Intermittent audits and an exit audit were conducted using the WHO AFRO SLIPTA checklist to measure progress made. SLIPTA external audit was conducted in November 2014 by ASLM Auditors, and cross mentoring techniques were applied thereafter. Following a document review in June 2015, SANAS was invited to conduct an initial audit in March 2016.

**Results:** In accordance with the SLIPTA audit process, the laboratory progressed from 1 Star (60.07%) at baseline in July 2013 to 2 Stars (67.05%) in the August 2014 exit audit and successfully attained 3 stars (82.9%) in the external audit of November 2014; and was recommended for ISO 15189-2012 accreditation. Fifteen non conformities were raised from an initial assessment by SANAS in March 2016, and following submission of a corrective action report, the laboratory was finally accredited to ISO15189-2012 standards, in July 2016.

**Conclusion:** SLIPTA successfully led NEIDRL to ISO 15189-2012 accreditation. Dedicated staff, onsite mentorship, SLMTA trainings and management support are critical prerequisites for a successful SLIPTA implementation. The dream of an accredited laboratory is now a reality for Cameroon and a ground breaking opportunity for Central Africa.
Assessment of Laboratory Capacity of Public Secondary Health Centres in Performing Assay of Selected Epidemic Prone Diseases in Oyo-State, Nigeria

**Background:** Performing laboratory assay is essential to detection and control of communicable diseases. Although central level laboratories are usually available for confirmation of epidemic-prone diseases during outbreaks, capacity of laboratories at peripheral levels require strengthening so as to meet demands of local health authorities. However, capacities of such hospitals and possible gaps in their functioning are not well documented. Thus, this study was carried out to assess the laboratory capacity of public secondary health centres in performing assay of selected epidemic prone diseases in Oyo-State, Nigeria.

**Methods:** A descriptive cross-sectional study was carried out in 17 hospital-based microbiology laboratories in Oyo State. All the functional laboratories in the state hospitals were surveyed. A WHO Laboratory Assessment Tool was modified and used to interview laboratory staff and collect information on socio-demographics of the participants, laboratory testing performance and involvement in disease surveillance. Laboratory capacity was assessed on a 100 point scale in which scores were rated low (≤49%), fair (50-79%) and good (≥80%). Data were analysed using descriptive statistics and chi-square at p= 0.05.

**Results:** Age and length of service of participants were 42.0 ± 5.1 years and 11.9 ± 8.8 years respectively. Laboratory testing performance for measles and meningitis was ‘low’ in all the 17 laboratories. Sixteen of the laboratories had ‘low capacity’ to test for cholera and one had ‘fair capacity’. Twelve laboratories had ‘fair capacity’ in disease surveillance while five of the facilities had ‘low capacity’. There was no association between the extra level of training received by laboratory staff and testing performance for the selected diseases. The reasons why the laboratories could not carry out WHO standard tests for the selected diseases as reported were inadequate equipments (17), non-availability of reagents (16) and clinicians’ failure to request for tests (13).

**Conclusion:** Laboratory capacity to perform assays for most of the selected diseases (measles, meningitis and cholera) was very low in Oyo State hospitals. Equipping the laboratories with modern instruments and reagents are recommended to enable them attain full capacity to provide diagnostic services relating to the selected diseases.
12:50

Kim Lewis1, Lucy Maryogo-Robinson1, Mary Ann Sondrini2

1. American Association of Public Health Laboratories, Silver Spring, MD, United States.
2. Eagleson Institute, Sandford, ME, United States.

A Comprehensive Approach to Biosafety Cabinet Usage, Maintenance and Certification to Ensure Biosafety and Biosecurity of Medical Laboratories

**Background:** Biosafety Cabinets (BSCs) protect the operator, the laboratory environment and work materials from exposure to infectious aerosols and splashes that may be generated when manipulating infectious agents such as primary cultures, stocks and diagnostic specimens. BSC Class II are typically used with Risk 2 and 3 infectious agents, and, with risk group 4, if positive-pressure suits are used. For BSCs to work effectively, they need to be properly installed, require user competency and routine maintenance, and regular periodic service certification. APHL, in collaboration with the Eagleson Institute, supported these activities through the Global Health Security Agenda in a select number of countries in Africa.

**Methods:** A program was implemented to address issues pertaining to BSCs. This included training of users, provision of SOPs, procurement of BSCs, service and certification of BSCs, evaluation of in-country engineers and provision of BSC certification program.

**Results:** Eighty BSC users, 20 from each country from Uganda, Tanzania, Ethiopia and Kenya were trained on safe use and routine maintenance of BSCs.

>60 BSCs were serviced and certified in Kenya, Uganda, Tanzania, Sierra Leone and Guinea.

XXX number of in-country engineers were evaluated by the Eagleson Institute.

XXX BSCs were procured for Sierra Leone. Ethiopian EPHI expanded their Equipment Training Centre to include BSCs.

XX HEPA filters and XXX spare part kits were procured for XXX countries.

Sierra Leone and Guinea enrolled 5 in-country engineers in phase 1 workshop of a 3 phase training program provided by the Eagleson Institute.

**Conclusion:** It is important that BSCs are fit for use and used properly. This includes user competency, having SOPs, routine maintenance performed, spare parts available, and service and certification of BSCs. More users and more in-country engineers need to be trained to build local capacity. MOH buy-in is critical for sustainability.

13:00

Doreen S. Mainza
Pharmaceutical And Diagnostics, Churches Health Association Of Zambia, Lusaka, Zambia.

Impact of External Quality Assessment for Tuberculosis In Eastern Province, Zambia

**Background:** Timely and accurate diagnosis of TB and appropriate treatment are essential for reducing disease burden as well as transmission in the community. The cost of implementing TB drug policies could also be reduced considerably by improving the accuracy of TB diagnosis. The Zambia National Tuberculosis Control Program recommends that all TB diagnostic centers in the country participate in the External Quality Assessment Program (EQA) for smear microscopy. This study therefore shows evidence of the impact of the TB EQA program in Zambia.

**Methods:** Fourteen (14) TB microscopy centers were selected for implementing the TB EQA program in Eastern province of Zambia. A model system was designed for selecting and blinded rechecking of TB slides from these laboratories. Supervision and evaluation was conducted at 3 month interval for 12 months.

**Results:** The TB EQA program improved the quality of TB smear microscopy results from the 14 participating laboratories particularly specificity and sensitivity. Specificity increased from 92.78% at baseline to 99.83% at the final assessment. Consequently, sensitivity increased from 92.74% to 99.10% at final assessment. The concordance rate of TB smear microscopy results increased from 84.25% at baseline to 90.47% at the final assessment. Increases in the concordance of TB smear microscopy results also resulted in decreased false positivity and false negativity rates.

**Conclusion:** The EQA program managed to increase the specificity and sensitivity of TB microscopy results. It also increased concordance rates and decreased false positivity and negativity rates. There is therefore, need to scale up the program to cover all TB microscopy centers as it has demonstrated positive impact on the TB program.
13:10

Sophie W. Mwanyumba
Immunology, National Publich Health Laboratory Services Nairobi Kenya, Nairobi, Kenya.

HIV Serology Proficiency Testing Panel Production Automation –Kenya Success Story

Background: In order to meet the demands of scaling up rapid HIV testing (RHT), Kenya implemented a task-shifting model which has seen RHT being performed by people with varied skills. This resulted in a large number of health care workers offering testing. In order to monitor the quality of RHT, Kenya adopted proficiency testing (PT) program based on plasma dry tube specimen (DTS) technology in 2007. The program, provided by the National HIV Reference Laboratory (NHRL), operates two to three times a year and sends panels comprising of six blinded samples and a buffer (totaling to seven vials) to participating facilities. By 2010, there were 3025 participating facilities. The demand for PT increased when Kenya shifted from facility-based to individual-based PT. As at February 2016, there were over 10,000 HCW enrolled in the program. This posed a big challenge in long working hours for staff during panel preparation as well as compromised the quality of panels produced. We describe the automation of PT production to meet the need.

Methods: Panel production was manual prior to 2015. In 2015, through PEPFAR support, NHRL acquired the Tecan Freedom Evo 100/8, an automated dispenser system for panel production, with a capacity of dispensing 14,400 samples in 2 hours when utilized optimally.

Results: With use of manual method, it took one month to meet the demand of providing 6000 PT panels, amounting to 42,000 tubes. A number of errors were reported from the field including tubes with insufficient or no sample. Upon acquisition of the automated dispenser, 10,000 PT panels (70,000 tubes) were produced within in a week to meet the February 2016 cycle. No errors were reported from the field.

Conclusion: Automation has improved production of quality PT panels in a timely manner therefore enabling access of these panels to more service providers in the aim of monitoring quality of HIV testing

13:20

Josephine Wahogo1, Elizabeth Gikonyo1, Margaret C. Mbouru2, Ernest P. Makokha2, Kyle DeGruy3, Heather Alexander3, Jane Mwangi2

2. Division of Global HIV and TB, U.S. Centers for Disease Control and Prevention, Nairobi, Kenya.
3. Division of Global HIV and TB, U.S. Centers for Disease Control and Prevention, Atlanta, GA, United States.

Improving the Quality of Xpert MTB/RIF Testing Services: A Kenyan Experience on the Use of Dried Tube Specimen Proficiency Panels

Background: Access to Xpert MTB/RIF testing services in Kenya increased tremendously from three machines in 2011 to 126 in 2015. In 2015, 77,861 sputum specimens were tested countrywide. Testing scale-up has not been matched with expansion of external quality assessment (EQA) efforts. We describe herein results of a dried tube specimen-based Xpert MTB/ RIF proficiency panel program for 57 enrolled testing facilities countrywide.

Methods: The National Tuberculosis Reference Laboratory (NTRL), in collaboration with CDC, implemented a pilot Xpert MTB/RIF EQA scheme in 2015. In July, September and November, CDC-Atlanta shipped three sets of proficiency panels (A, B and C) to the 57 enrolled facilities. NTRL coordinated the participating facilities on enrolment, panel distribution, collation of results and return of EQA reports using emails and phone calls. Upon receipt of reports, the laboratory managers identified challenges and initiated corrective actions as needed. Acceptable performance was defined as any score of ≥80%.

Results: For the 57 enrolled facilities, response rates were 91%, 96% and 84% for panel A, B and C, respectively. Performance scores improved from 90% in panel A to 96% in both B and C. False negative results were reduced from 18% to 2%. Overall, power interruptions and poor internet connectivity were the main barriers to results reporting. Phone call reminders improved response rates between panels A and B, while December holidays caused a lower response rate for panel C.

Conclusion: This EQA identified site-specific challenges to continuous Xpert MTB/RIF testing. Feedback and corrective actions yielded improvements in site performance over time. We recommend scale up of EQA in all facilities to ensure testing service continuous quality improvement. Additionally, all testing facilities should have steady power supply and internet connectivity to prevent interruption of diagnostic services. Lastly, NTRL could consider electronic reminders and web-based system for results reporting to improve response rates.
ORAL POSTER 1.2

ROLE OF LABORATORY NETWORKS IN DISEASE DETECTION AND OUTBREAK PREPAREDNESS

DATE: Tuesday 6 December
TIME: 12:30 – 13:30
ROOM: Ballroom East/West, Stage 2
CHAIR: Matitu Mwau, Kenya Medical Research Institute, Kenya

12:30

Ernest Tambo1, Christopher Khayeka-Wandabwa1, Adama Kuzenga1, Ololubi A. Oluwasogo2, Ahmed A. Aderedjii1, Jeanne Y. Ngpoga1, Emad. Khater2

1. Department Biochemistry and Pharmaceutical Sciences, Université des Montagnes, Bangangté, Bangangté, Cameroon.
2. Department of Public Health, Kwara State University (KWASU), Malete, Nigeria.
3. Unite de Recherche Clinique de Nanoro, Nanoro, Burkina Faso.
4. Department of Public Health, Kwara State University (KWASU), Malete, Nigeria.
5. Service de Biochimie, Centre Hospitalier Universitaire (CHU), Yaoundé, Cameroon.
6. Department of Pharmacology and Therapeutics, Kampala International University, Kampala, Uganda.
7. Department of Entomology, Faculty of Science, Ain Shams University, Cairo, Egypt.

The Value of Modern Public Health Laboratories Against Emerging Threats and Epidemics in Africa

Background: Globalization of trade and travel, intense urbanization and population pressures continue to impose new drawbacks and issues that underscore the need to improve our laboratories’ capacities to respond in a timely and effective fashion. While Sub-Saharan Africa has made significant strides in combating major emerging epidemics, co-infectious diseases and expansion of antimicrobial resistance are new threats in Africa.

Methods: A cross-sectional qualitative approach was used to analyze the potential value of enhanced modern public health laboratory services with digital systems and network indispensable in revamping effective health systems in Africa and global health security.

Results: Our findings documented that most rural and urban laboratories, including reference laboratories, were underdeveloped and underfunded across Africa. Early diagnosis and surveillance component being one of the core functions, was weaker and lacked core laboratory functions operations, dearth resources and weak/lack of supply chain facilities and management in most rural and urban in most African countries compared to developed nations. Emerging threat and epidemics investigations were almost nonexistent in these countries, except in few African countries that had a history of epidemics scourge, that could not be sustained either at the sentinel or nationwide laboratory. Understanding the value of building modern laboratory capacity is vital to mapping pathogen(s) and their reservoir, and human host susceptibility across Africa over time. Tracking and monitoring wildlife-population interactions for novel pathogens of significant public health threat is imperative. Strengthening and optimizing participatory community-clinical-laboratory models and prompt management.

Conclusion: The paper highlights and advocates the value of establishing and upgrading from traditional into modern public health laboratories with comprehensive surveillance capacity, digital integrated laboratory information management systems (ILIMS), contextual diagnostics and targeted drug and vaccine R&D improvements, technology transfer and laboratory exchanges and technical support in threats and epidemics preparedness, alertness, prevention and response is imperative.

12:40

Ibrahimm Mugerwa1, Guma Gaspard1, Richard Walwema2, Sulleiman Ikoba1, Steven Aisu1

1. Microbiology Surveillance Laboratory, Central Public Health Laboratories, Kampala Central, Uganda.
2. Makerere University College of Health Sciences, Infectious Disease Institute, Kampala, Central, Uganda.

Antimicrobial Resistance Baseline Survey Conducted Among 21 Facilities in Uganda by the Central Public Health Laboratories and Partners

Background: Early this year 2016 a partnership between the Central Public Health Laboratories and the Infectious Disease Institute, conducted a baseline AMR survey among 21 Uganda districts covering 14 Regional Referral Hospitals, 6 District Hospitals, two Private for profit hospitals and two Private Not for profit hospitals giving a total of twenty four facilities assessed. With support from the Global Health Security Agenda Partner project of the Infectious Diseases Institute, a baseline assessment among the 24 randomly selected public and Private facilities across all regions of the country was done. This in line with the World Health Organization efforts and strategies to improve public Health globally.

The rationale assess the Health sector’s capacity, AMR surveillance ability to identify and perform Susceptibility testing for at least two WHO priority pathogens, antimicrobial stewardship plan and tracking the rationale use of Antimicrobials.

Methods: A cross sectional observational study with mixed methods approach was used, employed quantitative and qualitative data tools with observational checklists. The methods included observations; key informant interviews (KIs) and individual interviews who were purposively identified.

Results: The survey discovered that among all the 21 facilities across the country, none of them had an existing AMR Stewardship framework, 19 had policies on rational use and monitoring of Antimicrobials, 5 had a physician to steer the stewardship program. The study also revealed that there was no AMR surveillance Programme among all facilities that carry out AST with poor record keeping.
Conclusion: To a minimal level, there is rudimentary Bacteriology activities conducted in line with AST/AMR at some facilities which needs enhancement and also to improve record keeping to enable the AMR Surveillance work. Harmonize AST/AMR work being done by private facilities to improve the surveillance program. There is also need to have a National AMR action plan that shall be rooted from the surveillance program, this shall help to inform Antimicrobial Stewardship policies at National level.

12:50

Frank L. Basiye¹, Jolly Okonji², Jane Mwangi¹, Eric O. Opiyo¹, Mamo Umuro³, Tolbert Ayuaya¹, Fredrick Miruka¹, Patrick Owuor¹, Keneth Ndige¹, Clement Zeh¹, Hellen Mutta¹.

1. DGHT, CDC, Nairobi, Kenya.
2. KEMRI /CGHR, Kisumu, Kenya.
3. NPHLS, Nairobi, Kenya.

HIV Viral Load Laboratory Testing and Sample Networking in a Resource-Limited Setting of Nyanza Province, Western Kenya

Background: Kenya’s HIV prevalence is estimated at 5.6 %, with 1.6 million people living with HIV (PLHIV); Nyanza region has an HIV prevalence twice higher than the national prevalence (0.6 million PLHIV). The 2014 WHO guidelines recommended viral load (VL) testing for monitoring and diagnosing antiretroviral therapy (ART) failure. VL testing faces challenges that may have significant impact on ART patient management. We describe an eight-year experience in viral load implementation and scale up by laboratory and field programs in Nyanza.

Methods: Data were collected from HIV care and treatment programs and laboratory information systems. The HIV VL tests were done at the Kenya Medical Research Institute HIV Research (KEMRI HIVR) laboratory in Kisumu on plasma samples received from clients on ART from 483 health facilities within Nyanza from November 2008 to September 2015. These facilities were networked through hubs-and-spokes.

Results: In 2008, only 4 facilities referred samples to the KEMRI HIVR VL-testing laboratory, increasing to 483 facilities by September 2015. In 2008, the laboratory operated at 1% of its annual available equipment capacity (tests done/equipment throughput) which increased to 66% by 2015. A total of 243,374 VL tests were done from 2008 to 2015 (lowest of 102 tests in 2008 and highest of 125,368 in 2015). The average annual turn-around-time (sample collection to results dispatch) was lowest at 9 days (2008) and highest at 68 (2014), while the average sample rejection rate at the laboratory was highest at 3.5% (2010) and lowest at 0.3% (2014). The longest equipment downtime in 2008 lasted 3 days while for 2015 lasted 47 days. The 8-year average around-time (sample collection to results dispatch) was lowest at 0.3% (2014). The longest equipment downtime in 2008 lasted 3 days while for 2015 lasted 47 days. The 8-year average around-time was 21 days/year.

Conclusion: Specific strategies and interventions (targeted facility-level mentorship, expanded referral networks and improved laboratory capacity i.e. personnel and equipment) improved access to VL testing and reduced sample rejections. Against an increase in numbers tested, equipment downtimes and reagent stock-out could have contributed to prolonged turn-around-times.

13:00

Matilu Mwau¹, Francis Ogollah¹, Priska Bwana¹, Norah Saleri¹, Elizabeth Ajema¹, Yvonne Scrivens¹, Alan O. Kwallah¹.

1. OPDCR, Kenya Medical Research Institute, Busia, Busia, Kenya.
2. CVR, Kenya Medical Research Institute, Nairobi, Nairobi, Kenya.
3. Biochemical Department, University of Nairobi, Nairobi, Nairobi, Kenya.
4. Production Department, Kenya Medical Research Institute, Nairobi, Nairobi, Kenya.

Building the Capacity to Offer HIV Drug Resistance Testing as a Standard of Care in Kenya

Background: Achieving viral suppression is the primary goal for people living with HIV on ART. In Kenya, almost 1,000,000 people are on HAART, and viral load testing is the standard of care. Despite intense adherence counselling, up to 20% of those on HAART have viral loads that exceed 1000 copies/ml. Drug resistance testing can help determine the proportion of failure to suppress virus that is due to HIV drug resistance, and also whether the current public health approach to HAART needs to be changed.

The primary objectives of this program are to set up HIV drug resistance testing capacity and to determine the prevalence of HIV drug resistance mutations.

Methods: The capacity needs of the program have been determined through a consensus between the National AIDS and STIs Control Program, Kenya Medical Research Institute, the Clinton Health Access Initiative, USAID and several other partners. Initially, genotyping was conducted by partial pol gene sequencing using an eight capillary ABI® 3500 analyser. Drug resistance mutations are being identified using ReCalTM software.

Results: Since inception in 2014, Kenya has delivered in excess of 1,500,000 viral load tests for people on HAART. Preliminary data analysis suggests that of those, up to 300,000 (20%) would be eligible for drug resistance testing, up to 200,000 tests per year. If drug resistance testing is to be extended to HIV positive individuals who are not on HAART, then the demand per year exceeds 300,000 tests.

The HIV testing program has a modular web based information system in place that is currently undergoing modification to accommodate drug resistance data.

One sequencer is already available for use. Working with manufacturers, it has been determined that a minimum of 12 high throughput genetic analysers are required immediately, with the potential for additional sequencers and next generation sequencing being clear. Three of these are being delivered on placement basis.

Fifteen (15) scientists have been trained, and the first HIV sequences delivered successfully. Each of the sequences has revealed important mutations.

Conclusion: Due to the extent of detectable viral loads in those on HAART, drug resistance testing capacity needs to be scaled up in Kenya. Although very few tests have been done, it is likely that drug resistance mutations are common, and that this reality will profoundly influence the current approach to HAART delivery.
Prevalence of Minor HIV-1 Drug Resistant Variants in Antiretroviral-naive HIV-1 Infected Patients in Botswana

Background: The efficacy of antiretroviral treatment is threatened by the emergence of HIV-1 drug resistance that can occur as acquired or transmitted drug resistance. In 2002, Botswana with a population of 2.1 million people began one of the first national HIV treatment programs in Africa. Surveillance monitoring of samples collected in 2007 showed no evidence of transmitted HIV drug resistance. However, samples collected between 2012 and 2015 showed a significant increase in transmitted drug resistance as detected by population sequencing. This technique is unable to detect minor HIV-drug resistant variants which are present at less than 10% of the viral quasispecies which some studies have shown may be clinically significant.

Methods: HIV infected, treatment-naive pregnant women were included in the study. The pol gene was analysed by standard population sequencing for both the K103N and M184V drug resistance mutations in reverse transcriptase. In the first 100 participants in whom genotyping results were available, Pan Degenerate Amplification and Adaption (PANDAA), a novel assay that can detect minor variants present at ~1% of the viral population, was used to quantify K103N and M184V mutations.

Results: The K103N mutation was detected as a major mutation (≥20%) in 3 out of 100 (3%) participants by both methods while there was no detection of M184V mutation as a major mutation by either method. PANDAA assay detected K103N minor variants in 31 participants and the proportion of mutants amongst these ranged from 1.0% to 1.6%. There were no samples with the M184V mutation detected at >1%.

Conclusion: The results from this study shows that minor variants missed by population sequencing can be detected by sensitive assays such as PANDAA. It will be important to determine the clinical significance of these mutations as the presence of these minor variants may reduce the efficacy of ART regimens. Mutations such as M184V have and large fitness cost and may be the reason that transmitted M184V was not detected as it reverted to wild type.

Has the Threshold of Case Detection with Xpert MTB/RIF Been Reached in South Africa?

Background: In March 2011, South Africa began public-sector implementation of Xpert MTB/RIF for the diagnosis of tuberculosis (TB). Full national laboratory capacitation was achieved in September 2013. The impact of this scale-up on TB case detection remains uncertain.

Methods: We analyzed routinely collected de-identified data from the South African National Health Laboratory Service. All Xpert MTB/RIF results from March 2011 to July 2015 were included. We report the number of tests conducted, the proportion positive, and the absolute number positive nationally and by province.

Results: Over 6.3 million Xpert MTB/RIF tests were conducted between March 2011 and July 2015 with an overall positivity of 11.0%, ranging from 6.5% in Limpopo to 15.2% in Western Cape. Case detection reached a plateau in January 2014, despite continued increases in monthly test volume after that point. In January 2014, 170,586 Xpert MTB/RIF tests were conducted nationally, of which 23,099 (13.5%) were positive. From July to October 2014, the number of positive tests remained stable (between 22,540 and 23,658) despite substantial increases in tests conducted each month (between 228,233 and 242,943 tests conducted). By July 2015, 245,558 tests were conducted nationally and 22,087 were positive.

Continued increases in the number tested were driven primarily by three provinces: KwaZulu Natal (KZN), Gauteng, and Eastern Cape (EC). In these provinces, comparing January 2014 to July 2015, Xpert test volume rose by 48% (KZN), 56% (Gauteng), and 48% (EC), but little change was observed in the number of positive tests: 0.6% increase in KZN (Jan 2014: 5206; Jul 2015: 5237), 3.5% increase in Gauteng (Jan 2014: 3396; Jul 2015: 3516), and a slight decrease in EC (Jan 2014: 4825; Jul 2015: 4328).

Conclusion: Despite ongoing increases in test volume after reaching full lab capacitation of Xpert MTB/RIF in South Africa, the absolute number of cases has reached a plateau. Further increases in Xpert MTB/RIF testing, without better targeting of those tests, may not substantially improve case detection in South Africa.
Kidney Function Tests Using Cobas C111 and Vitros 350 Chemistry Analysers: Method Comparison

Background: In view of rising cases of renal pathology globally, the need for cost effective and reliable laboratory equipment to diagnose this disease in low resource settings cannot be overemphasized. This study assessed level of agreement and bias between Cobas C111 and Vitros 350 for Blood Nitrogen Urea (BUN) and Creatinine for quantitative analysis.

Methods: As part of method verification exercise at the ISO 15189 accredited Clinical Laboratories of Medical Research Council Unit The Gambia, Banjul, Gambia, we tested 52 patient samples for BUN (0.65 – 15.8mmol/L) and 49 for serum Creatinine (25.0 – 182.3μmol/L) on Cobas c111 of Roche Diagnostics as candidate method and Vitros 350 of Orthoclinical Diagnostics, which has consistently performed excellently in external quality assurance scheme, as reference method. We used Medcalc Easy-to-use software, version 16.2.1 for the statistical analysis. Testing followed CLSI Guidelines on Measurement Procedure Comparison and Bias Estimation Using Patient Samples- 3rd Edition (EP09-A3).

Results: BUN: Correlation Coefficient was 0.980 (P<0.0001), Slope was 0.974, and intercept was 0.063 at 95% confidence interval, differences between Urea measurement on Cobas C111 and Vitros 350 were within the 95% agreement limit (+/- 1.96SD) on Bland-Altman difference plot, while bias between the two methods was 0.06mmol/L. Serum Creatinine: Correlation Coefficient was 0.948 (p<0.0001), Slope was 0.934, intercept was 6.379. Bland-Altman plot shows measurement difference which were within the 95% agreement limit (+/- 1.96SD), whilst bias was 3.1μmol/L creatinine.

Conclusion: There is strong positive correlation between Cobas C111 and Vitros 350 methods for BUN and serum Creatinine estimations. Also, the methods show strong agreements; the bias between the analysers for the two measurands tested are not clinically significant. Therefore, Cobas c111 and Vitros 350 are comparable and can be used interchangeably for BUN and serum Creatinine in renal pathology diagnosis and management.
**Metabolic Syndrome and Associated Factors Among Outpatients of Jimma University Teaching Hospital**

**Background:** Developing countries are now experiencing the epidemiologic transition, whereby the burden of chronic diseases, like metabolic syndrome, is increasing. However, no study had previously been conducted to show the status of metabolic syndrome among outpatients of Jimma University Teaching Hospital. Therefore, this study was designed to determine the prevalence of metabolic syndrome and associated factors among adult (≥20 years) patients.

**Methods:** A cross-sectional hospital-based study was conducted in July 2014 among adult (≥20 years) patients attending Jimma University Teaching Hospital, outpatient department. All patients attending the outpatient department and were willing to participate in the study were included. Anthropometric and biochemical measurements were undertaken for all the study subjects to know the status of metabolic syndrome. Metabolic syndrome was identified using the National Cholesterol Education Program’s Adult Treatment Panel III criteria.

**Results:** A total of 225 participants were included in the study, of whom 106 (47.1%) were males and 119 (52.9%) were females. A total of 59 (26%) adults were found to have metabolic syndrome, which was seen more than twice as much in females, 42 (35%), as compared with males, 17 (16%), (P<0.01). The most frequent metabolic syndrome parameters were hypertension (45%), hyperglycemia (39%), decreased high-density lipoprotein (HDL) (31%), central obesity (26%), and elevated triglycerides (18%). Elevated blood pressure is more common in females (44.5%) than in males (34.9%). Decreased HDL-cholesterol was observed among 37% of females versus 24% males (P<0.001) and 6% of males versus 45% females had central obesity (P<0.001). Hypertension and body mass index were significantly lower among males (35% and 14%) than females (45% and 41%) (P<0.01 and P<0.001), respectively.

**Conclusion:** It is demonstrated that metabolic syndrome is prevalent in adult outpatients in Jimma and increases as age increases; it is more common among females than males. Among the five diagnostic criteria for metabolic syndrome, hypertension, hyperglycemia, and low HDL-cholesterol were the most prevalent. As metabolic syndrome is rising at an alarming rate, we recommend that relevant prevention, diagnostics, and therapy in adult outpatients are undertaken.

**Prevalence and Pattern of Hypertension and Obesity in Ogun State, Nigeria, August 2015**

**Background:** Hypertension is one of the most prevalent noncommunicable diseases (NCD) worldwide contributing to global estimated deaths of 45% and 51% of heart disease and stroke respectively. The African region has the highest prevalence of adults with hypertension and in Nigeria, the reported prevalence ranges from 17.5% to 31.5% indicating high burden of hypertension in the country. This study was conducted to assess the prevalence and pattern of hypertension and obesity in Ogun state, Nigeria.

**Methods:** We conducted secondary analysis of data generated by Ogun State Ministry of Health during health outreaches to all the Local Government Areas (LGAs). The data were cleaned to correct for wrong entries and completeness. The variables of interest were: Body Mass Index (BMI), Systolic and Diastolic BP. Hypertension was defined as systolic BP ≥140mmhg and diastolic BP ≥ 90mmhg while overweight and obesity were defined as BMI of between 25.0kg/m2-29.9kg/m2 and BMI ≥30kg/m2 respectively. We reviewed and performed descriptive and bivariate analysis using Microsoft Office Excel and Epi info software packages.

**Results:** Of a total of 1511 individuals, 980 (64.9%) were females and the mean age was 43.7 (S.D±16.9) years. The overall prevalence of hypertension, overweight and obesity were 21.4%, 29.3% and 21.8% respectively. There was no statistically significant gender difference in hypertension (p=0.59). Participants aged ≥ 40yrs were seven times more likely to have hypertension [OR =7.2 (95%C.I 5.1-10.1, p<0.05)] than younger participants. Participants that were overweight/ obese were approximately two times more likely to have hypertension [OR =1.8 (95% C.I 1.4-2.3, p<0.05)] than those not overweight or obese. Females were two times more likely to be overweight/obese [OR =2.4 (95%C.I 1.9-3.0, p<0.05)] than males.

**Conclusion:** Overall, the prevalence of hypertension and obesity were high. There is need for proper blood pressure and cardiovascular risk factors awareness, detection and control campaign in the state using community based screening and surveys.
13:10

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The Prevalence of Diabetes in the Rural Kenyan Community is Not Known

Background: Word wide 285 million people are already affected by diabetes. The national prevalence of diabetes in Kenya is between 2.7 % to 14%. Nearly 1.5 million Kenyans are living with the diseases and many more are not aware. This number will rise to over 2.0 million if immediate intervention is not put in place.

Methods: The study carried out in Nyeri Provincial General Hospital, situated at Nyeri town, 50 kilometers West of Mt Kenya 20 kilometers East of Aberdare ranges and 1.5 kilometers east of Nyeri town. It serves a population of 800,000 people. It is the referral hospital for this region and therefore diabetic patient attends clinic here.

A retrospective data analyzed on patients who visited the hospital between July 2008 to March 2016. A total number of 11,134 patients had their blood sugar levels tested. All those who tested above 11.7 mmols were monitored.

Results: Between July 2008 to March 2016, 11,134 patients were tested and out of these, 1559 (14%) had their blood sugar levels above 11.7 mmols. A total of 878 (7.8%) patients were newly diagnosed to be diabetic. Females account for 6366 (57%) and males 4768 (43%) of the total number who visited the hospital during the study period. The most affected age group included males and females aged 45 years to 65 years.

Conclusion: The study showed that more females are affected by diabetes than males in Nyeri town, Kenya. This could be due to the life style behavior of the community living in this region. The study also depicts that affected persons are those who are employed (i.e. teachers, civil servants and business people). Could be due to poor eating, habit, lack of physical exercise.

Intensive public health awareness should be addressed, routine checkup must be advocated especially for person who are aged above 30 years.

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13:20

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Platelet Volume Indices in Hypertensive Sudanese patients – Khartoum, Sudan

Background: Hypertension is the third leading killer in the world and has the highest prevalence among the major non communicable diseases (NCDs) in Sudan (prevalence of 23.6% in Khartoum state, among adults (25 - 64 years). Hypertension is quantitatively the most important risk factor for premature cardiovascular diseases (CVD), being more common than other major risk factors (it accounts 54% of all strokes and 47% of all ischemic heart diseases events globally). Several reports have demonstrated an association between platelet volume indices (PVI) and traditional CVD risk factors, such as hypertension. The aim is to study Platelet volume indices (PVI) – mean platelet volume (MPV), Platelet distribution width (PDW), and Platelet large cell ratio (P-LCR) in Hypertensive Sudanese patients.

Methods: A descriptive study was conducted at Khartoum state in 2014. A total of 55 hypertensive patients and 20 non hypertensive individuals as controls were enrolled. The patients were 23 males and 32 females with mean age 58.40 years and more than one year hypertensive. Two and half ml of venous blood was collected from all individuals in EDTA anticoagulant. A blood cell counter Sysmex KX-21 was used to measure PVI within two hours after sample collection.

Results: Hypertensive individuals had significantly higher PVI. Mean MPV 10.27 FL (p = 0.000), mean PDW 12.84 FL (p =0.000) and mean PLCR 30.92% (P= 0.000) compared with the normotensive individuals Mean MPV 10.12 FL, mean PDW 12.74 FL and mean PLCR 27.00%.

Conclusion: Increased PVI is now emerging as a risk factor for thromboembolism, stroke and myocardial infarction. Hypertensive patients are known to have higher incidence of these disorders, hence the evaluation of platelet hyperactivity can be stressed as a potential marker for better assess of CVD risk.
Neonatal Haemolytic anaemia – a Diagnostic Challenge

Background: Neonatal haemolytic anaemia can be due to several factors and laboratory analysis is essential to provide an exact diagnosis.

Methods: A 16-day-old female dizygotic twin was referred to the Charlotte Maxeke Johannesburg Academic Hospital with a history of severe haemolytic anaemia characterized by poikilocytosis and red cell fragmentation.

Results: She presented with neonatal jaundice and required a red blood cell transfusion. The haemoglobin was 71g/l, mean cell volume (MCV) was 86.9fl and unconjugated bilirubin was 222 umol/l. Red cell membrane studies revealed a spectrin dimer self-association defect due to a mutant spectrin α/74 and normal spectrin content. These findings were consistent with a diagnosis of Hereditary Elliptocytosis (HE) with neonatal poikilocytosis. HE is typically inherited in an autosomal dominant fashion and the amount of mutant and normal spectrin should therefore be equivalent. In this case there was only a slight increase in spectrin α/74, but since the proband had been transfused prior to performing the analysis, the presence of normal transfused red cells would increase the relative amount of normal spectrin. However, the lack of elliptocytes on the peripheral smear, the low MCV and the requirement for red cell transfusions suggested a diagnosis of hereditary pyropoikilocytosis (HPP). HPP is a severe autosomal recessive disorder and all cases show a marked spectrin dimer self-association defect and a decreased amount of spectrin, which severely weaken the membrane skeleton and lead to red cell fragmentation and haemolysis. The presence of transfused red cells would have masked the decrease in spectrin and the severity of the functional and structural spectrin defects. HPP cases typically remain transfusion dependent until a splenectomy is performed, whereas HE cases follow a more benign course.

Conclusion: This study highlights the importance of evaluating the peripheral blood smear and requesting appropriate specialised laboratory tests prior to transfusion.

The Validity of HLA Antibody Testing in Designing Immunological Risk Stratification Strategies for Patients Awaiting Transplantation in Johannesburg, South Africa

Background: Pre-formed donor-specific anti-HLA antibodies cause antibody-mediated rejection in transplanted patients. Suitable laboratory testing prior to transplantation is vital in order to understand a patient’s immunological risk in order to make the correct decisions on donor-recipient pairing. Luminex single antigen assays are essential in detecting specific HLA antibodies in recipients. Regular monitoring of panel reactive HLA antibody levels prior to transplantation enables characterization of a recipient’s risk profile in order to prevent rejection.

Methods: Potential recipients awaiting renal or pancreatic transplantation (deceased donor) were tested using Luminex single antigen testing. HLA class I and II antibody specificities were determined, and patient demographics were determined for each blood group. The panel reactive antibodies in patients who were transplanted were compared to those who were not transplanted for each blood group.

Results: Of the 163 patients who had more than one Luminex single antigen test, ~38% (class I) and ~33% (class II) experienced changes in HLA antibody specificity. We report changes in relative antibody strength and specificity in both sensitized and non-sensitized patients. The highest panel reactive antibody percentage was determined for each patient. Overall, patients who were transplanted were found to have significantly lower levels of HLA antibodies when compared to those who remained on the waiting list (p=0.0006). Patients who did not receive transplants from the Group 0 waiting list had significantly higher levels of antibodies compared to those who were transplanted (p=0.0138), while there was no significant difference observed in Group A (p=0.0941) and Group B (p=0.2656). No patients in blood group AB were transplanted. HLA antibody specificities were found to change over time. HLA frequencies in cadaver donors were analysed; some HLA alleles occur more often than others in the donor population. Many patients had antibodies to these common HLA alleles.

Conclusion: Regular monitoring of HLA antibody levels can guide immunological risk stratification and can increase the chance of successful transplantation. Standard algorithms of laboratory testing need to be established to best allocate organs to the correct recipients.
The Clinical Utility of the Automated Fragmented Red Cell Count for Monitoring Patients with Thrombotic Thrombocytopenic Purpura

Background: Thrombotic thrombocytopenic purpura (TTP) is a haematological emergency. Accurate identification and quantitation of schistocytes on the peripheral blood smear (PBS) is required in order to initiate plasma exchange. Determination of the automated fragmented red cell (FRC) parameter provides improved precision and immediate availability with a reported high sensitivity.

Methods: One hundred and three PBS with schistocytes were identified from ten patients with the diagnosis of TTP at the National Health Laboratory Service Charlotte Maxeke Johannesburg Academic Hospital Complex over a twelve month period. The accuracy of the automated FRC was compared with the manual schistocyte percentage for the diagnosis and monitoring of plasma exchange therapy in patients with TTP. The manual schistocyte percentage was evaluated by microscopic observation by two competent morphologists according to the International Council for Standardisation in Haematology (ICSH) recommendations. Measurement of the automated FRC was performed by two dimensional optical analysis on the ADVIA (2)120 haematology analyser (Siemens Diagnostics, NY, USA). Platelet counts and lactate dehydrogenase were also collected.

Results: The correlation coefficient between the average of the morphologists and the automated FRC percentage was -2.98 (CI, -3.36 to -2.59). The mean automated FRC of 0.73±0.50 was significantly lower than the manual schistocyte percentage of 3.71±1.97 (p<0.0001). The ADVIA (2)120 underestimated the schistocyte count above a threshold of 1.5% and showed an increase in the difference between the two tests with increasing manual schistocyte counts. Further, the ADVIA (2)120 was unable to measure high schistocyte counts. There was no correlation between the automated FRC percentage and other laboratory parameters such as the platelet count and LDH (R2=0.109, P<0.003 and R2=0.102, P<0.006 respectively).

Conclusion: The automated FRC requires confirmation by microscopic examination of the PBS for the accurate diagnosis and monitoring of plasma exchange therapy in patients with TTP.

Severe Elevations in Serum Alanine Aminotransferase is Correlated with Haemoglobin Concentration and Platelet Counts in HIV Infected Patients

Background: Serum Alanine amino transferase (ALT) concentration is a commonly used biochemical surrogate for the assessment of liver dysfunction particularly in resource limited settings. We investigated the association between elevated ALT concentrations with haemoglobin concentration which is thought to modulate ALT and platelet counts in HIV infected individuals on HAART at a HIV Clinic in Jos, North-central Nigeria.

Methods: This analytical cross sectional study was carried out from January 2009 to March 2014 and examined 15118 patients for life threatening ALT elevations defined as concentrations ≥120IU/L.

Results: In this study, men with elevated ALT levels were significantly older than women p=0.005. The mean haemoglobin concentration of patients with ALT levels ≥120IU/L of 13.0±1.8g/dl was significantly higher than in patients with ALT concentrations ≤120IU/L, p<0.0001. A positive correlation was observed between haemoglobin concentration and ALT levels r=0.735, r2=0.564, p<0.0001. Our linear regression model to predict the relationship was y=0.031x+7.202. Conversely, the mean Platelet counts of patients with ALT levels ≥120 IU/L was (199.4±82.4)x103/L and significantly lower than the counts (314.4±159.3)x103/L in patients with ALT levels <120IU/L. We observed a weak negative correlation between platelet counts and ALT levels (r=-0.321, r2=0.103, p<0.0001). The linear regression model was y=328.9-0.725x. Also, the male gender was significantly associated with elevated levels of ALT than females.

Conclusion: Our study indicates there is an association between elevated ALT levels with haemoglobin concentration and platelet counts in HIV infected individuals. The implications and significance of these relationships will require further investigation.
Adebayo M. Fashola - 13:10

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**A Comparative Analysis of Clinical Breast Examination and Mammography Screening Among Women in a Tertiary Hospital, Ekiti State, Nigeria. 2016**

**Background:** Breast cancer is the most common cause of cancer death among women in the world with one million new cases diagnosed worldwide annually. In Nigeria, late presentation is common due to poor screening practices. We conducted this study to determine mammography awareness of the study population, prevalence of breast cancer by clinical breast examination (CBE) and mammography; and the accuracy of CBE compared with mammography.

**Methods:** A cross-sectional study of 67 women aged 40 – 70 years attending family medicine department, recruited by systematic random sampling between March - June 2016 and interviewed about their screening practices and mammography awareness. Thereafter a specific physician carried out clinical breast examination (CBE) on the women using the American Cancer Society 2004 guideline. The patients had digital mammography done, interpreted by a radiologist and data analyzed using Epi Info 7. Univariate and bivariate analysis done, both sensitivity and specificity of CBE were determined using mammography as gold standard.

**Results:** 64 (95.5%) were married and 2 (3.0%) widowed. 70.2% had tertiary education while 7.6% were uneducated. Mean age was 48.0 years and standard deviation 9.9 years. 33 (49.3%) regularly practiced breast self examination while 16 (23.9%) had previous CBE. 53 (79.1%) were aware of mammography while 6 (9.0%) had done it. The prevalence of breast lump by CBE and mammography was 10.5% and 21.4% respectively. Malignancy was suspected in 3 (4.5%) of the patients by CBE and benign findings in 6 (9.0%) mammography identified 4 (6.0%) and 16 (23.9%) as malignant and benign respectively. The sensitivity of CBE was 15.0%, specificity 82.4% and positive predictive value 33.3%.

**Conclusion:** There is a gap between awareness and practice of mammography among the study population, while CBE is highly specific; its sensitivity is low but advocated for resource poor settings with low prevalence of breast cancer.

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**Comparing the Glucose Metabolism Derangement in Human Immunodeficiency Virus Infection Patients on Antiretroviral Treatment with Drug Naïve Patients at Lagos State University Teaching Hospital**

**Background:** People living with HIV and AIDS are exposed to the challenges of aging and diet related diseases due to prolonged survival by retroviral drugs. The presence of chronic inflammatory state and the metabolic effects of antiretroviral therapy are additional burden.

**Methods:** This study was designed to determine the changes in glucose metabolism in HIV infection. This was a case-control study carried out at the adult HIV clinic. Consenting participants were grouped into four; those on nucleoside reverse transcriptase inhibitor/non-nucleoside reverse transcriptase inhibitor (NRTI/ NNRTI) (group 1), those on NRTI/PI (group 2), those that were treatment naïve (group 3) and age and sex matched HIV negative controls (group 4). Questionnaires were used to assess the demography of participants. The weight and height of participants were done. Blood was collected for fasting blood sugar, 2 hour post prandial glucose and CD4 count.

**Results:** The body mass index (BMI) was significantly lower in the participants on protease inhibitors. The control group had lower 2HPP glucose despite a higher FBS than the other groups that were HIV positive. Treatment naïve (group 3) tend to have higher 2-hour post-prandial blood sugar (2HPP) glucose tests (p= 0.04). The male HIV positive participants on PI also had significantly higher 2HPP glucose tests (p=0.01). The females had lower fasting blood sugar (FBS) and 2HPP glucose tests than the males. There were no correlations of glucose metabolism with CD4 count, age or BMI.

**Conclusion:** The higher 2HPP glucose tests in participants who are treatment naïve may be explained by insulin resistance associated with chronic inflammatory state. It is therefore recommended that HAART be commenced early.
Suboptimal Virological Suppression Among Children and Adolescents on Antiretroviral Therapy (ART) in Uganda

**Background:** WHO recommends routine ART monitoring using viral load (VL) testing to minimize failure and ensure treatment adherence. In line with this and the UNAIDS 90-90-90 initiative, Uganda adopted and gradually scaled up VL testing in August 2014 with children and adolescents among the priority populations.

**Methods:** The Central Public Health Laboratories (CPHL) hosts the national VL laboratory supporting the country’s VL program. The laboratory receives samples from health facilities through the national sample transport network. Each sample has a request form capturing key patient and program metrics necessary for program monitoring (including age, gender, ART regimen, duration on ART, reason for VL testing, self-reported ART adherence) that are entered in a VL laboratory information management system (LIMS). Between August 2014 and March 2016, 1,272 (76%) ART facilities submitted 398,849 samples from 104 of the 112 districts with an overall national VL access of 41.1%.

Between August 2014 and March 2016, 1,272 (76%) ART facilities submitted 398,849 samples from 104 of the 112 districts with an overall national VL access of 41.1%.

**Results:** In total, 42,125 (10.6%) of the samples were from children and adolescents with a coverage of 46%. Overall VL suppression was 90.8%. However suppression among children and adolescents remained suboptimal at 74% vs 93% for those aged 26 years and above. Additionally, 69% of children and adolescents who were initially not suppressing their VL on the first test remained unsuppressed on repeat testing after 6 months of intensive adherence support thus necessitating a regimen switch or other interventions compared to 42% of adults.

**Conclusion:** Implementation of a national VL program in Uganda has provided the AIDS Control Program immense capacity to understand virological outcomes of ART patients, the most striking being markedly suboptimal VL suppression among children and adolescents. Further understanding of the causes of this suboptimal VL suppression and innovative solutions to improve response to ART are required in order to achieve the 3<sup>rd</sup> 90 in this population.
Incidence and Predictors of Treatment Failure to Second-line Antiretroviral Treatment in a Young People Living with HIV/AIDS Clinic: A Retrospective Cohort Study

Background: Second line (PI) based regimens remain expensive in most developing nations yet will soon be needed by the high number of people on ART. The current clinical and immunological tests are not sufficient to identify early enough patients who are failing on second line regimens and routine virological testing is not readily available.

Methods: A retrospective cohort study was carried using 298 medical records of young people on second line regimens at Baylor-Uganda between the period 2010 and 2013. Laboratory tests were carried out at the Baylor Uganda College of American Pathologist Accredited laboratory and Mildmay Uganda laboratory using approved FDA equipments. Clinical data was obtained from the electronic monitoring record system captured by highly skilled professionals during the care and treatment of these participants while following the national treatment guidelines.

Results: During the follow up time of 12 (5-49.0) months, there were 65 (21.8%) treatment failures. The incidence was 18.2 (14.3-23.2) per 100 person years and the predictors that were associated with second line treatment failure were duration on ART of 1-2 years (HR=3.485, p=0.009), duration on ART of 3-4 years (HR=4.186, p=0.000), viral load > 1000 cp/ml (HR=3.933, p=0.000) and adherence levels <95% (HR=2.775, p=0.001). Age, gender, CD4, CD8, CD4:CD8, total lymphocyte count, absolute neutrophil count and WHO staging were not associated with treatment failure on second line.

Conclusion: A relatively high rate of treatment failure among young people on second line regimens from a clinical setup was reported from this study. Duration on ART was the strongest predictor of treatment failure with young people who had been on ART for more than five years at approximately eight times higher risk of treatment failure. Elevated viral load count and poor adherence were also associated with treatment failure on second line. This study highlights the need of virological testing in routine patient care for the success of the ART programs.

Building an International Biorepository in a Resource Limited Setting

Background: The Institute of Human Virology Nigeria- Human Heredity and Health in Africa (H3Africa) Biorepository’s (I-HAB’s) goal is to provide high quality biospecimen for research. Pre-analytical processes at and between clinical research sites and I-HAB are critical for attaining well-preserved, well-annotated biospecimen. I-HAB has journeyed from a rudimentary to an ISBER compliant biobank through cyclic process of needs assessment, remediation and training.

Methods: I-HAB partnered with Coriell Institute of Medical Research consultant to conduct baseline and follow-up assessments using the ISBER Self-Assessment tool and a customized assessment tool to upgrade practices at I-HAB; and engaged H3Africa clinical sites using a five steps approach: introductions, document review, training, pilot shipments with comparative QC, and outcome analysis.

Results: From 2012 to 2015, assessments improved at I-HAB from 66.9% to 95.0% (self-assessment) and 70.0% to 93.6% (consultant). I-HAB strengthened human, operational, and infrastructural capacity. Forty-one staff from six clinical sites were trained in 17 topics. Pilots conducted demonstrated that DNA transported at controlled ambient remained stable and exchange of MTAs and samples across Africa was possible. I-HAB stored, shipped, and received over 11,736 biospecimens across Africa.

Conclusion: Our study found that controlled ambient provides affordable DNA shipping method, serum/plasma visual grading QC is adoptable by research sites, Gels were useful for resolving DNA concentration discrepancies and trainings improved biospecimen collection, QC, storage and distribution. Achieving international standards in biobanking within developing countries is a partnership between countries, biobanks, clinical research sites, and shipping companies.
13:10

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**Challenges Facing Prison Workers in Diagnosis and Management of Tuberculosis in Mbeya, Tanzania**

**Background:** BACKGROUND Tuberculosis (TB) treatment and control in prisons is a major challenge. Based on field experience of 5 years working with TB diagnosis and treatment in prisons. We realized that prison workers were not given required attention as far as TB screening is concerned despite the risk they face. Due to prison environment, the close interaction between prisoner and prison staff is obligatory. Hence, for effective TB control, attention needs to be paid to both groups as transmission may occur both ways, from prisoners to prison staffs and vice versa. The aim of the study is to assess the knowledge of Tuberculosis based on transmission, sign and symptoms on prison workers.

**Methods:** METHODS A simple questionnaire was administered to 140 prison staff based on transmission, sign and symptoms of TB infections and gene Xpert was done to diagnose TB infections on prison workers from 2012 to 2015 in four prisons within southern highlands (Ruanda, Songwe, Tukuyu and Mbozi).

**Results:** RESULTS More than 60% of the prison workers had no knowledge on TB transmission, sign and symptoms, however 3.9% of the workers were TB infected and 21.6% of knowledgeable prison staff were also infected with TB. The gene xpert results shows that 12 (8.6%) of 140 sample tested were positive (Mtb detected) and 128 (91.4%) of 140 were negative (Mtb not detected).

**Conclusion:** CONCLUSION Prison staff contributes to the burden of TB in prison settings. Therefore government commitment, partnerships, and sustained finance are needed to create awareness among prison workers to improve control in prison settings by enhancing early detection of TB infections among prison staffs.

13:20

Charles Kiyaga1, Lara Vojnov1, Brittany Urick1, Youyi Fong3, Christopher Okiira2, Isaac Ssewanyana1, Victor Bigira1, Trevor Peter1, Anisa Ghadrshenas1

1. Clinton Health Access Initiative, Kampala, Uganda.
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**Where Have All the Children Gone? High HIV Prevalence in Infants Attending Nutrition and Inpatient Wards**

**Background:** Despite notable progress in elimination of mother-to-child transmission (EMTCT) programming, less than 50% received an EID HIV test within the first two months of life in 2014, and only 30% of HIV-infected infants are on ART. Current WHO guidelines suggest the expansion of testing and screening outside of EMTCT, but an assessment of prevalence and yield at various entry points has not been explored previously. Our study assessed the HIV infection prevalence of children receiving care at various service entry points in health facilities in Uganda.

**Methods:** We consecutively enrolled and tested infants 24 months of age and below at four major hospitals across Uganda. Six hundred children across four hospitals were included for each of the six major infant/child service entry points of the facilities: EMTCT, immunization, inpatient, nutrition, outpatient, and outreach. Each infant received a virological EID test to determine infection status.

**Results:** A total of 117 infants were HIV-positive for an overall prevalence of 3.25%. The traditional EID entry point, EMTCT, had a prevalence of 3.84%, representing 19.6% (n=23) of the HIV-infected infants identified. Fifty percent (n=59) of the 117 identified HIV-positive infants were found in the nutrition wards, which had a prevalence of 9.83% (p<0.001 compared to EMTCT). Inpatient wards had a prevalence of 3.50% and yielded 17.9% (n=21) of the infected infants identified. Immunization wards and outreach had the prevalence at less than 0.35%, and yielded 0.8% (n=1) and 1.7% (n=2) of the infected infants identified, respectively.

**Conclusion:** More effective identification of HIV-infected infants is critical to improve case-finding and initiate infants on life-saving ART. While EID testing should remain at EMTCT, strengthened, testing approaches should consider high HIV prevalence at nutrition and inpatient wards, which indicate that universal virological testing should be prioritized routinely at those entry points.
ORAL POSTER 3.2

APPROACHES FOR QUALITY MANAGEMENT SYSTEMS AND DIAGNOSTICS

DATE: Thursday 8 December
TIME: 12:30 – 13:30
ROOM: Ballroom East/West, Stage 2
CHAIR: Katy Yao, Centers for Disease Control and Prevention, United States

12:30

Agnes Munyalo 1, Emmanuel M. Kitso 1, Jeram Ondigo 2, Antony Mugendi 2, Muthoni Jungha 1, Ernest P. Makokha 3, Christina Mwachari 2, Sylvia Opio 1

1. iLabAfrica, Strathmore University, NAIROBI, Kenya. 2. University of Maryland, NAIROBI, Kenya. 3. Centers for Disease Control, NAIROBI, Kenya.

Piloting the E-SLIPTA Checklist in Kenya

Background: The WHO African Regional Office (AFRO) Stepwise Laboratory Quality Improvement Process Towards Accreditation (SLIPTA) checklist is an internationally recognized paper-based audit tool used in the Strengthening Laboratory Management Toward Accreditation (SLMTA) program. The paper-based checklist limits timely analysis and communication of findings. Recently, the Centers for Disease Control and Prevention-Kenya in collaboration with Strathmore University, customized the electronic (e)-SLIPTA checklist to facilitate audits and mitigate gaps in compiling timely reports.

Methods: Between October–December 2015, the offline and online versions of the e-SLIPTA checklist were piloted in 10 Ministry of Health facility laboratories in Kiambu, NAIROBI, Meru and Nyeri counties by University of Maryland’s trained SLMTA assessors. Following training on the e-tool by Strathmore University, assessors conducted SLIPTA audits.

Results: The e-tool allowed for different sections of the tool to be assessed by independent assessors in the same audit. Adjustments were made after initial assessments to merge summary scores and comments from independent assessors in the same audit. The e-tool auto-generated audit summaries soon after the audit, ready to be shared with relevant stakeholders compared to the manual version which would take at least two days to compile. The offline version was modified to allow for local data storage enabling laboratories to perform internal audits on independent sections at different time points in order to monitor progress of the selected sections. The online version was hosted centrally to allow access through the internet. This version enabled storage and retrieval of findings and auto-generation of summary scores across labs. The major problem was conducting e-SLIPTA audits using a lap-top.

Conclusion: The SLIPTA e-tool automates analysis and generation of summary reports, reduces the turn-around time for reporting and enables instant sharing of audit findings. The offline version offers flexibility for laboratories performing internal audits. Customizing the tool on handheld devices may optimize its utility.

Alignment of the WHO AFRO SLIPTA Checklist to ISO 15189:2012 Standard: Seamless Transition from Version 1 to Version 2

Background: The Strengthening Laboratory Improvement Process Towards Accreditation (SLIPTA) checklist, launched concurrently with the then World Health Regional Office for Africa (WHO AFRO) Accreditation process in 2009 and now the WHO AFRO SLIPTA program was revised in 2011 and 2015. The 2015 revision aligned the checklist with the ISO 15189:2012 version of the standard. We present an analysis of the comparison of the two versions as implemented in the field.

Methods: We compared two cohorts 2011 and 2015 versions (scores 258 and 275 respectively) of the checklist. 2015 version was developed after consultation with 96 ASLM certified auditors, 12 SLMTA Master Trainers and Laboratory managers for input in March 2016. A panel of experts reviewed the checklist to align with ISO15189:2012 standard. The new checklist was evaluated by users for coverage of ISO 15189:2012 clauses, clarity of questions and applicability to their laboratories and submitted to WHO for publication. Eleven laboratories in 5 countries piloted the new checklist. We compared the median overall percentages scores and by quality system components of the checklist using Wilcoxon sign rank test.

Results: On a scale of 1-10, on average, pilot respondents rated checklist scoring system as 8.1; coverage of ISO 15189:2012 clauses 8.8, clarity of questions 8.2 and applicability of checklist 8.4. Between September 2015 and April 2016, 22 laboratories were audited using the 2015 version. There was no statistically significant difference in performance between laboratories audited with 2011 (median score =68.8%; Q1, Q3: 61.6, 76.7) and 2015 version (median score =66.9; Q1, Q3:57.5, 71.6), p = 0.08. There was statistically significant difference in performance between the 2 cohorts in sections 2-management reviews (p<0.001), 9-information management (p=0.04), 0-corrective actions (p=0.001) and 11-continual improvement (p =0.002). Average performance was below 50% for Internal Audits and Corrective Action by both cohorts.

Conclusion: The transition from 2011 to 2015 version and alignment to ISO 15189:2012 standard of the SLIPTA checklist was seamless allowing for comparison of laboratory performance across versions and continuity in monitoring of progress. Sections 2, 9, 10 and 11 total possible scores were substantially different in version 2 with more variation and difference in performance observed.
A Baseline Assessment of the Policy and Regulatory Environment for HIV Self-testing in Malawi, Zimbabwe and Zambia

**Background:** Devices that allow individuals to conduct HIV self-testing (HIVST) are being rapidly scaled-up in Sub-Saharan Africa to increase access to testing. Some countries are already regulating HIVST and have developed policies to support implementation, but in many there is no regulatory or policy framework. A baseline assessment of the policy and regulatory environment for HIVST was undertaken to inform development of a regulatory and policy framework to support implementation. This study was undertaken in Malawi, Zimbabwe and Zambia (countries in the STAR project, a large impact evaluation study of HIVST).

**Methods:** We combined a legal and policy review on HIVST with in-depth individual interviews with key informants (e.g. legal, pharmacy and regulatory bodies, Bureaus of Standards, national reference laboratories, Ministries of Health, implementing agencies and academics). We used a policy analysis triangle to better understand current status and capacity for policy and regulation, as well as to identify key gaps and concerns. A thematic framework approach was used for analysis.

**Results:** We will present findings on close to 60 interviews in the three countries. Emerging themes to date indicate that policymakers need to have a clearer understanding of the role and mandate of their regulatory bodies for in vitro diagnostics (IVDs). IVDs are not actively regulated in all three countries, but regulators are currently pursuing this. Regulators were often not included in policy level discussions, leading to disconnection between policy and regulation. Ministries of Health are keen to adopt HIVST into policy however the establishment of coordination bodies for HIVST appears to be in a very early stage of development in all three countries.

**Conclusion:** The policy environment is favorable for HIVST however both policy makers and regulators must be included in national coordination bodies to ensure the alignment of policy and regulation and the development of regulatory pathways.
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Clinical Unit, Management Sciences for Health, CBD, Abuja, FCT, Nigeria.

**Expanding Access to GenXpert Technology Through Linkages of Peripheral TB Laboratory Service Delivery Networks in Northern Nigeria**

**Background:** The rapid introduction of the GeneXpert technology with proven advantages over the microscopy method holds the promise of overcoming current operational challenges as it reduces the turnaround time for TB testing, and improves the detection of rifampicin resistant TB strains. Although GeneXpert is the recommended first line diagnostic test for PLHIVs and re-treatment TB cases in Nigeria, the uptake is still very low. This study aims to evaluate the impact of linking GeneXpert laboratories with peripheral TB laboratory networks on GeneXpert service uptake.

**Methods:** The USAID funded ProACT project implemented by xxxxx (MSH), supports collaborative TB/HIV services at 41 rural and urban clinics. To address low uptake of GeneXpert services, 69 health facilities within 10-100km radius were mapped and clustered to feed in as spokes to 10 laboratories with GeneXpert capacity using the hub and spoke model, between October - December 2015. MSH further deployed SOPs and trained laboratory scientist on use of GeneXpert technology. A transport network that utilized district xxxxx (TBL) supervisors as sample logistics managers was also introduced.

**Results:** Of the 1198 samples analyzed prior to our intervention, 205 cases of TB and 14 RIF resistant TB were identified over a period of 9 months from January –September 2015. In contrast, six months post intervention-October 2015 to March 2016, 2135 samples (78% increase) were analyzed with 502 cases of TB identified-a 145% increase in the yield. Additionally we observed a 136% increase in RIF resistance TB detection.

**Conclusion:** To significantly increase TB case detection in Nigeria, peripheral and regional TB lab networks must be organized in a way that would strengthen sample logistics to improve patient access to early and accurate TB diagnosis. This increased and rapid TB case detection will potentially decrease morbidity associated with TB/HIV co-infection.
**POSTER 1**

Mahamadou Abdou, Ibrehima Guindo, Seydou Diarra, Souleymane Coulibaly, Flabou Bougoudogo  
Diagnostic et Recherche Biomedicale, INRSP, BAMAKO, Mali.

**Evolution of Bacterial Strains Responsible of Meningitis from 2006 to 2015 in Mali**

**Background:** The most common bacteria responsible for meningitis in the meningitis belt are *Neisseria meningitidis*, *Streptococcus pneumoniae* and *Haemophilus influenzae* b. The goal of this study was to show the evolution bacterial pathogen frequency that caused meningitis in epidemiological surveillance in Mali from 2006 to 2015.

**Methods:** This was a 10 year retrospective study carried out from 2006 to 2015. Cerebrospinal fluid (CSF) of patients were collected at all health districts and hospitals from suspected cases of meningitis according to WHO case definition and were shipped in trans-isolate medium or dry tube to the reference national laboratory of Meningitis at INRSP (Bamako, capital city) for confirmation. The diagnosis was based on results from performing agglutination of soluble antigens using Pastorex meningitis® (Bio-Rad), culture and/or real-time PCR (Stratagene®, MxPro 3005P).

**Results:** From 4859 CSF collected during ten years, 983 were positive cases (20.2%). The age average of patients was 9 years and median 5 years. The most identified pathogens were *Neisseria meningitidis* (56.8%); *Streptococcus pneumoniae* (26.2%) and *Haemophilus influenzae* b (8.2%). Other germs (1.2%) were found. Among meningococcal strain isolated mostly from 5-14 years, serogroup A was 56.1% and serogroup W135 was 38.53%. Pneumococcus and Haemophilus were isolated among children less than one year.

**Conclusion:** Introduction of meningococcal conjugate vaccine (MenAfriVac) permitted extinction of serogroup A in 2010 but other serogroups (W135 and X) and genus as Pneumococcus seem to emerge after this date.

**POSTER 2**

Izza Abdulhafedh  
The Nairobi Hospital, Nairobi, Kenya.

**The Role of Procalcitonin in Neonatal Sepsis at The Nairobi Hospital-Kenya**

**Background:** Neonatal sepsis (NNS) is the most common cause of morbidity and mortality in the neonatal period. The clinical picture of sepsis is variable in newborn infants. The diagnosis of NNS is difficult due to the clinical signs often overlapping with non-infectious causes of systemic inflammation. Currently there is no single reliable test for an early definitive diagnosis of NNS. There is need to establish a reliable test that will differentiate between sepsis and non-infectious conditions to reduce unnecessary antibiotic use.

**Methods:** A retrospective evaluation of data on neonates with a clinical diagnosis of NNS was conducted from 1st March, 2015 to 30th September, 2015, in the Nairobi Hospital. All newborns with a diagnosis of neonatal sepsis admitted to nursery including neonatal ICU (NICU) with at least one level of procalcitonin were included. PCT test was run on Biomérieux Vidas using the B.R.A.H.M.S PCT method.

Blood cultures were run on Biomérieux BacT/ALERT 3D. The colonies were then set for identification using the VITEK compact 2.

**Results:** A total of 348 samples from 231 babies in the nursery tested for PCT from March 2015 and September 2015, including 103 females. PCT values ranged from (0.06 - 252.1) ng/ml. Normal PCT value should be < 0.05 ng/ml; however the cut off for antibiotic treatment was > 0.5 ng/ml. A total of 49 babies had 2 PCT values measured. The first measure was elevated and the second after treatment showed a reduced value. A total of 26 babies had more than two PCT measurements taken, and we noted the reduced values of PCT after treatment. Out of 348 blood samples, 127 had blood cultures taken. A total of 116 were negative after 5 days incubation and 11 had positive cultures. *Staphylococcus epidermidis* (5) was the most common organism followed by *Klebsiella pneumoniae* (2), *Staphylococcus aureus* (1), *Streptococcus pneumoniae* (1) and *Enterococcus faecalis* (1). The highest PCT values also had positive blood cultures. One 138.3 ng/ml and 252.1 ng/ml on day 7 and 8, respectively, had blood culture positive for *Klebsiella pneumoniae*, a second blood culture taken after treatment produced no growth.

**Conclusion:** Serum levels of procalcitonin may contribute to the diagnosis of NNS. In addition, it may be used as adjunct information to guide antibiotic use in NNS. More studies are warranted to determine the correlation of procalcitonin with NNS and its value in stopping antibiotic use once clinical signs and symptoms have settled.
**POSTER 3**

Idris Abdullahi Nasir1, Muhammad Maimadu Barma2, Adamu Babayo2

1. Medical Microbiology and Parasitology, University of Ilorin
2. Department of Medical Laboratory Sciences, University of Maiduguri

**Bacterial Nosocomial Pathogens and Their Antibiotic Susceptibility Pattern from Intensive Care Units of the University of Maiduguri Teaching Hospital, Nigeria**

**Background:** Nosocomial infections are among leading causes of morbidity, mortality, and increased antibiotic resistance in Intensive care units (ICUs) of most healthcare facilities. This prospective study was conducted between March to October 2014 in ICUs of the University of Maiduguri Teaching Hospital (UMTH) to assess the rate, types and antibiotic susceptibility pattern of airborne and surface-borne bacterial contamination before and after fumigation.

**Methods:** Sixty (60) samples were collected and investigated from fomites by surface swabbing and open plate air exposure in the ICUs before and after fumigation using standard microbiological methods.

**Results:** Out of the 60 samples investigated, 63.3% (n=38) yielded positive bacterial growth. 68% (n=26) before fumigation of the ICU and 31.5% (n=12) from post fumigation culture. Coagulase-negative *Staphylococcus spp* (CoNS) accounted for 39.4% (n=15) of the positive cultures, *Bacillus spp* 15% (n=9), *Klebsiella pneumoniae* 13.2% (n=5), *Escherichia coli* 10.5% (n=4), *Klebsiella oxytoca* 7.9% (n=3) and *Streptococcus pyogenes* 5.3% (n=2). The antibiotic susceptibility test results of the isolates revealed that CoNS were resistant to amoxicillin, ampiclox and Cefuroxime. *Klebsiella pneumoniae* was also resistance to chloramphenicol, aminoglycosides and the penicillins, while *Escherichia coli* showed resistance to some of the fluoroquinolones, particularly ofloxacin and ciprofloxacin. Conversely, *Bacillus spp.*, *Klebsiella oxytoca* and *Streptococcus pyogenes* were susceptibility to all test antibiotics.

**Conclusion:** The high level of bacterial contamination particularly with equipment and inanimate objects in the ICUs and presence of multidrug resistant bacteria calls for prompt and holistic interventional measures because fumigation only minimized pathogen load in ICUs.

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**POSTER 4**

Abnet Abebe, Habtamu A. Alaba, Abeba G/Tsadik, Gonfa Ayana

Ethiopian Public Health Institute, Addis Ababa, Ethiopia

**Performance Evaluation of Malaria Microscopists Working at Malaria Slides Rechecking Laboratories for External Quality Assessment in Ethiopia**

**Background:** Microscopic diagnosis of Giemsa stained thick and thin blood films has remained the standard laboratory method for the diagnosis of malaria. The Performance of Malaria Microscopists in all health facilities have been raised concerns by many experts.

**Methods:** A cross-sectional study design was conducted to assess the performance of 107 Malaria Microscopists who are working at 23 Malaria Rechecking Laboratories in Ethiopia. A set of 12 blood film slides were distributed to each Malaria microscopists. Data was collected and exported to SPSS version 20 for analysis. Chi-square, sensitivity, specificity, percent agreement, and kappa score were calculated to assess laboratory professionals’ performance in detecting and identification of *Plasmodium* sp. specie. Association was taken as significant at P < 0.05.

**Results:** A total of 107 study participants were involved in this study, the mean age of the participants was 30±5.04 years and most of them (54(50.5%) were working at regional reference laboratories. Overall, the sensitivity of participants in detection and species identification of malaria parasites were 96.8% and 56.7%, respectively. The overall agreement on detection and identification of malaria species was 96.8% (Kappa = 0.9) and 64.77% (kappa = 0.33), respectively. The least malaria species which were identified correctly by the participants were *P. malariae* (2.8%) followed by and *P. ovale* (32.7%). Participants at Hospital laboratory had the highest percent agreement (72.3 %, Kappa=0.51) on species identification. Study participants who were participated on malaria microscopy and quality assurance training had a better performance on parasite quantification (P<0.001).

**Conclusion:** Agreement of the participants with expert microscopist in the identification of different malaria species and quantification were very low. Therefore, policy backed regular competency assessment and training for malaria microscopists is essential and mandatory to assure proper diagnosis and management of malaria in Ethiopia.
Predictors of Tuberculosis Treatment Outcomes by HIV Status in Western Kenya

Background: Tuberculosis is a serious health concern in Kenya which is ranked 15th among the countries with high TB burden globally. This problem is compounded by the high prevalence of HIV in the country. However, the demographic characteristics and predictors of TB treatment outcomes in TB patients by HIV status in Western Kenya is still not well understood.

Methods: All TB patients with HIV information notified in the Nyando Sub-County TB program from January 2012 to December 2013 were categorized as either HIV negative or positive at the time of TB diagnosis. TB-HIV Co-infected patients were compared to TB only patients using a hierarchical logistic regression model using Stata 13.0.

Results: Of the 443, 312 were TB-HIV co-infected. The following factors increased risk of co-infection: female sex (OR=1.99, 95% CI 1.16-2.75), 20-39 years of age (OR=6.58, 95% CI 3.52-12.31), 40-59 years of age (OR=11.87, 95% CI 5.44-25.85), <18.5 BMI (OR=1.56, 95% CI 0.27-9.07) and 18.5-25 BMI (OR=1.13, 95% CI 0.19-6.74). The study reported greater treatment success rates, cured (38.03) and treatment complete rates (38.03) with death, failure and default rates reported as 10.33%, 1.24% and 8.65% respectively. Factors associated with treatment success (cured and treatment complete) were: female sex (OR=1.19, 95% CI 0.77-1.85), residing in rural area (OR=1.52, 95%CI=0.98-2.36), having pulmonary TB (OR=1.70, 95%CI=0.88-3.29), being HIV negative (OR=1.10, 95%CI=0.67-1.79) and being on ART (OR=1.14, 95%CI=0.12-11.11).

Conclusion: The predictors of TB-HIV co-infection include being female, age and BMI while HIV co-infection is associated with poor treatment outcomes. In addition there is high uptake of ART services due to integration of HIV and TB treatment services. Moreover, identification of predictors of TB-HIV co-infection will lead to programmatic interventions targeting prevention and early diagnosis of TB and HIV that will ultimately improve treatment outcomes among the patients.

Use of Standardized Electronic Tools for Harmonized Data Collection Across Multiple Countries and Projects

Background: A huge variety of checklists and tools to monitor laboratory capacity, OMS and BS&S exist in the public sector are specific to the many projects engaged in improving global laboratory diagnostic capacity. While these tools seek to document the same information and measure project progress, the outputs are often difficult to compare due to differences in the organization of questions, formatting or language and are often paper based, further hampering data sharing. A standardized, electronic tool would serve to alleviate many of these problems and can have integrated translation functions. Furthermore, if a progress measure is agreed by multiple parties it would be possible to standardize data collection and progress measures across projects, improving donor coordination.

Methods: GSSH took the SLIPTA V2 checklist released by WHO as a PDF and adapted this into a standalone electronic tool which can be used in English or French on any computer system running Microsoft Excel. An internet connection is not required. The tool has been trialed in laboratories in Togo, Benin and Sierra Leone.

Results: Use of SLIPTA has allowed GSSHealth to compare the current level of laboratories in MOH and MOD systems in Togo, Benin and Sierra Leone. The tool has been refined through several iterations based on real life user experience. The results of these audits have been compared allowing common weaknesses to be identified and prioritized for improvement projects. Within MOD sites in Togo and Benin, the 2016 audits were the second round of assessments and clear, measurable improvements were seen at these sites. The use of a tool with which the sites were familiar allowed them to more easily understand the improvements made at their sites.

Conclusion: Consistent, comparable data collection enables easier measurement of project activities and ensures data obtained from multiple sources can be easily integrated to give a clear picture of current status and progress. This also reduces the work load in terms of data entry as paper based records do not need to be transcribed and, as language can be selected by the user, the language barrier is minimized. Given its focus on laboratory accreditation, SLIPTA may not be the optimal tool for measuring all aspects of laboratory capacity improvement but we believe that the use of this tool makes a strong case for the creation of an agreed checklist and eTool.
Poster 7

A Novel Quality-Focused Multi-Country Approach for Ministry of Defense Laboratory Systems

Background: Ministry of Defense (MOD) laboratories play a critical but under-recognized role in national laboratory networks and outbreak response, providing diagnostic services to military personnel and civilians. MOD personnel are exposed to unique challenges, which may put them at greater risk for HIV. Acknowledging this burden—and the need for a healthy military—military laboratories must optimize diagnoses to ensure patient care. Until recently, information on the scope and quality of military laboratory services in West Africa has been limited. Under the Department of Defense HIV/AIDS Prevention Program, GSSHealth and the MODs of Togo, Benin and Sierra Leone collaboratively initiated the Military Laboratory Quality Improvement Network to identify and address gaps.

Methods: Stepwise Laboratory Improvement Process Towards Accreditation (SLIPTA) internal audits were performed, work plans were devised and Quality Management System workshops were conducted to address laboratory challenges. Quantitative pre- and post-test scores were obtained and quality improvement initiatives were launched, monitored and reported within a year.

Results: Baseline SLIPTA scores (n=6) averaged 11% (range 7.7-24.7); two follow-up audits showed a 21% improvement. Average post-test scores increased by 16% and 25% points for Documentation and Equipment Workshops, respectively. Improvements resulted in the introduction of new diagnostic tests; >30 standard operating procedures; temperature monitoring; and a military-lead initiative to expand quality improvements which contributed to staff motivation. These approaches can be used to extend quality approaches to other diseases.

Conclusion: Baseline audits showed that while challenges exist, there is willingness within the military to enact quality assurance programs to improve patient services. MOD laboratories' collaboration with national and international stakeholders helped forge valuable linkages for training, information sharing and referral systems. PT was a useful early initiative and formed the basis for a concrete structure for quality improvements which contributed to staff motivation. These approaches can be used to extend quality approaches to other diseases.

Poster 8

Addressing Institutional Barriers to Improve Access to Dry Blood Sample in Rural Northwestern Nigeria: a 12-Month Retrospective Data Review of Partnership with Nigeria Poster Service for Sample Transportation

Background: Institutional challenges still limit access of HIV-exposed infants to DBS at 6 weeks in Nigeria. There is paucity of data that evaluate impact of multiple interventions in addressing these challenges. The objective of the study was to review institutional barriers and issues facing access of HIV-exposed infants to DBS in 6 general hospitals supported by Management Science for Health (MSH) and funded by USAID in Kebbi State, Nigeria.

Methods: We reviewed 6 months of data collected from the start of the partnership with Nigeria Service for DBS transportation in October 2014 through April 2015. Our study revealed that 34% HIV-exposed infant had access to DBS at 6 weeks. This led to key informant interview of 36 healthcare workers across 6 hospitals with identification of 5 major institutional challenges limiting access to DBS collection. Targeted interventions included strengthening of intra-facility referral; incorporation of adherence and tracking into PMTCT/EID service, building of capacity of hospital staff on DBS collection process and documentation in PMTCT service tools. We evaluated the outcome after 6 months by October 2015.

Results: By October 2015, a repeat evaluation showed that the number of DBS samples collected increased from 42 to 138. The number of results received increased from 31 to 112, while the average turnaround time (TAT) improved from 70 days to 43 days. DBS access increased from 32% to 86% within the 6 months of interventions.

Conclusion: Multiple structured interventions have potential to improve access of HIV-exposed infants to DBS for early infant diagnosis. The study will help implementers to improve early infant HIV diagnosis in poor resource setting through interventions aimed at institutional barriers. Integration of point of care testing for DBS need scale up to improve diagnosis and access to lifesaving antiretroviral therapy.
**Opportunities for TB/HIV Collaboration During GeneXpert Roll Out in Nigeria – the NACA/KNCV Experience**

**Background:** The Nigerian National Agency for Control of AIDS (NACA) with support from the GFATM interim HIV funding started the roll out of 185 GeneXpert MTB/RIF machines in 185 tertiary and secondary health facilities with a view to improve diagnosis of TB among PLHIV. The roll out process has reached 161 facilities assessment with 18 sites unsuitable, 4 ceded to other IP NASCP and IPs/SRs to collate the 185 for suitability assessment. Lessons learnt by the intervention, is the importance of collaboration as it brings about ownership, speed and eventually increased case diagnoses and response. Opportunities for collaboration with stakeholders such as Implementing Partners/Sub Recipients (IPs/SRs).

**Methods:** The Nigerian National Agency for the Control of AIDS (NACA) with technical assistance from KNCV Tuberculosis Foundation collaborated with the National Tuberculosis Program, NASCP and IPs/SRs to collate the 185 for suitability assessment and laboratory infrastructural upgrade following suitability. NACA continues to share updates on roll-out plan with the NTP assigning a State TB Officer for visits done (site assessments, installation, supervision and mentoring). NACA got involved, participates in every and sponsors some of the Country GeneXpert Advisory Team (CGAT) meeting where updates are continuously shared and infused into the NACA/KNCV GeneXpert project with feedbacks disseminated to all stakeholders.

**Results:** With this collaboration between NACA, NTP and IPs/SRs and quarterly CGAT meetings, the roll-out process has reached 161 sites assessments with 18 sites unsuitable, 4 ceded to other IP following IP readiness, 68 installed, 42 supervisory and mentoring visits/calls, 10 ready for installation, 9 ongoing laboratory infrastructural upgrades and 44 facilities to be assessed solely by the State TB Officers following past joint assessments. Lessons learnt by the intervention, is the importance of collaboration as it brings about ownership, speed and eventually increased case notification and right patient care initiation among others.

**Conclusion:** Opportunities for collaboration with stakeholders should never be overlooked as it brings about smooth execution of the GeneXpert roll-out while leveraging on human resources and learning from others’ experiences.

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**Assessment of Primary, Secondary and Tertiary Health Facilities Across Four States in Nigeria:**

**Background:** Disease surveillance is critical for providing evidence-based information to use in planning, implementing, monitoring and evaluating public health intervention programs. Laboratory is the integral part that supports with a scientific foundation by providing accurate data to those responsible for disease management and control. Effective network of properly equipped laboratories; at primary, secondary to tertiary institutions is important in surveillance, diagnosis and disease outbreak confirmation. Proper coordination of these levels of laboratory activity is also essential in providing focused response, yet most of the laboratories lack enough and proper equipment, material, resources and trained personnel to respond promptly to epidemic prone diseases like lassa and ebola.

**Methods:** Cross-sectional study using a structured questionnaire; a check list for the state level, epidemiologist and a laboratory check list consisting of laboratory service management, public health laboratory services, staffing (human resources), specimen storage, bio-safety and bio-security, equipment maintenance and consumable as well as reagents available for diagnosis of diseases was administered.

**Results:** A total of twelve primary, secondary and tertiary institutions were visited. Five (42%) were functioning conducting only basic clinical tests, while 1 (8.3%) test for polio. The central public health laboratories, 4 (33.3%) were not functioning due to lack of reagents, faulty equipment, dilapidated buildings and insurgency issues. The epidemic prone diseases such as Influenza, lassa, and other viral hemorrhagic fevers are not tested during outbreak samples are shipped to another state. Eight (16.6%) out 48 personnel interviewed had no refresher training.

**Conclusion:** Lack of equipment, reagent, training and appropriate facility design was found to be major setback in diagnostic capacity of the laboratories. Insurgency situation in two of the states has further crippled systems capacity to conduct the necessary diagnoses and respond to epidemics promptly and efficiently. Government should empower public health laboratories with resources, trained personnel and equipment.
Nonfermenting Gram Negative Bacilli Clinical Infections in a Nigerian University Hospital

Background: Nonfermenting Gram negative bacilli (NFGNB) have emerged as important healthcare associated pathogens globally. They exhibit resistance to beta lactams (including carbapenems) and other groups of antibiotics. Once regarded as normal contaminants, their increasing incidence in healthcare infections may be under-reported in our region. We investigated the incidence of resistance profiles and specific multidrug resistance phenotypes, including extended spectrum beta-lactamases, ESBL, Klebsiella pneumoniae carbapenemase, KPC, and metallo-b-lactamases, MBL in nonfermenting gram negative bacilli associated with clinical infections in a Nigerian university hospital.

Methods: One hundred and sixty four clinical specimens of patients diagnosed with bacterial infections were processed for the isolation of NFGNB. The isolates were identified by conventional biochemical tests and the Microbact™ 24E Identification kit. Resistance profiles to four different classes of antibiotics were investigated by the Kirby-Baeur method. The presence of ESBL, KPC and MBL were assessed by the combined disk method, modified hodge test and combination disk synergy test, respectively, according to the guidelines by Clinical and Laboratory Standards Institute. Results were analyzed using inferential and descriptive statistics.

Results: Thirty-three nonfermenters were recovered from clinical samples, distributed as 25 (76%) Pseudomonas aeruginosa and 8 (24%) Acinetobacter spp. Infections from which nonfermenters were recovered included wound infections (6), sepsis (6), urinary tract infections (9) and chest infections (6). Resistance was observed to be highest to tetracycline, chloramphenicol and augmentin (100%), while it was lowest in imipenem (12%). KPC and MBL were detected in 4 Acinetobacter spp. strains while ESBL was detected in 2 Pseudomonas aeruginosa strains. No ESBL production was detected in Acinetobacter spp.

Conclusion: NFGNB were recovered from hospitalized patients with a diverse bacterial infection diagnosis. Their role in clinical infections may be significantly higher than previously thought in our region. Multidrug resistance is extensive and interventions based on definitive diagnosis can be useful in controlling the spread of resistance. Proper and routine surveillance should be done regularly to monitor the spread of these pathogens in the various units in the hospital and regionally.
Increasing Trend of NTM isolated in Botswana: A Need for NTM Drug Susceptibility Testing?

Background: Pulmonary nontuberculous mycobacterial (NTM) infection treatment differs depending on the species isolated. In addition, patients may require individualised treatment with multiple antibiotics and an extended treatment course. Undoubtedly, reliance on MTB treatment to treat NTM infection has become insufficient given their resistance to MTB drugs. We highlight the need for NTM drug susceptibility testing in Botswana as supported by the increasing numbers of NTM isolated from patient material at the NTRL in the country.

Methods: A retrospective analysis of data at the NTRL was carried out from 2012 to 2014. A total of 27 898 specimens were received in that period and all subjected to culture. Confirmation of NTM was based on positive liquid cultures and confirmed by line probe assay (the Hain test).

Results: Confirmed NTM numbers increased significantly from 8.1% in 2012 to 12.4% in 2014. Simultaneous MTB recovery rates reflected a downtrend of 15.4% in 2012 to 10.9% in 2014; with confirmed NTM numbers increasing from 0.6% in 2012 to 12.4% in 2014. Simultaneous MTB recovery rates were 1.1% in 2014 per 100 000 population.

Conclusion: An observed increasing trend of NTM isolation in Botswana and reported cases of resistance to many MTB drugs necessitates individualized treatment achieved through NTM drug susceptibility testing; especially in immune-compromised individuals because of their potential to acquire mycobacterial infections.
Impact of Mentoring and Supervision on GeneXpert Laboratories- the NACA Experience

Background: The National Agency for Control of AIDS (NACA) and KNCV Tuberculosis Foundation, with support from the Global fund (GF) rolled out installation of 185 GX machines in secondary and tertiary health facilities across Nigeria, with a view to improve the TB case-detection among PLHIV.

Adoption of GX as a new diagnostic tool for MTB and MDR TB requires close follow up with facilities to ensure optimal functioning and utilization of the machine, quality assurance and conformity to standard operating procedures (SOPs).

Methods: Remote mentoring and supervision was conducted by phone two weeks after installation and then monthly and documented. This was followed up with an onsite supervisory visit four (4) months post installations using the National approved supervisory checklist.

The on-site exercise was conducted by experienced Laboratory personnel. Observed non-conformance, recommendations and corrective actions with timelines are documented.

Results: Generally, most facilities had enthusiastic and dedicated teams with adequate routine diagnostic skill set. However, issues identified included low utilization of the machine, Non-compliance to the SOP; inadequate GX machine maintenance and the consequent failure of the instrument.

Incomplete documentation; inappropriate waste disposal; inadequate infection control. Interrupted power supply and the consequent high error rates.

Most of these issues were resolved remotely whilst others were addressed during the on-site visits. These included advocacy visits to the hospital management and meeting of all the relevant stakeholders to address the low utilisation of the GX machine.

Great emphasis was placed on the TB/HIV collaboration for strong patient linkage and increased uptake at the site

Conclusion: Laboratory mentoring and supervision plays an important role in the conveyance of standards and form a part of the Laboratory’s quality assurance programme. This is critical in assessing the professional development of the lab personnel and in ensuring provision of quality service delivery.
POSTER 17

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Re-occurring Crimean-Congo Hemorrhagic Fever Outbreaks in Uganda; an Investigational Report of the 2015 Outbreak. First Laboratory Confirmation of an Outbreak of Rift Valley Fever Virus in 50 Years in Kabale District, Southwestern Uganda

Background: On March 10, 2016, the Uganda Virus Research Institute/Centers for Disease Control (UVRI/CDC) Viral Hemorrhagic Fever laboratory was notified of two suspect VHF cases from Kabale district, South Western Uganda. Both cases presented with febrile illness and reported fever, vomiting, fatigue, abdominal pain, headache, epistaxis, and melena. The initial case was a butcher who worked in the central Kabale abattoir. The second case was a student who resided approximate 12 Km south from central Kabale. The two cases were not epidemiologically linked.

Methods: Both cases were confirmed as RVF by RT-PCR and IgM serology. Within 24 hours, a team from UVRI, the Uganda MOH, and CDC-Uganda traveled to Kabale to carry out epidemiological and ecological investigations to determine the extent of the outbreak. Samples from 21 family member and community members of the confirmed and probable cases were collected, along with 86 livestock specimens from the same locations.

Results: Only two acute RVF cases were identified. One additional case was retrospectively identified as RVF by IgG serology. No additional human cases were confirmed from the household investigation samples collected. 9% of livestock specimens tested positive for RVF by IgG, and one caprine from the village of one of the confirmed cases also tested positive by RT-PCR. An expanded district-wide human and livestock serosurvey was initiated following these results to determine how widespread RVF transmission is in the region.

Conclusion: Extensive outbreaks of RVF have occurred elsewhere in East Africa, notably in 1997-1998 and 2006-2007. This RVF outbreak in Kabale represents the first reported laboratory confirmed human cases in Uganda since 1968, and is the 11th independent VHF outbreak confirmation in Uganda since enhanced VHF surveillance began in 2011. It again highlights the importance of the Uganda VHF surveillance and laboratory program is in detecting outbreaks early in order to initiate rapid response and control.

POSTER 18

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Implementation of a Quality Management System at the Viral Hemorrhagic Fevers Laboratory, Entebbe, Uganda

Background: A Quality Management System (QMS) is a set of policies, processes and procedures required to ensure that the laboratory meets quality standards of excellence consistently. The most important outcome of any successful QMS program is quality results that are broadly appreciated. The Viral Hemorrhagic Fever (VHF) laboratory at Uganda Virus Research Institute (UVRI), Entebbe, Uganda, routinely tests specimens from outbreak situations, and a quality process is highly desired. We report on the progress of implementing a QMS at this laboratory since August, 2015.

Methods: We performed an initial quality assessment to identify gaps in the laboratory management system and to help draft a plan to correct deficiencies and initiate the QMS process. In addition, the laboratory team received formal training on Laboratory Quality Management Systems. The laboratory then created an action improvement plan based on the WHO Laboratory Quality Stepwise Implementation tool. This tool assists in guiding QMS improvements by working through sequential phases. The team also conducts bi-weekly meetings between CDC- Atlanta and UVRI laboratory teams to discuss progress of the action plans, identify areas of improvement and make new action items.

Results: Management and laboratory teams have showed continued commitment to execute the QMS. The first phase of the implementation plan is almost complete and most laboratory procedures and protocols are only pending review and approval. A new specimen inventory and information tracking and management system has been implemented. In addition, recommended biorisk control measures have also been effected.

Conclusion: Laboratory accreditation is only one of many advantages to having QMS in place. As a laboratory, Implementation of QMS will help build a sustainable quality system to improve on service delivery. With the growing threat of emerging and reemerging infectious diseases, QMS will enable the VHF lab to function safely and efficiently, which builds trust and reliability for our clients.
Assuring Quality of HIV Rapid Testing Performed by Lay Counsellor Testers in 2014 Integrated Biological and Behavioural Surveillance Survey (IBBSS) in Nigeria

**Background:** The Integrated Biological and Behavioural Surveillance Survey (IBBSS) 2014 was conducted among the key and vulnerable high risk sub-populations in 13 selected states of Nigeria and the Federal Capital Territory (FCT) to determine the HIV prevalence among these populations. This study aimed at comparing the accuracy of HIV rapid test results from the field with the ELISA testing of DBS samples from the same participants.

**Methods:** Testers included Community Health Care Extension Workers, Nurses and Laboratory personnel that were trained prior to field testing. HIV rapid antibody testing using finger pricking was done on every consenting individual using the National Serial Algorithm and Dried Blood Spot (DBS) samples collected for quality assurance (QA) testing. The HIV test results were validated with the corresponding DBS samples for all positives and 10% of randomly selected negatives samples using Genscreen EIA HIV 1/2 Version 2.0 (Bio-Rad France), an antibody based third generation ELISA kit. This assay was performed by Medical Laboratory Scientists at Polymerase Chain Reaction (PCR) laboratory, Federal Medical Centre, Jalingo, Taraba, Nigeria.

**Results:** Of the 20,294 respondents tested, 1,753 were tested positive while 18,541 tested negative during field testing. The QA testing in the laboratory revealed 1,670 (95.27%) samples in agreement among the positive while 1832 of the negative tested samples showed 98.81% agreement. Overall, from the 3,607 QA samples tested, 3,502 (97.09%) gave concordant results with the field rapid testing results while 105 (2.91%) QA test results were discordant. Kappa values for agreement was 0.94 (p<0.001).

**Conclusion:** The study showed a significant acceptable concordance in the rapid test results compared to ELISA antibody testing in the laboratory. With adequate training and supervision, it is possible to achieve same quality of HIV test result by lay testers outside laboratory environment in comparison to a laboratory setting.

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Review of the Ebola Virus Disease (EVD) Laboratory Training of the Sierra Leone National Response Team

**Background:** Nearly two years ago, multiple international organizations established rapid diagnostic laboratories throughout Sierra Leone in response to the Ebola Virus Disease (EVD) outbreak. As the need for urgent response decreased, the focus turned to more permanent transitioning of the laboratories to the Ministry of Health and Sanitation and training their National Rapid Response Team of laboratorians with an undergraduate academic degree. Each of these training and transition programs in Sierra Leone vary from one another.

**Methods:** Training methodologies of each laboratory were evaluated with recommendations for future training needs comparing the international training programs of four EVD laboratories: Central Public Health Reference Laboratory/Defense Threat Reduction Agency (CPHRL/DTRA), Italian Laboratory (PCMH/ODCH), National Institutes for Communicable Diseases (NICD), and Public Health England (PHE). When applicable, comparison and differences were noted. Specifically addressed within these programs are: laboratory/training workspaces, length of trainings, subjects covered in training programs, and Quality Assurance (QA)/Quality Control (QC) methodologies.

**Results:** Each laboratory training program possessed both strengths and weaknesses that were reviewed and summarized objectively. For example, some programs displayed a greater emphasis on safety, and others were able to train for longer periods of time. Classroom and simulations experiences including training materials (i.e. lecture notes, operating procedures) were reviewed and discussed within each comprehensive program.

**Conclusion:** By the end of the trainings, laboratory personnel were trained to receive samples, inactivate EVD, extract RNA from samples, and perform EVD PCR in a safe, efficient manner and to report clinical testing results. Structural conditions of the laboratories varied greatly, thus affecting choice of procedures. When evaluating the training programs, especially considering the likelihood of another EVD outbreak, staff must be trained in specific laboratory procedures with an emphasis in biosafety, quality, and the proper use and handling of samples, reagents and instrumentation.
**Lessons Learnt from National HIV Viral Load Implementation and Scale-Up in South Africa**

**Background:** South Africa has a population of 54 million and one of the highest HIV prevalence globally, in the country, 6.4 million people living with HIV and over 3 million people receiving antiretroviral treatment. The National Health Laboratory Service provides services to 80% of the population and experienced massive scale-up of its HIV viral load program to reach UNAIDS 90-90-90 targets by 2020. In 2015/16, ~ 3.7 million viral load tests were conducted, with 30% increase from previous year. This resulted in the need for innovative solutions for further scale-up.

**Methods:** An implementation plan was developed by the National Priority Programmes (NPP) involving engagement with National Department of Health, suppliers, clinicians, health economists and funders. Full analysis of programme capacities was undertaken (number of analysers, staff, shift hours and projected test volumes). Health technology assessments were performed of various technologies and a tender process followed. Renovations to laboratories including site visits and plans; development of training materials, Standard Operating Procedures and verification material; interfacing with the laboratory information system (TrakCare); enrolment in Proficiency testing schemes; pre- and post- analytical workflow assessments; and monitoring of programme performance through development of operational and epidemiological dashboards was conducted.

**Results:** Collaboration with suppliers, UNAIDS and Clinton Health Access Initiative led to a reduction in HIV viral load costs in low and middle income countries, improving access and allowing for further scale-up of viral load testing. The NPP scaled-up viral load testing in 16 high-throughput centralized sites by rolling-out Roche's new Cobas 6800/8800 analysers (8 sites), Abbott A2000 analysers (3 sites), and Roche Cobas Ampliclprep/TaqMan (5 sites). Various models for further scale-up are being considered: Integrated Tiered Service Delivery Model (ITSDM) and Point-of-Care testing.

**Conclusion:** A number of challenges were encountered and lessons learnt that could be of great benefit to other countries embarking upon scale-up of viral load testing.

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**CXCL10 Gene Promoter Polymorphism -1447 A>G Correlates with Plasma CXCL10 Levels and is Associated with Susceptibility to Malaria in Ghanaian Children**

**Background:** Plasmodium falciparum malaria kills nearly a million people annually. Over 90% of these deaths occur in children under five years of age in sub-Saharan Africa. In Ghana, malaria accounts for about 60% of all outpatient visits in public health facilities, with 40% of the affected being children under age 5 years. The disease accounts for 13.2% of all mortalities in Ghana and ranks fifth as the commonest cause of death in children under 5 years of age. The risk factors for severity of malaria pathogenesis and the wide variation in clinical manifestations of malaria are poorly understood. The influence of host genetics on susceptibility to P. falciparum malaria has been extensively studied over the past twenty years. Recent studies indicates CXCL10, is a predictor of cerebral malaria severity. In addition, polymorphisms in the CXCL10 gene promoter has been associated with increased CXCL10 production. In the present study, we hypothesized that in a subset of Ghanaian malaria patients, susceptibility to malaria is associated with different variants of the CXCL10 gene.

**Methods:** We determined whether polymorphisms in the CXCL10 gene are associated with the clinical status of malaria patients. We tested several known polymorphisms and identified one reported single nucleotide polymorphism in the CXCL10 promoter (-1447A>G [rs4508917]) and compared 387 malaria and 118 non malaria cases using PCR-restriction fragment length polymorphism method. Adjusted Odds Ratio (AOR) was used.

**Results:** Individuals with the -1447(A>G) genotype were susceptible to malaria (adjusted odds ratio [AOR] = 2.60, 95% CI = 1.51–5.85, p = 0.021). In addition, individuals with the -1447(A>G) genotype had significantly higher plasma CXCL10 levels than individuals with the -1447(A>A) genotype. Stratifying patients according to gender, the observed association of malaria with over expression of CXCL10 were more pronounced in females than in male patients (AOR = 5.47, 95% CI = 1.34–22.29, p = 0.018).

**Conclusion:** Polymorphisms in the CXCL10 gene promoter sequence were associated with increased CXCL10 production, which is linked to severity of malaria. These results suggest that the 21447A>G polymorphism in CXCL10 gene promoter could be partly responsible for the reported variation underlying severity of malaria outcomes particularly in females.
**POSTER 23**

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**Role of Heme and CXCL10 in Malaria Pathogenesis**

**Background:** Plasmodium falciparum infections are responsible for about 283 million malaria cases and 584,000 deaths annually, primarily in Sub Saharan Africa. Malaria mortality is associated with exaggerated host responses to inflammatory factors such as free heme and C-X-C motif chemokine 10 (CXCL10). Extensive hemolysis and increased plasma heme leads to vascular activation, inflammation and over production of CXCL10, which exacerbates the disease. Heme oxygenase (HO) is the rate limiting enzyme thatcatabolizes free heme into carbon monoxide (CO), ferrous iron, and biliverdin/bilirubin.

The objective of this study was to determine the role of free heme, HO-1 and CXCL10 in malaria and non malaria subjects.

**Methods:** The is a hospital based case control study involving a total of 504 children (334 malaria subjects and 170 non malaria subjects) ranging from 1 month to 12 years of age.

To determine the role of heme, HO-1 and CXCL10 in the plasma of malaria patients, chromogenic heme assay and HO-1 and CXCL10 immunoassays were performed. CXCL10 and HO-1 levels were measured using optimal concentrations of standards and antibodies according to the manufacturer’s instructions. The data was analyzed at 450 nm wavelength using a Spectra Max 190 fluorescence micro plate reader (Molecular Devices Corp., Sunnyvale, CA). Data was presented as mean ± standard error or median and interquartile range (IQR). A p-value < 0.05 was considered statistically significant.

**Results:** There were significant increases in plasma concentrations of heme, Heme oxygenase-1 (HO-1) and CXCL10 in malaria patients compared with non malaria subjects. CXCL10 in non-malaria 26.3 µM (IQR 21.3–32.9), malaria 28.2 µM (IQR 22.3–41.7), p < 0.0001, HO-1 (non-malaria 1.9 ng/mL (IQR 1.3–2.4), malaria 2.6 ng/mL (IQR 1.2–5.2), p < 0.0001, and CXCL10 (non-malaria 186.0 pg/mL (IQR 107.7–335.2), malaria 712.4 pg/mL (IQR 465.0–1160), p < 0.0001, among malaria patients compared to non-malaria subjects.

**Conclusion:** Plasma levels of heme, heme oxygenase-1 (HO-1) and CXCL10 were significantly increased in malaria patients compared with non-malaria subjects.

**POSTER 24**

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**PCR as an Important Tool for Estimation of the Burden of Malaria during Pregnancy in Women Receiving IPTp-SP**

**Background:** Molecular tools provide the real prevalence of Plasmodium falciparum infections. Submicroscopic infections are now frequently reported in pregnant women and have been associated with adverse pregnancy outcomes. A pilot study designed to estimate the burden of malaria in a subset of pregnant women was performed in Libreville, the capital city of Gabon.

**Methods:** In a cohort of 85 Gabonese pregnant women followed monthly from the first ANC visit until delivery, Plasmodium falciparum microscopic parasitaemia detection with thick smear and polymerase chain reaction (PCR) genotyping was performed in 2014. The relationship between submicroscopic infections, intermittent preventive treatment with sulfadoxine pyrimethamine (IPTp-SP) uptake, anaemia and birthweight were assessed.

**Results:** At delivery, PCR and microscopy detected infection in 93% and 3% of women, respectively. Microscopic parasitaemia dropped significantly with the number of SP doses (from 56% in women with 1 dose to 6% in those who received 4 IPTp-SP doses) (*p*<0.01); while submicroscopic infection frequencies significantly increased, being respectively of 22%, 59%, 95% and 94% after 1, 2, 3, 4 IPTp-SP doses (*p*<0.01). Anaemia prevalence was comparable in cases of submicroscopic (30%) and microscopic (33%) infections (*p*=0.06). Mean birthweight was 3078g, and low birthweight rate was low (5%).

**Conclusion:** This pilot study shows that submicroscopic P. falciparum parasitemia which is not routinely detected by microscopy and RDTs frequently occurs during pregnancy despite a correct IPTp-SP regimen. Thus, pregnant women represent an important parasite reservoir and molecular tools should be considered for the evaluation of the burden of malaria during pregnancy as well as the revision of current strategies of prevention.
Sero-prevalence and Factors Associated with Rubella Infection Among Pregnant Women Attending Antenatal Care Services at Mulago National Referral Hospital in Kampala, Uganda

Background: Rubella infection during the first trimester in pregnancy remain of great public health concern as it increases the risk of congenital rubella syndrome (CRS) characterized by congenital malformations in children. Despite several outbreaks in Uganda, there is no vaccination and surveillance programmes for pregnant women attending antenatal clinics (ANC). We aimed at establishing rubella sero-prevalence and factors associated with rubella infection among pregnant women attending ANC at Mulago National Referral Hospital (MNRH).

Methods: This was a cross-sectional study conducted during June and July 2014 at MNRH. Six hundred and twenty six pregnant women attending ANC were randomly recruited. Socio-demographic and clinical data were collected. Five mls of blood were drawn for rubella IgM and IgG tests using SIEMENS ELISA Kit and IgG titers were calculated to establish levels of protection. Titters ≥15 IU/mL were considered protective as per manufacturer’s kit instructions. Data were entered in Epi-info (Version 3.5.4), exported to EXCEL and imported to STATA (version 12.0) for analysis.

Results: The median age was 24 (Inter-quartile range: 18-31) years. Of 626 pregnant women recruited, none was IgM positive and 598/626 (95.5%) were IgG positive. Of these, 569/598 (95.2%) had protective IgG titers. Overall, rubella susceptibility was 57/626 (9.1%) with IgG titers <15 IU/mL. Maternal age below 24 years was found to be significantly associated with reduced rubella susceptibility. (OR=4.91, 95% CI=1.01 – 5.50, P=0.048).

Conclusion: In our study, rubella IgG sero-prevalence among pregnant women was high, most likely due to the natural infection. However, the proportion of susceptible women to rubella infection was high and may pose a risk of CRS among children. Maternal age below 24 years of age was significantly associated with decreasing rubella susceptibility.

Dynamics of Evolution of Poliovirus Neutralizing Antigenic Sites and Other Capsid Functional Domains during a Large and Prolonged Outbreak in Nigeria

Background: From 2005 to 2014, a large poliomyelitis outbreak associated with type 2 circulating vaccine-derived poliovirus (cVDPV2) occurred in Northern Nigeria. This is the largest outbreak of cVDPV2 studied contemporaneously.

Methods: Poliovirus isolates were grown from stool samples of patients identified through the acute flaccid paralysis (AFP) surveillance system. Isolates were characterized using a real-time reverse transcription–polymerase chain reaction (rRT-PCR) nucleic acid amplification. Candidate VDPVs identified by rRT-PCR screening were sequenced in the VP1 region initially, followed by sequencing the complete capsids. Complete capsid sequences of 403 Nigerian outbreak isolates from 2005 through 2011 were analyzed to characterize the dynamics of capsid amino acid replacement. Four different functional domains were analyzed: 1) neutralizing antigenic (NAg) sites, 2) residues binding the poliovirus receptor (PVR), 3) VP1 residues 1–32, and 4) the capsid structural core. Replacement events were dated by mapping them onto the branch structure of time-scaled phylogenetic trees.

Results: Amino acid replacements mapped to 37 of 43 positions across all 4 NAg sites; the most variable and polymorphic residues were in NAg sites 2 and 3b. The most divergent of the 120 NAg variants had no more than 5 NAg site differences from Sabin 2. PVR-binding residues were less variable (25 different variants; 0–2 replacements/isolate; 30/44 invariant positions), with the most variable residues also forming parts of NAg sites 2 and 3a. Residues 1–32 of VP1 were highly variable (133 different variants; 0–6 replacements/isolate; 5/32 invariant positions), with residues 1–18 predicted to form a well-conserved amphipathic helix.

Conclusion: Rates of amino acid replacement varied widely across positions and followed no simple substitution model. Replacements into the structural core were the most conservative and were fixed at an overall rate ~20-fold lower than rates for the NAg sites and VP1 1–32, and ~5-fold lower than the rate for the PVR-binding sites. Only VP1 1-43-Ile, a non-NAg site surface residue, appeared to be under strong negative selection.
**POSTER 27**  
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**Prevalence of Schistosomiasis Among School Children of Fatima Aloi Demonstration Primary School, Alebtong District**

**Background:** Intestinal Schistosomiasis causes high morbidity and mortality in most tropical parts of the world, where climatic conditions, presence of water bodies like dams, lakes, rivers and irrigation schemes and poor sanitation favour its prevalence. A study was carried out in Fatima Aloi Demonstration Primary School in the month of February and March 2014. The aim of the study was to find the prevalence of intestinal Schistosomiasis among school children of Fatima Aloi Demonstration primary school, Alebtong District.

**Methods:** Stool was collected from 335 school children aged 6-16 years. The stool samples were examined microscopically using normal saline and iodine preparations. Formal ether concentration technique was performed on all stool samples that revealed no ova by the direct wet preparation, to concentrate the eggs. Questionnaires were used to collect demographic data from the participants.

**Results:** The overall prevalence of intestinal Schistosomiasis was found to be 11% and it was predominantly *Schistosoma mansoni* species. Infection was more prevalent in male children compared to females. The most infected age group was 10-13 years, followed by 14-16 years and 6-9 years respectively. All of whom are of age groups who go fishing, swimming and fetching water from cercariae infested waters, which predisposes them to infection.

**Conclusion:** This prevalence is still high, and there is need to encourage effective preventive and control measures to reduce the disease burden in this community. This kind of scenario calls for a revisit of the existing control measures and emphasize community health education, preventing contamination of water with infected human excreta through its proper disposal and minimizing contact with cercariae infested waters other than prophylactic treatment alone.

**POSTER 28**  
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**Influenza Vaccine Un-neutralized Viruses Associated with a Specific Seasonality Pattern in Uganda: the HA/ HAI Approach**

**Background:** Seasonal Influenza vaccination is important in combating influenza virus infections and severe disease associated with the infection. Hemagglutination (HA) and Hemagglutination Inhibition (HAI) assay has been used over the years to access the influenza vaccine’s effectiveness to neutralize the circulating influenza virus strains. In this research, we analyzed the seasonality and severity of influenza viruses which were not neutralized by the World Health Organization (WHO) recommended vaccine but showed hemagglutination (HA) on red blood cells, from 2012 to 2015

**Methods:** Clinical ILI and SARI samples positive for Influenza viruses by Polymerase Chain Reaction (PCR) were inoculated and propagated on Madin-Darby Canine Kidney (MDCK) cell line. Hemmaglutination and Hemmaglutination inhibition (HA/HAI) test was carried out using guinea pig erythrocytes. All viruses that showed HA titre but were not neutralized on HAI by the WHO recommended influenza vaccine for that year were recorded in MS-excel. Epidemiological data (seasonality and severity) corresponding to the viruses as captured on Influenza investigation forms were analyzed

**Results:** A total of 17 influenza A viruses were not neutralized on HAI by the recommended WHO influenza vaccine for the year 2012 and 2015. AH3N2 viruses showed no neutralization at 65% compared to 35% by AH1N1 2009 pandemic strains. The seasonality of circulation of the non – neutralized AH3N2 viruses corresponded to the late rainy season in Uganda from October to January for both 2012 and 2015, while AH1N1 2009 pandemic influenza viruses corresponded to the annual dry season in Uganda between June and July 2015 with only one virus detected in January 2013. The severity of the infection was none the less similar to seasonal influenza viruses and the patients had no underlying medical condition (Asthmatic, Heart problems or TB)

**Conclusion:** Seasonal influenza A virus strains which cannot be neutralized by the recommended WHO vaccines have been demonstrated to circulate at points in time. We recommend sequencing of these strains to ascertain genetic differences between neutralized and non- neutralized strains.
Molecular Epidemiology of Carbapenem-Resistant Acinetobacter Baumannii Isolates in a Senegalese Teaching Hospital

Background: Emergence and spread of carbapenem-resistant Acinetobacter baumannii are critical in hospitals particularly in intensive care units (ICUs), and represent a public health concern worldwide. In this study we investigated the molecular epidemiology of multi-drug resistant A. baumannii (MDR-AB) in Dakar, Senegal.

Methods: A total of 29 strains of MDR-AB were isolated from patients hospitalized in Aristide Le Dantec University hospital in Dakar, Senegal. The isolates were identified by API 20NE strip test as well as MALDI TOF. The antimicrobial susceptibility testing was performed using the disk diffusion method. Simplex-and multiplex-polymerase chain reaction with appropriate primers were used to detect and to sequence the following β-lactamase genes: two class D carbapenem hydrolyzing oxacillinsases (blaOXA-51, and blaOXA-23), three class B metallo-β-lactamase genes (blaIMMP, blaVIM and blaNDM), and five class A β-lactamase genes (blaPER, blaSHV, blaWEB, blaTEM, blarTG, blaCTX-M and blaGES).

Results: Among the 29 MDR-AB strains 11 (37.9%) were isolated from ICUs, 5 (17.2%) from pediatric surgery, and 13 (44.8%) from other departments. These MDR strains were mainly isolated from urines and pus samples (41.4% and 31.0%, respectively). All isolates were positive for the A. baumannii specific gene blaOXA-51. The blaOXA-51 and blaOXA-23 genes coexisted in 26 (89.65%) of the strains. Interestingly 1 strain harbored the gene coding for metallo-β-lactamase NDM-1. The blaIMMP and blaVIM genes were not detected among the selected strains. Finally three isolates turned out to produce the penicillilnase TEM-2.

Conclusion: Carbapenem resistance in Senegalese strains of A. baumannii is predominantly due to the worldwide disseminated gene blaOXA-23, and for a subset of strains to NDM-1. Systemic molecular surveillance network should be established for efficient monitoring of MDR strains in Senegal.
**POSTER 31**

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**HIV Treatment Guideline Changes: Implications for Predicting Future National CD4 Testing Costs for South Africa**

**Background:** The integrated tiered service delivery model (ITSDM) provides for 5 tiers of CD4 service to ensure geographically wide, full-service coverage across a national laboratory network. In 2014, a study to estimate costs of providing CD4 services across these five ITSDM tiers revealed higher costs of lower tiers (Tier-1 and Tier-2) where point-of-care technologies were utilized to extend services (at $32.32, $15.88 respectively) and lower costs for increasingly centralized laboratory-based tiers (Tier-3, Tier-4 and Tier-5), at $7.42, $6.24 and $5.37 respectively. The aim of this study was to project CD4 ITSDM network costs linked to future antiretroviral (ART) guidelines changes.

**Methods:** Test volumes for 2015/16 were extracted to establish a base-case and three forecasted scenarios, applying additional secondary information. Scenario-2 assumed that testing was offered to 90% of HIV+ individuals (n=5.67 million). Scenario-3 assumed testing is offered only to ART-naïve individuals (n=2.56 million), while scenario-4, based on 2015 District Health Information System information, assumed that testing would be performed for new patients initiated on ART (n=678k). Laboratories performing <=50 tests per day were allocated tier-2 costs, up to 300 tests, tier-4 costs were assumed, and laboratories (>300 tests) per day were assigned tier-5 costs. Annual test volumes for these categories were used to assess the total annual cost of CD4 testing.

**Results:** For the base-case, annual costs of $19.5 million were reported with 72% of testing costing $5.37/test. Scenario-2 reported increased annual costs to $31.3 million and 90% of tests costed at $5.37/test. In scenario-3, annual costs reduced to $15.8 million with 53% costed at $6.42/test. Finally, scenario-4 reported reduced annual costs, to $5.5 million, with 82% of testing to $6.42/test.

**Conclusion:** Changing ART guidelines, with related decreased CD4 laboratory monitoring volumes, leads to an increased need for additional lower tier-2/3 labs, but not to dramatically reduced programmatic CD4 costs.

**POSTER 32**

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**HIV Treatment Guideline Changes: Implications for and Predicting Network Restructuring Needs and Distribution of CD4 Testing Platforms in Laboratories Across South Africa**

**Background:** In 2015/16, the National Health Laboratory Service performed 3.44 million CD4 tests, using the integrated tiered service delivery model (ITSDM) which matches service demands with appropriate technology. Currently, community/ or district-laboratories (<300 samples/day) use the Aquios (Beckman Coulter) system, whilst metro-laboratories (>300 samples/day) utilize fully automated MPL/CellMek (Beckman Coulter). Mini-laboratories performing <=44-50 tests/day efficiently utilise point-of-care CD4 technologies to meet low-end service needs (including Becton Dickinson Presto or Alere Pima). The aim of this study was to enable predicting changes in network requirements linked to antiretroviral (ART) guidelines changes.

**Methods:** Historical CD4 test volumes for 2015/16 were extracted from the NHLS corporate data warehouse to establish a base-case and three forecasted scenarios, applying additional secondary information. Scenario-2 assumed that testing was offered to 90% of all HIV+ individuals (n=5.67 million). Scenario-3 assumed testing is offered only to ART-naïve individuals (n=2.56 million), while scenario-4 assumed that testing would be done for new patients being initiated on ART (n=678k). The forecasted annual volumes for each scenario were used to project daily laboratory volumes to assign systems.

**Results:** In the base-case, 8 laboratories were re-assigned as mini-laboratories, with 22 further laboratories using either Aquios or MPL/CellMek. For scenario-2, CD4 test volumes are projected to increase by 65% resulting in 33 (63%) laboratories upgraded to MPL/CellMek. Scenario-3 and scenario-4 forecasted a decrease of CD4 volumes by 26 and 80% respectively, requiring lower throughput platforms, i.e., Aquios allocated to 31 and 27 of 60 laboratories respectively. The requirement for low-volume platforms increased from 8 (base-case) to 25 laboratories in scenario four.

**Conclusion:** Changing ART guidelines and related CD4 laboratory monitoring requirements can markedly influence service delivery, necessitating laboratory ITSDM network restructuring that accommodates changing volumes of CD4 tests required to align testing demands and capacity requirements, as well as staff re-training and verification processes.
Integrating South Sudan’s National Public Health Laboratory with East African Public Health Networks

**Background:** The South Sudan Public Health Laboratory (PHL) was founded in 1974 and inaugurated in 2014, three years after independence. Currently, the PHL conducts quality assurance for HIV testing, tests sentinel survey specimens, tests for tuberculosis using GeneXpert, cultures bacterial pathogens and serves as a hub for specimens being transported to neighboring countries for further investigation. Though there was an existing National Laboratory Policy and Strategic Plan (2010) that guided implementation of laboratory projects, the management and organizational structure did not provide for all functions of a national public health institution. In order to mature, the PHL required an innovative approach to strategic planning and reorganization of the management structure. Based on this, the PHL management committee conceptualized a plan focused on “catch-up, convergence and integration” into the East African Public Health Laboratory Network.

**Methods:** Three members of the PHL undertook formal visits to the Ethiopian Public Health Institute (formerly Ethiopian Health and Nutrition Research Institute (EHNRI)) and the National Health Laboratory Quality Assurance and Training Centre (NHL-QATC) in Tanzania from 2 - 14 March 2015, in order to learn and share experiences with senior laboratory managers and to establish a network with these regional laboratories.

**Results:** A plan was developed to establish an autonomous Health Laboratory and Blood Transfusion Service (HLBTS) to coordinate all diagnostic, surveillance, blood transfusion and clinical laboratory services in South Sudan. Establishment of a standards and regulatory mechanism, specimen referral system, laboratory finance system, laboratory coordination mechanism, laboratory information management system, and quality management system were some of the key areas identified to strengthen in the next five years. A report was generated detailing these plans.

**Conclusion:** As South Sudan emerges from decades of conflict, it must begin where others are, leveraging lessons learned from its East African neighbors. “South-South” collaboration and partnership with regional laboratories are essential components for developing strong laboratory networks that support Global Health Security.

Impact of Sputum Samples Preservation and Transportation on *M. Tuberculosis* Laboratory Recovery for Drug Resistance Surveillance

**Background:** Conditions under which sputum samples are preserved and transported in for culture are vital for subsequent results. The National Reference Laboratory of Rwanda initiated an integrated active biological specimens’ transportation system in 2012 with the main objective to optimize the safety and facilitate the referral of samples in need of specialized testing. Sputum samples are being preserved using cetyl-pyridinium chloride (CPC) and delivered on weekly basis (routine). Recently, we conducted a national tuberculosis drug resistance surveillance (DRS) where eligible samples were preserved and transported in cool condition (4-8°C) for culture and drug susceptibility testing. We compare the quality indicators i.e. contamination rate, recovery rate and the turnaround time, for the DRS versus the routine sputum samples.

**Methods:** Smear positive sputum samples collected before patients started treatment came from countrywide health facilities for *M. tuberculosis* recovery from either drug resistance routine surveillance (routine) or collected during DRS. Sputum samples were cultured on two LJ slants to recover *M. tuberculosis complex*. In the DRS, samples were cultured in addition in MGIT, which was not possible for CPC preserved sputum samples from the routine samples. The line probe assay was used for culture identification and drug susceptibility test.

**Results:** Of the 1115 samples considered for analysis, 568 (50.9%) were transported in cool condition whereas 547 (49.1%) were transported in CPC preserved condition. The median time between date of sample collection and inoculation to culture media was 3 (IQR: 1-5 days) and 9 (7-12 days) days, (p=0.001) for DRS and routine samples respectively. The respective contamination rate were 4.3%, (95% C.I: 2.6-6.0%) and (3.3-7.1%) and recovery rate 84.6% (81.6 -87.6%) and 74.8% (71.2-78.4%) for DRS and routine. The median time from inoculation to results was 16 (14-18) and 26(23-29) days for DRS and routine samples respectively (p-value=0.03).

**Conclusion:** Routine sputum samples were marked by significant delays in obtaining results and low recovery rate when compared to sample transported in cool condition. The findings support the strategy of using cool condition for the countrywide transportation of sputum samples. Studies on the cost-effectiveness and feasibility of this strategy are necessary before its implementation.
**POSTER 35**

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District and Sub District Analyses of CD4 Counts <100cells/µl Identify Areas With Higher Rate of Late Presentation for ART Initiation and Risk for Opportunistic Infections

**Background:** The National Health Laboratory Service (NHLS) analyse ~3.8k CD4 samples/ annum. This data was analysed assess the proportional distribution of CD4 counts across the country. The percentage CD4 samples with a count <100cells/µl was used as an independent indicator of the immunological status of HIV patients per district and sub-district.

**Methods:** CD4 data for 2014/15 was extracted from the corporate data warehouse (CDW) and analysed using STATA to assess the distribution of CD4 counts<100cells/µl by health district/sub-district. Proportions of CD4 <=100 were stratified into four categories: (i) <10% low priority (within national average <=10%); (ii) 11-12% priority; (iii) 13-15% medium priority and (iv) 16-20% high priority. Subsequent sub-district analysis was performed to identify specific areas contributing to noted higher proportions. Age and gender distribution were analysed and maps generated using ArcGIS.

**Results:** Of the 53 districts, 17 (32%) had a proportion of CD4<100cells/µl of >=10%. Districts with high priority (16-19%) included Capricorn, Vhembe and Johannesburg Metro. Medium priority districts (13-15%) additionally included West Rand, Bojanala, Chris Han, Ekurhuleni, Saktukhune and Waterberg. 87 sub-districts within the 17 districts categorized as high/medium priority were analyzed, identifying 5 sub-districts (5.7%) with CD4<100. Sub-district analysis indicated that mainly 1 or 2 sub-districts contributed to the higher % seen for these districts. However, Capricorn, Vhembe and Waterberg districts reported a proportion of 16-20% and 20 with a proportion of 13-15%

**Conclusion:** The analysis indicated that 32% of districts have higher rates of CD4<100cells/µl than the national average of 10%. Sub-district analysis identified areas of high priority that require focused interventions to ensure earlier presentation for therapy in an effort to prevent the risk for opportunistic infections in these areas.

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**POSTER 36**

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Comparison of the New Fully Automated Volumetric Aquios Flow Cytometer PanLeucocogate (PLG) Platform for CD4-T Lymphocyte Enumeration to Existing Predicate Technology in South Africa

**Background:** The National Health Laboratory Service (NHLS) in South Africa offers CD4 T-cell enumeration for the HIV programme, using semi- or fully automated Beckman Coulter flow cytometers/ preparation platforms with the locally developed PanLeucogated (PLG) methodology. The new Aquios/PLG “load and go” cytometer (Beckman Coulter) was validated against the predicate MPL / CellMek platform.

**Methods:** Remnant EDTA blood samples (M121020, WITS Ethics Clearance) were initially analysed on the reference platform in the routine CD4 laboratory and retested on three Aquios systems according to manufacturer specifications. Data was analysed using GraphPad software for general statistics and Bland-Altman analysis with 95% limit of agreement (LOA). The percentage similarity model (%SIM) assessed agreement of absolute CD4 counts (CD4#) and CD4 percentage of lymphocytes (CD4%) between platforms, with a %coefficient of variance (%CV) indicating accuracy. In the %SIM analysis, where both reference and test absolute CD4 counts were <100, a correction to 100% was made, as the %SIM model over-estimates proportional differences at low CD4 counts. Comparative reanalysis excluding these samples <100cells/µl was done.

**Results:** CD4 reference counts (n=1885) varied between 1-3469cells/µl, with a mean of 397cells/µl. %SIM agreement of 95.56±11.53% (%CV of 12.2%) for CD4# and 99.4±83 (%CV of 8.4%) for CD4 was noted. Corrected %SIM values changed agreement for CD4# to 95.1±8.16 (%CV of 8.58%), while retaining tight results for CD4% (99%). Bland-Altman analysis confirmed the 5% under-estimation of CD4# -47.63±83.4 (95%LOA -211 to 115) overall. Excluding CD4<100 samples (n=179) did not significantly change Bland-Altman outcome (-55.4±87.8, 95%LOA -227 to 116).

**Conclusion:** The new Aquios/PLG platform showed excellent correlation with the reference platform (MPL/ CellMek/PLG) for both CD4# and CD4%. Daily quality control data for this period confirmed good reproducibility and stability over time with %CV’s<8% for both parameters. Aquios/PLG has been deemed suitable to replace outdated XL cytometers in NHLS CD4 laboratories.
**Site Verification of the Aquios Flow Cytometer as Replacement CD4 Platform for Outmoded XL Cytometers Across a National Testing Network**

**Background:** The National Health Laboratory Service (NHLS) utilizes flow cytometry for CD4 T-cell enumeration across 52 laboratories. During 2015, the new “load and go” fully automated Beckman Coulter PLG/CD4 Aquios replaced the XL cytometers with manual preparation. The replacement of 21 instruments in 16 laboratories commenced January 2016. This paper reports the onsite verification of the newly installed Aquios systems to date.

**Methods:** After installation of Aquios in 6 CD4 testing laboratories (March 2016), onsite training was done followed by verification, consisting of (i) “Fit for Purpose” (FFP) correlation of CD4 absolute counts (#CD4) and CD4 percentage of lymphocytes (CD4%) vs. an MPL/CellMek (Beckman Coulter) platform (at the nearest CD4 laboratory). A minimum of 30 samples/site were tested, with % similarity analysis CV values <8% and t-test >0.05 acceptable criteria for patient testing. (ii) A once-off reproducibility test (n=5) and white cell count comparison of 5 random samples was done. Laboratories accumulated quality control data (i.e. Immunotrol normal and Low, Beckman Coulter) for 10 consecutive days. Background and carry-over values were also submitted for analysis (n=5 days) on an XL template for statistical analysis and final verification report.

**Results:** %similarity analysis indicated good overall agreement between Aquios and MPL platforms for both #CD4 and CD4% of lymphocyte count across all sites (range from 92-101% with corresponding individual CV’s <8%), with t-test results showing no significant differences between platforms (p>0.05). Reproducibility across all sites showed CV values <5%, with background counts <15 events and carry over <1%. Immunotrol data over time showed CV’s <8% for both parameters at two levels (normal and low) on all systems verified.

**Conclusion:** The first 6 installations and verifications of the Aquios CD4 cytometer, as a replacement for the XL system, showed good performance with results correlating well with high currently used volume throughput systems (MPL/CellMek).

**Circulating Serotypes of Streptococcus Pneumoniae Responsible of Meningitis of 2012 to 2015 in Mali**

**Background:** Since the introduction of the vaccine A conjugated anti méningocoques (MenAfriVac) in 2010, the pneumococcus became the first bacterial meningitis reason in Mali. The goal of this work is to describe the serotypes of pneumococci responsible for meningitis in Mali.

**Methods:** This study was a retrospective survey by performing molecular typing of Streptococci pneumoniae isolates responsible for meningitis from 2012 to 2015. Patients suspected of meningitis had lumbar puncture and th cerebra-spinal (CSF) was routed to the laboratory of Bacteriology-Virology of the National institute of Research in Public health (INRSP). Latex agglutination, microscopy, culture, and PCR was used for the identification of the bacterial agents. Streptococcus pneumoniae isolates were molecular typed according to the described method by Spiced and al. (J Wink Microbial. 2013) permitting to identify 21 serotypes by PCR in real time according to the technology Strata gene Mx3005P (Agilene®). Data was analyzed with SPSS 20 software.

**Results:** Among bacteria positive CSF, Streptococcus pneumoniae represented 36/192 (18,8%) in 2012, 24/53 (45,3%) in 2013, 64/93 (68,8%) in 2014 and 38/74 (51,3%) in 2015 for a total of 162 isolates. The male sex represented 56, 2%, the age of 0 to 5 years represented 62, 3% and the vaccine status was unknown for the majority (85, 2%). On the 162 isolates, 109 (67, 3%) were unable to be typed considering the number limited of identifiable serotypes by the method. Among the 53 isolates typed, 13 were of serotype 1, 7 were of serotype 14, 5 of serotype 2. The group of serotypes 12F/12A/12B/44/46 was to the number of 12 and the group of serotype 6A/6B/6C/6D to the number of 4. Other serotypes has been identified the 18F, the 23, the 4, the 5 and the 7 notably.

**Conclusion:** These results show a diversity of the serotypes of pneumococcus responsible for meningitis of which the 2, the 44, the 46, the 18F, none included in the vaccine Prevnar® 13 of the routine PEV. An improvement of the traceability of the vaccine statute proves to be necessary. Other methods may be needed to permit the typing of isolates not typed.
POSTER 39

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Determinants du Portage Nasal du MRSA à Bukavu

Background: Les infections à Staphylococcus aureus, dans leur forme communautaire, constituent un problème important de santé publique. Le dépistage de porteurs de S. aureus particulièrement les souches résistantes à la méthicilline (MRSA) est un facteur important dans le contrôle et la dissémination de souches. Cependant l’ampleur de ce portage demeure inconnu à Bukavu, en RDC. Notre objectif était de déterminer la prévalence et les déterminants du portage nasal du S. aureus et du MRSA.

Methods: Il s’agit d’une étude transversale analytique à base communautaire, qui s’est déroulée à Bukavu d’Octobre 2015 à Février 2016 ; un prélèvement par écouvillonnage nasal a été réalisé chez toutes les personnes incluses dans l’étude. La culture et l’identification du S. aureus ont été faites par des méthodes conventionnelles. Toute résistance à la céfoxitine 30ug était considérée comme l’expression du gène mecA (résistance à la Méthicilline = MRSA).

Results: Les prélèvements de 312 personnes enrollées dans la présente étude ont été soumis à la culture et à la recherche de l’expression du gène mecA. L’âge médian de la population d’étude était de 24 ans (1-71 ans). Quarante cinq et 16 isolats ont été identifiés comme S. aureus et MRSA donnant respectivement des prévalences de portage nasal de 14% et 5,1%. Le portage du S. aureus ainsi que du MRSA ne dépendait pas de l’âge, du sexe, de la provenance, de la profession, de la notion de diabète, de plaie chronique et même du niveau d’étude (p-value >0,05).

Conclusion: La présente étude montre une forte prévalence du portage nasal du MRSA dans la communauté à Bukavu (5,1%). Cependant, d’autres facteurs de risques doivent être recherchés ultérieurement pour comprendre ce phénomène.

POSTER 40

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Prevalence of Extended-spectrum Beta-lactamase Production and Antibiotic Susceptibility Profile of Clinical Escherichia coli Isolates in Ibadan Metropolis, South-Western Nigeria

Background: Escherichia coli is a major extended spectrum beta-lactamase-producing organism. Extended spectrum beta-lactamases (ESBLs) inactivate newer cephalosporins through hydrolysis increasing therapeutic failure and antibiotic resistance worldwide. Very little is known about ESBL epidemiology in Nigeria particularly in primary and secondary care.

Methods: This prospective experimental study was done to determine the antibiotic susceptibility profiles and ESBL production by 51 Escherichia coli clinical isolates obtained from the main microbiology laboratories of University College Hospital, Adeoyo Maternity Hospital, Our Lady of Apostle Hospital, and a private diagnostic laboratory all in Ibadan metropolis, Oyo State, Nigeria over a period of three months. The clinical isolates were identified and confirmed using standard biochemical tests. Kirby-Bauer disc diffusion method was used to determine the antibiotic susceptibility profile and interpreted using clinical laboratory standard institute (CLSI) 2012. ESBL production was determined by the double disk diffusion method.

Results: Meropenem was observed to be most effective out of the twelve (12) antibiotics used with 100.0% sensitivity, followed by Nitrofurantoin 79.0% and Gentamicin 70.0%. Forty nine (96.0%) of the Escherichia coli isolates were resistant to trimethoprim/ sulphamethoxazole, and 48 (94.0%) were resistant to cefazidime. Forty-seven (92.0%) were resistant to amoxicillin and tetracycline respectively. Forty five (88%) were resistant to erythromycin, 39(76.0%) were resistant to cefotaxime, 31(60%) to ciprofloxacin, 26(50.0%) to chloramphenicol and 30(59.0%) to amoxicillin/ clavulanic acid. A multiple antibiotic resistance (MAR) index greater than 0.2 was observed in 50(98.0%) of the Escherichia coli isolates. Forty of the isolates (78.4%) were ESBL producers.

Conclusion: E. coli isolates from primary and secondary-care laboratories in Ibadan are commonly resistant to frequently used antibiotics. ESBL production is a major contributory factor to the emergence of antibiotic resistance.
Improving Program Efficiency Through Streamlining of Routine Clinical Chemistry Testing Profiles for HIV Patients in Nigeria

Background: The Global Fund for Aids TB and Malaria (GFTAM) supports 25% of the 850,000 patients receiving HIV treatment in Nigeria. The Integrated guidelines for Treatment and Care released in December 2014 updated the national treatment guidance. It stipulates the minimum baseline chemistry and haematology tests. The PEPFAR program in Nigeria discontinued all chemistry in 2014. Due to falling donor contributions and limited government support the need to seek efficiencies in the routine care of patients is essential.

Methods: We analyzed the chemistry tests recommended by the guidelines comparing this with utilization data and reports of wastage of laboratory reagents routinely procured for the past 24 months. A consultative meeting with the technical staff from the GFTAM sub-recipients supporting the 246 facilities providing comprehensive ART services.

Results: Our findings showed that twelve (12) chemistry parameters were being provided. These included Liver Function tests (GOT, GPT, Amylase, Bilirubin, Alkaline Phosphatase); Blood Glucose; Renal Function test (Creatinine, Urea, Potassium); Lipid Profile (Total cholesterol, High density Lipoprotein, Triglycerides). There was 50% underutilisation of reagents for Amylase, Bilirubin, Alkaline Phosphate, Urea, and HDL Cholesterol, Triglycerides. The reasons for the low utilization included non-evidence based clinician requests, poor understanding of the guidelines recommendations, poor forecasting, weak Logistics management systems, poor staff capacity, inadequate mentoring and guidance from supervising organizations. In line with the findings, the menu of tests was reduced by 50% to include GPT, GOT, Glucose, Creatinine, Potassium and Total Cholesterol for lipid profile. This resulted in a cost savings of about $300,000.00 in the last 6 months of the grant Global Fund Round 9 grant. These savings are being reinvested in scaling up Viral Load testing.

Conclusion: Streamlining clinical chemistry testing menu presents an opportunity to realize sustained cost savings and increase efficiency of service delivery in resource constrained countries.

Measuring Training Effectiveness of African Centre for Integrated Laboratory Training (ACILT)

Background: Aiming to strengthen laboratory workforce and institutional capacity for accurate and reliable services, PEPFAR supported trainings at the African Center for Integrated Laboratory Training (ACILT), Johannesburg, SA, from 2007-2016. A recent evaluation of this investment measured training impact by surveying participants regarding the extent to which knowledge, skills, and behaviors were transferred at the individual, workplace, and organizational level. The survey also determined factors that positively influenced workplace performance and those which impeded positive change.

Methods: Between April to September 2015 hard copy and online evaluation questionnaires (Survey Gizmo) were sent to 934 training participants from 43 countries to assess training effectiveness for courses offered between 2008-2014. Pre and post-training periods were defined as six months before and after training. SAS® and Microsoft Excel were used for qualitative and quantitative analysis.

Results: A total of 293/934 persons (31%), representing 173 laboratories, responded to the questionnaire. Of these, 96.6% were motivated to transfer knowledge, skills and behaviors at the individual level and at the workplace. The percentage of laboratories with less than satisfactory proficiency test (PT) scores decreased from 51% pre-training to 39% post-training. Furthermore, the percentage of trainees always taking corrective actions for less than satisfactory PT performance significantly increased from 47.3% to 71.5% (P-value<0.01).

Factors facilitating knowledge and skills transfer were good institutional policies and available resources. Key challenges were unavailability of funding, staff resistance to new protocols, lack of management and government commitment, and complicated logistics involved with implementing new protocols.

Study limitations were limited sample size and potential for recall bias inherent in the self-report survey.

Conclusion: Findings indicate ACILT courses were effective in improving quality and reliability of laboratory services, even in the absence of full laboratory accreditation. Continued improvement in laboratory practices will require subsequent trainings to address the identified challenges.
POSTER 43

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**Efficacy of Quality Management System in Improving the Reliability of Rapid HIV Testing in Kwara State, North-Central, Nigeria**

**Background:** Reliable laboratory results are critical for a sustainable health care service delivery for diagnosing and managing HIV/AIDS, especially in resource constrained settings. Management Sciences for Health (MSH) currently has 10,062 people enrolled into anti-retroviral therapy in Kwara State with a population of 2.3 million (0.4375%) indicating poor uptake of rapid HIV testing in Kwara state with the need to scale up and ensure access to high quality, accurate case detection using rapid tests.

**Methods:** MSH trained State Internal Quality Assurance (IQA) focal person quarterly prepares dry tube specimens using pooled known HIV positive and negative samples. The tubes were pretested using rapid test kits (Determine/Uni-Gold/STAT-PAK) before distribution to 7 hubs and MSH trained hub focal persons in turn distribute to assigned 33 spokes using self-sponsored public transportation system. 100% of results were collated using same means, forwarded to the State IQA focal person who compiles and analyses results to ensure HIV testing is in accordance with national approved HIV serial testing algorithm (process control) which included confirming Determine™ positive results with Uni-Gold™ while STAT-PAK™ is used as tie-breaker. A planned corrective action by hub focal persons was in place for facilities with nonconformity.

**Results:** Before-after study design was used to analyse data involving comparing variables measured at baseline with the same variables following intervention. Baseline data, taken shortly after HIV program rationalization with MSH taking over Kwara State, showed that out of the 40 facility laboratories, 15 followed HIV serial testing Algorithm in conducting HIV serology while data following intervention with Quality Management Systems shows all the facilities followed HIV serial testing Algorithm.

**Conclusion:** Following intervention as implemented by Kwara State MSH laboratory team, 100% improvement was recorded among facilities that follow HIV serial testing Algorithm, resulting in access to high quality HIV rapid testing, leading to an increased detection of people living with HIV in Kwara state to estimated 23,000 as compared to baseline 15,000 people (65.2%), over a period of 24 months.

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POSTER 44

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**Ciprofloxacin Resistance of Neisseria Gonorrhea Isolates Obtained from Genital Samples at the Ethiopian Public Health Institute**

**Background:** Sexually transmitted infections (STIs) are an important public health problem in both developed and developing country settings. If left untreated, STIs have serious adverse health consequences including adverse pregnancy outcomes, reproductive morbidity and mortality, and enhanced HIV transmission and acquisition in individuals. Gonococcus is a major public health challenge due to the high frequency of infections accompanied by a decline in of treatment options. This study focuses on a determination of antimicrobial resistance of gonococcal isolates circulating in Addis Ababa, Ethiopia.

**Methods:** Seven hundred thirty five gonococcal isolates were obtained from patients referred to the Ethiopian Public Health Institute for culture and sensitivity testing between 2008-2014. All suspected gonococcal isolates were confirmed using Oxidase, Superoxol tests followed by API-NH. Antimicrobial susceptibility test was done by the Kirby-Bauer (disk diffusion) method.

**Results:** Five hundred eight gonococcal isolates (69%) were resistant for ciprofloxacin which is the current antibiotics used for syndromic management of urethral discharge syndrome. The resistance pattern of gonococcal isolates for other candidate antibiotics were spectinimycin 1.5%, cefoxitin 0% and ceftriaxone 4%.

**Conclusion:** A large number of qunolone resistant N.gonorrhea (QRNG) were identified in this study. Since ciprofloxacin resistance is greater than 5%, it may not be applicable for national syndromic management of STIs.
Should We Have Concerns About the Accuracy of HIVST? A Systematic Review

Background: HIV self-testing (HIVST) is an additional approach to increase uptake of HIV testing, particularly for underserved populations. HIVST performance relates to diagnostic accuracy, reliability, and correct test interpretation. We will summarize the evidence on HIVST performance to inform policy development.


Results: Data were identified from 14 peer-reviewed articles, six abstracts and three reports. Most studies had low risk of bias for all QUADAS-2 domains and the STARD checklist reporting was incomplete. All 23 studies evaluated precision: raw proportion of agreement ranged from 88-100% and kappa ranged from fair (κ = 0.277, p<0.001) to almost perfect (κ =0.99), irrespective of type of assistance or sample specimen. Fifteen studies evaluated accuracy:sensitivity and specificity ranges were 96.4-98.8% and 99.5-99.6%, respectively, in studies using fingerstick/whole blood RDTs (three studies) compared to 65-99.1% and 96.1-100%, respectively, in studies using oral fluid RDTs (12 studies). Errors in performance were primarily incorrect oral-swabbing or finger-pricking (six studies). Pooled sensitivity and specificity for studies using OraQuick® (11 studies) was 93.9% (95% CI 88.4-96.9%) and 99.7% (95% CI 99.2-99.9%) respectively, similar to manufacturer’s indications for self-test use. Study limitations included the use of different reference standard tests to identify HIV-positive individuals and selection bias.

Conclusion: In the hand of intended users, accuracy of HIV self-tests can be high, even with unscaffolded approach. Users can self-test correctly and achieve the high level of sensitivity/specificity as health care worker. Errors in performance may be further reduced improving self-test kit design and instructions-for-use. This review demonstrates the ability of self-testers to use RDTs for HIVST accurately and encourages wider implementation, dependent on the target population values and preferences.

The Risk Factors of the Prevention of Mother-to-Child Transmission Interventions in the Bamenda City, Cameroon

Background: Mother-to-child transmission of Human Immunodeficiency Virus (HIV), has been a global public health concern. The use of antiretroviral drugs, caesarean section and replacement of infant breast feeding for formula feeding in the prevention of mother-to-child transmission (PMTCT) of HIV has not been without challenging due to limited literature. Our aim is to assess the prevalence and risk factors of PMTCT interventions in Bamenda City of Cameroon.

Methods: This was a retrospective study. Secondary data from 877 HIV exposed infants of age group ≤ 6 – 72 weeks was extracted from the records of the Regional Hospital Bamenda from January, 2008 to December, 2014. The prevalence was analysed using frequency distribution. Univariable analysis using Pearson chi-square was used to analyse the risk factors and multivariable logistic regression model was built based on Akaike Information Criterion (AIC). Statistical significant was considered at 95% confidence interval and p-value < 0.05.

Results: Out of 877 subjects, 62 were positive for HIV DNA-PCR test giving a prevalence of 7.1%. Univariable analysis indicated statistically significant higher rates of HIV transmission among subjects: age group > 6 – 72 weeks compared to those ≤ 6 weeks (11.6% versus 5.0%, p=0.001), mother-infant pairs not on HAART compared to those on HAART (9.8% versus 3.5%, p= <0.001). Based on our multivariable logistic model, mother-infant antiretroviral treatment option and infant age group remain statistically significant predictors of HIV transmission in HIV exposed infants. Mother-Infants pairs not on HAART were 2.49 times more likely to be infected with HIV than those on HAART and infant of age group ≥6-72 weeks was 2.34 times more likely to be infected with HIV than those ≤ 6 weeks.

Conclusion: The Policy on the use of HAART by pregnant women and the diagnosis of infants at age group ≤ 6 weeks should be reinforced
A WHO Performance Evaluation of Two HIV-1/2 Rapid Diagnostic Tests for Oral Fluid Specimens

Background: Rapid diagnostic tests (RDTs) for the detection of antibodies to HIV-1/2 in oral fluid can help in reducing unrecognized HIV infections. Two RDTs (DPP HIV 1/2 Assay (Chembio Diagnostic Systems, Inc) and OraQuick HIV-1/2 Rapid Antibody (OraSure Technologies) intended for use with oral fluid, serum/plasma and venous whole blood specimens were submitted for WHO prequalification assessment. Part of their assessment includes an independent performance evaluation, conducted by Institute of Tropical Medicine, Belgium. The detailed data of the performance evaluation are available at: http://www.who.int/diagnostics_laboratory/publications/en/

Methods: A panel of 597 clinically derived OF specimens were tested on two RDTs: DPP HIV 1/2 Assay (Chembio Diagnostic Systems, NY, USA) and OraQuick HIV-1/2 Rapid Antibody Test (OraSure Technologies, PA, USA). Half of the HIV-positive individuals were on ART and the HIV-negative individuals were recruited at a local blood bank. Results were compared with a standardized testing algorithm on the paired serum/plasma specimen.

Results: In this evaluation, the sensitivity for specimens from patients not on ART was 99.1% (94.9-100) for both DPP HIV 1/2 Assay (Chembio Diagnostic Systems, Inc) and OraQuick HIV-1/2 Rapid Antibody (OraSure Technologies) Tests. The sensitivity (95% CI) for specimens from patients on ART was 93.9% (87.9-97.5) and 92.2% (85.7-96.4) for DPP HIV 1/2 Assay and OraQuick HIV-1/2 Rapid Antibody Test (OraSure Technologies), respectively. The specificity was 100 % (99.0-100) for both assays compared to the reference test.

Conclusion: DPP HIV 1/2 Assay (Chembio Diagnostic Systems, Inc) and OraQuick HIV-1/2 Antibody Test (OraSure Technologies) are qualitative immunochromatographic RDTs for the detection of antibodies to HIV1/2 in oral fluid. These assays perform well and meet WHO prequalification requirement, if the individual is not taking ART. Our results emphasize that these assays should not be used for testing patients on ARV as recommended by the manufacturers. RDTs for oral fluid could play a useful role in reaching vulnerable and difficult to reach people for HIV testing.
**POSTER 49**

**Yeshwondm M. Gebresilasie**
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**Congenital Cytomegalovirus Infection and Zero Rubella IgM Prevalence in Newborns in St.Paul’s Hospital Millennium Medical College**

**Background:** Maternal cytomegalovirus (CMV) and Rubella infections result in adverse neonatal outcomes. Both CMV and Rubella are more widespread in developing countries and in communities with lower socioeconomic status.

**Methods:** Using cross sectional study design a total of 312 (156 newborns & 156 mothers) study participants were recruited by simple random sampling technique from gynecology outpatient department (OPD) and ward, starting from April 1, 2015 to June 30, 2015. Cord and venous blood samples were collected from all participants and structured questionnaire was introduced to gather risk factor related data. ELISA was used to detect CMV and Rubella-IgM. SPSS version 20 was used to analyze the data, and regression analysis was also performed.

**Results:** Out of 156 newborns, 2 [1.3%; 95% CI: 0.0-3.8] were positive for CMV – IgM and no single rubella was detected. Association was not computed between risk related variables and cytomegalovirus infected newborns due to the low positivity rate. Out of the total 156 mothers 149 [95.5%; 95% CI: 92.3-98.7] were positive for anti-CMV-IgG antibodies and 8 (5.5%; 95% CI: 1.3-9.0) were positive for CMV-IgM. Seven (4.5%) mothers were sero-negative. But multiple risk factors were found between maternal CMV – IgM positivity rate and obstetrical characteristics. Cytomegalovirus - IgM was significantly isolated from mothers with history of transfusion (25.0%, OR 0.09, 95% CI 0.0-0.3, P=0.006), history of abortion (OR 0.02, 95% CI 0.0-0.6, P= 0.023), HIV sero-status (OR 5.0, 95% CI 1.5-15.8, P = 0.034), and multi parity (OR 0.08, 95% CI 0.01-0.7, P = 0.022).

**Conclusion:** Although low congenital CMV and no Rubella are reported among newborns, more effort is needed to screen for congenital infectious viral disease and usage of advanced techniques should be take into consideration.

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**POSTER 50**

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**Antibiotic Resistance Patterns of Common Gram-Negative Uropathogens in St. Paul's Hospital Millennium Medical College**

**Background:** The resistance of bacteria causing urinary tract infection (UTI) to commonly prescribed antibiotics is increasing both in developing and developed countries. Resistance has emerged even to more potent antimicrobial agents. This study was undertaken to determine the current antibiotic resistance pattern among common bacterial uropathogens in St.paul's Hospital Millennium Medical College.

**Methods:** Using cross sectional study design, a total of 217 female and 207 male participants were consecutively recruited. Mid-urine samples were collected from all patients using wide mouthed urine cup. Inoculation was performed onto blood agar and MacConkey agar simultaneously, and isolated organisms were identified by conventional methods. Antibiotic susceptibility was done by Kirby Bauer disk diffusion method. Thirteen different antibiotics representing different families of antibiotics were tested on all isolated organisms.

**Results:** Of the total 424 samples, 95(22.4%) showed significant growth. Gram negative organisms totaled 85(20.05%), and 10(2.4%) isolates were gram positive. The most frequently isolated gram negative bacterium was E. coli followed by Protues and Klebsiella spp. 53(12.5%), 8(8.4%), and 7(7.4%) respectively. Resistance to Tetracyclin, Ampicilin, Amoxycilin and Nalidixic Acid was more than 70% of all isolates of E.coli strains. There was relatively low resistance rate to Nitrofurantoin, Gentamycin and Trimethoprim-Sulfamethoxazole. However, there was emerging resistance to Ciprofloxacin and Ceftriaxone especially for common bacteriuria.

**Conclusion:** In this study setting, resistant rates to Tetracyclin, Ampicilin, Amoxycilin and Nalidixic Acid were high. Since most isolates were sensitive for Nitrofurantoin, Gentamycin and Trimethoprim-Sulfamethoxazole, they are considered as appropriate antimicrobials for empirical treatment for urinary tract infections with the absence of culture and sensitivity setting. Increasing antibiotic resistance trends indicate that it is imperative to rationalize the use of antimicrobials in the community and use these conservatively.
POSTER 51
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Effect of 1.5% Sodium Hydroxide Final Concentration on Recovery Rate of Mycobacterial Species and Decontamination of Bacterial and Fungal Contaminants from Sputum Collected in Patients Referred to the Ethiopian Public Health Institute

Background: Digestion and decontamination of nonsterile clinical specimens, such as sputum, are an essential step in the isolation of mycobacteria. Masking of mycobacteria in MGIT 960 liquid culture system by contamination of fungi and other bacteria is a major problem.

Methods: A laboratory-based cross sectional study was carried out on subjects referred to the National Tuberculosis Reference Laboratory (NTRL) of Ethiopian Public Health Institute (EPHI) from November 2015 to February 2016 using convenient sampling techniques. A single morning sputum was collected from each patient then split and decontaminated with N-Acetyl L-Cysteine (NALC) sodium hydroxide (NaOH) solution to attain a 1% and 1.5% final NaOH concentration. The collected data, was analyzed by SPSS version 20 and Stata/SE Ver. 13. The kappa statistic (the degree of association), x² (Agreement of the two methods) and the Z test (difference of proportions) were used and the time to positive culture was compared using the Wilcoxon signed-ranks test.

Results: A total of 264 subjects were enrolled in the study. The mean age of the participants was 31 (SD 20.14 - 41.42) years old. The majority (61%) were male. Among the study participants, 251 (92%) were on a multidrug resistant (MDR) treatment and were referred for follow up TB culture examination. Increasing the final concentration of NaOH from 1% to 1.5% improved the contamination rate from 22.4% to 6.8% (P<0.001) without affecting mycobacterial recovery (P= 1.00). A total of 26 different species of microbial contaminants were identified as being associated with BACTEC MGIT 960 culture system.

Conclusion: Results presented in this study demonstrated that the use of a final concentration of 1.5% NaOH with NALC method are suitable and aids in reducing the culture contamination rate for decontaminating clinical specimens referred for tuberculosis culture diagnosis, particularly in the settings where culture contamination is a big quality problem. Among the identified microbial contaminants, the most predominant was coagulase negative Staphylococcus species. Using 1.5% final concentration of NaOH for clinical specimens usually collected from follow up patients referred for TB culture diagnosis, would be preferable to reduce contamination rates in TB culture laboratories.

POSTER 52
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Characteristics and Outcomes of HIV Exposed Infants Receiving Early Infant Diagnosis for HIV in Rural Kenya, 2015

Background: In Kenya, Homa Bay has the highest prevalence of HIV (25.7%) with a prevention of mother to child transmission need of 10,200 women in 2015. We sought to describe the characteristics of HIV exposed infants (HEI) seeking early infant diagnosis (EID) services in Homa Bay County.

Methods: We reviewed data on HEIs enrolled for EID in Homa Bay County from January through December 2015 from the EID database. Infant information on age, sex, feeding regimen, and prophylaxis and entry point was collected. We calculated proportions and frequencies for categorical data using MS-Excel.

Results: A total of 6,155 infants were enrolled for early infant diagnosis. The median age at enrollment was 1.5 months (range; 1 to 17 months). About half, (2,960) of the infants were female. A majority, 5,125 (83.4%), were enrolled for EID through Mother-Child Health (MCH), 514 (8.4%) through comprehensive care clinics while 106 (1.7%) was through the outpatient department. A total of 3,345 (55%) of HEIs received nevirapine prophylaxis for six weeks, the infant prophylaxis regimen was not documented for 971 (16%) of HEIs. A total of 4,972 (81%) of HEIs, were exclusively breast fed, 348 (6%) mixed fed and 139 (2%) exclusive replacement fed. Seven percent (438) of the HEIs turned HIV positive. The HIV positivity among exclusive replacement fed infants was 23%; 5% for exclusive breast fed and 20% for mixed fed infants. The HIV positivity based on type of infant prophylaxis was 4% for infants who received nevirapine for six weeks; 29% for infants who did not receive any prophylaxis and 10% for infants with an undocumented infant prophylaxis regimen.

Conclusion: HIV transmission rates remain significantly high for infants who do not receive HIV prophylaxis and among infants who receive mixed feeding. We recommend documentation of testing intervals, complete records on infant prophylaxis and feeding options.
Sodium Hydroxide–N-acetyl-L-Cysteine (NaOH-NALC) and 0.7% Chlorhexidine Decontamination Method in Detection of Mycobacterium Tuberculosis Complex: A Comparative Analysis

Background: Tuberculosis (TB) caused by Mycobacterium tuberculosis complex (MTBC) is an infectious disease and a prominent global health problem. Culture remains the gold standard for the isolation of mycobacteria after effective decontamination. The aim of this work was to determine the culture yield and contamination rates during isolation of mycobacteria using 0.7% Chlorhexidine and the standard NaOH-NALC methods respectively.

Methods: A total of 68 sputum samples were worked on from 13th February 2016 to 10th March 2016, (42 smear positives and 26 smear negatives). Of these, 68% (46/68) were from males whilst 32% (26/68) were from females with an approximate average age of 27 years. Sputum samples were decontaminated by the two methods. Aliquot of 250 µL of the concentrates were then cultured in parallel onto Lowenstein Jensen (LJ) media. LJ slopes were read daily for the first two weeks and weekly till the eighth week for the detection of mycobacterial growth. Confirmation was done by standard bacteriological methods.

Results: The overall recovery rate of MTBC on both methods was 51.5% (35/68), MTBC growth on 0.7% Chlorhexidine and standard NaOH-NALC decontamination method on LJ media were 61.8% (42/68) and 54.4% (37/68) respectively. However, Mycobacterial growth was faster on samples treated with 0.7% Chlorhexidine compared to NaOH-NALC method (average 32±5 days, 33±5.2 days respectively). Culture contamination rate using 0.7% Chlorhexidine was 1.5% (1/68) and NaOH-NALC was 4.4% (3/68).

Conclusion: The 0.7% Chlorhexidine method is rapid, and has lower contamination rate recovery compared to the standard NaOH-NALC method. The use of 0.7% Chlorhexidine decontamination method could be an ideal replaceable decontamination method for recovery of MTBC in resource poor countries. The evaluation of different strain by spoligotype will be done.
POSTER 55

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The Performance of BD FACSPresto for CD4 T-cell Count in Ethiopia

Background: Access to CD4+ T cell count to determine antiretroviral therapy (ART) eligibility and Hgb concentration for anemic patients in rural health facilities remains a major challenge in Ethiopia. We hypothesized that the newly released BD FACSPresto CD4 point of care (POC) technology could be an alternative technology for consideration within the ART program in Ethiopia.

Methods: To evaluate the performance of the BD FACSPresto (Becton Dickinson, East Rutherford, NJ, USA), a total of 325 HIV-positive patients were recruited in Addis Ababa and its surroundings. Both capillary and venous bloods were drawn from each study participant. The capillary blood was tested at one of the four study health facilities using the BD FACSPresto device. The venous blood was tested at the national HIV reference laboratory, using the BD FACS Calibur (CD4+), the BD FACSPresto (CD4+ and Hgb), and the Sysmex-1800i (Hgb).

Results: The median age of the study participants was 37 years and 69% were female. The BD FACSPresto for CD4+ T-cell counting had a mean bias of -13.3 cells/µl (95% LOA: -163.2, 136.6) and 28.3 cells/µl (95% LOA: -157.1, 213.7) using venous and capillary blood, respectively, compared with the BD FACS Calibur. The sensitivity of the FACSPresto at an ART eligibility threshold of 500 cells/µl using capillary and venous blood was 87.9% and 94.3%, respectively, while the specificity was 91.4% and 83.8%, respectively. The absolute bias of Hgb concentration tested using the BD FACSPresto and capillary blood was -0.2 dl/µl (95% LOA: -1.7, 1.3) compared to the Sysmex 1800i.

Conclusion: The BD FACSPresto showed acceptable agreement with the BD FACSCalibur for CD4+ T-cell counting and the Sysmex1800i for measuring Hgb concentration. As countries move towards treating all patients with ART, the BD FACSPresto POC technology would support patient prioritization for treatment and monitoring those on treatment.

POSTER 56

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Failure to Detect HIV-1 by PCR Testing Amongst Infected Infants Receiving Antiretroviral Therapy

Background: The COBAS® AmpliPrep/COBAS® TaqMan HIV-1 Qualitative Test, version2.0 (CAP/CTMv2) is currently the only assay used within South Africa’s early infant diagnosis programme, and is approved for in vitro diagnostic use with a reported sensitivity of 100% amongst adult dried blood spot (DBS) specimens. There is, however, increasing concern that antiretroviral therapy (ART) may compromise diagnostic sensitivity. This is especially relevant in those cases where confirmatory testing is performed after initiation of ART.

The aim of this study was to assess the ability of the CAP/CTMv2 and an in-house nested-PCR assay to detect HIV-1 amongst infected infants receiving ART.

Methods: Dried blood spot (approx. 60µl) and whole anti-coagulated blood (2ml) specimens were taken from 11 HIV-1 infected infants (defined as HIV-1 DNA/RNA detected using PCR on two separate specimens) receiving ART. Children were 7-39 months of age (median 14) at the time of sampling, having been on ART for 4-39 months (median 12). The DBS specimens were tested using the CAP/CTMv2 as per package insert and reviewed on ART for 4-39 months (median 12). The DBS specimens were tested using the CAP/CTMv2 as per package insert and reviewed according to South Africa’s National Health Laboratory Service procedure. Peripheral blood mononuclear cells (PBMCs) were separated from anti-coagulated blood using Ficoll, genomic DNA extracted using the Qiagen QIAamp Blood DNA Kit and tested using the in-house nested-PCR assay.

Results: Six infants tested positive, three indeterminate and two negative using the CAP/CTMv2 whilst nine tested positive and two negative using the in-house method. The in-house assay yielded consistently lower Ct values thereby conclusively identifying the indeterminate results as positive.

Conclusion: Healthcare workers need to be aware that HIV-1 infected infants receiving ART may test PCR negative or indeterminate on DBS with the current diagnostic assay. In this small sample, an in-house PCR assay developed for testing on PBMCs performed better than the CAP/CTMv2, conclusively confirming indeterminate results as positive but still failing to detect HIV-1 in some infants.
Antimicrobial Resistance in Pathogenic Aerobic Bacteria Causing Surgical Site Infections in Mbarara Regional Referral Hospital, Southwestern Uganda

Background: Surgical site infections (SSIs) are infections that occur at the surgical site postoperatively. Despite use of prophylactic antibiotics and other preventive measures, SSIs remain a burden to postoperative patients contributing to prolonged hospitalization, increased cost of treatment, morbidity and mortality. The increased incidence of SSIs has been ascribed to the injudicious use of antimicrobials that favors drug resistance and lack of surveillance including documenting antimicrobial susceptibility pattern.

This study presents the bacterial isolates of SSIs, their antibiotic resistance pattern, and isolation rate by patients’ characteristics in Mbarara Regional Referral hospital, Southwestern Uganda.

Methods: A descriptive cross sectional study was carried out with a total of 83 postoperative patients with clinical SSIs recruited. Data regarding patients demographic, clinical and operation procedure was collected using structured data collection form. Two swabs were collected and analyzed microbiologically by culture, Gram staining, biochemical tests including API20E test. Antibiotic susceptibility test was done by Kirby-Bauer disc diffusion method.

Results: Out of the 83 samples analyzed, 81.93% showed culture positivity with Gram negative predominance (85.59%) and Klebsiella spp (29.03%) were the dominant isolates. Isolation rate was higher in emergency, males and dirty wounds in relation to nature of surgery, gender and class of surgical wound respectively. 95.7% of the aerobic bacteria isolated were multidrug resistant. Gram negative isolates showed high resistance to all antibiotics tested except for ciprofloxacin with moderate resistance. E.coli demonstrated high resistance to all antibiotics tested. Gram positives showed low resistance to ciprofloxacin (37.5%), moderate resistance to sulfamethoxazole/trimethoprim, gentamicin and erythromycin, and high resistance to other antibiotics tested. Staphylococcus aureus demonstrated high resistance to all antibiotics tested except ciprofloxacin with moderate resistance.

Conclusion: The high isolation rate and multidrug resistant pattern necessitates antimicrobial susceptibility testing as guidance for antimicrobial administration, and calls for surveillance of SSIs periodicaly as well as implementation and practice of infection control measures.
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## Performance Evaluation of Alere q HIV-1/2 Detect

**Background:** In 2014, < 50% of infants in need received virological testing as recommended by WHO (UNAIDS 2015). The current standard for infant virological HIV testing relies on laboratory-based technologies requiring highly skilled staff. New technologies are smaller, faster and less operator-dependent; however, stringent independent evaluations are required before use in patient care. This collaborative study conducted by WHO, CDC, and NHLIS aims to verify selected manufacturer’s performance claims of the Alere q HIV-1/2 Detect.

**Methods:** Analytical performance was assessed by limit of detection (LOD), carry-over, and subtype coverage studies. To evaluate carry-over, viral supernatant (subtype C) was titrated to 10^6 copies/mL; 20 replicates were tested alternating with negative whole blood. Three replicates of each subtype (B, C, D, F, AE, AG) were diluted to 5000 copies/mL to validate subtype coverage. To verify the stated LOD, 30 replicates of 5 serial dilutions of WHO 3rd HIV-1 International Standard were tested. All dilutions were performed in HIV negative whole blood and confirmed by the reference method (Roche CAP/CTM Qualitative Test, Version 2.0). Clinical performance was assessed by testing 92 positive and 150 negative infant samples and 50 positive and 50 negative adult samples as determined by the reference.

**Results:** No carry-over was seen, and all subtype replicates were detected. The manufacturer’s stated LOD (2451 copies/mL) was verified by Probit analysis. 1758 copies/mL, 95% fiducial limits: 1285 – 3638 copies/mL. No discordants were noted in infant samples (100% sensitivity, 100% specificity), whereas adult specimens yielded five discordants (90% sensitivity; 100% specificity).

**Conclusion:** Data collected to date from this independent evaluation are consistent with the manufacturer’s whole blood claims for the Alere q HIV-1/2 Detect assay. Lower sensitivity in adult specimens may be due to limited sample size. Further evaluation to determine clinical utility, effectiveness and uptake, at the intended use setting is required.

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## Serotype Distribution and Ampicillin Susceptibility of Haemophilus influenzae Associated with Non-Invasive Infections

**Background:** *Haemophilus influenzae*, colonises the human upper respiratory tract and is associated with localized and invasive disease. *H influenzae* type b (Hib) is responsible for invasive infections especially in young children. Following the Hib conjugate vaccine, a reduction in colonization rates and invasive infections has been reported globally – including South Africa (GERMS Report).

Hib vaccination does not confer protection against other serotypes of *H. influenzae* and strain replacement has been documented. The serotype prevalent in non-invasive specimens at King Edward Hospital is largely unknown. We determined the serotype distribution and Ampicillin susceptibility of *Haemophilus influenza* from non-invasive specimens of hospitalized patients.

**Methods:** Over a 10-month period, all *Haemophilus influenzae* from non-invasive samples of paediatric and adult patients were serotyped using agglutination sera for types A-F (Murex Biotech). Ampicillin susceptibility testing was performed by disc diffusion method and zone sizes interpreted in accordance with CLSI guidelines. For β-Lactamase testing the chromogenic cephalosporin test with nitrocephin was used.

**Results:** A total of 69 *H influenzae* were isolated. 43% were from adults and 57% from children, majority being less than 2 years old. Slide agglutination serotyping showed that 50.7% of the strains were *H influenzae* type B while 40.5% were non-typeable. Type A, C and D were the remainder of the serotypes (3% each).

17 (25%) of the 69 HI strains were resistant to ampicillin of which 7 (5 HIb, 1 group C and 1 non-typable) were -lactamase negative (-lactamase–negative ampicillin resistant –BLNAR strains).

**Conclusion:** The study shows that despite the Hib vaccine the predominant serotype in the non-invasive specimens in our setting remains serotype B – especially children less than 2 who are most vulnerable to *Haemophilus influenzae* infections. Ampicillin resistance is present but the BLNAR strains are low.
Evaluation of a Point-of-Care Test for Diagnosis of HIV at Birth

**Background:** Early infant HIV treatment may reduce viral reservoir and improve long-term treatment outcomes, but early diagnosis of infants remains a logistic challenge. The use of HIV point-of-care (POC) tests may alleviate this problem, but the accuracy of POC testing in the first week of life and in the setting of antiretroviral prophylaxis for the prevention of mother-to-child HIV transmission (MTCT) is unknown. This study aimed to evaluate sensitivity and specificity of the Cepheid Xpert® HIV-1 Qual POC test as compared with the Roche Taqman HIV PCR platform to diagnose infant HIV infection.

**Methods:** As part of the Botswana-Harvard Partnership Early Infant Treatment Study, infants <96 hours of life were screened for HIV. Dried blot spot screening samples were initially run by PCR. All PCR-positive screening samples were tested using the Cepheid platform to evaluate sensitivity, and seventy-five HIV-exposed, PCR negative infants were tested by Cepheid to evaluate POC specificity.

**Results:** Of 2110 infants screened from April 2015 to April 2016, 11 infants were identified as PCR positive, yielding an in utero MTCT rate of 0.5%. Among the PCR positive infants, baseline viral load ranged from <40 copies/ml to 10,000,000 copies/ml, with a median of 2,403 copies/ml; at least eight of the 11 infants were exposed to maternal antiretrovirals near delivery, and all infants received single-dose nevirapine and zidovudine. Ten of 11 PCR positive samples tested positive by Cepheid POC, yielding a sensitivity of 91% (95% CI: 58.7 – 99.8%). The HIV RNA level for the infant with false negative POC testing was 1661 copies/mL. Of note, one sample that had a viral load <40 copies/mL by HIV RNA testing was correctly identified as HIV positive by Cepheid POC. All of the 75 PCR-negative samples tested negative by Cepheid POC, yielding a specificity of 100% (95% CI: 95.2 –100%).

**Conclusion:** Although additional HIV-positive samples are required to narrow the confidence intervals for this series, our study demonstrates high sensitivity and specificity for the Cepheid POC assay within the first 96 hours of life in the setting of substantial maternal and infant antiretroviral exposure. The Cepheid POC testing platform may be a useful approach for early infant HIV diagnosis in Botswana.

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**Improving Laboratory Performance During Ebola Virus Disease Outbreak in Sierra Leone - 2015**

**Background:** Provision of laboratory support during the epidemic of Ebola Virus Disease (EVD) in West Africa facilitated the rapid testing of suspected cases. Laboratory support was one of the pillars during the response. To evaluate the performance of the laboratory support, review of laboratory record is required. We therefore reviewed the laboratory data to identify gaps in performance.

**Methods:** Laboratory data for EVD in Tonkolili District was reviewed and descriptive analysis was performed using Microsoft Excel. Key informant interviews (KII) with the program stakeholders in the laboratory was done. CDC updated guidelines for evaluating public health surveillance was used. Attributes determined include Timeliness, Simplicity, sensitivity and Positive Predictive value.

**Results:** Standardized data collection tools were in place and data communication was clear with daily feedback. Information technology were updated frequently on suspected cases sent to the laboratory. Data completeness was about 91%, consistency exist but data quality was poor (incompletely filled data and missing data existed). Timeliness of sample getting to the laboratory either same or the following day occurred in 84.9%. Sensitivity of the surveillance system was 88.5%. Predictive value positive was 25.8%. KII showed that delay occurred between sample collection and transportation to the laboratory. The government of Sierra Leone were not fully in charge of the surveillance system. It was mainly foreign volunteer driven. The system could not fully met its objectives.

**Conclusion:** The data flow was simple. However, timeliness, flexibility, acceptability and stability were not as expected. The roles of indigenes of the community as supportive staff in the laboratory during outbreak response cannot be over emphasised. Findings were shared with the Epidemiology and Surveillance pillar of the outbreak response, the District Health Management Team and the laboratory lead. Improvement of data completeness and timeliness occurred after recruiting and providing training for the volunteered indigenes. Laboratory performance was improved through the implementation of the findings of the evaluation.
Malaria and Intestinal Parasites Coinfections and Haemoglobin Levels Among School-Aged Children in Bebuatsuan Clan, Obudu, Cross River State, Nigeria

Background: Malaria and intestinal parasites are endemic in Sub-Saharan Africa, and their co-infection occurs commonly with children being the most affected.

Methods: A total of 95 male and female subjects aged 4 - 15 years were enrolled in the study. Structured questionnaires were administered. Thick and thin blood blood films were made and examined microscopically for the diagnosis of malaria infection, saline and iodine wet preparations and formal ether concentration technique were used for the diagnosis of intestinal parasitosis while packed cell volume and haemoglobin estimation was determined by using the standard methods.

Results: A total of 39 (41.1%), 25 (26.3%) and 12 (12.63%) were infected with malaria, intestinal parasites and co-infection respectively. Males had a higher prevalence of malaria (47.16%) and intestinal infectious (28.3%) than females 33.33% and 23.81% respectively and these were significant (p<0.05). Although, the mean MCHC show 31.03 ± 0.48 and 30.71 ± 0.71 in males and females respectively which suggest slight anemia. Moreover, subjects weighing 12 – 26kg had the highest prevalence of malaria (66.67%), intestinal parasite (68%) and co-infections (58.33%) and also reduce PCV and Hb values. The highest percentage of malaria infection (44%) was seen in subjects with packed cell volume (PCV) between 32-37% while the highest percentage for intestinal parasitosis and co-infection (66.7%, 33.3%) was seen in subjects with PCV in the 20 - 25% range. These results suggest a strong relationship between the high prevalence of malaria and intestinal parasitosis in school-aged children and gender (p<0.027). It also shows a significant effect of the co-infection on the weight of the subjects though the impact on packed cell volume was not significant (p>0.05).

Conclusion: This data may provide invaluable statistics needed for planning meaningful public health control programmes that target the prevention and control of parasitic infections among school-aged children.
**Improve Awareness and Understanding of Antibiotic Resistance Through Participation in Public Cultural Forums**

**Background:** Antibiotics save the lives of millions of people around the world, and have been a critical public health tool since the discovery of penicillin in 1928. Today, the development of resistance of antibiotics is well recognized around the world which means simple infections that are treatable today may become untreatable tomorrow. Antibiotic resistance starts at the individual level and impacts the population.

More attention is needed where the access to antibiotics could be without prescriptions. The aim of the study to increase the awareness among the public communities and create effective communication tools.

**Methods:** The most active five public cultural forums in Khartoum State participated in this study, these public cultural forums are used to conduct weekly events about the Sudanese music and songs for two hours. The time for music and songs was reduced to one hour and the remaining hour was half power point presentation, about the use of antibiotics, and the other half reserved for questions and discussion. The key points in the presentation were definitions, types and classifications, mode of action, methods of use guidelines and recommendations.

**Results:** The ideas were accepted by the participants and there was interaction through questions, comments and discussion, as well they enjoyed the music and songs. Awareness improved among the participants and many invitations from other public cultural forums were received, showing they are interested in participating in the program.

**Conclusion:** Direct effective communication with public communities could improve the awareness of the right way to use antibiotics, where the access to antibiotics is not restricted to have a prescription.

Communication with public cultural forums could be one effective tool to fight the development of antibiotic resistance in certain settings.

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**Field Evaluation of a Schistosome Antigen-Based Rapid Test Kit (CCA) at Point-of-Care for Mapping Urinary Schistosomiasis Endemic Districts in the Gambia**

**Background:** The traditional parasitological urine filtration and kato katz thick smears methods have been found to be less sensitive in the detection of light intensity of *Schistosoma haematobium* and *Schistosoma mansoni*. Many field surveys in Sub Saharan Africa have shown that Circulating Cathodic Antigen point-of-care-test (POC-CCA) is more accurate for the detections of *Schistosoma mansoni* than the microscopic kato katz technique. However there is limited data on the field accuracy of this point-of-care test tool for rapid mapping of urinary schistosomiasis endemic areas such as The Gambia. The purpose of this study was to evaluate the field accuracy of POC-CCA as a rapid test kit for schistosomiasis mapping in The Gambia.

**Methods:** The study was conducted in 4 regions across the country, namely: North Bank Region (NBR), Lower River Region (LRR), Central River Region (CRR) and Upper River Region (URR). Ten schools were randomly selected from each region, and a total of 2018 participants whose ages range from 7 to 14 years were enrolled in the study. Stool and urine samples were collected from each participant from 8th May to 8th June 2015, and tested for *Schistosoma haematobium* and *Schistosoma mansoni* infections. The tests were conducted using POC-CCA against double kato katz smeared slides, urine filtration and dipstick methods as gold standards.

**Results:** *Schistosoma haematobium* accounted for a total prevalence of 8.19% (n=198), using the urine filtration technique. CRR has the highest cases of urinary schistosomiasis with a prevalence of 27.95% (n=135), followed by URR with a prevalence of 12.37% (n=60). Very low urinary schistosomiasis prevalence (0.61%) was found in LRR whilst NBR had no case of schistosomiasis. Only 5 participants were infected with *S. mansoni*. Using urine filtration as reference standard for the detection of *S. haematobium*, the sensitivity of POC-CCA was 47.69% and the specificity was 75.81%. Whilst the Sensitivity and specificity of POC-CCA for detecting *S.mansoni* were 60.0% and 71.24% respectively using double kato-katz as reference standard.

**Conclusion:** POC-CCA could be a useful tool for the rapid mapping of intestinal schistosomiasis. This study showed low sensitivity of POC CCA in detecting *S. haematobium* and therefore not ideal for rapid diagnosis of urinary schistosomiasis.
**POSTER 67**

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**Performance comparison of pair of LJ media supplemented with pyruvate and glycerol (LJPG/LJG) and a combination of both supplements in single LJ (LJPG) to assess the growth of Mycobacterium Tuberculosis Complex (MTBC)**

**Background:** MTBC consists of five *M. tuberculosis* (*Mtb*) and two *M. africanum* (*Maf*) lineages, all of which cause tuberculosis (TB). Culture remains the gold standard for isolation of MTBC due to its high sensitivity. In contrast to *Mtb* which utilises glycerol in the growth medium, *Maf* isolates require an unusual carbon source (pyruvate) due to a mutation in the *glpk* gene, which is essential for glycerol uptake and metabolism. LJPG/LJG is commonly used when compared to the usual pair of LJ slopes supplemented with glycerol (LJG) or pyruvate (LJP). This is a promising new culturing approach for *Maf* endemic West African countries, where the two geographically restricted *Maf* lineages are endemic. The aim of this work is to compare the performance of LJG/LJP and the LJGP for the growth support of MTBC.

**Methods:** This study was carried out on 100 Ziehl-Neelson confirmed positive Mycobacterium Growth Indicator Tube (MGIT) 960 culture samples obtained from clinical samples during routine diagnosis. All the cultures were inoculated in parallel on LJG/LJP and LJGP, which are incubated and read weekly for evidence of growth. The mycobacterial recovery rate, contamination rate and time to detection are compared.

**Results:** The recovery rate for LJG/LJP and LJGP was found to be 90% and 88% respectively. There was no significant difference in the contamination rate (LJG/LJP 8% and LJGP 9%). Bacterial growth was faster in LJGP (1.6 weeks) than LJG/LJP (2 weeks) respectively.

**Conclusion:** A single LJPG slope have no significant difference when compared to the usual pair of LJ slopes supplemented with glycerol (LJG) or pyruvate (LJP). This is a promising new culturing approach for *Maf* endemic West African countries that not only significantly reduces labour time and consumables costs, but also leads to a faster detection of MTBC. The sensitivity of the LJPG for primary isolation of TB from sputa is currently under investigation.

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**POSTER 68**

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**Surveillance Nationale de la Resistance aux Antibiotiques: Experience du Senegal**

**Introduction:** La lutte contre l’évolution de la résistance bactérienne aux antibiotiques passe par une bonne analyse situationnelle et par une surveillance active de la résistance. Ainsi, le Sénégal, à travers sa Direction des laboratoires, a fait un état des lieux en 2013 et mis en place un système de surveillance mensuelle depuis 2014.

L’objectif est de partager l’expérience du Sénégal après un an de surveillance, voir les avancées et noter les difficultés rencontrées.

**Méthodologie:** Des fiches de notifications sous format Excel validées ont été mises à la disposition des laboratoires. Ces fiches remplies mensuellement sont envoyées au niveau de la division Études et Documentations de la Direction des laboratoires qui les archive et les exploite pour avoir une vue situationnelle.

**Résultats:** Sur les 26 laboratoires concernés par cette surveillance, seuls 19 (73.1%) ont effectivement participé à la notification. De Janvier à Juin 2015, la notification était irrégulière pour 63% des laboratoires.

La présence de superviseurs sur les sites a permis de collecter l’ensemble des données de l’année 2015. Les raisons évoquées étaient principalement des problèmes de ressources humaines et la non maîtrise des outils de collecte.

Pour la résistance, nous avons noté une légère augmentation du taux global de SARM de 11% en 2012 à 14% en 2015 ; la production de BLSE est restée constante autour de 35% pour Klebsiella pneumoniae et 25% pour Enterobacter spp.

**Conclusion:** L’écologie bactérienne est restée relativement la même entre 2012 et 2015. Cependant, la remontée irrégulière des données sur la résistance bactérienne constitue un problème pour la pérennité de la surveillance, d’où l’importance de renforcer la sensibilisation du personnel de laboratoire. Des supervision semestrielles pour collecter les données in situ et la mise en place du DHIS-2, un autre outil plus maniable ont été instituées par la Direction des Laboratoires.
Echec Virologique et Résistance au Traitement ARV de Première Ligne en Guinée

Background: La surveillance de la résistance chez les patients sous traitement antirétroviral (TARV) reste un défi majeur pour les pays à ressources limitées. L’objectif de ce travail était d’évaluer l’échec virologique et la résistance chez des patients sous TARV de première ligne en Guinée.

Methods: Cent trente et 150 patients sous TARV de première ligne ont été recrutés respectivement en 2010 et 2015, au niveau du CTA de Donka à Conakry et en milieu décentralisé après consentement. En 2010 Les trithérapies étaient à base de AZT ou d4T et en 2015 40% des patients étaient sous un schéma thérapeutique à base de TDF. A partir d’un prélèvement de sang veineux, des spots ont été confectionnés avant d’être transférés au laboratoire de Bactériologie-Virologie du CHU Aristide le Dantec (LBV). La charge virale (CV) a été réalisée avec les kits NucliSENS EasyQ (Biomérieux France) et Generic HIV Charge virale (Biocentric, France). Le génotypage de résistance a été effectué sur tous les échantillons à charge virale >3 log copies/ml avec la technique de l’ANRS/AC11. Les séquences ont été analysées en utilisant l’algorithme d’interprétation des résistances de HIVdb. 

Results: Le taux d’échec virologique était de 22,3% (suivi médian : 35 mois) en 2010 et de 24% en 2015 (suivi médian : 36 mois). Les mutations de résistance les plus fréquemment retrouvées étaient la M184V (68,4% vs 66,7%), K103N (57,9% vs 60%) et les TAMs (57,9% vs 60%) respectivement en 2010 et 2015. Le CRF O2_AG demeure la souche prédominante avec plus de 60% pour les deux années.

Conclusion: Malgré l’introduction du TDF en première ligne, l’accumulation des mutations de résistance reste problématique en Guinée.
**POSTER 71**

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**Comparison of an in-house Quantitative Real Time PCR and COBAS AmpliPrep/TaqMan Roche for determination of Viral Load for HIV Type 1 non-B**

**Background:** The in-house technical or experimental methods are increasingly recommended for their low cost reagents for the determination of the Viral Load (VL) in resource-limited settings. The objective of this study was to compare the determination of VL from HIV-1 non-B samples by an in-house technique with the COBAS Ampliprep/TaqMan version 2.0.

**Methods:** In this cross-sectional study, 39 plasma samples from patients infected with HIV type 1 non-B from N’Djamena and Kinshasa were used to determine the VL using the two techniques.

**Results:** The mean values of VL are respectively 4.68 ± 1.26 and 4.58 ± 1.33 log_{10} copies of RNA/ml for the COBAS Ampliprep/TaqMan assays and the in-house PCR assays. A good correlation (Spearman Correlation) was obtained, with a coefficient (R^2) of 0.9452 (p <0.001).

**Conclusion:** This work demonstrates that there is no significant difference between the results of VL determined by the COBAS Ampliprep/TaqMan assays and the in-house assays used.

**POSTER 72**

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**Correlation Between Sequencing Results from Liquid Plasma and Dried Plasma Spot (DPS) for Determination of HIV Type 1 Non-B Subtypes**

**Background:** The Blotting paper is an alternative to the collection of blood in the tubes for analysis, especially in the field of Human Immunodeficiency Virus infection. This technique allows for easy sending of the collected samples to specialized laboratories while limiting the stresses of storage and transport. The objective of this study was to compare the results of sequencing performed on liquid plasma and Dried Plasma Spot (DPS) for the variants of HIV-1 non-B.

**Methods:** Fifty subjects diagnosed positive for HIV Type 1 using the Rapid Screening Tests voluntarily participated in this study. Two hundred microliters of plasma are deposited on blotting paper Whatman 903 and 500µl in a micro tube. RNA was extracted from 140µl of plasma fluid and from a piece of DPS of 5mm of diameter using the QIAamp RNA Mini Kit QIAGEN®. After extraction, the Viral Load (VL) was performed on each sample of liquid plasma. A Reverse Transcription PCR and Nested PCR were used to amplify the regions of interest on the Protease and Reverse Transcriptase for subsequent sequencing.

**Results:** Protease and Reverse Transcriptase were amplified and sequenced respectively for 44 (88%) and 48 (96%) with the liquid samples and 40 plasma (80%) and 45 (90%) with the DPS. The results of Viral Loads were in the range of 2.5 log_{10} and 6.5 log_{10}. The results of sequencing are comparable for plasma samples and DPS. The correlation coefficient (R^2) between the two methods is good (R^2 = 0.903, p <0.001).

**Conclusion:** Liquid Plasma and Dried Plasma Spot give highly correlated results for sequencing strains of HIV type 1 non-B.
UV Visible Spectrophotometric Determination of the Quality of Antiretroviral Drugs Distributed in Kinshasa

**Background:** AntiRetroVirals (ARVs) are the molecules used in the fight against infection by the Human Immunodeficiency Virus (HIV). Their main objective is to stop the virus from replicating and thus allow the immune system to recover. In 2001, the program to fight against HIV/AIDS United Nations (UNAIDS) and its partners have decided to strengthen the pharmaceutical channel and improve access to good quality care. Thus ARV quality control is recommended. The objective of this work was to monitor the quality of ARVs distributed in Kinshasa.

**Methods:** In this work, UV-visible spectrophotometry was used for the analysis of ARVs presented in simple form distributed in the city of Kinshasa.

**Results:** The results of this work show that the ARV analyzed contain stated active ingredients and that there is no placebo. Ten percent of these ARVs are non-compliant with regard to dosing of the active test.

**Conclusion:** These results confirm the need to control these drugs to protect patients from adverse consequences related to their poor quality.

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The Uganda Ministry of Health/Centers for Disease Control and Prevention District Level Epidemiology Training Program’s Contribution to the Global Health Security Agenda using the One Health Approach to Transform Outbreak Rapid Response Teams

**Background:** An operational workforce is important to Global Health Security Agenda (GHSA). For GHSA to become functional, there is need to redevelop health workers’ capacity to quickly detect, report, respond to disease outbreaks and other public health emergencies.

In 2012, Centers for Disease Control and Prevention (CDC) and Walter Reed Army Institute of Research (WRAIR) supported Epidemiology and Surveillance Division (ESD) at Uganda Ministry of Health (MoH) to implement District Level Epidemiology Training (DLET). Curricula were designed by ESD, CDC, and WRAIR through integrating concepts of One Health, with the knowledge that 70% of infectious diseases are of zoonotic nature. DLET’s goal is to enhance understanding of One Health, Public Health Surveillance, Outbreak investigation and response, at the District level.

**Methods:** DLET offers two one-week didactic modules, and a 6-8 weeks field mentorship in-between. Sessions are delivered in cohorts of 5 districts to five positions of DRRTs. These include Health and Veterinary Officers, Surveillance and Laboratory Focal Persons, a Clinician or Community Health Personnel at a Regional/District Hospital. DLET relies on ESD to identify facilitators, gaps, and outcomes.

**Results:** In 4 years, 249 rapid responders from Kenya (6), Nigeria (2), and Uganda (241 from 49 epidemic prone districts) have been trained. Since 2012, Uganda DRRTs have detected, investigated and reported ~14 disease outbreaks. DRRTs are now more prepared and involved in detecting and reporting disease outbreaks. They also provide reliable and timely investigations of public health emergencies.

4 of the Uganda MoH/ESD DLET program beneficiaries have participated in the West Africa Ebola Virus Disease outbreak response.

**Conclusion:** In-service training has improved the capacity of first-line outbreak responders in Uganda to timely investigate, report, and respond to outbreaks.

DLET has provided an opportunity for Uganda to share expertise in investigating, reporting and responding to disease outbreaks within Africa.
Audit Diagnostic Pilote des Laboratoires de Biologie Médicale du Togo

Background: La division des laboratoires (DL), dans le but d’accompagner les laboratoires de biologie médicale (LBM) à la mise en place de la démarche qualité, a adopté en 2015 comme référentiel la norme ISO 15189. La DL a opté pour une stratégie d’accompagnement étape par étape.

Methods: Un audit diagnostic des laboratoires cibles est un préalable à la mise en œuvre de cette stratégie d’accompagnement. La phase pilote de l’audit a été organisée dans les LBM publics de la région sanitaire Maritime et ceux des services de santé des armées de la région sanitaire Lomé-Commune, en utilisant les versions électroniques des outils d’audit SLIPTA V2-2015 et de biosécurité-biosûreté DCN 90064 FR.

Results: Au total 21 laboratoires, dont 15 de la région maritime et 6 du service de santé des armées, ont été audités. Tous ont obtenu un score inférieur à 55% avec des extrêmes de 11% et 34% et ont été qualifiés à «Zéro étoile ». Des 12 sections de l’outil SLIPTA, celle relative aux acquisitions et inventaire, a obtenu le meilleur score (42%) alors qu’aucun laboratoire audité n’a satisfait aux exigences de la section relative à l’audit et l’évaluation. En outre, les grandes politiques SLIPTA n’ont pas été mises en œuvre dans ces laboratoires. Concernant le volet Biosécurité/Biosûreté, le personnel est peu sensibilisé et les pratiques à risque sont persistantes. Cette évaluation a également montré que l’insuffisance en personnel, en infrastructures et en équipements constitue un autre grand défi pour ces laboratoires.

Conclusion: Ce premier audit pilote a permis de faire l’état des lieux de 21 LBM et de proposer de concert avec eux, des plans d’actions d’amélioration de leurs pratiques.

Antibiotics Susceptibility Pattern of Streptococcus Pneumoniae Isolated from Sputum Cultures of Human Immunodeficiency Virus Infected Patients in Yaoundé–Cameroon

Background: The increased predisposition of HIV–infected patients to invasive bacterial diseases has been described. Streptococcus pneumonia has been reported to be the most common bacterial cause of lower respiratory tract infections (LRTIs). Resistance of S.pneumoniae to antibiotics has also been described. Therefore, antibiots resistance surveillance is important to improve the management of LRTIs.

Methods: A cross sectional study was carried out from May to October 2014. HIV infected patients suspected of LTRIs attending the Center Medical laboratory and those followed up at the authorized treatment center of Yaounde Military Hospital in Cameroon were enrolled. Sputum was collected from each patient and cultured; identification of microorganisms was performed following standards methods. The disk diffusion method was used for antibacterial susceptibility testing according to the Antiibiogram Comity of French Society for Microbiology guidelines.

Results: 51 (25.5%) isolates of S. pneumonia were recovered from sputum samples obtained from 200 HIV infected patients aged 19-66 years old (mean age: 36±10.087 years old); 144 (72%) of them were female (sex ratio M/F: 1/3). Patient age group [30-44 years] accounted for 60.78% of the total isolates. S. pneumonia carriage was not age dependent (P = 0.384) and was significantly higher in women (34/51 of isolates) compared to men (17/51 of isolates), (P = 0.008). S. pneumonia isolates were susceptible to amoxicillin-clavulanic acid (100%), pristinamycin (100%), erythromycin (100%) and cefixime (98.04 %). Highest resistance rates were recorded with fusidic acid (100%), fosfomycin (100%) and tetracyclin (100%).

Conclusion: S. pneumonia is still susceptible to some agents in our study area but ongoing surveillance for antimicrobial susceptibility remains essential to identify resistance and attempt to limit its spread.
Performance of Ethiopian Laboratories in Oneworld Accuracy Proficiency Testing Program (2014–2015)

**Background:** The implementation of a robust, comprehensive and standardized proficiency testing program is an important tool to assess performance of laboratories. Ethiopia set National External Quality Assessment Scheme in 2007. Oneworld Accuracy PT program was launched in 2009 in Ethiopia by enrolling 30 laboratories with increment to 300 in 2016.

**Methods:** Participating laboratories were enrolled to the program through Ethiopian Public Health Institute (EPHI). The specimen chosen for each Proficiency Testing round sent from Oneworld Accuracy (Vancouver, Canada) 2–3 times per year. EPHI redistribute the specimens to all participating laboratories through local courier. The results sent back to EPHI or submitted through online web based system at site level. Feedbacks published online, printed and sent back to participating laboratories or accessed. Performance reports, feedbacks from sites and routine assessment of EQA process for the 2014 and 2015 test events were used to evaluate performance of laboratories.

**Results:** The number of participating laboratories has increased from 30 to 300 from 2009-2016. Laboratories have been participating in 1-28 types of programs according their capacity. The overall response rates have varied form 47-66% over the 2 years. The most frequent reasons for non responses were machine failures, reagent shortage and failure to report before deadlines. Delays were also observed at customs and courier system deliveries.

**Conclusion:** Implementation of One World Accuracy Proficiency program has enabled Ethiopia to enroll many laboratories in External Quality Assessment program. It also helped to create national External Quality Assessment network for peer evaluation and facilitated laboratories to participate in Accreditation schemes. The program needs participating sites to have internet access to facilitate online result submission and on time feedback access. It also needs stronger courier services and efficient custom clearance to facilitate on time proficiency testing material delivery and result submissions before the deadline.

Performance of PIMA™ CD4 Sites in Oneworld Accuracy Proficiency Testing Program

**Background:** The implementation standardized proficiency testing program is an important tool to assess performance of laboratories. PIMA™ CD4 is a point of care technology (POCT) which provides absolute CD4 counts for sites which cannot benefit from available conventional technologies. Expanding POCT in resource limited countries requires novel approaches to ensure sustainable quality assurance practices including external quality assessment that lead to accurate, reliable patient results. 84 PIMA™ CD4 sites were enrolled in Oneworld Accuracy Proficiency Testing Program (OASYS) in 2015 in Ethiopia.

**Methods:** Participating laboratories were enrolled in the program through the Ethiopian Public Health Institute (EPHI). The specimens were sent from Oneworld Accuracy (Vancouver, Canada) 2 times per year. EPHI redistribute the specimens to all participating laboratories through local courier. The results were sent back to EPHI and submitted through an online web based system. Both OASYS and self evaluation were used to prepare feedback for the sites. The feedback was published online, printed and sent back to the participating laboratories. Performance reports and participation statistics were used to evaluate performance of the laboratories.

**Results:** Of 84 participants, 63(75%) reported PT results for the second test event of the 2015 cycle. Among laboratories with scores, 75.4% of them scored 100% and corrective actions were completed for the laboratories with less than 100% score to complete the quality assurance circle. Nine (9) Laboratories didn’t respond within the deadline and of the 12 laboratories excused, 8 were due to stock out, one due to an electric power outage and three due to specimen transportation related issues.

**Conclusion:** Implementation of an External Quality Assessment program for PIMA™ CD4 has enabled the participating laboratories’ evaluation and comparison with other peer laboratories. The program needs participating sites to have internet access to facilitate the online result submission and on time feedback access. It also needs stronger courier services to facilitate on time proficiency testing material delivery and result submissions before the deadline. Quality management should be implemented to address issues related to stock outs.
Fluorescence Microscopy Deployment, the Need for Effective Training and Quality Assurance

Background: To confront the World Tuberculosis burden, the World Health Organization had as one of its elements of Directly Observed Treatment Short course (DOTS) as detection of the causative organism by Quality Assured Bacteriology. One of the methods for diagnosis in resource limited settings is the smear microscopy by either Ziehl Neelsen (ZN) or florescence techniques (FM), the latter being now deployed in the developing world. There have been however some issues with the FM with regards to low false positives false negatives. This is a retrospective analysis of a national prevalence survey data that employed five diagnostic tools in the laboratory to establish the agreement or otherwise of the FM technique.

Methods: Results from samples received from prevalence survey in Ghana at the Chest Clinic Laboratory in Korle bu Teaching Hospital were analysed using MS Access. All positive TB tests from any of the five techniques (Ziehl Neelsen, Florescence Microscopy, GeneXpert, Culture using both liquid and solid media) used were included.

Results: A total number of 364 cases’ performance of FM was compared with the other methods. Out of the 206 FM negatives, 45.6% were positive by ZN, 16.1% and 39.8% were positive for GeneXpert and MGIT respectively. Of 102 scanty FM, 25%, 6.1% and 2.9% were positive for TB by ZN, GeneXpert and MGIT respectively. For the 1+, 2+ and 3+, ZN was 78.8%, 80.0% and 89.3%, respectively, while GeneXpert and MGIT recorded respectively; 44.4%, 70%, 78.6% and 27.8%, 20%, and 46.4%.

There was agreement in high positives from FM while the negatives and scanty positives had low agreement raising a question of specificity for the florescence technique.

Conclusion: Morphology of the acid fast organism at lower magnifications in FM is difficult to differentiate in smears especially when artefacts also fluoresce. In high positives, there are other AFBs to compare with which support the agreement. In contrast, negative and scanty cases have fewer AFBs making differentiation difficult leading to false negatives and low false positives. This observation suggests that adequate training and re-training coupled with frequent and effective quality assurance be considered alongside the deployment of florescence microscopy to overcome the low specificity of FM technique.

Evaluation of Faecal Occult Blood Testing Kits for Rapid Point-of-Care Diagnosis of Invasive Diarrhoes in Young Children

Background: A rapid and cost-effective screening process to identify invasive infections at the point of care would ensure that antimicrobials are only prescribed for infantile diarrhoea when necessary. Many brands of faecal occult blood testing (FOBT) kits are widely available in Nigeria. The aim of this study was to compare the diagnostic efficacy of locally procurable rapid FOBT kits in invasive infantile diarrhoea, with faecal microscopy as the gold standard.

Methods: A total of five FOBT kits were investigated. Faecal specimens from children under 5 years old with diarrhoea, being collected as part of a case-control study, were tested according to manufacturers’ instructions for each kit. Faecal microscopy for occult blood, and culture for bacterial pathogens were also performed concomitantly using standard procedures.

Results: Stool microscopy confirmed the almost ubiquitous presence of white blood cells in stool specimens from children with diarrhoea, whereas red blood cells were uncommonly detected and typically seen in low densities. A positive FOBT reaction was only seen when red blood cells were present in modest to great amounts and was partially correlated with the presence of a potentially invasive pathogen. Each of the 5 FOBT kits showed similar sensitivity, specificity, positive- and negative- predictive values for invasive diarrhoea.

Conclusion: FOBT kits are rapid, cost effective and valuable screening processes for quick diagnosis of diarrhoea and are a viable alternative to stool microscopy for paediatric specimens at the point-of-care. Inexpensive, locally available kits perform similarly to the more difficult-to-procure innovator’s product. Positive FOBT results are uncommon among paediatric diarrhoeal stools under sporadic endemic conditions. Therefore, if used routinely, FOBTs could be an early warning indicator tool for outbreaks due to invasive or haemorrhagic pathogens.
Retrospective Assessment of VIKIA® Rota-Adeno and Premier™ Rotaclone® Tests Compared to Reverse Transcription Polymerase Chain Reaction for Detection of Group A Rotavirus

Background: Rotavirus is the most common cause of severe diarrhea in young children. Although enzyme immunoassays (EIA) are recommended for screening of rotavirus in stool samples, rapid diagnostic tests (RDT) may be better suited for use in peripheral health centers or ambulatory services.

Methods: We conducted a parallel retrospective evaluation of the diagnostic accuracy of VIKIA® Rota-Adeno (bioMérieux, France) RDT and Premier™ Rotaclone® (Meridian Bioscience, USA) EIA using reverse transcription polymerase chain reaction (RT-PCR) as the reference standard (Seeplex® Diarrhea-VACE, Seegene, Korea). We randomly selected 119 RT-PCR positive and 132 RT-PCR negative samples out of 734 stool specimens previously tested with VIKIA® Rota-Adeno and characterized by RT-PCR. Selected samples were tested with the VIKIA® Rota-Adeno and the Premier™ Rotaclone® and read by two technicians blinded to the results.

Results: The samples selected for the comparison were representative of the pool of specimens, as suggested by the similar performances of Vika performed in the field compared to RT-PCR among all specimens or the selection. The sensitivity of both tests was 95.5%. Inter-reader agreement was excellent for both tests (kappa=1).

Conclusion: Considering the better specificity of the EIA assay compared to the RDT, it should be preferred for surveillance and diagnostic purposes whenever laboratory capacity allows. However, the similar sensitivity and acceptable specificity of the rapid test make it a good alternative for use in peripheral health centres.
**POSTER 83**

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**Mass Screening for Infectious Diseases Using Fluorescence Microscopy in Cameroon**

**Background:** Malaria and Neglected Tropical Diseases (NTD) are related to poor socioeconomic conditions all over the globe. In Cameroon, 30 to 40% of admissions in health facilities are due to malaria. Co-infections with other blood, urine and intestinal parasites are frequent in rural areas meanwhile absenteeism is common in schools and enterprises of urban settings. Routine diagnostic using RDTs is limited to malaria and cumbersome with light microscopy, thus triggering the need of novel mass screening approaches for infectious diseases.

**Methods:** This study describes mass screening of 14570 individuals in schools, enterprises and communities in Cameroonian urban and rural areas between 2012 and 2016. Parasites were searched in blood, feces and urine samples, using the CyScope® (SYSMEX, Japan), an energy autonomous LED fluorescence microscope and prestained slides.

Knowledge, Attitudes and Practices related to malaria were investigated in enterprises. Data were recorded in collaboration with a local NGO (CCA/SIDA), which provided treatment for all positive cases.

**Results:** Malaria prevalence was highest among schoolchildren in Tole (South -West) 66.2%, Prevalence of *Loa loa* was 22.1% in Nkom (Littoral) where 34 cases of multiparasitism were recorded from 163 screened individuals (20.86%). Prevalence of urinary schistosomiasis was 43.4% among schoolchildren in Kotto Barombi (South –West). Shift workers had higher malaria prevalence than day workers. Sensitivity and specificity of CyScope® was 87.6% and 94.9% respectively. Positive and negative predictive values were 97.1% and 79.6% respectively.

**Conclusion:** Our study confirms that Cameroon is hyperendemic for malaria with very high prevalence among schoolchildren in rural communities. Coinfections of malaria with blood filariasis and urinary schistosomiasis are still common in some rural settings. Absenteeism in enterprises and schools is mainly due to malaria.

The fluorescent microscope CyScope® is useful for active case detection, especially in rural areas lacking electricity.

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**POSTER 84**

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**The Role of Point of Care (POC) CD4 Testing in Accelerating Newly Identified HIV Positive People Enrollment in to ART Services**

**Background:** In many countries including Lesotho CD4 count is still the prerequisite for HIV positive patients to be enrolled in to ART services. CD4 testing is usually available at hospital laboratories in which health facilities have to schedule a subsequent visit for CD4 sample collection. In this process a significant number of newly identified HIV positive people missed their appointment for CD4 sample collection due to several reasons and therefore missed the opportunity of being timely enrolled in to ART services. The introduction of Point of Care (POC) CD4 testing in health facilities plays a vital role in CD4 testing for ART initiation. In all facilities using POC CD4 count analyzers the number of patients who missed their ART enrollment while eligible is significantly low.

**Methods:** 10 facilities providing Point of Care CD4 testing were selected. This was a mixture of 5 facilities located in mountainous, rural and hard to reach areas and 5 facilities located in urban high volume HIV testing facilities. The facilities were visited and assessed on how many patients missed their appointment for CD4 sample collection while the POC CD4 analyzer was down due to either analyzer break down or reagent stock out, and this was compared to times while the POC CD4 analyzer was working normal.

**Results:** The percentage of newly identified HIV positive patients that missed their appointment for initial CD4 test was as high as 46% in one of the assessed facilities while the POC CD4 count analyzer was down. The average percentage for all assessed facilities was 34%. In contrast, in those facilities with a functioning POC CD4 analyzer, all newly identified HIV positive people eligible for ART services based on their CD4 count were able to timely access ART services.

**Conclusion:** Point of care CD4 testing at HIV testing and ART facilities increases enrollment of newly identified CD4 count eligible HIV positive people in to ART services.
**Pediatric Treatment of HIV in Decentralized Areas in the North of the Country: the Case of the Saint Louis, Senegal**

**Background:** The prevention of mother-child transmission has saved a lot of children born from HIV positive mothers. In Senegal, this strategy has been adopted since many years but the number of children infected is still estimated at 6,000. This work reports the pediatric treatment of HIV in a peripheral area in Senegal.

**Methods:** This is a cross-sectional study of children followed at the Regional Hospital in Saint Louis which is 270 Km from Dakar. These children benefit from therapeutic treatment, biological and social monitoring. Forty children received ARV treatment; 29 (72.5%) initially took AZT + 3TC + NVP. Other regimens were AZT + 3TC + EFV (n = 4), TDF + 3TC + LPV / R (n = 3), ABC + 3TC + NVP (n = 2), TDF + 3TC + EFV (n = 1), and TDF + 3TC + NVP (n = 1). Viral load was performed on DBS collection with NUCLISENS EQ V.2.0 technique to detect viral load, and RT region was sequenced for genotyping. Data were collected from the monitoring database. Analysis of data was performed using Epi Info V.3.1.

**Results:** The cohort included 23 boys and 19 girls infected with HIV-1. The mean duration of ARV treatment was 49 months [2-133]; 81% were alive, 16.7% died, and one was lost to follow. The results of viral load testing were: undetectable 60%, low 12.5%, moderate 22.5% and high 5%. Genotyping showed the exclusive presence of the CRF02_AG form. Resistance was noted with moderate 22.5% and high 5%. Genotyping showed the exclusive presence of the CRF02_AG form. Resistance was noted with moderate 22.5% and high 5%

**Conclusion:** The low resistance rate highlights good therapeutic and social care for children in a decentralized area despite the difficulty to perform viral load and genotyping tests, which are made at the central level.
**The Susceptibility of Moxifloxacin and Capreomycin in XDR Isolates over a 10 Month Period in Kwazulu-Natal, South Africa**

**Background:** The increasing prevalence of Drug-resistant tuberculosis (DR-TB) in high burden countries continues to be a public health emergency that hampers TB control. Almost half a million new cases of MDR-TB develop every year, of which approximately 40,000 are thought to be extensively drug-resistant tuberculosis (XDR-TB).

Individualized treatment regimens are currently advocated for XDR-TB treatment in the absence of international consensus. Moxifloxacin is a newer generation fluoroquinolone with enhanced activity against Mtb. It is the preferred fluoroquinolone used in XDR-TB, based on its enhanced antimycobacterial activity and favorable pharmacokinetic and pharmacodynamic characteristics. Capreomycin is also recommended in the treatment for XDR-TB but due to the increase usage in clinics, the therapeutic efficiency of capreomycin is decreasing.

**Methods:** We conducted a retrospective analysis of XDR-TB isolates to assess susceptibility patterns of Moxifloxacin and Capreomycin in our setting as reasonable choices when designing treatment regimens for patients with XDR-TB. An analysis over a 10 month period was done on confirmed XDR-TB isolates.

**Results:** The 10 month period was from April 2014 – January 2015. We had a total of 507 confirmed XDR-TB isolates. The total number of isolates per month ranged between 37 and 69 per month with a mean of 50.7. The mean susceptibility of Moxifloxacin was 71% with a monthly range of 51-86% whilst Capreomycin susceptibility was a mean of 5.2%. The monthly range of XDR-TB isolates which were susceptible to Capreomycin was between 0-11.7%.

**Conclusion:** The susceptibility to Moxifloxacin in the XDR-TB isolates whilst not optimal, remains high while Capreomycin susceptibility is extremely low. Such high rates of resistance in Capreomycin pose a great concern in including this drug in the XDR-TB regimen. However, inclusion of Moxifloxacin is a reasonable choice. These results further highlight the urgent need to expand the armament of anti-TB drugs and the newer anti-mycobacterial agents like Bedaquiline and Delamanid are addressing this challenge.
Molecular typing of multidrug-resistant Candida auris strains in South Africa

Background: Candida auris is an emerging, multidrug-resistant fungal pathogen responsible for a wide spectrum of clinical manifestations and high mortality. We investigated the genetic relatedness of C. auris isolates circulating in South Africa.

Methods: Isolates initially identified as C. auris, from patients admitted to public- and private-sector hospitals in Gauteng province, were submitted to a reference laboratory from 2012 through to 2015. Patient age, sex, specimen site and date of specimen collection were recorded. Antifungal susceptibility testing for nine agents was performed using Sensititre YeastOne and Etest methods; Clinical and Laboratory Standards Institute breakpoints for nine agents was performed using Sensititre YeastOne and Etest methods; Clinical and Laboratory Standards Institute breakpoints for Candida albicans were applied. Sequencing of the hotspot 1 and 2 regions of the FKS1 gene was performed for all isolates with phenotypic echinocandin resistance and compared to wild-type C. auris sequences. ITS, D1/D2, RPB1 and RPB2 regions of the ribosomal gene were sequenced to generate multilocus sequence typing (MLST) genotypes. A neighbor-joining phylogenetic tree was constructed using MLST data to identify clusters.

Results: Seventy nine isolates were confirmed as C. auris; 1 isolate identified as C. haemulonii was excluded. The median patient age was 59 years (IQR: 50-69 years), with males accounting for 61% of cases. Specimen types included: blood (32%), urine (27%), central venous catheter tips (20%), respiratory tract specimens (6%), irrigation fluid (6%) and tissue (4%). All isolates were resistant to fluconazole, 8% to voriconazole and 9% to echinocandins; 50% had an amphotericin B minimum inhibitory concentration >1 mg/L. No FKS mutations were detected. MLST analysis grouped the isolates into two clusters: cluster 1 and cluster 2 comprising of 77 and 2 isolates respectively.

Conclusion: Multidrug-resistant C. auris strains circulating in Gauteng hospitals were highly related and the possibility of nosocomial transmission should be explored using a more discriminatory technique such as microsatellite genotyping.

Identification of Non-tuberculous Mycobacteria Isolated from Clinical Specimens in a High Volume Diagnostics Laboratory, South Africa, Using the GenoType Mycobacterium CM/AS assay and 16S rRNA Gene Sequencing

Background: Besides the burden of disease from Mycobacterium tuberculosis (Mtbc), non-tuberculous mycobacteria (NTMs) are increasingly isolated from pulmonary and extra-pulmonary sites in both immunocompromised and immunocompetent individuals worldwide. This study aimed to identify the prevalence of different non-tuberculous mycobacterial species from patients suspected for TB at the NHLS-DGM.

Methods: Consecutive NTMs identified in clinical specimens by direct molecular tests on acid fast bacilli (AFB) positive sputum and/or from MGIT cultures in the period 2012 to 2014 were included in the study. The MPT64 Ag detection test was used to exclude the Mycobacterium tuberculosis complex (Mtbc) in AFB positive MGIT cultures, followed by identification of NTMs using the GenoType Mycobacterium CM and AS assay methods, and 16S rRNA gene sequencing.

Results: From 174,650 clinical samples (90.0% from pulmonary source and 10.0 % extrapulmonary specimens, 22% AFB positive on FM microscopy), we identified in MGIT culture 30,967 (17.7%) MTBc isolates from pulmonary samples and 783 (2.5%) AFB positive but MPT64 Ag negative cultures. Direct molecular assays on AFB positive specimens identified NTMs in 4,515 (11.7%) of AFB positive specimens. In total, 516 (11.4%) NTMs were available on AFB positive specimens identified NTMs in 4,515 (11.7%) of AFB positive specimens. In total, 516 (11.4%) NTMs were available for inclusion in the study. Nineteen (3.8%) were identified as MTBC after all, i.e. these were missed by the MPT64 Ag test, which had a sensitivity of 97.5% for the MTBC in our setting. The most prevalent mycobacterium was M. intracellulare (172, 34.6%) followed by M. avium (18, 3.6%), M. smegmatis (27, 5.4%) M. fortuitum (16, 3.2%). A total of 75 (15.1%) NTMs could not be identified to species level by both the GenoType Mycobacterium CM and AS assays, and 16S sequencing did not yield additional mycobacteria.

Conclusion: This is the largest study to date reporting on the distribution of NTM species from clinical specimens in South Africa. Isolation of NTM from clinical specimens however needs to be correlated with clinical and radiographic findings to determine their clinical significance.
**POSTER 91**

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**Diarrheal Outbreak Among Infants Caused by Rotavirus Infection in Swaziland, 2014**

**Background:** From July to August 2014, a diarrheal outbreak occurred in all the four regions of Swaziland. The diarrheal cases reported exceeded 10% of cases observed by 6 health facilities both in government and private health facilities, with a majority of cases from children less than 2 years of age. The case fatality rate (0.35%) was well below the 1% target for diarrheal disease, the cutoff that accelerated the introduction of the rotavirus vaccine into the country in May 2015.

**Methods:** A total of 3042 of diarrheal cases were observed at the 6 health facilities between July and the end of August 2014. Of these, there were only 511 hospital admissions. A total of 186 (36%) stool samples were collected from children less than 2 years of age, who were hospitalized at 4 government and 2 private hospitals with severe gastroenteritis, Samples were transported to the National Reference Laboratory where testing for the detection of Group A rotavirus antigen was performed using ProSpecT™ rotavirus enzyme immunoassay kit, and the detection of P and G genotypes were established the

**Results:** Group A rotavirus was detected in 74 % (138/186) of the samples collected in 2014. The most predominant causative organisms for the diarrheal outbreak were rotavirus coexisting with adenovirus, astrovirus and sapovirus. Occasionally, Escherichia Coli microorganisms and Ascaris Lumbricoides parasites were observed. Children less than 1 year old were the most affected group with rotavirus infection accounting for 84 % (156/186). Molecular analysis of the virus revealed that the G1P[8] were the most predominant rotavirus strains with 93% (91/98), followed by G1P[6], G2P[4], and G3P[8] with 4%(4/98), 2% (2/98), and 1% (1/98) respectively.

**Conclusion:** The high prevalence of rotavirus observed in the stools examined indicated that rotavirus was the underlying causative organism for the diarrheal outbreak resulting in the death of infants. Hence, Rotarix vaccine was introduced in the country by the Ministry of Health through the Expanded Programme of Immunization (EPI) to reduce the severity of the gastroenteritis and improving the quality of life for children below 5 years of age. In addition, it is recommended that we strengthen the Integrated Disease Surveillance and Response and expand the enteric pathogen testing protocols.

**POSTER 92**

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**Characterization of Disputed rpoB Mutations in Phenotypic and Genotypic Discordant Mycobacterium Tuberculosis Isolates**

**Background:** Phenotypic resistance in Mycobacterium tuberculosis isolates, as detected by culture-based methods, often differs from genotypic resistance detected by molecular methods. We describe rifampicin (Rif) susceptibility in a series of discordant M. tuberculosis isolates, including the relationship of MICs and mutations on the rpoB gene by Sanger sequencing (SS) and by next-generation sequencing (NGS) in a subset of these isolates.

**Methods:** A sample of 89 M. tuberculosis isolates were selected from routine sputum specimen submissions to the NHLS Tshwane Academic Hospital TB Laboratory at the University of Pretoria. Of the 89 isolates, 34 showed discordance in Rif DST results between Xpert MTB/Rif (resistant) and MGIT 960 (susceptible). From the main series, 17 isolates (10 discordant MGIT-SS) were subjected to NGS. Microtitre alamar blue assay was performed on 77 of the 89 isolates to determine the relationship between Rif MIC of the isolates and detection of resistance by other assays.

**Results:** On SS, the most frequent rpoB gene mutations which conferred resistance to Rif occurred in codons 531, 516, and 526 (41%, 29% and 11% respectively) and 1 isolate had a novel mutation (S601T) outside the rpoB-RDRR. The most frequently identified mutations in discordant isolates were (L511P and D516Y), 40% and 40%, respectively. Ten isolates susceptible to Rif on GeneXpert and BACTEC MGIT 960 system revealed mutations outside the RDRR region, or on rpoC or efflux pump genes (Rv1145, Rv1146 and Rv0933). Ten of 77 MGIT Rif resistant isolates resistant had Rif MICs greater than 1 µg/ml, and two had Rif MICs below the critical concentration used by MGIT 960 system. Forty-eight of 52 (92%) isolates with discordant results had Rif MICs below 1 µg/ml. Twelve of 21 (57%) patients who failed Rif-based TB therapy had no rpoB mutations (based on currently used molecular-tests) in the hotspot region.

**Conclusion:** Our data support recent reports that the expression of efflux pump mutations in minipl 13a, and pstB gene and alterations in rpoC and gyrA may have synergy with rpoB mutations within or outside the hotspot region. These associations are known to result in low levels of resistance. We conclude that NGS of all isolates that show discrepancies in drug susceptibility testing between MGIT and GXP or LPA be routinely performed in order to better inform treatment regimens for TB suspects.
Update on the Implementation of the World Health Organization Regional Office for Africa Stepwise Laboratory Quality Improvement Process Towards Accreditation

Background: In response to increasing demand for reliable information from the laboratory in the form of quality results the World Health Organization Regional Office for Africa (WHO AFRO) and its partners developed and implemented the WHO AFRO Stepwise Laboratory (Quality) Improvement Process Towards Accreditation (SLIPTA) program.

Methods: Laboratories enrolled in the SLIPTA program were evaluated by auditors trained and certified by the African Society for Laboratory Medicine. Laboratory performance was measured using the WHO AFRO SLIPTA scoring checklist and recognition certificates rated with 0-5 stars were issued. The checklist was reviewed and updated in 2015. A total of n=159 Cohort 1 laboratories were audited using version 1 of the checklist (total score 258) between May 2013 – August 2015 and n=22 cohort 2 using version 2 of the checklist (total score 175) between September 2015 – April 2016. Overall and section specific median scores were compared by cohort using Wilcoxon sign rank test.

Results: By April 2016, 105 auditors competent in the Portuguese (6), French (12) and English (87) languages from 18 African countries had been certified. There was no statistically significant differences between Cohort 1 laboratories (median score =68.8%; Q1:03: 61.6; 76.7) and Cohort 2 laboratories (median score =66.9; Q1:03: 57.5; 71.6), p = 0.08. Most of the laboratories (cohort 1 and 2, n=181) obtained 2 stars (36%) and 3 stars (25%). A total of 10 (6%) and 2 (1%) obtained 4 and 5 stars, respectively. Of the SLIPTA audited laboratories, 4 (2%) have attained international ILAC recognized accreditation status. On average, performance was below 50% for Internal Audits and Corrective Action by both cohorts.

Conclusion: There has been progressive implementation of the WHO AFRO SLIPTA in the Africa region with no significant difference in performance between cohort 1 and cohort 2 laboratories.
Site Mapping Approach to Optimizing EID Networks with POC EID Platforms in Lesotho

Background: Low early infant diagnosis (EID) and general pediatric HIV testing rates continue to present challenges, leaving HIV-positive children undiagnosed with a high risk of mortality. Point of care (POC) EID has the potential to ensure that at-risk infants have timely access to HIV diagnosis and possibly treatment. We present site mapping as an approach to introduction of POC EID in Lesotho.

Methods: Data extracted on site level from relevant national databases on patient (based on expected number of HIV exposed infants) and test volumes (historic numbers of DNA PCR tests conducted in 2015) was used to estimate expected testing volumes. The following factors were then considered in mapping sites into POC hubs and spokes: (existing access to EID, provision of pediatric ART on site, availability of adequate personnel and capacity for close monitoring and supervision. Realistic working totals of daily workloads for each site, determined by considering the historical and expected testing rate per day, were used to assess the benefits of placing POC EID in sites with less than 1 test per day. POC hubs were created by grouping several low testing volume sites such as health posts that are in close proximity or linked by a sample transport system.

Results: From a total of 255 potential sites in the country, 66 were excluded from placement of POC EID due to their adequate access to the existing conventional EID system. The POC EID landscape will have 29 testing sites, of which 25 are placed in hubs which jointly are planning to receive samples from an additional 160 spokes sites. Of these, 5 sites were selected for piloting to inform national roll out.

Conclusion: Site mapping based on several considerations is necessary to determine the optimal number of POC EID platforms that can integrate into an EID network that will include POC and near POC EID.

Baseline Findings From Assessment of Quality Management Systems in Potential Sites for Point of Care Early Infant Diagnosis

Background: Quality management systems in Point-of-Care (POC) testing settings are not well documented in literature. Because of large volumes of HIV-related testing in Sub-Saharan Africa, any margin of error, even minimal, might translate to significant numbers of patients misdiagnosed or mismanaged in clinical care. Through a grant from UNITAID, Lesotho is introducing POC early infant diagnosis (EID) to ensure that infected infants have timely access to antiretroviral treatment. This remains a major challenge with the current conventional and centralized EID network. Strengthening quality management systems in EID POC is crucial as this is a diagnostic rather than monitoring test. We present baseline findings of assessment of key quality essentials in selected potential POC EID sites.

Methods: A standardized checklist was used to assess capacity of 15 potential POC EID pilot sites. The tool inspected 8 quality essentials relevant to POC testing: Integration of POC service to HIV care, personnel management, physical space, safety, pre-testing phase, post-testing phase management, equipment and inventory management and quality monitoring.

Results: High average scores were obtained in possibility of integration of POC service to HIV care (75%), facilities space (84%), quality control (84%), and safety (82%), while lower average scores were obtained in pre- and post-testing phases (both 75%), equipment & inventory management (63%), and personnel management (67%). 13/15 of the sites were enrolled in an EQA program in at least one of the tests currently offered. All sites had a standardized system for recording and reporting POC results. Documentation of personnel training, competency, and certification was lacking in 80% (12/15) of the sites. About half (7/15) of the sites did not have documented procedures, written SOPs or job aids for ordering and receiving of supplies, equipment maintenance, trouble shooting and repairs. Only 26% (4/15) of the sites had regular monitoring and review of POC performance by a supervisor or external monitor.

Conclusion: As the range of POC testing continues to grow in these facilities, with some turning into mini laboratories, measures that ensure that these testing centers conform to international standards of quality such as the ISO 22870 are required. There is need to address the identified gaps before introducing POC EID.
Procurement and Standardization Model for Laboratory Equipment: The Swaziland Experience

**Background:** The rapid expansion of care and treatment programs for AIDS, TB and Malaria in high burden countries demands quality and efficient laboratory services in order to cope with the increased demand. Realising the existing challenges for procurement of reagents, maintenance of aging equipment, and quality assurance arising from multiple equipment platforms in Clinical Chemistry, the SHLS embarked on the process of standardization of equipment.

**Methods:** In December 2013, SHLS took a decision to standardize the Clinical Chemistry Platforms. A technical task team was set up that spearheaded the process. The Tender was floated in February to March 2015. Preliminary evaluation was conducted in April, 2015. Site visits were done in August, 2015. The tender was finalized on the November 2015. The process was concluded in February 2016.

**Results:** The major steps in standardizing the laboratory equipment included: Appointment of a task team; Development of a national standardization and procurement plan; Stakeholder engagement; Development and adoption of a policy guide to standardization of laboratory equipment; Tender advertisement; Evaluation of proposals; Bench marking/verification visits; Contract negotiation and Management of contracts. Each stage had specific bottlenecks along the way which delayed the process. We learnt that selection and procurement of diagnostics and laboratory technologies is challenging given the wide choice of products and suppliers in the global market. The process lead to development of key documents which never existed before namely the Equipment Standardization policy guide. Due to the development of the documents, the process took longer than anticipated.

**Conclusion:** This systematic approach is an efficient way of setting up standardised equipment in a laboratory network. It highlights key potential bottlenecks that exist in the process of introducing new and standardized equipment to the laboratory network. The consultation was important to ensure acceptance by the policy makers, donor and end-users. Proper planning and the step by step approach to introduction of the standardized equipment will reduce unnecessary delays caused by unforeseen circumstances that emanate during this process. It is anticipated that the standardisation will save the government a lot of money in procurement and improved laboratory service delivery.

Lessons learnt are valuable to roll out other disciplines.

**Utilization of GeneXpert Technology in the Diagnosis of Mycobacteria Tuberculosis among HIV positive patients in Kenya, 2016**

**Background:** GeneXpert Technology is a Molecular diagnostic, sensitive and specific test used to detect the presence of Mycobacteria Tuberculosis genes as well as the genes associated with Rifampicin (RIF) resistance. Nationally, the utilization target is 80%. In 2015, 80,000 GeneXpert tests were done for HIV patients. There are over 120 GeneXpert analyzers across 129 health facilities in the country. The country has over 120,000 new TB cases with at least 39% of all TB patients being HIV positive. World Health Organization estimates over 600 Multi Drug Resistant TB patients in the country. I assessed the utilization of GeneXpert technology which should be the first test for people living with HIV for presumptive Tuberculosis.

**Methods:** Assessment was conducted in three GeneXpert hubs between January and March 2016. Simple random sampling and structured questionnaires was used to select participants from the testing hubs. 49 clinicians, 34 laboratory technologists, 16 nurses and 1 patient attendant working in comprehensive care and TB clinics participated.

**Results:** Ninety eight percent (n=69) of the participants were conversant with the GeneXpert algorithm, specimen collection, and the test results. Seventy percent (n=28) of clinicians indicated lack of dissemination of GeneXpert information, delayed results and samples from children. Frequent service interruption led to low uptake. Forty nine percent (n=34) of laboratory staff experienced commodity stock outs, low service demand from clinicians and high workload. Twenty three percent (n=16) of nurses indicated the need to increase access to peripheral sites.

**Conclusion:** Lack of information, access, stock outs and low test demand are some of the modifiable factors that were blamed for underutilization of GeneXpert by respondents. These findings warrant further assessment of the uptake of GeneXpert in more hubs.
**POSTER 99**

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**MTBDRplus ver. 2.0 an Effective Method for Recovering MTB in Apparent Contaminated Samples**

**Background:** Contamination rate at the NTRL had dramatically increased throughout the last years from the average of 9-12% to 16.3%. This has largely been attributed to the substantial increase of the proportion of GA specimens received at the lab in the recent years. GA share in the NTRL workload in 2009 was 6.2% (561/9001) while in 2012 the proportion increased up to 14.4% (1491/10338).

**Methods:** 20 cultured contaminated GA were tested using the MTBDRplus assay and results compared to that of MGIT culture.

**Results:** MTBDRplus was able to identify MTBC in 20% (4/20) of the cultures reportedly contaminated with MGIT. And 16% (16/20) yielded negative results with MTBDRplus.

**Conclusion:** An increase in bacillary load subsequent to incubation of the GA’s in the MGIT machine despite the presence of contaminants in the culture yields results with the MTBDRplus assay. Therefore culture contaminated GA’s should be subjected to MTBDRplus to rule in or out MTB. Though MTBDRplus was able to positively detect the presence of MTB in the samples it was however unable to render an interpretable results regarding sensitivity to rifampicin and isoniazid.

**POSTER 100**

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**Four Novel Coronaviruses Detected in Multiple Bat Species from Cameroon**

**Background:** Bat species are a primary reservoir of coronaviruses (CoVs), including the causative agents for (re)emerging zoonotic infections of epidemic importance such as severe acute respiratory syndrome (SARS-CoV) and Middle East respiratory syndrome (MERS-CoV). In Cameroon, coronaviruses have been detected in patients with influenza-like illness. High bat biodiversity across Central Africa, coupled with the zoonotic potential of CoVs highlights the importance of national surveillance for bat CoVs across diverse human-animal interfaces.

**Methods:** As part of the United States Agency for International Development Emerging Pandemic Threats Program PREDICT project, bats, including individuals of *Eidolon*, *Epomophorus*, *Epomops*, *Hipposideros*, *Megaloglossus*, *Micropteropus*, *Mops*, *Pipistrellus*, *Rousettus* and *Scotophilus* genera, were sampled at select sites across Cameroon from 2009-2014. Oral, rectal and blood samples were obtained, preserved in RNA-later or VTM, and stored at -80°C. RNA was later extracted from all specimens and tested for CoVs by a family level consensus PCR targeting the *RdRp* gene. All positive samples were confirmed by Sanger sequencing, and a phylogeny was constructed using maximum-likelihood methods.

**Results:** A total of 1713 bats were sampled from around human dwellings, ecotourism, hunting and agricultural areas. Seventy-three bats (4%) from 12 bat species tested positive for CoV. Specifically, 2% of all bats, primarily *Mops* and *Scotophilus* species (Microchiropteran bats), tested positive for alphacoronaviruses and another 2%, primarily *Eidolon* and *Epomorphorus* species (Megachiropteran bats), were positive for betacoronaviruses. Four novel bat coronaviruses were detected (two betacoronaviruses and two alphacoronaviruses), as well as five previously undescribed coronaviruses in Cameroon (two alphacoronaviruses and three betacoronaviruses).

**Conclusion:** The high biodiversity of bat species in Cameroon supports a diverse range of coronaviruses. Two of the novel viruses are of the same genus (betacoronavirus) as known zoonotic pathogens, including MERS-CoV and SARS-CoV, however, at this time there is no indication that the two new viruses cause human disease.

**Acknowledgements:** To be included prior to publication in conference proceedings.
POSTER 101

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**Background:** Although several diagnostic tests are available to diagnose intestinal helminthes, direct wet mount is commonly used as a reliable diagnosis method for the diagnosis of intestinal parasitic infections generally in Africa and particularly in Ethiopia. The aim of this study was to evaluate the diagnostic performance of direct wet mount microscopy in detecting intestinal helminthes in pregnant women.

**Methods:** A cross sectional study was conducted in five health centers of East Wollega Zone of Oromia Region, Ethiopia between November 2015 and January 2016. Pregnant women were selected consecutively using proportional stratified sampling. Stool specimens were collected and processed using direct wet mount and formol-ether concentration techniques to detect intestinal helminthes. Sensitivity, specificity, positive predictive value, negative predictive value, test efficiency and kappa agreement of direct wet mount microscopy was determined using formol-ether concentration (FEC) method as a gold standard. Data were entered and analyzed by SPSS version 20 software.

**Results:** The total prevalence of intestinal helminthes was 18.8% (70/372) by direct wet mount microscopy and 24.7% (92/372) by FEC technique (P<0.001). The sensitivity, negative predictive value (NPV) and test efficiency (TE) of direct wet mount microscopy in diagnosing intestinal helminthes was 76%, 92.7% and 94%, respectively. The sensitivity of direct wet mount microscopy was very low in detecting ova of *Hymenolepis nana*. The two methods showed excellent agreement in detecting ova of Hook worm and *Ascaris lumbricoides* (Kappa >0.81), but they fairly agreed in detecting ova of *Hymenolepis nana* (Kappa= 0.39).

**Conclusion:** Intestinal helminthes were underdiagnosed and the total diagnostic performance of direct wet mount microscopy was significantly poor in detecting intestinal helminthes as compared to FEC technique. Routine use of FEC method is recommended for the diagnosis of intestinal helminthes in pregnant women.

POSTER 102

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Data From a Proficiency Testing Program Reinforces the Need for Effective Quality Management at Xpert MTB/RIF Sites

**Background:** Since the 2010 WHO endorsement of the Xpert MTB/RIF assay for rapid detection of tuberculosis and rifampicin resistance, rollout has been swift and sizeable. We analyzed data from a proficiency testing (PT) program to examine associations between testing site PT performance and equipment and assay-related factors such as test cartridge age and instrument calibration date.

**Methods:** Data were collected as part of CDC’s Xpert MTB/RIF PT program, which distributes dried tube specimen-based PT panels to assess testing performance. In logistic regression analysis, the number of days until cartridge expiration and since last instrument calibration were broken into quartiles and assessed as categorical variables for association with PT scores of 100%. Prior PT participation was similarly analyzed as a binary variable. Analyses were conducted in SAS 9.3.

**Results:** In 2015, 417 participating sites from 14 countries returned 1,030 results from three PT rounds. Using a pre-defined scoring algorithm, 90% of sites yielded satisfactory results (≥80%) and 73% yielded scores of 100%. Xpert MTB/RIF cartridges with the longest time (vs. shortest quartile) to expiration (country-adjusted odds ratio (aOR)=1.99, 95% confidence interval(CI)=1.25-3.18) and results reported nearer to the instrument’s last calibration date (aOR=1.44, 95% CI=0.84-2.47) were more likely to yield PT scores of 100%. Prior participation in PT was also an important factor; sites that participated in 2013 or 2014 had higher odds of scoring 100% on the first panel distributed in 2015 (OR=1.58, 95% CI=0.97-2.57).

**Conclusion:** PT data from 14 countries suggest that Xpert MTB/RIF testing performance is better at sites that use newer cartridges or more recently calibrated their instrument, and have participated in previous rounds of PT. These results underscore the importance of both considering the state of quality management systems (QMS) at prospective sites prior to instrument allocation and implementing or strengthening QMS at existing sites.
**Poster 103**

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**Surveillance of Canine Rabies in the Central African Republic: Impact on Human Health and Molecular Epidemiology**

**Background:** Although rabies represents an important public health threat, it is still a neglected disease in Asia and Africa, where it causes tens of thousands of deaths annually, despite available human and animal vaccines. In the Central African Republic (CAR), this disease remains poorly investigated.

**Methods:** To evaluate the extent of the threat that rabies poses in the CAR, we analyzed data for 2012 from the National Reference Laboratory for Rabies, where laboratory confirmation was performed by immunofluorescence and PCR for both animal and human suspected cases, and data from the only anti-rabies dispensary of the country and only place where post-exposure prophylaxis (PEP) is available. Both are located in Bangui. For positive samples, a portion of the N gene was amplified and sequenced to determine the molecular epidemiology of circulating strains.

**Results:** In 2012, 966 exposed persons visited the anti-rabies dispensary and 632 received a post exposure rabies vaccination. More than 90% of the exposed persons were from Bangui and its suburbs and almost 60% of them were under 15-years of age. No rabies-related human death was confirmed. Of the 82 samples from suspected rabid dogs tested, 69 were confirmed positive. Most of the rabid dogs were owned although unvaccinated. There was a strong spatiotemporal correlation within Bangui and within the country between reported human exposures and detection of rabid dogs (P<0.001). Phylogenetic analysis indicated that three variants belonging to Africa I and II lineages actively circulated in 2012.

**Conclusion:** These data indicate that canine rabies was endemic in the CAR in 2012 and had a detrimental impact on human health as shown by the hundreds of exposed persons who received PEP. Implementation of effective public health interventions including mass dog vaccination and improvement of the surveillance and the access to PEP are urgently needed in this country.

**Poster 104**

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**Characterization of Non-tuberculous Mycobacteria, (NTM), from Sputum Isolates Not Specified by a Commonly Used Commercial Line Probe Assay in Pretoria**

**Background:** Non-tuberculous mycobacteria (NTMs) are opportunistic pathogens mostly identified in immunocompromised individuals such as those infected with human immune virus or acquired immunodeficiency syndrome (HIV/AIDS). Due to high prevalence of HIV/AIDS in South Africa and TB-drug resistance associated with certain species, correct identification is required. Identification of non-tuberculous mycobacteria (NTMs) is challenging due to similar presentation with *Mycobacterium tuberculosis* infections, and the environmental ubiquity of the bacteria. Phenotypic methods are time consuming and can give erroneous results. Proper implementation of therapy depends on rapid, accurate diagnosis and proper characterisation of NTMs species. Therefore the aim of this study was to characterize and identify NTMs which could not be identified by the Hains Genotype Mycobacterium CM commercial assay using.

**Methods:** This was a retrospective study. Twenty previously stored NTM cultures were collected from National Health Laboratories Services/Tshwane Division (NHLS/TAD) and further confirmed using Zeil-neelson (ZN) staining method. The PRA-hsp65 and the hsp65 gene sequencing methods were used on all the 20 cultures to characterise NTMs species. Result were analysed by comparing the PRA-patterns with the published PRA profiles and PRASITE. Sequences were compared with the NTM sequences on the BLAST database.

**Results:** Only 2/20 (10%) NTM isolates were predicted to species level using the PRA-hsp65 method and those species were *Mycobacterium gordanae* and *Mycobacterium flavescens* and the rest of the isolates could not be characterised to species level. The phylogenetic analysis of sequencing results showed that the 20 isolates were related as they clustered together and segregated significantly (0.8%) from all the reference strains obtained from GenBank.

**Conclusion:** The isolates could not be identified to species level by the PRA-hsp65 and sequencing methods suggesting that the PRA-patterns are novel and have not been published before. The use of more than one gene could helpful in further identification of NTMs to species level.
**POSTER 105**
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**Seroprevalence of Polio Antibodies in Adult Laboratory Staff in South Africa, 2009 to 2013**

**Background:** The global eradication of polio has been a World Health Organization (WHO) goal since May 1988 with the current target for global eradication set at 2018. A keystone of the eradication initiative is achieving and maintaining high immunization coverage, producing high population immunity. Assessing infant vaccination coverage does not give a reliable indication of adult immunity levels as antibody titres decline with age. A requirement of the occupational health programme at the National Institute for Communicable Diseases is to test newly appointed personnel for immunity to polio.

**Methods:** During the period 2009 to 2013, 352 sera were collected and tested by means of antibody neutralization assays to determine immunity to all three poliovirus serotypes. The objective of this study was to assess immunity to poliovirus in personnel employed at the NICD as a proxy for the general adult South African population.

**Results:** The seroprevalence rates to poliovirus serotypes 1, 2 and 3 were 85.5%, 90% and 74% respectively. Of the 352 samples tested, 2.3% were sero-negative for all three serotypes and 36% were sero-negative to at least one of the serotypes.

**Conclusion:** The seroprevalence rate to poliovirus serotype 3 falls below the target of 80% and could pose a potential risk following importation or development of vaccine derived poliovirus type 3.

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**POSTER 106**
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**The Pima National Program – the Cost of a Pima Point of Care (POC) CD4 Test in Papua New Guinea (PNG)**

**Background:** In PNG the PIMA POC device has been integrated into 47 HIV Counselling and Testing (HCT) sites to improve linkage to care of PLHIV and increase access to CD4 testing. CD4 testing is the only monitoring test available therefore assessing the cost of sustaining and expanding POC testing is essential to the national HIV program.

**Methods:** We analyzed data from 42 HCT sites using a published methodology (Larson et al, 2012). To calculate an overall cost per Pima POC CD4 test in this program setting, our formula includes the cost of reagents and lab consumables, reagent distribution, daily quality controls (QC), warranty, data monitoring, charging PIMA, external quality assurance (EQA) and staff CPT which was based on government salaries the hours worked and analysis time per test.

**Results:** For reagent and lab consumables the CPT is $12.11. CPT for daily QC, warranty, data monitoring, charging PIMA, reagent distribution and EQA are $0.69, $1.59, $0.68, $0.22, $0.28 and $0.70 respectively. Given that 68% of the primary operators are nursing officers (NO), 23% are community health workers (CHW) and 10% are medical laboratory technicians (MLT), staff CPT based on average analysis time of 28 minutes per CD4 test for NOs and MLTs is $2.99 and CHW is $1.77. Overall CPT for a PIMA POC CD4 test is $19.26 for NOs and MLTs and $17.64 for CHWs.

**Conclusion:** The HIV Program can utilize the cost per test to budget, plan for the scale up of POC testing and evaluate facets of the program to improve cost-efficiency. The data may point to increased cost-efficiency of implementing POC testing at lower tiers of the health system as well as utilizing CHWs in delivering health care in PNG. However, further evaluation is required to determine whether cost savings are significant and equate to program effectiveness.
Adherence to Artemisinine-based Combination Therapy Prescription Guidelines: A Case Study of Kisugu Health Center III, an Urban Setting in Uganda

Background: In 2012, Uganda Ministry of Health with World Health Organization initiated new malaria treatment guidelines using ACTs, due to the increased resistance to first line antimalarial drugs. This study aimed at finding out adherence to the standard ACTs prescription guidelines and health workers views towards the guidelines among the patients diagnosed with malaria in Kisugu Health Center III. Increasing resistance of malaria parasites towards many regimens with rampant change of anti-malarials has been the core reason for conducting this study and to find out whether health workers adhere to current malaria treatment guidelines.

Methods: Using the pharmacy register, 356 prescriptions for ACTs were reviewed retrospectively. Data for the months of August and September 2014 were correlated with the laboratory records for those particular months and followed by KII of three key health workers involved in prescription of ACTs.

Results: The majority of patients who got ACTs never went to the laboratory (n=302, 84.8%). Of the 54 (15.2%) sent to the laboratory, majority 40 (74.1%) tested negative for malaria parasites but received ACTs. Only 14 (25.9 %) of the 54 sent to the laboratory received ACTs with positive test for malaria parasites. Majority of the patients in this study who got ACTs (n=342, 96.1%) didn’t adhere to Malaria Treatment Guidelines. Health workers admitted to presumptive prescription of ACTs for patients with clinical symptomatic malaria with explicit reasons contrary to the guidelines.

Conclusion: This study confirmed non adherence to the new ACTs policy treatment guidelines. Health workers admitted to practice presumptive prescription of ACTs for patients with clinical symptomatic malaria contrary to the guidelines. However more research in public facilities similar to Kisugu Health center III, is highly recommended to broaden the evidence with a bigger sample size.

SMS Photograph-based External Quality Assessment of Reading And Interpretation of Malaria Rapid Diagnostic Tests in the Democratic Republic of the Congo

Background: External quality assessments (EQA) are an alternative to cross-checking of blood slides in the quality control of malaria microscopy. The present EQA assessed reading and interpretation of malaria rapid diagnostic tests (RDTs) in the Democratic Republic of the Congo (DRC).

Methods: The EQA consisted of (i) 10 high-resolution printed photographs displaying cassettes with real-life results and multiple choice questions (MCQ) addressing individual health workers (HW), and (ii) a questionnaire on RDT use addressing the laboratory of health facilities (HF). Answers were transmitted through short message services (SMS).

Results: The EQA comprised 2344 HW and 1028 HF covering 10/11 provinces in DRC. Overall, median HW score (sum of correct answers on 10 MCQ photographs for each HW) was 9.0 (IQR 7.5 – 10); MCQ scores (the % of correct answers for a particular photograph) ranged from 54.8% to 91.6%. Most common errors were (i) reading or interpreting faint or weak line intensities as negative (3.3%, 7.2%, 24.3% and 29.1% for 4 MCQ photographs), (ii) failure to distinguish the correct Plasmodium species (3.4% to 7.0%), (iii) missing invalid and negative test results (8.4% and 23.6%) and (10.0% and 12.4%) respectively. HW who were trained less than 12 months ago had best MCQ scores and a significantly higher proportion of 10/10 scores, but absolute differences in MCQ scores were small. HW who had participated in a previous EQA performed significantly better compared to those who had not. Except for two photographs, MCQ scores were comparable for all levels of the HF hierarchy and non-laboratory staff (HW from health posts) had similar performance as to laboratory staff. Main findings of the questionnaire were (i) use of other RDT products than recommended by the national malaria control programme (nearly 20% of participating HF), (ii) lack of training for a third (33.6%) of HF; (iii) high proportions (two-thirds, 66.5%) of HF reporting stock-outs.

Conclusion: The present EQA revealed common errors in RDT reading and interpretation by HW in DRC. Performances of non-laboratory and laboratory staff were similar and dedicated training was shown to improve HW competence although to a moderate extent. Problems in supply, distribution and training of RDTs were detected.
Human Pegi Virus (HPGV) Incidence and Factors Associated with its Infection among Blood Donors in Kano, Nigeria

**Background:** The burden of hepatitis HPGV in Africa is not clear. Molecular and phylogenetic tree analysis of nucleotides and amino acids sequences of HPGV, HBV, HCV and HIV suggests relationships between the viruses. However, closer amino acid sequence relationship exists between HPGV and HCV. In addition its relationship with other hepatitis viruses is also not yet clearly understood. However its co-infection with HIV has been found to suppress the multiplication and growth of HIV thereby reducing the progression of HIV sero-positive patients into AIDS. The blood transfusion policies provide that all blood and blood products are screened for hepatotrophic viruses and HIV. However there appears to be other hepatotropic viruses such as the HPGV whose significance needs to be investigated.

**Methods:** A total of four hundred (400) blood donors from 3 health facilities in Kano were screened for HBsAg and HCVAb by rapid strip immuno-chromatography technique, HIV screening by Nigerian facilities in Kano were screened for HBsAg and HCVAb by rapid strip immuno-chromatography technique, HIV screening by Nigerian facilities in Kano were screened for HBsAg and HCVAb by rapid strip immuno-chromatography technique, HIV screening by Nigerian facilities in Kano were screened for HBsAg and HCVAb by rapid strip immuno-chromatography technique, HIV screening by Nigerian facilities in Kano were screened for HBsAg and HCVAb by rapid strip immuno-chromatography technique, HIV screening by Nigerian facilities in Kano were screened for HBsAg and HCVAb by rapid strip immuno-chromatography technique, HIV screening by Nigerian facilities in Kano were screened for HBsAg and HCVAb by rapid strip immuno-chromatography technique, HIV screening by Nigerian facilities in Kano were screened for 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**POSTER 111**

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**Improving Access to CD4 Testing Using Point of Care Referral Networks**

**Background:** Use of CD4 counting to determine ART eligibility and monitoring HIV-infected persons on treatment is currently the backbone for HIV treatment programs in Mozambique until new WHO guidelines on viral load usage and treat all can be adopted. Of the 974 health facilities offering ART services, 225 had on-site CD4 testing. 749 (77%) health facilities referred CD4 samples to on-site CD4 testing facilities. Fifty-six (25%) of the 225 sites with on-site CD4 testing used conventional laboratory technologies while 169 (75%) of the health facilities used the Alere Pima for CD4 point of care testing (POCT). Given the wide distribution of CD4 POCT across the 11 provinces of Mozambique, a CD4 referral network was established for the 749 sites with no on-site CD4 testing to refer CD4 samples to the 169 CD4 POCT sites and 56 conventional sites.

**Methods:** Forty-five health facilities and five mobile clinics using CD4 POCT were visited in five provinces. Data was collected on the number of health facilities served and number of samples tested by each CD4 POCT device over a period of one month.

**Results:** Each CD4 POCT device served an average of 4.9 health facilities (range: 1 – 13 facilities per device). 47 of the 50 (94%) sites had a CD4 POCT device serving at least two health facilities. Approximately half of the CD4 tests at these facilities were referred through the referral networks (5,340 out of 10,381) during the month of February 2016.

**Conclusion:** Though CD4 POCT is best used and intended for immediate and on-site testing allowing rapid clinical decision-making, it can be networked to local health facilities for more efficient CD4 testing networks. The CD4 POCT referral network increased access to CD4 testing in hard to reach areas of Mozambique and to areas that do not have easy access to CD4 testing facilities.

**POSTER 112**

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**Performance Characteristics of Xpert MTB/Rif Testing in a TB Population-based Prevalence Survey in Zimbabwe**

**Background:** Xpert MTB/Rif is a rapid molecular test for detection of Mycobacterium tuberculosis (MTB) as well as rpoB mutations associated with rifampicin (Rif) resistance in sputum and other specimens. Performance characteristics of Xpert MTB/Rif in tuberculosis (TB) diagnosis in symptomatic individuals are well documented, but there are limited data on its performance in TB Prevalence Surveys. The main objective of this study was to determine Xpert MTB/Rif performance among sputum smear positive cases in the context of a TB prevalence survey.

**Methods:** This was an analytic diagnostic sub-study of a national TB prevalence survey conducted in Zimbabwe in 2014 which analysed the laboratory dataset. In the main prevalence survey, sputum specimens (at least one per individual) were tested using smear microscopy, liquid (reference method), and solid culture. The Xpert MTB/Rif test was incorporated to confirm a smear positive case. The data were analysed for frequencies and performance characteristics using STATA version 13.

**Results:** A total of 206 participants had a positive smear result and of these 18/206 (8.7%) were MTB positive in liquid culture, and 22/206 (10.7%) were MTB positive by Xpert. Sensitivity, specificity, positive predictive value, and negative predictive value for detection of MTB by Xpert were 94.4% (95% confidence interval [CI] 70.6, 99.7), 97.4% (93.1, 99.2), 81.0% (81.7, 92.1), and 99.3% (95.8, 100.0) respectively; agreement between Xpert and liquid culture was 85.6% (73.2–97.9). For the unsuccessful results (contamination on culture vs failed tests on Xpert) the difference was statistically significant [p =0.0001 (15.5% vs 0.5% respectively)].

**Conclusion:** Xpert MTB/Rif positivity rate was similar to that of liquid culture suggesting that the Xpert MTB/Rif may be useful as a single test for detecting TB cases in prevalence surveys. Its use greatly simplifies survey logistics, making it a feasible option for survey implementation, especially in resource-constrained settings.
Proficiency Testing of Xpert MTB/Rif Tests Using Dried Tube Specimens: Zimbabwe Pilot Experience

Background: Xpert MTB/Rif is a rapid molecular test for detection of Mycobacterium tuberculosis as well as rpoB mutations associated with rifampicin resistance in sputum and other specimens. By 2015, a total of 108 GeneXpert instruments had been installed but an external quality assurance program (EQA) was lacking in Zimbabwe. This report details the experiences of the pilot of the Xpert MTB/Rif proficiency testing conducted in 2015 using Dried Tube Specimens.

Methods: This pilot EQA involved 36 sites selected randomly from all sites in the country. Three schemes of 5 specimens each (panel A, B and C respectively) were sent to each of the 36 selected testing sites. Results from the individual sites were submitted in an excel file to CDC Atlanta for scoring. Scored results were analysed using excel for frequencies.

Results: A total of 36 sites participated in the pilot PT program across the country representing about 38% of all the sites in the country. Results returning was high (>90%) for all the panels. Mode of returning results from sites were through email (38.9%, 52.9% & 55.6% respectively), WhatsApp platform (44.4%, 38.9% and 38.9% respectively), paper-returns (11.1%, 0.0% and 0.0% respectively) with less than 10% non-returns for all three panels. The performance (reported vs expected results) of the sites was high (88.2% for panel A, 87.9% for panels B and C respectively). However, the proportion of failed tests was marginally higher (7.9% and 9.1%) compared to the standard 5% except for panel A.

Conclusion: Participation rate, measured by the result return rate and performance of the participating sites was satisfactory indicating that the PT scheme is implementable at country level. However, it is also crucial to have central instrument remote monitoring through GX-Alert or Remote Xpert platforms to allow real-time performance indicator monitoring and reduce TAT of results reporting.

Measuring Annual Forecast Accuracies for Human Immunodeficiency Virus Diagnostic Commodities Using Mean Absolute Percentage Errors in Kenya

Background: Accurate forecasting of HIV care and diagnostic commodities is vital in ensuring uninterrupted testing services. In Kenya, forecasts for HIV commodities are conducted at the national level annually using trends of historical service and consumption data. Confirmatory tests are calculated using prevailing positivity yield of HIV testing services. Targets are set through a consultative stakeholders meeting. We present herein annual HIV diagnostics commodities forecasts with associated accuracy for the period July 2010 to June 2015.

Methods: HIV diagnostic quantification reports from July 2010 to June 2015 were reviewed and data on forecasted number of tests of HIV screening test, viral load (VL), early infant diagnosis (EID) and CD4 extracted. Data of actual number of tests conducted each year for test was abstracted from the District Health Information Software (DHIS2). Mean Absolute Percentage Error (MAPE) was calculated. A MAPE of 0%-10% was classified as highly accurate forecast; 11%-20% good forecast; 21%-50% reasonable and ≥51% inaccurate forecast.

Results: The forecast targets for Screening tests were lowest (5,738,282) in 2010/11 and highest (11,600,224) in 2015. EID tests forecasted were highest in 2010/11 (107,419) and lowest (64,271) in 2013/14. CD4 testing targets were highest (1,372,144) in 2013/14 and lowest (439,567) in 2015. Viral load targets increased from 102,925 in 2013/14 to 999,500 tests in 2015. More HIV screening tests were performed in 2010/11, 2013/14 and 2014/15 than was estimated. MAPE for screening tests for all the years was consistently lower than 10%. MAPE for EID tests ranged from 14.9% to 93.2%, CD4 tests from 11.8% to 81.2% and viral load tests between 11.1% and 24.4%.

Conclusion: Annual forecasts were highly accurate over the review period for RTKs, inaccurate in 2012/13 but good in 2013/14 for viral load. This could be attributed to adoption of routine VL testing in the National guidelines which also affected accuracy of the CD4 forecasts. The EID quantities were overestimated initially resulting in inaccurate forecasts. Accurate forecasts are possible with quality data.
POSTER 115

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Implementing Routine Viral Load Testing Services at a Kenyan HIV Reference Laboratory: Successes and Challenges

Background: National HIV Reference Laboratory (NHRL) is a Ministry of Health referral facility. Prior to introduction of routine viral load for monitoring ART, its roles included provision of Proficiency Testing for HIV rapid testing, and testing for CD4 and population based HIV surveillance. Viral load testing was then the preserve of research laboratories. Our goal was to identify successes and challenges encountered at the facility in meeting the increasing viral load testing demand.

Methods: Data was extracted from the viral load database from July 2014 to December 2015. Variables included demographics, dates of sample collection, receipt, testing and result dispatch, sample rejection, and test results. Data was analyzed using Stata 13.1.

Results: A total of 92,970 frozen plasma samples from 326 ART sites were tested representing 12% of country’s viral load workload. Majority, 53,150 (67.6%) were from females. Number of samples increased from 4,128 in July-September 2014 quarter to 25,964 in quarter 3, 2015. Overall, 78,432 samples had less than 1000 copies/ml indicating 87.1% suppression. Suppression in male was 87.5% compared to 87.3% for female. Adults were more likely to be suppressed (87.9%) compared to children (77.3%). Collection to receipt turnaround time was high; 68% of samples received within 30 days. About 3 quarters (76.8%) of samples were tested within 30 days. Upon testing, 72% of results were dispatched within 1 day. High test and data management demands, equipment downtime and reagent stock-outs contributed to building up of backlogs. A total of 2846 (3.1%) samples were rejected on receipt while 46 (0.1%) had invalid results. Short term strategies included working longer hours and mobilizing staff from other sections. Currently, more staff have been hired.

Conclusion: Despite initial challenges, NHRL now meets over 12% of national viral load workload and is testing real-time. However, sample referral system requires strengthening to address high rejection rates and turnaround times from sample collection to receipt.

POSTER 116

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HIV Serology Proficiency Testing Panel Production Automation – Kenya Success Story

Background: In order to meet the demands of scaling up rapid HIV testing (RHT), Kenya implemented a task-shifting model which has seen RHT being performed by people with varied skills in laboratory and non-laboratory settings. This resulted in a large number of health care workers offering testing. In order to monitor the quality of RHT, Kenya adopted proficiency testing (PT) program based on dry tube specimen (DTS) technology in 2007. The program, provided by the National HIV Reference Laboratory (NHRL), operates two to three times a year and sends panels comprising of six blinded samples and a buffer (totaling to seven vials) to participating facilities. By 2010, there were 3025 participating facilities. The demand for PT increased when Kenya shifted from facility-based to individual (HCW)-based PT. As at February 2016, there were over 10000 HCW enrolled in the program. This posed a big challenge in long working hours for staff during panel preparation as well as compromised the quality of panels. We describe the automation of PT production to meet the need.

Methods: Panel production was manually done where staff could dispense 30,000 to 42 000 samples for a single cycle. It took 2 hours for one staff to pipette 2000 samples and production would take a whole month to meet the demand. In 2015, through PEPFAR support, NHRL acquired an automated dispenser system for panel production. The equipment (Tecan Freedom Evo 100 / 8) can dispense 14,400 samples in 2 hours which is over 7 times faster than the manual method.

Results: The capacity of panel production increased. Panels were produced in a timely manner, less labor intensive and improved quality due to fewer dispensing errors.

Conclusion: Automation has enabled access of proficiency testing panels to more service providers in the aim of monitoring quality of HIV testing.
Serological and Virological Evidence of Crimean-Congo Haemorrhagic Fever Virus Circulation in the Human Population of Borno State, Northeastern Nigeria

Background: Despite several studies on the prevalence of antibodies against Crimean-Congo Haemorrhagic Fever virus (CCHFV) from humans and cattle in Nigeria, detailed investigation looking at IgG and IgM have not been reported. Additionally, there have been no confirmed cases of human CCHFV infection reported from Nigeria.

Methods: This is a cross-sectional study on surveillance for CCHFV infection in Borno state, Nigeria. Sera (n=1,189) collected from four Local Government Areas (LGAs) in Borno State (Askira/Uba, Damboa, Jere and Maiduguri) were analysed for the presence of IgG and IgM antibodies using recombinant CCHFV nucleoprotein in an ELISA technique. Additionally, sera from undiagnosed febrile patients (n=380) were assessed by RT-PCR assay for the presence of CCHFV RNA. One positive sample (N428) was characterised further by next generation sequencing (NGS) resulting in the full-length sequence.

Results: Of the 1,189 sera from the 4 LGAs tested, 126 were positive for CCHF IgG giving an overall seroprevalence of 10.6%, while 42 (3.5%) and 7 (0.6%) were seropositive for IgM and IgG+IgM antibodies, respectively. The study shows that the prevalence of IgG was higher in rural (15.0%) than the urban (8.9%) areas, conversely the incidence of IgM was slightly higher in urban (3.9%) than in rural (2.7%) areas. The NGS of RNA from sample N428 identified the presence of CCHFV. Phylogenetic characterisation of the viral S segment sequence demonstrated it belonged to the Africa 3 clade, in congruity with earlier reports for other viruses isolated from Nigeria along with those from South Africa, Namibia, United Arabs Emirates, Senegal, Mauritania, Burkina Faso and the Central African Republic. The M and the L segments clustered closely with the Sudan AB1-2009 isolate and the Nigeria lbAr10200 isolate.

Conclusion: This article provides evidence for the continued exposure of the human population of Nigeria to CCHFV. The genomic analysis provides the first published evidence of a human case of CCHFV in Nigeria and its genomic sequence and phylogeny.
POSTER 119
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Countrywide Audit of Multidrug-Resistant Tuberculosis Cases Reported; Treatment Delay and Outcomes in Tanzania

Background: According to the Ministry of Health in Tanzania, patients diagnosed with multidrug-resistant tuberculosis (MDR-TB) must be referred to Kibong’oto Hospital for treatment initiation. MDR-TB is difficult to diagnose and the centralised referral model is beset with challenges that contribute to treatment delays. This study aimed to determine total number of MDR-TB cases detected in the country, delay between diagnosis and treatment initiation, and its effect in treatment outcomes.

Methods: This study was a retrospective cross sectional study involving review of records from a cohort of MDR-TB patients enrolled from November 2009 to December 2015. Analysis was done comparing two groups: delayed treatment and those who did not delay treatment.

Results: Since MDR-TB management program started in Tanzania to December 2015, a total of 471 patients were diagnosed and initiated on treatment. Of these patients, over two third were males between aged 25 to 54 years from the Eastern zone, and 43.7% were from Dar es Salaam. Mean (standard deviation [SD]) total health system delay was 206 (SD151.4) days and most of the total delay was contributed by the time taken for the patient to get DST results (118.5 [SD88.4] days). Of all the patients, it took over 105 mean days (137) from the day of drug susceptibility testing (DST) results to when treatment was initiated at Kibong’oto. Treatment outcomes did not differ between patients who were delayed and those who did not delay. Risk factors for total health system delay included being aged 35-54 years and type of technique used to diagnose MDR TB.

Conclusion: There was a significant delay in initiating definitive management for MDR-TB. However, treatment outcomes did not differ between the two comparison groups. Decentralization of MDR TB services provision in the country should be enhanced to reduce the overall delay in MDR-TB management.

POSTER 120
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Adherence to National Guidelines for Treatment Follow up of Patients Treated for Multidrug – Resistant Tuberculosis and Treatment Outcomes in Tanzania.

Background: Rapid diagnosis of Mult Drug resistant tuberculosis (MDR TB), prompt treatment and close follow up is important in ensuring favourable treatment outcomes, however, little is known about level of adherence to national guidelines for MDR TB treatment in Tanzania. This study aimed to determine the level of adherence to national guidelines for MDR treatment follow-up and its effect on treatment outcomes.

Methods: We conducted a retrospective cross sectional study involving review of records from cohort of MDR TB patients enrolled on treatment from November 2009 to December 2015.

Results: Of 471 MDR-TB patients registered in Tanzania since MDR TB program started in 2009, 319 (67.7%) were male and 51.2% were aged between 25–44 years (n = 241). Among 207 patients with treatment outcome (2009-2013 cohort), 181 (87.4%) had complete treatment outcome records. Total of 102/181 (56.4%) were cured, 31 (17.1%) completed treatment; 31 (17.1%) died; 15 (8.3%) default and 2 (1.1%) failures. Only 130 (33.9%) patients had smear performed monthly for eight months while 90 (23.4%) had culture performed monthly for eight months. Only 83 (21.6%) had both smear and culture done for all eight months. Of the 120 culture positive patients in Month one, only 21 (17.5%) had 1st line DST results. Two hundred patients underwent MDR TB treatment based on Gene Xpert results alone. Patients with culture done for all 8 months and those with culture done at month 0 and 6 had OR of 3.6 (95 CI: 1.6-7.8) and 7.4 (95 CI: 3.4-16.4) respectively, of having favourable treatment outcome.

Conclusion: Adherence to MDR TB treatment guidelines is poor and this affected treatment outcome unfavourably. Significant numbers of MDR TB patients are treated with Rifampicin mono resistant results alone. We recommends to the National Tuberculosis Control Program to reinforce monitoring of MDR TB treatment follow up according to the guidelines.
**POSTER 121**

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**Mycobacteriology Data of Failures to 2RHZE/4RH Regimen**

**Background:** Tuberculosis remains an important cause of mortality worldwide. Rapid methods for TB and drugs resistance diagnosis implemented since 2012 with the support of international and national partners allow for providing routine molecular diagnosis in Côte d’Ivoire. This study aimed to analyze bacteriological data collected from 2012 to 2015 of failures treated with 2RHZE/4RH regimen.

**Methods:** For each failure, sputum collected according to National Tuberculosis Control Programme directives in the tuberculosis centres were transported to the Tuberculosis Reference Laboratory at Institut Pasteur de Côte d’Ivoire, at 4°C in an icebox.

Sputum decontaminated by NALC method was used to perform Ziehl-Neelsen staining, MTBDRplus or GeneXpert MTB/RIF assay according to manufacturer instructions. Bacteriological data collected were registered in a Microsoft Office Excel 2013 database.

**Results:** Of the 714 failures, 666(93.3%) were positives for AFB detection. Smears interpreted paucibacillary (Scanty, 1+) were 192. With the molecular methods, 678(95%) clinical strains were detected from which 419 (61.7%), 256 (37.8%) were Rifampin resistant and susceptible respectively. Of clinical strains resistant to Rifampin, 273/419 and 146/256 were respectively detected on patients recruited in Abidjan district and outside. The comparison of rates estimated showed a statistically significant difference (p-value = 0.02). Among the positive smears with susceptible strains to Rifampin, 107/174 (60.7%) and 127/473 (26.8%) were respectively interpreted scanty or 1+ and 2+ or 3+. Comparison of rate estimated has shown a statistically significant difference (Chi-square test = 66.03).

**Conclusion:** Bacteriological failures data collected showed that quality of initial treatment need to be improved.

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**POSTER 122**

Joseph M. Nguta

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**Selective Antimycobacterial Potential of Selected Medicinal Plants**

**Background:** Mycobacterium tuberculosis, the prominent causative agent of tuberculosis (TB), is one of the leading causes of human mortality and morbidity caused by infectious microorganisms. Many plant species contain antimycobacterial compounds, which may serve as template molecules for new anti-TB drugs. Several medicinal plants are used traditionally to treat tuberculosis in Ghana. The current study was designed to investigate the antimycobacterial activity and cytotoxicity of crude extracts from five selected medicinal plants.

**Methods:** The microplate alamar blue assay (MABA) was used for antimycobacterial studies while the CellTiter 96® AQueous Assay, which is composed of solutions of a novel tetrazolium compound [3-(4,5-dimethylthiazol-2-yl)-5-(3-carboxymethoxyphenyl)-2-(4-sulfophenyl)-2H-tetrazolium, inner salt; MTS] and an electron coupling reagent (phenazine methosulfate) PMS, was used for cytotoxic studies. Correlation coefficients were used to compare the activity of crude extracts against nonpathogenic strains and the pathogenic Mycobacterium tuberculosis subsp.tuberculosis.

**Results:** Minimum inhibitory concentration values as low as 0.1563 mg/mL against *M. tuberculosis; Strain H37Ra (ATCC® 25177™)* were recorded. Cytotoxicity of the extracts varied, and the leaves from *Solanum torvum* Sw. (Solanaceae) had the most promising selectivity index. Activity against *M. tuberculosis; Strain H37Ra* was the best predictor of activity against pathogenic *Mycobacterium tuberculosis subsp.tuberculosis (correlation coefficient= 0.8).*

**Conclusion:** The overall results of the present study provide supportive data on the use of some medicinal plants for tuberculosis treatment. The leaves of *Solanum torvum* are a potential source of anti-TB natural products and deserve further investigations to develop novel anti-TB agents against sensitive and drug resistant strains of *M. tuberculosis.*
**Poster 123**

**Shon Nguyen, Guoqing Zhang, John N. Nkengasong**

CDC, Atlanta, GA, United States.

**Assessing the impact of Early Infant Diagnosis and Viral Load Proficiency Testing Programs in PEPFAR-supported Countries**

**Background:** Proficiency testing (PT) is an essential component of a comprehensive laboratory external quality assurance program that monitors the performance and quality of test results. However, PT programs are often lacking or unaffordable in resource-limited countries. To help strengthen laboratories in PEPFAR-supported countries, the United States Centers for Disease Control and Prevention (CDC) has been providing two PT programs: HIV-1 early infant diagnosis (EID) and viral load (VL) testing, since 2008 and 2010, respectively. We collected and analyzed feedback from PT participants to assess the impact on laboratories.

**Methods:** Between July and October 2015, a questionnaire was sent to all 159 laboratories in 43 countries that participated in CDC’s EID and VL PT programs. It consisted of 10 questions including yes/no, multiple choices, and short answer formats. Participants were asked to provide information about the level and type of laboratory, their performance and result turnaround time, accreditation status, and number of specimen and staff.

**Results:** Of the 123 responding laboratories, a majority self-reported that participation in the PT program improved their performance (91.9%) in HIV molecular testing and results turnaround time (79.7%). The laboratories included different levels: national 55 (44.7%), regional 40 (32.5%), district 20 (16.3%), local 8 (6.5%) with various types; reference 69 (56.1%), hospital 37 (30.1%), private 12 (9.8%), research 4 (3.3%) and unspecified 1 (0.08%). With the exception of 10 laboratories, all participated in the PT program to fulfill their accreditation requirements. Of these laboratories, 105 (85.4%) were in the process or plan to apply for accreditation, and 18 (14.6%) laboratories have been accredited by external accreditation organizations. A monthly average of 42,900 EID tests by 372 staff and 86,325 VL by 491 staff were performed in responding laboratories.

**Conclusion:** Results of these survey responses highlight the beneficial impact of PT to laboratory performance and maintaining laboratories accreditation. This improved performance may directly translate into improved EID and VL testing services for patients in HIV treatment and prevention programs.

**Poster 124**

**Shon Nguyen, Guoqing Zhang, Stephen Jadczak, Karidia Diallo, R. Suzanne Beard, Mackenzie Hurlston, Katrina Skleeman, John N. Nkengasong**

CDC, Atlanta, GA, United States.

**Analytical Evaluation of the Roche Free Virus Elution Protocol for HIV-1 Viral Load Testing on Dried Blood Spot**

**Background:** HIV viral load (VL) testing is the preferred approach to monitor ART treatment failure. The current plasma VL method requires costly cold chain transportation that is unfeasible for resource-limited settings. Dried blood spots (DBS) have been proposed as an alternative sample type. This study evaluated the analytical performance of the Roche Free Virus Elution (FVE) Protocol for VL testing on DBS.

**Methods:** DBS specimens made from normal human whole blood spiked with cultured HIV-1 virus were used for this evaluation. To evaluate the precision, 22 replicates of HIV-1 subtypes B and C at VL of $10^3$, $10^4$, and $10^5$ copies/ml were tested. Cross-contamination was assessed by running 20 replicates alternating between positive and negative specimens. Linearity was evaluated by testing five replicates of HIV-1 subtypes B, C, D, and CRF02-AG dilution series with VL ranging from 500 to $10^6$ copies/ml. The limit of detection (LOD) was determined by testing 24 replicates of a dilution series of HIV-1 subtype C.

**Results:** The standard deviations (SD) for intra- and inter-assay precision of the FVE protocol for DBS specimens at $10^4$, and $10^5$ copies/ml ranged from 0.06 to 0.12 log 10 copies/ml and a higher SD (0.27 log 10 copies/ml) was observed at $10^6$ copies/ml. No cross-contamination was observed throughout the study. The R-square of linear regression analysis were greater than 0.97 for all subtypes tested. Probit analysis revealed that the LOD was 700.3 copies/ml.

**Conclusion:** The FVE DBS protocol demonstrated good precision and linearity over the measuring range. The calculated LOD is below the current WHO cutoff value of 1,000 copies/ml used to define virological failure. These promising results warrant clinical evaluation of the assay using patient specimens.
Standardized Assessment of Quality Services in Mini Laboratories of Swaziland

**Background:** In Swaziland, 63% (38/60) of health facilities with clinical laboratories are classified as mini-laboratories which perform point of care tests including HIV rapid test, CD4, GeneXpert MTB/RIF, Haemoglobin, Glucose, Pregnancy, Urine biochemistry, Malaria RDT, and PRP tests. Developing a standardized checklist & implementing stepwise laboratory quality improvement process in mini-laboratories is critical.

**Methods:** In order to develop a standardized checklist to monitor lab quality, the following steps were undertaken: 1. The types of tests performed by each mini-laboratory were reviewed and relevant essential quality elements were identified; 2. International Organization for Standardization - ISO 15189 and ISO 22870 standards were used as a reference to customize the checklist development; 3. Requirements for each selected essential quality element were developed along with a total score point scale; 4. Checklist designed to provide recognition of performance to facilities on a five-tiered approach; 5. Baseline assessments of mini-laboratories were conducted to measure strengths and weaknesses for quality improvement.

**Results:** Key achievements included: the development of the checklist and scoring methodology with a total points (pts) of 116 comprised of Documents & Records (20pts), Organization & Personnel (60pts), Equipment (12pts), Purchase & Inventory (20pts), Process control (24pts), Identification of Non-conformities, corrective action & preventive measures (8pts), Occurrence management & process improvement (8pts), and Facilities & Biosafety (18pts). Five levels of categorizing performance of facilities were created: Poor for 0-58pts (<50%), Satisfactory for 59-74pts (50-64%), Good for 75-86pts (65-74%), Very Good for 87-98pts (75-84%), and Excellent for 99-116pts (≥85%). Baseline assessments were conducted from February to April 2016 for 80% (31/38) of the mini-laboratories. Of the 31 labs assessed, 10 (32.3%), 12 (38.7%), 4 (12.9%) and 3 (9.7%) were categorized as Poor, Satisfactory, Good and Very Good, respectively. Identification of non-conformities, occurrence & equipment management were the weakest areas.

**Conclusion:** The standardized checklist developed by ICAP was useful in objectively assessing the performance of mini-laboratories at baseline in order to identify gaps and guide implementation of corrective measures and monitor progress of quality improvement over time.

**Analysis of HLA Genotypes in HIV-1-infected Ghanaians**

**Background:** The human leukocyte antigen (HLA) is responsible for antigen presentation and the subsequent activation of the active immune system in response to an infection. Association of various Class I HLA genotypes with disease progression has been described in HIV-1 infections. Since distributions of HLA genotypes and prevailing HIV-1 subtypes do differ among populations, it is important to determine HLA-associated HIV-1 polymorphisms and association between HLA genotypes and disease outcomes in HIV-1-infected individuals in various areas. However, HLA genotypes and HIV-1 genome variations in Ghana have not been fully explored. This study aimed to analyze HIV-1 and host HLA genotypes in HIV-1-infected Ghanaians.

**Methods:** More than 300 antiretroviral therapy (ART)-naive individuals chronically infected with HIV-1 were recruited at the Koforidua Government Hospital in the Eastern Region of Ghana in 2013 and 2014. HLA class I genotyping first performed by PCR-SSOP (sequence-specific oligonucleotide probes) method using LABType SSO (One Lambda) in Luminex 100 System.

**Results:** HLA-A*23:01, A*30:01, A*03:01, A*02:01, A*68:02, A*33:01, A*30:02, B*53:01, B*07:02, B*42:01, B*44:03, B*15:03, and B*35:01 were frequently observed. Preliminary analysis indicated weak association between HLA-A*68:02 and lower CD4 counts. Viral genome subtyping showed that approximately 70% of the samples are HIV-1 subtype AG recombinants.

**Conclusion:** Accumulation of these data would contribute to determination of HLA-associated HIV-1 polymorphisms in HIV-1-infected Ghanaians. This would further understanding of the role of HLA in HIV disease and ultimately improve patient care.

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**Standardized Assessment of Quality Services in Mini Laboratories of Swaziland**

**Background:** In Swaziland, 63% (38/60) of health facilities with clinical laboratories are classified as mini-laboratories which perform point of care tests including HIV rapid test, CD4, GeneXpert MTB/RIF, Haemoglobin, Glucose, Pregnancy, Urine biochemistry, Malaria RDT, and PRP tests. Developing a standardized checklist & implementing stepwise laboratory quality improvement process in mini-laboratories is critical.

**Methods:** In order to develop a standardized checklist to monitor lab quality, the following steps were undertaken: 1. The types of tests performed by each mini-laboratory were reviewed and relevant essential quality elements were identified; 2. International Organization for Standardization - ISO 15189 and ISO 22870 standards were used as a reference to customize the checklist development; 3. Requirements for each selected essential quality element were developed along with a total score point scale; 4. Checklist designed to provide recognition of performance to facilities on a five-tiered approach; 5. Baseline assessments of mini-laboratories were conducted to measure strengths and weaknesses for quality improvement.

**Results:** Key achievements included: the development of the checklist and scoring methodology with a total points (pts) of 116 comprised of Documents & Records (20pts), Organization & Personnel (60pts), Equipment (12pts), Purchase & Inventory (20pts), Process control (24pts), Identification of Non-conformities, corrective action & preventive measures (8pts), Occurrence management & process improvement (8pts), and Facilities & Biosafety (18pts). Five levels of categorizing performance of facilities were created: Poor for 0-58pts (<50%), Satisfactory for 59-74pts (50-64%), Good for 75-86pts (65-74%), Very Good for 87-98pts (75-84%), and Excellent for 99-116pts (≥85%). Baseline assessments were conducted from February to April 2016 for 80% (31/38) of the mini-laboratories. Of the 31 labs assessed, 10 (32.3%), 12 (38.7%), 4 (12.9%) and 3 (9.7%) were categorized as Poor, Satisfactory, Good and Very Good, respectively. Identification of non-conformities, occurrence & equipment management were the weakest areas.

**Conclusion:** The standardized checklist developed by ICAP was useful in objectively assessing the performance of mini-laboratories at baseline in order to identify gaps and guide implementation of corrective measures and monitor progress of quality improvement over time.
POSTER 127

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Sustainable Approach in the Establishment and Implementation of a National Biosafety Cabinet Maintenance and Certification Program in Kenya: What Are the Outcomes?

Background:

Biosafety cabinets (BSC) provide protection when handling pathogens with possible aerosol transmission. A faulty BSC exposes laboratory workers (LW) to infectious agents. Maintenance service of BSCs helps to ensure that the BSC protects LW, materials being manipulated, and the environment. BSC maintenance and certification in Kenya has been rare. In 2011, Kenya Ministry of Health (MOH), in collaboration with CDC, initiated a national BSC certification program, with the aim of addressing two challenges: lack of in-country capacity and prohibitive cost. We describe program outcomes from 2011-2015.

Methods: Local biomedical engineers were trained at Eagleson Institute USA, followed by in-country proficiency mentorship by Eagleson engineers on service and maintenance of BSC. After the training, local engineers took inventory of BSC and Ventilated Workstations (VWS) available in the country, followed by actual servicing. During the servicing activity, they also conducted onsite trainings on safe use of BSCs and data was captured using excel sheets.

Results: By September 2015, six engineers had been trained and mentored by Eagleson Institute. MOH established a national biosafety cabinet inventory comprising 323 cabinets: 237 (73%) BSC and 86 (27%) VWS. Of the 323 cabinets, 178 (55%) were serviced by local engineers in 2015 which was an increase from 45 serviced in 2014. Of the 178 cabinets serviced, 68% were BSC and 32% were VWS. Data on performance after servicing were available for 154 (87%). Of the 154, 65% had never been serviced before. Ninety percent (139) passed smoke test and calibration, whereas 10% (15) failed both tests and were found unsuitable for use. Of the 10% that failed, 2% (3) were BSC and 8% (12) were VWS. Seven hundred BSC users received training on safe use.

Conclusion: A BSC maintenance and certification program has been successfully implemented in Kenya using local-engineers, resulting in increased access and awareness on safe use.

POSTER 128

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Root Cause Analysis of Turn Around Time for Automated Full Blood Samples and Peripheral Blood Films Samples in Haematology Department at Mbeya Referral Hospital Laboratory

Background: Turnaround time (TAT) is one of the most noticeable signs of the laboratory service to its customers and is used as a key performance indicator of laboratory quality performance. The objectives of this study was to determine the TATs for Automated Full Blood Count (FBC) and Peripheral Blood Film (PBF) samples and compare with the established benchmark TATs inorder to identify the root causes for delays in TAT at the Hematology department of the Mbeya referral hospital Laboratory for potential areas of improvement.

Methods: Turnaround time and process event times at the pre-analytical, analytical and post analytical stages of the laboratory for Automated FBC and PBF count were recorded during a descriptive cross sectional study period in a logbook. This data was then transferred into Microsoft excel for consistent checks and data cleaning. It was then compared with the established benchmark turnaround times using one sample paired t-test. Central tendency and dispersion were described using median values and inter-quartile ranges (IQR). Analysis was done by using statistical/data analysis (STATA) version 10.1 software.

Results: Of the 211 enrolled blood samples during this study, 90.8% (178/196) samples met the established turnaround time of 24 hours with the median turnaround time of 6:06hours (IQR 5:27- 21:57hours), 9.18% (18/196) did not meet the established benchmark TAT and 7.11%(15/211) were not registered in the laboratory information system and thus were considered lost. Root causes for delays were: The long period reported at the pre-analytical stage due to shortage of staff, shortage of work tools-only 2 computers for registration of samples in the laboratory information system (LIS). Longer period at the analytical stage was due to the shortage of staff-only one verified and calibrated hematology analyzer for FBC (SYSMEX XT 2000 analyzer), inadequate number of competent laboratory personnel for examining PBF, delayed transportation of samples from reception to hematology department.

Conclusion: TAT for Automated FBC and PBF samples met the established 90% completion time of 24hours by 90.8% and number of lost samples was large (7.11%(15/211) of the total enrolled samples.)
Quality Control of Lots of Malaria Rapid Diagnostic Tests (RDTs) with Recombinant Proteins as Reference Materials: Implementation of a Decentralized In-Country Programme

Background: The WHO-FIND malaria rapid diagnostic test (RDT) lot testing programme supports the evaluation of lots of commercially-available test before they are distributed in endemic countries of intended use. The purpose is to ensure that malaria RDTs for use in national malaria control programs are of good quality and meet performance expectations. Lot-testing is currently performed in two WHO-FIND reference laboratories in Cambodia and the Philippines. The current evaluation programme is based on testing RDTs with blood samples collected from malaria patients endemic countries, however it is expensive, donor-funded, and there is a need to move to a simpler, cheaper and sustainable programme. A new decentralised system using recombinant antigen panels is being developed to allow for a more standardized and sustainable system.

Methods: Panels of recombinant HRP2 and aldolase antigens have been developed and their quality assessed in reference laboratories. Standard operating procedures (SOPs) for testing RDTs with such panels were developed and a pilot study was conducted in the WHO-FIND reference laboratories. Twelve countries in Africa and Asia were selected to pilot the decentralization of this new programme. One reference laboratory will be selected in each country, and its staff will be trained.

Results: Preliminary results of pilot studies show that the panels are giving consistent results. A memorandum of understanding has been shared with the twelve pilot countries to set up the project, and a quality assessment tool was developed to select the national lot testing laboratories.

Conclusion: Key activities to transition from the current Lot Testing Programme to a new format based on recombinant panels have been completed, and preliminary experience of pilot studies is promising. The plans for the future decentralization will be presented, with a new system that will allow endemic countries for more ownership for assuring the quality of malaria RDTs in a sustainable way.
POSTER 131

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Outcome of Adequate Adherence to the Prevention of Mother to Child Transmission (PMTCT) Programme in the Control of HIV. A study Conducted at Federal Medical Center Abeokuta, Nigeria

Background: Adherence of HIV seropositive pregnant women to antiretroviral (ARV) prophylaxis determines the success of prevention of mother to child transmission (PMTCT) of HIV interventions and there is a need to evaluate this in a resource limited setting like Nigeria.

Methods: A cross-sectional study was conducted to evaluate the socio-economic factors, knowledge and adherence of forty consented sero-positive pregnant women to Antiretroviral (ARV) prophylaxis for their own health and Prevention of Mother to Child Transmission (PMTCT) of HIV/AIDS using semi-structured questionnaire. Mothers’ blood samples were analyzed for CD4+ count, HIV-Syphilis and HIV-HB co-infections, lipid profile, creatinine, serum enzymes and electrolytes using standard methods. Early infant diagnosis (EID) using PCR was conducted for HIV exposed infants. Data were analyzed using SPSS version 16.

Results: The Study showed that all the mothers (100%) were on ARV consisting Zidovudine (AZT), Lamivudine (3TC) and single dose Nevirapine (NVP) while all the HIV exposed babies (100%) received 1.5ml daily dose nevirapine from birth to their first EID. Moderate adherence was observed in 90% of the mothers while 2.5% of them were low in adherence. Among socio-economic factors examined, only age was associated with good adherence. Adherence was also found to be statistically significant with mothers’ platelets, creatinine and electrolytes level. Majority (92.5%) of the infants were HIV negative showing a high prevention rate.

Conclusion: Moderate adherence and high reduction in mother-to-child-transmission (MTCT) was observed in this study. Only mothers’ CD4+ count was found to be statistically significant with infants’ EID results at P<0.05, emphasizing the import of mothers immunologic and viral factors.

POSTER 132

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How Do Authors of Diagnostic Test Accuracy (DTA) Reviews Disseminate Their Findings After Publication? A Mixed Methods Study

Background: Published literature shows that health-care workers and decision makers find it difficult to read and understand systematic reviews of DTA studies (DTA reviews). Poor understanding can lead readers to make unclear or incorrect recommendations, ultimately leading to incorrect diagnostic practices. Review authors should therefore think about their target audience and about strategies to reach the audience. We aimed to identify strategies used by authors to communicate and disseminate the findings of DTA reviews after publication.

Methods: We searched MEDLINE for recent English language DTA reviews published within the last five years that evaluated the accuracy of tests on any infectious disease. We designed an online questionnaire usingSurveyMonkey software and emailed the final questionnaire to the corresponding authors of the included DTA reviews including 2 email reminders to non-respondents. We descriptively analysed the survey responses with the analyse function of SurveyMonkey software.

Results: Of the 186 authors of DTA reviews we contacted, 34 authors have responded to this survey (18.3% response rate) and 22 are willing to be contacted for a follow-up interview. A majority of the respondents were aware of efforts to disseminate their review findings after publication (n=22, 65%). Of those who were not aware (n=12, 35%), many felt that publication of their review was sufficient (54%). A majority of those who disseminated their findings initiated the dissemination (59%); mostly to clinicians (95%), fellow researchers (77%) and policy makers (59%). Many respondents did not tailor their review summaries to the target audience (52%) and were unsure if the audience understood their review findings (67%). Many respondents did not have a dissemination plan a priori (72%) and a majority (45%) stated that they found the quality assessment of included studies most difficult to explain. Few respondents used social media (28%), Wikipedia (11%) or blogs (11%) to disseminate.

Conclusion: As the majority of DTA review authors were unsure if their review findings would be understood by the target audience, a description of target audience and a dissemination plan should become part of study plans or review and funding proposals. In this ongoing study, we plan to conduct a follow-up in-depth interview to everyone who indicated willingness to be interviewed in the survey.
**POSTER 133**

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**Dissemination of Integron-borne Resistance Cassettes in Faecal Escherichia Coli Isolated From Mother-Child Pairs in Ile-Ife, Southwestern Nigeria**

**Background:** Antimicrobial resistance resulting from both chromosomal and mobile genetic determinants is an issue of global health concern. Understanding the mechanisms for evolution and dissemination of resistance in microorganisms will provide rational basis for identifying interventions. Such data are sparse in sub-Saharan Africa. We investigated the role of integron, a mobile genetic element in antibiotic resistance and the mode of dissemination of integron-borne resistance cassettes among faecal Escherichia coli strains from mother-child pairs.

**Methods:** We tested 1164 faecal E. coli strains isolated from 134 mother-child pairs against eight antimicrobial agents. The presence and cassette contents of class 1 and 2 integrons were determined by polymerase chain reaction and sequencing. Plasmid replicons were detected by PCR. Genetic relatedness of isolates was determined by flagellin and multi locus sequence typing.

**Results:** More than 90% of the isolated E. coli were resistant to streptomycin, sulphonamides and tetracycline, but fewer to ciprofloxacin (8.4%). Integrons were detected in 474 (40.7%) isolates and were associated with resistance to trimethoprim and chloramphenicol. We found only 10 and two gene cassette array types in classes 1 and 2 integrons respectively; dfrA and aadA cassettes were predominant and aadA1 cassette (n=115, 24.2%) was most frequently found. The detection of few cassette combinations suggests that few strains or mobile elements may be disseminating them. IncFIB/Y plasmids (21.6%) were commonly associated with integron-borne cassettes. Similar strains containing identical integrons-borne cassettes dfrA17-aadA5 and dfrA5 were found in two and one mother-child pairs respectively, suggesting their possible clonal expansion and interfamilial exchange.

**Conclusion:** Integrons are widely distributed in faecal E. coli and are important determinants of antimicrobial resistance. Besides horizontal gene transfer, clonal expansion contributes to dissemination of resistance in faecal E. coli. There is a need for improved surveillance which can provide information for the persistence and mobility of resistance genes between community and clinical settings.

**POSTER 134**

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**The Expression of SLAMF7 Levels in Malignant B Cells: A Novel Therapeutic Pathway for Treatment of Patients with CLL**

**Background:** Activation of SLAMF7 leads to proliferation or differentiation of the B-cells, a receptor found on the surface of B-lymphocytes. It is hypothesized that SLAMF7, mostly found in multiple myeloma cells, can also be found and upregulated in B chronic lymphocytic leukemia cells (B-CLL). Here, we look at the possibility of upregulating the level SLAMF7 expression on the B-CLL cells, with phorbol myristate acetate (PMA) and Bryostatin and to determine the optimal dose for upregulation using Bryostatin.

**Methods:** B-CLL cells were cultured with RPMI 1640 to increase the number of SLAMF7 receptors on the cell surface and the white cells were extracted with histopaque. The levels of expression of SLAMF7 cells were measured, using immunofluorescence, flow cytometry, confocal microscopy and reverse transcriptase polymerase chain reaction (RT-PCR). The effects of treatments with PMA and Bryostatin were measured. Optimal dose response for upregulation of SLAMF7 receptor using Bryostatin was further determined.

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**Conclusion:** Successful upregulation of SLAMF7 provides a novel therapeutic pathway for treatment of CLL patients.
Sustainable Approach to Improving the Quality of HIV Testing at Multi Testing Points in Nigeria Using Dried Tube Testing as an Alternate Approach

**Background:** False-positives in HIV testing can result in erroneous initiation of antiretroviral treatment. With the recent 90-90-90 strategic goal on HIV programme, reliability of HIV rapid testing is an imperative. Availability of affordable Proficiency Testing (PT) panels to assure reliable HIV results remains a challenge in resource limited settings including Nigeria. FHI 360 with funding from USAID scaled up the use of Dried Tube Specimen (DTS) technology as PT methods at FHI 360 supported HF including some remote HCT & PMTCT sites in Nigeria.

**Methods:** A total of 506 identified testing points (TPs) from 244 HF in 7 states were assessed for quality of HIV serology testing between March and October 2015. DTS panels were produced following standard operating procedures. Five characterized panels (3 Negatives & 2 Positives) were distributed to each TPs using a cluster model. The results were collated and analyzed centrally and TPs reports generated. A score of 20% was awarded for each panel reported accurately. Benchmark of 80% was set as acceptable performance. Data analysis was done using Stata software.

**Results:** Parasiaemia by *P. f.* was 26%. Out of the 389 subjects that presented with fever, 35.5% were positive for *P. f.* malaria. Prevalence was highest amongst age group 49-72 months (42.6%) while the age groups 1-24 and 25-48 months recorded prevalence of 25% and 35.7% respectively. More so, 22.5% of afebrile group were positive while 77.5% were negative for *P. f.* (p<0.05).

**Conclusion:** The overall PT performance was satisfactory. The use of DTS technology can serve as a sustainable PT method for monitoring quality of HIV rapid testing. Effective corrective action plan targeted at each testing point has to be instituted to address the gaps seen in the quality of HIV testing.

Fever Cases Associated with Plasmodium Falciparum Malaria Infection Among Children Attending a Secondary Health Facility in Imo State, Nigeria

**Background:** In Malaria endemic countries, fever cases have been associated with Malaria infection. Malaria has been declining across sub Saharan Africa but fever cases at health facilities have remained high. Thus, a need to determine fever cases associated with *Plasmodium falciparum* (*P. f.*) infection among children aged 1-72months attending a Secondary Health facility in Imo State, Nigeria.

**Methods:** This is a hospital based cross sectional descriptive study. Children between 1-72months of age with documented fever at presentation or history of fever in the last 24 hours without signs of severe malaria and have not taken anti-malarials were eligible. Fever was regarded as axillary temperature of ≥ 37.5 °C. For all subjects (febrile and afebrile) the presence of *P. f.* was assessed microscopically by a competent WHO Certified Malaria microscopist.

**Results:** Parasiaemia by *P. f.* was 26%. Out of the 389 subjects that presented with fever, 35.5% were positive for *P. f.* malaria. Prevalence was highest amongst age group 49-72 months (42.6%) while the age groups 1-24 and 25-48 months recorded prevalence of 25% and 35.7% respectively. More so, 22.5% of afebrile group were positive while 77.5% were negative for *P. f.* (p<0.05).

**Conclusion:** The result of this study showed that *Plasmodium falciparum* is linked with fever, however not all cases of fever is attributable to plasmodiasis. Thus the health care providers should broaden the spectrum of analysis during routine diagnosis so as to detect other etiologies of fever other than plasmodium so as to avert possible over diagnosis and/or overtreatment.
Antimicrobial Sensitivity in Three Counties in an Ongoing Widespread Cholera Outbreak in Kenya, 2015-2016

Background: Cholera remains a major public health problem in Africa in spite of advances in its management. The mainstay of management is rehydration however antibiotic therapy is recommended for moderate and severe disease since it reduces purging time and volume and hence recovery period. The emergence of resistance strains poses a major challenge to this adjunct treatment. In the present study we evaluated antibiotic sensitivity of samples drawn from 3 counties in a large, widespread and ongoing outbreak in Kenya.

Methods: Ninety eight (98) samples from patients with suspected or probable cholera were processed and Vibrio cholerae isolated using WHO recommended standard methods. Antibiotic sensitivity testing (AST) using the Kirby-Bauer method was done.

Results: 60, 30 and 8 samples were collected from Wajir, Bomet and Murang’a respectively. All samples were positive for Vibrio cholerae O1 serogroup, El Tor biotype, Ogawa serotype and all showed resistance to at least one antibiotic. Twenty eight (28) different resistance patterns were identified of which 20 (71%) showed resistance to at least 3 antibiotics. Overall ampicillin was most implicated in resistance (89%). Gentamicin, erythromycin, tetracycline, ciprofloxacin and trimethoprim-sulphamethoxazole were moderately involved (43-54%). Chloramphenicol resistance was very low (4%) while cefuroxime was not involved. Shared resistance patterns were noted between counties.

Conclusion: Antimicrobial resistance surveillance should be prioritized to guide rational antibiotic use, development of treatment protocols and strategies to prevent development of resistance to antimicrobial therapy.


Background: Lassa fever (LF) is an epidemic prone viral haemorrhagic disease of public health importance and it is endemic in Nigeria. LF outbreaks mostly follows a seasonal pattern. In January 2016, the Federal Ministry of Health was notified of Lassa fever (LF) outbreak across states in the federation during Epi week 51 through week one of January 2016. Ten states of the federation reported at least a case of Lassa fever. Following this, immediate outbreak response was initiated, active laboratory surveillance on all LF suspected cases was conducted while control measures, including community sensitization, contact monitoring, and environmental cleaning, were progressively implemented. We characterize the outbreak in Edo state between January – February, 2016

Methods: Our study was a descriptive cross sectional study involving active surveillance among all Lassa fever suspect patient samples received at the laboratory. We defined a confirmed case of LF as a suspected case that is laboratory confirmed by Reverse Transcription-Polymerization Chain Reaction or epidemiologically linked to a laboratory confirmed case during January – February 2016. Data were analysed to identify outbreak clusters for immediate intervention

Results: We screened 283 suspected cases. Median patient age was aged 30 years (range: 5 months – 84 years). One of 10 (10%) blood samples screened was positive for Lassa virus. Peak incidence occurred in Epi week 5 (6 cases). Of 29 confirmed cases, (17) 59% were males and 11 (40%) were aged 20 - 29 years. Case fatality ratio (CFR) was 60% while 12 (41%) of all confirmed cases were from Etsako west LGA, Edo State.

Conclusion: Active surveillance was useful, enabling detection of the outbreak and it informed implementation of comprehensive interventions. Active surveillance should be promoted for early detection of future infectious disease outbreaks.
Tetanus Antibody Concentrations in School Aged Children in Calabar, Nigeria

**Background:** Immunization with the Diphtheria, Pertussis and Tetanus (DPT) vaccine followed by periodic booster doses, remains the best way to reduce the risk of tetanus in children. The present study determined the level of tetanus antibodies in children in Calabar.

**Methods:** Four hundred and forty subjects: 352 test subjects aged 3-15 years and 88 adults aged 16 years and above were recruited for the study. Using a structured questionnaire, socio-demographic, vaccination history and other relevant data about the subjects were obtained. Tetanus antibody concentrations in the sera of subjects were measured using Tepanus toxoid IgG antibody ELISA Test Kit (Genway Plantinum, USA). The risk of contracting tetanus was determined by isolating Clostridium tetani school playground soils using AnaerogenTM Compact System (Oxoid AGS, Japan).

**Results:** Protective immune levels of tetanus occurred in 133 (37.8%) of the 352 children tested. Subjects aged 3-5 years who received the recommended three dose of the Diphtheria-Pertussis-Tetanus (DPT) vaccine at infancy had the highest (74.1%) prevalence of sero-protective tetanus antibody levels. The levels declined progressively with increasing age. In the control group, seroprotective immunity increased from 65.7% among subjects aged 16-30years and peaked at 83.3% among those aged 31-50years (Child-bearing age) but reduced to 80% in those aged 50 years and above. There was a strong association between recent tetanus toxoid (TT) booster vaccination and high concentration of tetanus antibodies in subjects’ sera. The level of tetanus immunity in the study population was not influenced by socio-demographic factors (P>0.05). Soil samples of four out of the five schools enrolled for the study yielded Clostridium tetani.

**Conclusion:** Protective immune levels among subjects was associated with younger age, receiving full DPT immunization (three doses of DPT) vaccine and booster dose of tetanus toxoid. The high percentage of children with sero non-protective antibody levels and isolation of Clostridium tetani from the playground soil further highlight high risk of contracting tetanus infection among subjects. The study highlights the need to introduce booster doses of tetanus vaccine into the National immunization schedule possibly after the age of 5 years.

The Effectiveness of a PMTCT Program in a Cohort of Nigerian HIV Positive Mothers: Data from the Infant Study

**Background:** Prevention of Mother to Child Transmission of HIV (PMTCT) has been effective in reducing transmission from mothers to their infants. With the introduction of the Option B plus program, which places, HIV positive pregnant women on HAART despite CD4 counts and HIV viral load levels from pregnancy till the cessation of breastfeeding. Infants are also placed on prophylactic ARVs and this can cover any issues with adherence in the mothers. Worldwide transmission rates have reduced to below 5%. We documented transmission rates in a cohort of exclusively breastfed infants whose mothers may or may not be adherent.

**Methods:** Ethical approval was received from the Plateau State Specialist Hospital in Jos were the study was conducted. A cohort was designed to enroll 300 HIV positive and 100 HIV negative pregnant women in Jos Nigeria. After consenting, women were enrolled at >37 weeks of pregnancy and followed up with their infants, after delivery, for 2 years. Eligibility criteria for enrollment included pregnant women ≥18 years old, no complications during labor and birth weight of >2.4kg. HIV Viral load and CD4 counts were offered to all enrolled HIV positive mothers to be at gestational age ≥37 weeks.

**Results:** A total of 511 pregnant women were screened out of which 409 (303 HIV positive and 106 HIV negative). Median age of enrolled mothers was 30 years (IQR: 27-34), a majority 153 (39.8%) had high school education as their highest degree, 177(46%) were self employed and 370(96.4%) were married. For 60(9.9%) it was their first pregnancy, 348(90.6) delivered their babies vaginally and 268(70%) opted to breastfeed their infants exclusively. Despite being HAART a total of 42(14%) enrollees had viral load ≥1,000 copies/ml (Range: 1,326- 654,769 cells/ml). We had only two infants infections tested after birth through a DNA PCR assay. CD4 counts in HIV positive mothers were at almost a normal level compared to HIV negative mothers (p=0.5).

**Conclusion:** In this study we show that despite mothers being placed on HAART, there is still unsuppressed viral load in the cohort. The low transmission rate may be due to the prophylaxis in infants and emphasizes the importance of this step at birth for the infant.
**The Role of Extended-Spectrum Beta-Lactamases in Antibacterial Resistance among Enterobacteriaceae in a Tertiary Hospital in Southwestern Nigeria**

**Background:** Treatment failure due to the worldwide challenge of extended-spectrum beta-lactamase (ESBL) production is rising. Information on the extent of the ESBL challenge in Nigeria and the local prevalence of ESBL producers remains much needed. We sought to determine the spectrum of enterobacteria involved in clinical infections, determine the role of ESBL production in conferring resistance, and identify risk factors associated with infections caused by ESBL-producing enterobacteria.

**Methods:** We obtained a total of 350 non-duplicate clinical isolates (with corresponding biographical data of respective patients) from diverse clinical specimens including blood, urine, stool, and sputum from Obafemi Awolowo University Teaching Hospitals Complex. The isolates were identified by conventional methods and the analytical profile index (API 20E) kit. Antimicrobial susceptibility was determined using the Kirby-Bauer disc diffusion technique. ESBL screening was conducted using combined disc diffusion technique involving cefotaxime and ceftazidime with their clavulanate combinations. Risk factors were analysed for association with ESBL infections.

**Results:** There were 157 (44.9%) *Klebsiella pneumoniae*, 143 (40.9%) *Escherichia coli*, 49 (14%) *Proteus mirabilis*, and one (0.3%) *Serratia grimesii*. The isolates were most resistant to trimethoprim (n=298, 85.1%) and least resistant to imipenem (n=53, 15.1%). Furthermore, 136 (38.9%) were ESBL producers, with *K. pneumonia* being the commonest (50.7%), followed by *E. coli* (44.1%) and *P. mirabilis* (6.2%). 37.3% of urine isolates (69 of 185), as against 88.9% of blood isolates (8 of 9), were ESBL producers. ESBL production was significantly associated (P<0.05) with resistance to all antibiotics tested (except cefotaxin and imipenem) and to every antibiotic class represented (except the carbapenems). ESBL infections are likely to occur in bacteremia, among the hospitalised, and in catheterised patients (P<0.05).

**Conclusion:** ESBL production is an important determinant of antibacterial resistance within *Enterobacteriaceae*. Hospitalised and catheterised patients and those with bloodstream infections are more likely to be infected with ESBL-producing organisms.

**Comparison of Genetic Diversity of Plasmodium falciparum after DNA Extraction from Filter Paper and Rapid Diagnostic Tests**

**Background:** Molecular epidemiological surveys allow the genetic diversity analysis of malaria parasites in relationship with malaria transmission, spread of drug resistance and immune response. Such studies are based on samples collection at large scale. Parasite’s DNA is usually obtained from whole blood collected on EDTA tubes or filter papers. However, the use of Rapid Diagnostic Tests (RDTs) for DNA extraction has been reported. The aim of our study was to compare the parasite genetic diversity after DNA extraction from filter paper (dried blood spots, DBS) and from RDTs membrane.

**Methods:** DNA extraction from DBS and RDTs membrane (Acon) stored at different temperature has been performed using DNA Qiagen kit. All samples were collected from *Plasmodium falciparum* infected children. For each child, blood was stored on one DBS and 1 RDTs at room temperature; and 1 additional RDTs at -20°C. To analyze the parasite diversity, *msp1* gene, has been amplified using nested PCR. Two allelic families, K1 and Mad20, have been analyzed with specific primers. The size of each allele has been determined after electrophoresis on agarose gel.

**Results:** Samples have been collected from 15 children: 3 per child. Msp1 gene was amplified in all the samples (n=45). The amplification rate (n=14/15; 93.3%) was comparable regardless of the sampling support for K1 family. For Mad20 allelic family, amplification was successful in 11/15 samples whatever the sampling support. Within K1 and Mad 20 allelic families, 6 and 5 different alleles have been identified, respectively. The number and size of K1 alleles were identical after DNA extraction from RDTs, stored at room temperature and at -20 °C. However, for 3 isolates out of 15, all K1 and Mad20 alleles detected after DNA extraction from filter paper were not found after extraction from RDTs.

**Conclusion:** RDTs are simple and low-cost methods that can be used for diagnosis of malaria parasites as well as DNA extraction for molecular analysis for large scale epidemiological surveys. However, analysis of genetic diversity of malaria parasite after nucleic acids extraction from RDTs should be performed with caution. Moreover, the evaluation of the influence of the storage duration requires further studies.

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**POSTER 143**

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**Epidemiology of Staphylococcus Aureus Strains Meti-R In Dakar: A Four Years Retrospective Study**

**Background:** In recent decades, staphylococcal infections have increasingly become a public health concern because of *S. aureus* methicillin-resistant (MRSA) pandemics in hospitals. The aim of this study was to determine the prevalence of MRSA clinical isolates, and their resistance patterns to other families of antibiotics.

**Methods:** Over a 4 year period (2011 to 2014) 1150 *S. aureus* clinical isolates were selected from the bacteriology laboratory of Aristide Le Dantec University Hospital in Dakar, Senegal. The antimicrobial susceptibility testing was performed using the disk diffusion method.

**Results:** The overall prevalence of MRSA was 16.1%. The median age of patients infected with MRSA was 32 years. Men were more susceptible to be infected with these multi-drug resistant strains (62.2% of cases). The majority of MRSA infections were hospital-acquired (71.9%). MRSA strains were mainly isolated from pus (46.5%), blood (17.8%) and urine (13.5%) samples from patients admitted in surgery (24.3%), internal medicine (20%) and in intensive care units (14.6%). In addition to β-lactams, these strains expressed resistance to fluoroquinolones (57.9%), macrolides (50.5%), aminoglycosides (phenotype KTG: 40.4%), tetracycline (38.5%), rifampicin (26.5%) and glycopeptides (10.7%).

**Conclusion:** This study described a high prevalence of MRSA strains in Senegal. Detection of PLP2a protein and molecular characterization should be established for a better management of MRSA infections.

**POSTER 144**

Kaiser Shen1, Clement Phiri1, Davy Nsamba2, Fales Zulu2, Izukanji Sikazwe3, Esther de Gourville4, James McAuley4, Clement Ndongmo4


**The Effectiveness of a PMTCT Program in a Cohort of Nigerian HIV Positive Mothers: Data from the Infant Study**

**Background:** Prevention of Mother to Child Transmission of HIV (PMTCT) has been effective in reducing transmission from mothers to their infants. With the introduction of the Option B plus program, which places, HIV positive pregnant women on HAART despite CD4 counts and HIV viral load levels from pregnancy till the cessation of breastfeeding. Infants are also placed on prophylactic ARVs and this can cover any issues with adherence in the mothers. Worldwide transmission rates have reduced to below 5%. We documented transmission rates in a cohort of exclusively breastfed infants whose mothers may or may not be adherent.

**Methods:** Ethical approval was received from the Plateau State Specialist Hospital in Jos were the study was conducted. A cohort was designed to enroll 300 HIV positive and 100 HIV negative pregnant women in Jos Nigeria. After consenting, women were enrolled at >37 weeks of pregnancy and followed up with their infants, after delivery, for 2 years. Eligibility criteria for enrollment included pregnant women >18 years old, no complications during labor and birth weight of >2.4kg. HIV Viral load and CD4 counts were offered to all enrolled HIV positive mothers to be at gestational age >37 weeks.

**Results:** A total of 511 pregnant women were screened out of which 409 (303 HIV positive and 106 HIV negative). Median age of enrolled mothers was 30 years (IQR: 27-34), a majority 153 (39.8%) had high school education as their highest degree, 370(96.4%) were married. For 60(9.9%) it was their first pregnancy, 348(90.6) delivered their babies vaginally and 268(70%) opted to breastfeed their infants exclusively. Despite being HAART a total of 42(14%) enrollees had viral load >1,000 copies/ml (Range: 1,326- 654,769 cells/ml). We had only two infants infections tested after birth through a DNA PCR assay. CD4 counts in HIV positive mothers were at almost a normal level compared to HIV negative mothers (p=0.5).

**Conclusion:** In this study we show that despite mothers being placed on HAART, there is still unsuppressed viral load in the cohort. The low transmission rate may be due to the prophylaxis in infants and emphasizes the importance of this step at birth for the infant.
Baseline Human Prevalence and Intensity of Infection of Schistosomiasis japonica and Use of Innovative Strategies for Sustainable Control through Socio-Ecosystem-Based Interventions among Endemic Villages of Gonzaga, Cagayan, The Philippines

Background: The knowledge on the disease prevalence and intensity of infection of Schistosomiasis japonica is essential for proper diagnosis, clinical management and monitoring of cases that will have an impact on the prevention and control of infection and disease morbidity. The objectives of the study are the following:

Specific objectives:

1. To determine the baseline prevalence of human Schistosomiasis japonica among target population.
2. To quantify the intensity of infection among infected study participants.
3. To describe the socioeconomic and demographic profile of the study participants.
4. To develop innovative strategies for sustainable control of Schistosomiasis through Socio-Ecosystem-Based Interventions.

Methods: A baseline human prevalence survey was carried out in Barangays Magrafil and Sta. Maria of Gonzaga, Cagayan, The Philippines. All residents, 5 years old and above, living in the two study sites were requested to submit stool samples. Two stool samples were examined per study participant using Kato Katz technique. The key informant and household interviews as well as focal group discussions were also conducted. Environmental factors were also studied using ocular inspection of the area, GPS mapping and snail survey.

Results: The baseline prevalence survey showed high prevalence of schistosomiasis in both barangays, 32% for Barangay Magrafil and 11.5% for Barangay Sta.Maria. There was also a high prevalence of co-infections with other helminth eggs in both barangays. Animals such as dogs, cow and carabaos were also infected.

Conclusion: The study reports that Schistosomiasis japonica is highly prevalent in the two barangays of Gonzaga, Cagayan. They are already considered as the newly documented endemic foci for Schistosomiasis in the northernmost part of the Philippines.

Implementation of innovative strategies for sustainable control of Schistosomiasis japonica in the said study sites was done through socio-ecosystem based interventions. This strategy gave a positive impact among residents in the endemic villages and changed the behavior and quality of life of infected participants.
Considerations Around the Rapid Diagnostic Test (Immunochromatographic Assay) to Support Preparedness AND Response To Infectious Diseases Threat

Background: Rapid Diagnostic Tests (RDTs) using immunochromatographic technology to detect infectious diseases have been increasingly used during the last 20 years. A broad range of RDTs for bacterial, parasitological and viral diseases detection are now available. They are convenient for use in remote areas or resource-limited settings as they are simple, inexpensive and provide a quick result.

Methods: Here we present considerations and recommendations surrounding the choice, introduction and use of RDTs in the context of a national testing algorithm for pathogen detection.

Results: The decision to use a RDT should be based on objective criteria and clear guidelines. Knowledge on test characteristics, disease course and prevalence are critical. Specifically the detected compounds (antigens or antibodies) and the disease course can limit the test utility. The ASSURED criteria for a test (A = Affordable, S = Sensitive, S = Specific, U = User-friendly, R = Robust and rapid, E = Equipment-free or minimal equipment, D = Deliverable to those who need them) along with the Positive/ Negative Predictive Values can guide test choice, but also the purpose of the use. Accuracy of RDTs during field evaluation is a relevant guidance for application as an alert test in outbreak situation or as a diagnostic for case management. Disease-wise, guidelines on interpretation of the negative or positive RDT results and outcome measures enhance the value of the test. Usually further laboratory confirmation is required and additional testing (antimicrobial susceptibility, molecular characterization) are necessary. Consequently, appropriate specimen collection and referral to reference laboratory is critical and training of users in proper handling assures quality results.

Conclusion: Formal decision-tree and recommendations stated by a legal authority like WHO or in-country regulatory agency are also helpful in standardization of RDTs use.

Impact Of Pima™ Point-Of-Care Cd4 Cell Count Test Analyser On Initiation Of Antiretroviral Therapy—Arusha, Tanzania, 2013

Background: CD4 T cell count is used as a criterion for initiation of anti-retroviral therapy (ART) among HIV-infected patients. Delayed turnaround in obtaining CD4 count leads to late initiation of ART. Tanzania adopted 2010 WHO recommendations of initiating ART at CD4≤350 cells/μL. We assessed the impact of Pima™ point-of-care (POC) CD4 counter on timely initiation of ART among HIV-infected patients in Arusha

Methods: During October—December 2013, we enrolled HIV-infected patients attending five care-and-treatment centres with Pima™ analysers and five without (samples tested by FACS Calibur at nearby sites). Chi-square was used to compare proportions and non-parametric Mann-Whitney test to compare median times to ART initiation between sites. Timely ART initiation was defined as <3 days from CD4 testing

Results: Of 294 HIV-infected patients, 166 (56.5%) were females, mean (SD) age was 35.7 (12.3) years, and 141 (48.2%) had CD4≤350 cells/μL. There was no significant difference in proportion of patients with CD4≤350 between Pima™ and non-Pima™ sites [79/147 (53.7%) versus 62/136 (45.6%), p=0.17]. Of 294 enrolled, 95 (32.3%) were newly-diagnosed, with 74 (77.8%) eligible for ART initiation. Proportions eligible for ART initiation were similar between Pima™ (40, 54.1%) and non-Pima™ (34, 45.9%) sites. Patients at Pima™ sites more often had timely initiation of ART compared to those at non-Pima™ sites (100% versus 11.8%, p<0.001). Median (IQR) days from first CD4 T cell count to ART initiation at Pima™ sites was significantly less than at non-Pima™ sites [1 (1-3) days versus 12 (16-26) days, p<0.001].

Conclusion: Sites with Pima™ resulted in faster initiation of ART than sites which send samples to the nearby centres for testing by FACS. It should be used to reduce delay in ART initiation in health centres across Tanzania.
POSTER 149

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Mobile Phones as a Source of Transmission of Nosocomial Pathogens in Healthcare Facilities: A Comparison Between Hospital Personnel and Visitors

Background: The objective of this study was to compare contamination rates by various microorganisms on mobile phones of healthcare workers (HCWs) and patient’s visitors (PVs) in various hospital settings and assessment of cross contamination of hands by bacteria from mobile phones.

Methods: Swabs from both mobile phones and hands of HCWs (61) and PVs (39) were taken and cultured on 5% sheep blood agar and MacConkey agar (Oxoid, UK). Growth was identified using colony morphology, Gram stain and standard biochemical identification tests. Antimicrobial susceptibility testing of isolates was carried out using the modified Kirby-Bauer disc diffusion method on Mueller Hinton agar (Oxoid, UK), as per CLSI guidelines. A questionnaire was designed for data collection.

Results: Mobile phones of 51/61 (84%) of HCWs and 26/39 (67%) of patient visitors were contaminated by bacteria associated with healthcare associated infections (HAIs). Isolates recovered ranged 1 to 6 per mobile phone. 143 bacterial isolates commonly associated with HAIs were recovered. Organisms which were susceptible to most of the antibiotic groups were 43 whereas MDR organisms recovered were 96 as illustrated in table below. A questionnaire was designed for data collection.

80% isolates from hands were similar to those isolated from their mobile phones. 64.3% were associated with HAI’s. According to the questionnaire 57% HCWs admitted using their phones while performing their respective jobs and between examination of patients, while 97.4% PVs were using their mobile phones while in hospital. Only 13% used disinfectants to wipe their phones.

Conclusion: HCWs and PVs use their mobile phones excessively while in the hospital thus contaminating them by HAIs associated microorganisms more so in HCWs. Therefore use of mobile phones should be curtailed to minimum in hospital setup to avoid spread of these highly resistant pathogens to patients in particular and community in general.

POSTER 150

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The Evaluation of New CD4 Technologies: the Zyomyx MyT4, the Becton Dickinson FACSPresto, and the Beckman Coulter Aquios CL with Tetra-1

Background: The U.S. Centers for Disease Control and Prevention (CDC) performs evaluations of HIV-related technologies to assess the analytical performance and feasibility of use in resource-limited settings. Here we describe the results of three recent evaluations of CD4 assays: Zyomyx MyT4, Beckton Dickinson (BD) FACSPresto, and Beckman Coulter Aquios CL with Tetra-1.

Methods: EDTA whole blood (Zyomyx MyT4 = 121, FACSPresto = 101, Aquios = 213) was analyzed between April 2014 and June 2015 on the test and reference assays (BD FACSCalibur, BD FACSCount and Alere Pima). Test assay performance was assessed by linear regression and Bland-Altman analysis compared to the mean CD4 count or CD4% of the reference assays. Precision was assessed by %CV (Coefficient of Variation) of samples tested 10 times in one day. Compatibility with quality control (QC) and external quality assurance (EQA) materials was also assessed on the MyT4 and FACSPresto.

Results: Bland-Altman analysis revealed a mean bias of $-11.8 \pm 63.2$ cells/µl for the MyT4, $51.2 \pm 41.9$ cells/µl and $1.4 \pm 1.3%$ for the FACSPresto and $-16.5 \pm 39.2$ cells/µl and $1.6 \pm 1.7%$ for the Aquios. The MyT4 assay had a mean %CV of CD4 count of 10.3%, compared to the FACSPresto (5.4%) and the Aquios (4.9%). MyT4 and FACSPresto were shown to be compatible with Streck CD-Chex Plus BC QC material, while only the FACSPresto was compatible with R&D Status Flow QC and UKNEQAS and CAP EQA material.

Conclusion: These data illustrate that the manual Zyomyx MyT4, the point-of-care BD FACSPresto, and the benchtop Beckman Coulter Aquios CL performed similarly to the reference assays, although the FACSPresto had a notable positive bias and the Zyomyx MyT4 assay demonstrated higher variability. In choosing appropriate CD4 technology, performance characteristics should be weighed against target level of placement within the tiered network and feasibility of sustainable quality monitoring.
**POSTER 151**

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**Implementation of HIV-1 Viral Load Testing in 4 West African Countries Using Innovative Open Polyvalent Platforms (OPP)**

**Background:** WHO recommendations indicate that HIV-1 viral load testing (VLT) should be done once a year for all treated patients; that represent huge needs of more than 15 millions tests a year. Open Polyvalent platforms OPP constitute an innovative technology for VLT and might help to increase the market with new suppliers. The public health goal of the OPPERA program is to scale up VLT by providing new tools at competitive prices.

We present the Phase 1 experience of this program funded by UNITAID.

**Methods:** The program was implemented in four West African countries (Ivory Cost, Cameroun, Guinea, Burundi). A Call for tenders organized in 2013 selected the Diasorin small extractor, the Roche PCR machine and the Biocentric Generic HIV. The procurement was centralized in Paris. Training programs were organized for 220 physicians and technicians. Physicians should prescribe VLT for cART treated patients. Samples for laboratory quality control were distributed for a weekly follow up of 8 quality indicators (to test sensitivity, reproducibility of each technique, in each lab). Analysis of the results was centralized.

**Results:**

Complete networks from blood sampling to result delivery were first implemented, including seven molecular biology laboratories (two in Ivory Cost, Cameroun, Guinea and one in Burundi). Labs have been rapidly efficient and functional; the weekly quality control confirmed a continuous good quality of quantitative results.

From August 2014 to April 2016 more than 50 000 VL were performed and more than 75% of patients controlled VL. We identified some difficulties for physicians to progressively include VLT in their clinical practice.

**Conclusion:** We report a large experience of VL implementation in four West African countries, showing the sustainability of OPP, a simple affordable and feasible approach to scale up VLT. In the Phase 2, TB and HBV diagnosis will be implemented on those polyvalent platforms.

**POSTER 152**

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**Molecular Characteristic and Insilico Analysis of KatG Gene in Isoniazid Resistance Mycobacterium tuberculosis isolate from Sudan**

**Background:** The KatG gene of Mycobacterium tuberculosis (MTB) coded for catalase-peroxidase, which was essential enzyme to activate isoniazid (INH) that considered as corner stone and main chemotherapy used throughout the world to manage tuberculosis, therefore alterations in katG gene has been strongly associated with INH drug resistance. The progress in apprehension of principle concepts associated with INH resistance have allowed molecular tests in addition to bioinformatics tool for the detection of drug-resistant tuberculosis to be developed. We conducted this study to detect KatG mutation(s) that responsible for converting MTB to multidrug-resistance MTB and to predict protein structure to identify possibility of this resist.

**Methods:** Part of katG gene hot region extracted from 20 multidrug-resistant Mycobacterium tuberculosis isolates, then were amplified through conventional Polymerase Chain Reaction. The amplicons were sequenced for INH resistance analysis. BLAST analysis with the available strain “EGY-K361” Mycobacterium tuberculosis with Accession No: KC49137.1. The secondary structure of wild and mutant proteins had been done using phyre2 software while the three dimensional structures of them had been done by Chimera software.

**Results:** All sequences revealed 100% identity except 6 isolates revealed 99% identity. Those six isolates (30%) have detected mutation in Catalase-peroxidase enzyme S315T; three isolate from six 3/6 (50%) of mutant isolates have SNP AGC>ACC substitution while others 3/6 have substitution C>G in position 1280 which may contributed in altering gene expression. Stability of mutant protein was increased which detected by i-mutant. Phylogenetic tree of the sequences revealed two distinct phylogroups: mutant isolates and wild isolates phylogroups.

**Conclusion:** Serine (S) at position 315 is one of potential drug active sites that proved via SiteEngine software, therefore any substitution will change efficiency of INH.
MONITORING OF TUBERCULOSIS TREATMENT RESPONSE IN REAL TIME USING A ‘MOLECULAR CULTURE’ METHOD: AN AFRICAN MULTI-CENTRE STUDY

**Background:** Tuberculosis (TB) is a global health threat and a difficult to treat disease requiring minimum 6 months to complete treatment. Effective monitoring of patient progress on treatment is crucial to ascertain response to prescribed therapy. Current methods are less sensitive, slow and prone to contamination. We report multisite evaluation of a rapid ‘molecular culture’, Mycobacterial molecular bacterial load assay (MBLA) that simultaneously detects and quantifies TB bacterial load of patients as a marker of response to anti-TB therapy.

**Methods:** Serial sputa from baseline to month 3 were collected from 178 TB patients and tested for treatment response using MBLA in parallel with MGIT and LJ culture. Bacterial load, rate (SLOPE) of clearance and time to culture positivity (TTP) were determined. Treatment response was defined as the change in patient’s bacterial load measured by MBLA or increase in MGIT TTP and or conversion to negative culture.

**Results:** 1768 samples were processed. Mean bacterial load at baseline was 6.1 ± 1.3 log_{10} CFU/ml falling to 1 ± 1.2 log_{10} CFU/ml with a corresponding rise in MGIT TTP, 5 ± 3 to 22 ± 11 days by month 3 of treatment, Spearman correlation = -0.5, p < 0.0001.

MGIT culture contamination rate was 25% of which 20% grew only contaminants and could neither be determined as TB positive nor negative. First 2 weeks of treatment marked the highest rate of response, SLOPE -1.0 log_{10} CFU/ml/week. At 3 months 55% and 76% of patients were negative by MBLA and MGIT respectively. Of the 17 (10%) patients who failed treatment 14 (82%), 4 (24%) and 1 (6%) were respectively detected TB positive by MBLA, MGIT and LJ at 2 months of follow-up. Unlike culture that was either negative or contaminated-undeterminable, MBLA consistently identified slow response to therapy among MDR patients. High baseline bacterial load strongly predicted TB positivity at 2 and 3 months of treatment, p < 0.0001. Analysis of assay standard processing of urines based on the greater sensitivity of the 0.01 ml (10ul) loop was introduced to process urine specimens with higher bacterial counts eg. catheter urine. The 0.01 ml loop was retained to process specimens with lower bacterial counts eg. suprapubic urine. A verification of the smaller loop was required prior to routine implementation.

**Results:** The 10^6 culture of E. coli yielded between 30-300 colonies and the conversion factor was calculated as 10^6 CFU/ml. The isolates were further diluted 1:10, three more times to represent 10^7, 10^8, and 10^9 CFU/ml.

4. A further “1:20 dilution” of the “10^7, 10^8, and 10^9” CFU/ml dilutions were made and spread with a glass spreader for accurate colony counting.

5. After 18 h incubation, the lowest dilution of the 1:20 dilution plates that had 30 – 300 colonies was found and the colony count was multiplied by 20 to determine the CFU/ml. This count was used to adjust the final colony counts for each of the four dilutions.

**Conclusion:** The findings recommend continued use of 2 loops for the processing of urines based on the greater sensitivity of the 0.01 ml loop for having a marginally greater threshold of detecting the lower bacterial counts.
**POSTER 155**

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**Evaluation of Five Years Early Infant Diagnosis (2009 - 2013) In Infants and Children Born to HIV Positive Mothers In Mali**

**Background:** Early Infant diagnosis began in 2008 in Mali and currently covers 54 sites in four regions and Bamako District. According to sentinel surveillance among pregnant women, HIV prevalence was 3.4% in 2012. Our study aim was to evaluate five years activity.

**Methods:** This was an early infant diagnosis assessment from January 2009 to December 2013 among children less than aged18 months born to HIV-1 positive mothers in 4/8 regions (Kayes, Koulikoro, Sikasso, Segou) and Bamako District. Data from a centralized system for collecting and samples shipment to the reference laboratory at Bamako were analyzed. Molecular diagnosis was performed for all DBS using AMPLICOR HIV-1 DNA kit, m2000rt and AmpliPrep / Taqman. Positive cases were retested for a second PCR. Discordant cases were tested for a third round.

**Results:** Overall 4960 PCR were performed: 564 in 2009, 853 in 2010, 1400 in 2011, 829 in 2012 and 1314 in 2013. Median age was 3 months [0- 26]. Prophylaxis was reported in 25.2% of newborns. The estimated transmission rate was 7.3% in 2009; 9.4% in 2010; 8.6% in 2011, 10% in 2012 and 9.4% in 2013.

The transmission rate was higher among children who received mixed feeding (25.6%) than those who received artificial feeding (6.7%) and breastfeeding (8.4%). The transmission rate was lower in children who received prophylaxis (3.1%) than children who had not received it (25.2%).

**Conclusion:** The transmission rate is still high and preventive measures must be strengthened for elimination of mother-to-child transmission of HIV.

**POSTER 156**

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**The Spectrum of Use of the Xpert MTB/RIF Test in the South African National GeneXpert Program**

**Background:** The Xpert MTB/RIF (Xpert) test was implemented in South Africa in 2011 for initial diagnosis of pulmonary TB as a replacement for smear microscopy. By 2013, 207 testing centres were established and additional protocols for the use of Xpert for paediatric and extrapulmonary (EPTB) specimens were introduced. Five years and over 8.1million tests later, we investigated the spectrum of use of this test within a 12 month period.

**Methods:** Xpert results from tests performed between October 2014-September 2015 were obtained from the NHLS data warehouse including the variables specimen type, testing laboratory, specimen collection facility name and patient age. After data cleaning, descriptive analysis was performed.

**Results:** Of 2,362,821 Xpert tests, 9.7% were positive for *Mycobacterium tuberculosis* Complex (MTBC) and 6.3% resistant to rifampicin (RR), with 2.4% performed on non-pulmonary specimens, and 13% performed on patients aged <13 years. The predominant specimens from children aged <5 years were sputum (91%), gastric wash (7%) and 1% each for CSF and fluid aspirates. The Xpert detected an overall positivity rate of 7% with 7% RR. Children aged between 5-13 years reported testing predominantly on sputum specimens (99%), with MTBC detected in 1.7% with 7.5% RR. Among patients aged >13 years, 99% of the specimens were from sputum, and Xpert was positive in 10.2% with 6.2% RR. The predominant EPTB specimen in patients aged >13 years was CSF (43%) with Xpert positive in 3.1% with 10.8% RR, followed by fluid aspirates (26%) with Xpert positive in 13% with 8.6% RR. Test volumes and MTBC positivity varied across provinces: Kwa-Zulu Natal contributed the highest test volumes (25%), and Limpopo and Northern Cape the least (~3%). Western Cape reported the highest MTBC positivity for individuals aged 5-13 years (2.8%) and aged >13 years (15.6%), while Gauteng reported the highest MTBC positivity among children aged <5 years (9%).

**Conclusion:** The uptake of Xpert testing has been good across the country, with the yield of MTBC depending on specimen type, age and geography.
Evaluation of Ceftriaxone Use for Hospitalized Patients in Ethiopia: The Case of a Referral Hospital

Background: Microorganisms resistance has grown due to frequent use and misuse of antimicrobial agents both in humans and animals resulting in global public health and economic threats. We evaluated the prescribing practices of ceftriaxone at inpatients, Felege hiwot referral hospital in Ethiopia.

Methods: We retrospectively reviewed the prescribing practices of ceftriaxone in 127 patients who received ceftriaxone between April 1, 20015 and June 30, 2015. Ceftriaxone use evaluation was based on standards set by World health organization. The criteria used in this evaluation were indication for use; the dose, frequency, duration, contraindication and interaction. The presence of a single error in either of the individual criteria was considered as inappropriate use.

Results: The overall evaluation of use of ceftriaxone was inappropriate in 88 cases (70.0%) which seem higher than other hospitals in Ethiopia. Inappropriate use of ceftriaxone by diagnosis were, acute abdomen 23 (79.3%), pneumonia 19 (67.9%), sepsis 12 (75.0%), trauma 8 (80.0%), obstructed labor 7 (75.3%), elective surgical cases 6 (75.0%), meningitis 4 (44.4%), lower urinary tract infection 3 (100.0%), upper urinary tract infection 1 (50.0%), and others 5 (55.6%). The inappropriate use of ceftriaxone by the different units of inpatients were surgery 41 (74.5%), internal medicine 19 (65.5%), gynecology and obstetrics 20 (74.1%), and pediatrics 8 (50%). Most of the durations of prescribing showed a high rate of inappropriateness which accounts 60 cases (47.2%) of the total inappropriateness followed by frequency 11 (8.7%), interaction 9 (7.1%), indication 6 (4.7%) and contraindication 2 (1.6%) respectively.

Conclusion: Inappropriate prescribing of ceftriaxone was higher compared to other hospitals in Ethiopia. Antimicrobial stewardship in general and prudent prescribing of ceftriaxone in particular is needed to improve its useful life. This research can be extrapolated to other antimicrobials and health facilities for appropriate interventions.

Assessment of Cytological Changes in Cervical Smears Among Women of Active Reproductive Age in Kebbi State, Nigeria

Background: Women of active reproductive age are more likely to have cervical cancer and its precursors, and suggested co factors includes, age at first intercourse, number of life partners, parity, co infection with Herpes simplex Virus 2, Human papilloma Virus, use of contraceptives and family history. Early detection and treatment of the precursor lesions and co-infection can prevent neoplastic lesions. This study sought to assess cytological changes in cervical smears among women in Kebbi State.

Methods: Cervical cancer screening was conducted on 150 consenting women in five local government areas of Gwandu emirate council of Kebbi State. Eligibility criteria included women aged 15-60 years who had no prior screening for cervical lesion, women who visited the gynecology unit presenting with a history of sexually transmitted infection associated with recurrent itching and bleeding, and women with a history of candidasis, bacterial vaginosis, trichomoniasis, herpex simplex, HPV and HIV. Standard Papnicouloa manual staining technique was employed, and microscopic examination of the different patterns of cytological changes (premalignant lesions) in smears obtained from the 150 subjects.

Results: In total, 106 (70.3%) respondents had no knowledge of cervical cancer. Of the 150 women screened, 32 (21%) presented different cytological features, 8 (5.3%) presented CIN 1,18 (12%) had CIN 2,11 (7.3%) presented CIN 3, and 2(1.3%) were associated with Human Papilloma Virus (HPV), Sexually transmitted infection, recurrent vaginal discharge, HPV, HIV, smoking, oral contraceptives, [arity and number of previous husbands were significant factors in cervical lesion.

Conclusion: This study highlights the lack of awareness of cervical cancer screening and identifies risk factors for cervical lesions. Unavailability of routine screening programs and poor uptake of cervical screening by women may be responsible for the increase in the death rate due to the occurrences of cervical neoplastic changes which can progress to cancer among women in Kebbi State. We recommend that more attention be placed in recognising and addressing this preventable cancer among women.
**POSTER 159**

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**Leishmania Donovani: An In Vitro Study of Antimony-resistant Amphotericin B-sensitive Isolates**

**Background:** Drug sensitivity of clinically antimony-unresponsive Leishmania donovani isolates from Eastern Sudan was evaluated in an in vitro culture system against sodium stibogluconate (Pentostam) and Amphotericin B. This study was initiated in an attempt to determine the in vitro sensitivity of *Leishmania donovani* isolates from Sudanese VL patients with diverse clinical drug responsiveness to standard leishmanicidal drugs.

**Methods:** Eight isolates, six from antimony-resistant and two from clinically responsive patients were included in the study. Parasites were tested as promastigotes and four of them were selected to be tested as amastigotes using a murine macrophage-like cell line. The results indicated that the conventional promastigotes and amastigotes-screening assays did not correlate with the clinical picture of patients. In vivo unresponsiveness does not necessarily mean primary parasite resistance.

**Results:** The results indicated that the conventional promastigotes and amastigotes-screening assays did not correlate with the clinical picture of patients. Increasing concentrations of SSG diminished the incorporation of the [3H]thymidine in a linear fashion compared to the control values in both sensitive and resistant isolates. [3H]thymidine uptake was inhibited in all isolates in a linear fashion with increased concentrations of amphotericin B. In the macrophage assays, the four parasites tested were highly infective to the cells (80–99%) and exhibited moderate to high intracellular replication potentials.

**Conclusion:** Amphotericin B could be a suitable second line drug in patients unresponsive to pentostam and without concomitant diseases, if close hospital monitoring is available. Promastigotes sensitivity testing concentrations are virtually incomparable with the in vivo clinically curable doses and the amastigotes/macrophage test concentrations.

**POSTER 160**

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**Anti-Leishmania Donovani Antibodies Enhance Promastigotes Internalization Into Host Macrophage**

**Background:** *Leishmania* promastigotes and amastigotes preferentially infect macrophages, where several host cell surface molecules have been proposed to mediate internalization of *Leishmania* into macrophages.

This study aimed to demonstrate the role of humoral immunity in *Leishmania* parasite internalization into host macrophages.

**Methods:** Informed consent sera were obtained from 67 parasitologically confirmed visceral leishmaniasis patients reporting to our field treatment centre, Eastern Sudan. Then following titre determination, sera that had a titre of >102,400 were selected for parasite coating. An *in vitro* parasite internalization system was developed to enhance the *Leishmania* macrophage interactions.

**Results:** The mean parasite number per monocytes was 626 ± 91 for antibody-coated *Leishmania donovani*, compared to 412 ± 70 uncoated isolates (\(p=0.01\)). On the other hand, the percentage of infected cells was significantly higher for all antibody-coated isolates (100%) compared to uncoated ones (40%). This evidence of high infectivity probably points to the fact that anti-*Leishmania* antibodies facilitated the parasite uptake by host macrophages and monocytes-derived macrophages (MDM).

**Conclusion:** *Leishmania* spp. promastigotes preferentially infect host macrophages, where parasite internalization is facilitated by several host and parasite surface molecules. Moreover, the rate of parasite uptake by MDM was significantly higher compared to monocytes. This could be explained by the fact that the functional capabilities of fully differentiated macrophages differ from monocytes. In conclusion, host humoral immunity probably plays a pivotal role in *Leishmania* parasites internalization into host macrophages.
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The Economic Impact of Treating Hepatitis C in Ethiopia: The Case for Increased Investment

Background: Hepatitis C virus (HCV) is endemic in Ethiopia [1], where viral hepatitis is responsible for 60-80% of hepatocellular carcinoma in the country [2]. HCV treatment is cost intensive in resource-constrained countries [2], but new therapies are making HCV a more manageable disease [4-6]. The economic impact of three scenarios is evaluated using a disease progression model.

Methods: A model was developed to estimate changes in HCV-related disease and economic burden. Assumptions are based on published literature and validated by in-country experts. Direct costs (in US Dollars) include diagnostic, screening, treatment and healthcare costs. Indirect costs (USD) are estimated as lost productivity using disability-adjusted life years (DALYs). Three scenarios were developed to estimate the cost-effectiveness of HCV treatment through 2050: Base; Increase Treatment Efficacy only; Disease Control.

Results: Under the Base scenario, total direct costs during 2015-2050 are estimated at 4.3 billion and indirect costs at 563 million. Under the Increased Treatment Efficacy only scenario, total healthcare costs during 2015-2050 decrease by 0.13% and indirect costs decrease by 0.19% as compared to the Base scenario, with relatively small reductions due to low treatment rate.

Under the Disease Control scenario, healthcare costs decrease by 57%, while total direct costs decrease by 40%, largely due to reductions in costs associated with end stage liver disease. Total indirect costs decrease by 85% with a marked decline in DALYs and a reduction of 70% in HCV-related deaths. This scenario is cost-effective, achieving a positive cumulative return on investment by 2033. By 2050, annual total costs are estimated at 2.7 billion, a 39% reduction from the Base scenario.

Conclusion: Reducing HCV-related disease and economic burden are achievable by 2050 if policies to expand screening and treatment are put in place. National intervention is needed to implement strategies leading to long term return on investment.

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Bacterial Indoor-Air Load and Its Implications for Healthcare-Associated Infections in A Teaching Hospital in Ethiopia

Background: Microbial quality of indoor-air in healthcare facilities is essential for the wellbeing of the occupants. Lack of regular cleaning and disinfection practices in the healthcare environment is among the main factors for the spread of healthcare-associated infections (HAIs). The aim of this study was to determine the profile, load and antimicrobial susceptibility pattern of bacterial isolates from indoor-air of medically sensitive rooms at Adama Hospital Medical College, Adama, Ethiopia.

Methods: Totally, 78 indoor-air samples were collected from 29 rooms of teaching hospital, from May-August 2013. Settle plate sampling technique was implemented to obtain the index of bacterial air contamination. A 90mm diameter Petri-dish containing Sheep Blood agar was left open according to the 1/1/1 scheme to recover possible indoor-air bacterial colonizers. The samples were processed following standard bacteriological procedures at Oromia Regional Public Health Laboratory, Adama, Ethiopia. The colony forming units were calculated in CFU/m³. Data were analyzed using SPSS version 20.0.

Results: Overall, 182 bacterial isolates were recovered with an average of 3.42 bacterial species/room. The predominant isolates observed were Coagulase Negative Staphylococci (CNS) (42.9%), Staphylococcus aureus (20.3%), Pseudomonas spp (10.4%) and Escherichia coli (6.6%). The highest mean colony forming units were obtained in Obstetrics and Surgical wards, 1.2x10¹+18.31cfu/m³ and 8.7x10+2943.7cfu/m³, respectively. 8% of the S. aureus and 7.6% of the CNS isolates were resistant to 8 and 7 classes of antibiotics including methicillin, respectively. Moreover, 10 (27%) of S. aureus strains were MRSA.

Conclusion: Bacterial indoor-air loads of the hospital rooms were beyond the acceptable standard limit. Profile of the isolates revealed the presence of multidrug resistant agents that cause HAIs. Hence, safety precautions should be strictly followed in the hospital to prevent tragic outcomes of HAIs.
First Laboratory Confirmation of an Outbreak of Rift Valley Fever Virus in 50 Years in Kabale District, Southwestern Uganda

**Background:** On March 10, 2016, the Uganda Virus Research Institute (UVRI)/CDC Viral Hemorrhagic Fever laboratory was notified of two suspected VHF cases from Kabale district, South Western Uganda. Both cases presented with febrile illness and reported fever, vomiting, fatigue, abdominal pain, headache, epistaxis, and melena. The initial case was a butcher who worked in the central Kabale abattoir. The second case was a student who resided approximately 12 km south from central Kabale. The two cases were not epidemiologically linked.

**Methods:** Both cases were confirmed as RVF by RT-PCR and IgM serology. Within 24 hours, a team from UVRI, the Uganda MOH, and CDC-Uganda traveled to Kabale to carry out epidemiological and ecological investigations to determine the extent of the outbreak. Samples from 21 family members and community members of the confirmed and probable cases were collected, along with 86 livestock specimens from the same locations.

**Results:** Only two acute RVF cases were identified. One additional case was retrospectively identified as RVF by IgG serology. No additional human cases were confirmed from the household investigation samples collected. 9% of livestock specimens tested positive for RVF by IgG, and one caprine from the village of one of the confirmed cases also tested positive by RT-PCR. An expanded district-wide human and livestock serosurvey was initiated following these results to determine how widespread RVF transmission is in the region.

**Conclusion:** Extensive outbreaks of RVF have occurred elsewhere in East Africa, notably in 1997-1998 and 2006-2007. This RVF outbreak in Kabale represents the first reported laboratory confirmed human cases in Uganda since 1968, and is the 11th independent VHF outbreak confirmation in Uganda since enhanced VHF surveillance began in 2011. It again highlights the importance of the Uganda VHF surveillance and laboratory program in detecting outbreaks early in order to initiate rapid response and control.

**Poster 164**

**Disseminated Bacilli Calmette-Guerin Disease from the Northern Region of South Africa**

**Background:** Vaccination with bacille Calmette-Guerin (BCG), a live attenuated strain of *Mycobacterium bovis* (*M. bovis*), is primarily used to vaccinate infants against tuberculosis (TB). Its efficacy in high HIV endemic countries like South Africa remains controversial. Previous studies show that HIV-related suppression of T-cells can compromise specific T-cell mediated immune responses and reduces BCG efficacy in infants. Disseminated BCG disease is associated with high mortality rates in infants. The BCG vaccine strain Danish 1331 has been previously associated with complications such as regional lymphadenitis, osteomyelitis and disseminated infections. In South Africa, the Danish 1331 strain replaced the Tokyo 172-1 strain in early 2000 as a BCG vaccination strain; however, data to determine its efficacy to date are scant.

**Methods:** This was a prospective study. Five culture isolates from suspected disseminated BCG disease were collected from the National Health Laboratory Service (NHLS) from July 2014 to January 2015. Data collected included: sex, age, and type of specimen. Drug susceptibility testing (DST) to isoniazid and rifampin was performed using MTBDRplus assay and for molecular characterization, a spoligotyping assay was used.

**Results:** All culture isolates were from infants less than 12 months old. Four of these isolates were from abscess aspirate and one from a lymph node tissue. All culture isolates were confirmed to be *M. bovis* susceptible to both isoniazid and rifampin by the MTBDRplus assay. The spoligotyping assay characterized all isolates to be BOVIS1_BCG strain.

**Conclusion:** Findings emphasize the need for data to determine the protective efficacy of BCG vaccine in both HIV-infected and -uninfected infants in high TB and HIV settings. Safer and more effective antituberculosis strategies are urgently needed for high TB and HIV endemic countries.
**POSTER 165**

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**The Increase of Laboratories Participating on Quality Assurance Program for CD4 Testing Does Not Affect the All Performance, in Mozambique**

**Background:** External Quality Assurance (EQA) programs are important to measure the performance of laboratories that perform the same test. The main challenge of these programs is the increase on number of laboratories participants that could affect the performance of the EQA program. It is necessary, therefore, to monitor the performance this laboratories to ensure that the augment of the participants do not affect the EQA program and laboratory testing.

**Methods:** In 2005, Mozambique started participating in an EQA CD4+ T cell program to ensure the quality of results provided by the laboratories. Three times a year, all sites that perform CD4 testing receive a panel composed of two specimens with low and normal level of CD4 T cells. The laboratory results were sent to INS for submission to the Quality Assessment and Standardization for Immunological Measure (QASI) program. The performance of all laboratories was analyzed based on reports for National EQA Program for CD4 testing (PNAEQ).

**Results:** We monitored the performance of 17 panels, from 2009 to June 2015. During this period, the number of participants increased from 26 to 165 laboratories. The number of participants increased 6 times but did not affect the national performance (>90% successful) in all panels. This performance was also not affected by the percentage of participation in each panel.

**Conclusion:** These results suggests that the increase on number of participants on EQA-CD4 program when accompanied with monitoring of remedial actions implementation’s do not affect the general performance. The success of the program depends also on follow-up of the sites.

**POSTER 166**

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**Rapid, Blood and Bone Marrow Based TB Diagnostic Test Which Characterises and Distinguishes Between BCG, Latent and Active TB Using Flow Cytometry by Measuring Intracellular Cytokines Released by CD4 T Helper Cells**

**Background:** Accurate TB diagnostics still faces challenges due to the limitations of current assays. There’s a need for a rapid diagnostic assay to distinguish between BCG, latent and active TB. Most current diagnostic tools use sputum or body fluids in their assays. The diagnosis of disseminated TB in the absence of a sputum sample or body fluid still remains a challenge. This study aims to develop and validate a rapid flow cytometry (FC) blood and bone marrow-based TB test to diagnose and distinguish between BCG, latent and active TB by measuring cytokines released by CD4 T cells following exposure to TB specific antigens. Additionally this study aims to detect TB in patients who cannot produce sputum such as immune-compromised patients, in whom disseminated TB is suspected clinically. The results could add important strategic focus for managing TB in resource constrained environments.

**Methods:** TB positive and HIV-1 negative/positive patients will be recruited from Tygerberg Hospital. Whole blood will be stimulated for 18 hours with TB antigens (ESAT6 & CFP10) and Staphyloccous enterotoxin B. Thereafter sample preparation for multicolour flow cytometry follows a whole blood no-centrifuge intracellular staining protocol. CD45+ CD3+ T cells will be delineated into the following subsets: naïve (CD45RO- CD27+), central memory (CD45RO+ CD27+), effector memory (EM)(CD45RO+ CD27- ) and terminally differentiated EM (CD45RO- CD27-).

**Results:** Expression dynamic of intracellular cytokines TNF-α and IFN-γ and the exhaustion marker TIM-3 on the T-cell subsets will be studied to classify results as active TB, latent TB or BCG vaccinated individuals

**Conclusion:** Flow cytometry enables us to identify antigen-specific lymphocytes in whole blood and bone marrow following antigen stimulation, which therefore should provide us with a higher positive predictive value when compared to the current conventional gold standard methods for distinction between BCG, latent and active TB. Furthermore it may supersede the more advanced techniques such as GeneXpert in the diagnosis of disseminated TB and could certainly represent a potential diagnostic tool within our setting.
**POSTER 167**

**Samuel Sorie**

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**Public Health Rapid Response Team (PHRRT) Diagnostic Capacity to Combat Measles Threats**

**Background:** Measles is a highly contagious, serious disease caused by a virus. The disease remains one of the leading causes of death among young children globally, despite the availability of a safe and effective vaccine. Approximately 114,900 people died from measles in 2014 – mostly children under the age of 5.

In Sierra Leone, many children missed out on routine vaccination services due to the Ebola outbreak and since 2014, measles outbreaks, mostly among under-five children, have been reported in the country.

The year-long Ebola outbreak in Sierra Leone has had a negative impact on basic health services, especially maternal and child health, with opportunistic childhood diseases such as measles continuing to challenge an already overstretched system.

Hence, the health system with shortage of trained laboratory scientist had to train public health laboratory personnel to serve as a rapid diagnostic response to public health prone diseases such as measles. Now, in the Measles unit are two (2) trained laboratory scientists who can rapidly respond to treat or outbreaks of measles in the country.

**Methods:** The study examines the positive impact of rapid diagnostic response available to analyze all Measles samples presently as compared to the past and how has that improved the surveillance and diagnostic response to national treat of measles.

We also compared the inflow of samples for diagnosis in the first quarter of the year 2016 and PHRRT response to analyze them in good turn-around-time.

**Results:** The Measles/Rubella unit has shown an improved diagnostic capacity to handle cases of Measles/rubella in country, setup EQA systems and work with partner laboratories.

**CONCLUSION:**

There is a greater need for improvement in diagnostic capacity to handle the diagnosis of public health diseases. The result shows how just in a quarter, 238 samples of measles have been analyzed by the PUBLIC HEALTH RAPID RESPONSE TEAM (PHRRT), and the turn-around time has improved by 95%. This improvement in the diagnostic capacity has positively impacted the diagnostic response available to handle public health prone diseases in the country.

Therefore, there is a call for more trainings and sustenance of diagnostic capacity in the country.

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**POSTER 168**

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**Evaluation of Agreement of the Results of HIV Pre-mortem and Post-mortem, Using Rapid HIV Tests in Use in the National Algorithm**

**Background:** In Mozambique, HIV testing in forensic medicine and for the administration of prophylaxis in autopsy rooms is done using rapid tests (Determine HIV-1/2 and Unigold HIV) that were previously validated for living individuals. Our study aimed to assess the performance of anti-HIV Rapid Tests Determine HIV-1/2 and Unigold HIV for use in the national algorithm for HIV testing of cadavers in autopsies.

**Methods:** We conducted a cross sectional study of corpses at the Pathology Service (SAP) of Maputo Central Hospital (MCH). Blood samples were taken from all bodies that meet the selection criteria, including a request for clinical and autopsy results of prior HIV available in the clinical process. Rapid tests were conducted at the SAP autopsy room according to the national algorithm in place for HIV testing. We report compliance measures between the results of HIV pre-mortem test and post-mortem test.

**Results:** Of the 438 screened corpses 10 (2.3 %) were excluded for not having results available (pre and post-mortem). In total, 280/428 were HIV-positive (HIV +) pre-mortem, but 5 were HIV- and 6 were indeterminate point-mortem. Of the 148/428 who were pre-mortem HIV-, 8 were post-mortem HIV+ and 12 were post-mortem HIV-indeterminate. We observed a concordance of 92.8% (95% CI : 89.9-95.0) and kappa 0.846 (95% CI : 0.790-0.901).

Over half (18/31) of discordant HIV tests were indeterminate post-mortem and of these 33.3 % (6/18) were pre-mortem HIV+. After excluding indeterminate results, the kappa was 0.928 (95% CI 0.89 -0.97).

**Conclusion:** The agreement of rapid HIV tests pre and post-mortem is good and support the decision making of the administration of post-exposure prophylaxis whenever there is an occupational accident by technical staff involved in the management of dead bodies.
**Poster 169**

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*Xpert MTB/RIF for the rapid detection of rifampicin resistance Mycobacterium tuberculosis from pulmonary tuberculosis patients in Southwest Ethiopia*

**Background:** Accurate and rapid detection of drug resistant strain is critical for early initiation of treatment and for limiting the transmission of drug resistant TB. We investigated the accuracy of Xpert MTB/RIF for detection of rifampicin resistance and whether detection of rifampicin resistance by Xpert MTB/RIF predicts multidrug resistance (MDR) in Southwest Ethiopia.

**Methods:** Smear- or culture-positive sputa obtained from TB patients with increased suspicion of drug resistance were included in this study. GenoType MTBDRplus line probe assay (LPA) and Xpert MTB/RIF tests were done directly on smear-positive sputum specimens and on the cultured isolates for smear-negative specimens. We used the routine drug susceptibility test using LPA as the reference standard for confirmation of rifampicin (RIF) and isoniazid (INH) resistance.

**Results:** In this preliminary result, first line drug susceptibility results were available for 67 *M. tuberculosis* complex-positive sputum specimens using LPA test: 30% (20/67) were MDR-TB, 3% (2/67) were RIF monoresistant, 6% (4/67) were INH monoresistant, and 61% (41/67) were susceptible to both RIF and INH. Relative to routine RIF susceptibility testing (LPA), Xpert MTB/RIF detected all RIF resistance correctly with 100% sensitivity and 97.8% specificity. The positive predictive value of Xpert MTB/RIF for RIF resistance was 95.7%. Of 23 RIF resistant strains on Xpert MTB/RIF, 87% (20/23) were resistant to both RIF and INH (MDR), 8.7% (2/23) were RIF monoresistant, and 4.3% (1/23) were sensitive to RIF by LPA test. High proportion of RIF resistance was documented among patients previously categorized as failure cases (50%, 10/20) followed by relapse cases (31.6%, 6/19), and defaulters (28.6%, 2/7).

**Conclusion:** Xpert MTB/RIF was highly effective for identification of rifampin-resistant strains in smear or culture-positive samples. RIF resistance based on Xpert MTB/RIF result could be used to estimate multidrug resistance and can allow rapid initiation of MDR-TB treatment in regions with high drug resistant TB.

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**Poster 170**

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*Sero Epidemiology of Hepatitis B and C Viruses in the General Population of Burkina Faso*

**Background:** In Burkina Faso, few studies reported the prevalence of HBV and HCV in the general population. This study aimed to evaluate the sero-prevalence of hepatitis B and C viruses in the general population and to determine the most affected groups in relation with the risk factors associated with the infection.

**Methods:** A voluntary testing opened to anyone interested was held at Saint Camille Hospital Ouagadougou. Rapid tests were carried out on 995 people who voluntarily answered a range of questions before the venous blood sampling.

**Results:** Antigens anti-HbS carriers in the general population represented 144/995 (14.47 %) and the prevalence of HCV was 10/995 (1.00%). The difference between HBV’s prevalence in men (18.58%) and women (11.60%) was statistically significant (p = 0.002). The most affected groups were students (19.57 %), those working in the informal sector (15.98 %) and the least affected group was high school students (8.82 %).

**Conclusion:** HBV has a high prevalence while that of HCV is still low in the general population of Burkina Faso. Therefore, more campaigns on the transmission routes of HBV and HCV are needed to reduce the spread of these viruses in sub-Saharan Africa.
**POSTER 171**

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**Burden of Hepatitis B Virus and the Risk of Vertical Transmission at the Penka Michel Health District, Cameroon**

**Background:** Hepatitis B virus (HBV) is transmitted through blood and infected body fluids. Prevention of vertical transmission is of high importance since early infection in life usually results in a chronic carrier state. Among the risk factors are infants born by infected mothers. In this study we evaluated the overall prevalence of HBV in pregnant women and their children in Penka- Michel, a rural health district in West Region of Cameroon, as well as the incidence of socio-demographic characteristics of the study population.

**Methods:** The study was carried out from February to June 2014 and involved 1021 pregnant women and 751 of their children born at the Penka-Michel health district. Questionnaire was administered to identify factors that may influence the transmission rate of HBV in pregnant women and their children. Blood samples from volunteers were screened for the serological markers (HBcAb, HBeAb, HBeAg and HBsAg) using ELISA method.

**Results:** The overall prevalence of hepatitis B based on the positivity to HBsAg was estimated at 15.2% while the prevalence of HBeAg, anti-HBe and anti-HBc were respectively 2.2%, 0.9% and 77.4%. The highest prevalence rate of HBsAg (24.5%) was recorded for pregnant women aged above 40 years and the lowest recorded (13.9%) for those aged between 15-19 years. In children the prevalence of HBsAg was estimated at 10.7%.

**Conclusion:** This study indicates that in rural areas of Cameroon, hepatitis B infection may be high, and improved education on the severity and mode of transmission of the virus may be a very important strategy to reduce the hepatitis B prevalence in pregnant women and their children.

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**POSTER 172**

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**Comparison of Malaria Rapid Diagnostic Tests with Microscopy for the Diagnosis of Malaria at Lubwe Mission Hospital, Samfya, Zambia**

**Background:** High quality malaria diagnosis is the pillar to proper treatment and reduction in mortality and morbidity in a malaria endemic area like the community surrounding Lubwe Mission Hospital. Although microscopy is the golden standard method of malaria diagnosis, due to erratic power supply in the area, RDTs are often preferred to microscopy and due to short turnaround time. However, the results obtained are not of quality assured standards as compared to microscopy. Finding the contributing factors will help improve to provide quality assured accurate reliable laboratory results.

**Methods:** Malaria RDT tests results data were routinely captured in registers in all the 5 PoC sites. Comparison with microscopy data and repeated RDTs based on Hospital numbers for 11 months period were entered in a database and analyzed to identify which PoC sites are commonly affected.

**Results:** From May 2012 to March 2013, Lubwe Mission Hospital recorded a total of 18,116 with 895 false (positive and negative) results tested with a mean of 75 false (positive and negative) RDT results per month. False negative results recorded a higher percentage (4.0%) than false positive results (0.9%). Although false (both positive and negative) results were recorded from all the 5 PoC sites, OPD and wards accounted for 80.7% of all false malaria RDT results.

**Conclusion:** There is a high rate of false malaria RDT tests results in PoC sites at Lubwe Mission Hospital. Therefore the interventions required will be to sensitize and train personnel especially at OPD and nurses in the wards; also to establish a quality assurance system in all the sites performing RDTs.
Colonization and Drug Resistance Pattern of Staphylococcus Aureus among Pre-school Children in Debre Markos Town Northwest Ethiopia, 2015

Background: Staphylococcus aureus is one of the bacterium that can asymptomatically colonize the human upper respiratory tract (i.e. nose and throat). Carriage of S. aureus, including methicillin resistant Staphylococcus aureus, is common in children.

Methods: Institutional-based cross sectional study was conducted. A total of 400 nasal swabs were collected from pre-school children from April to June, 2015 following standard microbiological methods. MRSA was detected using both Cefoxitin (30µg) and Oxacillin (6 µg) (Oxoid Ltd. England) discs in combination and associated factors were assessed using self-administered pretested questionnaires, which were delivered to the children’s parents/guardians. Statistical analysis of the data (logistic regression) was done using SPSS V-22.

Results: A total of 52 Staphylococcus aureus isolates were recovered from 400 nasal swap samples. The prevalence of S. aureus among pre-School children was 13 % (52/400). The susceptibility patterns of the isolates to commonly used antibiotics were: 84.62% to Chloramphenicol, 69.2% to Doxycycline and Tetracycline, 92.3% to Kanamycin, 7.7% to Ampicillin and Penicillin, 86.6% to Ceftriaxone, and 76.9 % to Augmentin. All the isolates were sensitive to Oxacillin, and also sensitive to Gentamycin, Erythromycin and Clindamycin. The main associated factors for nasal colonization of S. aureus in the study area were, having recurrent acute otitis media [AOR= 2.09(1.08, 4.09)], Children admission in hospital [AOR=1.96(1.03, 3.73)] and cough [AOR=2.09(1.08, 4.09)].

Conclusion: This is the first study among Ethiopian pre-school children below six years of age studying nasal colonization of S. aureus and antimicrobial susceptibility pattern of the isolates and showed that attending pre-school was associated with S. aureus colonization, having factors like, recurrent acute otitis media, hospital admission and cough.

Introduction of Point-of-Care Monitoring and Diagnostic Technologies for HIV: Decision-Making Processes in Tanzania and Zambia

Background: Point-of-Care (POC) approaches to CD4, viral load and early infant diagnosis are currently either available or in development. However, there have been lengthy delays in the national uptake of POC technologies, particularly in low-income countries. This study aimed to understand the decision-making process to introduce new HIV POC monitoring and diagnostic technologies.

Methods: Semi-structured interviews (n=30) with key stakeholders involved in, or knowledgeable of, the introduction process were carried out in Tanzania and Zambia in 2015. Key informants were purposively sampled and included staff from Ministries of Health (MOHs), NGOs, international organisations and the pharmaceutical industry. Interview transcripts were coded and analysed thematically.

Results: In both countries, Alere’s Pima was the only CD4 POC test to have been introduced; viral load testing and early infant diagnosing continued to be lab-based. Although there was a general satisfaction about having introduced Pima, the decision-making process was felt to have been excessively long. Laboratory and field evaluations were carried out before a decision was made. There were competing motivations for introduction: increasing access and reducing turn around-time of results, but also reducing laboratories’ testing volume. Although MOHs were the main actors involved, international donors played an important role in advocating for POC technologies and in setting timelines for procuring equipment consistent with their own budgetary deadlines. Some laboratory staff were sceptical about decentralising monitoring and diagnostic technologies; consensus-building took time. Although prices of equipment and reagents were examined, staff-related costs and cost-utility considerations did not play a key role. Changes in WHO guidelines on antiretroviral treatment initiation delayed the introduction by causing shifts in national programme priorities. The introduction process required the creation of Pima-specific guidelines.

Conclusion: The debate around technology decentralisation can be polarising. Those hoping to introduce HIV POC technologies may accelerate the process through the preparation of generic HIV POC guidelines that can later be tailored to specific diagnostic devices. Challenges will remain in aligning national capabilities and priorities with donor timelines and international agencies’ guidelines.
**POSTER 175**

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**Implementation of a Pneumocystis jirovecii Molecular Detection Assay: Clinicians Buy In**

**Background:** Pneumocystis pneumonia (PCP) caused by an opportunistic agent *Pneumocystis jirovecii* (PJP) is one of the most serious respiratory infections in immunocompromised patients including HIV infected individuals. Laboratory diagnosis of PCP through culture methods is not widely available making fluorescent antibody assay the only available method for its detection in most clinical microbiology laboratories. However, the sensitivity of fluorescent assay is poor and clinicians may be reluctant to request the test. We present the results of the first year of PJP molecular assay implementation.

**Methods:** After a successful validation process, the LightMix® Kit *Pneumocystis jirovecii* (Roche Diagnostics) assay was implemented at the clinical microbiology laboratory in Tshwane. Letters were sent to the tertiary hospital served by the laboratory to inform the clinicians about the availability of the assay and to encourage them to request the assay when PCP is suspected. Only respiratory samples were processed.

**Results:** Between March 2015 and February 2016, a total of 582 samples were processed. The requests for the assay have been increasing since the implementation of the assay from 18 requests in the first month to the current average of 50 requests per month. All positive results were communicated to the clinicians.

**Conclusion:** The results demonstrate the effectiveness of good communication between laboratory personnel and the clinician. The availability of the molecular assay means that clinicians have a more sensitive tool to support their clinical diagnosis of PCP and patients are treated with confidence. This also ensures that unnecessary tests are not done and potentially harmful treatments are not given.

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**POSTER 176**


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**Laboratory Confirmation of a Single Case of Marburg Virus Disease (MVD) in Mpigi/Kampala 2014**

**Background:** Marburg virus disease (MVD) is caused by Marburg virus (MARV), a member of Filoviridae family including Ebola viruses. Uganda has experienced three MVD outbreaks; the latest being a single fatal case. On September 23, 2014, a 30-year-old male radiographer who worked at Mengo Hospital in Kampala presented with fever (38.4°C), nausea and vomiting, diarrhea, musculoskeletal pain, abdominal pain, headache, sore throat, difficulty swallowing and breathing, anorexia, bleeding from body orifices. He died on September 28, 2016.

**Methods:** A blood sample from this suspect case was sent to the Uganda Virus Research Institute/CDC viral hemorrhagic fever laboratory for testing. The sample tested positive for Marburg virus by RT-PCR. Additional RT-PCR testing was performed, as well as a commercial filovirus-screening assay was used, and all were positive for MVD. Antigen detection and IgM ELISA was also performed on the suspect sample. Specimens were shipped to CDC Atlanta for further testing, virus isolation and sequencing. A team from UVRI/CDC-Uganda investigated the possible source of the infection. Data was managed by an Epi Info™ VHF outbreak Application.

**Results:** MARV was detected by RT-PCR assays, while antigen detection and IgM serology were negative for MARV. A virus isolate (SPB 201403434) was obtained in cell culture (Vero E-6) from the clinical specimen and a full genomic sequence (MBG 201403434) obtained that falls into a cluster that consists mostly of MARV sequences previously isolated from bats in Uganda.

**Conclusion:** We describe the first MVD case in a health worker in the capital city of Kampala, Uganda without any secondary transmission. This filovirus case detection is the 10th outbreak since enhanced VHF surveillance began in 2011. This highlights the effectiveness of heightened surveillance and rapid diagnostics for VHF case detection and response in order to control filovirus outbreaks.
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The Epidemiology of Rubella in Uganda from 2005 to 2014

**Background:** Rubella is a rash-like illness in children with 20-50% of infections being sub-clinical. However, infection in women during early pregnancy (first trimester) could result in an infant born with congenital birth defects collectively known as Congenital Rubella Syndrome (CRS), a major public health threat. Uganda lacks a rubella vaccination programme and knowledge of the trends and burden of the disease in the country prior to vaccine introduction is crucial.

**Methods:** Data entered in the Uganda National Measles laboratory database from 2005 to 2014 were analyzed for rubella sero-status, age, sex, seasonality, and region of residence.

**Results:** A total of 15,863 cases were investigated with 3539 (22%) being rubella IgM positive. These cases were distributed throughout the country with only 3 of the 112 districts not having confirmed a rubella case. The central region (mostly urban) had the highest number of confirmed cases (44%) while the northern region (mostly rural) had the least (10%). Of these, 49.2% were from males and 50.8% were from females with 95.4% of these females below the age of 15 years. The highest number of confirmed cases were recorded in the months of April, August and November for majority of the years with the year 2010 having the least number of confirmed cases.

**Conclusion:** This data shows that there is a high prevalence of rubella in Uganda with children below 15 years being more vulnerable to it. A small percentage of the rubella IgM positive cases were in women of childbearing age hence the need for introduction of the rubella vaccine and a greater need of scaling up CRS surveillance.

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Common Uropathogens and Their Antibiotic Susceptibility Pattern among Diabetic Patients at St. Paul Specialized Hospital Millennium Medical Collage, Addis Ababa, Ethiopia

**Background:** Urinary tract infection (UTIs) is a significant health problem in diabetic patients. Proper investigation and prompt treatment are needed to prevent morbidity, serious outcomes, and diabetic complications secondary to UTIs. This study aimed to determine common uropathogens, antibiotic susceptibility patterns, and associated risk factors among adult diabetic patients.

**Methods:** A hospital based, cross-sectional study was conducted from April - July 2015. A total of 248 diabetic patients with asymptomatic UTI (n=184) and symptomatic UTI (n=64) were investigated for common uropathogens. Clean catch mid-stream urine specimens were collected from each study subjects. Uropathogens were isolated and identified by using conventional microbiological tests. Samples were cultured on blood agar, MacConkey agar, Sabouraud Dextrose Agar and germ tube solution. An antibiotic susceptibility testing was performed on Muller-Hinton agar following Kirby–Bauer disc diffusion method.

**Results:** The overall prevalence of uropathogens among diabetic patients was 22.6%. From this 11.4% were asymptomatic and 54.68% were symptomatic. E. coli (23.2%), Coagulase negative Staphylococci (CONs) (12.5%), S. aureus (7.1%), Candida albicans (17.9%) and Non-albicans Candida Spp. (9.16%) were the most commonly isolated uropathogens in both groups. Significant uropathogens were significantly associated with blood glucose level. Both gram positive and negative bacteria showed high level of resistance to most antibiotics tested. Multiple drug resistance to two or more drugs was observed in 81.1% of bacterial isolates.

**Conclusion:** High prevalence of uropathogens and increased rate of multi-drug resistance was shown among diabetic patient in this study. Continued surveillance and followup of uropathogens might be required in other similar situations to minimize the impact these agents impose on care of this group of patients.
**Assessment of the National Public Health and Reference Laboratory Within the Framework of Global Health Security in Ghana**

**Background:** Laboratory confirmation of suspected cases of measles and rubella (MR) is critical to surveillance. In Ghana, MR testing is performed by the National Public Health and Reference Laboratory (NPHRL). NPHRL currently performs MR IgM ELISA. The capacity to conduct molecular testing is not available. The Second Year of Life (2YL) project in Ghana, which is part of the Global Health Security Agenda, aims to improve immunization systems and strengthen diseases surveillance for MR, including building laboratory capacity and supporting implementation of congenital rubella syndrome surveillance. The objectives of the assessment of NPHRL’s capacity were to describe the status of the laboratory and determine the needs for equipment and training to initiate molecular testing.

**Methods:** Two laboratory assessment tools were used to capture information on public health functions: the WHO Laboratory Assessment Tool, which broadly captures all aspects of laboratory services; and a new CDC International Measles and Rubella Laboratory Assessment Tool, which focuses on MR. The CDC tool was field tested for the first time.

**Results:** Results from March 2016 assessment indicated that NPHRL is well organized with a functioning quality management system. However, equipment, reagents and supplies are insufficient, and these shortages affected laboratory performance. Significant challenges include inadequate funding for laboratory activities and training for personnel in molecular techniques.

**Conclusion:** Results will be used to develop a working plan for improving MR molecular surveillance in Ghana. Laboratory activities will focus on the implementation of molecular biology techniques for case confirmation and genetic characterization of MR viruses at the NPHRL. Data produced will be sent to the Ministry of Health and the WHO country office, which may be used to help inform vaccination policy as the country has a measles elimination goal for 2020. The new CDC tool will be used to assess laboratories in other countries.

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**Review of the Walk-in Blood Donor Services, Kisumu Regional Blood Transfusion Centre (KRBTC), Kenya, January – December 2015**

**Background:** Blood safety is a major challenge throughout Africa. Strategies for improving blood product safety should emphasize collecting donations from low-risk donors and testing all blood for transfusion-transmissible infections (TTIs). In Kenya, the prevalence of key TTIs (HIV, hepatitis B Virus (HBV) and syphilis) among Voluntary and Family Replacement Donors is 1.7%, 4%, 0.7% and 1.2%, 7%, 4%, respectively (International Society of Blood Transfusion, 2010). RBTC obtains blood donations from Nyanza, a region with a 15.1% HIV infection rate (Kenya Aids Indicator Survey, 2012). We determined the quality of data and magnitude of TTIs among walk-in blood donors in KRBTC.

**Methods:** We conducted a retrospective record review of blood donor registers in KRBTC from January to December 2015, collecting donors’ epidemiological and TTI information. We also assessed the quality of registry data using a standardized data quality assessment tool. Data were cleaned and organized and descriptive statistics calculated with MS-Excel.

**Results:** A total of 2738 walk-in donors’ records were reviewed. Those accepted to donate blood were 2046 (75%). Mean age was 30±9.6 years, 1360 (76%) were male, and 1321 (37.3%) were the main donors. Kisumu County recorded 1255 (80%) of donors, 427 (30%) were businessmen, 891 (51.2%) were married, 738, (46%) had at least a tertiary education, and 1055 (56%) were first-time donors. Of the 2046 blood pints collected, 64 (3.7%) had HBV infection, 50 (2.9%) had HIV, 48 (2.8%) had hepatitis C virus and 20 (1.2%) had syphilis. A total of 195 (9.5%) blood pints were discarded. Overall data quality score for accuracy and completeness was 1723 (84.2%).

**Conclusion:** Most donors are young and HBV is the most prevalent TTI. First-time donors are the majority. Accuracy and completeness of registry data are below international standards.
Assessment of Pre-analytical Error on Blood Specimens Referred for CD4 and Haematology Tests in Central Oromiya: Ethiopia: a Cross-Sectional Study Triangulated by Qualitative Method

**Background:** Although, Ethiopia is working to improve the qualities of laboratory services, errors are still prevailing. These errors are classified as pre-analytical, analytical and post-analytical. However, studies that focus on prevalence and factors that influence the pattern of laboratory error remain very scarce in Ethiopia. This study aimed to determine the extent of pre-analytical error and factors contributing to this error among blood specimens referred for CD4 and Haematology tests.

**Methods:** We conducted a quantitative study triangulated by qualitative technique in three laboratories in Central Oromiya, Ethiopia. For quantitative study, a total of 754 randomly selected blood specimens and its accompanying laboratory request forms were reviewed using a structured checklist. Data were entered in to EPI-Info 3.5.3 and analysed using SPSS version 20 software. P value of less than 0.05 was considered as statistically significant. For qualitative part thematic content analysis of the interviews was performed using Open Code software version 3.4 and three different categories were emerged.

**Results:** In this study, the magnitude of pre-analytical error among 754 blood specimens and its accompanying laboratory request forms was 314(41.6%) with 95%CI of (38.3-45.2). Blood specimen collected using syringe and needle methods, specimens collected in under 15 years old patients and specimens where referred to Fiche and Saint Lukas hospitals were prevalent for pre-analytical error; with ORs (95%CIs) of 4.948(1.993-12.285), 6.973(4.032-12.060), 2.964(1.480-5.936) and 3.582(1.696-7.563) respectively. The in-depth interview indicated that Knowledge, Process failure and lack of patient centeredness were factors accounted for pre-analytical error.

**Conclusion:** Alongside of the efforts to control laboratory error, this study highlighted complexity of pre-analytical error control efforts in central oromiya health institutions. Co-operation with clinicians and personnel outside the laboratory, process automation, computerized test requesting, procedure for specimen collection and training are of vital importance to make progress on pre-analytical testing process.

Deciphering New Environmental Samples for Buruli Ulcer In West Africa: The Case of Mosquitoes in Sédjé-Dénou, Southern Benin

**Background:** Buruli ulcer continues to be a serious public health issue. Despite efforts to unravel the mysterious nature of this disease, the environmental niche of its etiological agent, *Mycobacterium ulcerans*, as well as its mode of transmission, remain poorly understood and unknown. Aside the aquatic environment that has been incriminated as the main environmental ecology for *M. ulcerans*, this study is designed to investigate the presence of *M. ulcerans* in mosquito species in three Buruli ulcer endemic localities in Sedje-Denou division in the southern Benin, West Africa.

**Methods:** Two independent surveys were conducted during the long rainy season in 2013 and 2015. Adult mosquitoes and mosquitoes’ larvae were sampled and genomic DNA was extracted from pooled samples. The presence of *M. ulcerans* DNA was screened by conventional and quantitative real time PCRs, and the strain was confirmed by VNTR profiling of four molecular microsatellites markers (MIRU1, Locus6, VNTR19, ST1).

**Results:** Overall, 16.7% of mosquitoes collected were positive for IS2404 target sequence, which not definite for the presence of *M. ulcerans*. The Ketoreductase (KR) domain of *M. ulcerans* plasmid was detected in IS2404-positive mosquitoes. VNTR genotyping of IS2404-positive samples confirmed the presence of *M. ulcerans*, and the strain found had a VNTR profile C and corresponded to a human isolate (Agy99).

**Conclusion:** *Mycobacterium ulcerans* was detected in hematophagous mosquitoes trapped in households in Sedje-Denou division in Benin. However, further studies should be conducted in other endemic areas before it can be concluded whether mosquitoes are involved or not in the transmission dynamics of Buruli ulcer.
LOAD and GO Automated Enumeration of CD4+ T Cells in HIV whole blood samples by AQUIOS-PLG Flow Cytometer System

Background: The automated AQUIOS CL (Beckman Coulter) consists of integrated sample loading and preparation, a flow cytometry analyzer, and the AQUIOS PLG algorithm. The recovery of CD4+ cells using the automated AQUIOS PLG system was compared to the semi-automated FlowCARE PLG CD4 system using a CellMek and FC 500 MPL Flow Cytometer (Beckman Coulter). Aged specimen performance with AQUIOS PLG system was also assessed.

Methods: 220 residual specimens from clinical (HIV+) subjects were tested to compare Aquios PLG and FlowCARE PLG systems. Samples were prepared and analyzed at room temperature (RT, 18°C-22°C) and -80°C for at least 6 weeks. However, exposing DBS to high temperatures should be avoided.

Results: The absolute count and percent positive CD4+ cells were compared between methods. The statistical analysis demonstrated a significant correlation (r² > 0.99) between the AQUIOS PLG system and the FlowCARE PLG CD4 system. Recovery of absolute count and percent positive parameters for CD4+ cells at 72 hours showed insignificant drift within clinical limits when compared to fresh samples.

Conclusion: The results indicate that the enumeration of CD4+ cells on the automated AQUIOS CL instrument gives comparable performance to the semi-automated system. Furthermore, AQUIOS-PLG provides accurate results for enumeration of CD4+ cells for samples stored up to 72 hours post venipuncture.

Stability of Dried Blood Spot Specimens for HIV-1 Viral Load Testing with the Roche Free Virus Elution Protocol

Background: Use of dried blood spots (DBS) for HIV-1 viral load (VL) testing could help overcome the existing specimen processing and sample transport challenges associated with plasma VL, the current gold standard for VL testing. A greater understanding of DBS stability under various storage conditions is critical.

Methods: Two DBS VL panels derived from patients on antiretroviral therapy in Côte d’Ivoire with detectable plasma VL were analyzed using the Roche Free Virus Elution (FVE) protocol. Specimen panel A consisted of four sets of 36 DBS specimens: three sets were stored at room temperature (RT, 18°C-22°C) and analyzed at 0, 4 and 6 weeks, respectively. The fourth set was stored at -80°C for one week prior to analysis. Panel B consisted of four sets of 39 specimens: one set was tested immediately, two sets were stored at -20°C or -80°C for 6 weeks, and the fourth set was stored at 45°C for one week prior to analysis.

Results: A close correlation was observed between the VL in freshly prepared DBS and DBS stored at RT, 45°C, -20°C and -80°C for various duration studied (r² ranged from 0.92 to 0.95). Compared to VL obtained from freshly prepared DBS, VL obtained from stored DBS at RT for 4 weeks and 6 weeks were, on average, 0.13 and 0.33 log10 lower, respectively. On average, DBS stored at 45°C for one week were 0.42 log10 lower, -20°C for 6 weeks were 0.19 log10 lower, -80°C for 1 week and 6 weeks were 0.11 and 0.10 log10 lower, respectively.

Conclusion: These data suggest that accurate VL results can be obtained using DBS specimens stored at RT for up to 4 weeks, and no significant reduction in VL was observed after storage at -20°C or -80°C for at least 6 weeks. However, exposing DBS to high temperatures should be avoided.
**POSTER 185**

**Background:** Global priorities for TB control are to improve TB case-detection and detect cases earlier due to HIV-associated TB and multidrug-resistant tuberculosis (MDR-TB). In Swaziland, the high burden of TB is largely driven by the HIV epidemic and co-infection remains one of the leading causes of morbidity and mortality among adults. In view of all mentioned, Swaziland in 2011 adopted the GeneXpert MTB/RIF platform, a rapid TB diagnostic method. We present results from the systematic rollout of GeneXpert MTB/RIF in Swaziland from 2011-2014.

**Methods:** The rollout of GeneXpert followed a phased approach: Phase 1 (2011-2012) prioritization and pilot in high burden sites, Phase 2 (2012-2013) development of implementation plan and additional placements based on site selection criteria, Phase 3 (2013-2014) scale up of the intervention to all TB diagnostic sites. The TB diagnostic algorithm and TB guidelines were reviewed and recommended use of Xpert MTB/RIF as the initial diagnostic test for presumptive TB cases. To establish coordinated mechanisms in the country, the Swaziland Xpert MTB/RIF implementation guidelines were developed and through PEPFAR support, the MOH deployed a GeneXpert Mentor to oversee scale up, coordinate and monitor the implementation of the new technology. The rollout and scale up of Xpert MTB/RIF was coordinated with optimizing deployment on the basis of workload, prioritizing health facilities with existing infrastructure, competent laboratory personnel, TB treatment capacity, facilities serving special populations and efficiency of referral networks.

**Results:** In phase 1, 5 instruments were placed in 4 sites and 372/1689 MTB cases were detected of which 36 were RIF resistant. In phase 2, 15 instruments were placed in 12 sites and 1458/10074 MTB cases were detected of which 173 were RIF resistant. In phase 3, 26 instruments were placed in 20 sites and 7747/67798 MTB cases were detected of which 850 were RIF resistant. The TAT for onsite capacity was 24 hours and 72 hours for offsite (referring facilities using NSTS).

**Conclusion:** Countrywide rollout of Xpert MTB/RIF in Swaziland has played a key role in intensifying TB and MDR-TB diagnosis and timely initiation of treatment. However, it is imperative to have strong leadership and coordination under the MOH to ensure that the roll out of new technologies is integrated within the plans of the government to ensure sustainability.

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**POSTER 186**

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**HIV Prevalence at Benin Military Teaching Hospital of Cotonou in 2015**

**Background:** We evaluated human immunodeficiency virus (HIV) testing and HIV infection rates at Benin Military Teaching Hospital of Cotonou from January to December 2015

**Methods:** HIV testing was conducted for civilians and all military personnel going or returning from peacekeeping operations, for recruitment and candidate for various courses. Rapid HIV antibody tests using immunochromatographic technology are available: Alere Determine™ HIV-1/2 for screening, Genie III HIV ½ or ImmunoComb® II HIV 1&2 BiSpot and Geenius™ HIV 1/2 Confirmatory assay for confirmation. For the first time in our Military Health System and help of the US Department of Defense HIV/AIDS Prevention Program, Global Scientific Solution for Health (GSSHealth), HIV proficiency testing (PT) was performed to provide quality assurance services.

**Results:** In total, 6390 tests were performed. Among this, 2922 (45.7%) concerned civilian. Positive results were found in 202 (3.1%) cases, 6162 (96.5%) negative and 26 (0.4%) indeterminate. Civilian had the highest prevalence of HIV (6.3%) compared to military (0.5%). HIV PT showed a good performance and no false result was observed.

**Conclusion:** In 2015, overall rate of HIV in military population is lower than civilian in our hospital. HIV prevention efforts may help to reduce HIV incidence in the Benin armed force. A quality assurance program in progress and continuous training program with proficiency testing will improve the HIV testing performance.
**POSTER 187**

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**The Frequency and Variation of RDT Errors by Field Healthcare Workers**

**Background:** Malaria rapid diagnostic tests (mRDTs) allow for the diagnosis of malaria at the community level and have become a key component of malaria control programs. Although mRDTs are relatively simple to perform and interpret, in the field it is crucial to ensure correct processing and interpretation of test results.

**Methods:** An analysis of nine Fionet implementation studies was done to quantify the frequency and variation of RDT related errors occurring in the field during routine use of mRDTs. Implementations were included if healthcare workers received training on processing RDTs and integrated an automated RDT reader (Fionet Reader) into their point-of-care case management. The reader features an in-process quality control and automated test interpretation for malaria RDTs.

**Results:** The data showed over 150 healthcare workers who processed more than 30,000 mRDTs. RDT errors (e.g. no control line, smearing) varied significantly by brand, with estimates from 0% to almost 4%. We observed a large variation in the frequency of RDT processing errors (e.g. incorrect volume or placement of solutions, delayed reading, interpreting the wrong RDT) between individual healthcare workers ranging from 0% to ~35%, with an overall estimated frequency of 5.6% accounting for users in the analysis. Lastly, the most common interpretation errors were not recognizing RDTs that should be redone and faint positive control lines. Based on a secondary study of RDT images that were interpreted discordantly, we observed a significant amount (~4%) of RDTs are inconsistently interpreted.

**Conclusion:** Errors are relatively frequent in the field, which can jeopardize the accuracy of the test results. Quality assurance and control are integral for mRDTs to be effectively used in the field by healthcare workers.

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**POSTER 188**

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**Strengthening Point-of-Care Management and Diagnosis for HIV in Meru County of Kenya**

**Background:** Meru is one of the largest counties in Kenya, with a population of 1.4 million residents with over 70% living in rural areas. Kenya is among the HIV burden countries, so it is pertinent to reduce the transmission by early case detection of HIV infected individuals through widespread quality screening (HCT), testing, and linkage to appropriate care.

**Methods:** A pilot study in Meru County with the Fionet-Reader began in May 2014. Fionet has been designed to strengthen quality control both at the health worker level and at the remote supervisory level. The RDT reader (Fionet Reader) performs automated interpretation of RDTs. It also collects data and test results and reports them electronically. Managers have prompt access to field data. In Meru county, 50 healthcare workers at 10 sites were trained on Fionet and implemented it at point-of-care for HIV testing.

**Results:** To date, approximately 1500 individuals have been tested for HIV in Meru county using Fionet. The testing algorithm includes two serial RDT tests and a third RDT as a tie-breaker if required. The Fionet Reader ensures compliance with test procedures and algorithms and provides a diagnostic interpretation of the RDT test results from all three brands used. HIV prevalence was 6.7% in the population and the testing algorithm had a 97.8% compliance by healthcare workers. The data were uploaded, in almost real-time, to a Fionet cloud for monitoring. Early feedback on errors motivated healthcare workers to improve performance and a reduction in process-related errors was observed.

**Conclusion:** Complex and challenging guidelines, using multiple RDTs, are easily adhered to by field healthcare workers using the Fionet system. Data collected were analyzed and feedback to healthcare workers improved their performance.
POSTER 189

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Multi-Drug Resistant *Mycobacterium tuberculosis* and Associated Risk Factors in the Oromia Region of Ethiopia

**Background:** Tuberculosis (TB) drug resistance is a global threat. The impact of multi-drug resistant tuberculosis (MDR-TB) is substantial; especially in resource limited countries like Ethiopia. The financial requirements and skilled human power required for diagnosis and management are extensive. This implies the need for identifying the risk factors of MDR-TB and preventing cases. The aim of this study was to determine risk factors for TB caused by multi-drug resistant *Mycobacterium tuberculosis* in Oromia region, Ethiopia.

**Methods:** In a 6-months case control study in 2013-14, sputum samples and standardized questionnaire data (demographics, treatment, TB contact history, underlying disease, history of imprisonment) were collected from 88 cases and 177 controls of ≥ 18 years of age. Sputum was processed locally in the Oromia public health laboratory using standard techniques. Data from MDR-TB cases and TB positive controls were compared using logistic regression analysis. For each factors, their association with outcomes variable was estimated by calculating the odd ratio (OR) together with 95% confidence intervals (95% CI).

**Results:** Of 439 suspected MDR-TB cases, 265 had confirmed *Mycobacterium tuberculosis* infection, of whom 33% (88) had laboratory, confirmed MDR-TB. Over two thirds (65%) were between 18 to 39 years of age. Multivariable analysis indicated occupation (farming), known TB contact history, alcohol use, HIV infection, previous known TB history and previous TB treatment outcome were predictors of MDR-TB.

**Conclusion:** The rate of MDR-TB was high among suspected cases in the Oromia region of Ethiopia. Local MDR-TB detection capacity and local epidemiology studies are key for detection and guiding use of sparse resources to optimize MDR-TB control. If TB is suspected, the presence of any of the above factors should alert Oromia region clinicians and public health to be screen for the MDR-TB.

POSTER 190

Kayode Akanbi
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Predictors of Tuberculosis Treatment Success Among HIV Patients Attending Major Tuberculosis Treatment Sites in Abeokuta, Ogun State, Nigeria. March 2014 to June 2015

**Background:** Tuberculosis (TB) is a common opportunistic infection and cause of death in patients with Human Immunodeficiency Virus (HIV) in developing countries. The World Health Organization (WHO) recommends 85% treatment success rate for all TB cases as an indicator of TB control. This study determined TB treatment success rates among TB/HIV co-infected individuals and identified predictors of successful treatment in Abeokuta, Nigeria.

**Methods:** A health facility-based cross-sectional study was conducted among HIV/TB co-infected individuals in Abeokuta, Nigeria. Biological and socio-demographic characteristics with treatment history were obtained using a semi-structured questionnaire. Laboratory tests were conducted on sputum samples to determine treatment success rate. Test results were recorded in a structured data collection register. Treatment success was defined as any HIV-positive patient with a diagnosis of TB by acid fast bacilli (AFB) smear positivity, who after six months of complete treatment became smear negative. Multivariable analysis was used to identify independent predictors of successful treatment outcomes with confidence interval set at 95%.

**Results:** A total of 109 HIV/TB co-infected patients from 2 treatment centres were enrolled. Mean age was 34.7 ± 14.2 years. Fifty nine (54.1%) were females, and 106 (97.3%) were newly treated for TB. Eighty-five (78.0%) patients were treated in private health facility. Overall, 91 (83.5%, 95%CI: 75.2-89.9%) had successful treatment. Eleven (10.1%) died, 5 (4.6%) defaulted and one (0.9%) failed treatment. Successful treatment was associated with being newly registered, receiving TB treatment for the first time (AOR= 18, 95% CI: 1.5-482.3) and being treated at a private health facility (AOR= 14.1, 95%CI 4.27-48.4).

**Conclusion:** Treatment success rate of TB among HIV co-infected patients in this study met the WHO target. Registration status and health facility type were predictors of treatment outcome among study patients. Patients and healthcare workers in public facilities were educated on HIV/TB co-infection management.
POSTER 191

Kayode Akanbi
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Assessment of Knowledge and Practice of Healthcare Workers on Ebola Virus Disease in Rivers State, Nigeria, September 2014

Background: Pivotal roles are being played by healthcare workers (HCWs) in outbreak responses. Ebola Virus Disease (EVD) outbreak spread to Port Harcourt from Lagos, Nigeria in August 2014, infecting 11 HCWs (two in Port Harcourt and nine in Lagos) with case fatality rate of 45%. This study was conducted during the outbreak to assess HCWs EVD related knowledge and practices.

Methods: Cross-sectional study was conducted among HCWs across health facilities in Rivers State using stratified sampling technique. Interviewer administered questionnaire was administered to elicit respondents’ socio-demographic characteristics, knowledge and practices. Assessment of health facility’s level of preparedness and HCWs’ EVD-related training was done using a checklist. HCWs’ knowledge and practices were scored and classified as either good or poor. Bivariate analysis was used to identify independent predictors for good knowledge and practice with confidence interval set at 95%.

Results: A total of 185 health facilities with 931 HCWs were recruited. Mean age of respondents was 36.1 ±10.2 years. Overall, 603 (64.8%) HCW had good knowledge. Highest prevalence of good knowledge was among doctors, 151 (89.9). However only seven (0.8%) HCWs reported good practices. Two hundred and twenty seven (24.4%) reported being trained in identifying suspected EVD patient(s) while 103 (11.1%) had a triaging area for febrile patients in their facilities. Only 27 (2.9%) of the HCWs have personal protective equipment (PPE). HCWs with EVD-related training were eight times more likely to adopt good practices [OR = 7.9 (95%CI 1.5 – 41.0)].

Conclusion: Rivers State HCWs had good knowledge of EVD without a corresponding level of good practices. Training was found as a predictor of good practices. We developed Standard Operating Procedures (SOPs) for EVD active surveillance and patient management. EVD-related Information, Education and Communication (IEC) materials were also developed and used in training the HCWs towards containing the outbreak.

POSTER 192

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Influence of Hand Hygiene Campaigns During the 2014 Ebola Outbreak on the Practice of Hand-Hygiene by a Selected Population of Nigerian University Pharmacy Students

Background: During the time in which the Ebola crisis pervaded in Nigeria in 2014, campaigns to support hand hygiene practices in and outside the hospital were at their peak. This study was conducted to investigate the influence of the hand hygiene campaigns during the Ebola outbreak on the practice of hand hygiene by a population of Nigerian students.

Methods: The study was conducted after the Ebola pandemic in Rivers State in March, 2015. Primary data were collected by giving a set of pretested semi-structured questionnaires to Pharmacy students of the Obafemi Awolowo University, Ile-Ife, Nigeria, where were enrolled in the professional classes and consented to the study. Questionnaire items elicited information on the demographic characteristics of the students, their hand-hygiene practices and their use of hand sanitizer before and since the Ebola pandemic. Data were analysed using descriptive statistics.

Results: A total of 204 valid questionnaires were returned. Of these, 106 were males (Age: 18 to 31 years, mean: 22.54±2.418). Of the respondents, 59.6 % normally use hand sanitizers before the Ebola pandemic while 32.3% don’t normally do this. The hand sanitizer used by most of the respondents before (42.2%) and since (52.5%) the Ebola pandemic is a chloroxylenol preparation. Only 32.1% of the respondents have made changes in their hand-hygiene practices since the Ebola pandemic. Of these, 39.7% claimed that they now wash their hands more than they used to do while 16.4% indicated that they just started hand-washing. Changes in hand-hygiene practices were mostly influenced by media campaigns (47.4%), recommendation from friends and relatives (15.8%), POSTERS and handbills (11.8%) as well as lectures and books (9.2%). For those who made changes in their choice of hand sanitizers, the main reasons are: the active ingredients (54.2%), personal liking for the product (16.7%) and past experience of use (12.5%) while for those who still retained the hand sanitizer they used before the Ebola pandemic, their main reasons include: preference for the product type (16.4%) and active ingredient (12.7%).

Conclusion: There were positive changes in the hand-hygiene practices of this population of students since the Ebola outbreak in Nigeria and media campaigns play a major role in these. There is a need to put measures in place to sustain and improve on these changes.
Compliance with Epidemic-Prone Diseases Surveillance and Response Guidelines among Surveillance Units Personnel in South-West Nigeria

**Background:** Compliance with surveillance guidelines is crucial to epidemic diseases control. In Nigeria, factors affecting health workers compliance with these guidelines are poorly documented. This study assesses compliance and factors associated with the surveillance and response guidelines for epidemic-prone disease in South-West Nigeria.

**Methods:** In a cross-sectional study, 199 officers selected by multistage sampling from health departments were interviewed using a schedule containing questions on socio-demographic characteristics, knowledge on disease surveillance, core surveillance activities and support functions. Data were analysed using descriptive statistics, chi-square and multiple logistic regression at $P=0.05$.

**Results:** Majority (82.4%) of the surveillance units reported disease outbreaks and 77.4% regularly reported monthly surveillance data over six months. Timeliness and completeness of weekly reporting were 94% and 95% respectively. At the health facility level, 25.9% followed standard case definitions guidelines, 85.7% used laboratory case confirmation guides and 2.6% analysed surveillance data within the health facility. Predictors for six months reporting activity were attending a training (OR=7.92; CI=1.65–37.92), having adequate funds (OR=27.81; CI=7.68–100.60) and knowledge of surveillance dataflow (OR=4.80; CI=1.64–14.10).

**Conclusion:** Health departments staff need continuous training and adequate resources for optimal surveillance activities.

Impact of Massive Drug Administration for Elimination Of Lymphatic Filariasis In Mozambique

**Background:** Lymphatic Filariasis (FL) is a parasitic disease caused by helminths that hosts the lymphatic system, causing lymphedema, elephantiasis and hydrocele. The mozambican Ministry of Health joined the global program for LF elimination, and in 2006, was carried out the mapping of the disease in country, and, in 2009 the first Sentinel sites (SS) were created to monitor the impact of the MDA of FL. In the same year (2009), was launched the first campaign of MDA in 8 districts. The MDA happens every year and expanded for new sites. The expansion of the MDA is accompanied by new SS and evaluation of MDA impact in previously SS created. We evaluate the impact of mass drug administration for lymphatic filariasis elimination program in Mozambique.

**Methods:** To evaluate the MDA, were selected eighteen SS created in 2009 in Cabo Delgado, Niassa, Nampula and Zambezia provinces. Overnight (22h-2h), 1 mL of blood sample was collected per participant, finger prick to a tube with anticoagulant. For detection of parasite were used to prepare smears (3 lines of 20 20µL each) on microscope slides and stained with Giemsa. Smears were examined under optical microscope for observation of *Wuchereria bancrofti* (*W. bancrofti*) in the Molecular Parasitology Laboratory of National Institute of Health.

**Results:** In 2009, a total of 8 SS were created covering 4300 participants the overall prevalence of microfilaria was 7.09%. In 2015, the same 8 SS covered 2353 participants with a prevalence of microfilaria of 1.02%, showing a significant reduction of the prevalence (with 95% of CI). Was also found significant reduction between the microfilaria prevalence found in 2009 (17%) and 2015 (2.63%). After five years of MDA in all SS, was observed a reduction of microfilariae prevalence in 7 SS, except Cuamba district where the prevalence increased from 0.5 to 1.58 %.

**Conclusion:** The MDA, is beeing a useful tool for the elimination of LF in the affected areas in the country. Since its implementation in 2009, was observed an infection reduction measured by low microfilaraemia and circulating filarial antigen in all SS evaluated in this study.
Evaluation of the Magnitude and Socio-demographic Factors Associated with Multi-Drug Resistant Tuberculosis Among TB Patients on Follow Up in Rwanda, 2012-2014

Background: Multidrug-resistant tuberculosis (MDR-TB), characterized by treatment failure to isoniazid and rifampicin has become an increasing threat to global TB control. The aim of the study was to evaluate the magnitude and socio-demographic factors associated with MDR-TB in Rwanda.

Methods: We analyzed secondary data on 584 TB positive samples received at NRL from health centers and district hospitals between 2012 and 2014 who still tested positive after two months of treatment with isoniazid and rifampicin. We calculated proportions of samples testing positive for MDR-TB using TB culture, both overall and by selected socio-demographic variables (age, sex and residence). We used logistic regression to identify socio-demographic factors associated with MDR-TB.

Results: Overall, MDR-TB was identified in 16 (3%) of 584 TB positive samples tested at NRL. Of the 16 MDR-TB cases identified, 9 were females, 9 were aged 25-49 years and 6 were from Kigali city. Female sex (Odds Ratio: 3.2, 95% Confidence Interval: 1.2-8.6) was significantly associated with MDR-TB.

Conclusion: MDR-TB remains a substantial challenge in Rwanda. Closer monitoring and appropriate targeted interventions are required especially among females.

Heamagglutination Inhibition as an Indicator of Antigenic Variation in Circulating Influenza A Subtypes and Influenza B Lineages in Uganda, 2009–2015

Background: The effect of Influenza is considered negligible in Africa; yet it is still one of the major causes of mortality due to respiratory ailments especially among children. There are not enough data published on Influenza circulation, trends and impact on the Ugandan population. We therefore set out to understand and document the trends of circulating Influenza A and B subtypes in Uganda in order to predict any changes in the antigenic characteristics of the virus that could be useful in implementing the effective influenza vaccine.

Methods: Basing on the RT-PCR Ct Values, Influenza A and B positive samples were cultured and isolated on Madin-Darby Canine Kidney cell lines. The isolates were tested using the WHO hemagglutination and hemagglutination-inhibition (HA and HAI) Kit.

Results: From 2009 to 2015 a total of 286 viruses were isolated, 3 (1%) AH1N1 seasonal, 72 (25.2%) AH1N1 pandemic, 74 (25.9%) AH3, 76 (26.6%) B Victoria and 61 (21.3%) B Yamagata. From 2009 to 2015, influenza A subtypes remained antigenically similar to the reference ferret antisera used with the lowest HAI titer being 1:320. Influenza B subtypes also showed antigenic similarity but with low HAI titers ranging from 1:40 to 1:160 until 2015 when viruses isolated had HAI titers of 1:1280 with the reference antisera used. A change in the main circulating influenza B lineage from B Victoria to B Yamagata was noted from 2013 to 2015 though the first case (single case) of B Yamagata was noted in 2012.

Conclusion: Much as most isolated viruses were neutralized by the reference ferret antisera used there could be evidence of antigenic changes displayed by reduction in HAI titers. It is an indicator of existence of new variants that are not completely neutralized by the reference antisera used. This shows the need to use more recently prepared reference antisera for diagnostics to be able to capture a clear picture of the circulating virus subtype and predict the trend of virus circulation. Further sequencing is required to confirm any antigenic variations and to perform phylogenetic analysis.
**POSTER 198**

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**Analysis of distribution of Vibrio Cholera serotype O1 Cholera in Rwanda between 2006 and 2012**

**Background:** Cholera outbreaks have occurred periodically in Rwanda. However, the distribution of the different cholera serotypes in Rwanda and their antimicrobial sensitivity have not been described previously. This study assessed the distribution and antimicrobial sensitivity of *V. Cholera* serotypes O1 in Rwanda between 2006 and 2012.

**Methods:** We conducted secondary data analysis of laboratory results of 170 cholera positive samples tested at the National Reference Laboratory (NRL) between 2006 and 2012. Cholera infection was defined as laboratory detection of any of the *V. Cholera* serogroup in patient stool after culture.

**Results:** A total of 170 samples tested positive for *V. Cholera* O1 at NRL between 2006 and 2012. *V. Cholera* O1 serotype Inaba was detected in 154 (90.5%) samples while *V. Cholera* O1 serotype Ogawa was detected in the remaining 16 samples. All serotypes were sensitive to ciprofloxacin, ceftazidime and gentamycin but resistant to Co-trimoxazole and Ampicillin. Overall, 63.6% of all confirmed cases originated from the western province along Lake Kivu.

**Conclusion:** The geographic clustering of cholera along Lake Kivu suggests that the lake could be a reservoir for *V. Cholera*. While Cholera treatment has largely been successful by oral rehydration salts, the use of ciprofloxacin, ceftazidime and gentamycin could shorten disease duration. Cholera is a waterborne disease and the main preventive measure is to ensure access to safe water & proper sanitation.

**POSTER 199**

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**Assessing the Capacity of 10 Selected Peripheral Medical Laboratories to Implement Biosafety in Uganda**

**Background:** A laboratory biosafety program (LBP) is essential to ensure the health and safety of laboratory staff and the general public from hazardous materials and infectious agents. The important safety measures include proper lab facilities and environment in terms of engineering systems, biologic safety cabinets, PPE, disinfectants, hazardous waste disposal, and an administrative plan for overall risk assessment and SOPs.

**Methods:** Questionnaires and observations were used to assess performance in biosafety, biosecurity, use of protocols, physical security, and training. Fifty staff, including laboratory heads of the peripheral laboratories, were interviewed at their sites and laboratory area biosafety levels (BSL) were evaluated at the ten sites.

**Results:** The tool included 110 indicators administered in three formats: pre-visit questionnaires (48), on-site observation checklists (46), and staff interviews (16). Pre-visit questions and on-site observations determined that only 2 (20%) out ten sites fully implemented an LBP and these were private hospitals. Staff interviews elicited a range of responses on the efficacy of biosafety practices and training. Using averaged like scale ratings, eight of the sites were considered “not capable” at operating safely with biologic materials and “not effective” at reducing or controlling biologic exposures. In the BSL tests, 3 staff were rated “very competent” to “extremely competent at following biosafety practices when performing laboratory procedures. Reasons stated for lower ratings included unfamiliarity with underutilized protocols and equipment, lack of more engaging biosafety training, and complacency/human error.

**Conclusion:** In any laboratory, a proper LBP is a critical component of laboratory practice. Nonetheless, specific funding for laboratories to procure essential supplies, to conduct biosafety trainings and engage the workforce on biosafety is often overlooked and therefore opportunities to develop or acquire biosafety training materials are extremely limited or non-existent.
**POSTER 200**

**Scholastica A. Okui**

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### Persistent Typhoid Fever Epidemics Associated with Environmental Factors in Internally Displaced Persons Camps in Uganda

**Background:** Typhoid fever has continued to cause prevalent epidemics in some districts in Uganda from 2002 to date. According to Ministry of Health epidemiological data from 2009 to 2013, there has been an increase in the number of typhoid fever cases reported particularly from districts with people living in internally displaced peoples camps (IDPs) with some cases admitted with intestinal perforations.

**Methods:** Case occurrence for the period 2009 to 2013 was collected from epidemiological annual data from MOH. Focus group discussions, interviews and observations of the homesteads in the camps, latrines and markets for sanitation and hygiene were conducted. Water samples from sources and households were analysed for faecal contamination. Similarly stool samples obtained from previously confirmed cases who had recovered from typhoid fever were cultured and isolated for *salmonella typhi* organisms and tested for sensitivity to Uganda first line antibiotics.

**Results:** The typhoid fever case incidence in the community survey was 8,092 cases/100,000 persons. A total of 577 cases were confirmed during that period including 47 deaths. Most of the cases were living in crowded homesteads, and 81 patients were admitted in 2013. *Salmonella typhi* was isolated from 27/81 patients by culture. We found that 76% of the cultured *S. Typhi* organisms were resistant to ampicilline, sulfisoxazole, tetracycline and cotromoxazole which are first line drugs in Uganda, but were analysed with intestinal perforations.

**Conclusion:** The main reasons why typhoid fever was highly prevalent in IDPs included poor hygienic practices, (p≤0.004) as well as overcrowding, eating communally from the same dish (p≤0.008), high positivity rate at 33%, high carrier status at 36% and unsafe water sources which were contaminated with faeces. Both *E.coli* and cholera organisms were isolated from water sampled from one faecal contaminated water source.

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**POSTER 201**

**Michael A. Okungbowa**

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### Prevalence of Malaria Parasitaemia and its Effects on Haematological Parameters in Pregnant Women (At Booking) Attending Antenatal Clinic of the University of Benin Teaching Hospital

**Background:** Malaria parasitaemia is a prevalent health problem in pregnancy. This work was aimed at studying the prevalence of malaria parasitaemia and evaluating haematological parameters among pregnant women.

**Methods:** One hundred and fifty pregnant women who presented for booking in the antenatal clinic of the University of Benin Teaching Hospital, Benin-City, Nigeria were evaluated. Their blood samples were analyzed for malaria parasites, total WBC count, absolute RBC counts, haemoglobin level, PCV, MCV, MCH, MCHC, differential white cell count and platelet count using the manual conventional methods.

**Results:** *Plasmodium falciparum* was the only species identified with 74% (105) of the total subjects having peripheral parasitaemia infection. A higher parasite density was observed in 77.1% (81) of the infected subjects while 22.9% (24) had low parasite density. The RBC and Hb in women with high parasite density (3.80×10^9 L^-1±0.78) and (10.3×10^9 L^-1±1.64) respectively were lower than the value in those with low parasite density (4.32×10^9 L^-1±0.59) p = 0.01) and (11.15×10^9 L^-1±1.61) p=0.03). Also there was an increase in the WBC count with high parasite density (7.14×10^9 L^-1±1.45) p=0.03). WBC count in primigravidae was decreased with a mean value (5.01×10^9 L^-1±1.87) with mean multigravidae value (6.14×10^9 L^-1±1.49) p=0.001). Platelet count in primigravidae was relatively high with mean value (214.63×10^9 L^-1±60.11) p=0.0007) to multigravidae mean value (178.16×10^9 L^-1±43.10). Asymptomatic *Plasmodium falciparum* infection in pregnancy was associated with increase in monocyte count with mean value (7.74×10^9 L^-1±3.25) p=0.04) as well as in lymphocyte count with mean value (29.40×10^9 L^-1±10.49) p=0.03).

**Conclusion:** Peripheral parasitaemia in asymptomatic pregnant women causes an increase in the number of monocytes and lymphocytes, while thrombocytopenia tends to occur in the multigravidae than in the primigravidae. Screening of pregnant women of the above cellular elements is highly advocated.
Utilisation and Error Reporting of GeneXpert Machines in Nigeria, NACA GeneXpert Roll-Out

**Background:** Nigeria ranks the 2nd highest burden of HIV and 3rd highest burden of Tuberculosis (TB) in the world. Diagnosis of TB in HIV patients remains a major challenge due to low bacillary load and advanced immunosuppression associated with the patients. The recommendation of WHO in 2010, to use GeneXpert MTB/RIF assay as initial diagnostic test in HIV patients with TB symptoms has improved diagnosis of TB. Nigeria adopted this technology in 2011 and there are over 300 machines in the country now.

**Methods:** The Global Fund for AIDS, TB and Malaria is supporting the procurement of 185 GeneXpert machines in Nigeria through the National Agency for the Control of AIDS (NACA) in collaboration with the National TB & Leprosy Control Programme (NTBLCP), KNCV TB foundation and other partners to improve TB/HIV diagnosis across Nigeria. This study evaluates error reporting from GeneXpert data obtained in 40 health facilities, during onsite mentoring and supervision. The review period is 3 months post GeneXpert installation.

**Results:** Based on the utilization and error reporting obtained from the onsite mentoring and supervision of 40 health facilities 3 months post GeneXpert installation, 31 (77%) health facilities were within the acceptable percent error rate of 2-5% while 9 (23%) health facilities were out of the acceptable percentage error rate.

**Conclusion:** In general, the result shows that there is effective utilization of GeneXpert machines in most facilities. However, the most common error reported during the onsite mentoring and supervision of these health facilities fall within the two common errors: post run analysis and operation termination which could be avoided by proper liquefaction of sample, before inoculation, into the cartridge and careful addition of sample to avoid bubbles.

Genetic Diversity of the MSP-1, MSP-2 and GLURP Genes of Plasmodium Falciparum in Children Under 5 Years in Different Regions of Mozambique

**Background:** The genetic diversity of *P. falciparum* is the major obstacle to the development of immunity against malaria as well as the therapeutic efficacy of antimalarial drugs, since it gives the parasite ability to evade the host immune response, causing changes in their antigenic composition, favoring the drug resistance antimalarial. This diversity allows us to establish the intensity of malaria transmission in a region. The MSP 1, MSP 2 and GLURP genes, which encode antigenic proteins are highly polymorphic and therefore are commonly used as markers of genetic diversity of *P. falciparum*. In this context, we evaluated the genetic diversity and multiplicity of infection of *P. falciparum* using the genes encoding the protein, MSP 1, MSP 2 and GLURP, in children under 5 years from Tete and Gaza province.

**Methods:** We analyzed 163 samples collected on filter paper, The region 2 of the gene coding for MSP 1, the central region of the gene encoding the MSP -2 and the R2 region of the gene encoding the GLURP were genotyped by Nested PCR using primers and following the protocol described by Snounou et al and fragment analysis by gel electrophoresis.

**Results:** In total of 163 *P. falciparum* samples, 159 (97.5 %) amplified to MSP -1, 158 (96 %) amplified to MSP -2 and 143 to GLURP. For the MSP 1, 17 genotypes were observed, corresponding to the three allele families (6 K1, 6 MAD20 and 5 RO33). For the MSP 2 27 genotypes (18 IC / 3D7 and 9 FC27) were observed and the GLURP, 9 genotypes. A total 16 haplotypes for MSP -1 were detected.

**Conclusion:** There was a high degree of genetic diversity suggesting a large population of parasites and high intensity transmission.
**POSTER 204**

**Odette Sharangabo**

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**Background:** Between 2006 and 2013 the Rwanda National Reference Laboratory (NRL) isolated 58 (4%) Salmonella Typhi, the bacterium which causes typhoid fever from 189 samples of suspected typhoid fever patients. Historically, the disease has been successfully treated with antibiotics like ampicillin, ceftriaxone, and co-trimoxazole. However, overtime, the bacterium has gained resistance to some of the antibiotics and to previously highly effective drugs like ciprofloxacin. The aim of this study was to evaluate trends in resistance of Salmonella typhi to various antibiotics in Rwanda.

**Methods:** We analyzed laboratory results of 189 suspected typhoid fever samples (blood and stool) received at the National Reference Laboratory (NRL) from all public hospitals in Rwanda. Antimicrobial susceptibility patterns from 58 positive Salmonella typhi isolates were determined by modified Kirby-Bauer disk diffusion technique.

**Results:** Salmonella typhi was resistant to four of the nine antibiotics (ampicillin, chloramphenicol, co-trimoxazole, tetracycline, nalidixic acid, ciprofloxacin, ceftaxime, ceftazidime and gentamycin) that were used for the susceptibility testing. The diameter of inhibition was ≤13mm for ampicillin10µg disc, ≤17mm for chloramphenicol 30µg, ≤10mm to co-trimoxazole 1.25µg, and ≤ nalidixic acid 30µg. There was variable susceptibility to tetracycline between 2008 and 2011. All isolates were susceptible to ciprofloxacin.

**Conclusion:** The presence of multidrug resistance of Salmonella typhi to ampicillin, chloramphenicol, co-trimoxazole, nalidixic acid calls for appropriate use of antibiotics for typhoid treatment. Ciprofloxacin remains the drug of choice for treatment of uncomplicated typhoid in Rwanda.

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**POSTER 205**

**Ahmad I. Sow, Aicha Sarr**

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**Le Réseau National de Laboratoires, un Outil de Développement des Laboratoires : Expérience du Sénégal**

**Background:** L’existence d’un sous système de Laboratoires performant est indispensable pour relever le niveau de qualité d’un système de santé. La mise en place d’un Réseau National de Laboratoires fonctionnel peut y contribuer largement.

Le Sénégal a mis en place depuis plusieurs années un Réseau National de Laboratoires considéré comme un programme de développement des Laboratoires.

Le but de cette communication est de partager notre expérience et de démontrer le rôle fondamental du RNL en Santé Publique.

**Methods:** Il s’agira de présenter la genèse et réalisations du RNL, depuis sa création légale (en 2005) à nos jours.

Mis en place officiellement depuis une dizaine d’années, le RNL est aujourd’hui une composante à part entière de la Direction des Laboratoires du Sénégal créée en 2012, érigé en Division.

**Results:** Le RNL a à son actif diverses réalisations dans les domaines de la formation continue du personnel, de la supervision des activités, de l’évaluation externe de la qualité, de l’accompagnement à la démarche qualité, de la surveillance des résistances bactériennes notamment.

Cette communication montre comment la mise en réseau a permis rehausser le niveau des prestations et de renforcer l’implication des agents de laboratoires dans la surveillance épidémiologique.

En adoptant l’accompagnement qualité selon la norme ISO 15189, la Direction des laboratoires vise à faire régner l’assurance qualité dans tous les laboratoires du pays.

De même, l’installation de la plateforme DHIS-2 a fortement amélioré la promptitude et la complétude de la remontée des données de Laboratoires, y compris celles concernant la surveillance des résistances aux antibiotiques.

**Conclusion:** Des chantiers concernant la distribution des réactifs, la mise aux normes des infrastructures, équipements et ressources humaines sont en train d’être développés et font partie du plan stratégique quinquennal en cours d’élaboration.
Hepatitis B and Human Immunodeficiency Virus Coinfection Among Pregnant Women Addis Ababa, Ethiopia: Implications for Prevention and Control Measures

Background: Hepatitis, a highly contagious viral infection, is one of the leading killer diseases globally caused by hepatitis virus. Among the existing viral causes for hepatic failure, hepatitis B virus (HBV) plays a significant role with devastating implications, especially when combined with other viral infections such as human immunodeficiency virus (HIV). Co-infection with hepatitis B virus and HIV leads to increased morbidity and mortality as compared to independent HIV and HBV infections. In this study, we aimed to assess the seroprevalence of HBV and HIV coinfection and associated risk factors among pregnant women in a selected hospital facility around Addis Ababa, Ethiopia.

Methods: A total of 215 pregnant women were recruited between July and October 2014 from Tirunesh Beijing General Hospital. A pretested and structured questionnaire was used to collect socio-demographic characteristics and possible risk factors. In addition, 5 ml venous blood was collected and centrifuged to estimate the seroprevalence of HBV and HIV. Descriptive statistics and logistic regression analysis were done and a P value less than 0.05 was considered statistically significant.

Results: The overall prevalence of hepatitis B virus infection was 6%. This positivity was different across different age categories: 11.1 %, 4.5 %, 6 %, 3.2 %, and 25 % among those between 15–19, 20–24, 25–29, 30–34, and 35–39 years, respectively. However, a statistically significant association was not established between age and HBV. Among the total, 4.2 % of the positive cases were detected among persons who had completed primary school. Multivariate analyses indicated that history of abortion (p = 0.003), history of surgery (p = 0.0022), and tattooing (p = 0.033) were significantly associated with HBV infection. A total of 9 (4.2 %) women were found to be HIV-seropositive, of whom 2 (22.2 %) were co-infected with HBV.

Conclusion: We observed a relatively high seroprevalence of HBV infection among pregnant women in the study area, in which majority of the cases had underlying risk factors for acquiring the infection. Since none of the mothers were vaccinated for HBV, the possibility of perinatal transmission is inevitable. Hence, routine screening and immunization against HBV during pregnancy and health education are highly warranted to alleviate the situation.

Possible Health-care-associated Transmission as a Cause of Secondary Infection and Population Structure of Staphylococcus Aureus Isolates From Two Wound Treatment Centres in Ghana

Background: We have previously shown that secondary infection of Buruli ulcer (BU) wounds are frequently caused by Staphylococcus aureus. Such complications may lead to significant healing delays. To gain understanding in possible routes of secondary infection, we characterised S. aureus isolates from patient lesions and surrounding environments across two Ghanaian health centres.

Methods: One hundred and one S. aureus isolates were isolated from wounds (n=93, 92.1%) and the hospital environment (n=8, 7.9%) by microbiological culture and characterised by the spa gene, mecA and the Pantone Valentine Leukocidin (PVL) toxin followed by spa sequencing and whole genome sequencing (WGS) of a subset of 49 isolates. Susceptibility testing of the isolates to commonly prescribed antibiotics was performed.

Results: Spa typing and sequencing of the spa gene from 91 isolates identified 29 different spa types with t355 (ST152), t186 (ST88), and t346 dominating. While many distinct strains were isolated from both health centers, genotype clustering was also identified within centers. These clusters were confirmed by phylogenomic analysis. Twenty-four (22.8%) isolates were identified as methicillin-resistant S. aureus (MRSA) and lukFS genes encoding PVL were identified in 67 (63.8%) of the isolates. Phenotype screening showed widespread resistance to tetracycline, erythromycin, rifampicin, amikacin and streptomycin. Genomics confirmed the widespread presence of antibiotic resistance genes to β-lactams, chloramphenicol, trimethoprim, quinolone, streptomycin and tetracycline.

Conclusion: Our findings indicate that the health-care environment likely contributes to the superinfection of BU wounds with multi-drug resistant MRSA and calls for improved training in wound management and infection control techniques.
**POSTER 208**

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Viral Sexually Transmitted Infections (STIs) among Pregnant Women in Southwestern Nigeria: A Hidden Epidemic Potential

**Background:** Viral STI epidemics are emerging and sometimes rapidly increasing in vulnerable populations such as the pregnant women. In Nigeria, there is a dearth of data on prevalence of viral STIs such as Herpes Simplex Virus-2, Hepatitis B and C among pregnant women and no clear understanding of the dynamics of STI transmission pathways. Hence it is not easy to inform specific interventions, models for feasible and cost effective STI service delivery within the socio-cultural and gender specific contexts. This study aimed at identifying outlets for tailored interventions to curb the prevalence of HIV, HBV, HCV and HSV-2 infections among pregnant women in southwestern Nigeria.

**Methods:** A total of 270 counseled pregnant women aged 20 to 44 years, attending the antenatal clinic of the University College Hospital Ibadan were enrolled in this cross-sectional study. Women were tested for HSV 2 IgG using type specific third generation ELISA and HIV-1, using Uni-Gold Recombigen and ALERE determine, while 180 consented to HBV and HCV testing using third generation ELISA. Questionnaires were administered to obtain data and analyses were done using SPSS version 20.

**Results:** Sero-prevalence rates of 33.3% (90/270) HSV-2, 19.6% (53/270) HIV-1, 8.3% (15/180) HBV and 26.7% (72/270) HCV-2 infections among pregnant women in southwestern Nigeria.

**Conclusion:** These high prevalence and co-infection rates among pregnant women suggest that viral STIs have a hidden epidemic potential in this population. There is need for structural, behavioural and biomedical interventions tailored to respond to this STI epidemic.

**POSTER 209**

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Prevalence of Symptomatic and Asymptomatic UTI and Their Antimicrobial Susceptibility Patterns among people Living with HIV; A Comparative Cross Sectional Study Between HAART Naive and Patients on HAART Attending Tikur Anbesa Specialized Hospital (TASH) and Zewditu Memorial Hospital, Addis Ababa, Ethiopia

**Background:** Urinary Tract Infections (UTI) are major causes of morbidity in people living with HIV. Hence the study aimed to determine the prevalence of symptomatic & asymptomatic UTI & their antimicrobial susceptibility patterns among HAART naïve & patients on HAART.

**Methods:** A comparative cross sectional study conducted from April to June 2015. Proportional allocation of sample size was made for both institutions on HAART & HAART naïve participants. A total of 297 & 153 participants were from ZMH & TASH respectively. First morning urine samples were collected and cultured on Blood & MacConkey agar. Culture positives were characterized by gram stain and standard biochemical tests & Kirby-Bauer method was used for antimicrobial susceptibility patterns of the isolates. P-value <0.05 were taken as statistically significance. The independent T-test was used to compare the mean of CD4 cells between HAART naïve & HAART users. Data was entered & analyzed using SPSS(V-20).

**Results:** Overall prevalence of bacteruria was 11.3% (n=51/450). Isolated bacteria from HAART naïve & on HAART participants were 6.9% (n=9/131) & 13.2(42/319) respectively. E.coli 25(49%), S.aureus 10(19.6%) & Enteroccous species 7(13.7%) were the predominant isolated bacteria. Asymptomatic and symptomatic participants were 7.3% (n=29/398) and 42.3% (n=22/52) respectively. 84 % of bacteruria was from participants with CD4 <500 cells/mm3. Most bacterial isolates were sensitive amikacin(100%), ceftriaxone(96%), cefazidim(96%); resistance to ampicillin(81%), sulfamethoxazole-trimetoprim(71%) & amoxicillin-clavulenic acid. (61%). Multiple drug resistance was 78.4%. Gram positives and gram negatives accounts 13(65%) and 27(87%) of MDR level respectively.

**Conclusion:** Participants with low CD4 count were highly infected by urinary pathogens compared with HAART naïve. More than 3/4th of isolated bacteria were resistant to two or more commonly prescribed antimicrobial drugs. Thus, regular monitoring of bacteruria & their antimicrobial susceptibility patterns among this group of individuals is used to manage the prescribed antibiotics.
Pattern of Opportunistic Infections and Cytological Changes in Sputum Specimens from HIV Infected Patients at Mbagathi District Hospital, Nairobi, Kenya

Background: Patients with advanced stages of HIV infection are vulnerable to secondary infections that are generally termed as opportunistic infections (OIs). This is because the microorganisms take advantage of the opportunity offered by a weakened immune system. Respiratory opportunistic infections commonly associated with HIV includes pneumococcal pneumonia, Pneumocystis jiroveci pneumonia and tuberculosis. Sputum is one of the specimens that can be utilized in making a rapid diagnosis of opportunistic infections.

Methods: Objective: To describe the pattern of OIs and cytological changes in sputum specimens from HIV infected patients from Mbagathi District Hospital (MBH), TB Clinic Nairobi, Kenya.

Study design: A cross-sectional descriptive study.

Study population: Adults 18 years and above attending MDH TB Clinic, who submitted sputum specimens for diagnosis of OIs diagnosis.

Material and methods: Demographic and clinical information was collected by direct interview of the patients. Two sputum samples per patient were obtained, pick and smear technique was used to prepare smears which were stained using Papanicolaou and Heamatoxylin and Eosin stain. The remainder of the sample was processed using bleach centrifugation method and stained with Ziehl Neelsen stain.

Results: A total of 100 HIV-infected patients were studied. Majority of the patients, (51%) were female, while remainder were male (49%). The mean age was 38.98 years (± 10), with a median (IQR) of 38years (32, 45). A total of 80% patients were on HAART medication and 20% had defaulted on HAART. The mean CD4+ lymphocyte count was 207 cell/mm$^3$ (±114.9), with a median (IQR) 193.5 cell/mm$^3$ (134.3, 269.5). Inflammatory changes were seen in 57% of patients, atypical squamous cells of undetermined significance (ASCUS) in 4%, negative findings in 34%, and unsatisfactory smears were 5%. The commonest opportunistic pathogen was Mycobacterium species (30%) and Candida species (14%) with HIV includes pneumococcal pneumonia, Pneumocystis jiroveci pneumonia and tuberculosis. Sputum is one of the specimens that can be utilized in making a rapid diagnosis of opportunistic infections.

Conclusion: Majority of these HIV infected patients had inflammatory changes in the sputum, with Mycobacterium, Candida and Aspergillus species the pathogens that were detected. Sputum cytology should be used for preliminary diagnoses of opportunistic pathogens before confirmatory test.

Molecular-Based Assays Reveal Streptococcus Pneumoniae as the Lead Etiological Agent in the Ongoing Meningitis Epidemic in Ghana

Background: Ghana experiences outbreaks of bacterial meningitis frequently; however, the current epidemic in Ghana has received significant impact and media attention. Latex agglutination test and Gram stain are used for detecting meningitis within affected health facilities. However, these tests fail to identify the serotype of the bacteria causing the infection, which is critical to initiating population-level interventions such as vaccination. We therefore aimed to use molecular techniques to aid in the characterization of suspected agents responsible for the current epidemic of meningitis in Ghana.

Methods: To determine the prevalence and etiology of meningitis, we investigated cerebrospinal fluid (CSF) specimen from 161 individuals suspected of meningitis using standard microbiological methods and a Fast Track Diagnostics (FTD) real time multiplex polymerase chain reaction (PCR) assay. The multiplex PCR assay consists of primer/probe mix and allows simultaneous detection of N. meningitidis, S. pneumoniae and H. influenzae.

Results: Overall, 93.3% (148/161) of the cases were from the Brong-Ahafo region, while the remaining were from Greater Accra and Ashanti regions. In total, 53% (85/161) were female, and the median age was 21 years (0.3 - 83) for both sexes. Forty-eight percent (77/161) of the patients were positive for bacterial meningitis; 73% (56/77) for S. pneumoniae, and 26% (20/77) for N. meningitidis, while 1% (1/77) was positive for H. influenzae. We found that 2.6% (2/77) patients were co-infected with both S. pneumoniae and N. meningitidis.

Conclusion: PCR-based assay implicates S. pneumoniae as the principal etiologic agent followed by N. meningitidis in the ongoing meningitis epidemic in Ghana and suggests the need for appropriate vaccines to prevent current outbreaks. In addition to providing necessary logistics and other interventional measures, we recommend existing research institutions and referral hospitals within the affected regions to be equipped with molecular based-approaches to improve diagnostic capacity of meningitis in Ghana.
**Correlation Between CD4 Counts and Total Lymphocyte Counts in Newly Diagnosed HIV Positive Children at Korle Bu Teaching Hospital in Ghana**

**Background:** HIV infects T helper lymphocytes, replicates within them and lyases the cells as the replicated virions are released extracellularly to infect yet other CD4 cells. Consequently CD4+ T-helper lymphocytes are gradually depleted and the immune system crippled. Given that HIV induced immunodeficiency is largely due to infection and gradual depletion of CD4+ T-helper cells, CD4 count has become a useful indicator of immune function in infected patients.

CD4 count is said to be the most reliable prognostic indicator of immune response to therapy, and is thus a major criterion in the CDC/WHO classification of HIV. CD4 count is said to be the most reliable prognostic indicator of immune response to therapy, and is thus a major criterion in the CDC/WHO classification of HIV. Given that HIV induced immunodeficiency is largely due to infection and gradual depletion of CD4+ T-helper cells, CD4 count has become a useful indicator of immune function in infected patients.

**Methods:** We investigate CD4 count using BD Fascount analyzer in newly diagnosed HIV-infected children attending the HIV clinic at the Child health Department, Korle Bu Teaching Hospital and evaluated suitability of total lymphocyte count (TLC) using Mindray BC 5300 Hematology analyzer as a surrogate marker for CD4+ T-lymphocyte counts required as a baseline test for antiretroviral therapy.

**Results:** Approximately 61.7% of our patients were diagnosed late as revealed by CD4 count ≤ 350 cells/µL. An overall good correlation was noted between TLC and CD4 counts using linear regression and Spearman’s correlation analytical tools.

**Conclusion:** When considering initiating ART for HIV-infected Ghanaian Children, TLC can be considered as an inexpensive and easily accessible surrogate marker for predicting CD4+ T-lymphocyte at two clinically important CD4 thresholds of CD4 count of ≤ 350 cells/µL and < 500 cells/µL.

**Total and CD4+ T-lymphocyte Count Correlation in Newly Diagnosed HIV Children in Korlebu Teaching Hospital**

**Background:** CD4 count is said to be the most reliable prognostic indicator of immune response to therapy, and is thus a major criterion in the CDC/WHO classification of HIV. Since laboratory assessments of HIV-infected patients by flow cytometric methods are expensive and unavailable in low and middle income countries, total lymphocyte count by haematology cell counter is supposed to be a suitable surrogate marker to initiate and monitor course of the disease in these patients. The aim of this study was to evaluate the utility of total lymphocyte count as a surrogate marker for CD4 count in HIV-infected children.

**Methods:** In this study 186 HIV-positive children were evaluated for total and CD4 lymphocyte count using Mindray 5300 Hematology analyzer and BD Fascount Flow cytometer. For correlation between CD4 count and total lymphocyte count, haemoglobin and haematocrit we defined cut-off values as 200 cell/µl, 1200 cell/µl, 12 gr/dl and 30%, respectively, and compared CD4 count with each parameter separately. Positive predictive value, negative predictive value, sensitivity and specificity of varying total lymphocyte count cutoffs were computed for CD4 count ≤ 200 cell/µl and ≤ 350 cell/µl.

**Results:** Strong degree of correlation was noted between CD4 and total lymphocyte count (r: 0.640, P < 0.001). Mean and standard deviation of total lymphocyte count, haemoglobin and haematocrit in relation to CD4 count calculated indicated significant correlation between these variables. Kappa coefficient for agreement calculated showed fair correlation between CD4 200 cell/µl and total lymphocyte count 1200 cell/µl (0.35).

**Conclusion:** This study reveals that despite low sensitivity and specificity of total lymphocyte count as a surrogate marker for CD4, total lymphocyte count is of great importance and benefit in Low and Middle Income countries.
POSTER 214 CANCELLED

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The Effects of *Cryptolepis sanguinolenta* Root Extracts on Gametocyte Development

**Background:** Current efforts to eliminate malaria worldwide are soaring and one of the approach to this is the mass screening of medicinal plants for their possible potential anti-malarial property. The current study conducted was to determine the effect of one such plant, *Cryptolepis sanguinolenta* on gametocyte development.

**Methods:** *C. sanguinolenta* roots was obtained from Mampong Research Centre into Plant Medicine, Ghana and subjected through aqueous and ethanolic extraction. The antigametocytic activity of the aqueous and ethanolic root extract were tested using different concentrations (100µg/ml, 50µg/ml, 25µg/ml, 12.5µg/ml, 6.25µg/ml, and 3.125µg/ml). Enzyme assays were performed to test the effect of the ethanolic root extract on some of the gametocyte’s tricarboxylic acid cycle enzymes. Rhodamine and bodipy-tr ceramide dye staining of *C. sanguinolenta* treated gametocytes to access the effect of the ethanolic roots extract on gametocyte’s mitochondrial membrane potential and intracellular membranes was also performed.

**Results:** Compared to the aqueous extract, the antigametocytic activity of the ethanolic root extract of *C. sanguinolenta* was more pronounced, particularly on the late gametocytes stage (III-V) than the early gametocytes stage (I&II) (IC\(_{50}\): 291±24.66µg/ml and 307±20.42µg/ml respectively). Also, using the IC\(_{50}\) and IC\(_{90}\) of the ethanolic root extract, there was observed a significant inhibition of the aconitate activity (p= 0.0001) and citrate synthase activity (p= 0.001) in the mitochondria of Cryptolepis treated gametocytes but not -Ketoglutarate dehydrogenase activity (P=0.01). There was reduced uptake of the rodamine 123 dye in the late stage gametocyte’s mitochondrial matrix and the reduced uptake of the fluorescent dye bodipy-tr ceramide by the intracellular membranes of the *Cryptolepis* treated late gametocytes stage. The effect of the ethanolic root extract on the morphology of the late gametocytes stage was pronounced and it revealed a morphological deformity in 85% of the population of stage III gametocytes treated with the IC\(_{90}\) 75% for the IC\(_{50}\) and 59% for the IC\(_{10}\) treated groups.

**Conclusion:** The ethanolic root extract of *C. sanguinolenta* inhibited the late gametocytes stage development. The ethanolic root extract of *C. sanguinolenta* possess active agents that strongly had effect on the gametocytes and can further be studied for its potential as a transmission blocking agent.

POSTER 215 CANCELLED

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Microbiological Analysis of Hemodialysis Water in Chu Yaoundé

**Background:** Rigorous control of the microbiological quality of water in hemodialysis services is important because the immune system of patients with chronic renal failure is weakened. The objective of this study was to determine the microbiological quality of water for hemodialysis in the hemodialysis department of the Hospital Centre and the University Hospital of Yaoundé.

**Methods:** Twelve water samples were collected each month at different sites of the hemodialysis circuits A (inlet of filters), B (Outlet of filters / inlet of RO device) and C (outlet of the RO device / close to the generator) between July and October 2015 to be analyzed. The bacteria were isolated after filtration of 100 ml of water at each site through nitrocellulose membrane with 0.45 µm microporosity deposited on the surface of the Tryptone Glucose Extract Agar (TGEA) and then incubated at room temperature for 7 days. After transplanting to different environments, pure bacterial isolates were identified by their cultural characters and marketed biochemical galleries.

**Results:** The colony count was well above the required international standards (Superier à 100 CFU / ml), a percentage of 83.3% (10/12) of non-compliance. Among the bacteria identified, nine (09) were Gram-negative bacilli including Pasteurella haemolytica, Pseudomonas fluorescens, Pseudomonas paucimobilis, Aeromonas salmonicida and Klebsiella pneumoniae subsp ozaenae, three (03) Gram-positive bacilli all Bacillus sp and six (06) Gram-positive cocci all of coagulase-negative staphylococci. The most frequently isolated bacterial genera were Pseudomonas (30.4%), Staphylococcus (26.1%), Aeromonas (13%), Bacillus (13%), Klebsiella (13%) and Pasteurella (4.3%).

**Conclusion:** In this study, the detection of a variety of bacteria in the hemodialysis water indicates the need for regular monitoring of the water for hemodialysis by the CHUY hemodialysis center to ensure a better quality of life for patients undergoing this treatment.
**La Spiruline Contre les Risques de Santé Liés aux Métaux Lourds**

**Background:** Des études précédentes ont révélé la présence de métaux lourds, plomb, cadmium et arsenic dans des légumes consommés au Bénin à des teneurs dépassant plusieurs fois les limites autorisées par l’Organisation Mondiale de la Santé. Le présent travail a évalué le potentiel protecteur de l’algue Spiruline contre les effets toxiques du mélange de plomb, cadmium et arsenic sur le rat Sprague-Dawley.

**Methods:** L’expérimentation a été réalisée en 4 semaines sur 5 lots de 6 rats chacun (3 mâles et 3 femelles) alimentés normalement. Hormis le lot témoin, les autres lots ont été gavés, de façon simultanée et répétée par le mélange des trois métaux toxiques avec ou sans spiruline: deux lots de rats ont reçu différentes doses du mélange des métaux toxiques et deux lots ont reçu, en plus des métaux, de la spiruline à des concentrations différentes. Les paramètres hématologiques et biochimiques ont été analysés parallèlement à l’élimination des métaux et du calcium dans les selles et les urines des rats.

**Results:** L’exposition aux métaux lourds a induit une diminution du taux des globules rouges et blancs ainsi qu’une augmentation des transaminases et du cholestérol total. La correction de ces dysfonctionnements chez les rats ayant reçu la spiruline confirme le rôle protecteur de l’algue contre l’anémie, la déficience immunitaire et l’atteinte du foie. Ces effets protecteurs ont été parallèlement corrélés à la rétention du calcium chez ces rats contre l’élimination du plomb et du cadmium dans leurs selles et urines. Chez les témoins, la prise de la Spiruline n’a pas eu d’effets toxiques. D’autres travaux ont confirmé ces résultats.

**Conclusion:** Les risques de santé liés à l’exposition aux métaux lourds à travers la consommation de produits maraîchers pourraient être atténués par la prise régulière de la Spiruline.
Prevalence of Hepatitis B and C in HIV-positive Men Who Have sex with Men in Senegal

Background: Since the early 2000s, the National Programme against AIDS in Senegal recognized the importance of taking into account the specific needs of men who have sex with men (MSM) for prevention of STIs and HIV infection among them and among the general population. So in addition to regular monitoring, two surveys have already been conducted in this population to analyze the links between behavior and the presence of STIs. This third survey included research of hepatitis B and C markers; the objective was to analyze the presence of HIV and hepatitis in a population of MSM in Senegal.

Methods: This study was a cross-sectional study conducted in 2013 in ten regions. Snowball sampling of MSM was initiated by MSM leaders. Eligibility criteria were: being a man aged 18 or over who had sex with men in the past. Five ml of blood were collected to test for the presence of HIV and Hepatitis C Virus (HCV) antibodies as well as Hepatitis B Virus (HBV) surface antigen (HBsAg) using ELISA. Statistical analyses were done with excel and Epi-info.

Results: A total of 1002 MSM consented to lab testing. The majority (41.4%) were aged between 20-24 years and had secondary level education (44.9%). HIV prevalence was estimated at 18.5% (185/1002), 2.9% for HBV and 0.4% for HBV. Of the 185 MSM infected with HIV, 29 (15.7%) were carriers of HBsAg and only 4 (0.4%) had anti-HCV antibodies. No HIV/HBV/HCV co-infections were noted.

Conclusion: In Senegal the prevalence of HIV is high among MSM (18.5%) while it is only 0.7% in the general population. Paradoxically HBV prevalence among MSM is low (2.9%) compared to the national prevalence, at 17%. Co-infection HIV-HBV in our study was present for 15.7% of MSM. Prevention programs targeting both HIV and HBV must be strengthened among senegalese MSM.

HIV and Multi-Drug Resistance Tuberculosis Co-infection among Tuberculosis Patients at the National Tuberculosis and Leprosy Training Centre (NTBLTC), Zaria, Nigeria

Background: Tuberculosis (TB) is one of the leading infectious diseases worldwide especially in low and middle income countries. TB ranks alongside HIV as a leading cause of death, with 1.5 million people dying from the disease in 2014, 400,000 of whom were HIV-positive. Globally, an estimated 3.3% of new TB cases and 20% of previously treated cases have Multi-Drug Resistance Tuberculosis (MDR-TB), a level that has changed little in recent years. Nigeria has an estimated MDR-TB rate of 2.2% and 9.4% among new and re-treatment TB cases respectively, and is therefore ranked 15th among the 30 High Burden Countries for MDR-TB. The study was carried out to determine the prevalence of HIV/MDR-TB coinfection and the effect of HIV on the development of MDR-TB.

Methods: A descriptive cross sectional study was carried out using records of all 398 TB patients screened for HIV and MDR-TB at the National TB and Leprosy Training Centre, Zaria, Nigeria in 2015. Data obtained from the centre was cleaned, entered into excel sheet and exported into Epi-Info 7. Frequency tables and cross tabulation were generated and a P-value < 0.05 was statistically significant for the study.

Results: The average age of the study population was 36 years ± 12.6 years with 270 (68%) male and 128 (32%) female. Among the 398 patients, 110 (27.6%) were tested HIV positive while 288 (72.4%) were tested HIV negative. 93 (23.4%) were confirmed to have MDR-TB. Among the 93 with MDR-TB, 7 (7.5%) were HIV positive while 86 (92.5%) were HIV negative. The risk of developing MDR-TB among HIV positive and HIV negative patients were 6.36% and 29.86% respectively. The Relative Risk was 0.21 (0.10, 0.45) while the attributable risk was -23.5 (-30.5, -16.5). (x² = 23.3 and P-value <0.05).

Conclusion: There is a significant effect of HIV status on MDR-TB, MDR-TB was higher among non HIV patients, those enrolled into HIV care and treatments are less likely to develop MDR-TB. The use of highly active antiretroviral therapy with high drug adherence level is likely to reduce MDR-TB in HIV patients. Patient on both TB and HIV treatments should be more counselled and properly monitored to have a treatment partner/supporter to improve drug adherence. Also contact tracing of all MDR-TB patients should be intensified to reduce the further spread of MDR-TB in the communities.
Evaluation of a Laboratory Based Surveillance System for a Viral Hemorrhagic Fever at a National Reference Laboratory in Nigeria, 2013 to 2015

**Background:** Viral hemorrhagic fever is a generic term for a severe illness, often accompanied by bleeding and caused by viruses. Lassa fever is a viral hemorrhagic fever caused by Lassa Virus of the family Arenaviridae. Lassa fever is endemic in Nigeria especially Edo State with seroprevalence of 21% and 28% mortality. The aim of this study was to evaluate the laboratory based surveillance system for Lassa fever to assess its key attributes and whether it meets its objectives.

**Methods:** This study was conducted by carrying out an evaluation of the Laboratory based Lassa fever surveillance system at the Institute of Lassa Fever Research and Control, Irrua Specialist Teaching Hospital, Irrua, Edo State from 2013 to 2015 (BO1). The evaluation was conducted using the CDC’s Updated Guidelines for Evaluating Public Health Surveillance System, 2001. The methodology included interview of stakeholders and review of documents. Relevant stakeholders were identified and interviewed to obtain their input in describing the system and assessing key attributes of the system. Documents relevant to the surveillance of Lassa fever in Nigeria were also reviewed.

**Results:** Out of 3,268 suspected cases screened for Lassa fever from 2013 to 2015, 308 were laboratory confirmed as Lassa fever. The predictive value positive was 9.4%. The case definition for Lassa fever surveillance is simple and easy to apply. The system integrates well with the Integrated Disease Surveillance Response system and is representative. The system is flexible as data is also being collected on malaria and typhoid fever. Data incompleteness for all variables ranged from 7% to 11%. The system is also useful as it provides data on distribution of Lassa Fever in the country. Stakeholders interviewed agreed that effective Lassa fever surveillance ensured the control and elimination of Lassa fever.

**Conclusion:** The Lassa fever surveillance system in ILFRC is meeting its objectives of detecting and controlling the disease in Nigeria. However, the surveillance system has a gap in terms of data quality and completeness. The Government should provide more funding and support to the system.

Laboratory Confirmed Lassa Fever Cases at Irrua Specialist Teaching Hospital, Irrua, Edo State, Nigeria, 2011 to 2015

**Background:** Lassa Fever is a viral hemorrhagic fever endemic in the West African countries of Sierra Leone, Guinea, Liberia and Nigeria. Lassa fever outbreaks occur in Nigeria especially Edo State with case mortalities as high as 28%. The Institute of Lassa Fever Research and Control was established in 2008. It is a center of excellence for the diagnosis and treatment of Lassa Fever in Nigeria. It is located within the premises of Irrua Specialist Teaching Hospital, Irrua, Edo State. This study was conducted to characterize the Laboratory based Lassa fever surveillance data at the Irrua Specialist Teaching Hospital, Irrua Edo State by time, place and person and to determine the trend in this period.

**Methods:** We carried out a retrospective study of the Lassa Fever surveillance data at the Institute. Descriptive analysis of Lassa fever data from the diagnostic laboratory in ISTH from 2011 to 2015 was carried out. We used Microsoft Excel and Epi Info to analyze the data. We set the confidence level at 95%.

**Results:** Of the 6,673 persons screened, 575 (8.61%) were positive with January to March accounting for 298 (53%) of the samples. Mean positive age was 34.77 with standard deviation 16.77. The highest positives fall in 2012 with 172 (29.91%), while 2015 had the least positives with 58 (10.09%) (7.81, 12.92%). Age group 20 - 29 years had the highest positive with 175 (27.71%) . Students accounted for 129 out of 460 making 28.04% (24.03%, 32.43%) of total positives. Edo State has the highest positive samples with 376 out of 519 making and 72.45% (68.35%, 76.21%), with Esan West LGA having the highest positives with 120 out of 548 and 21.62% of total positives.

**Conclusion:** Analysis showed that Lassa Fever trend remains fairly consistent throughout the five year period with a downward trend. The study highlighted the distribution of Lassa fever over the five year period. The highest prevalence of Lassa fever falls among students and is consistent with age group 20 to 29. Further studies should be carried out to determine the risk factors among this age group.
**POSTER 222**

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**Chronic Infection with HIV, HBV, and HCV May Leads to More Painful Symptoms and a High Risk of Autoimmune Diseases Through the IgM-RF Production**

**Background:** Autoimmune diseases (AID) are defined as diseases in which the progression from benign autoimmunity to pathogenic autoimmunity occurs*. Some are mediated by autoantibodies such as rheumatoid factor (RF). In fact, RF designed a group of autoantibodies directed against the Fc region of human and animal IgG. RF has been shown to be highly implicated in induction and development of AID that may lead to destruction of target tissue and sometimes lost of its function.

**Methods:** In this cross sectional study, we sought to evaluate the impact of infection by viruses such as HIV, HBV and HCV on the IgM-RF production amongst people infected. The study participants were recruited in five regions of Cameroon. Whole blood were collected from each participant and the serum used to sough for the HIV antibodies; the core, the surface and the replicative antigen of HBV; the HCV-antibodies and the IgM-RF. Frequencies were calculated using SPSS version 15.0 software and p values less than 5% (p<0.05) were considered to be significant.

**Results:** A total of 405 participants were enrolled in the study; 266 (65.7%) females and 139 (34.3%) males. The various parameters measured were as follows: anti-HIV antibodies 7.61%, anti-HBc-Ab 38.7%, HBs-Ag 5.43% and 6.41 % for rheumatoid factor (IgM-RF) in the study population. The prevalence of IgM-RF was 6.7% and 5.7% respectively for women and men (sex ratio of 2.25 for women). The IgM-RF prevalence was 9.7%, 8.9%, 9.1%, and 27.8% in participants with positive serological results for HIV, HBcAb, HBsAg, and HCV respectively.

**Conclusion:** Our results suggested that these viral infections leading to increased IgM-RF production may cause more painful syndromes and elevated risks of AID.

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**POSTER 223**

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**Some Realities of the Practice of Screening for HIV in the Field: the Case of Centre Pasteur of Cameroon**

**Background:** AIDS has become one of the major issues of our time; it is a problem that affects all continents with a focus on Sub-Saharan Africa countries (WHO / UNAIDS 2007). Mass education and awareness remain strong arms for the battle against this pandemic. These weapons that rely heavily on the various health staff, on care providers and Medias remain poorly use. Stress and anxiety continue as ever to influence the acceptability of HIV screening and tests results.

**Methods:** In order to elucidate a little more people resistance to mentalities changes, we conducted a cross-sectional study from March to May 2008 in the services of Centre Pasteur of Cameroon (National and reference Laboratory for public health). Our questionnaire focused on the proposal for screening, prescription, counseling, consultation time

**Results:** 259 people investees in this study on which 68.3% (177/259) were women. The most represented age was that of participants aged between 26 to 35 years old. The study revealed that 85.7% (222/259) of participants had a prescription made in 91.4% by a doctor. The analysis of the requirements showed that 36.5% (81/222) of the HIV test requests were coded (LAV, CHECK, RETRO, MODERN SERO); 20.7% of participants claimed that they did not know they were prescribed that test. Precounseling was done in 60.4% (134/222) of participants. 22.0% (57/259) said the test was part of the diagnosis of the disease; 9% of participants were doing it for the first time. 77.8% personally withdrew their result. The removal rate was 83.0% among HIV+ and 96.0% for HIV- participants.

**Conclusion:** This study highlights the gaps in the screening process; the need to educate patients to enable each to fully play its role in the fight against the HIV.
Posters 224
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Immunophenotypic Features of Acute Promyelocytic Leukaemia in the South African Context

Background: Acute Promyelocytic Leukaemia with t(15;17);PML-RARA is a particular subtype of Acute Myeloid Leukaemia with unique pathophysiology, morphology, immunophenotype, cytogenetics and molecular findings. The immunophenotype including mean fluorescent intensity(MFI) has not been characterised in the South African context. Thus we undertook a retrospective study of flow cytometry results for APL cases since 2013 at the GSH/C17 Haematology laboratory and compared these results to other acute myeloid leukaemia cases, which tested negative for the APL.

Methods: Data from 2013 to 2016 was collected. All suspected cases of APL were further cross-matched with the flow cytometry data base to identify the final sample population of all suspected APL cases with results from the BD FACSCanto™ II flow cytometer. Descriptive statistics and box plots were used to appraise the immunophenotype of APL in the South African context. The Spearman’s correlation rank test was used to evaluate the correlation between percentage expression and mean fluorescence intensity (MFI) of each immunophenotypic marker within the APL group and the Kruskal-Wallis equality-of-populations rank test was used to determine whether or not there was a significant difference between the immunophenotypic markers in the APL and non-APL groups.

Results: We managed to characterise the APL in the South African context in terms of MFI and percentage of cells expressing markers used. Further more we demonstrated that the percentage expression of CD13, CD64 and CD56 was significantly different between the APL and non-APL groups at the 0.05 significance level using the Kruskal-Wallis equality-of-populations rank test. In terms of mean MFI the two-sample t-test using log-transformed data showed no evidence of significant difference between the APL and non-APL groups, at the 0.05 significance level. However, the non-APL group had a wider range for CD34 and HLA-DR as well as dimmer expression of CD13 and CD64.

Conclusion: We have rejected the hypothesis that genetic differences in the South African population were causing a different immunophenotype of APL. Although our objective of utilising MFI for a clearer depiction of the APL immunophenotype was not well supported the data recorded is useful in furthering our knowledge of APL and recognising the need of prospective studies and refinement of the strategies to distinguish between APL and other AMLs.

Posters 225
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Implementing Routine Viral Load Testing Services at HIV Reference Laboratory, Kenya

Background: Kenya currently has approximately 1.6 million people living with HIV; 2,000 ART sites; and approximately 850,000 patients enrolled in care against the target of 1.2 million people. Most studies in other countries have assessed this coverage against the USAID 90-90-90 targets, but none has focused on measurements of adherence pattern which is a key indicator that will be used to track the third 90. Our goal was to assess VL scale-up implementation plan in Kenya in terms of meeting third 90.

Methods: Data variables was extracted from Kenya HIV-1 viral load database which include number test done, testing sites, suppression, dates of sample collection, and result dispatch. Data was analyzed using Stata 13.1

Results: A total of 945,843 samples were tested from 3,879 VL network facilities between 2012 and 2015. The testing trend gradually increased from 12,040 in 2012; 53,331 in 2013; 243,314 in 2014 up to 637,158 patients in 2015. Turnaround time reduced to a median of 10 days as at March 2016. Sample collection to receipt turnaround time was high; 68% of samples received within 30 days, and 76.8% tested within 30 days. Suppression rate has improved from 48% in 2012 to 83 % by 2016.

Conclusion: The viral load scale up implementation plan in Kenya has experienced positive impact in terms of establishment of more testing laboratories, efficient laboratory testing network as indicated by reduced turnaround time. In addition, the program have met 83% of the population achieving suppression by date 2016 and improved suppression from below 48% in 2012 to 83% in 2016 against the viral suppression target of 90%.
POSTER 226

Allan O. Campbell

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Percentage Positivity of Influenza Infection Between Male And Female Children Below the Age of 5 years for 2011, 2013 and 2014

**Background:** Over the years under review Influenza like Illnesses (ILI) and Severe Acute Respiratory Illnesses (SARI) samples have been collected from four (4) sentinel sites in the Western Urban Area of Sierra Leone. Sierra Leone activated the Strengthening of Influenza Sentinel Surveillance (SISA) in 2011. Four (4) sites were activated in the capital in the western area; 1) Ola During Children’s Hospital (ODCH) which collected samples for only Severe Acute Respiratory Illness (SARI) patients, 2) Jenner Wright Clinic linked to the ODCH collected ILI samples, 3) Lumley hospital and 4) Blue Shield collects both SARI and ILI samples. The objective of this abstract is to analyze the trend in positivity of children below 5 years exposed to SARI and ILI.

**Methods:** 1,218 samples were tested between 2011, 2013 and 2014 with 548, 633 and 37 respectively for SARI and ILI cases combined. Target groups were children below 5 years who are considered more vulnerable to flu. Data were collated under the following categories: total number of samples for the year, ratio of male to female who visited the sites and the number of positive cases for both male and female.

**Results:** Out of 1,218 samples analysed 68 (6%) tested positive. Ratio of positivity by sex was 42 (63%) males to 25 (37%) females. Most affected age cohort was children 12 months / 1 year old. Children less than 12 months were least affected.

**Conclusion:** Children below the age of 5 are predominantly affected / exposed to flu due to various possible points of contact through which they may have contacted the virus. One (1) year children account for a large percentage of positivity within this age gap (1month-5years). Children less than 12 months were least affected by the virus possibly because of the delicate care that they receive from their mothers at that early stage after birth. At age one (1) they begin to leave there mother’s arms slowly, and begin to creep / walk and play with other children and they become exposed.

POSTER 227

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Decentralizing the Proficiency Testing Program for Timely feedback and Corrective Action. A Best Practice for Improving Quality of HIV Testing

**Background:** The adoption of task shifting in Malawi has resulted in increasing access to HIV testing, but potentially compromising the quality of test results. To alleviate this, the National HIV Reference Laboratory (NHRL), mandated to develop a Quality Assurance Program or HIV rapid testing, has established a proficiency testing (PT) program aimed to assess testing providers’ performance bi-annually. However, a review of the program indicated delays in provision on performance feedback to the sites. To address this gap, NHRL has decentralized the assessment of the PT results to the district level.

**Methods:** In July 2016, 200 Rapid Quality Improvement Initiative (RTQII) site were enrolled for assessment of the decentralized program. PT panels were sent to district level and then quality corps (Q-corps) volunteers hand-delivered to all testing sites. After PT panels were performed Q-corps returned to district level. After scoring, feedback was provided and corrective actions were implemented during follow up visits.

**Results:** Of the 200 pilot sites, 90% reported receiving feedback and corrective actions for those with unsatisfactory performance within six (6) weeks, resulting in a 37.5% decrease in average turnaround time and a 62.5% increase in performance, compared to the last centralized PT panel program in the same sites.

**Conclusion:** Empowering the districts to manage the PT program and other quality-related activities has the potential to reduce turnaround time for feedback and corrective actions. Additionally, innovative approaches such as the Q-corps volunteer program should be considered to improve quality monitoring processes.
**Prevalence and Microbiology of Child Acute Urinary Tract Infection at University Teaching Hospital of Kamenge**

**Background:** Urinary tract infection (UTI) is an acute infection frequently meet in children. Its prevalence is affected by sex and age. Before 1 year the risk of UTI is estimated at 6% for girls and 3% for boys, between 1 and 2 years, it is estimated at 8% for girls and 2% for boys. Each year, 150 million UI are reported worldwide with a cost of more than 6 billion US dollars. Knowledge of microbiology urinary infections and sensitivity of germs to antibiotics should guide the choice of antibiotic therapy. This study is to determine the prevalence and microbiology of child acute urinary tract infection in hospital.

**Methods:** We made a descriptive analytical study during 10 months for 101 children hospitalized at Kamenge University Hospital for acute urinary tract infection confirmed by the KASS urinalysis criteria. For causal agent isolated culture and susceptibility antibiotic tests were performed in laboratory.

**Results:** The prevalence of acute urinary tract infection was 8.4%. It was 86.1% in children less than 24 months and 21.4% for over 24 months. The average age was 15 months occurred with a peak between 7 and 9 months. It was pyelonephritis in 82% of cases and cystitis in 18% of cases. The main causal bacterial pathogens were enterobacteria (95%) with E. coli (82%), Klebsiella pneumoniae (10%) and Proteus mirabilis (3%). The E. coli and K. pneumoniae were resistant to the aminopenicillins (100%), cotrimoxazole (98.2 to 100%) and Amoxicillin + Clavulanic acid (70.5 to 80%) to cefotaxime (45.8% and 28.6%) to Cefuroxime (36.8 to 45.5% and 50%), to fluoroquinolones (33.3 to 53.6% and from 28.6 to 50%), to Gentamycin (27.5% and 20%) and to Nitrofurantoin (9.3% and 50%).

**Conclusion:** The E. coli is the main causal bacterial pathogens with a high resistance to antibiotics. Appropriate antibiotics according to antibiogram decrease resistance.

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**Optimizing Early Infant Diagnosis Testing in Nigeria: FHI360 Strategic Approach to Eradicate EID Backlogs at Supported PCR Laboratories**

**Background:** Early diagnosis of HIV infection is essential for ensuring timely initiation of ART, reducing the high morbidity and mortality that occurs among HIV-infected children. In Nigeria, government support to PCR laboratories efficiency for HIV DNA PCR testing had been faced with challenges such as delays in transitioning from manual to automation. This has resulted in backlog of DBS samples and long turnaround for timely diagnosis of infants exposed to HIV infection. Against this backdrop, a targeted strategic approach was employed to eradicate EID sample backlog at FHI 360 supported laboratories. This effort was geared towards reducing turnaround time (TAT) for patient result and also enhance optimization of the Roche CAP/CTM 48-96 PCR platform.

**Methods:** Roche COBAS Ampilprep / Taqman 48 /96 platform was used in three reference PCR laboratories. A three prong strategic approach was applied; extended laboratory operation hours from 4pm to 10pm, uninterrupted power supply using a stand-by generator set and manually conveying the extracted samples into the Taqman machine and reload samples for extraction immediately.

**Results:** A total of 132 patient samples (six racks) were analyzed within the normal resumption time of 8am to the extended operating hours of 10pm (6 hours extra). The number of analyzed samples per day was increased from the initial average of 48 to 132 (175% increase). The upsurge in throughput led to the eradication of 4,650 EID backlogs within 12 days and consequently reducing the TAT from 3 months to 5 days.

**Conclusion:** With the three prong strategy; effectiveness of PMTCT programs can be improved for EID services with continued system management and optimization of the PCR laboratory operation to reduce TAT of patient result.
Prevalence of Babesiosis in Exotic Breeds of Dairy Cattle on Sebore Farm, Mayo-Belwa, Adamawa State, Nigeria

Background: Tick-borne protozoan diseases (Theileriosis and Babesiosis), are of medical/veterinary importance, affecting the livelihood of farmers. In Nigeria, there is scanty data on the bovine zoonotic diseases. We conducted a pilot study to establish the prevalence of Babesiosis amongst the exotic breeds of dairy cattle in Adamawa state, Nigeria.

Methods: One hundred (n=100) cattle, (Holstein Friesian, Brown Swiss, Jersey, Simmental), were randomly sampled; after disinfecting the site with 70% methylated spirit, 5ml whole blood was collected in EDTA tubes from the jugular vein, evenly mixed, placed in icepacks and transferred to the Parasitology Laboratory, NVRI Vom for examination. Thick/thin films were prepared, stained with 10% Giemsa, examined under X100 objective. The buffy coat area was observed for motile parasites while the PCV were recorded accordingly.

Results: Overall prevalence of infection by Babesia species was 27%, babesia bigemina 20% and 7% Babesia bovis. Simmentals had the highest prevalence, 35% (n=24), Brown Swiss 11% (n=3) while Holstein Friesian and Jersey had no infection. A high infection rate (X2=59.667; P>0.05) was observed with no mixed infection recorded, suggesting that Babesiosis is endemic in these cattle.

Conclusion: This is the first report on prevalence of Babesiosis (which is zoonotic) in the exotic dairy cattle in this area and its prevalence amongst humans is unknown; this calls for more attention on control/preventive measures on ticks and tick-borne diseases, to stop its possible spread to humans.
**POSTER 232**

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**Tuberculous Lymphadenitis in Ethiopia Predominantly Caused by Strains Belonging to the Delhi/CAS Lineage and Newly Identified Ethiopian Clades of the Mycobacterium tuberculosis Complex**

**Background:** Recently, newly defined clades of Mycobacterium tuberculosis complex (MTBC) strains, namely Ethiopia 1–3 and Ethiopia H37rv-like strains, and other clades associated with pulmonary TB (PTB) were identified in Ethiopia. In this study, we investigated whether these new strain types exhibit an increased ability to cause TB lymphadenitis (TBLN) and raised the question, if particular MTBC strains derived from TBLN patients in northern Ethiopia are genetically adapted to their local hosts and/or to the TBLN.

**Methods:** Genotyping of 196 MTBC strains isolated from TBLN patients were performed by spoligotyping and 24-loci mycobacterial interspersed repetitive unit-variable number of tandem repeats (MIRU-VNTR) typing. A statistical analysis was carried out to see possible associations between patient characteristics and phylogenetic MTBC strain classification.

**Results:** Among 196 isolates, the majority of strains belonged to the Delhi/CAS (38.8%) lineage, followed by Ethiopia 1 (9.7%), Ethiopia 3 (8.7%), Ethiopia H37rv-like (8.2%), Ethiopia 2 and Haarlem (7.7% each), URAL (3.6%), Uganda 1 and LAM (2% each), S-type (1.5%), X-type(1%), and 0.5% isolates of TUR, EAI, and Beijing genotype, respectively. Overall, 15 strains(7.7%) could not be allocated to a previously described phylogenetic lineage. The distribution of MTBC lineages is similar to that found in studies of PTB samples. The cluster rate (35%) in this study is significantly lower (P = 0.035) compared to 45% in the study of PTB in north western Ethiopia.

**Conclusion:** In the studied area, lymph node samples are dominated by Delhi/CAS genotype strains and strains of largely not yet defined clades based on MIRU-VNTR 24-loci nomenclature. We found no indication that strains of particular genotypes are specifically associated with TBLN. However, a detailed analysis of specific genetic variants of the locally contained Ethiopian clades by whole genome sequencing may reveal new insights into the host-pathogen co-evolution and specific features that are related to the local host immune system.

**POSTER 233**

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**Concordance Results Between Xpert/MTB Rif Assay and MGIT 960 Culture System at the Mbabane Government Hospital in Swaziland, 2015**

**Background:** Tuberculosis (TB) is a major global health problem with a high mortality and morbidity rate. Multi-drug resistant TB (MDR-TB) is a global threat with a prevalence of 3.6% and according to the drug resistance survey conducted in 2010, Swaziland is amongst the countries with a high prevalence of MDR-TB (7.7%). Currently Swaziland is following a TB diagnostic test algorithm that dictates that all presumptive TB cases should be tested by GeneXpert diagnostic equipment and all positive results for MTB/RIF the specimens are confirmed by MGIT 960 culture and first-line then second-line DST is done for all Expert positive-rifampicin-resistant cases. The objectives of the study was to estimate the number of MDR-TB cases that are missed by the Xpert MTB/RIF assay and also to identify any discordances between the two diagnostic methods.

**Methods:** This was a retrospective study where 189 sputum samples were analysed for Mycobacterium tuberculosis infection and rifampicin resistance using GeneXpert and MGIT 960 culture system. Data was abstracted from the Laboratory Information System (LIS) at the National TB Reference Laboratory and Mbabane Government Hospital.

**Results:** Comparison of the results indicated that 170 cases (89.9%) whether sensitive/resistant to Rifampicin were found to be in agreement between the two techniques. Four cases (2%) that were reported to be rifampicin susceptible by GeneXpert were found to be resistant by the MGIT system. There were 2 cases (1%) found to be rifampicin resistant by GeneXpert yet sensitive by the MGIT system. Moreover, 13 cases were found to be negative for TB using GeneXpert but positive with MGIT system.

**Conclusion:** The level of agreement between the two diagnostic methods will allow us to estimate the number of MDR-TB cases that are missed by the Xpert MTB/RIF assay. There is need to expand this study to include other GeneXpert facilities in the country and also to include all GeneXpert negative samples for culture. This will enable us establish the magnitude of the discordant results obtained from the two platforms to influence policy change especially in the current laboratory algorithm.
Posters 234

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**Malaria Rapid Diagnostic Test (RDT) Product Lots Quality Evaluation in Ethiopia**

**Background:** As malaria rapidly lead to death, quick and accurate diagnose is important to manage patients. Malaria RDT’s has offered extension of diagnosis to remote and poorly resourced areas. However, the qualities vary between different products and batches/lots. Therefore, all production lots must be checked, either pre or post marketing to check lot-lot quality variations and to guarantee end users that RDT result saves lives by guiding the correct treatment.

**Methods:** This laboratory evaluation was done in 82 different product lots of malaria RDTs tested against Positive Pf, Pv and negative sample panels. Each Lot RDTs evaluated with positive samples at parasite density 200 and 2000 parasite/ul of Pf samples; 200,500, 2000 parasite/ul of Pv samples and 10 malaria negative panels based on WHO protocol.

**Results:** The results indicated that 78(95%) lot RDTs detected the parasite antigen to an acceptable threshold level whereas 4 lots (5%) showed inadequate sensitivity of the laboratory evaluation.

**Conclusion:** The result revealed most lots passed the evaluation while some lots showed inadequate sensitivity. Laboratory evaluation of each lot is important for malaria programme to ensure the adequate performance of the test at the initial stage and throughout the shelf life.

Posters 235

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**Prevalence of Malaria Among Clinically Malaria Suspected Acute Febrile Patients in Zeway Health Center, Ethiopia**

**Background:** Many malarious countries are scaling up malaria intervention programmes towards elimination which demands accurate diagnosis. On the other hand, malaria diagnosis is still a common challenge in developing countries with limited diagnostic services. The control strategies require accurate diagnosis and effective patient management as its signs and symptoms are non-specific and overlapping with other febrile illnesses.

**Methods:** This cross sectional study was carried out in 2014 to assessed the common febrile illnesses from 280 malaria suspected patients and each case was subjected to clinical and laboratory examination of malaria (using microscopy as gold standard and RDTs), relapsing fever, typhoid fever, typhus and brucellosis. Data was entered and analyzed using Epi-info version 3.1 software.

**Results:** Malaria accounted for only 17 % (CI: 12.6% to 21.4%) of suspected febrile illnesses. The remaining was associated with typhoid fever (18.40%; CI: 13.95% to 23.05%), typhus (17.60%; CI: 13.32% to 22.28%), brucellosis (1%; CI:-0.17% to 2.17%); relapsing fever (2%; CI: 0.36% to 3.64%) and unknown fever cause 44% (CI: 38.19% to 49.81%). About 7% Co-infections were recorded, of which 2% treated as mono-infection. About 1.4 non-malarial patients received antimalarial treatment. Sensitivity and specificity of Carestart Pf/pan RDTs compared to microscopy were 100% and 91%, respectively with positive and negative predictive values of 94% and 100%, respectively. The PPV of malaria each symptom compared to microscopy were very low: fever 17%, sweating 30%, headache 18%, general body ache 22% and loss of appetite 21%.

**Conclusion:** The study findings revealed high proportion of non-malarial illness clinically categorized as malaria. Relying on parasite based diagnosis is recommended to manage malarial and non malarial cases.
Skin Snip Survey Results Revealed Absence of Human Onchocerciasis in Bale, Borenna and West Arsi Zones of Eastern Ethiopia

**Background:** Onchocerciasis is used to be one of the most important public health problems in Ethiopia. However with the intensified interventions over the last decade mainly of community based ivermectin drug distribution it is possible to control the disease. Hence, the programme changed its objective from control to elimination in 2012. The disease is believed to be found mainly in the western, northern and south western part of Ethiopia and there was no evidence in the eastern part of the country although the presence of transmission was predicted in Bale, West Arsi and Borenna zones. Therefore, this study is conducted to assess the presence of onchocerciasis transmission and its magnitude in the area.

**Methods:** In 2014, a cross sectional microfilarial survey of onchocerciasis was undertaken in 19 villages and examined 2560 people from 10 districts of Bale, Borenna and West Arsi zones. The study sites (villages) are selected based on the proximity to the rivers (possible breeding sites) and representation to the programme implementation unite (district) and vegetation cover. The study participants are all village residents with age >5 years, permanence residence in the areas and with good health condition.

**Results:** In this study a total of 2560 study participants were surveyed of which 1332 were female (52%) and 122 male (48%). From the total study participants the age group >51 years were the lowest (3%) and 21-30 years were the highest participants (34%). Of these females with age range 21-30 years highest (30.4%) and age<10 years were lowest participants (4%). Whereas male with age range >51 years had low participation (1.6%) and 21-30 years had high participation (38%) in the study. The survey result revealed that none of the study participants demonstrated skinsnip onchocerca microfilariae in all systematically selected study sites out of all examined 2560 people. The prevalence of microfilariae and community microfilarial load (CMFL) by district, zone and out of total all study participants was 0% in all 19 villages.

**Conclusion:** The finding of this survey implies that there is no onchocerciasis case and transmission in the area and therefore no need of implementing interventions unless further study evident the cases.
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POSTER 238

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Background: Laboratories systems (LS) in resource limited settings remain a limitation for the development of research studies. Petti highlighted in 2006 numerous challenges in laboratory medicine, including lack of skilled personnel, training programs and government quality standards. During the last Ebola crisis in West Africa health workers were heavily affected draining the health system, however post-Ebola reconstruction studies show that the LS are being neglected (Nkengasong et al 2015).

Methods: In 2015 the PREVAC consortium was founded to conduct a phase 2 clinical trial to assess immunogenicity, toxicity and durability of two Ebola vaccines in Guinea, Liberia and Sierra Leone. A LWG was established to coordinate the laboratories of the consortium.

Results: The PREVAC-LWG cooperates with the local ministries of health working to compromise between high quality standards and local sustainability. In the three countries national laboratory quality plans are not in place. The LWG is implementing a parallel quality program: intra laboratory QS and enrollment in international EOC. The three countries are implementing different LIS (Laboratory Information Systems) which allow data centralization. The LWG is using a barcode labeled collection kit system already used in Liberia in a previous study. The tool is simple and replicable, providing a model for future research projects in the countries. Liberia and Guinea adopted the same chemistry system. This has software in English, resulting in challenges for Guinea where of 162 lab-candidates, nobody reported medium knowledge of English and among 11 interviewed nobody was able to analyze a list of laboratory material edited in English.

Conclusion: The success of the PREVAC-LWG will be evaluated once the trial will enter its active phase. We hope to provide an effective model to both increase the quality of research laboratories in western Africa and to contribute to the reconstruction of LS in post-Ebola countries.

POSTER 239

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Prevalence of Hepatitis B Surface Antigen (HBsAg) Mutations in Hepatitis B Virus (HBV) Positive Blood Donors from South Africa: Robust Detection by the Elecsys HBsAg II A assay

Background: Immunodominant “a” determinant region mutations of the HBsAg between the amino acids 124 to 147 are clinically important as they are associated with false negative HBsAg test results. The objective of this study was to explore the prevalence of HBsAg mutations in blood donors from South Africa and identify their potential impact on the Elecsys HBsAg II assay.

Methods: A total of 179 HBsAg and HBV DNA >100 IU/ML positive blood donor samples obtained from SANBS (Roodepoort, South Africa) were included in the study between January 2014 and October 2015. Samples were (a) analysed for the presence of HBsAg using the Roche Elecsys HBsAg II Qualitative assay and (b) sequenced using next generation ultra-deep sequencing for HBsAg mutations. To explore potential location-dependent aspects of the mutations, the immunodominant “a” determinant region was subgrouped into the “first loop” (aa 124-137), and the “second loop” (aa 139-147), and the mutation rates were compared between the two subdomains. Additionally, frequency of occult HBV infection (OBI)-associated Y100C mutations was determined.

Results: The immunodominant “a” determinant region mutations were observed amongst 91 (32.6%) out of 279 distinct mutations. The first loop subdomain displayed the highest mutation frequency (89%). The well-known immune and vaccine escape associated variant G145R was identified in 2 (1%) samples. In addition, Y100C mutations outside the “a” determinant region, which was previously linked to OBI, were observed in 2.8% of the samples. All OBI-associated Y100C and common diagnostic and vaccine-escape-associated P120T, G145R, M133L, M133T, Q129H, G130N, T126S, and D144A mutations were reliably detected by the Elecsys HBsAg II Qualitative assay.

Conclusion: Our results indicate that the performance of the Elecsys HBsAg II Qualitative assay is not compromised by HBsAg “a” determinant region mutations or the OBI-associated Y100C mutation and is suitable for routine diagnostic use or blood donor screening in the South African population.
Rapid Molecular Detection of Mycobacterium Tuberculosis in Resource Constraint Laboratories

Background: Recent WHO TB report estimated 9.6 million new TB cases and 1.5 million TB deaths in 2014. This is unacceptably high but with a timely diagnosis and correct treatment, almost all the affected people can be cured. TB diagnosis still remains the “biggest challenge” in most affected countries, due to poor sensitive tests and expensive molecular tests. The molecular tests including GeneXpert are not affordable, except for government intervention. Here we tested our developed rapid molecular TB test based on Recombinase polymerase amplification technology (RPA) for diagnosis of pulmonary tuberculosis. We blindly assessed our TB DNA test using sputum samples that were already tested with sputum microscopy and GeneXpert.

Methods: We designed, screened, and selected oligonucleotides using the clpP1 gene from Mycobacterium tuberculosis H37Rv complete genome (GenBank#: AL123456.3). Selected primers and probe were tested against standard serial dilutions (1 x 1010 to 1 x 101) of gene fragments of M. tuberculosis clpP1. Oligonucleotides were added to lyophilized format of RPA (TwistDx, UK) and incubated at 37oC for 30 minutes and analyzed on a lateral flow device (Milenia biotec, Germany). TB DNA test was compared to sputum microscopy and GeneXpert and blindly tested 22 patients. TB DNA test further tested DNA extracted from cultured pathogens Streptococcus spp, Klebsiella pneumoniae, Pseudomonas spp, Escherichia coli, and Staphylococcus aureus. Samples for our test were prepared in 5 minutes by heating up the sputum at 90oC.

Results: TB DNA test detected 10 copies of the TB gene fragments. Out of 22 patients tested, only 15 had the clinical and laboratory data available. GeneXpert tested 3 samples as MTB high and 3 samples as MTB low respectively, while sputum microscopy tested positive for only the MTB high samples. Our test was positive for both the MTB high and low samples. Our test was also negative for 9 samples that were confirmed with GeneXpert. Our test did not detect any of the cultured pathogens, confirming the specificity of our test.

Conclusion: TB DNA test is comparable with GeneXpert results and had better sensitivity when compared with microscopy. It has the potential to replace the routine tests and it is user friendly, simple, cheap, fast and detect TB DNA directly from sputum samples. TB DNA test did not cross react with other infections that could be isolated from the respiratory tract.

TB Detection by Blood Culture in a Cohort of Hospitalized Patients with Kidney Disease

Background: Despite global progress in tuberculosis (TB) prevention and control, TB remains a leading cause of morbidity and mortality in sub-Saharan Africa, especially among persons with HIV. In Zambia the annual TB incidence is 427/100,000 and 64% of TB patients are HIV-infected. It is not known how prevalent active TB is among people with HIV and an additional risk factor for TB like kidney disease. A prospective case-control study was done at the University Teaching Hospital (UTH) and a sub-analysis is presented here.

Methods: 126 HIV positive patients seeking care at UTH with normal kidney function and diagnosed with renal disease were recruited in the parent study. Among other tests, one blood culture for TB was collected from all patients. 5ml of blood was inoculated into a BD Myco/F lytic blood culture bottle and incubated in the BD BACTEC 9120 instrument for 42 days. Positive blood cultures were examined by Ziehl-Neelsen staining procedure and AFB positive cultures were further confirmed by BDTBc antigen test specific for M. tuberculosis complex.

Results: Of the 125 blood cultures submitted, 22 (17%) were instrument positive of which 6 (4.8%) were confirmed M. tuberculosis complex. This translated to a detection rate by blood culture of 9% in the patients diagnosed with renal disease and 3.1% among the patients with normal kidney function. Blood culture detected 25% of TB cases confirmed by the Gold standard (TB sputum culture) and 2 additional cases that were confirmed by blood culture only.

Conclusion: TB Blood culture detection rate can be enhanced by utilizing an optimum of 3 cultures per patient, as per Good Clinical Practice. However, having used one blood culture in combination with other TB diagnostic tests proved valuable among patients with double risk factors - HIV positive with renal dysfunction.
Evaluation of Flocked Rectal Swab Specimens for Use with the BioFire FilmArray® Gastrointestinal Panel in Children with Severe Gastroenteritis in Botswana

Background: Gastroenteritis is one of the leading causes of childhood morbidity and mortality, especially for those under the age of 5 years. Diagnostic laboratory testing is needed to identify the causative agent/s. Bulk stool is the main specimen used for testing, however obtaining this specimen may be difficult particularly for outpatients. Given the rapid results possible with current molecular diagnostic assays, delayed specimen collection becomes more relevant for overall turnaround time. The BioFire Filmarray® Gastrointestinal Panel (GIP) can detect 22 pathogen targets in just over an hour but has only been validated for use with bulk stool samples. We sought to evaluate anatomically designed flocked rectal swab samples for use with this assay.

Methods: Matched flocked rectal swab and bulk stool specimens were collected from children admitted to hospital in Botswana with severe gastroenteritis. The flocked swab was eluted in 2ml of modified Cary Blair transport media; 132mg of bulk stool was weighed and placed in 2ml of modified Cary Blair. The FilmArray GIP was used according to manufacturers instructions. McNemar’s test for matched pairs was used to assess for difference in yields.

Results: 40 swabs and 40 stool samples were tested. A total of 106 pathogen targets were detected. There was no statistically significant difference in yields across pathogen types. 53 (50%) were detected in the flocked swabs: 72% (38/53) were bacteria, 2% (1/53) were parasite, and 26% (14/53) were viral. 53 pathogens were detected in bulk stool: 70% (37/53) were bacteria, 2% (1/53) were parasite, and 28% (15/53) were viral.

Conclusion: This initial evaluation suggests that rectal swab specimens have similar performance to bulk stool when tested with the Filmarray GIP. Rectal swab specimens may greatly facilitate the rapid molecular diagnosis of diarrheal disease.
POSTER 244

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mHealth Connectivity Solution to Remotely Monitor PIMA POC CD4 Testing

Background: The Connectivity project in Zimbabwe is used to monitor CD4 testing using the Alere connectivity modern and telecommunication networks to transmit and analyze the data that is stored automatically on each CD4 device. Connectivity endeavors to provide visibility into: results, quality control, quality performance of end-users, monitoring of stock level individual facilities and devices in need for service and maintenance.

Methods: Data is transmitted from the 338 devices in Zimbabwe to a remote database known as POCLabs via mobile network. The data received are then analyzed to report to monitor the process of the CD4 testing. Indicators include testing volumes, stock status, IQC results, error codes and the performance of the devices and the users.

Results: Monitoring access to CD4 Testing: The number of tests successfully performed was used to determine the number of clients accessing CD4 testing. Successful CD4 tests were defined as tests that passed the IQC parameters. Consumption Monitoring: Connectivity provides a solution in improving stock level consumption management. Device Functionality and Performance: Device functionality and test performance can be visualized through Quality Control parameters embedded in cartridges and device. Quality Control (QC) and Performance Monitoring: End-users’ daily QC performance can be monitored remotely using connectivity. External Quality Assurance: Pima CD4 site is enrolled into an EQA scheme to measure the performance of each site against international standards for CD4 testing.

Conclusion: Connectivity using telecommunication networks proved to be a very useful tool in monitoring test performance remotely. Connectivity improves testing quality and effective monitoring of patient data; improve stock level management; improve and maintain performance of end-users and improve reliability of results therefore saving lives. With proactive check in and monitoring of dashboard, this will simplify and standardized information and harmonized fragmented data set and management. Furthermore, connectivity can help supervisors to prioritize the sites to visit thus improving efficiency of supervision. As Zimbabwe looks to introduce point-of-care devices for Early Infant Diagnosis (EID) and Viral Load (VL), connectivity will be a requirement on these devices to ensure that patient and device data are used for planning purposes.

POSTER 245 CANCELLED

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Comparison of Cryptococcal Antigenemia among HIV-infected In-patients and Out-patients in Swaziland

Background: Cryptococcal meningitis is a major cause of HIV/AIDS-related deaths in Africa and yet cryptococcal Antigenemia (CrAg) screening and pre-emptive treatment which has the potential to save the lives of people living with HIV, is not routinely practiced in Swaziland despite the nation’s high HIV prevalence. This study aimed to pilot targeted screening and pre-emptive treatment in order to understand the operations of such a program before scale up.

Methods: This was a cross sectional study focusing on Antiretroviral treatment (ART) naive patients who were enrolled from August 2014-March 2015 and included out-patients from the hospital’s Voluntary Counselling and Testing (VCT) clinic and in-patient admitted at the hospital’s general medical ward. Plasma and urine CrAg were measured using the CrAg Lateral Flow Assay (LFA) test on enrolled patients attending the national referral hospital in Mbabane in Swaziland.

Results: About 183 ART-naive patients with CD4 less than 200 cell/mm3, 145 (79.2%) were out patients in the HIV clinic and 43 (21.8%) were in-patients on the medical ward. The prevalence of plasma CrAg in patients with CD4 less than 200 cell/mm3 was 4.4% overall and among patients with CD4 ≤100 cells/mm3 was 7.8%. CrAg was more frequently detected among in-patients (prevalence 10.5% in in-patients and 2.7% among the out patients in patients with CD4 less than 200 and 15.4% in the in-patients and 5.2% in the out patients with CD4 less than 100. Statistically significant results were associated with whether the patient was an in-patient or out patient p value = 0.04); patients with severe immune suppression; WHO stage 3 or higher, p value = 0.05). The median CD4 for out patients was 88 cell/mm3 and 48 cell/mm3 among in patients. The prevalence of Urine CrAg was 21.9%. All patients with a positive plasma CrAg had a CD4 count less than 100 cells/mm3 and none had a CD4 of ≥100 cells/mm3. The CrAg positivity in urine was 21.9%, while sensitivity and specificity of using a urine sample relative to plasma were 100% (95% CI: 59%-100%) and 80% (95% CI: 73%-86%).

Conclusion: The prevalence of 7.8% among patients with CD4 ≤100 cells/mm3 indicated an urgent need for this group to be targeted for CrAg screening and pre-emptive treatment at entry into HIV care. Urine CrAg has a low specificity of 80% indicating that urine is not a good specimen for CrAg screening our setting.
**POSTER 246**

**Comparative Evaluation of Dried Blood Spot (DBS) and Dried Plasma Spot Sampling (DPS) Methods vs. Plasma for Detection of HCV Using the COBAS® AmpliPrep/COBAS® TaqMan® HCV Test v2.0**

**Background:** Laboratory diagnosis of HCV can be challenging due to lack of well-equipped facilities and logistical obstacles. DBS and DPS sample collection methods can be suitable alternative methods in low resource settings. The objective of this study was to evaluate the suitability of DBS and DPS sampling methods for HCV viral load quantification.

**Methods:** Whole blood and plasma samples of 48 HCV infected patients were used to generate DBS and DPS cards. Samples were air dried overnight at room temperature and eluted using Roche Specimen Pre-Extraction Reagent (SPEX) in one of two different protocols: the first included a heating bath and shaking step (SWH) and the second, without heating or shaking (SWO). After incubation with SPEX, each sample was loaded onto the COBAS AmpliPrep/COBAS® Taqman® (TaqMan®) System for nucleic acid extraction, amplification and HCV detection. HCV viral load testing was performed using TaqMan® HCV Test v2 at Roche Molecular Diagnostics in Pleasanton, CA, USA. DBS and PSS elution results were then compared to the results of plasma testing, which was used as the gold standard.

**Results:** Plasma HCV viral loads varied from 2.77 to 7.08 log10 IU/mL. After correcting for input volume, the mean difference from DBS to plasma was -0.40 for SWH and -0.36 for SWO. For DPS, the mean difference to plasma was -0.49 for SWH and -0.55 for SWO. Correlations between HCV viral load results using DBS or DPS and plasma samples were linear: $y = 0.969x - 0.2158$, $R^2 = 0.960$ (SWH); $y = 0.9765x - 0.2242$, $R^2 = 0.969$ (SWO) for DBS and $y = 0.973x - 0.3312$, $R^2 = 0.980$ (SWH) and $y = 0.9555x - 0.2945$, $R^2 = 0.983$ (SWO) for DPS.

**Conclusion:** HCV-RNA viral load measurements from DBS and DPS using TaqMan® HCV Test v2 correlates to plasma and are suitable in resource constrained environments.

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**POSTER 247**

**Analysis of Xpert MTB/RIF Specimen Rejection Rates Using Laboratory Data 2011–2015, South Africa**

**Background:** In South Africa the Xpert MTB/RIF program was initiated in March 2011; since then laboratory data is used for monitoring of pre-analytical, analytical and post-analytical procedures. Specimen rejection data is one of the tools used for measuring the effectiveness of training programs. The aim of this analysis is to provide guidance on training required to improve specimen rejection rates.

**Methods:** Laboratory data was extracted from the Corporate Data Warehouse (CDW) for the study period. Data was analyzed using Microsoft SQL, Stata version 14.1 and MS Excel 2013. Data analysis included number of specimens, and rejection reasons.

**Results:** Between 2011 and 2015 increase in specimen rejection rates were reported. Analysis of data from year 2015 indicated that out of 2,646,536 specimens tested, a total of 218,621(8.27%) were rejected by testing laboratories. The following were the main reasons reported for specimen rejections: insufficient volume (74.5%), unsuitable specimen (12.2%) and clerical errors (6.6%). Analysis of specimens rejected due to insufficient volumes were distinguished further into leaked specimens (50.1%), less than minimum volume required (35.4%) and empty specimen containers (11.4%). In addition, the analysis indicated that 60.6% of unsuitable specimens resulted from poor specimen quality and 11.4% due to the presence of foreign particles like food.

**Conclusion:** Continuous monitoring of rejection rates allows for implementation of appropriate training corrective measures to reduce unnecessary delays in TB diagnosis.
**POSTER 248**

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**Biobanking: The Backbone of Scientific Research**

**Background:** Biobanking plays a crucial role in research, particularly with direct positive impact on healthcare in terms of enhanced diagnosis as well as technological development. The significance of having readily available specimens span across many domains ranging from genetic studies, cancer research, pharmaceutical studies, to name a few. Other than serving as knowledge hubs, biorepositories reduce the time it takes to collect biomaterial, reduce costs associated with research through obtaining standardized samples from a controlled source as well as increased life expectancy through enhanced research. Furthermore, biobanking structures ensure that there’s consistency in the accuracy of data as well as the maintenance of quality standards as the main purpose of the department would be Biobanking.

**Methods:** In South Africa, The National Biobank was established to meet the ever increasing need for scientific research and caters for a broad range of biobanking needs which include cell culture, genetics, cancer and molecular biology (nucleic acid storage), histology and cytology, as well as infectious diseases.

**Results:** In order to maintain quality, there is strict adherence to Quality Assurance and Quality Control measures. These include enhanced temperature control by ultra low temperature freezers interphased with a temperature monitoring system and software. Critical to quality maintenance is also strict biomaterial inclusion criteria such as procedure for previously thawed and or aliquoted biomaterial as well as standardized procedures for specimen storage and retrieval.

**Conclusion:** The ultimate objective of biorepositories is not only enabling research studies to be carried out with statistically significant sample sizes, but also within reasonable time frames.

**POSTER 249**

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**Estimated Pediatrics Bcterial Meningitis in Swaziland in Under 5 years in Children Between 2013 1nd 2015**

**Background:** Bacterial meningitis is a major cause of death and disability worldwide. Neisseria meningitides, Haemophilus influenza type b and Streptococcus pneumonia are responsible for large epidemics in many African countries causing between 100,000 to 400,000 deaths in children less than 5 years. Introduction of new vaccines to the Expanded Immunization Programmes (EPI) Swaziland experienced reduction of meningitis confirmed infections. The aim of the study is to estimate the number of children less than 5 years who confirmed meningitis from the EPI Sentinel surveillance sites.

**Methods:** A retrospective data analysis of all CSF samples collected from children below 5 years suspected of Meningitis admitted at EPI Sentinel surveillance sites (Mbabane government Hospital and Raleigh Fitkin Memorial Hospital) between year 2013 and 2015. The CSF samples collected by Lumber puncture and the laboratory analysis conducted were microscopy and culture to confirm meningitis and identify the causative organisms.

**Results:** A total of 301 children suspected of meningitis invasive bacterial disease cases from the two sentinel sites were recorded. Lumber puncture done were 284/301 (94%) . The CSFs with cultures done were 214. Bacteria isolated were 2/55 (3.6%) Streptococcus pneumonia in 2013, Hemophilus influenzae b 1/72 (1.4%) in 2014 and Neisseria meningitides 2/87(2.3%) in 2015. Other pathogens were isolated were 4/87(4.5%). Estimations determined from age groups 0-5months=20%, 6-23 months=42% and 24-59 months=6%

**Conclusion:** The positive pediatrics meningitis bacteria cases from the two sentinel sites were low, S.p (3.6%), Hib (1.4%) and N.m (2.3%). The most affected age group was 12 -23 months. The introduction of the vaccines in Swaziland has greatly benefited the kingdom and the surveillance will continue monitoring the impact of the vaccines.
**POSTER 250**

Sthembiso Msweli, Justen Manasa, Anne Derache, Siva Danaviah, Zandile Sibisi, Sureshnee Pillay, Thato Ikoteng, Tutlo De Oliveira


**Identification of Minority Drug Resistance Mutations in Patients Failing 1st line ART in Rural South Africa**

**Background:** South Africa has the largest Antiretroviral therapy (ART) programme in the world with an estimated 2.6 million people taking ART. Unfortunately, the scale-up is threatened by the development of ART drug resistance. Variants with genotypic evidence of drug resistance are associated with treatment failure. Traditionally, population based sequencing (PBS) has been used for drug resistance genotyping. However, PBS can not detect mutation below 20% of the viral population. Recent advances in sequencing technologies, which are currently available at Africa Centre for Health and Population Studies, UKZN, enable the detection of minority variants.

**Methods:** Blood specimens collected from 17 primary care clinics in Umkhanyakude sub-district of KZN. As part of this project, we generated 296 HIV-1 complete genomes using Illumina NGS. All of the genomes were compared to previous PBS Sanger sequencing results using bioinformatics software application Geneious 8.0. Patient’s demographics and clinical data were analyzed using descriptive statistics. Proportion of drug resistance mutations were calculated for PBS and NGS. Variables related with resistance in the univariate analyses where a p value is <0.05 and those statistically significant were then included in multivariable regression.

**Results:** The median time on ART was about 45 months and the interquartile ranges were 41 to 48 months. Only the mutation L210W that was statistically different between the NGS calls at 20%, 10% and 5% as compared with Sanger result.

**Conclusion:** In this study, NGS showed that there is no significant difference between Sanger and NGS in detecting patients with any drug resistance mutations. Hence, NGS can be use in resource limited setting to provide individualized patient management.

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**POSTER 251**

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**Challenges During Implementation of GeneXpert MTB/RIF at Health Centers and District Hospitals in Zambia**

**Background:** Since January 2014, Center for Infectious Disease Research in Zambia (CIDRZ) TB Program has been partnering with the Zambian Ministry of Health in scaling up Xpert MTB/RIF implementation in 10 district hospitals and clinics in Zambia.

**Methods:** 22 technical and operational quality performance indicators, instrument error codes and their root causes collected during site visits by two CIDRZ laboratory scientists were analyzed retrospectively. Site visits provided opportunity for comprehensive assessment and training in instrument handling, preventative maintenance (PM), troubleshooting, testing and performance monitoring.

**Results:** Over a 12-month period, across 10 district health facilities, we recorded and analyzed a total of 4,518 Xpert MTB/RIF system errors. Power supply issues- indicative of power interruption during run (main power and UPS fluctuations) – were frequent (56-98% of all errors) at 7 sites. In the other 3 sites poor fan performance and out of range ambient or internal instrument temperature indicative of poor dust and environmental controls were most common (65-87% of all errors). Instrument PM was adequately documented regularly in only 4 sites. Room temperature in testing areas was not regularly monitored and documented in 9 laboratories. During the site visits it was observed that handovers (prompted by staff rotations and transfers) lacked emphasis on PM.

**Conclusion:** Incomplete training and quality assurance as well as inconsistent power supply may undermine the usefulness of Xpert MTB/RIF in Zambia. For this platform to be a sustainable and reliable actively promoting local ownership by lab managers to perform frequent on-the-job staff training, and quality assurance mentoring to ensure adequate PM and monitoring of environmental conditions is a requirement. Further, stable power supply and efficient dust control measures can improve instrument performance.
**POSTER 252**

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**Loop Mediated Isothermal Amplification (LAMP) for HIV Diagnosis in Adults and Children: A Systematic Review**

**Background:** Loop Mediated Isothermal Amplification (LAMP) is a rapid and effective method for molecular pathogen detection. LAMP is easy to perform and does not require complex, dedicated equipment and laboratory space, so it is attractive for near-patient and point-of-care testing, especially in resource limited settings. WHO Policy Guidance (2016) now recommends LAMP as a molecular test for diagnosis of pulmonary tuberculosis, based on clinical data from 20 studies in 17 countries. LAMP also has considerable potential for diagnosis of other infections of global public health significance, such as HIV. Effective molecular tests for HIV are important for situations where conventional HIV antibody/antigen tests are unreliable, especially for early infant diagnosis.

**Methods:** A systematic literature review was conducted to identify and collate the outcomes of studies reporting the sensitivity and specificity of reverse-transcriptase LAMP (RT-LAMP) for diagnosis of HIV infection, compared to reverse-transcriptase polymerase chain reaction (RT-PCR) testing.

**Results:** Seven eligible studies with a total of 408 samples tested were identified. All reported a specificity of 100% and a mean sensitivity of 99% (CI 95%: 93 -100). Two studies had English abstracts with the full report in Chinese so these were not included in the quality appraisal. Of the remaining five studies appraised, four were of high and one was of moderate quality.

**Conclusion:** Based on published data, RT-LAMP for HIV diagnosis has comparable diagnostic accuracy to RT-PCR in laboratory validation studies. There is a clear need for more clinical studies to assess the potential for including RT-LAMP in clinical diagnostic algorithms. In particular, field evaluations to assess the clinical utility of RT-LAMP for HIV testing in infants are lacking.

**POSTER 253 CANCELLED**

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**Virologic Response in First Year of Treatment Among Adults Living with HIV Commenced on Antiretroviral Therapy in a Tertiary Facility in Enugu State Nigeria, 2009 – 2014**

**Background:** Early and sustained viral suppression with effective Antiretroviral Therapy (ART) has been linked to good clinical outcome in HIV-infected patients. Resource constraints limits pre-ART resistance testing to ensure potent customised ART in our environment. We therefore assessed the virologic response to the first line ART regimen recommended by the national guideline.

**Methods:** We extracted relevant data from the records of 478 HIV infected adult patients initiated on ART seen in our facility between 2009 and 2012 who did not miss any drug pick-up or laboratory visits for at least one year after ART initiation. We entered and analysed data with Epi Info 7. We determined the proportion of patients who achieved undetectable viraemia [viral load (VL) < 400 copies/ml] at 12 weeks and 24 weeks on ART and compared this across different ART regimen.

**Results:** Of the 478 patients studied, 310 (64.8%) were females, majority 346 (72.4%) were between 30-49yrs old. While 299 (62.5%) completed at least Secondary school, 151 (31.6%) were traders. While 332 (69.5%) patients achieved undetectable viraemia at 12 weeks of ART, 356 (74.5%) achieved same at 24 weeks. While 112 (74.7%) of 150 patients on Tenofovir/Emtricitabin/Efavirenz fixed dose combination of ART achieved undetectable viraemia at 12 weeks, 184 (67.1%) of the 274 on Zidovudin/Lamivudin/ Nevirapin achieved same. This difference was not statistically significant (p-value=0.13).

**Conclusion:** Some patients started on the recommended first line ART in our setting still have detectable viraemia at 12 weeks and 24 weeks on ART. This could have implications for early virologic failure. The two preferred ART regimen in our setting are however equally effective. Resistance testing prior to ART initiation is recommended. Findings shared with hospital authorities.
**POSTER 254**

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Control of Lassa Fever in Nigeria Using Geographic Information System (GIS) Applications

**Background:** Lassa fever is endemic in West African countries including Nigeria with yearly peaks between December and February. LF is listed among priority diseases for integrated disease surveillance in the African Region (4). Due of its epidemic potential and its transboundary nature of spread. The 2015/2016 LF outbreaks in Nigeria is characterized by high incidence and case fatality rates (CFR) with non-endemic regions reporting cases of the disease. In this study, we mapped regions needing control interventions using robust GIS software applications and laboratory data of Lassa fever confirmed cases at the Institute of Lassa Fever Research and Control (ILFRC), Irrua Nigeria.

**Methods:** We reviewed line lists and clinical records of all confirmed cases laboratory confirmed using Reverse transcriptase Polymerization Chain Reaction- RT-PCR between January 2013 and June 2016 at the Institute of Lassa fever research and control Edo State, Nigeria. We mapped changes in Lassa fever density and distribution, analyzed for disease pattern, identified clusters and performed spatial cluster analysis

**Results:** We documented 417 confirmed Lass fever cases; where 43.2% of the cases were females. Most cases were within the 15 – 45 age group (32.4%). Eighteen states of the federation reported outbreaks with high incidences from Edo (68.6%), Ondo (8.4%), Taraba (7%) and Ebonyi (4.5%). While the overall case fatality ratio (CFR) was 27.5%, two-third of the cases were observed between the months of November and March. Endemic patterns were observed in Edo, Ondo, Taraba and Ebonyi States. Results shows that incidence increases with the onset of the dry seasons (November - March).

**Conclusion:** Regions of high Lassa fever burden were identified for control activities. GIS application using laboratory data contributed to efficent delivery of control interventions

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**POSTER 255**

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Improving Quality of HIV Testing in PMTCT Sites Using Dried Tube Specimen - Experience from South Eastern Nigeria

**Background:** The first 90 of the UNAIDS 90-90-90 strategy is concerned with the giving HIV Testing Services (HTS) access to 90 percent of the population. The quality of the HTS provided depends among other factors on the skill of the testers. The inadequate human resources for health, the high HIV prevalence in Nigeria and urbano-centric concentration of health workers especially Laboratory Scientist resulted to the use of the trained Lay Testers to provide HTS; especially in the rural areas. Lay Testers provide HIV Testing Service for Pregnant women accessing antenatal care. Quality Assurance procedure for HIV test results from Lay testers is ascertained using Dried Tube Specimen-based Proficiency Testing. This study assesses improvements in the quality of HIV testing at ECEWS supported PMTCT Sites enrolled into Proficiency Testing program in 2014.

**Methods:** 315 HIV testing points in PMTCT Sites were enrolled into PT program using DTS. The PT program was administered in cycles of four rounds per year. Each Testing point was provided with 2 sets of PT samples per round and were instructed to submit the PT results within 3 weeks of receiving the samples. The lay Testers were mentored on how to do the PT using the provided DTS. The acceptable PT result pass rate per round was set at 100%. The PT results were evaluated based on the reference results and adherence to National HIV Testing Algorithm. The proficiency testing reports including recommended corrective actions for unsatisfactory performance were generated and dispatched to the participating sites within a week. Sites with unsatisfactory outcomes were supported through mentoring to implement the Corrective Actions towards improving the quality of HIV testing in the sites, while those with satisfactory performance are supported to sustain it.

**Results:** The pass rate for the four rounds were 25%, 41.7%, 13.8%, and 100% in 2014 and 41.5%, 92.7%, 95.4%, and 100% in 2015 respectively.

**Conclusion:** The quality of HIV testing at the supported sites improved significantly with each round. Quality Assurance monitoring using Dried Tube Specimen should be prioritized in order to ensure accurate, reliable and reproducible HIV testing results from Lay Testers.
**POSTER 256**

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**Improved Diagnosis of TB, Including MDR-TB, Using New TB Diagnostic Technology Through the East Africa Public Health Laboratory Networking Project**

**Background:** The East Africa Public Health Laboratory Networking Project (EAPHLNP), which supports a network of 32 Laboratories in East Africa, has introduced new diagnostic services, including GeneXpert technology to aid in improving the diagnosis of tuberculosis (TB) and detection of resistance to Rifampicin (RIF). An assessment was done to determine the contribution of the project laboratories in the diagnosis of TB and detection of Rifampicin Resistance in the East Africa Region.

**Methods:** A cross-sectional descriptive study was conducted between July and August 2016, using a semi-structured questionnaire to obtain data on the number of TB tests performed, (TB) positive cases detected and cases with confirmed Rifampicin resistance from the project laboratories. Cross-country data was compiled and analyzed to determine the contribution of the project facilities in improved rate of detection of MTB and Rifampicin resistance.

**Results:** In Tanzania, out of 21768 TB cases and 1100 MDR-TB detected countrywide, 8158(37.5%) TB cases and 386(35.1%) MDR–TB cases were detected from the project laboratories. In Kenya, out of 40606 TB cases and 1866 MDR-TB detected countrywide, 2614(6.4%) TB cases and 147(7.9 %) MDR–TB cases were detected from the project laboratories. In Uganda, 596 MDR–TB cases detected countrywide, 245(41.1%) were detected from the project laboratories. Burundi, 145 MDR–TB cases detected countrywide, 143(98.6%) were detected from project laboratory (INSP). Overall, out of 3707 MDR-TB cases detected from the four countries nationally, 921(25%) MDR–TB cases were confirmed at the project laboratories. This shows that 921(25%) MDR–TB cases would have been missed had there been no project support.

**Conclusion:** Deployment of the GeneXpert technology has improved the diagnosis of TB and MDR-TB. Laboratories under the EAPHLNP have contributed to the improved diagnosing TB and detection of MDR-TB cases in the East Africa Region.

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**POSTER 257**

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**Variation in Uptake of CD4 Point of Care Testing Offered at Community Sites Providing HIV Testing Services in South Africa in 2015**

**Background:** As South Africa (SA) adopts “Test and Treat” as the HIV treatment guideline, CD4 point of care testing (POCT) can continue to play a pivotal role in rapidly assessing opportunistic infections (CD4 ≤100µl) and fast tracking (CD4 ≤200µl) for people living with HIV (PLHIV). Community based POCT can expand access and support the expected volume increase of PLHIV initiated and retained in care. PEPPAR partners providing community based HIV testing services (HTS) (HTS modalities include home-based, campaign, workplace and mobile testing) previously initiated CD4 POCT technology to rapidly assess anti-retroviral treatment (ART) eligibility immediately following HIV diagnosis. This analysis describes implementation of CD4 POCT in SA in 2015.

**Methods:** Routine program data from 28 community based HTS sites implementing CD4 POCT in 10 districts of SA during 2015 was extracted using a standardized tool and validated by record review. Analysis was restricted to data from 13 sites with accessible programmatic data. Descriptive statistics on POCT uptake and linkage to care were calculated.

**Results:** Among 14,108 newly identified PLHIV, uptake of CD4 POCT following HIV diagnosis was 39% and varied across sites (median 57.7%, IQR 31.8% - 68.9%). Among 2,583 PLHIV that received a CD4 ≤500µl (ART eligibility criteria in 2015), 51.3% were linked-to-care within 90 days. All eligible PLHIV accessing HTS at sites offering ART services initiated care, compared to 49% of eligible PLHIV that had to access care at another location. Data on HTS modality was absent.

**Conclusion:** Program data suggest uptake of community based CD4 POCT is suboptimal. Unavailable data on HTS modality contributes to limited understanding of community based POCT implementation. POCT is most impactful where care is available onsite. Guidance to optimally integrate POCT technology is needed to efficiently enable flow of services from HIV testing to treatment, and reduce loss-to-follow up.
**POSTER 258**

**Using Connected Diagnostics to Implement the New WHO Shorter MDR Treatment Regimen**

**Background:** In May 2016, the WHO announced new recommendations for the use of innovative, rapid diagnostics for multidrug-resistant tuberculosis (MDR-TB) combined with a shorter, cheaper treatment regimen that is easier for patients to complete. Quick triage using MTBDRsl combined with Xpert results enables fast and appropriate treatment initiation under these guidelines. This Line Probe Assay (LPA) is a DNA-based test that identifies genetic mutations in MDR-TB strains, making them resistant to fluoroquinolones and injectable second-line TB drugs. The test is a critical prerequisite for determining MDR-TB patient eligibility for the newly recommended shorter regimen, while avoiding placing patients resistant to second-line drugs on this regimen. Rapid implementation is expected to improve outcomes, reduce loss to follow-up, and decrease deaths due to better adherence to treatment. The use of a connected diagnostics platform (e.g. Aspect, GxAlert, etc.) can achieve this by making Xpert and LPA results interoperable, connected, and available immediately to the clinician.

**Methods:** Results must be linked together from multiple TB diagnostic platforms and different levels of the lab network. Current information systems are based on manual data entry and ownership of that data stays with the lab doing tests but is not easily shared. The purpose of this work is to digitally connect the necessary TB diagnostic results into a single record and to make that data remotely available for patient management. While unique national patient IDs remain elusive in the developing world, it is possible to combine test results within “micro-populations”. A Rif-positive GeneXpert result can trigger custom notifications for the technician and assign a unique “Shorter Treatment Regimen ID” (to be renamed) to be used during follow-on LPA testing. Through use of that ID at the LPA instrument, results can be joined and provide clinicians a combined view for diagnosis and treatment assignment.

**Results:** This method is under evaluation for Myanmar, Tanzania, and Mozambique; results are expected by November 2016.

**Conclusion:** If successful, this demonstrates the role connected diagnostics can have in executing policy objectives, and also demonstrates a capability in Tuberculosis that can easily be ported to HIV, Zika, Ebola, and other diseases.

**POSTER 259**

**Leptospirosis is a Cause of Acute Illness Among Patients with Fever and Jaundice in Burkina Faso**

**Background:** Leptospirosis is a zoonotic bacterial disease of worldwide distribution but data for West African countries are extremely scarce. The incidence in semi-arid zones has been only very occasionally explored for this disease and no human cases were reported in Burkina Faso.

**Methods:** Here, we took advantage of yellow fever surveillance program to evaluate the proportion of febrile jaundice caused by leptospirosis samples received from January 2014 to July 2015 in the Centre Muraz (national reference laboratory for yellow fever). Sera were tested for the presence of anti-leptospira IgM antibodies (Abs) by ELISA. Microscopic Agglutination Test (MAT) and quantitative PCR assay targeting lipL32 gene were used to confirm seropositive specimens.

**Results:** Forty five sera were tested positive by ELISA and 26 (3.32%) were confirmed by MAT (titer of ≥ 400) or PCR. Acute leptospirosis cases occurred most frequently during the rainy season from May to September. Confirmation of probable cases by MAT suggested circulation of multiple serogroups including Australis, Ballum, Canicola, Grippotyphosa, Icterohaemorrhagiae, Pomona, and Sejroe. The predominant reactive serogroups among participants with confirmed leptospirosis were Ballum and Grippotyphosa.

**Conclusion:** These data suggested that leptospirosis may represent a disease of concern in Burkina Faso. Greater awareness of leptospirosis among clinicians and efforts to improve the diagnosis are mandatory to improve patient management and facilitate estimation of the burden of morbidity and mortality. Leptospirosis would deserve to be more rigorously surveyed in semi-arid and tropical savanna regions in West Africa.
**POSTER 260**

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**Optimizing Provider Initiated Testing and Counselling Services (PITC) in the Out Patients Department (OPD) of Three Mission Hospitals in Zimbabwe Improves HIV test yield and Subsequent Enrollment into HIV Care**

**Background:** Sixty-two percent of men and forty percent of women in Zimbabwe have reported never being tested for HIV (Zimbabwe Demographic Health Survey 2010/11). Studies in Sub Saharan Africa indicate that PITC coverage is around 43%; higher in antenatal care and tuberculosis clinics, and lower in other settings.

**Methods:** We employed a baseline rapid assessment followed by an Interrupted Time Series study design, having a power of 80% to detect a 16% increase in the average number of out-patient department (OPD) clients testing for HIV. All individuals presenting to the OPD were routinely offered HIV testing through enhanced opt-out PITC model. Nine Nurse Counselors and three data clerks were hired, trained (in HIV rapid testing, research ethics, monitoring and evaluation and ART adherence counseling), and assigned to provide PITC in the OPDs. Dried tube based proficiency testing (PT) panels for rapid HIV tests were sent to multiple service delivery points (including all 3 OPD’s) at these facilities.

**Results:** The number of clients who received HIV testing and counselling service increased from 449 (36%) at baseline to 779 (95%) per month by the 10th month of project implementation. The HIV positivity rate ranged from 9 to 15 percent in the first 4 months and between 6 to 9 percent in the last 9 months. Linkage of HIV-positive clients from the point of diagnosis to enrolment in HIV care increased from 89 to 100 percent. All OPD’s scored 100 percent in PT challenges.

**Conclusion:** This PITC intervention demonstrated rapid improvement in PITC coverage, maintained quality of testing, maintained a high positivity rate and increased the proportion of positive patients successfully linked to HIV care. This high-impact intervention can be readily and rapidly scaled-up to accelerate progress towards reaching ‘the first 90’, where 90% of HIV individuals know their status by 2020. 1.Ayesha et al., Uptake of provider-initiated HIV testing and counseling among women attending an urban sexually transmitted disease clinic in South Africa – missed opportunities for early diagnosis of HIV infection. AIDS Care 2010, 22:5.

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**POSTER 261**

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**Performance Validation of the Thermo Fisher Scientific HIV-1 Genotyping Kit Adopted from CDC**

**Background:** As the UNAIDS 90-90-90 target drives improved access to antiretroviral therapy (ART) in resource-limited settings (RLS) the need for a cost-effective and reliable HIV drug resistance (HIVDR) kit arises. Due to the prohibitive high cost and limited genotyping capability of diverse HIV-1 subtypes and circulating recombinant forms (CRFs), commercially available HIVDR genotyping assays are not routinely used for testing in RLS. The Centers for Disease Control and Prevention (CDC) previously developed a low cost and broadly sensitive genotyping assay which is currently used in many genotyping laboratories globally. In collaboration with CDC, Thermo Fisher Scientific has adopted the technology and plans to introduce a research use only (RUO) kit.

**Methods:** The assay detects HIVDR mutations in the protease and reverse transcriptase regions and the kit comprises two modules: the Amplification Module is used to generate a 1.1 kb PCR product from viral RNA and the Cycle Sequencing Module uses six bidirectional primers to Sanger sequence the PCR product. We evaluated the initial kits produced by Thermo Fisher with spiked plasma and DBS samples using HIV-1 isolate subtype panels with viral load ranging from 500 to 500,000 copies/mL.

**Results:** The accuracy, sensitivity, precision and reproducibility were comparable to the CDC assay. The Thermo Fisher Scientific HIV-1 genotyping kit could amplify and genotype HIV-1 group M subtypes A, B, C, D and CRF01_AE and CRF02_AG, and was able to genotype plasma and DBS samples with viral load as low as 1,000 copies/mL. The sequences generated had >99.3% nucleotide identity when compared to the CDC assay. The re-developed positive control with improved stability performed similarly as the original RNA control.

**Conclusion:** This validation confirms that the HIV-1 genotyping kit manufactured by Thermo Fisher for RLS based on a previously CDC-developed assay has similar performance characteristics as reported by CDC.
Genotyping Performance Evaluation of ATCC HIV-1 Drug Resistance Test

Background: ATCC HIV-1 drug resistance test kit was designed to detect HIV-1 drug resistance (HIVDR) mutations in the protease and reverse transcriptase genes for all the HIV-1 group M subtypes and CRFs. The test has been validated for both plasma and dried blood spot specimen types with viral loads of ≥1000 copies/ml. We performed an assessment study on the ATCC kit to determine the genotyping sensitivity and accuracy in detecting HIVDR mutations in comparison with Viroseq assay using plasma samples stored under suboptimal conditions.

Methods: We randomly included 128 plasma samples with VL ≥ 1000 copies/ml, consisting of 47 genotyping-positive and 81 genotyping-negative samples with Viroseq assay. These samples were tested with ATCC kits following the manufacturer’s instructions. Sequence identity and drug resistance patterns were analysed.

Results: Among the 47 samples with a median VL of 38,378 (IQR: 12,523.5-94,776.5) copies/ml and genotyped by Viroseq, 46 of them were successfully genotyped by ATCC kits, giving a genotyping sensitivity of 98% (95% CI: 88.9-99.9%) for the ATCC kits. The ATCC kit was also able to genotype 25 of 81 (30.9%) of the Viroseq genotyping-negative samples with a lower median VL of 15,413 (IQR: 6,261-96,421) copies/ml. Sequence identity analysis revealed that the sequences generated by both methods were >98% identical and yielded similar HIVDR profiles at individual patient level: 43 (93.5%) of the patients had exact identical HIVDR profiles while the remaining 3 (6.5%) patients had differences in 1-4 drugs HIVDR profile.

Conclusion: This study confirms that ATCC kit had equivalent sensitivity in genotyping diverse HIV-1 group M strains circulating in Nigeria comparing to Viroseq. Moreover, the ATCC kit is more suitable for use in detecting HIVDR in resource-limited settings where continuous power supplies are challenging to ensure the integrity of stored samples.

Analysis of Acute Flaccid Paralysis Surveillance data of Kano State, Nigeria from January 2009 to December 2015

Background: Recently in Nigeria, Wild polio virus type 1 was detected in Borno State, this highlights the need to close surveillance gaps. The international accepted gold standard for detecting Poliomyelitis (WPV) cases is through acute flaccid paralysis (AFP) surveillance. Objectives of analyzing Kano State AFP surveillance data were to describe the epidemiology and trend of AFP/WPV, to evaluate the AFP surveillance performance indicators in Kano State and to make recommendations.

Methods: Secondary data analysis of Kano Stae AFP surveillance data from 2009 to 2015 was carried out. Data were obtained from WHO Kano State and ethical clearance was obtained from Kano State Ministry of Health. Data were analysed with EPI INFO version 7.2.0.1.

Results: Overall, 4644 AFP cases were reported over the study period and 3586 cases were discarded after investigation while 1058 cases were confirmed as true AFPS. Fifty six percent of the AFP cases were males and 83% were less than five years. More cases were seen in Ungogo local government area and 69% of the cases received <3 doses of Oral polio vaccine (OPV) while 30% did not receive any OPV. There was reduction in the number of AFP cases across the years from 521 cases in 2009 to 0 (zero) case in 2015. WPV accounted for 145 cases (14%). There was increase in the prevalence of WPV in March, May and July throughout the study period. Evaluation of the performance indicators showed that the AFP surveillance system did not meet the WHO targets for some of the performance indicators throughout the study period, including; timeliness, completeness of reporting and Core IDSR indicators.

Conclusion: We concluded that AFP/Poliomyelitis was prevalent among age < 5 years, in males and in children that received < 3 doses of OPV in Kano State. More cases were seen in the months of March, May and July and Kano State AFP surveillance system did not meet the target for some of performance indicators. We recommended improvement on OPV immunization and the AFP surveillance performance indicators.
**POSTER 264**

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**Antibiotic Resistance of Escherichia Coli Associated with Urinary Tract Infections and Food Poisoning at Two Main Hospitals in Bujumbura, Burundi**

**Background:** The study determined the rate of resistance of strains of Escherichia coli (E. coli) isolated from patients with urinary tract infection and cases of food poisoning at two main hospitals located in the capital of Burundi (CHUK and Prince Regent Charles Hospital) against antibiotics commonly prescribed as first line as part of the studies under the East Africa Public Health Laboratory Networking Project.

**Methods:** This prospective study was conducted over 6 months; from January 2015 to June 2015), in 535 patients with symptomatic acute lower urinary tract infection (leucocyturies> 104 / ml, monomicrobial culture E.coli account colonies> 105 cfu / ml) and 14 patients with food poisoning due to E. coli. Sensitivity to antibiotics commonly used (diffusion method) and the detection of beta-lactamase extended spectrum were carried out as recommended by the API 20E.

**Results:** Among the sampled patients with urinary tract infection, E.coli was isolated in 75% of women and 25% of men. Among these, 61% were in the age group of 15 and 65, 27%, 0-15 years while 12% for those whose age exceeds 65 years. The rate of resistance to the antibiotics were as follows: amoxicillin (76%), amoxicillin + clavulanate (57%), ticarcillin (64%), ceftriaxone (5%), cefuroxime (5%), ceftazidime (10%), gentamicin (51%), trimethoprim + sulphamethoxazole (38%), nalidixic acid (23%), ciprofloxacin (11%), and fosfomycin (2%). [M1] Was there differences in the resistance for those isolates from Stool (food poisoning) and those from Urine (UTI)?

**Conclusion:** The study showed increasing resistance of E. coli to commonly used antibiotics and emergence of resistance to ciprofloxacin. The study further showed that E.coli is a common pathogen associated with UTI and food poisoning in the population.

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**POSTER 265**

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**Xpert MTB/RIF Assay for the Diagnosis of Mycobacterium Tuberculosis and its Rifampicin Resistance at Felege Hiwot and Debre Tabor Hospitals; Northwest Ethiopia: A Preliminary Implementation Research**

**Background:** The World Health Organization in 2010 indorsed Xpert MTB/RIF (Xpert) assay for the diagnosis of tuberculosis and multidrug resistant tuberculosis. However, the use of this novel diagnostic method is still limited in a high TB and human immunodeficiency virus burden settings including Ethiopia. Therefore, we conducted this study to describe the first implementation result of Xpert assay in the diagnosis of TB, TB/HIV and MDR-TB at Felege Hiwot Referral Hospital (FHRH) and Debre Tabor General Hospital (DTGH), Northwest Ethiopia.

**Methods:** We analyzed the records of 1922 (FHRH=544 and DTGH=1378) presumptive TB patients diagnosed using Xpert test from 2015 to 2016 at FHRH and DTGH, Northwest Ethiopia. Information on the demographic and clinical data was collected. Data were entered, cleared, and analyzed using SPSS statistical software package; p < 0.05 was considered to be significant.

**Results:** Overall Xpert assay properly diagnosed 14.6% of the cases (258/1922). Among this rifampicin (RIF) resistance was detected at 9.3% (24/258) of the cases. In the studied region, clinical data reported that 81.0% (1556/1922) of the cases were MDR- TB. Among the study subjects, 888 (46.2 %) of them were HIV positive. TB-HIV co- infection rate was at 41.9% (108/258). Of the total patients registered, 1005 (52.3%) of whom were males. The mean age of patients was 31.1 years with SD of 17.5. Significant predictors of the Xpert test were: age (p=0.000), sex (p=0.009), HIV (p=0.003) and presumptive MDR-TB (p=0.000).

**Conclusion:** In the studied areas, large proportion of clinically TB suspected patients were wrongly diagnosed with multidrug resistant TB. Therefore, the use of Xpert assay in health settings with no culture facility will decrease the unnecessary use of anti-TB drugs and improve rapid TB, TB/HIV and MDR-TB detection and proper management of the cases.
Incidence and Risk Factors for Postoperative Infections among Neurosurgical Patients in Mthatha, South Africa

Background: Despite progress in hospital care, infections continue to represent one of the major complications among hospitalized patients, particularly following neuro-surgical procedures. Expenditures associated with the management of such infections can be avoided if the associated risk factors are identified and specific preventive measures are implemented.

Methods: Retrospective and prospective observational study designs were conducted from October 2013 to September 2014. A standardized form was used to collect data from patients who had undergone neurosurgical procedures. Data included patients’ demographics, duration of stay in the hospital, type of operations, and primary diagnosis. Post-operative infections were defined according to the US Center for Disease Control and Prevention definitions. Infection rates were calculated and risk factors associated with postoperative infections were determined. SPSS v.23 was used for statistical analysis.

Results: A total of 1,688 patients who had undergone neurosurgical operations were studied. The incidence and prevalence were 6.4% and 3.4% respectively. Surgical site infection was significantly associated with craniotomy (p = 0.001), traumatic brain injury (TBI) (p = 0.004), and brain abscess (p= 0.001) while central nervous system infection was significantly associated with hydrocephalus (p = 0.001), ventriculo-peritoneal shunts (p = 0.001), and prolonged stay (≥ 2 weeks) in the ward (p = 0.025).

Conclusion: Post-surgical infections remain an important problem in neurosurgery. Mitigation of the identified risk factors is mandatory in improving patient care.
**POSTER 268**

**Can SLMTA be Integrated into the Laboratory Pre-service Training? Lessons Learnt from Safe Phlebotomy Training Program in Kenya**

**Background:** Inadequate skilled and competent personnel is a major contributor to poor quality laboratory services in Africa. In-service training programs have been implemented to improve laboratory support for HIV diagnosis, care and treatment. Strengthening Laboratory Management Towards Accreditation (SLMTA) is an in-service capacity building program which has been successful in getting laboratories to implement ISO 15189 standard and attain accreditation. In addition to SLMTA, there are other complementary trainings like safe phlebotomy, targeting laboratory workers. Some challenges of in-service training include cost, work absenteeism with attendant impact on sustainability. Integrating such trainings into pre-service curricula provides the best opportunity for sustainability by having service ready graduates. To promote this, MSH-SPHLS-Kenya project funded by U.S. Centers for Disease Control and Prevention (CDC) under PEPFAR, piloted the process of infusing the safe phlebotomy training program into pre-service training in one University in Kenya in 2014.

**Methods:** The project targeted the University Laboratory and Pathology departments for training 2014. The departments were sensitized together with other county and hospital managers in the target training cohort on the benefits of implementing the safe phlebotomy training program. A training of trainers (TOT) course was then held, where lecturers from the University were included. Technical assistance including onsite mentorship, provision of training manikins, facilitation and logistical support were provided. The lecturer TOTs performed skills-transfer to their students.

**Results:** Two Heads of departments were sensitized; three (3) lecturers were trained as TOTs from the departments. Forty (40) final year students were trained on safe phlebotomy, before exiting for health market. The course practicum was immediately integrated into the university practical component, as the process for infusing theory part being initiated through the senate. MSH supported the upload of the training package (Curriculum outline, Trainers guide and participants manual) into ministry of Health website and materials became immediately accessible.

**Conclusion:** The safe phlebotomy training program was successfully integrated into the pre-service university curriculum. The same approach can be applied for SLMTA and complementary training programs.

**POSTER 269**

**First Report of Rubella Genotype 2B Sequences in West Africa**

**Background:** Rubella is a highly contagious disease usually benign that primarily affects children but which can cause serious birth defects when women are infected in early pregnancy. The causative agent is the virus of rubella (RV). RV is the sole member of the rubivirus genus in the togaviridae family [1]. In 2005 a systematic RV nomenclature has been established by the World Health Organization to describe the different genotypes of RVs based of sequencing of a fragment of at least 739 nt within the E1 gene. To date, the WHO recognizes 12 RV genotypes, 1B, 1C, 1D, 1E, 1F, 1G, 1H, 1I, 1J, 2A, 2B, and 2C, and 1 provisional genotype, 1a.

**Methods:** In accordance with the strategic plan against measles, Ivory Coast has implemented case-based surveillance since 2005. This surveillance also helps to capture rubella cases. For each suspected case reported by all 82 health districts, a blood sample (5-10ml) is collected and analyzed in the measles national reference laboratory measles at Institut Pasteur de Cote d’Ivoire by ELISA test using kits Enzygnost anti-rubella virus / IgM SIEMENS. For four districts of Abidjan (Abobo is West Abobo, Yopougon and Yopougon East West) since 2010 oral fluid samples are systematically collected with and analyzed in the laboratory by RT-PCR and ELISA.

**Results:** In the first quarter of 2016 compared to 2015 for the same period, we observed an increase in the proportion of positive cases of rubella (10% vs 22%). One of 4 positive cases confirmed at national level was reported by the health districts of Abobo (East and West). Molecular analyzes by real time RT-PCR followed by sequencing of the E1 gene allowed to highlight two genotypes: Genotype 1G and Genotype 2B. The Genotype 1G have been present in West Africa since at least 2004. Regarding genotype 2B, this is the first report in West Africa region as confirmed by CDC.

**Conclusion:** This study has allowed us to identify the circulation of genotype 2B in West Africa and to show the interest of sequencing in understanding the dynamics of circulation of rubella virus.
Epidemiology of Pulmonary Nontuberculous Mycobacteria Infections in Bamako, Mali

Background: Nontuberculous Mycobacteria (NTM) are a heterogeneous group of bacteria with many different species in our environment. The emergence of HIV/AIDS, which is characterized by immunosuppression in patients, changed completely the epidemiological picture of the diseases caused by NTM. However, very few studies have tackled the epidemiological characteristics of the association with HIV. In addition, the symptoms from NTM diseases are similar to tuberculosis but the treatments are different and thus require differential diagnosis with more advanced tools that are unavailable in developing countries such as Mali where the prevalence is high in TB and low in HIV. Consequently, there is few or no data in Mali on the prevalence of NTM infection and factors associated with the disease. The main objective of this study was to evaluate the prevalence of NTM infections and their co-infection with HIV in Bamako.

Methods: A cross-sectional study was conducted at the University Teaching Hospital of “Point-G” Bamako from January 2006 to December 2013. The investigation concerned sputum from 439 TB suspected patients of whom 332 culture were positive. Identification was done using GenProbe Accuprob® and Capillia TB®. All patients were tested for HIV. This study was approved by the Ethics committee of the FMOS/USTTB in Bamako and the IRB (Internal Review Board) of NIAID-NIH in USA. Logistic regression was done to identify associated factors to NTM infection.

Results: The prevalence of NTM infection was 9.3% (41/439) among all the patients, and 12.3% of culture positives. The prevalence of the co-infection with HIV was 17.1% in the NTM infected individuals. The absence of cough (but presence of other symptoms suggestive of tuberculosis) was the main factor associated with NTM infection. Moreover, older age was also significantly associated with NTM infection (P < 0.0001).

Conclusion: The prevalence of NTM infections in Bamako is not negligible and requires further investigations to determine the factors associated with the disease in Mali. Molecular rapid Test (GeneXpert) should be considered to double check sputum AFB positive in older patients.
POSTER 272

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The Role of Sentinel Site System in Surveillance of Influenza Disease in Uganda

Background: The Influenza disease is one of the upper respiratory viruses that causes infections such as pneumonia. Although it is not one of the priority diseases in Africa, the Influenza disease is one of the leading causes of hospitalization and deaths, with approximately 3–5 million cases of severe illness and 300 000–500 000 deaths globally. The rising of global concerns around avian and pandemic influenza, countries set up National preparedness and Response Plans to conduct routine surveillance and report on the circulating strains of influenza. In 1980’s UVRI was designated a World Health Organisation National Influenza Center (NIC).

Methods: Influenza surveillance is carried out in 10 selected hospitals and Health Units in four regions of Uganda as sentinel sites. Both Nasal pharyngeal and oral swabs are collected from all patients who present with signs and symptoms of influenza i.e. temperature ≥38°C, Cough of sore throat within onset of 10 days.

Results: Since, 2007 a total number of 17,455 samples from sentinel sites have been collected and 2,490 samples have been positive by PCR with Influenza. The common circulating strain are Influenza AH3 at 908(36 %) positivity, followed by Influenza H1N1 Pandemic Influenza with 806(32%) positivity. Of the PCR positive samples isolated on MDCK cell lines, 10% are sent to the CDC WHO collaborating centre to determine antiviral resistance and susceptibility and vaccine production.

Conclusion: The Sentinel Site Surveillance system has played a vital role in identification of patients that meet the WHO set case definition for sample collection, which has led to the collection, isolation and the production of vaccines for the Influenza virus.

POSTER 273

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Hepatitis C Virus Sero Status among Haemodialysis Attendees, Sickle Cell Patients and Blood Donors at the University Health Centre of Yaounde in Cameroon

Background: Hepatitis C virus (HCV) is highly endemic in Cameroon, and regular surveillance in high-risk populations might help for awareness and public health interventions. We aimed at assessing the rate of anti-HCV), among high-risks populations and blood donors in this context

Methods: A prospective and cross-sectional study was conducted on 113 haemodialysis patients, sickle cell patients and blood donors recruited at the University Health Centre of Yaoundé in Cameroon. HCV antibodies were determined by lateral flow immunochromatographic assay (DiaSpot HCV One Step HCV Test Strip). Data were analysed using SPSS.v-16.0, with a p-value<0.05 considered statistically significant.

Results: The mean age of participants was 35.89 (±1.23) years, min-max: 21-69 years; and 68.1% (77/113) were male. Overall rate of anti-HCV was 15.9% (18/113), with 15.58% (12/77) in male, 16.66% (6/36) in female, p=0.884. Among high-risk individuals, anti-HCV positivity was 31% (10/38) for haemodialysis patients vs 8.57% (3/35), for sickle cell patients, p=0.048. Anti-HCV positivity was 12.5% (5/40) among blood donors, without any statistical significance difference compared to high-risk individuals (p=0.089).

Conclusion: Haemodialysis appears as a major setting for HCV transmission, thus calling for optimised preventive measures. Surprisingly, donors might be at higher risk compared to sickle cell patients, thus stressing the necessity of thorough screening before transfusion.
Antimicrobial Resistance Surveillance in Uganda: Barriers and Recommendations

Background: Antimicrobial resistance is an increasingly serious threat to global public health. However, there is no antimicrobial resistance surveillance program in Uganda. We therefore evaluated the barriers related to antimicrobial resistance surveillance in Uganda. Objective: To identify barriers to antimicrobial resistance surveillance in 24 referral health facilities in Uganda.

Methods: The evaluation focused on policies/guidelines; definition of roles and mechanisms; human resources and infrastructure; knowledge and skills; tools in 14 Regional Referral Hospitals, 9 General Hospitals and 1 Health Centre IV. A cross-sectional study design using focus group discussions, checklists and questionnaires was employed. 19 physicians, 27 pharmacists/dispensers, 4 medical records officers, 50 laboratory technologists/staff, 20 laboratory in-charges, 18 hospital directors/health facility in-charge and 18 District Health Team members participated. In addition, relevant documents/records were reviewed.

Results: 37.5% of the Health facilities reported the ability to identify and perform susceptibility testing on some priority WHO antimicrobial resistance pathogens. Health workers possessed scanty knowledge on antimicrobial resistance and how the respective data could be generated. Registers collecting some data elements on microbiology as well as antibiotic drug usage were available at the facilities. These included Health Management Information System data collecting tools such as laboratory microbiology and serology registers, dispensing logs and stock cards. However, these registers didn’t sufficiently provide for variables and space to collect all the required antimicrobial resistance surveillance data. All the Health Facilities neither had policies/guidelines on antimicrobial resistance surveillance nor a plan for combating antimicrobial resistance.

Conclusion: There was no routine collection of antimicrobial resistance data to support surveillance. Efforts should therefore be geared towards strengthening the laboratories’ capacity to conduct susceptibility tests, developing and cascading antimicrobial resistance surveillance guidelines/plans, revising the existing tools to cater for antimicrobial resistance data elements and improving health workers’ skills and knowledge.

Phage Therapy as an Alternative Treatment Against Haematogenous Multi-Drug Resistant Staphylococcus Aureus Pneumonia in Mice

Background: Community-acquired haematogenous Staphylococcus aureus pneumonia is a rare infection, though it can be acquired nosocomially. Currently, antibiotics used against S. aureus pneumonia have shown reduced efficacy. Thus, there is need for an alternative therapy against multidrug-resistant S. aureus (MDRSA) strains in the community. We sought to determine the efficacy of environmentally-obtained S. aureus lytic bacteriophage (phage) against haematogenous MDRSA pneumonia in mice.

Methods: Phages and MDRSA were isolated from sewage samples collected within Nairobi County, Kenya. Staphylococcus aureus bacteria isolated were screened for resistance against ceftazidime, oxacillin, vancomycin, netilmicin, gentamicin, erythromycin, trimethoprim-sulfamethoxazole and cefuroxime. Thirty BALB/c mice aged six to eight weeks were randomly assigned into three groups: the MDRSA-infection group (n=20), the phage-infection group (n=5) and the non-infection group (n=5). Mice were infected with either MDRSA or phage (10^8 CFU/mL) and treated after 72 hours with a single dose of clindamycin (8 mg/kg/bwt) or 108 PFU/mL of phage or a combination therapy (clindamycin and phage). The efficacy of phage, clindamycin or clindamycin with phage combination was determined using resolution of lung pathology and bacterial load in lung homogenates. The experimental protocols and procedures were approved by the Institutional Review Committee on Animal Ethics of the Institute of Primate Research (ref no: IRC/02/14). The results were reported as required by the animal research reporting in vivo experimental guidelines.

Results: The viable MDRSA count was 0.5 ± 0.2 log10 CFU/gm in the phage-treated group, 4.4 ± 0.2 log10 CFU/gm in the clindamycin-treated group and 4.0 ± 0.2 log10 CFU/gm in the combination-treated group. The efficacy of phage therapy was significantly different from other therapeutic modes (p≤0.0001). Histology showed that the mice treated with phage did not develop pneumonia.

Conclusion: Phage therapy is effective against haematogenous MDRSA infection. Thus, it needs to be explored as an alternative treatment method.
Investigation of a Lassa Fever Outbreak, Katsina, Nigeria, 2016

Background: Lassa fever (LF) is an acute viral infection which causes a hemorrhagic fever. It is widespread in rodent-endemic parts of West Africa, where poor sanitation practices are common.

On April 5th 2016, two cases were reported in Katsina State. We investigated to confirm the outbreak, determine its extent, characterize the outbreak and institute public health actions.

Methods: We conducted a cross sectional study from 14th April to 6th May, 2016. We used the Integrated Disease Surveillance and Response guide to define cases and contacts. We conducted active case search by reviewing hospital records, interviewing patients patients and visiting communities. We line-listed the cases, identified and followed contacts for 21 days. We evaluated various factors including age, gender, occupation and history of contact with a confirmed or suspected case. We collected and submitted blood samples, where needed, to the reference laboratory for LF IgM detection. We used Microsoft Excel and Epi info version 7.1 to enter, clean and analyze data.

Results: Between March 28th and April 5th, a total of 11 cases occurred. Eight cases were laboratory-confirmed (72.7%) and 1 epidemiologically-linked. Three deaths occurred giving a case fatality rate of 27.3%. The median age of cases was 27 years (range: 4 months to 58 years); 5 out of 11 cases were females. The commonest presenting feature was fever (100%). A total of 82 contacts were followed up, and serological tests for 73 out of 82 contacts and suspected cases were negative. Two cases were imported from other States. There was evidence of rat infestation in the homes of the affected cases.

Conclusion: There was a confirmed outbreak of Lassa fever in Katsina State. We conducted community and health workers sensitizations in Katsina State on Lassa fever. We recommended that Lassa fever surveillance be strengthened, public health workers sensitization activities should become routine, and all efforts at environmental sanitation and vector (rat) control should be intensified.

Establishing EVD Testing at a Mobile Laboratory Using GeneXpert Technology in Liberia - Impact on Surveillance System and Outbreak Detection and Management

Background: The Ebola Virus Disease (EVD) outbreak in West Africa 2014-15 highlighted the necessity for sustainable, rapid, point-of-care diagnostics. In October 2015, Xpert Ebola Assay was approved by the Minister for Health of Liberia, for use as a stand-alone EVD test for whole blood specimens. We describe implementation of GeneXpert technology at an Ebola Treatment Unit (ETU) mobile laboratory in Liberia and subsequent impact on surveillance of EVD, outbreak detection and patient management.

Methods: GeneXpert technology was established at a mobile laboratory and local laboratory technicians trained to conduct EVD diagnosis. Site coordination, management and oversight of operations was provided through successful collaborations between Ministry of Health, WHO and international partners.

Results: The EVD laboratory has capacity to test 64 blood specimens per day, requiring two technicians. Over 10000 specimens were analysed over the one year operational period, between October 2015 and September 2016. Sample turn-around-time with the Xpert Ebola Assay is two hours compared with six hours for conventional RT-PCR and allows for single specimen testing. Specimens taken from patients during EVD flare-ups in November/December 2015 and April 2016 were analysed at the laboratory and Ct values of consecutive specimens compared, indicating trends in the viral load of patient specimens.

Conclusion: The mobile laboratory contributed significantly to EVD surveillance activities in Liberia. In November 2015, a new case of EVD was identified during routine surveillance. The resulting cluster of cases, were closely monitored at the laboratory using Ct values from the RT-PCR assay informing clinical care and patient management. In addition, during the flare-up in April 2016, two confirmed EVD patients at the ETU were monitored by real-time testing at the on-site laboratory. The GeneXpert platform is easy to use, has relatively low running costs and can be easily integrated into other national diagnostic and testing algorithms; a sustainable system for Liberia. The strategic placement of GeneXperts to complement isolation facilities and establishing an integrated network of GeneXpert laboratories would strengthen epidemic preparedness and response capabilities for future flare-ups of EVD clusters.
Bacterial Contamination and Antimicrobial Susceptibility Pattern of Isolates From Stethoscopes at a Referral Hospital in Tanzania

Background: Nosocomial infections pose a challenge to the medical field and are a global safety issue for both patients and health care providers. The burden of NIs is substantial in developed countries, affecting 5% to 15% of hospitalized patients and more than 50% of patients in intensive care units. In developing countries the magnitude of the problem remains underestimated and literature is very scarce. Some nosocomial infections spread via contaminated medical equipment such as stethoscopes. To date, there is no data reported from Tanzania about the potential role of stethoscopes in spreading these infections. This study aimed to determine bacterial contamination of stethoscopes and antimicrobial susceptibility pattern of isolates from stethoscopes at Kilimanjaro Christian Medical Centre, a referral and a teaching hospital in northern Tanzania.

Methods: This cross-sectional study was conducted from February to April 2014 at KCMC. One hundred medical doctors and medical students were randomly selected to participate in this study. Structured questionnaires were used to collect demographic data and behavioral information related to the cleaning and storage of stethoscopes. Participants’ stethoscopes were sampled with sterile moistened cotton swabs. Laboratory analysis was done following standard microbiological techniques in the KCMC Microbiology Unit. Data analysis was done using SPSS window version 16, and P-values of 0.05 or less were considered to indicate statistical significance.

Results: A total of forty six (46%) of the stethoscopes were found to be contaminated. A total of 134 bacterial strains were isolated. Of 134 isolates, 70 (52%) were potential pathogenic, including S.aureus, Klebsiella spp, Proteus spp, E.coli and Paeuginosisa. Eighteen percent of the S.aureus was methicillin-resistant. All strains were resistant to at least one class of antibiotic. Pathogen detection was found to be significantly associated with poor stethoscope storage practices. Pathogen detection and frequency of stethoscope cleaning were inversely related.

Conclusion: We found a significant amount of bacterial contamination of stethoscopes at our hospital, a significant percentage of which is Methicillin-Resistant Staphilococcus Aureus (MRSA). Similar to other settings in Northern Tanzania, stethoscopes are important potential vehicles for nosocomial infections.
**Poster 280**


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### Implementation of an Open Source PT Data Management System in Zimbabwe

**Background:** Zimbabwe’s National Microbiology Reference Laboratory (NMRL) explored various options to support data management of its External Quality Assurance Program (EQA). Data analysis was time consuming and error prone using spreadsheets. NMRL was managing 360 sites for HIV RDT PT, and needed to scale up to 1600 sites. Association of Public Health Laboratories (APHL) recommended a pilot of ePT, an open source web based application.

**Methods:** APHL supported NMRL to improve IT infrastructure, install ePT in local and web-based mode, conduct data analysis and follow up corrective action. To address concerns regarding limited internet connectivity, data architecture diagrams, data migration procedures, and training plans were developed and implemented. Roles for system support were defined at NMRL. Data analysis was accomplished in real-time through pre-designed and ad hoc reports. Recommended corrective actions were rapidly generated through pre-designed algorithms.

**Results:** Use of ePT reduced duplicate data entry and allowed for automated results management. The average turnaround time (TAT) for producing reports was reduced by 5 working days, from 15 to 10, following roll-out of ePT – a 33% reduction. TAT for was reduced by 80% – from 5 working days to less than 1. The number of data entry errors seen during data quality check before release of PT reports reduced from 8% (27 records out of 360 records) to 2% (9 records out of 410 records) per survey Overall, users expressed satisfaction with ePT which showed reduced data errors, improved data management control and improved quality management systems.

**Conclusion:** Introduction of web based systems enables efficient data analysis and reporting of PT events. Timely reporting of PT data validates the quality of testing, identifies sites for corrective action, informs training needs and provides Ministry critical information for planning. A positive impact on the quality management system can be demonstrated concerns about data security can be addressed by ensuring redundancy measures are available.

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**Poster 281**

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### A Nosocomial Outbreak of Human Monkeypox in the Central African Republic (CAR)

**Background:** Monkeypox is an infectious disease whose causal agent is the Monkeypox virus (MPXV) which family Poxviridae and genus Orthopoxvirus. The humans clinical signs are macular lesions, appear on the face and spread in a centrifugal distribution on the entire body. Clinical differentiation from smallpox and varicella may be difficult. Human infection seems to occur after contact with supposedly infected animals, whether through biological fluids, a bite, or the consumption of bush meat (rodents, primates). The exact animal reservoir of such zoonotic disease remains unknown. Since 2001, isolated human monkeypox cases have been reported in two regions in CAR. This study reports an outbreak of familial monkeypox with a nosocomial transmission.

**Methods:** During the period from December 2015 to January 2016, 12 cases of monkeypox were notified and identified in Bangassou region (South of CAR). The first two cases, children aged 5 and 9 years old from a hunters’ family, residing in Madigui village, were cared after a cutaneous rash initially thought to be due to mumps by Catholic Relief Services. Virological investigations took place at the Institut Pasteur de Bangui (CAR) either from blood samples, vesicles or pus samples from 4 persons and index case.

**Results:** Monkeypox virus was revealed through the use of specific quantitative PCR only on the samples of pus and vesicles with CT variants of 19 and 24. Sequencing of the amplicons performed on the genes of hemagglutinin and a partial region of the ATI gene have shown that the same strain is responsible for these cases and belongs to the Zaire genotype. On the basis of the molecular data obtained, this strain is identical to the one revealed during the two previous reports of cases of monkeypox in CAR in 2001 and 2010.

**Conclusion:** This report describes the first outbreak of monkeypox in the CAR with further evidence of nosocomial transmission. Similar outbreaks have been reported in the DRC and North of Congo Republic. This epidemic and other sporadic cases reported occurred in remote areas with poor medical infrastructure and a failure of the health system linked to repeated armed conflicts in CAR. The situation is similar in the DRC and Congo. It is obvious that in these countries and in the surrounding areas in Sudan, there exists the potential future of the largest and frequent epidemics nosocomial.
Fla-typing and Antibiotic Resistance Profiling of Enteropathogenic Campylobacter in Children and Chickens in Gaborone, Botswana

**Background:** Foodborne zoonoses cause morbidity and mortality in humans. In Botswana, other pathogens have been reported in gastroenteritis outbreaks but little is known about involvement Campylobacter spp. Campylobacter surveillance is absent in-country hence prevalence, molecular epidemiology and antibiotic resistance data in humans and animal reservoirs is scanty. The study seeks to help address this knowledge gap.

**Methods:** A cross-sectional study was conducted in 228 diarrheal children at Princess Marina Hospital and ready-for-slaughter chickens (75 broilers and 75 free-range) from Gaborone. Stools were processed by direct culture and Cape Town protocol, caecal samples were cultured on Preston agar to isolate Campylobacter. FlaA typing and antibiotic susceptibility testing were performed on isolates using RFLP and E-test respectively.

**Results:** 14% prevalence was observed in humans; Campylobacter jejuni (66%) and coli (34%). Direct plating and Cape Town Protocol yielded 11% and 14% positivity respectively without significant difference (p>0.05). Positivity in broilers was 71% (63/75); Campylobacter jejuni 36% (19/53) and coli 64% (34/53). Positivity in free-range chicken was 57% (43/75); Campylobacter jejuni 77% and coli 23%. Tetracycline resistance was 34% (11/32), 87% (45/52) and 60% (25/42) in human, broiler and free-range chicken isolates respectively. Using resistance in humans as baseline, risk of Tetracycline resistance in free-range chickens was 3-fold and 12-fold in broilers. Erythromycin resistance was observed in 34% (11/32), 42% (22/50) and 62% (26/42) of human, broiler and free-range chicken respectively. Human isolates had most diverse genotypes, chickens produced more clones.

**Conclusion:** Campylobacter coli positivity was higher than in most past studies; virulence studies are needed for further investigations. Cape Town Protocol improves Campylobacter recovery from stools. High Tetracycline resistance necessitates antibiotic stewardship. Isolates from same locations had similar RFLP patterns; flaA typing helps in outbreak investigations.

**POSTER 283**

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**Strengthening Local Capacity to Improve and Monitor the Quality of HIV Rapid Testing in Uganda and Zambia**

**Background:** More than 150 million rapid HIV tests are performed each year, with the majority being in non-laboratory settings in developing countries. Recent reports indicated rates of HIV misdiagnosis as high as 10.3%, with major implications on patient care. In 2015, Uganda and Zambia adopted the HIV Rapid Testing Quality Improvement Initiative (RTQII), a data driven approach for impact. Support from the U.S. CDC and FIND was provided to strengthen local capacity.

**Methods:** Two hundred HIV testing sites were selected in both Uganda and Zambia to pilot RTQII. Training of trainers and regional workshops were conducted using a comprehensive training package on quality assurance. Additionally, quality corps officers (Q-corps) were recruited to conduct baseline and subsequent quarterly site assessments using a standardized checklist over 12 months. The checklist, based on scaled scoring system, with Level 0 being the lowest performance and Level 4 the highest, addressed eight quality standards at HIV testing sites. Sites were mentored and corrective actions implemented when quality gaps were identified.

**Results:** At baseline, 28% and 25% of sites were at level 0 and only 0.5% and 1% were at level 4 in Uganda and Zambia respectively. After 12 months of continuous monitoring and mentoring only Uganda reported 0.4% of sites at level 0 while 8% and 6% of sites were at level 4 in Uganda and Zambia respectively. The lowest scores observed at baseline were in Personnel Training and only 0.5% and 1% were at level 4 in Uganda and Zambia respectively. The lowest scores observed at baseline were in Personnel Training and only 0.5% and 1% were at level 4 in Uganda and Zambia respectively. The lowest scores observed at baseline were in Personnel Training and only 0.5% and 1% were at level 4 in Uganda and Zambia respectively. The lowest scores observed at baseline were in Personnel Training and only 0.5% and 1% were at level 4 in Uganda and Zambia respectively. The lowest scores observed at baseline were in Personnel Training and only 0.5% and 1% were at level 4 in Uganda and Zambia respectively. The lowest scores observed at baseline were in Personnel Training and only 0.5% and 1% were at level 4 in Uganda and Zambia respectively. The lowest scores observed at baseline were in Personnel Training and only 0.5% and 1% were at level 4 in Uganda and Zambia respectively. The lowest scores observed at baseline were in Personnel Training and only 0.5% and 1% were at level 4 in Uganda and Zambia respectively.

**Conclusion:** This pilot project demonstrated that continuous monitoring can improve the adherence of testing sites to quality standards and therefore can impact the quality of testing and potentially decrease the rate of HIV misdiagnosis. Plans for sustaining improvements and scale-up to additional testing sites are underway.
**POSTER 284**

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**Background:** Since 1990, Uganda has expanded HIV rapid testing services to over 4,600 testing sites. To achieve the first UNAIDS 90 targets, significant efforts are underway to increase access to HIV testing. However, the current set of quality assurance measures in place in Uganda and funding commitments are inadequate for ensuring the accuracy of HIV test results. To address these gaps and promote a systematic implementation of quality management systems, the PEPFAR supported HIV Rapid Testing Quality Improvement Initiative (RTQII) was endorsed in 2014 and has been piloted since 2015 in Wakiso and Jinja districts in Uganda.

**Methods:** Since March 2015, a stepwise process for improving the quality of HIV rapid testing (SPI-RT) has been implemented in 212 testing points selected in the RTQII pilot districts, following national and district levels trainings on quality processes. The baseline performance of these testing points was determined using the SPI-RT checklist, targeting 8 quality components. To assess the impact of the corrective actions provided and to monitor the improvements overtime, follow-up assessments were conducted quarterly using the SPI-RT checklist.

**Results:** After 12 months of implementation of a continuous quality improvement program, the number of sites that need immediate remediation in all quality areas has reduced by 26.6%, while the number of sites partially and fully eligible for national certification has increased by 37.3% and 8.6%, respectively. Furthermore, incremental improvements were observed in all quality areas but were more noticeable in Testing phase (44%), External Quality Assessment (43%), Personnel Training and Certification (39.3%) and Documentation (39.6%).

**Conclusion:** We have demonstrated that implementing a comprehensive approach for quality can improve adherence to quality standards can improve adherence to quality standards in Uganda and is likely to increase rigor of existing quality improvement practices for HIV rapid testing in order to meet the UNAIDS first 90 target.

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**POSTER 285**

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**Laboratory Improvement Program Boosts Disease Surveillance in East Africa**

**Background:** Laboratories are some of the most neglected parts of the health systems in resource-limited settings, yet they are an important component of disease surveillance and control. The World Bank funded East Africa Public Health Laboratory Networking Project was initiated in Kenya, Rwanda, Tanzania and Uganda in 2010, and Burundi in 2012, to strengthen 32 transboundary laboratories in East Africa by improving their physical structure (construction/rehabilitation), equipping them and training lab professionals. In addition, health workers were trained on IDSR, IHR(2005); community-based disease surveillance and on data management. Fourteen sessions were held between districts from neighbouring countries of 9 designated transboundary zones to review and exchange disease surveillance data and experiences; and 4 table-top and two field simulation exercises were conducted to train frontline workers and test the participating countries’ status on emergency preparedness including against viral haemorrhagic fevers.

**Methods:** To assess the contribution of the project on disease surveillance at 6 years (4 for Burundi), a structured self-administered questionnaire to country project coordination units was instituted between July and August, 2016. The regional coordination team based at the East, Central and Southern Africa Health Community analyzed the collated data.

**Results:** The horizontal exchange of disease surveillance data across countries has increased during the regular semiannual surveillance zone review sessions. The proportion of outbreaks confirmed by laboratory tests has increased from 10% (range: 0-20%) in 2010 to 98% (range: 88-100%) in all countries by 2016. Five trans-boundary (inter-country) and many intra-country cross-border outbreaks were jointly investigated by neighbouring country/district teams; and Joint EAC support was promptly provided to control Ebola and Marburg virus outbreaks in Uganda. Response time to reported outbreaks has reduced.

**Conclusion:** Strengthening laboratories is a viable gateway for strengthening disease surveillance in the sub-Saharan context and may be replicated in other regions.
ART outcomes.
and early intervention for those with virologic failure to improving results reinforce the importance of expanding access to VL testing viral re-suppressions after intensified clinical intervention. These and the majority of them remained suppressed. More importantly, almost 30% of the patients with initial virologic failure achieved viral re-suppressions after intensified clinical intervention. These results reinforce the importance of expanding access to VL testing and early intervention for those with virologic failure to improving ART outcomes.

Conclusion:

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Virologic Outcome among Patients Receiving Antiretroviral Therapy at Five Hospitals in Haiti

Background: Viral load (VL) monitoring is the preferred method for diagnosing and confirming virologic failure for patients on antiretroviral therapy (ART). We conducted a retrospective cross-sectional evaluation on virologic suppression rate among patients on ART for ≥6 months in five hospitals around Port-au-Prince, Haiti.

Methods: Plasma VL was measured with BioCentric VL Assay and patients with VL <1,000 copies/mL were defined as virologically suppressed. A second VL test was performed within 6-month of the first test. Factors associated with virologic suppression were analyzed using logistic regression models accounting for site-level clustering using complex survey procedures.

Results: Between July 2013 and February 2015, 2,456 ART patients having at least one VL test results were included. Among these patients, the median year on ART at the first VL test was 2.5 (IQR: 1.4-4.4) and 67.3% (1,654) achieved virologic suppression. Of the 668 patients with a second VL result performed within 6-month of the first one, including 422 patients with virologic suppression and 246 with virologic failure at the first test, 79.9% (337/422) retained virologic suppression and 27.6% (68/246) achieved virologic re-suppression after intensive counselling. Virologic suppression was negatively associated with male gender (adjusted odds ratio [aOR]: 0.80, 95% CI: 0.68-0.94), longer duration on ART (aOR: 0.81, 95% CI: 0.66-0.98), TB co-infection (aOR: 0.73, 95%CI: 0.54-1.00) and poor adherence (aOR: 0.66, 95% CI: 0.53-0.82) and positively associated with older ages (41-50, aOR: 1.33, 95%CI: 1.03-1.71; >50, aOR: 1.91, 95% CI: 1.62-2.25).

Conclusion: These results showed that over-two-thirds of the patients achieved virologic suppression after ≥6 months on ART and the majority of them remained suppressed. More importantly, almost 30% of the patients with initial virologic failure achieved viral re-suppressions after intensified clinical intervention. These results reinforce the importance of expanding access to VL testing and early intervention for those with virologic failure to improving ART outcomes.

Seroprevalence of HBV, HCV and Associated Factors Among Blood Donors at EZBTS Tanzania 2014

Background: Prevention of Transfusion Transmissible Infectious Agents are among the greatest threats with high mortality, morbidity, and financial burden to blood safety for recipient. This retrospective study was conducted to investigate the seroprevalence of HBV, HCV and associated factors among blood Donors.

Methods: Analysis of consecutive blood donors who attended national blood services center in Tanzania from March 2013 to March 2014. Logistic regression analysis was used to determine risk factors associated with HBV, HCV infections. Serum was used for detection of Hepatitis B surface Antigen (HBsAg), antibodies to Hepatitis B core Antigen (anti-HBc), and antibodies to Hepatitis C antigen (anti-HCV) by Murex HBsAg 3.0 version; Murex HCV Ab/Ag Combination assays respectively.

Results: The study involved a total population of 559 blood donors whereby the prevalence were 119 (21.3%) for HBV, 46 (8.2%) for HCV and 15 (2.6%) co-infected with HBV/HIV. The prevalence of HBV infection among male blood donors was 17% and in females 4.3%. Donors who were HIV positive were at a high risk of being HBsAg positive (OR = 15.55; 95% CI 2.93 - 172.66). There was a negative association between HBV and HBsAg (OR = 0.05; 95% CI 0.01 - 0.21). Likewise females were at a lower risk compared to their male counterparts though this was not statistically significant (P = 0.009). There was entirely no association whatever between marital status and HBsAg (P = 0.431). We observed that donors in the age category 15-24 years were more likely at higher risk for HBV infection (OR = 2.15; 95%CI 1.25 - 3.71) and this was statistically significant (P = 0.006).

Conclusion: Therefore from the data we can conclude that the risk factor for HBsAg are HIV status, HCV, Sex. Age in ranges and weakest association for Occupation (P = 0.237). However must remain significant that while controlling risk factors for each other because they have same mode of transmission. Lastly Blood and Blood Products safety remains as crucial consideration in transfusion medicine in order to prevent TTI’s to recipients.

**Background:** Antimicrobial resistance became a growing public health problem in the world and Escherichia coli (E. coli) appeared as one of nine bacteria commonly causing infections in community and hospitals. It prevalence and its resistance to antibiotics were evaluated in Benin throughout an eleven year period.

**Methods:** In this retrospective study, routine urine samples from patients collected at the National Laboratory (NL) of Health Ministry during the period 2005–2015 were analyzed. Samples higher than 103 CFU/mL bacterial growth were considered positive and for these cases, the bacteria were identified and antimicrobial susceptibility test (AST) was performed.

**Results:** From the 4467 samples analyzed, 1455 (32.6%) were positive with E. coli preponderance (38.3%) of all isolated germs and (58.5%) of enterobacteriaceae. Most of the isolates were susceptibility to netilmicin (80%), gentamycin (93%), chloramphenicol (70%), pipemidic acid (60%), nalixidic acid (75%), ciprofloxacine, ofloxacine (51%), amoxicilline, carbénicilline, ceftriaxone (59%), chloramphénicol (68%) pefloxacine (100%). Susceptibility rates increased for cefotaxim (78%-100%), ceftriaxon (71%-100%) and azteronam (67%-100%). Resistances were observed for minocyclin (70%), triméthoprime/sulfamethoxazole (100%), ampicillin (67%), amoxicillin (86%), cephalothin and cephalexin (50% and 80% respectively).

**Conclusion:** The use of drugs such as minocyclin, ampicillin, amoxicillin, carbenicillen, cephalothin, cephalexin and trimethoprim/sulfamethoxazole does not seem appropriate for empirical treatment of UTI in Benin.
Integrated Disease Surveillance and Response System in the Far-North Cameroon: Trends from 2005 to 2015 and present challenges

Background: IDSR has been established by WHO AFRO in 1998 to improve on countries abilities to detect, confirm, and respond to high priority diseases. Its implementation in African countries is unfortunately taking place in a context dominated by poverty, high population density, lack of access to adequate and safe water and sanitation as well as insecurity. The Far North Region of Cameroon is known to experience natural disasters such as flooding and recurrent epidemics of measles and cholera, and now insecurity and population displacement since 2014.

Methods: This is a retrospective study, consisting of records review of IDSR of 30 health districts for the period 2005-2015 and 15 Key Informant interviews. An administrative authorization was obtained. Hierarchical cluster analysis with SPSS and L-jung Box test with R were used to examine for the districts with the same pattern and the statistical significance for trends at 95% CI respectively.

Results: Measles’ overall mean incidence rate per year was 59.82 cases per 100 000 populations (CI: 12.41 - 107.22 cases/100 000 populations) and the case CFR was 1.10% (CI: 0.75% – 1.46%). The overall incidence rate per year of cholera was 30.45 cases/100 000 populations and the mean CFR was 5.20% (CI: 2.05% - 8.36%). The mean incidence rate per year of neonatal tetanus was 14.58 – 24.69 case per 100 000 populations) and the overall case fatality rate was 40.48% (CI: 27.12% - 53.84%). The trends for the incidence rate per year of measles (p-value = 0.540), cholera (p-value = 0.488), and neonatal tetanus (p-value = 0.676) as well as the trends of the case fatality rates of measles (p-value = 0.607), cholera (p-value = 0.607) and neonatal tetanus (p-value = 0.673) were all not found significant over this period. Major challenges faced by the IDSR system include among the others insecurity issues, insufficient personnel, insufficient training of personnel and community relay agents on surveillance, insufficient equipment and means of transportation, population displacement and insufficient financial resources.

Conclusion: Measles, cholera and neonatal tetanus were all found to be endemic in the Far North Region of Cameroon. There is therefore an urgent need to strengthen public health interventions and IDSR which could serve as a powerful tool to control diseases.

When a Mirror is Not Enough: Active Feedback Versus Passive Monitoring in Improving Laboratory Quality

Background: Detecting and supporting Non-Communicable Diseases (NCDs) requires laboratory results that are reliable enough for clinical care. However previous studies have demonstrated that, excepting laboratories involved in international research protocols, most laboratories in low-resource settings (LRS) are of poor quality and unreliable. The challenge has been creating Quality Assurance (QA) for such laboratories that is simple, effective, and transferable. To address this problem, Pathologists Overseas, a US non-profit, developed and implemented a 3-phase, proficiency testing (PT)-based, QA program. We report our experience in 10 laboratories that were enrolled over 4 consecutive years.

Methods: Chemistry and Hematology PT samples were from the Royal College of Pathologists of Australasia. In the first phase (each phase was 12-18 months long) the laboratories were enrolled in PT without any interventions. At the beginning of the second phase the staff were educated on various aspects of laboratory QA - including how to interpret PT reports and take appropriate corrective actions for failures. Monthly feedback by PO volunteers who had access to the PT data also commenced. In the third phase the monthly feedback was stopped.

Results: Pass rates varied widely across laboratories and was highest in the second ‘feedback’ phase. Average pass rates for laboratories were 36, 64, and 56% in the first, second, and third phases respectively. The main change was an improvement in the pass rates of the initially worst performers. Average pass rates of the 3 lowest performing laboratories were 11.7, 48.7, and 30.5% in the first, second, and third phase respectively. Of note, the laboratories with the highest pass rates had scores of 82 and 92.8% in the first and second phase respectively.

Conclusion: The underlying rate of quality in many public hospital laboratories is not reliable enough to support NCD care. PT enrollment provides a simple, effective, and transferable way to improve laboratory quality and reliability. However PT enrollment alone was not sufficient, especially for the worst performers. Sustained monthly feedback greatly improved laboratory quality.
**POSTER 292**

**Almost Doesn’t Count: A Survey of Test Cost and Accuracy in Laboratories in Kampala, Uganda**

**Background:** Both communicable and non-communicable diseases rely on laboratory results that are accessible and reliable. Accuracy is the basis of reliability, and cost is a key determinant of access. However, for the vast majority of sub-Saharan cities, the accuracy and cost of laboratory tests is not known. To obtain this information, as well as provide a practical method for future studies, we performed a city-wide study of the accuracy of laboratory tests in Kampala, Uganda.

**Methods:** A total of 42 moderate-to-high complexity laboratories were randomly selected from a comprehensive list of all laboratories in Kampala, Uganda. 94% of these laboratories were private, to match proportions in Kampala, and 3 met international quality standards. All 42 laboratories were paid to perform 13 of the most commonly utilized tests. All tests were performed on two sets of blinded samples. Hematology, HIV, Syphilis, and Malarial samples were obtained locally. Other samples were from the Royal College of Pathologists of Australasia.

**Results:** Pass rates by test type were Malarial blood smear-96%, HIV-95%, Syphilis-91%, Platelet count-88%, HCG-83%, WBC-80%, AST-78%, HGB-78%, Cr-77%, ALT-61%, Hematocrit-53%, Glucose-42%, and BUN-38%. The overall pass rates was 77.1%(50-100%). Quantitative, and qualitative pass rates were 66%(31-89%), and 91%(68-97%) respectively. Pass rates of the 3 internationally-certified laboratories was 100%, 100%, and 92% respectively. Although test prices varied by up to 3600% between laboratories, there was no correlation between test price and accuracy ($r^2 = 0.09$) or between the WHO laboratory quality checklist score and accuracy ($r^2 = 0.04$).

**Conclusion:** Test accuracy in Kampala varied across laboratories, by test type and category. Test costs and ranking on laboratory quality checklists were no guarantee of quality. Our results suggest that either international accreditation or the use of blinded samples (as presented here), will be required to guarantee accurate results.

**POSTER 293**

**The effect of Pecuniary Benefit on Blood Donation: A Study at the University of Calabar Teaching Hospital Blood Donor Clinic, Calabar, Nigeria**

**Background:** In many countries, there are cultural attitudes that limit acceptance of blood donation activities. Governments and other institutions do little to counteract these attitudes.

**Methods:** One hundred and eighty-four (184) subjects were recruited into five groups in this study- 35 (19.0%) subjects in the control group (donors donating for the first time), 32 (17.4%) subjects in the group donating for the second time, 35 (19.0%) in the group donating for the third time, 41 (22.3%) in the group donating for the fourth time, and 41 (22.3%) in the group donating blood for the fifth time. The donors were aged 18 – 49 years. Their haemoglobin concentration was measured using complete automated cell counter (ERMA INC. Tokyo PCE-210, 5.10 version).

**Results:** Students (42.4%) comprised highest percentage of donors, followed by artisans (19%). Bankers, politicians, business men made up a small proportion of blood donors. Most (63.4%) of the blood donors were paid while 37.5% were not paid at the time of donation. There was a progressive decline in average Hb in the repeat blood donors of more than 3 times.

**Conclusion:** In our study population, most repeated blood donors were young persons between the ages of 18- 35 years. Majority of the participants had donated blood for pecuniary benefit. It is therefore necessary to conduct motivational campaigns to educate the blood donors to donate blood willingly without the expectation of being remunerated.
Correlation Between Soluble Transferrin Receptor with Hemoglobin Concentration, Transferrin Saturation and Serum Ferritin Levels Following Repeated Blood Donations in Calabar, Nigeria

**Background:** Soluble serum transferrin receptor (sTfR) is an index of erythropoietic activity. It is a useful test in diagnosing iron deficiency anaemia particularly when associated with chronic inflammation.

**Methods:** One hundred and eighty-four (184) subjects, aged 18 – 49 years were recruited for this study. Subjects were divided into 5 groups – a control group which had 35 (19.0%) subjects, a first-time blood donor group with 32 (17.4%) subjects, a second-time blood donor group with 35 (19.0%) subjects, a third-time donor group made up of 41 (22.3%) subjects, and a fourth-time donor group which had 41 (22.3%) subjects. Blood and sera were obtained from all the donors and tested for haemoglobin concentration (Hb), serum iron (SI), total iron binding capacity (TIBC), transferrin saturation (TS), serum ferritin level (SF) and serum transferrin receptor level (sTfR) to assess for iron stores using colorimetric and enzyme immunoassay methods.

**Results:** Among male blood donors, significant negative correlation was seen between sTfR and haemoglobin concentration (p < 0.05) and positively correlated with TIBC (p < 0.05). Transferrin saturation was negatively correlated with serum ferritin levels (p < 0.05). The association in all the measured parameters was strongly significant among male blood donors who had donated blood three or four times within a year (p < 0.01). However, 45.7% of the total blood donors were in the 18-25 year group and 47.3% were in 26-35 year group. Only a few (7.1%) were above 36 years old.

**Conclusion:** Our study suggests that the level of sTfR is a useful indicator of iron deficiency anaemia in blood donors. Therefore, assessing the sensitive sTfR assay alongside other test used as a criterion to recruit donors should be considered especially in those donating three and four times within a year.

The Distribution Pattern of Soil Transmitted Helminths in Children Under 5 Years of Age Attending AMREF Health Center in Kibera

**Background:** Soil transmitted helminths (STH) that affect the children include Ascaris lumbricoides, Trichuris trichiura, Necator americanas and Ancylostoma duodenale. Transmission is by ingestion of eggs passed in stool and lodged in soil. Exposure occurs when children play in contaminated soil and later eating food without proper hand-washing. Ironically, children below five years old are not included in an ongoing primary school deworming program in Kenya. The study aimed to find the distribution pattern of STH infections in children below 5 years, to determine the prevalence of each species and to compare helminth burden between species.

**Methods:** This was a descriptive cross-sectional study using data collected from AMREF Health Center, parasitology record book in Kibera slum. A total of 385 children below 5 years were recruited. Data was analyzed using SPSS version 20, the student t-test and chi square analysis.

**Results:** Out of 385 children, 55.1% (212) had STH infection. High prevalence was identified among age 25-36 months (31.1%) and low prevalence rate in children below 12 months (10.4%). A. lumbricoides was the most predominant, egg with prevalence of 37.7% (145). Hookworms had a prevalence of 21.6% (83) and T. trichiura 13.5% (52). Children below age 12 months had no cases of hookworm infection. T. trichiura was predominant among age 37-48 months (34.6%). Helminth burden in children below 2 years was 30.7% while burden in children above 2 years was 69.3%.

**Conclusion:** STH infections are high among pre-school age children in Kibera. The current mass deworming programs for controlling STH that is targeted towards school-going children should include children below 5 years because this population is equally at risk. The study findings should encourage the relevant authorities to in-cooperate deworming interventions in Kibera slums. This measure will reduce the prevalence of STH infections and thus minimize the children’s exposure to these infections.
Cytologic Outcome of Breast Masses in Patients Attending Fine Needle Aspiration Clinic at Moi Teaching and Referral Hospital, Kenya

Background: Despite the breast cancer awareness programs, many people do not attend breast cancer screening clinics early enough. Majority of them present when the breast cancer is at an advanced stage due to the high exposure to the risk factors such as alcohol, smoking, age and gender. This study aimed to determine the outcome of breast masses in patients attending fine needle aspiration clinic at Moi Teaching and Referral Hospital, in Eldoret, Kenya.

Methods: This was a cross sectional study. A total of 150 patients were be recruited by purposive sampling. Fine needle aspirates of their breast masses were obtained. Smears were made, fixed immediately in 95% ethanol for at least 15 minutes and stained by the Papanicolaou staining technique. The preparations were examined microscopically and reported by the attending pathologist. Secondary data was obtained from pathologists’ reports. Descriptive statistics of mean and mode based on age and gender were analysed using SPSS version 22 statistical software. The results were then presented in the form of charts and tables.

Results: The study found fibroadenoma to be the most prevalent cytologic finding. Fibroadenomas were most common findings (48.6%) among the 12-25 years age bracket but the percentage decreased with an increase in age. The least occurring findings (0.6%) were ductal papilloma, lipoma and normal breasts. In the 26-39 years age bracket, the most prevalent cytological finding was fibroadenoma (9.3%) followed by fibrocystic disease of the breast (6%). Fibrocystic disease of the breast was the second most seen condition in the 26-39 years age bracket.

Conclusion: A young age is associated with a reduced incidence of breast tumors however there is a marked rise in breast neoplasms with advancing age. Gynaecomastia is a rapidly rising finding in men probably due to environmental and hormonal factors.

Improving Anatomic Pathology Services in Sub-Saharan Africa to Support Cancer Care

Background: Accurate diagnosis is key to quality cancer care and to populating cancer registries. In most SSA countries, varying standards of pathology training and a scarcity of pathologists limit access to quality cancer diagnosis and impair the quality of cancer care and accuracy of cancer registry data. This research project focuses on determining the best approach to improve the ability of anatomic pathologists in ECSA to detect and diagnose cancer using standard approaches commonly used in the US and EU. The project establishes a partnership between ASAP, COPECSA, and AKUHN, three organizations integrally involved in improving cancer care in LMIC’s.

Methods: This project involves two 2.5-day workshops that include pathologists from seven institutions across ECSA and features two different approaches to training. Educational assessments were developed to measure knowledge gained through each approach. The project will assess which approach is most effective in changing practice patterns at ECSA institutions by comparing pre- and post- training results of an online survey tool designed to assess diagnostic capacity at each institution, and will validate the accuracy and effectiveness of the online survey tool by conducting site visits to each of the participating institutions.

Results: Results of individual and departmental assessments will be analyzed to determine which teaching approach is most effective to educate and train pathologists and senior residents in the ECSA region. A white paper on the findings will be written and distributed to stakeholders. A manuscript to an international peer-reviewed journal describing the methods and results of this research study will be submitted.

Conclusion: The research strategy will aim to determine which approach is most effective at improving the expertise of the pathology workforce in LMICs in ECSA, and share the lessons learned to contribute to future training efforts. This project will train up to 30 anatomic pathologists and senior residents in the ECSA region in current best practices for processing, diagnosing and reporting four common cancers. The training conducted at the workshops will result in a higher performing pathology workforce who will be able to assess and train other anatomical pathology laboratories within the region. The site visits will contribute to the improvement of anatomical pathology laboratories in the seven participating institutions.
Effect of Health Educational Intervention on the Knowledge and Uptake of Mammography among Females in Cross River State, Nigeria

Background: Breast cancer is the most common site-specific cancer in women and is the leading cause of death from cancer disease. Mammography is an effective preventive measure to detect breast diseases. The study was conducted to determine the effect of health educational intervention on the knowledge and uptake of mammography among females in Cross River State.

Methods: The study was a community-based interventional study conducted among 560 women aged 20 to 65 years in Akamkpa (study population) and Yakurr (control population) communities of Cross River State, Nigeria. The post-intervention phase was done 6 months after the health education to allow time for behaviour change. A multistage sampling method was used to select the study participants. Data was collected using an interviewer-administered questionnaire and analysed using SPSS version 20.

Results: The study showed that the overall mean age of respondents was 37.5 ± 10.1 years. Pre-intervention; 85 (30.4%) of women in the intervention group had heard about mammography compared with 278 (99.3%) post-intervention. Post-intervention 21 (7.5%) of the respondents in the intervention group did mammography compared with 4 (1.4%) pre-intervention. This was statistically significant (P-value < 0.0001). Post-intervention 196 (70%) of women in the intervention group did not do mammography because it was expensive unlike pre-intervention when 390 (69.6%) in both groups did not do it because they had not heard about it before. There was no difference in the control group between pre and post-intervention.

Conclusion: The health education intervention was effective in increasing awareness of women about breast cancer and early screening through mammography as well as increasing minimal uptake of mammography. Health education is critical thus Government and policy makers should institute breast cancer education programs for women to help change their behavior in relation to screening.

Trends and Patterns of Histologically Diagnosed Cancers at the University of Nigeria Teaching Hospital, Enugu, 2012 – 2015

Background: Cancer is a major health problem that is under-emphasized in Africa, partly because of the overwhelming burden of infectious diseases. We analyzed data from the cancer registry of the University of Nigeria Teaching Hospital (UNTH), Enugu to determine the trends and patterns of histologically diagnosed pre-cancer and cancer cases between January, 2012 and December, 2015.

Methods: We conducted secondary data analysis of cancer cases histologically or cytologically diagnosed and entered into the cancer registry of UNTH, Enugu between 2012 and 2015. We extracted demographic variables such as age and sex as well as cancer types, and organ sites affected. We categorized cases as either pre-cancer or cancer. Data were analyzed using Microsoft excel version 2007 software and presented as frequencies, proportions and ranks with respect to cancer type, gender and age.

Results: A total of 1,495 cancer specimens were histologically reviewed over the four year period with 1,479 (98.9%) cancer cases and 16 (1.1%) pre-cancer cases. All pre-cancer cases were among females and consisted of in-situ carcinomas of the breast. Of the cancer cases, females constituted 891 (60.2%) cases. Childhood cancers constituted 57 (3.6%) cases. The median age of cancer cases was 52 years (range: 1 - 95 years). The mean age of female cancer cases was 47.1 ± 15.7 years while the mean age of male cancer cases was 56.9 ± 20.1 years. Breast cancer was the most frequent histologically diagnosed cancer over the study period with 448 (30.3%) cases followed by prostate cancer with 237 (16.0%) cases, skin/soft tissue cancers 151 (10.2%) cases, cervical cancer 83 (5.6%) cases and lymphomas 67 (4.5%) cases.

Conclusion: Cancers of the breast, prostate, skin/soft tissue and cervix predominated as the commonly occurring cancers at UNTH, Enugu over the study period. Of these, only about one percent were diagnosed at the pre-cancer stage suggesting that late diagnosis is still a challenge to early detection and treatment of cancer cases.
**POSTER 300**

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The Identification of Differentially Expressed Proteins in Breast Cancer Subtypes from Kenya

**Background:** Breast cancer is the second most common cancer in women in Kenya constituting 20.9% of all cancers in females. Breast cancer is a heterogeneous disease with many molecular subtypes, each with distinct pathologic features and clinical behaviour. One of the key tools that physicians use for stratifying patients and determining optimal therapeutic strategies is the immunohistochemical detection of oestrogen receptor (ER), progesterone receptor (PR), and human epidermal growth factor receptor 2 (HER2) in tumours. Approximately 15-20% of breast cancer patients in the Western world have tumours that do not express ER, PR or HER2, and are referred to as “triple negative” breast cancer (TNBC).

The objective of this study therefore, was to determine proteins differentially expressed between breast cancer subtypes from Kenyan patients using the matrix-assisted laser desorption ionization time of flight (MALDI-TOF) platform.

**Methods:** Tissue microarrays of breast cancer tissue specimens were constructed and cancers subtyped by immunohistochemistry. The protein signatures for each breast cancer subtype were analysed on the MALDI-TOF platform, at the University of KwaZulu-Natal. The identification of proteins was carried out using nLC-MS/MS.

**Results:** There were twenty one differentially expressed proteins between TNBC and non-TNBC breast cancer subtypes. We were able to identify 7 of these proteins using nLC-MS/MS.

**Conclusion:** The proteins identified herein may be used to direct further research in understanding the molecular differences between breast cancer subtypes.

**POSTER 301**

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Point of Care Diagnosis of Cancer Using Tumor Markers; Lessons Learned from HIV Diagnosis

**Background:** Cancer supplanted HIV to become the third killer disease in Kenya after malaria and pneumonia in 2011 according to Ministry of Health cancer registry and National Bureau of Statistics Kenya whereby 80% of cancer cases are diagnosed in late stages. This paper tries to establish how point of care diagnosis of HIV has led to reduction in the deaths caused by HIV and how similar strategies can be applied in the timely diagnosis of cancer in Kenya by use of tumor markers point of care test devices.

**Methods:** Data available on HIV testing and deaths arising from AIDS up to 2013 in Kenya was analyzed and compared to available data on cancer over a similar period in Kenya.

**Results:** According to Kenya AIDS progress report 2014, the number of people tested for HIV annually increased from 3,471,000 in 2009 to 6,364,000 in 2013. AIDS related deaths declined from 85,000 in 2009 to 58,000 in 2013. Cancer deaths in Kenya according to Nairobi cancer registry increased from 11,995 in 2010 to 13,720 in 2013 whereby four in five cases were diagnosed in late stages. In Kenya, 33 per 100,000 people died of cancer in 2014 up from 31 per 100,000 people in 2010 according to a study by institute of economic affairs. This figure is estimated to rise to 64 per 100,000 people by 2026. Cancer causes 7% of all deaths in Kenya according to WHO NCD country profiles 2014.

**Conclusion:** Point of care diagnosis of cancer using tumor markers should be adopted at the lowest level of health care provision for early diagnosis and prompt start of treatment as evidenced in HIV. Academic and industry laboratories should work towards producing point of care diagnostic devices based on tumor markers for all types of cancer with high sensitivity and specificity.
**POSTER 302**

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**Are Point of Care Testing Sites Producing Reliable CD4 Results? Findings From NHLS CD4 Proficiency Testing Scheme/External Quality Assessment Programme**

**Background:** The availability of a CD4 count platform at a site of care could expedite antiretroviral treatment initiation and improve patient management considerably. Point of Care Testing (POCT) has become an acceptable diagnostic tool and represents a paradigm shift from traditional laboratory practice. A proficiency testing scheme (PTS) has an important role in the quality assurance (QA) measures of POCT sites as participation demonstrates a commitment to quality, allows the user to monitor their own QA procedures, identify and remedy any problems with internal processes. The objective was to assess the performance of the POCT sites using the PIMA™ analyser in comparison with the NHLS CD4 Proficiency Testing Scheme (PTS) global pooled results based on the submission of CD4 results.

**Methods:** CD4 absolute counts data was analysed for the trimmed mean %CV from April 2011 - December 2015. Participating sites enumerated stabilised CD4 control material at a normal value range (550-691 cells/µl) and low value range (109-160 cells/µl). Information given to participants on registration ranged from handling samples up until interpretation of results.

**Results:** The trimmed mean %CV of PIMA™ analyser results were 9.8 % (range 4.3-17.1%) (n= 846) for normal value range and 22.0% (range 7.4-38.5%) (n= 760) for low value range material.

The trimmed mean %CV of global pooled results were 10.1 % (range 7.9-12.2%) (n= 13402) for normal value range and 14.0% (range 7.9-12.2%) (n= 12461) for low value range material.

**Conclusion:** The overall performance of the POCT PIMA™ analyser, on the NHLS CD4 PTS, demonstrates over time reliable CD4 results. The analyser performs within acceptable limits with less precision at the lower range. These sites have the ability to provide clinicians with reliable, timely and clinically relevant results exhibiting a commitment to quality.

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**POSTER 303**

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**Hematological Manifestation in HIV Infected Children**

**Background:** Hematological abnormalities are common in HIV infected children. Of these abnormalities, peripheral cytopenias and bone marrow abnormalities are common. Anemia is the most common hematologic manifestation. Other hematological findings include neutropenia, thrombocytopenia and coagulation abnormalities. Several mechanisms have been postulated in the pathophysiology of these abnormalities. Both impaired production of blood cells (defective hematopoiesis) due to direct infection of the progenitor cell or through cytokine mediated and autoantibody-mediated increased peripheral destruction may occur. The aim of this study was to determine the common hematological manifestations of HIV infected children.

**Methods:** This was a cross sectional study involving 60 HIV infected children referred to the HIV Clinic of Korle Bu Teaching Hospital over a period of 6 months in 2015 underwent a baseline hematological analysis. All patients underwent a thorough clinical examination, CD4 count, opportunistic infections and their association with various hematological manifestations were studied. The data were analyzed by Chi square test and by Anova-1 test using ANALYSE-IT software (version 1.7).

**Results:** 48 patients (80%) had elevated ESR, 36 patients (60%) had anemia, 18 patients (30%) had leucocytosis, 15 patients (25%) had lymphopenia, 6 patients (10%) had thrombocytopenia and 3 patient (5%) had leukopenia with neutropenia. Patients with lymphopenia had a mean age of 5.7 + 2.4 years Vs 3.6 + 1.1 years which was statistically significant (p = 0.01) whereas patients with thrombocytopenia had a mean age of 5.4 + 3.1 years Vs 4.0 + 1.2 years (p = 0.03) and patients with elevated ESR had a mean age of 3.8 + 1.2 years Vs 6.5 + 3.0 years (p = 0.03). All patients with anemia had microcytic hypochromic anemia. There was no correlation with lymphopenia and decrease in CD4 count (p=0.71) or CD4 percent (p=0.34).

**Conclusion:** Hematological problems in HIV infected children are common. Elevated ESR and anemia are the commonest features. Elevated ESR may be used as a marker to screen a child for HIV infection. Microcytic hypochromic anemia is the commonest type of anemia seen.
Applying the ITSDM Model to District Hospitals in the Gauteng Province

Background: Gauteng province has 11 district hospitals with bed-numbers ranging from 126 to 414 serving a population of ~10 million people, but plans to establish new hospitals, e.g. Bronkhorstspruit. The aim of this study was to review the standards defined in the district hospital package with a view to developing a tiered laboratory service model for new and existing district hospitals to improve access to pathology services.

Methods: Hospital test volumes were extracted from August - October 2015. Tests were grouped into logical test groups including FBC, U&E, LFT and INR/PTT. A scatter plot of bed-size and the mean daily volumes for the FBC and U&E test groups was used to develop criteria for a tiered district service.

Results: Daily FBC volumes ranged from 8-114. The U&E and LFT volumes ranged from 13-121 and 6-58 per day respectively. Daily CRP test volumes of up to 59 were noted. The daily volumes for the glucose, troponinT, malaria, PI/PTT, D-dimer, CK and procalcitonin tests were <=10 across all hospitals. The scatter plot of mean daily volumes for FBC and U&E (11-118 tests p/day) and bed size (126-414) was used to classify hospitals, i.e. tier-1/small hospitals (<=150 beds and <=25 tests p/day) utilising a depot (with/without limited repertoire), tier-2/medium hospitals (150-300 beds and 26-50 tests p/day) utilising a depot (with/without limited repertoire), tier-3/large hospitals (up to 414 beds) requiring full district repertoire. Where high-care services are offered, basic on-site laboratory services are not negotiable.

Conclusion: Tiered laboratory services at district hospitals can provide appropriate laboratory service access. Lower throughput platforms could be used to facilitate rapid implementation and meet local stipulated clinical needs. A proof of concept (POC) site is required to establish cost-efficiency. Innovative human resources strategies are required to man tier-1 and tier-2 sites.

Assessement of Quality for Laboratories in Senegal

Background: The Direction of Laboratories set in motion an assessment of the level of quality offered by Medical Laboratories in the country, in view of an accompaniment to the gait quality.

Methods: Assessors used the WHO‘ SLIPTA tool of assessment elaborated according to ISO 15189: 2007. According to the quotation of the grid the number of stars assigned is function of the total note gotten by the laboratory.

On sites data are collected during a cross-examination during which the proofs are brought and the different sections of the grid filled. At the end, an assessment report is elaborated and put back to every laboratory in order to correct the gaps.

Results: The survey led from January to May 2014. It concerned 13 private laboratories on 127 distributed in the 14 regions of the country. Among them 69 laboratories belonged to public sanitary structures of peripheral level. Scores varied from 29 to 187 points corresponding to 0 to 2 stars.

Results’ analysis revealed that the level of quality varies from a laboratory to another. Laboratories were more effective to the sections 5, 7 and 9 of the grid. The sections 2, 6, 11 represented the domains for which the laboratories were less effective.

Conclusion: This assessment succeeded to an accompaniment of 20 laboratories to the gait quality. They have been chosen according defined criteria of selection. The laboratories will be able to choose accreditation according to ISO 15189. Those that have not been selected will be pushed nevertheless in the goal of an improvement of the quality of their services for a better harmonization.
**Hematological Reference Ranges for Healthy Adults in Cameroon**

**Background:** Haematological reference ranges are essential for interpretation of data for diagnostic orientation, treatment decision and research studies. There has been the use of different reference ranges from manufacturers’ kits and text books in clinical Laboratories in Cameroon. These values might affect the clinical decision of the patients since these ranges were not established from this population. The aim of this study was to determine the mean values, medians and 95th percentile for haematological reference ranges of healthy adults in Cameroon.

**Methods:** This was a retrospective study. Secondary data for Complete Blood Count (CBC) collected during the method verification process of Mindray BC 2800 at Bamenda Regional Hospital Laboratory was explored. The CBC data of healthy voluntary blood donors aged 17 to 60 years, negative for: HIV, HBsAg, HCV, syphilis and without Hemoglobin abnormalities in Hemoglobin-Electrophoresis were included in the study. Precision and accuracy of the machine were assured by running internal quality control daily and external quality control every two weeks. The 95th percentile for haemalotogical parameters was determined using 2.5-97.5 percentile. The Mann–Whitney U-test was used to compare the distribution of haematological parameters between gender.

**Results:** The data for 150 healthy voluntary blood donors were analyzed. The mean Erythrocyte (RBC) count, Hemoglobin level and Haematocrit were higher in males than in females: (5.2X10^12/ul versus 4.6X10^12/ul, p=0.000), (14.9g/dl versus 12.9 g/dl, p=0.000) and (44.1% versus 39.1%, p=0.000) respectively. The mean Leukocyte (WBC) count and Platelet count were lower in males than in females: (5.8X 10^9/ul versus 6.6X10^9/ul, p=0.000) and (205X10^3/ul versus 229X10^3/ul, p=0.028) respectively.

**Conclusion:** We propose that the present hematological reference ranges should be further evaluated and used for clinical management of patients and interpretation of laboratory data for research purpose in Cameroon.

**The Effect of Participation in a Regional CD4 Split-sample Proficiency Testing on CD4 Test Results at Health Laboratories in Western Kenya, 2014–2015**

**Background:** It is crucial that reliable CD4 count results are generated by testing laboratories. There is no data on the quality of CD4 tests in field laboratories in Kenya. We evaluated the influence of participation in a sample split-test proficiency testing QA program on accuracy of CD4 results produced by laboratories in Western Kenya.

**Methods:** A longitudinal survey was conducted at participating health facilities in Western Kenya, on a bi-monthly basis between February 2014 and February 2015. Each field laboratory provided five randomly selected samples and the corresponding field CD4 results’ at every cycle. The model entailed splitting a sample into two, testing one at the field laboratory and the other at the reference laboratory. Accuracy of CD4 test results generated by field laboratories at the beginning and the end of the participation in the PT program was assessed using bias, LOA (Limit of Agreement) and upward misclassification probability for CD4 cut-off of 350cells/ul.

**Results:** A total of 35 laboratories submitted 945 samples during the survey. A decrease in the bias [-2.5 (95% CI -22.2; 17.1) to -1.5 (95% CI -27.1; 24.2)], LOA [(-196.9; 191.8) to (-161.0; 158.1)] and upward misclassification probability for CD4 cut-off of 350cells/ul (27% to 17 %) was observed from the beginning to end of the participation cycles.

Similarly, the correlation of field laboratories CD4 results to that of reference laboratories increased from 93% to 94% and there was an increment in coefficient of determination (R2) from 86% to 88% and the beginning and end of CD4 EQA program respectively.

**Conclusion:** Participating in CD4 EQA programs decreased the variability of test results between the field and reference laboratories and should be done regularly and continuously.
POSTER 308

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Evaluation of the Beckman Coulter Access Total Vitamin D Assay on the Beckman Coulter DXI 600 Analyser

Background: Apart from its role in bone health numerous recent studies have demonstrated the significance of Vitamin D in various aspects of health ranging from cardiovascular disease to autoimmune conditions. This has led to an exponential increase in 25 OH Vitamin D requests. Whilst chromatographic based assays remain the preferred method of analysis, high throughput automated Vitamin D assays are being considered in order to handle increased tests requests. The aim of our study was to evaluate the newly introduced Beckman Coulter Access Total Vitamin D assay (a two step competitive binding immunoenzymatic assay) and compare the assay to our in-house LC-MS/MS method employed in our laboratory.

Methods: Linearity was assessed: using CLSI EP6 protocol Calibrators ranging from the zero calibrator to the highest calibrator were run in duplicate as patient specimens Limit of blank, limit of detection, limit of quantitation were assessed. Precision analysis: EP15 protocol. Method comparison 45 serum samples, across the analytical reporting range, were run on the ABSciex QTrap 4000 tandem mass spectrometer with Agilent 1260 HPLC system and the Beckman Coulter Dxix600. Deming regression, medical decision limits and Bland altman plots were utilized for analysis. Statistical analyses was performed on the EP evaluator software (Data Innovations Rhoads).

Results: Method comparison: Deming regression: R^2 = 0.93, medical decision limits were within 95% confidence limits with no significant bias between reference method (LC-MS/MS) and Beckman assay. Ep 15 evaluation showed acceptable performance for total imprecision with CV% at levels within manufacturer’s claims. Linearity was confirmed to 217.8 nmol/L. The lower limit of detection and upper limit of linearity did not match manufacturer’s claims on our assessment

Conclusion: Beckman Coulter Access Total Vitamin D assay results are comparable to that obtained on the LC-MS/MS method employed in our laboratory.

POSTER 309

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Performance Evaluation of CD4 Count Using the International External Quality Assessment Scheme (IEQAS) in Ethiopia

Background: The national HIV prevalence among adults is 1.23% with estimated 775,000 people living with HIV. The number of patients currently on ART is 381,196. In HIV infection, the CD4 T-cell count is the most commonly utilized laboratory measure for clinical prognosis, therapeutic monitoring, and entry criteria for clinical trials. The ART monitoring guideline in Ethiopia is recently revised. The current guideline recommends viral load testing for all patients after six months of initiation of ART and annually then after. CD4 testing is still recommended for initiation of treatment and biannually for monitoring.

Methods: Reviewing the performance report (feedback) of IEQAS participation on Lymphocyte Immunophenotyping (QASI432) of 2015 and group discussion with stakeholders.

Results: From the total of 160 health facilities participated on QASI432 program, 147 were from Government and 13 from private health facilities. The total response rate showed, 49(30.6%), 90 (56.3%) and 80(50%) of health facilities were submitted their result in test events of one, two and three of 2015 respectively.

From the total health facilities which submitted their results to the provider through test events of 2015, 31(63.8%), 65 (72.2%) and 45 (56.2%) were got Event Performance satisfactory in test events of one, two and three of 2015 respectively.

65 health facilities scored Event performance satisfactory at least two out of the last three events, called Laboratory performance is Successful. The rest 95 health facilities were scored Event performance unsatisfactory.

Delayed custom clearance, problems in sample transportation, unavailability of internet services in some facilities, skill gap on online result submission, feedback access and feedback result interpretation were identified challenges during focused group discussion.

Conclusion: Based on our assessment the average response rate was low but the trend showed that response rate was increased in event two and three of 2015. Event performance score indicated that the overall laboratories performance is unsuccessful. In order to increase the response rate and success rate, EPHI has to work hard in collaboration with custom clearance office, Ethiopian Postal Services Enterprises, Regional Reference Laboratories and implementing partners to support the participating health facilities for effective utilization of the program for continual improvements.
POSTER 310

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Background: In Zambia, Antiretroviral therapy/ART for HIV infected people was expanding and ART required tests consisted of Complete Blood Count (especially Hemoglobin), CD4 count and Chemistry tests (especially ALT and Creatinine) were conducted. Among three types of tests, CD4 count was HIV specified, however CBC and Chemistry tests were cross-disease and could be used for NCD required tests. With the expansion of testing services into district level, implementation of those became difficult. Factors inducing those difficulties were investigated through the performances of testing implementation and Internal Quality Control/IQC.

Methods: Descriptive method was used by checking the number of month in which tests of CBC, CD4, ALT, Creatinine were done by using conventional analyzers and the results of monthly IQC implementation for those tests in four laboratories in four districts from Jan 2012 to Aug 2014 in Zambia. Then Monthly average rates (%) of testing availability and IQC implementation for those tests were calculated. Also the problem records were checked.

Results: Monthly average rate (%) of testing availability by conventional analyzers for CBC, CD4, ALT, and Creatinine in the four laboratories for 32 months was 94 (120/128 months), 100 (128/128 months), 73 (94/128 months) and 73 (94/128 months) respectively.

Monthly average rate (%) of IQC implementation for those tests in the four laboratories for 32 months was 47, 73, 65 and 70 respectively. Both rates on the CD4 count were better than those of CBC and Chemistry tests.

Conclusion: Electricity supply, logistics including procurement of controls, reagents and spare parts, competency depending on knowledge, willingness and attitude of staff toward IQC affected both performances. Resource optimization by the usage of existing HIV required tests was important through prioritization under the strong leadership of Ministry of Health with the cooperation of international organizations and new technologies for improving diagnostic capacity for NCDs.

POSTER 311

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Thrombotic Profiles of Patients Undergoing Kidney Biopsies

Background: Impaired renal function is a frequent condition and cardio-vascular disease is common in these patients. It is also a complex clinical entity and involves hormonal, metabolic and haemostatic changes. The haemostatic changes are however not elucidated yet. Kidney biopsies are associated with bleeding complications and to investigate primary and secondary haemostasis could be usefull in predicting the risk of bleeding. It is also necessary to understand the hypercoagulable state in patients scheduled for renal biopsies. The aim of this study was to investigate the hypercoagulable state associated with kidney dysfunction by determining TEG profiles as well as plasma VWF and ADAMTS13 levels and to investigate the effect of renal impairment on platelet function by measuring platelet sensitivities.

Methods: Citrate plasma was received from 100 patients scheduled for renal biopsies. Thrombo-elastography and platelet sensitivities using the PFA-100 platelet function analyser was performed on whole blood, while plasma was frozen for measuring Von Willebrand factor and ADAMTS13 levels.

Results: Sixty percent of patients showed hypercoagulability on TEG profiles. Five percent showed secondary fibrinolysis, while 35% had normal TEG profiles. Platelet function was impaired in 55% of patients while aspirin was the cause of 30% of them. The VWF levels were increased with a mean and standard deviation of 260±129%. ADAMTS13 levels on the other hand were slightly decreased with a mean and standard deviation of 44±16%. A slight inverse relationship existed between the VWF and ADAMTS13 levels.

Conclusion: There is no doubt that VWF do play an important role in the hypercoagulable state of patients with renal impairment and ADAMTS13 and VWF levels are useful indicators of thrombosis in these patients. The reduced platelet function in these patients is mostly due to aspirin-intake. Furthermore, thrombo-elastography may aid in the thrombosis risk stratification and determining the subsequent need for anti-coagulant prophylaxis in patients with renal impairment.
POSTER 312

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Evaluation of the International Council for Standardisation in Haematology Recommendations for Schistocyte Quantitation at Charlotte Maxeke Johannesburg Academic Hospital

Background: Schistocytes are red blood cell fragments. The presence of ≥1% schistocytes on peripheral blood smears (PBS) is an important criterion for the diagnosis of a thrombotic microangiopathy (TMA). The reporting of schistocytes has been standardised by the International Council for Standardisation in Haematology (ICSH). Despite the availability of guidelines, the assessment of schistocytes remains subjective. More recently, measurement of the automated fragmented red cell (FRC) parameter has been evaluated. However, local studies are not readily available.

Methods: We performed a prospective review of the PBS referred for microscopy at the National Health Laboratory Service, Charlotte Maxeke Johannesburg Academic Hospital Complex. Over a four month period, 120 PBS with schistocytes were identified which represented 1.1% of the referred PBS. The schistocyte percentage was evaluated by microscopic observation by two competent morphologists according to the ICSH recommendations and by the ADVIA (2)120 haematology analysers (Siemens Healthcare Diagnostics, NY, USA).

Results: The correlation co-efficient between the two morphologists was 0.63 (CI; 0.52-0.75). Schistocytes were ≥1% in all PBS with TMA (n=74) with a mean of 3.47 ± 1.84. The mean schistocyte percentages of PBS with sepsis (n=13), chronic renal failure (n=5), haematological malignancies (n=10), mechanical heart valves (n=2), haemoglobinopathies (n=4) and in neonates (preterm, n=6 and term, n=4) were 0.84±0.76%, 1.71±0.85%, 0.70±0.41%, 0.43±0.32%, 1.52±0.51% and 1.78±0.9% respectively. The correlation co-efficient for the automated FRC percentage was -1.97 (CI; -2.3 to -1.60). The ADVIA (2)120 underestimated the schistocyte count above a threshold of 1.5%.

Conclusion: Schistocytes were ≥1% in all PBS with TMA. Schistocytes of ≥1% were also observed in other conditions. Observer bias may be decreased by implementing the ICSH recommendations for microscopic identification of schistocytes. The automated FRC, however, requires confirmation by microscopic examination of the PBS.

POSTER 313

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A 5 Year Review of External Quality Assurance Experience at a University Hospital in South Africa

Background: Laboratories at the National Health Laboratory Service (NHLS) participate in the resident external quality assurance (EQA) program. EQA is a system of objectively checking laboratory results by an external agency which supports quality improvement. The laboratory responds to unacceptable EQA results by conducting an investigation into the root cause of the testing error, correcting the procedure that produced the error and implementing preventive measures. In this way EQA provides an opportunity for the continuous improvement of laboratory services.

Methods: We retrospectively reviewed the EQA results of 11 haematology tests in 60 events between 2011 and 2015 at the Charlotte Maxeke Johannesburg Academic Hospital. Tests included the full blood count (FBC), morphologic assessment of the peripheral blood smear, manual and automated prothrombin time (PT) and partial thromboplastin time (PTT). The FBC was measured using the laboratory’s two ADVIA (2)120 haematology analysers (Siemens Diagnostics, USA). The automated PT and PTT were measured using the laboratory’s two STA-R evolution coagulation analysers (Diagnostica Stago, France). Satisfactory performance was defined as achieving an overall testing score of at least 80%.

Results: Over a five year period, all tests, with the exception of the mean cell volume achieved a testing score of at least 80%. The automated PT, PTT and morphologic assessment achieved scores of 100%. There were 86, 2.7% unacceptable results. There was no significant difference in the EQA performance between the years. Reasons included clerical errors (n=10, 0.31%), procedural errors (n=32, 1.00%), analytical errors (n=34, 1.06%) and no explanation after investigation (n=11, 0.30%). The EQA performance showed an improvement in these parameters following implementation of preventative measures such as staff retraining, instrument inspections, quality control review and calibration review.

Conclusion: Unacceptable EQA results in conjunction with internal quality control monitoring help the laboratory to improve its day to day performance and patient safety.
**Prevalence of Hepatitis B Virus infection among blood donors at the Yaounde Military Hospital, Cameroon.**

**Background:** Blood transfusion can provide life-saving therapeutic benefits to patients. However, many infectious agents including Hepatitis B virus (HBV) can be acquired from infected, transfused blood. HBV infection is a serious public health problem facing the world today. The aim of this study was to determine the seroprevalence of Hepatitis B virus infection among voluntary blood donors at the Yaounde Military Hospital, Cameroon.

**Methods:** A cross-sectional study was conducted on blood donors from August 2013 to August 2014, to assess the prevalence of HBV infection. A total of 313 study subjects were recruited and tested for Hepatitis B surface antigen (HBsAg) using the rapid chromatographic immunoassay and Enzyme Linked Immunosorbent Assay.

**Results:** Of the 313 blood samples tested, 277 were negative and 35 were positive for HBsAg; giving an overall hepatitis B prevalence of 11.2 %. The blood donors were comprised of 275 males and 38 females.

**Conclusion:** The prevalence of HBV infection could be high among voluntary blood donors in Cameroon; hence it demands more vigilance in routine screening of donated blood prior to transfusion.

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**Verification of the BD FACSPresto™ Machine for Haemoglobin and CD4 Cell Counts**

**Background:** Haemoglobin levels and CD4 cell count are important prognostic markers in HIV infection. Decline of the two is often associated with disease progression hence the need for accurate and reliable monitoring of these markers. Previously, the FACSCalibur machine and haematology analysers have been used to monitor CD4 count and haemoglobin respectively in patients. However, the entry of the FACSPresto™ machine in Kenya as a Point of care testing device (POCT) needs to be verified for use in clinical set up. This device will help in reducing the turn around time and its versatile nature would allow it to perform the two assays concurrently. The objective of this study was to compare the BD FACS Presto machine with the reference equipment for CD4 enumeration and haemoglobin analyzer.

**Methods:** Capillary and venous blood was collected from 103 HIV positive patients attending Mbagathi Hospital. Absolute CD4 counts, percentage of CD4 positive cells in the lymphocyte population and haemoglobin concentrations were enumerated using FACSPresto™ (BD Biosciences, CA, US) and data compared with measurements obtained using FACSCalibur (BD Biosciences, CA, US) for CD4 and Mindray Haematology Analyser (Mindray Medical Espana, Spain) for haemoglobin levels. Bland Altman plots were used to evaluate the difference between the test and reference equipment.

**Results:** Absolute and percentage CD4 readings from reference and test equipment had 0.97 and 0.82 (p<0.001) correlation respectively. Using venous blood, haemoglobin results from reference and test equipment had a correlation of 0.94 (p<0.001). In addition, haemoglobin results from venous and capillary blood on the BD FACSPresto™ had a correlation of 0.97 (p<0.001).

**Conclusion:** Results obtained from the BD FACSPresto™ machine were comparable to FACSCalibur and Mindray Hematology analyzer reference equipment. Moreover the BD FACSPresto™ machine can utilize both venous and capillary blood thus it can be used as a point of care device.
Expanding Newborn Screening Programs in Africa: Current Initiatives and Future Directions

**Background:** There is recognition of the importance of newborn screening (NBS) as a public health program in the US and worldwide. Each year thousands of newborns with severe genetic and congenital conditions are identified in the US from state NBS programs. With about 97% of the world’s newborns born outside the US and Canada, there is a lot to be learned from interactions between NBS systems around the globe.

Sickle cell disease (SCD) affects about 100 million people worldwide, and 5% of the world’s population are carriers. Over 250,000 infants are born yearly with SCD in Africa of which 60% will die as infants according to World Health Organization. Africa has the highest prevalence of sickle trait in the world with prevalence in Ghana and Nigeria estimated between 15-40%. Despite the high prevalence of sickle cell disease in Africa, a neonatal screening programme is available in only a few countries in the sub-Saharan region.

**Methods:** Since the early 1990’s, countries in Sub Saharan Africa have been working on small pilot initiatives to evaluate the feasibility of systematic neonatal screening for sickle cell disease in the region. Over the years, the number of countries with pilot initiatives for newborn screening has increased through collaborative efforts and engagement of Ministries of Health officials. The collaborations have led to the development of several newborn screening systems which includes laboratory testing, follow up, management, treatment, education and policy related activities in several countries in Africa.

**Results:** NBS initiatives in different countries in Africa over the years have led to earlier detection, management and treatment of sickle cell diseases, reducing the burden of this condition in thousands of babies across Africa. Newborn screening for sickle cell diseases in Africa has also lead to the increase in laboratory technological capabilities and systems.

**Conclusion:** We are currently working with Ministries of Health in several African countries to expand NBS programs and maximize the coverage of screened worldwide. Some African countries have expressed a desire to utilize NBS to improve the delivery of genetic health services. The goal of these NBS initiatives is to reduce morbidity and mortality related to NBS conditions, using sickle cell disease as a model. This session will highlight the NBS in Ghana, Uganda, Nigeria and Liberia from four distinguished presenters.
Effect of Helminth and Malaria Co-infections among Afebrile and Febrile Children on Cytokine Profile in Ibadan, Southwest Nigeria

**Background:** Intestinal helminths and malaria are among the most prevalent infectious diseases in the tropics. The effect of coinfections on immune response is not clearly understood. We therefore investigated the immune response profile in children with and without symptoms.

**Methods:** A total of 78 afebrile school children (20 helminth-malaria co-infected, 17 helminth infected, 19 malaria infected and 22 uninfected) and 75 febrile children (14 helminth-malaria co-infected, 16 helminth infected, 20 malaria infected and 25 uninfected) were recruited into the study. Helminths were screened using Kato Katz method while malaria parasite screening was done using Giemsa-stained thick blood films. Circulating TNF-β, IFN-β, IL-1, IL-10 and IL-6 concentrations were assessed by ELISA from serum samples. Data were analysed using analysis of variance.

**Results:** Among the afebrile school children, IL-10 was significantly increased in helminth infected children compared with helminth-malaria co-infected, malaria infected and uninfected groups (p<0.05). IFN-β was significantly elevated in malaria and malaria-helminth coinfection relative to helminth alone (p<0.05). IL-1 level was significantly higher in single infection of helminth and malaria relative to coinfection and the uninfected groups (p<0.05). An insignificant difference was observed for IL-6 and TNF-β concentrations across all the four groups while among febrile children, IL-6 was significantly increased among helminth alone and helminth-malaria coinfection relative to malaria infected group (p<0.05). IL-10 was significantly elevated in co-infected group compared with helminth or malaria infected group while TNF-β was significantly increased in helminth and helminth-malaria coinfection compared with uninfected or malaria infected group (p<0.05). IFN-β level was insignificant in the infection groups relative to uninfected group (p>0.05). IL-1 level similar across the groups.

**Conclusion:** Helminth infection seem to upregulate Th2 immune response among children with symptomatic uncomplicated malaria while there was no significant changes in Th immune response among afebrile children.


**Background:** Early detection and treatment for syphilis is critical in preventing severe long-term complications. In South Africa, annual National Antenatal Sentinel HIV & Syphilis Prevalence Surveys (ANSUR), showed a significant decrease in syphilis prevalence between 1997 and 2011. This annual survey is considered an indicator of syphilis prevalence among the South African population. In contrast, the prevalence among high-risk populations, including patients presenting with sexually transmitted infections (STIs) at primary health clinics (PHCs), may paint a different picture.

**Methods:** Laboratory-based STI surveillance was undertaken in the 9 South African provinces at different time periods between 2006-2014. Patients presenting with male urethritis syndrome (MUS), VDS vaginal discharge syndrome (VDS), or genital ulcer syndrome (GUS) were recruited. Anonymous genital and blood samples were collected from consenting patients, who were treated in accordance with national STI syndromic management guidelines. The aetiologies of three main syndromes (GUD, VDS and MUS) were determined. Serological evidence of syphilis was assessed by the OmegaRPR test and HIV serostatus by the Abbott Determine test. Serological evidence of active syphilis was defined as an RPR ≥1:4.

**Results:** A total of 3580 STI patients (1317 MUS, 1564 VDS and 671 GUS) attending PHCs were recruited between 2006-2014. Syphilis seroprevalence was 1.1% - 8.9% among MUS, 1.1% - 12% among VDS and 3.5% - 15% among GUS patients over the total period of surveillance. Active syphilis ranged from 0%-15.0% across all the STI syndromes, with the highest prevalence in patients with GUS. HIV seroprevalence was higher in females (37.4% - 55.1%) compared to males (14.9% - 43.4%) and was highest in patients presenting with GUS (29.0% - 83.3%) compared to other syndromes.

**Conclusion:** Overall, syphilis seroprevalence among STI patients attending PHCs in South Africa was much higher than among antenatal clinic attendees during the same period. The ANSUR study may not truly reflect syphilis prevalence in key population groups such as STI patients, sex workers and men who have sex with men. Strengthening of current surveillance systems for syphilis is critical for tracking and monitoring the disease burden in high risk South Africans.
**POSTER 320**

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**Séroprévalence de la Toxoplasmose et Facteurs de Risque Associés Chez les Femmes Enceintes au District de Santé de Cité Verte**

**Background:** La toxoplasmose est une zoonose due au protozoo Toxoplasma gondii. Bénigne chez les immunocompétents, cette infection peut paraître fatale chez les immunodéprimés et surtout au cours de la grossesse avec des malformations congénitales et avortements indésirés. On note de nos jours une recrudescence de cette infection avec pour tropisme particulier les régions chaudes tropicales comme le Cameroun. La prévalence varie essentiellement en fonction de l’exposition aux facteurs de risque. L’objectif ici était d’évaluer la séroprévalence et les déterminants de la toxoplasmose chez les femmes enceintes suivies à la cité verte.

**Methods:** Une étude transversale, prospective a été menée de janvier à février 2016 à la cité verte ou Toxoplasma Immunocomb IgM et IgG étaient réalisés simultanément chez chaque participante après obtention d’autorisation du chef de district et consentement éclairé. Seuil de signification 5%.

**Results:** L’âge moyen de la population était 27,2 ±1,8 [IQR:17;45] ans. La séroprévalence de la toxoplasmose chez les 34 participantes était de 32,4% avec 14,7% (5/34) IgM et 23,5% (8/34) positifs. Les parturientes âgées de [17-27] ans étaient les plus représentées dans la population générale 47,05% (16/34) et étaient les plus affectées, 50% (8/16). L’âge gestationnel plus affecté: premier trimestre 40%(6/15) et troisième trimestre 40% (2/5), 65,55% (5/9) de gestantes affectées possédaient un chat domestique contre 24% (6/25) d’affectés sans chat (p non significatif). L’hygiène alimentaire a été incriminée chez la quasi-totalité des femmes infectées et 76,5% de participantes (26/34) ignoraient l’existence de cette maladie.

**Conclusion:** La prévalence de la toxo reste élevée dans cette étude et lié essentiellement à la jeunesse des parturientes, à l’âge gestationnel, la promiscuité avec le chat, l’hygiène alimentaire et les connaissances sur la maladie. Il devient donc urgent d’intensifier les stratégies d’IEC sur les facteurs de risque et rendre l’examen financièrement accessible à tous.

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**POSTER 321**

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**Hemostatic Profile and Associated Factors of Hemostatic Abnormality in Human Immunodeficiency Virus Infected Adults Attending Jimma University Specialized Hospital, South-West Ethiopia: A Case-Control Study**

**Background:** Human immunodeficiency virus infection has been proposed to inflict an insult on hemostatic system which involves endothelium, platelet and coagulation proteins. Information regarding hemostatic profile in human immunodeficiency virus infected patients is limited and contradicting too.

**Methods:** A case control study was conducted from April to May 2014 in Jimma University specialized hospital, involving 96 HIV infected patients and 96 healthy controls that came consecutively to comprehensive chronic care center and voluntary counselling and testing (VCT) center respectively. Socio demographic and clinical data were obtained using structured questionnaire. For the purpose of hemostasis tests, 2.7ml of venous blood sample was collected in a 3ml citrated (3.2%) vacuum tube. Platelet count and CD4 count was determined from a 3ml EDTA sample. Mixing study was undertaken for prolonged coagulation tests. Data were analyzed using SPSS, version 20.

**Results:** The mean value of prothrombin time (PT), international normalized ratio(INR), activated partial thromboplastin time(APTT) and fibrinogen level was significantly higher in case group than control (p<0.001, 0.01, <0.001 and <0.001) while mean platelet count was significantly lower in case group (p<0.0001). Mixing study showed correction of 35(87.5%) of 40 prolonged PT both in immediate and delayed test while 58(95.1%) of 60 prolonged activated APTT fail to correct in both situations. A CD4 count of less than 200cells/mm3 (AOR=3.4, 95% CI (1.2-10.1)) use were significantly associated with prolonged PT while a CD4 count of less than 200cells/mm3 (AOR=8.8, 95% CI (1.8-42.4)) and HAART (AOR=3.4, 95%CI (1.2-10.1)) use were significantly associated with prolonged APTT.

**Conclusion:** There was a significant mean difference between case and control groups with respect to PT, APTT, platelet count and fibrinogen level. Direction of the finding points towards presence of inhibitors and factor deficiency which demands in depth investigation and corresponding intervention.
Impact and Strategies for Sickle Cell Screening after the Uganda Sickle Surveillance Study

Background: Sickle cell trait (SCT) and sickle cell disease (SCD) are prevalent in sub-Saharan Africa. SCD contributes to under-5 childhood mortality due to lack of early and accurate diagnosis. A partnership between the Uganda Ministry of Health (MOH), Makerere University, and Cincinnati Children’s Hospital led to the Uganda Sickle Surveillance Study (US3), documenting the current prevalence and distribution of SCT and SCD across the country. Following US3, targeted sickle cell screening in high-burden districts was implemented to confirm the results, improve the sickle cell laboratory capacity, and develop a national sickle cell strategy.

Methods: A specialized sickle cell laboratory was established at the Central Public Health Laboratories (CPHL); local personnel were trained to analyze dried blood spots by hemoglobin electrophoresis by isoelectric focusing. A comprehensive sickle cell curriculum was developed to educate healthcare providers in high-burden districts and support pilot sickle cell newborn screening programs. Eight pilot programs have already been initiated.

Results: Between April 2015 and March 2016, 35,588 dried blood spots with valid results were collected from babies ≤24 months. A high prevalence of SCT and SCD was confirmed along with geographic variability across the country. The highest prevalence of SCT was in the East Central and Mid Northern regions, with ~20% trait and >1% disease identified in Gulu, Jinja, Kitgum, and Oyam districts. Samples collected through the Early Infant Diagnosis (EID) programme for HIV prevention confirmed a lower prevalence of SCD in HIV+ samples compared to HIV- samples, confirming the co-morbidity between HIV and SCD.

Conclusion: New epidemiological data confirm a high prevalence of SCT and SCD in specific regions, which allows the MOH to focus resources and interventions, such as education and training. The observed co-morbidity between HIV and SCD needs prospective investigation. A national sickle cell strategy is warranted for Uganda and other sub-Saharan countries.

Local Validation of the Sysmex CS-5100 Coagulation Analyser: Statistical Lesson Learnt...

Background: Laboratories have to assess the agreement of two methods of measurement when migrating between different analytical platforms, introducing new or alternative methods of analysis and when misalignment is detected between instruments. When 2 different methods of analysis are compared some degree of difference is always expected and the statistical approach to assess the degree of disagreement is not always clear.

Methods: The NHLS coagulation laboratory at Charlotte Maxeke Johannesburg Academic Hospital (CMJAH) validated the Sysmex (Siemens) CS-5100 coagulation analyser in terms of accuracy, reproducibility, carry-over and lipid interference. The STAGO EVO-R coagulation analyser currently in routine use in the laboratory was the reference method. For the correlation study at least 40 patient samples were analysed. Commercial controls were utilised to assess the inter- and intra-run precision. The correlation between the 2 instruments was evaluated with Bland and Altman difference plot and Passing-Bablok regression analysis.

Results: The assays that demonstrated acceptable correlation according to the Westgard minimum acceptable requirements for % Bias were INR, D-Dimers, Anti-Xa, Protein C, von Willebrand Antigen and coagulation Factor VII. Assays with unacceptable % Bias were activated Partial Thromboplastin Time (aPTT), Antithrombin, Thrombin Time, Protein S and coagulation factors VIII and IX. The coefficient of variance (%CV) in the precision study was acceptable for the majority of parameters. No significant carry over from elevated to normal samples occurred. An acceptable level of lipid interference on level of detection was demonstrated.

Conclusion: Chromogenic and immunoturbidimetric assays demonstrated better correlation yielding acceptable % Bias results. The lack of correlation between the 2 instruments for various coagulation parameters can be attributed to different reagent reference ranges and the difference in technique of clot detection (mechanical on the STA EVO-R and optical on the CS-5100). The CS 5100 demonstrated acceptable precision and is therefore suitable for the processing of coagulation samples although new reference ranges will probably have to be established.
**POSTER 324**

Alfred Machiko

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**Assessment of Serum Zinc, Copper and Selenium in Non-Symptomatic Sickle Cell Anaemia Patients at the University Teaching Hospital, Lusaka, Zambia**

**Background:** Zinc, Copper and Selenium are important trace elements in human health and disease. They play a vital role as cofactors of enzymes such as Superoxide Dismutase and glutathione peroxide. These act as first line antioxidants enzymes in Red blood cells and in whole blood. In sickle-cell anaemia patients, the antioxidant activities of such enzymes is markedly reduced. Despite improvement in Sickle-cell anaemia management, morbidity and mortality still remains significant. The study was aimed at determining the serum levels of Zinc, Copper and Selenium in asymptomatic Sickle-cell anaemia patients at the University Teaching Hospital in Lusaka, Zambia.

**Methods:** The study was a case control study. Asymptomatic participants were enrolled from the specialized Haematology and Oncology clinic 4 at the University Teaching Hospital, Lusaka, Zambia. 4mls of Whole blood was collected from 46 Sickle-cell anaemia patients and 46 Controls who did not have any major medical condition from Out-Patient Department after consent. Using atomic Absorption Spectrometry, (ContraAA700® ANELYTIK JENA, Germany) the serum levels of Zinc, Copper and Selenium were assayed and determined. STATA version 11.0 was used for data analysis.

**Results:** The median levels of Zinc in patients were [85.64±20.46mg/L vs 104.39±43.23mg/L; p<0.028] compared to controls. Copper levels were [150.26±54.82mg/L vs 129.49±54.16mg/L; p<0.191] in patients compared to the controls. Selenium levels were [0.082±0.041mg/L vs 0.083±0.032mg/L; p<0.380] in patients compared to the controls. There was no association between the frequency crises per last one year to the levels of Zinc, Copper and Selenium.

**Conclusion:** Findings show that Zinc, is markedly reduced in sickle-cell anaemia patients compared to controls. Copper levels were elevated and selenium had no statistical significance. Further findings suggests that there is no direct link between the Sickling crises frequency and levels of Zinc, Copper and Selenium.

**POSTER 325**

Kayode A. Olawuyi1, Adetbola Olayinka2, Saad Ahmed1, Patrick Nguku2

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4. Resident Advisor, Nigeria Field Epidemiology and Lab Training Program, Abuja, FCT, Nigeria.

**Comparison of Malaria Parasitaemia among HIV Positive and Negative Under Five Children Attending Selected Health Facilities in Jos, North Central Nigeria. 2015**

**Background:** Malaria and HIV contributes to the burden of diseases among children less than five years globally. Nigeria National Malaria Control Program reported that 30% Under 5 (U5) mortality is due to malaria infection. It is diagnosed by the presence of parasitaemia in the peripheral blood. We conducted this study to determine the prevalence and factors associated with malaria parasitaemia in children 6-59 months in Jos, North Central Nigeria.

**Methods:** A cross sectional study was conducted among children aged 6-59 months. Blood specimens were collected from 528 U5 children and tested for the presence of parasitaemia by microscopy. Malarial parasitaemia was defined as the presence of at least one asexual parasite in the blood film. Haemoglobin estimation was carried out and CD4% determined for children living with HIV. Structured interviewer administered questionnaire was used to obtain demographic information and potential risk factors from caregivers.

**Results:** Of the 528 children enrolled, 264 were HIV positive. The mean age in months (± Standard deviation) was 40.6 (± 13.7) among HIV positive children, while among HIV negative children was 28 (± 14.2). Prevalence of parasitaemia was 16% and 23% among HIV positive and negative U5 children respectively. Mild anaemia was significantly associated with malaria parasitaemia among HIV negative children (aOR, 2; 95% Confidence interval (CI), 1.7-3.3). No association was found between CD4% and presence of malaria parasitaemia among children living with HIV.

**Conclusion:** Prevalence of parasitaemia was higher among HIV negative U5 children. Parents of U5 children should intensify efforts in ensuring clean environment devoid of stagnant water and grasses as this will reduce the breeding site for mosquitoes.
Homocysteine and Micronutrients in Dementia Subjects South Western Nigeria

Background: The aging global population makes dementia a priority disorder among neurodegenerative disorders. This debilitating disorder remains poorly understood. Oxidative stress though implicated in dementia has not been sufficiently explored particularly in populations with compromised nutritional status.

Methods: This study was conducted among patient attending the Federal Neuropsychiatric Hospital in Yaba, Lagos and Lagos State University Teaching Hospital in Ikeja, Lagos. Dementia was established by clinical criteria and confirmed by neuropsychological assessment. Structured questionnaires with an informant provided medical information. Plasma copper, zinc, manganese, and magnesium were measured by inductively coupled plasma spectrometer (ICP-MS). Homocysteine was measured by Enzyme linked immunosorbent assay (ELISA) and Vitamin B6, Vitamin B 12 and Folic acid were measured by High performance liquid chromatography (HPLC). This report evaluates the involvement of Homocysteine and micronutrients such as copper (Cu), Selenium (Se), Manganese (Mn), Magnesium (Mg), Zinc (Zn), Vitamin B6 and Vitamin B12 in dementia population at risk of micronutrient deficiency disorder (MDDs).

Results: Eighty-four (84) patients were selected, including forty-two (42) dementia subjects and forty-two (42) control subjects. The Mean age ± SE of dementia subjects was 72.16 years ± 1.37 and of control subjects was 75.07 years ± 0.82. The male to female ratio of dementia patients was 25:17 and 22:23 for control patients.

The result revealed that dementia patients have significantly lower plasma folate and Vitamin B12 than control patients while homocysteine, copper, selenium, manganese, iron, and systolic blood pressure were significantly higher in dementia subjects compared to control subjects (p<0.05). Remarkably, BMI and folic acid of female dementia subjects were significantly higher than that of males while manganese levels were significantly higher in males compared to female subjects. Dementia subjects that smoked and drank alcohol had significantly higher zinc levels compared to those that did not engage in these behaviors. Alzheimer dementia subjects had significantly lower Vitamin B 12 and Zinc levels compared to vascular and other dementia patients. Raised Homocysteine promotes copper-mediated and beta -amyloid peptide toxic effects in cell culture and induces apoptosis.

Conclusion: Lower Vitamin B12 and Folic acid suggested that micronutrients determination should accompany diagnosis of dementia.
**Poster 328**

**Moussa Sylla**

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**Identification of a Small Sample of Anopheles Mosquitoes from Maferinyah Sub Prefecture, 2015**

**Background:** Anopheles mosquitoes have not been comprehensively studied in Guinea. There remains much to learn about the distribution of malaria vectors. Additionally, the distribution of different resistance mechanisms is poorly understood. The aim of the current work was the analysis of a small sample of mosquitoes from Maferinyah sub-prefecture, to determine the species and resistance mechanisms present in Anopheles mosquitoes. It is hoped that this information can contribute to a better understanding of malaria vectors to inform vector control choices in Guinea.

**Methods:** Anopheles larvae were collected in two sites: Fandie and Maferinyah Centre 2, using dippers. Larvae were reared in pans and were fed fish food until pupation. Adult mosquitoes were killed by placing the cup into a -20°C freezer. Mosquitoes were dipped in methanol, dried on a paper towel, and then placed into a tube half-filled with RNALater, kept at 4°C for molecular analysis in CDC (Atlanta, Georgia, USA). Genomic DNA was extracted from single mosquitoes (or portions) by the method of Collins et al. (1987). Primers used in this assay were described by Wilkins et al. (2009). PCR-based assays for mutations L1014F and L1014S were performed as described in the MR4 Methods in Anopheles Research Training Manual (section 5.3.2).

**Results:** Of the 30 mosquitoes provided, one did not amplify. Two mosquitoes were not identified as being in the Anopheles gambiae complex. The mosquitoes were then tested for presence of both kdr mutations, however, only kdr-west (1014F) was detected. In Fandie collection site, only one sample of Anopheles gambiae s.s. (S-form) were found with kdr-West resistant (100%) and 14 samples of Anopheles coluzzii (M-form) found also with kdr-West resistant (100%). Concerning Maferinyah centre, 11 Anopheles coluzzii (M-form) kdr-West resistant and 1 sample susceptible and resistance allele was found (96%).

**Conclusion:** It must be stressed here that the samples analyzed here were quite small and only taken from a few breeding sites. Further studies should be conducted to have a better idea of the Anopheles gambiae complex and resistance status in Maferinyah sub-prefecture.

**Poster 329**

**Rosemary Audu, Nkiruka Odunukwe, Rosemary Okoye, Francisca Nwamkorie, Nkiru Nwokoye**

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**Comparing SLMTA Driven Quality Improvement Between Private and Public Laboratories**

**Background:** The first cohort of the Strengthening Laboratory Management Toward Accreditation (SLMTA) programme in Nigeria commenced in 2010 and it involved only public sector laboratories across the country. This programme generated much interest and some private sector laboratories expressed their desire to be involved. As such, the second cohort enrolled both private and public sector laboratories. This study was aimed to compare the impact of SLMTA training on private and public laboratories and describe any peculiarities found with either type of laboratory.

**Methods:** Three private and three public laboratories were enrolled into the cohort two of the Nigerian SLMTA programme. They jointly attended the three workshops and each laboratory was given improvement projects after each workshop. The laboratories were audited at baseline and after each of the workshops using the Stepwise Laboratory Quality Improvement Process Towards Accreditation checklist to measure the impact of the training in their implementation of quality management system within the period. The audits were conducted annually between 2012 and 2015.

**Results:** The average baseline audit scores for the private laboratories was 36.7% (0 stars) and the average exit score was 79.9% (3 stars) giving an improvement of 43.2%. For the public laboratories, the average baseline score was 47.6% (0 stars) and average exit score was 84% (3 stars) giving an improvement of 36.4%. Both laboratory types improved in the twelve quality essentials except for internal audit in which the private laboratories did not have any appreciable improvement. On the average, they had similar number of professionals as staff, except that the public laboratories had significantly higher number of degree holding personnel (20 versus 7).

**Conclusion:** The similar levels of improvement shows that implementing the SLMTA programme will result in the desired quality improvement irrespective of whether they are private or public laboratories as they prepare for accreditation.
**POSTER 330**

Rosemary Audu, Fehintola Ige, Chika K. Onwuamah, Mabel Uwandu, Morenike Awe, Jamda Ponmak, Florence Okhiku

1. Nigerian Institute of Medical Research, Yaba, Lagos, Nigeria.

**A 10 Year Trend of HIV Types among HIV Patients in a Reference Laboratory**

**Background:** Individuals infected with different HIV types may require different approaches of care and treatment. Monitoring the trend of HIV types will help determine the risk of transmission and the patients’ treatment response. This review was carried out to determine the trend of HIV types over a 10-year period.

**Methods:** This was a retrospective study carried out between February 2006 and December 2015 in a HIV reference laboratory in Nigeria. A total of 7,155 HIV positive results were de-identified and abstracted from our records. These results were obtained using 4th generation ELISA kit and a differentiation kit for HIV status determination amongst patients visiting the laboratory for HIV confirmation.

**Results:** HIV-1 accounted for 99.0 % of the positive samples, HIV-2 had a rate of 0.6% and dual HIV-1/2 was 0.4% during the 10-years period. HIV-1 remained the dominant type and was the only type reported in 2013. The rate of occurrence of HIV-2 infection was between 0.3 - 1.4% in the first 7 years. No infection with HIV-2 was detected in the last 3 years. In the first four years, the rate of HIV-1/2 dual infection was between 0.2 - 1.0 %, then it was not detected in the next four years before re-emerging in 2014 (0.8%) and 2015 (1.9%).

**Conclusion:** Over a ten-year period, infection with HIV type 1 was predominant within our cohort. There was a gradual decline in HIV-2 single infection but a re-emergence of dual HIV-1/2 infection. This implies that approaches for the control of HIV infection in the country are still very appropriate.

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**POSTER 331**

Floyd Olsen, Lynsey E. Stewart-Isherwood

NHLS, Johannesburg, Parktown, South Africa.

**Bi-Directional Printer Technology Rapidly Delivers HIV and TB Results to Health Care Facilities in South Africa**

**Background:** Since 2013, bi-directional laboratory SMS Printer technology has improved the rapid delivery of HIV and TB diagnostic data of patients throughout South Africa, providing health care workers immediate patient results.

**Methods:** The National Health Laboratory Service (NHLS) bi-directional SMS printer has the capability to allow results of CD4, HIV viral load, Infant HIV PCR, TB microscopy and/or TB GeneXpert testing to be sent (“Push”) from their laboratory information system (LIS - Trakcare) to printers placed at Primary Health Care (PHC) clinics upon authorization. The printer also has the ability to retrieve laboratory results (“Pull”) from the LIS Trakcare database by scanning the barcode on the specimen requisition form at the PHC. All SMS Printers are monitored remotely on a daily basis by automated heartbeat messages, ensuring that SMS printers are functional at each facility.

**Results:** To date, bi-directional laboratory SMS Printers have been installed in 2096 health care facilities and 242 correctional services across all nine provinces of South Africa. The turnaround time (TAT) from specimen collection to result delivery has reduced substantially. Weekly reports are generated and distributed indicating a list of facilities where SMS Printers are not functional. In addition, a real-time monitoring website has been created. Connectivity within remote areas across South Africa continues to be challenging, as well as staff rotation within facilities. On average 870 000 results are queried every month costing approximately R165 000 per month.

**Conclusion:** Bi-directional SMS printer capability offers clinicians and nurses the ability to query HIV and TB patient results upon demand, this increases productivity in patient management and reduces turnaround time for result delivery to the facility.
**POSTER 332**

Andani Phaswana1, Nomvula Skhosana1, Leigh Berrie1, Wendy Stevens1

1. NHLS, Johannesburg, Parktown, South Africa.

**Xpert MTB/RIF Use in Correctional Facilities Embedded in the South African National Program**

**Background:** The Department of Correctional Services (DCS), Department of Health (DOH) and clinical NGOs in South Africa have scaled-up HIV and TB services in correctional facilities, through funding by the Global Fund and CDC PEPFAR. The National Health Laboratory Service (NHLS) provides Xpert MTB/RIF testing for all inmates screened and found to be presumptive of TB, either on-site or at the closest NHLS lab, as a way to provide improved access to diagnosis and monitoring.

**Methods:** Xpert MTB/RIF laboratories were established at 7 selected correctional facilities: Kgosi Mampuru, Johannesburg, Groenpunt, Durban-Westville, Polismoor, Barberton and St Albans. Technical staff were recruited for processing of specimens and equipment and consumables were procured and installed. Quality systems were introduced such as Standard Operating Procedures, training and competency, Lab information systems and safety and security. Monthly dashboard reports were developed for monitoring of data. SMS printers were placed at all 242 DCS centres to improve turnaround time and new courier routes were established for collection of specimens and transport to labs.

**Results:** Challenges were experienced with establishing the 7 on-site labs in non-lab environments, eventually they became successfully operational from October 2014. NHLS data generated from both on-site labs as well as NHLS labs performing Xpert MTB/RIF testing for DCS showed that since inception of the Global Fund grant in October 2013, a total of 225972 tests have been conducted with a positivity rate of 4.5% (n=10090) and a RIF resistant rate of 3.65% (n=34). CD4 tests performed reveal that more than 50% of HIV positive inmates have a CD4 count of less than 500.

**Conclusion:** Due to the efforts of the NHLS, clinical partners and DCS, there has been an increase in the number of inmates being screened and tested for TB, and further being diagnosed and placed into treatment and care.

**POSTER 333**

Gudeta T. Gudeto

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**The Role of GeneXpert in Meeting the Increased Demand for Tuberculosis Drug Susceptibility Testing in Amhara and Oromia Regions of Ethiopia**

**Background:** Two cultural centers in Amhara and Oromia regions, with a population of 54 million, could not cope with the increasing demand of drug susceptibility testing (DST) for multidrug resistant TB. In response, the Ethiopia Ministry of Health adopted global recommendations to use GeneXpert MTB/Rif for detection of MDR-TB. The laboratory turnaround time with GeneXpert is 2 days, compared to 6 weeks with a culture test. We present the contribution of GeneXpert in meeting the increased demand for DST in the two regions.

**Methods:** The USAID-funded HEAL TB project supported the roll out of GeneXpert. By December 2015, a total of 49 GeneXpert machines were functional in the two regions. The project built the capacity of health workers in the identification of presumptive multidrug resistant TB (MDR-TB) cases and the need for DST, increasing the demand for DST. The project also provided technical and material support.

**Results:** GeneXpert service started in the two regions as of January 2014 whereas the diagnosis of MDR-TB before January 2014 was only made by culture. Of 122 MDR-TB cases reported in January-March 2014 when GeneXpert was introduced, 58% were diagnosed by GeneXpert while 42% were diagnosed by culture. Recently, a significant proportion (96.5%) of new MDR-TB cases was diagnosed using GeneXpert. A remarkable spike was noted in the trend of cases enrolled to second line drugs at the introduction of GeneXpert (from 35 to 122) (Figure). Since October 2014, the quarterly enrollment of MDR-TB patients ranged from 72 to 86 which is twice the quarterly reports in the pre-GeneXpert era. Decentralization of DST with GeneXpert test improved access to service and the timely initiation of MDR-TB treatment as the results were ready within two days rather than 6 weeks if culture had been used.

**Conclusion:** The introduction of GeneXpert improved access to DST and met the progressively increasing demand of DST.
**Improved Quality of Acid Fast Bacilli Microscopy Service through Decentralized External Quality Assurance System in Two Regions of Ethiopia**

**Background:** Quality Assurance (QA) system for Acid Fast Bacilli (AFB) microscopy measures the quality of DOTS implementation in a Tuberculosis (TB) Control Program. The USAID funded HEAL TB project supported the decentralization of External Quality Assurance (EQA) of AFB microscopy in Amhara and Oromia Regions of Ethiopia. Before the project support, EQA programs were limited in 4 regional laboratories and the EQA participant laboratories were only 104.

**Methods:** Results from EQA decentralization practice in Amhara and Oromia regions of Ethiopia (April 2012 to December 2015) were analyzed. The participating microscopic centers were using Ziehel Nielson method and blinded rechecking was done on a quarterly basis. The EQA coverage, concordance rates and discordant rates (false positivity and false negativity) were reviewed in the two regions.

**Results:** The decentralized approach increased the number of EQA centers from 4 to 101 and EQA participant laboratories from 104 to 1264. Between 2012 and 2015, a total of 517,887 slides (26,347 positive and 491,518 negative slides) were rechecked in a blinded manner by 101 EQA centers. The proportion of slides with concordant results increased from 98.9% in 2012 to 99.5% in 2015 with the false positivity decreasing from 7.6% to 3.7% in the same duration. The proportion of EQA participating laboratories with more than 95% concordant results increased from 90.3% in 2012 to 95.8% in 2015.

**Conclusion:** Decentralizing blinded rechecking of sputum smear microscopy contributed to significant improvement in the quality of AFB microscopy service.

**The Role of GeneXpert in Meeting the Increased Demand for Tuberculosis Drug Susceptibility Testing in Amhara and Oromia Regions of Ethiopia**

**Background:** The two culture centers in Amhara and Oromia regions for a population of 54 million could not cope with the increasing demand of drug susceptibility testing (DST). Ministry of Health adopted the global recommendations to use GeneXpert MTB/Rif. The laboratory turnaround time with GeneXpert is 2 days, compared to 6 weeks with a culture test. We present the contribution of GeneXpert in meeting the increased demand for DST in the two regions.

**Methods:** The USAID-funded HEAL TB project supported the roll out of GeneXpert. By December 2015, a total of 49 GeneXpert machines were functional in the two regions. The project built the capacity of health workers in the identification of presumptive multidrug resistant TB (MDR-TB) cases and the need for DST, increasing the demand for DST. The project also provided technical and material support.

**Results:** GeneXpert service started in the two regions as of January 2014 whereas the diagnosis of MDR-TB before January 2014 was only made by culture. Of 122 MDR-TB cases reported in January-March 2014 when GeneXpert was introduced, 58% were diagnosed by GeneXpert while 42% were diagnosed by culture. Recently, a significant proportion (96.5%) of new MDR-TB cases was diagnosed using GeneXpert. A remarkable spike was noted in the trend of cases enrolled to second line drugs at the introduction of GeneXpert (from 35 to 122) (Figure). Since October 2014, the quarterly enrollment of MDR-TB patients ranged from 72 to 86 which is twice the quarterly reports in the pre-GeneXpert era. Decentralization of DST with GeneXpert test improved access to service and the timely initiation of MDR-TB treatment as the results were ready within two days rather than 6 weeks if culture had been used.

**Conclusion:** The introduction of GeneXpert improved access to DST and met the progressively increasing demand of DST.
**International External Quality Assessment Schemes (IEQAS) Performance Evaluation of TB Smear Microscopy Examination in Ethiopia**

**Background:** External Quality Assessment (EQA) is a system for objectively checking a laboratory’s performance by authorized groups or agencies from outside the laboratory and includes an evidence-based comparison of a laboratory’s testing quality to a peer group of laboratories or to the performance of a reference laboratory.

**Methods:** We reviewed the performance report (feedback) of IEQA on TB Laboratory Diagnosis (MAFS435) through all test Events of 2015 and conducted group discussion with stakeholders.

**Results:** In 2015, of the total of 166 health facilities that participated in the MAFS435 program, 150 were from Government and 16 from private health facilities. The total response rate was 63 (38.0%), 94 (56%) and 84 (50.1%) in test event one, two and three, respectively. From the total health facilities which submitted their results to the provider throughout the three test events, 58 (92.1%), 82 (87.2%) and 73 (86.9%) scored Event Performance Satisfactory (80% or more were correct) in event one, two and three, respectively. Seventy one health facilities which scored Event performance satisfactory at least two out of the last three events had Laboratory performance that was Successful. The rest of the 95 health facilities scored Event performance unsatisfactory. Delayed custom clearance, problems in sample transportation, unavailability of internet services in some facilities, skill gap on online result submission, feedback access and feedback result interpretation were identified as challenges during focused group discussion.

**Conclusion:** Based on our assessment the average response rate was very low. But the trend showed that the response rate increased in the second and third test events of 2015. Event performance score indicated that the overall laboratories performance was Unsuccessful. In order to increase the response rate and success rate, EPHI has to work hard in collaboration with custom clearance office, Ethiopian Postal Services Enterprises, Regional Reference Laboratories and implementing partners to support the participating health facilities for effective utilization of the program for continual improvements.

**Evaluating the Performance of HIV Rapid Testing Laboratories in Ethiopia**

**Background:** The first evidence of HIV epidemic in Ethiopia was detected in 1984. Since then, AIDS has claimed the lives of millions and has left behind hundreds of thousands of orphans. According to single point HIV related estimates and projections for Ethiopia 2014, the national HIV prevalence is 1.14%. In order to minimize poor quality of HIV testing, effective Quality Assurance (QA) system must expand along with the expanded delivery of HIV testing services. The objective of this study is to evaluate the performance of HIV rapid testing laboratories in Ethiopia.

**Methods:** Reviewing the Performance Report (feedback) of HIV Antibody Tests (HIVA435) on the International External Quality Assessment Schemes (IEQAS) of 2015 and group discussion with all stockholders.

**Results:** From the total of 147 health facilities participated on HIV435 program, 139 were from Government and 8 from private health facilities. The response rate showed that, 38.1%, 58.5% and 49.7% in test event one, Two and three of 2015 respectively. From the total health facilities which submitted their results to the provider, 93% in event one and two, and 89% in test event three were scored Event Performance Satisfactory (80% or more are correct).

69 (47%) health facilities laboratories performance were Successful. The rest 78 health facilities were scored event performance Unsatisfactory.

Unavailability of internet services in some facilities, skill gap in online result submission, problems with sample transportation and storage condition, not following the Standard Operating Procedures (SOPs) and switching of PT samples were identified challenges during focused group discussion.

**Conclusion:** In this assessment the overall HIV rapid testing laboratories performance were satisfactory and increased response rate was also observed in each consecutive test events. However, most laboratories scored event performance unsuccessful. This decrease in success rate was due to all health facilities were not consistently sending their results to the provider.
**POSTER 338**

**Feyisayo Jegede**, Olubunmi Negedu-momoh, Emmanuel A. Ojo, Mansur Aminu, Titilope Badru, Ayodele Oguriente, Chinedu Aghakwuru, Henry Mbah, Shuaibu Hamzat, Kabir Gesto

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**Quality Improvement of Laboratory through Strengthened Laboratory Management Towards Accreditation (SLMTA) Process at Infectious Disease Hospital Kano, Nigeria**

**Background:** Laboratory Accreditation (LA) process begins with implementation of Quality Management System (IQMS). LA provides assurance & comparability of patient’s results; however, many laboratories in developing countries lack functional QMS. PEPFAR Nigeria adopted WHO-AFRO recognition process towards Accreditation in 2010. Objective: To describe efforts & progress made in instituting QMS towards WHO-AFRO recognition at Infectious Disease Hospital Kano (IDHK).

**Methods:** With PEPFAR funds, Strengthening Laboratory Management Towards Accreditation (SLMTA) process at IDK Hano commenced in 2010 with baseline audit, succeeded by follow-up and exit audit in 2011 & 2012 by SLMTA auditors. In 2014, IDHK was assessed by African Society of laboratory Medicine (ASLM) certified auditors. Upon expiration of 2014 rating, baseline audit took place by in-country certified ASLM auditors in July 2016. Stepwise Laboratory Improvement process towards accreditation (SLIPTA) checklist process adopted for all audit. Overall, the laboratory was rated using a five tiered approach (0 <55% to 5 stars≥95%) based on WHO-AFRO recognition guideline. Gaps identified in assessment reports were followed up by FH360 team and state government with quality improvement projects (QIP). Most two recent audit outcome was compared by Chi-square test. FH3-60 and Kano state government’s interventions included; sensitization, advocacy, Training, mentoring, supervision, infrastructural upgrade and QIP.

**Results:** At baseline, IDHK got (45%-0 stars), follow-up audit in 2011 was (90%-4 stars) & 2012 exit audit revealed (94%-4 Stars). In 2014 IDHK obtained (63%-1 Star) with certificate of recognition by WHO AFRO with significant improvement from (63%-1 stars) in 2014 to (76%-3 Stars) in 2016 by the ASLM auditors (p=0.0011). Audit report of 2016, 9 most improved sections taken place by in-country certified ASLM auditors. Upon expiration of 2014 rating, baseline audit was assessed by African Society of laboratory Medicine (ASLM) and exit audit in 2011 & 2012 by SLMTA auditors. In 2014, IDHK (63%-1 Star) in 2011 was (90%-4 stars) & 2012 exit audit revealed (94%-4 stars) and exit audit in 2011 & 2012 by SLMTA auditors. In 2014, IDHK obtained (63%-1 Star) with certificate of recognition by WHO AFRO with significant improvement from (63%-1 stars) in 2014 to (76%-3 Stars) in 2016 by the ASLM auditors (p=0.0011). Audit report of 2016, 9 most improved sections observed out of 12 with the least mark of 67% in Purchase & Inventory to 100% in Client management and customer services. Management review (29%) and identification of non-conformities (47%) were 2 weakest sections of the checklist.

**Conclusion:** IQMS and LA is achievable in IDHK with increased government support. Consistent advocacy, sensitization of state government, infrastructural upgrade, Continuous capacity building, mentoring support & increased staff commitment are critical factors for success.

**POSTER 339**

**Feyisayo Jegede**, Tinuade I. Oyeyi, Surajudeen Abdulrahman, Henry Mbah, Titilope Badru, Chinedu Aghakwuru, Ayodele Oguriente, Olubunmi R. Negedu-momoh, Alhassan Momoh, Oluwasanmi Adedokun

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**Epidemiology of Malaria and Evaluation of Possible Risk Factors for Malaria Infection in HIV Infected Adults Attending ART Clinic at Infectious Disease Hospital Kano, Nigeria**

**Background:** Human immunodeficiency virus (HIV) and associated possible risk factors are well documented. However, malaria parasite co-infection in HIV and associated risk factors are not well described in Nigeria where both diseases are of huge public health concern. Objective: To determine HIV and malaria co-infection burden & its associated possible risk factors.

**Methods:** In a cross sectional design of 761 consenting HIV infected adults attending ART clinic at Infectious Disease Hospital, Kano were randomly selected from June to December 2015. Participants’ socioeconomic characteristics & clinical details collected. Venous blood samples collected into EDTA bottle for malaria parasite diagnosis by rapid diagnostic tests/blood smear microscopy. Multivariable binary logistic regression was used to evaluate possible risk factors of HIV/malaria co-infection. Data was analyzed with SPSS version 22 with probability set at <0.05.

**Results:** A total of 761 HIV infected 64% (n=487) females with mean ± (SD) age 37.30 (10.4) years was recruited. Prevalence of malaria in HIV was 27.7% (n=211) with Plasmodium falciparum accounting for 99%. Of the possible risk factors assessed only education level, treated nets usage, co-trimoxazole usage & WHO stage were statistical significant predictors of malaria infection (p<0.05). Those without formal education were 4 times more likely to be infected with malaria compared to those who completed tertiary education (OR =4.35, 95% CI: 2.11-9.0; p<0.001). Similarly, those who did not use treated nets were about twice more likely to be infected with malaria (OR = 1.92, 95% CI: 1.30-2.85; p<0.001) compared to those who used treated nets. Those not on co-trimoxazole were about twice more likely to be infected with malaria (OR =1.75, 95% CI: 1.21-2.54, p=0.003) compared to those on co-trimoxazole. WHO stage IV participants were about four times more likely to be co-infected with malaria compared to those in stage I (OR =3.58, 95% CI: 1.09-11.84; p=0.036).

**Conclusion:** Malaria & HIV co-infection is prevalent in Kano. Education status, treated net usage, co-trimoxazole usage & WHO stage were statistically significant predictor of malaria in HIV infected. These findings support WHO malaria prevention strategy recommendations in developing countries on the use of treated net and co-trimoxazole prophylaxis among HIV patients.
Introducing a Culture of Quality at HIV Testing Sites in Tanzania through a Stepwise Process for Improving the Quality of HIV Rapid Testing

**Background:** The decentralization of HIV testing services has resulted in increasing the number of HIV testing sites in Tanzania. Prior to their provision of service, in order to be certified, these sites are assessed using a standard checklist developed by the Ministry of Health. However, this checklist does not assess the compliance with testing quality management systems (QMS) at testing sites. With the introduction of the HIV Rapid Test Quality Improvement Initiative (RTQII), which builds upon the existing Quality Improvement Framework to ensure accurate HIV test results, there is a need to strengthen capacity for a stepwise process to improve the quality of HIV rapid testing (SPI-RT).

**Methods:** Between December 2014 and May 2016, 208 HIV testing sites were identified to pilot RTQII in Tanzania. At the onset of RTQII, the sites were audited by the quality corps volunteers using the SPI-RT checklist to quantify the deficiencies in 8 QMS standards. Subsequently, the sites were audited quarterly and corrective actions were provided periodically. The baseline and last audits findings were compared to assess the level of the improvement.

**Results:** Of the 208 pilot sites, the mean performance of 181 sites with 5 consecutive audits using the SPI-RT checklist improved from 61% [23% - 84.6%] at baseline to 80.5% [50%-93%] in 18 months. Additionally, the proportion of sites eligible for certification raised from 0% to 18% at the last audit. While improvement was observed over time, Personnel Training and Certification was the quality standard with the lowest performance (<50%), whereas the scores for External Quality Assessment and Documentation increased by 42.0% and 33.3%, respectively after 18 months.

**Conclusion:** The SPI-RT checklist is shown to be suitable tool to monitor site compliance with a site certification requirement. Therefore there is a need to establish a system to support site and personnel certification in Tanzania.
Embedding Method Validation into the SLMTA Process To Improve Quality Of Laboratory Services in Kenya

Background: Through the President’s Emergency Plan for AIDS Relief (PEPFAR) funding, Kenya has invested in on-site capacity-building for laboratory improvement towards accreditation through the Strengthening Laboratory Management Toward Accreditation (SLMTA) process. During this process, a method validation (MV) was identified as one of the significant barriers to achieving SLMTA goals and quality laboratory results. Responding to this need, in 2014, Kenya sent four laboratory technologists to South Africa for a 2-week training of trainer (TOT) course on method validation (MV) and quality control (QC), offered by CDC Atlanta and hosted by Roche Scientific campus.

Methods: Following the above training, the trainers customized the MV and QC curriculum to Kenya’s immediate laboratory needs. Using this curriculum, several MV and QC trainings were rolled out to laboratory staff from SLMTA implementing laboratories. As part of SLMTA-related improvement projects, trainees were tasked to conduct method validation activities in their respective laboratories. Impact of training and quality improvement were measured using the SLIPTA checklist.

Results: By end of 2015, three regional MV trainings had been conducted in Kenya. A total 75 laboratory Quality Assurance (QA) officers were trained, majority 63 (84%) obtaining a post-training score of >80%. This number represented a coverage of 83% for the SLMTA-implementing laboratories and also significantly increased availability of laboratory staff with MV and QC skills in Kenya. Of the trained QA officers, 45(60%) had implemented method validation as an improvement project after training. The laboratories with MV-trained officers demonstrated considerable improvements in the following QSEs: documents and records; equipment management and process control.

Conclusion: By customizing the CDC MV and QC curriculum, Kenya has been able develop a critical number of laboratory workforce with practical skills in method validation. Embedding method validation into SLMTA process in Kenya promises to improve QA documentation and achieve laboratory quality goals.

Using SLIPTA e-Tool to Manage Laboratory Audits in Kenya

Background: Through the Strengthening of Laboratory Management Toward Accreditation (SLMTA) program, Kenya has experienced major scale-up of laboratories implementing quality systems improvement. In 2010, Kenya had 12 laboratories supported by 1 PEPFAR implementing partner. By the end of 2015, this number had risen to more than 140 laboratories supported by more than 10 partners. To improve the laboratory auditing process and provide timely progress reports across an expanding partnership, CDC and the implementing team customized the WHO-AFRO Stepwise Laboratory Quality Improvement Process Towards Accreditation (SLIPTA) checklist e-Tool to Kenya’s needs. We report the customization process, lessons learned and potential use of this tool for tracking continuous quality improvements.

Methods: The e-Tool was customized through a 3-step process: laboratory stakeholder review and recommendations; initial laboratory-based field testing; and practical refining of the tool for data reports management. The tool was then piloted in conducting audits in 10 field laboratories, and further refined using auditors’ feedback. Lessons learned, the tool’s utility and outstanding challenges were documented.

Results: The Kenya SLIPTA e-Tool is fully customized to the country’s Ministry of Health (MOH) settings, and allows longitudinal tracking of audit reports. It also allows differential comparison of laboratories in terms of audit scores. The tool was further designed to produce graphic reports on budgetary projections, tracking usage of consumables, documentation of corrective and preventive actions (CA/PA), audit recommendations and follow up. The tool can be used by a facility in conducting internal audits, allowing for stepwise monitoring of progress in individual quality systems essentials (QSEs). However, merging of audit data collected off-line was still an outstanding challenge.

Conclusion: Kenya’s version of the SLIPTA e-Tool has potential to standardize the audit and reporting process across different partners. By reporting on audit recommendation and CA/PA, the customized e-Tool will be useful in ensuring continuous improvement of quality systems in laboratories implementing SLMTA.
Monitoring and Evaluating Supplier Performance in a National Health Laboratory Network

Background: Quality standards require laboratories to select and approve suppliers based on their ability to supply external services, equipment, reagents and other consumables. However, this has not always been the case in most public health settings. To help improve supply of commodities the Swaziland Health Laboratory Service (SHLS) developed a system to track and monitor supplier performance. We present results of active monitoring of the supplier’s performance for public health laboratory network in Swaziland.

Methods: Baseline data were retrospectively collected on 8 main suppliers awarded tenders to supply laboratory commodities over the financial year 2014/15. Indicators measured included average lead time (time between order placement and delivery), purchase orders completion, purchase order aging (days to delivery). A standardized Microsoft Excel based template for entering and comparing supplier specific information was developed and implemented. Suppliers were informed of the new tool which prompts follow up at specific stages of the supply chain after order has been issued. Suppliers’ performance was then monitored prospectively using the tool for the 11 suppliers in the financial year 2015/16.

Results: The average lead time for the 8 major suppliers improved from 76 days in FY 2014/15 (range 40 to 106 days) to 49 days in FY 2015/16 (Range 22-90 days) (See Fig 1). Lead times for 88% (7/8) of the suppliers present in both years decreased (range 24-66% reduction) with only one supplier performing worse than the previous year (Fig 1). Overall the proportion of suppliers supplying beyond the contractually agreed upon lead time of 42 days decreased from a baseline 75% (6/8) to 27% (3/11) in 2015/16. The proportion of suppliers delivering between 42-90 days increased from 38% (3/8) to 100% (11/11) in 2015/16. The proportion of suppliers delivering orders beyond 90 days decreased from 88% (7/8) in FY2014-15 to 36% (3/11) in 2015/16. Of suppliers with more than 2 orders, none were delivered before the contractually agreed 42 days. (Fig 2).

Conclusion: Suppliers generally performed below expectations in 2014/15 and significantly improved upon active monitoring in 2015/16. Evaluating supplier performance can help identify a pool of suppliers who are able to deliver high quality products on a consistent basis within a reasonable period of time. Such information may be useful in informing future tender awards.
Accelerated QMS/SLMTA Implementation through Focused Mentorship

Background: Funding was awarded by PEPFAR to assist laboratories in implementing a quality management system (QMS) up to a level of international recognition. All the selected laboratories had implemented the three phases of the SLMTA program and had achieved star ratings ranging between 2 and 4 at the exit audit. Technical assistance was required to mentor the laboratories to attain 5 stars and/or international accreditation aligned to ISO 15189 standards. CLSI in collaboration with CDC in Kenya developed a SLMTA-CLSI QMS hybrid program to fast-track the progress of these laboratories toward accreditation.

Methods: As a guiding principle, CLSI technical assistance to Kenya centered on complementing and building upon the success of the SLMTA program in the country. In March 2014, CLSI and CDC in Kenya conducted an audit of the targeted laboratories to identify the gaps. This established a baseline before technical assistance. This was immediately followed by focused mentorships whose aims were to address the identified gaps. Each mentorship ranged from two to four weeks in duration. The mentors worked with the laboratories to ensure that their documents complied with the standards, and were implemented and monitored for adequacy and effectiveness. Baseline, mid-term and exit audits were conducted to measure progress toward the goal of accreditation.

Results: After 18 months of applying the QMS/SLMTA hybrid approach at six targeted laboratories, two (2) achieved ISO 15189 accreditation, two applied for accreditation assessment, one achieved 4 stars and one dropped out due to high staff turnover. The high staff turnover led to the laboratory’s inability to implement the documented QMS requirements. All laboratories have a documented QMS that complies with the ISO 15189 standard and staff have been trained on the documents.

Conclusion: The accelerated QMS/SLMTA hybrid approach can be used to assist laboratories to fully and completely implement QMS leading to a successful accreditation assessment. Through this approach, laboratories that have implemented SLMTA can achieve the goal of accreditation aligned to ISO 15189 standards. Strong leadership and senior management support are critically essential for the success of this approach to mentorship.

Implementing Structured Mentoring towards ISO 15189 Accreditation: the Tanzania Experience

Background: Mentorship is a well-respected method for transferring knowledge and practical skills from an expert to a protégé. Mentoring is documented as a successful method in professions such as education, nursing, and many others. Based on a continuous feedback loop, CLSI designed mentorship program utilizing 12 Quality System Essentials. This considers various stakeholders along the process towards accreditation. The model consists of four distinct phases: 1) gap assessment, 2) training and documentation, 3) system implementation and 4) monitoring and continual improvement. The objective of the model focuses on laboratory leadership, management, and staff. The target outcome is to build capacity to perform medical examinations competently, produce reliable laboratory results and to attain international accreditation.

Methods: The four-phased program was implemented at six targeted laboratories. In phase one, assessments were conducted to identify gaps in meeting accreditation requirements. Phase two included system training and documentation and involved in-depth training on the standard requirements and clarifying and documenting policies and procedures based on the ISO 15189 requirements. Phase three was mentorship; this involved side-by-side mentoring to creating a culture of quality within the organization. Lastly, the monitoring and continual improvement included the identification of remaining gaps between the standard, system documentation, implementation and adjusting the system to address deficiencies.

Results: Through this model, laboratory staff gained theoretical and practical knowledge utilizing the QSEs. The laboratories managed to attain international accreditation aligned to ISO 15189 standard. All the laboratories managed to maintain accreditation after yearly surveillance assessments. The model has been extended to four regional laboratories and currently three have applied for accreditation. CLSI has implemented a similar mentorship model in Kenya with success; two laboratories attained accreditation while two are awaiting assessment.

Conclusion: Application of this mentorship model in multiple laboratories has demonstrated positive results, and there is evidence that the model can be successfully applied to different settings with similar desired outcomes. The model demonstrates a sustainable program for laboratories to consistently operate at a level that meets international standards.
Conducting Management Reviews that Meet ISO 15189:2012 standards

Background: Management review is a meeting that is chaired by the laboratory director or designee and attended by key members of the laboratory management and stakeholders. In this meeting, the performance of the quality system is examined to determine if it is serving its intended purpose. Management review is a key requirement of the ISO 15189:2012 standards. Failure by the laboratory to conduct management reviews jeopardizes the chances of getting accreditation or maintaining accreditation. Management reviews are aimed at detecting errors before they lead to quality failures. This abstract seeks to share lessons learnt in conducting management reviews and common findings that were identified.

Methods: After implementing quality for an average of six months, the laboratories were further supported in conducting management reviews to prepare for accreditation. Quality officers were assisted in collecting data that for management review inputs and development of the agenda for the meeting as required by the standard. The data was presented in histograms and pie charts to identify trends and shifts. The meeting agenda and reports were shared with the participants two weeks prior to the meeting. The quality managers took the role of the secretary in the meetings while the laboratory directors or designees chaired. The minutes were shared with the rest of the staff in meetings where minutes were captured as evidence. The laboratories were given additional three months on average to start implementation of the action plan and produce sufficient evidence.

Results: A total of 15 laboratories (10 in Tanzania, 5 in Kenya) successfully conducted management reviews. As of December 2015, a total of 8 accredited laboratories (6 Tanzania, 2 Kenya) had successfully been assessed for accreditation or maintaining accreditation with no non-conformances in management reviews. Management commitment and involvement in the operations of the laboratories increased due to their participation in management review meetings.

Conclusion: It is with no doubt that the approach for implementing management review as shared in this abstract has helped laboratories to comply with the requirements of the standard. Performance of management reviews that meet the standard can improve management’s involvement in the operations of the laboratory. Additionally, proper management reviews result in continual improvement of the laboratory processes.

Maintaining Accreditation Aligned to ISO 15189 Standards – Key Aspects

Background: The journey towards accreditation aligned to ISO 15189 standards has unique challenges. Assisting laboratories to achieve this goal is rewarding for the personnel involved as they acquire knowledge and skills to perform quality testing. After accreditation, most laboratories have a tendency to relax compliance with standards weakening the quality system. While attainment of accreditation is a wonderful milestone; maintaining accreditation is the ultimate achievement. Accreditation bodies offer accreditation expecting the laboratory to continue to implement the requirements, maintain quality testing and quality performance on a continuum. Therefore, yearly surveillance assessments of the laboratory to assure consistent application of the documented quality system are conducted. An accredited laboratory loses its status if there is systemic evidence of widespread lack of continuous implementation of the quality system.

Methods: CLSI designed a laboratory training program targeting key aspects for maintaining accreditation. The main topics of the training are: internal auditing; identification, and control of non-conformances; resolution of complaints; root cause analysis; corrective actions; and management review. After the training, each of the laboratories received a two-week mentorship; generally one month before the scheduled date of the surveillance assessment. The purpose of this assessment is to ensure quality system is fully functioning. CLSI also continued to mentor the laboratories remotely to ensure ongoing implementation of the quality system.

Results: Four out of five accredited laboratories in Tanzania have maintained their accreditation status for the past three years. One laboratory had its accreditation status suspended for six months due to gaps in the consistent application of the quality management system. After focused technical assistance at this laboratory, accreditation was reinstated.

Conclusion: Mentorship does not end after the laboratory achieves accreditation but continues after accreditation to ensure the “success syndrome” does not affect the laboratory. Accreditation also brings new challenges, which require continuous mentor guidance in ensuring the laboratory maintains a process for continuous implementation of the quality management system. On-going training programs are useful tools to keep the personnel focused on continual application of the developed quality management system.
**Impact of SMS Alerts on Enrolment in Enhanced Adherence Counselling Among Patients with an HIV Viral Load ≥1,000 Copies/ml in Two Rural Districts in Zimbabwe**

**Background:** Among HIV-positive patients on antiretroviral therapy (ART), routine HIV viral load (VL) monitoring helps to detect adherence problems. The World Health Organization (WHO) recommends that patients with a VL ≥1,000 copies/ml have enhanced adherence counselling (EAC) to prevent treatment failure. We assessed the effect of short messaging system (SMS) alerts sent from the central VL laboratory in Harare to patients with a VL ≥1,000 copies/ml in two rural districts in Zimbabwe.

**Methods:** In June 2014, the laboratory began sending SMS to patients to inform them that their VL results were available. The SMS advised patients with a VL ≥1,000 copies/ml to return to the clinic as soon as possible, and those with a VL <1,000 copies/ml to collect their result during their next clinic visit. Using data from clinical and laboratory records, we compared EAC uptake among 278 patients with a VL ≥1,000 copies/ml before (Oct to Dec 2013) and 139 patients after (Oct to Dec 2015) SMS alerts were introduced.

**Results:** The median time from the laboratory releasing VL results to patients starting EAC was 49 days (interquartile range [IQR]: 34-71 days) before, and 38 days (IQR: 21-63 days) after, introducing SMS alerts. After introducing SMS alerts, the median time to starting EAC was 14.5 days (IQR: 6-37 days) among patients who responded to the alert, 40 days (IQR: 26-60 days) among those contacted by clinic staff, and 48 days (IQR: 26-61 days) among those who returned to the clinic at their next scheduled visit.

**Conclusion:** Sending SMS alerts to patients with a VL ≥1,000 copies/ml substantially reduced the time to starting EAC. Sending SMS alerts to patients with abnormal laboratory results is a simple and efficient way to improve responsiveness to the results, particularly in rural settings remote from the laboratory, and where patients live far from health facilities’
Place de la Logistique dans l'utilisation du Laboratoire dans la Santé Maternelle au Sénégal: étude menée dans 16 Structures Sanitaires

**Background:** La logistique est l’ensemble des méthodes et moyens qui concourent à l’organisation des services. L’objectif de ce travail est d’évaluer sa place dans l’utilisation du laboratoire dans le bilan prénatal au Sénégal.

**Methods:** Il s’agit d’une étude analytique prospective, menée dans 16 structures périphériques dans les services de laboratoire et Consultation Prénatale (CPN), avec des outils de collecte appropriés et l’outil d’audit SLIPTA, de juin 2013 à mai 2014. Les variables étudiées sont: nombre et qualité des ressources humaines (RH), temps d’attente, équipements, matériels, protocoles analytiques, score SLIPTA, comparés aux normes nationales ou internationales.

**Results:** Les sages-femmes (SF) représentaient 50% du staff des CPN, soit un gap de 4000 (SF), selon l’OMS. Au laboratoire, les techniciens titulaires du BTS étaient majoritairement représentés (36%). Le défi en RH qualifiées peut impacter négativement sur la qualité des prestations. Le matériel de prélèvements ainsi que les protocoles analytiques utilisés par les SF pour les Tests de Diagnostic Rapide (TDR) à albumine ne sont pas conformes, remettant en question la qualité du dépistage de la crise pré-éclamptique chez 56% des femmes enceintes. L’absence de maintenance préventive dans 10 des 16 laboratoires, corrélée aux pannes et interruptions d’activités, de l’absence de SIGL (16 laboratoires), donc de réseautage entre laboratoire-CPN, constituent des barrières aux urgences. L’absence de synchronisation des horaires des CPN (9h-15h) et ceux du laboratoire (8h-12h) ainsi que les TDR rendus en même temps que le reste du bilan (24 à 72 heures) entraînent des coûts indirects liés aux va-et-vient des femmes enceintes et une prise en charge différée des résultats pathologiques. L’évaluation-qualité par l’outil d’audit SLIPTA suggère que les aspects managériaux et techniques des laboratoires doivent être renforcés.

**Conclusion:** Les logistiques du laboratoire et de la CPN doivent être dans les normes, en phase et bien organisées car elles contribuent incontestablement à la qualité des soins prénatals au Sénégal.

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**Improving the Clinical-laboratory Interface to Increase Uptake of Antenatal Maternal Screening. Recommendations from a Mixed-Methods Study in Public Health Facilities in Senegal**

**Background:** Improving professional interaction between clinical and laboratory staff may promote the adequate utilization of laboratory diagnostic in sub-Saharan Africa. Studies addressing the clinical-laboratory interface are scarce. We performed a case study of the antenatal care clinic (ANCC)-laboratory interface in Senegal. The objective was to identify organizational, personal and contextual factors negatively influencing the quality of the ANCC-laboratory interface and limiting the uptake of antenatal maternal screening.

**Methods:** The study was explorative and descriptive. Data collection lasted 9 months in 11 public health facilities across Senegal between 2013 and 2014. The mixed-methods used included ethnography; in-depth interviews with ANCC and laboratory staff and health facility managers (51); structured interviews with pregnant women accessing the laboratory (169); and workshops with health staff and managers (8).

**Results:** Incomplete test requests, lack of communication on reagent stock-outs, and scarce direct professional communication, resulted in low uptake of antenatal testing (56% of women obtaining the complete set of 6 tests results). These weaknesses are related to organizational factors (lack of guidelines and supervision, shortage of qualified human and material resources, unsupportive management) and staff’s personal factors (incompetence, ANCC staff being overly empathic towards patients, laboratory staff isolating themselves), which were influenced by higher-level contextual determinants, such as poverty, lack of national directives and insufficient staff recruitment.

**Conclusion:** Professional communication was poor from both sides of the interface, severely impacting ANC screening test uptake. Individual personal factors, reflecting the tightly-knit societal context in Senegal, disproportionately compromised ANC staff’s professionalism as compared to other factors. Adequate utilization of laboratory services to support quality health care cannot be achieved without addressing the weaknesses in the clinician-laboratory interface. Improved management, clear guidelines, intensified supervision and adequate material and human resources should foster a high quality clinician-laboratory interface preventing staff’s individual personal factors to compromise the quality of service delivery.
The Role of Connected Diagnostics in the Patient Linkage to Care

**Background:** With the advent of connectivity platforms for existing medical instruments in the lab- and point-of-care environments (e.g. GxAlert), new opportunities arise for faster clinical results reporting, defaulter tracing, and clinical follow up. When patient data is captured digitally in the Cepheid GeneXpert, Abbott m2000, or Alere PIMA instrument (for example) the ability to automatically transmit patient results back to a referring clinician or the patient themselves should lead to faster enrollment, better care, and better outcomes. But, does it?

**Methods:** In a pilot and scale up (2016) in Malawi, the Abbott m2000 high-throughput Viral Load (VL) analyzer was connected through GxAlert and clinical results were transmitted in near-real-time back to the referring clinic to open-source hardware computers. In Nigeria, Myanmar, Kenya, and several other countries, Cepheid GeneXpert results are automatically sent via SMS text message back to clinicians. Although several attempts with SMS printers were made, no evidence was found to support they were a sustainable or effective method for consistently transmitting clinical test results. And, in several countries, clinical results were integrated with Laboratory Information Systems (LIS), case management tools, electronic medical records, or other mHealth interventions (e.g. eMOCHA). In this intervention, SMS text, email, and direct integration with clinical reporting systems were tried.

**Results:** The results of the Malawi pilot are still in progress. However, small scale studies in Nigeria, Indonesia, and elsewhere indicate that faster, better quality diagnostic results sent back to the referring clinician lead to better health outcomes. One WHO-sponsored study in the Philippines was inconclusive and was limited in the number of sites and datapoints available for the study. The data from these studies is limited and largely anecdotal. A large-scale study has not yet been conducted but is likely warranted given the preliminary results.

**Conclusion:** Through connected diagnostics like GxAlert, there is tremendous potential for improving linkage to care. Diagnoses are being linked to clinical results reporting frameworks. The next step is to connect them to EMRs and case management tools. While there is still much work to do in integrating the downstream information systems, connected diagnostics appear to be an effective step towards better care.

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Staying in Control of Lab Data in a World of Connected Diagnostics

**Background:** Virtually every device maker now sees the benefits of remotely monitoring instruments through the use of connectivity (e.g. 3g mobile data), and they are racing to bring fully connected lab- and point-of-care (POC) instruments to Africa. But, this brings up challenging questions: Who owns the data? What data can manufacturers access? Can they see patient data and sell it? We need to ensure that connected instruments move critical health data faster, but not at the expense of patient privacy or MOH control.

**Methods:** The makers and implementers of GxAlert—a connected diagnostics software for TB, HIV, Ebola and other diseases—teamed with USAID to draft an MOH-centric Data Use Agreement (DUA) that sets the rules of ownership and permitted uses in a legal document. When new manufacturers add their instruments to a country’s connectivity platform, the DUA codifies the role of each stakeholder, defines what data they can access, and describes permitted and non-permitted uses for that data. It provisions the capability for the MOH to audit and legally enforce compliance while allowing for a more equitable distribution of value created by connected devices.

The DUA is based on a mix of the European GDPR, US Privacy Shield, South African POPI Act, and in-country law. It is designed to be simple to read, use, and adopt. It protects patient, MOH, and device maker from unnecessary exposure while creating the environment to unleash the tremendous value that connected diagnostics promises. The terms of the DUA are codified in the MOH connectivity software (www.GxAlert.com) which allows Ministries to audit the use of its data.

**Results:** The DUA has being implemented in Botswana (April 2016) and is scheduled for several other countries in 2016. Whereas device maker licenses are restrictive to the MOH and give nearly complete access and control to the manufacturer, the USAID DUA in Botswana substantially shifts the center of control back to the MOH.

**Conclusion:** Although very early in its adoption, the MOH DUA for connected diagnostics highlights the need for providing MOH’s a legal basis for asserting their control, ownership, and rights to the public health data it creates. The Botswana MOH DUA illustrates how connected diagnostics can unleash value in a respectful, equitable, and legal way.
Continuous Quality Improvement (CQI) Through Connected Diagnostics

**Background:** Data around lab- and point-of-care diagnostics quality has always been difficult and expensive to obtain, and often dubious in quality. With the recent introduction of “connected diagnostics” (equipping existing lab instruments with 3g mobile data connections to MOH servers for remote monitoring), it is now possible to watch the performance of medical instruments hundreds or thousands of miles away and pinpoint user-, instrument-, or environmental-errors around the use of that instrument with pristine quality and in near-real-time. All without ever leaving the MOH headquarters. How should this new capability be used to implement CQI?

**Methods:** Traditional CQI programs rely on manual data collection in the field often using international consultants traveling along itineraries known well in advance. Sparkling clean labs, fully filled out registers, and robust maintenance logs seen by these international consultants are sometimes not the full truth of the quality environment. With the introduction of connected diagnostics systems like GxAlert, near real-time instrument data is shared directly with MOH’s. Errors are reported with detailed codes and classifications, enabling supervisors to assess a lab’s ability to effectively use and maintain an instrument remotely.

**Results:** At the first introduction of connected diagnostics, the average lab displays a 7 percent error rate in use of the Cepheid GeneXpert instrument. After connecting the instruments, errors are quickly diagnosed and new training, maintenance, or repairs are typically provided. Within the first 12-24 months of implementing connectivity, the average lab has only a 3.5 percent error rate for GeneXpers across a sample of 20+ countries using GxAlert. Furthermore, it is possible to identify which quality intervention worked and to what degree by monitoring the data streaming in each day. Dashboards display lab, regional, or national error rates and highlight outliers. The data is being used to alter in each day. Dashboards display lab, regional, or national error rates and highlight outliers. The data is being used to alter

**Conclusion:** Connected diagnostics platforms like GxAlert are making CQI a cost effective reality in 28 countries. MOH’s, programs, and donors monitor errors of the GeneXpert, Alere PIMA, Abbott m2000, Sysmex, Humastar and other instruments at a fraction of the cost of manual data collection and with much higher data quality.

The $1b Return on Investment (ROI) for Connectivity

**Background:** Since 2009, high disease burden countries (HDBC) purchased nearly 10,000 Cepheid GeneXpert instruments and 10m–20m cartridges. The investment to date by the global community has been significant: ~$170m in instruments, ~$150m in cartridges through 2015, and another ~$300m-$600m for global health policy development, programmatic reform, training, maintenance, and other expenses related to implementation. All told, ~$1b on the GeneXpert. A foundational concept of this investment was a “buy-down” of the cartridge price to $9.98ea to make the tests affordable in the developing world. But what is the true cost of a successful test to the MOH and can a connectivity platform like GxAlert effectively measure success rates and utilization to better inform these investment decisions?

**Methods:** Through the use of connectivity platforms in the developing world for TB, HIV, and Ebola diagnostics, Ministries of Health (MOH), donors, and implementing partners can accurately monitor real-time rates for errors, invalids and aborted tests. In our research, we also included the number of cartridges (potential tests) that likely expired due to underutilization of these instruments over-purchase of cartridges into a metric we call “Unsuccessful Test Rate”. The data was collected over 4 years of Cepheid GeneXpert use across 28 countries. We suspect it applies to many other instruments.

**Results:** The average 4-module GeneXpert exhibits a 9 percent rate of failure due to errors, invalids, and aborted tests (20-country sample). Additionally, while procurement data varies, we found most donors and programs purchase 1,000 - 4,000 cartridges (2,000 mode)/Xpert/yr while only running 600 tests/yr, a 70 percent failure rate due to over-purchase. This implies, assuming a constant procurement rate, that only 21 percent of purchased cartridges result in a Successful Test, costing $33 per successful test, not the $9.98 most teams reference.

**Conclusion:** The data indicates significant over-purchase of commodities for many lab instruments, leading to grossly distorted results. By remotely monitoring utilization and expiration, connectivity solutions help donors and MOHs quantify their ROI. We question whether the traditional metrics of test “sensitivity” and “specificity” are still sufficient to evaluate field effectiveness of a diagnostic platform in light of connectivity’s new ability to monitor net implementation costs and a new definition for “Unsuccessful Test Rates”.
Implementing SLMTA in Kenya National Blood Transfusion Service: Lessons Learnt

Background: The Kenya National Blood Transfusion Service (KNBTS) is mandated to provide safe and sufficient blood and blood components for the country. In 2013, the KNBTS National Testing Laboratory (NTL) and its six Regional Blood Transfusion Centres (RBTC) were enrolled in the Strengthening Laboratory Management Toward Accreditation (SLMTA) process to ensure a comprehensive and integrated quality management system.

Methods: Implementation of SLMTA at KNBTS facilities followed the standard three-workshop series, on-site mentorships and audits. Baseline, midterm and exit audits were conducted at the seven facilities using a standard checklist to measure progress. Facility quality status and accreditation preparedness was determined by using a zero to five star rating. Given that SLMTA was designed for clinical and public health laboratories, key stakeholders tailored SLMTA materials to address Blood Transfusion Service (BTS), and oriented trainers, assessors and mentors on the same. Non-laboratory KNBTS staffs were also sensitized on the tailored SLMTA materials. For greater impact, SLMTA champions were selected within KNBTS to drive the quality improvements process based on BTS activities.

Results: The seven facilities moved from zero star at baseline to an average of three stars at the exit audit. At exit assessment three facilities achieved 4 stars, two facilities achieved 3 stars and two facilities achieved 2 stars. The average baseline audit score was 38% (97 points), midterm 71% (183 points) and exit audit 79% (205 points), representing a 41% score increase from baseline to exit. Areas with marked improvement from baseline to exit were: occurrence/incident management and process improvement (67% score increase); internal audit (59%); and corrective action (58%). Areas of least improvement were: facility/safety (31%); purchasing (38%); and inventory/ equipment (38%).

Conclusion: Implementation of SLMTA resulted in quality improvements in all the seven KNBTS facilities therefore SLMTA can be an effective tool for preparing BTS for accreditation. However, a tailored SLMTA integrating other blood transfusion-specific accreditation standards is necessary.
**POSTER 360**

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**Strengthening Biosafety and Biosecurity Capacity Through Partnerships Program**

**Background:** On 14th of September 2014, the German-Sudanese Partnership Program for Excellence in Biological and Health Security was launched in an official opening ceremony in Khartoum, Sudan. This new cooperation is an expression of a recently intensified collaboration between the Sudan and Germany.

**Methods:** Joined meetings for technical individuals from both side conducted for 2 days to develop Action plan with time frame and coordination team appointed from both side as well as the area of capacity development designated as follow (Awareness Raising, Biosafety&Biosecurity, Surveillance, Detection and Diagnostics and Networking). The key Partnership Drivers Sudan side: Federal Ministry of Health-(Epidemiology Department-Health Promotion Department) ,National Public Health Laboratory, German Side: Robert Koch Institute (RKI)- GIZ.

**Results:** Six B&B ToT workshops out of 6 planned workshops series were conducted, include 14 participants from different institutions and acquired knowledge implemented at institution level in between the workshops.

Three workshops out of three planned workshops were conducted in the area of laboratory networking and agreed network approved from undersecretary council, FMOH. As well as 18 members Coordination team was appointed.

Training course for 3 weeks hold at RKI for 4 Sudanese participants in laboratory diagnosis of highly pathogenic viral infections as well as one hold at NHPL and Central laboratory includes 6 participants. Twelve participants from NHPL and 12 from CL trained on Glove box machine. Laboratories network established with 18 laboratory members regarding biosafety & biosecurity issues. The capability of the country in laboratory diagnosis of highly pathogenic viral infections improved. Awareness plans and material developed regarding KAP study for B&B conducted to identify the gaps in knowledge, attitude and practice.

**Conclusion:** The German-Sudanese Partnership program for Excellence in Biological and Health Security not only aim to minimizing biological security risks, such as the outbreaks of highly pathogenic infectious diseases, whole Sudanese health care system was benefit too. The partnership will provide sustainable support to improve the resilience against the natural or intentional outbreaks of dangerous infectious diseases as well as boost life sciences in the Sudan and Germany.

**POSTER 361**

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**Partnership in the Stop TB Program [Zambia TB Policy Review]**

**Background:** Global commitment to the fight against TB has been illustrated in the United Nations Millennium Development Goals: Goal 6: combat HIV/AIDS, Malaria and other diseases; Target 6: to halt and begin a reverse incidence for TB by 2015. This study focuses on the Zambian scenario, highlighting evidence of partnership in TB policy implementation and efforts to achieve global targets.

**Methods:** A systematic paper review was used in this analysis, to establish evidence of national, sub national and global collaboration in the fight against TB.

**Results:** United Nation Development Program - Zambia, Stop TB Strategic Plan Implementation indicators achieved the following: 73% External Quality Assurance coverage for laboratories; 12,645 new cases of smear positive TB out of 15,868 cases (target) were notified. A total of 10,523 (88%) new smear positive TB patients were successfully treated compared to 87% in 2011. Overall, 39,543 (87%) registered TB patients were tested for HIV compared to expected achievement of 86%. The Centre for Infectious Disease research in Zambia (CIDRZ), stop TB campaign provides technical support for 337 clinic sites in 12 districts in Lusaka, western, southern and eastern provinces, to enhance screening, diagnosis and TB management. The European Union (EU) / (CIDRZ) has a special program for high risk groups which includes Prisoners and Refugees. Other observed partnerships/collaborations included media ministry of education support, community support groups, DOT programs and coordination with other programs such as national HIV/AIDS programs.

**Conclusion:** Zambia has a robust and proactive TB prevention policy that has been adopted from international TB prevention guidelines. There is government commitment in terms of funding and partnership with international and private organizations. In light of the above factors Zambia has evidenced a steady reduction in the incidence of TB. However due to inter dependency of the strategies of the policy, factors such as education, poverty and lapses in the health care system impacts negatively on the national and international efforts to combat TB.
The Austere Environments Consortium for Enhanced Sepsis Outcomes (ACESO): Applications to Improving Biosafety and Biosecurity

Background: The Austere environments Consortium for Enhanced Sepsis Outcomes (ACESO) is a group of investigators from military medical research institutes and world-class civilian research entities. ACESO has executed an observational study of sepsis at sites in Cambodia, Ghana, and Liberia, where adults with suspected infection and evidence of systemic inflammation have undergone minimally invasive blood draws, on which a multitude of diagnostic tests and molecular diagnostics were performed. In addition to contributing to our understanding of host-response to sepsis, these studies have begun to improve the biosafety and biosecurity of the partner institutions.

Methods: By performing a biosafety/biosecurity risk assessment of the partner hospital laboratories, we were able to identify hazards that are likely to cause harm. In addition, we administered a Likert scale survey to all lab staff to track the perception, understanding, and individual knowledge, and identify the barriers to following biosafety guidelines. Finally, we implemented training modules and workshops to continually improve the lab practices of the staff.

Results: The risk assessments among partner hospitals revealed numerous similarities in the gaps that were deemed to be high risk based on likelihood and consequence. Notably, organizational aspects of biosafety/biosecurity tended to be absent: inventory programs to track biological specimens, protocols to address accidents or spills, and records of needlesticks or blood exposures. Additionally, the individual surveys revealed numerous barriers to achieving optimal biosafety practices. Among the most commonly identified barriers were: lack of time to read/follow guidelines, no clear benefits to self, and inability to change or improve practice.

Conclusion: Hospitals in low-resource settings have to allocate their budgets carefully; funding for biosafety tends to be overlooked. ACESO has worked to identify gaps in biosafety and biosecurity in partner hospitals through the use of a risk assessment and individualized surveys. Overall, clinical research and biosecurity in partner hospitals through the use of a risk be overlooked. ACESO has worked to identify gaps in biosafety allocated their budgets carefully; funding for biosafety tends to

A Comprehensive Tool to Improve Public Health Laboratory System Preparedness and Response

Background: In 2012, the African Society of Laboratory Medicine (ASLM) called for the enrollment of 2,500 laboratories in the World Health Organization (WHO AFRO) Stepwise Laboratory Quality Improvement Process Towards Accreditation (SLIPTA) and 250 laboratories accredited by international standards by 2020. Since then, 159 laboratories have been audited by ASLM-certified auditors. To meet this goal, we developed an innovative approach that models the necessary progression in the number of SLIPTA laboratories and external auditors needed.

Methods: This excel-based model included initial star results from the 159 SLIPTA audits as baseline star estimates. The model assumed that time required to progress from one star to the next was 1 year for stars 0, 1, and 2; 2 years for stars 3 and 4; and 1 year from 5 stars to the accreditation process. This assumption was based on political commitment and ownership of the SLIPTA process, stakeholder engagement, prioritization of laboratories, dedicated CQI personnel, and a national strategic plan with committed human and financial resources. Additional model assumptions included auditor time based on 2 audits per week and re-auditing biennially. The ASLM 2020 goal was used as the target for laboratory audits over a ten year period. Four scenarios were determined: enrollment of cohorts of 15, 45, 75, and 250 labs per year.

Results: The baseline star estimates were 9% of labs with 0 stars, 21% with 1 star, 36% with 2 stars, 36% with 3 stars, 27% with 4 stars, and 1% with 5 stars. Over a 10 year period, 98.5% of enrolled laboratories would reach ≥75% compliance (3 star+), with 51.1% eligible for accreditation. Enrollment of 2,500 laboratories over 10 years (250 labs/year) would require 6,175 audits and 3,088 auditor/weeks. Over ten years, a country with 15 labs enrolled yearly would require 371 audits and 185 auditor/weeks; 45 labs/year: 1,112 audits and 556 auditor/weeks; and 75 labs/year: 1,853 audits and 926 auditor/weeks.

Conclusion: This CQI model sets targets and prioritizes resources to improve laboratory systems and all three stages of laboratory processing: pre-analytics (specimen collection/processing), accuracy of analytical phase and reporting of results. The model is adaptable to different stepwise improvement strategies and country and regional contexts. Investment in CQI ensures that public health laboratories are able to respond effectively to emerging threats.
**Poster 365**

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**Current Access to VL Tests and Implications for Effective Implementation of the 2015 WHO Guidelines for VL Testing**

**Background:** The 2015 WHO consolidated guidelines recommend one VL test per person on ART. We will share the results from the WHO global survey on diagnostic use conducted since 2012 and demonstrate the capacity of countries to effectively implement WHO guidelines.

**Methods:** WHO conducts annual surveys since 2012 in countries from WHO African, American, Eastern Mediterranean, European, South-East Asian and the West Pacific regions. Surveys cover access to CD4, VL and EID technologies including tests performed. We performed a cross-sectional analysis and a trend analysis to assess access to VL testing.

**Results:** The response rate was 67%, 69%, 80% and 62% respectively in the 2012, 2013, 2014 and 2015 WHO surveys. The results refer to the period 2011-2014. The testing capacity increased from 8 million in 2011 to 11 million in 2014 which corresponds to a theoretical coverage of 2.1 VL tests per PLWHA on ART in 2011, 2.2 in 2012, 1.2 in 2013 and 1.8 in 2014. Based on actual tests performed by countries, the VL testing coverage was only 37%, 34%, 53% and 46%, respectively in 2011, 2012, 2013 and 2014. The major factors underlying this low performance include shortage of reagents, instruments not installed/deployed, repair required, and staff training. Data also show that Sub-Saharan Africa is most affected. The trend analysis shows an increase in VL coverage of people on ART from 20% in 2011, 2.2 in 2012, 1.2 in 2013 and 1.8 in 2014. Based on actual tests performed by countries, the VL testing coverage was only 37%, 34%, 53% and 46%, respectively in 2011, 2012, 2013 and 2014.

**Conclusion:** Access to VL test is increasing but could be better if available theoretical capacity were used at optimal level. Countries need to address the factors impeding optimal use of existing VL testing capacity in their progress towards 90/90/90 targets. POC VL technologies may improve the coverage but issues raised above need to be kept in mind in national strategic planning.

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**Poster 364**

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**Improved Quality and Efficiency of HIV Viral Load and EID HIV PCR Testing In Kenya: Laboratory Information Management System Infrastructure is a Cornerstone for Building Sustainable Quality Laboratory and Patient Care Services**

**Background:** Turnaround time (TAT) for HIV viral load (VL) and early infant diagnosis (EID) tests at the National HIV Reference Laboratory (NHRL) was unacceptable with TATs for EID 3 weeks and viral load 2 months. Specimens were logged into the NHRL Laboratory Information Management System (LIMS) and uploaded into the National AIDS and STI Control Program (NASCOP) database. Then testing worksheets were generated from the database. Test results were downloaded separately from the database, uploaded into the NASCOP database, reviewed and sent back to clinicians at facilities submitting request.

**Methods:** To reduce TAT, a team from the NPHL, Association of Public Health Laboratories (APHL) and Clinton Health Access Initiative (CHAI) evaluated specimen workflow, test reporting and commodity management at NHRL, and data management at NASCOP. APHL developed an integration protocol to support electronic transfer of laboratory data from instruments to the NHRL LIMS and between NHRL LIMS and NASCOP database. Functionality was developed for LIMS real time auto email of test results to facilities and daily batch results to NASCOP. Weekly reports for commodity consumption data, and critical alerts on VL and EID backlogs were developed to be sent to NASCOP.

**Results:** TAT was reduced for both tests (VL and EID) to 8 days. Frequent stock-out of reagents due to manual ordering process was eliminated and currently the laboratory receives testing kits on time.

**Conclusion:** LIMS provided significant capabilities that directly improved quality of patient care by providing timely electronic test result to clinicians, data management and reporting. Four components in the HIV care diagnostic system were integrated (NHRL LIMS; EID and VL instruments; clinical sites; and a national database). Integration was key to improved patient care but required communication and collaboration between laboratory and clinical centers.
POSTER 366

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Laboratory-initiated Follow Up of Abnormal and Unexpected Findings

Background: The clinical laboratory plays an important role in ensuring availability of required test repertoire and of assuring accuracy and reproducibility of results. However, the role is likely to expand beyond reporting results on the specimen received. Here we report experience of periodic notification and follow up of detectable PSA levels post-total prostatectomy and of TSH values that remained elevated or continued to increase.

Methods: Monthly reports of all PSA results and of all TSH results above 40.0 IU/L were obtained. First PSA results greater than detection limit of 0.05 ng/mL were notified to the requesting physician for follow up. Similarly, a report of TSH results that remained elevated at or above 40.0 IU/L was sent to the respective requesting physician for appropriate clinical follow up. The study was conducted over an 11 months period.

Results: A total of 5799 PSA results were obtained. PSA values ranged from <0.05 to 1460 ng/mL (median 1.11 ng/mL). 16% of PSA values were below 0.05 ng/mL. Among those, 11 patients had subsequent detectable PSA levels and ordering physician immediately notified. 839 TSH values above 40.0 IU/L from 533 patients were obtained. TSH values above the selected threshold of 40.0 IU/L were as high as 663.6 IU/L (mean of 104.6 IU/L). 41 patients showed increasing TSH values. Review of clinical charts indicated that replacement therapy had been prescribed to most.

PSA values greater than detection limit of 0.05 ng/mL represented 16% of all patients whereas TSH values greater than 40 IU/L represented 1.0% of all TSH samples analysed by the laboratory during the study periods.

Notification of first instance of detectable PSA following total prostatectomy facilitated earlier intervention with satisfactory outcomes. Similarly, notification of discordant TSH results facilitated closer intervention. 6% of patients showed reduction in TSH levels following initiation of notification of respective physician.

Conclusion: The role of the clinical laboratory is likely to extend beyond that of ensuring a timely and accurate reporting of a test result. This report described laboratory-initiated follow up of PSA and TSH results and active participation in continued patient care. Elevated values that either did not decline to normal limits, remained elevated or continued to increase may represent a high risk population.

POSTER 367

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The Triangular Partnership Between South Africa (SA), Tanzania (TZ) and Germany for Strengthening Laboratory Capacities in Diagnosis and Management of Infectious Diseases and Research

Background: In 2011 a previously bilateral partnership between CUHAS/BMC Mwanza Tanzania and Medical Mission Institute / Wuerzburg University Germany was expanded into a triangular partnership with Stellenbosch University South Africa. This North-South-South initiative is based on three pillars: teaching and training; improvement of quality of patient care; and research. Recognizing the laboratory as the “Achilles heel” the partnership is committed to professional development of laboratory personnel and capacity building. We describe the benefits/outcomes of these efforts to the laboratory in Tanzania.

Methods: This is an experience report of laboratory involvement and capacity building during the three phases of the partnership covering the time period from 2006 to 2016.

Phase 1 (2006-2009)
Laboratory involved in clinical trials by monitoring HIV-disease progression.

Phase 2 (2010-2014)
Involvement in TB screening and HIV drug resistance (HIVDR) surveillance. Prevalence studies of hepatitis B and C, schistosomiasis, and Helicobacter pylori. Supporting laboratory staff in further studies (Bachelor).

Phase 3 (2015-2018)
Support of bachelor and masters students (MSc done in Stellenbosch). Continuation of HIVDR, TB and schistosomiasis studies. Introduction and implementation of E-learning courses for HIV and TB surveillance.

Results: Rapid expansion of technical knowhow and technology transfer: introduction of HIV viral load and resistance testing, Gene Xpert for TB, HIV viral load and HPV, ISO 15189 accreditation of TB, Molecular Biology, Microbiology, Biochemistry and Parasitology laboratories. The E-learning program has contributed to expansion of knowledge in the areas of HIV and TB.

*What is still to happen?
HIV genotyping and sequencing, TB liquid culture, line-probe assay, hepatitis B viral load and sequencing.
**POSTER 368**

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**Background:** The UNAIDS “90-90-90” targets call for 90% of HIV infections diagnosed, 90% of diagnosed individuals on antiretroviral therapy (ART) and 90% of those on ART achieving viral suppression by the year 2020. Viral load (VL) data from the laboratory not only provides a direct measure into our progress towards the latter part of the goal, it can also be used to identify areas which are potentially most in need of resources.

**Methods:** We reviewed the 2010-2015 HIV VL data, tested at the Groote Schuur Hospital National Health Laboratory Service laboratory. These data represent a catchment area consist of approximately half of the public sector ART clinics and hospitals in the Western Cape Province of South Africa. We defined viral suppression as any VL <1000 copies/ml and analysed the proportion of virologically suppressed adults (> 16 years of age) by year and health care facility.

**Results:** Data included 557,942 VL testing episodes from 530 facilities. Overall, 16% VL measures were above 1000 copies/ml. Total annual VL testing in the catchment area increased from 51,160 in 2009 to 109,959 in 2014 (2015 was 93,698). The proportions of virologically suppressed episodes increased from 81% in 2010 to 80%, 83%, 83%, 84% and 86% in 2011, 2012, 2013, 2014 and 2015, respectively. There was considerable variation between facilities however, with suppression rate in the largest 10 facilities ranging from 81%-89% while the suppression rate in the smaller facilities (between 100– 1000 VL tests) ranging from 33%-91%. The overall pattern in institutions is one of increasing rates of suppression in the large institutions, though the overall suppression rate including smaller institutions remains stationary.

**Conclusion:** Despite gradual progress in increased number of patient on therapy and increased proportion of virological suppression, the Western Cape province remains short of the final 90-90-90 target. There are large discrepancies between the performance health care facilities which could be used to help direct resource allocation and health system planning.

**POSTER 369**

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Integrating Point-of-Care Technologies into National EID Networks: Choice of Sites for Platform Placement

**Background:** Only half of HIV-exposed infants undergo early infant diagnosis (EID) of which, only half receive test results. Without diagnosis and treatment, 68% of children die by five years of age. Point-of-care (POC) EID can improve the HIV diagnostic cascade, increasing the number of HIV-positive children on treatment. EGPAF supports nine countries in sub-Saharan Africa to build the POC EID system. A key component of this process is appropriate selection of sites to support POC EID technology.

**Methods:** Programmatic criteria included 1) EID demand; 2) turnaround time; 3) EID positivity rates; 4) facility and staff capacity; and 5) geographical proximity to other health facilities and 6) access to facilities providing pediatric HIV treatment. To improve access to POC EID facilities, hub-and-spoke and platform sharing designs were utilized.

**Results:** POC EID products currently available limited the number of sites where a platform could be placed due to proficiency requirements and cost. Relying on hub-and-spoke models increased access to POC EID for a planned 1878 total sites, including 297 testing sites of which 160 are hubs and 1581 are spokes over 13 countries versus 231 total sites with access to POC EID without the hub-and-spoke model. In most countries, non-laboratory staff will operate the POC EID platforms. An initial 57 testing sites will serve as pilots between Q4 2016 and Q1 2017 to evaluate the function of platforms and operators and the feasibility of hub-and-spoke models for POC EID.

**Conclusion:** Designing appropriate placement criteria and networks will be key to improve access to POC EID within existing EID networks. Close monitoring of sample transport systems, return of results and turnaround time will be key to ensure that use of hub-and-spoke models represent an improvement upon use of the conventional EID system. As simpler and more affordable platforms come to market, coverage may further increase.
POSTER 370

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Utilization of CD4 as a Baseline in Relation to Viral Load Testing as a Measure Prior to Treatment Initiation

Background: HIV infection among injectable drug users progresses rapidly as compared to adults without interventions. About 50% of injectable drug users die within 2 years of active drug injection and consumption. CD4 cells are the primary target of HIV. CD4 count shows the strength of immune system. When the CD4 count is low, the patient is at risk of developing opportunistic infection and progressing towards AIDS. The viral load is described as the number of copies of HIV’s genetic material (RNA) per milliliter (copies/ml). The rapid advice for antiretroviral therapy demonstrates the reduction of CD4 testing as viral load target testing initiation is in progress. Without active interventions towards these clients, the rate of rising opportunistic infections which increases chances of lowering immunity leads to death in these clients.

Methods: This study was carried out amongst injectable drug users in two regions in Kenya. This was a prospective cohort study of population group enrolled between January and June of 2015. All patients who were sampled are directed to this study with the help of a peer guide who introduces the clients to the study. A separate questionnaire is used to qualify the patient as an injectable drug user. The study was to capture prevalence of HIV amongst this population based on the study. In analysis, a CD4 test was carried out to assess immunological aspect. The final testing was viral load which acts as a baseline testing and linked to HIV care clinics for initiation of ART.

Results: A total number of 252 clients were in the program with 11% of them having CD4 levels below >750 copies. 89% of the clients had CD4 above the stated range. In comparison to viral load insignificant range of 400 copies per ml was 26.5% which gave a comparison with CD4 less than >350 gave the values of 40%. Clients with viral load copies above <1000 copies gave a tally of 59.9% in comparison to CD4 above <350 that presented with 43.6%.

Conclusion: The conclusion illustrates that higher CD4 levels can also be observed in clients with very high viral loads. CD4 tests cannot be used as a maker for initiation of ART as the pictures gives low values of CD4 <350 and in comparison to viral load which had insignificant copies of <400 copies. I conclude with high expectation that scaling up of viral load as a routine test prior to initiation of antiretroviral drug is the best option.

POSTER 371

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Antenatal Care (ANC) Screening Tests are Under-utilized in Senegal, Despite the Availability of ANC Testing Facilities

Background: Laboratory screening tests are an important component of quality antenatal care (ANC). In Senegal, 7 tests are mandatory for normal pregnancy, including HIV and proteinuria rapid tests (RT). Under or inappropriate utilization of ANC screening tests could favor maternal and child mortality and morbidity. We determined the proportion of women obtaining a complete set of test results and receiving appropriate care upon their 1st ANC visit in Senegal.

Methods: Cross-sectional survey among women visiting 16 properly equipped health facilities, for their 1st ANC (ANCWom) or upon referral from surrounding health posts (only RT available) to complete their ANC screening (LABWom). Information on participants, test request, execution, interpretation & utilization for clinical care were captured on study cards.

Results: As compared to the 1246 ANCWom, the 446 LABWom were more likely to be nulliparous (46.2% vs 35.2%), report later than the 1st trimester (60% vs 38.4%) and be attended by less qualified ANC staff (19.3% vs 0.6%). Thirty-two percents of ANCWom and 30% of LABWom obtained the complete set of test results. In the cascade from test request to availability of results, the step between test request and test execution constituted the largest bottleneck. Only 19% of the 517 pathologies detected were adequately managed. HIV serology, provided for free at the point-of-care, was the individual result most likely to be available (82%), whilst hemoglobin concentration measured as part as the full blood count, was the least likely to be available (48%).

Conclusion: ANC tests are underutilized despite available laboratory infrastructure. Right choice of technology and delivery, combined to gratuity and programmatic support; seem to facilitate access to testing. Additional RT options at health posts could increase the uptake of ANC screening among the most vulnerable women. Further analysis of women-, test- and facility-associated determinants on test uptake is ongoing.
Partnering with Nurse/Midwifery Leaders to Advance the Scale-up of Viral Load Testing to Manage the HIV epidemic in East, Central and Southern Africa

Background: The US Government and global stakeholders are implementing a VL scale-up initiative for countries with a high incidence of HIV/AIDS. Many African clinicians, especially nurses and midwives, are unfamiliar with VL testing protocols and how to integrate VL results in ART patient management. While PEPFAR’s task sharing policies advocate nurse-initiated and managed antiretroviral treatment (NIMART), with VL testing becoming the standard of care in HIV patient management, it is unknown the extent to which nursing leaders in East, Central and Southern Africa understand the importance of integrating VL testing and results into patient care. WHO’s 2013 “Consolidated Guidelines on the Use of Antiretroviral drugs for Treating and Preventing HIV infection” state that midwives and nurses can initiate and maintain first-line ART. Since first-line managed care now involves VL testing, it is critical to assess the acceptance and adoption within NIMART.

Methods: A 23 question Knowledge, Attitude and Practices (KAP) survey was administered to 53 African nurses and midwife leaders representing 17 countries in February 2015 during a regional meeting convened by CDC and Emory University.

Results: While 51 (98%) of respondents believed VL testing should be incorporated into HIV clinic management protocols, 21 (40%) stated that VL testing is within a nurse’s scope of work, and only 11 (21%) stated that nurses were authorized to conduct VL tests.

Conclusion: Results from this survey document the need for increased collaboration between the laboratory and nursing workforce, as well as the need for updated policies and protocols. These conclusions resulted in two PEPFAR-supported activities that address provider utilization of VL findings in patient management. Through PEPFAR’s Public Private Partnership, the KAP findings enabled Roche to design a VL workshop specific to the needs of nurse and midwifery leaders. The training also underscored the importance of updating nursing policies and protocols to include VL testing as a component of nurse-patient management. An additional intervention, the African Regional Collaborative for Laboratory Technologists and Technicians (LARC), is supporting the establishment of national teams of nurse and laboratory leaders to address VL health systems bottlenecks and benchmark progress over the next 12 months.

Laboratory Driven Linkage-to-Care: Outcomes from the Treat-TB mHealth Solution for MDR-TB Patient Care in South Africa

Background: MDR-TB patients who remain unlinked to care continue to present a public health risk. One delay is the speed in which laboratory results reach the treatment facilities. mHealth has the potential to address systematic gaps to improve patient care. mHealth is defined as the use of mobile technology in the practice of public health. National Department of Health National Strategic Plan 2012-2016 states that newly diagnosed MDR-TB patients need to initiate treatment within five working days. Treat-TB was designed to address this strategy.

Methods: Treat-TB consists of two apps; one app to record the treatment initiation and another to notify stakeholders of newly diagnosed Rifampicin resistant (R-R) patients. It enables real-time, automated communication between laboratory, health care facility where patient was diagnosed, MDR-TB treatment initiation site and local TB-Coordinators. Users of apps are authenticated. Implementation training and evaluations were conducted. Daily exceptions reports and weekly linkage reports were generated.

Results: From 2 June 2015, Treat-TB was initiated within Ekurhuleni, Gauteng supporting 89 health facilities and five MDR-TB treatment initiation sites. From 31 March 2016; 378 newly diagnosed R-R patients were registered onto Treat-TB with 241 (63.7%) linked into care; 104 (43.1%) within five working days. Average time linked to care was 8 working days. Seven local municipalities and four DoH Coordinators receive automated alerts onto their personal mobile phones.

Conclusion: Treat-TB is an easy model to implement. The model can be further developed to include drug-sensitive TB and the notify app can be adapted to include notifications of all priority diseases. Further health systems gaps were identified through this model, which adds value in strengthening health systems. Current Treat-TB model only includes existing government personnel. mHealth is still a foreign concept in South Africa, thus implementation of these solutions should be coupled with training to ensure positive ‘mind-set’ changes within the health system.
Use of PEPFAR Program Data to Identify Key Areas for Focus in the Infant Virologic HIV Testing Cascade

Background: Only 49% of HIV-exposed infants (HEIs) in high burden countries received the recommended virologic HIV test by 2 months of age in 2014 (UNAIDS). The infant virologic HIV testing cascade is complex. Routinely collected program data can be used to identify areas for improvement.

Methods: Indicators for prevention of mother to child transmission (PMTCT), infant HIV virologic testing and Site Improvement through Monitoring System (SiMS) data were examined for each PEPFAR PMTCT program. Indicators included number of: pregnant women receiving antiretrovirals, HEIs initiating cotrimoxazole (CTX) by 2 months, infant virologic HIV tests and results by 2 and 12 months, and infants initiated on antiretroviral treatment. Facility SiMS data evaluated included tracking systems for pregnant and breastfeeding women and HEIs, dried blood spot (DBS) collection and documentation, stock-outs of DBS supplies, and linkage to care (data not shown).

Results: Data on 2 illustrative countries are included here. In Country 1, only 33% of HEIs initiated CTX—of these, 63% and 75% underwent DBS collection by 2 and 12 months of age respectively, suggesting challenges with identification of HEIs and potential infant testing limitations. Of the sites in country 1 assessed with SiMS, 50% had corroborating failing scores in the mother-infant tracking systems portion and 14% noted stock-outs of DBS collection kits. In Country 2, 54% of HEIs initiated CTX, with 96% of them having DBS collected by 2 months, suggesting challenges with identification of HEIs but not with testing those initiating CTX. SiMS data from country 2 showed failing scores in 20% of sites on tracking but stock-outs in only 3%.

Conclusion: Bottlenecks vary by location and site. Routinely collected indicators and SiMS data can be used in combination to identify bottlenecks in the infant virologic HIV testing cascade to allow focused technical assistance for improvement.

Strengthening Specimen Referral Network in Swaziland

Background: In order to improve the quality of laboratory services by improving the movement of samples and results from one level to another, technical assistance was provided to the Swaziland MOH to support the establishment of a National Sample Transport System (NSTS). Through the NSTS, the MOH was supported to enhance access to diagnostic and treatment monitoring laboratory services for HIV/AIDS and TB across three of the country’s supported regions.

Methods: The aim was to increase access to diagnostic and treatment monitoring tests in peripheral facilities or hard to reach areas.

A NSTS system was established comprising 5 laboratory hubs, each servicing primary health care facilities in their locality within three regions of Swaziland. Earmarked hub-laboratories were provided with vehicles and a motorcycle, driven by trained phlebotomists. Drivers collected samples from health facilities and delivered them to the laboratory hubs, according to a predetermined schedule. Data was collected from log books and entered into the NSTS database. This included data on number of samples collected, type of test, turnaround time from specimen collection to result delivery, specimen rejection rates and health facilities serviced. The NSTS efficiently transported HIV and TB samples to laboratories, supporting primary health care facilities to diagnose and monitor HIV and TB infection.

Results: The average number of samples transported per month from primary health facility to laboratory hubs was approximately 8,000 specimens. The average turnaround time for test results was reduced from 5 days to 2 days. The testing menu covered CD4+, GeneXpert testing, TB microscopy, culture and drug susceptibility testing, viral load, DNA-PCR. The NSTS also facilitated the distribution of laboratory commodities, supplies and external quality assessment panels for quality assurance oversight.

Conclusion: Sustaining and scaling up this intervention is key in ongoing national efforts to reduce HIV and TB incidences. The MOH is now able to provide specimen referral routes to ensure population access, especially by rural and vulnerable groups, to testing and care facilities.
**POSTER 376**

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**Laboratory Response Networks: A Model for Linking Private Clinical and Governmental Public Health Systems to Combat Global Health Threats**

**Background:** Since the 2014 launch of the Global Health Security Agenda (GHSA), nearly 50 nations and organizations have committed to building countries’ capacity for a world safe and secure from infectious disease threats. To ensure high quality laboratory testing, the GHSA is investing in strengthening national laboratory systems by linking clinical and public health institutes across laboratory networks.

**Methods:** To support countries in Africa and Asia with strengthening their national laboratory system, the Association of Public Health Laboratories (APHL) has provided extensive support under the US President’s Emergency Plan for AIDS Relief and most recently, under the GHSA. APHL focuses on: Laboratory Network Development including mapping referral systems, capabilities and capacities; Biosafety and Biosecurity Enhancements; Incident Management; Workforce Development including management and leadership training, and technical skills training.

APHL has provided training courses on the items noted above including promoting the US managed Laboratory Response Network for Biological Threats Preparedness (LRN-B) as a model network which connects private clinical, governmental and corporate partners for an effective response to emerging threats and terrorism.

**Results:** The LRN successfully responded to threats from Anthrax to Zika. Its approach to ensuring member laboratories are ready to respond to the “threat du jour” encompasses: Standard Operating Procedures; Biosafety and Biosecurity Practices; Proficiency Testing; Notification and Data Messaging Policies; Communications/Information Sharing; Support for reagents, equipment; Scientific/Technical Assistance; and a Robust Management Structure. APHL will share this LRN model describing its unique ability to link private clinical laboratories with various governmental laboratories as well as discuss why its principles are beneficial to African countries.

**Conclusion:** APHL will continue to share the LRN model to assist African countries with strengthening national laboratory systems. Using this approach, APHL believes that countries will meet the GHSA goal of: “A nationwide laboratory system able to reliably conduct at least five of the ten core tests on appropriately identified and collected outbreak specimens transported safely and securely to accredited laboratories from at least 80 percent of districts in the country.”

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**POSTER 377**

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**Using Mobile Phones as Barcode Scanners to Optimize the Sample Transport Tracking System in Lesotho**

**Background:** Lesotho has the highest rates of HIV and TB globally, which makes it imperative to have an efficient and reliable system of sample transportation and patient’s results delivery to optimize turnaround time (TAT) for patient care. The sample transport (ST) and result delivery system in Lesotho comprises of coordinated efforts across health centers, hospitals, sample transporters, appointed courier service agencies and testing laboratories. The objective of the ST Tracking system is to improve visibility on samples in transit and results delivered, through a nationwide system utilizing mobile phones as barcode scanners for sample transporters. This is a cost-effective substitute to installing expensive diagnostic devices at each clinic.

**Methods:** Data around current challenges in ST were collected. All test requisition forms were revised, consolidated and printed with barcodes, and the mobile application and ST Dashboard was developed. A mini pilot was conducted with the demo version to understand stakeholder challenges. Laboratory Information System was integrated with the ST server, allowing sample status notifications to be sent to the ST Server. The application was developed using open source software, including Open Data Kit, and modern web development technologies (Node.js and React). This system will be handed-over to MoH’s IT department for administration and further enhancements. Training will be conducted for sample transporters and concerned facility, laboratory and MoH representatives.

**Results:** The ST Dashboard will identify and measure bottlenecks in the current ST system which include: incomplete records of tests requested, multiple requisition forms with outdated fields, lack of unique identifiers on test request forms to assist with follow-up, poor recording of rejected samples; and inefficient tracking of results delivery.

**Conclusion:** The proposed system will ensure ease of follow-up and sample/result status tracking, reduced LTFU, faster TAT and more patients being brought on treatment; while closing gaps on ST tracking between facility and laboratory.
**Feasibility of Sample Transport Network for Highly Infectious Diseases: The Concept of a Hub Transport System, The Ugandan Model**

**Background:** In 2006, Uganda Central Public Health Laboratories of the Ministry of Health, rolled out a national sample transport network. This was first piloted on Early Infant Diagnosis Samples and Viral Load DBS samples. Later on, wet specimens for highly infectious diseases were slowly enrolled on to the Hub system for Microbiology confirmatory testing (isolates), Viral Hemorrhagic Fevers suspected samples, biopsies for reference testing and many others.

**Methods:** A systematic retrospective review of 820 different categories of specimens referred to the National Microbiology and Outbreak Reference Laboratory was conducted considering technical observation of specimen integrity indicators was done and data on turnaround time for each specimen in regards to wherever it came from was taken.

**Results:** The data for 820 specimens referred to Central Public Health Laboratories by the Hub transport network clearly revealed that out of that volume, the sample volume by region was 816 including Southern Sudan, district 807 with over 56% of samples arriving in less than a day as the turnaround time. Sample volume by suspected disease and confirmed was 782 (95.3%) samples and specimen volume by type of sample was 787 (95.6%) of specimen referred.

**Conclusion:** This revealed that the Hub model of sample transportation can provide functional, reliable and an efficient National referral transport network especially for routine surveillance and outbreak investigations of infectious diseases using wet biological samples when the standard guidelines are adhered to.

**The Next Generation of Laboratory Leaders: APHL Implements Its Emerging Leader Program in Uganda**

**Background:** In 2016, the Association of Public Health Laboratories (APHL) received funding from the Centers for Disease Control and Prevention (CDC) to support the implementation of the Global Health Security Agenda (GHSA) in several countries. APHL has extensive expertise in leadership development, both domestically and internationally. In 2015, the organization piloted its Emerging Leader Program (ELP) in Lesotho and in 2016, APHL collaborated with the Uganda Ministry of Health to offer the Program to a cohort of laboratory leaders. The goal of the ELP is to transform high level managers into effective leaders by enhancing their skills in communications, network strengthening, and leadership to solidify their role in leading strong national laboratory systems, which contribute to early disease detection and incident response.

**Methods:** Fifteen participants over the course of three formal in-person meetings across 9 months will be instructed in the fundamentals of leadership, project management, effective communication and change management. To practically apply the presented concepts, the class identified three projects to address the needs of the national laboratory system. These projects are:

1) Improvement of the External Quality Assessment Program
2) Implementation and analysis of the Internal Quality Control
3) Recommendations on strengthening the national laboratory referral system

**Results:** It is expected that the participants will complete the program and deliver recommendations to strengthen their referral and quality systems, contributing to a more robust national laboratory system. Furthermore, the participants will strengthen their leadership skills and serve as the next generation of laboratory leaders in Uganda. With the success in Lesotho and Uganda, the ELP has demonstrated it is a model for other countries to use in establishing leadership development programs to strengthen the laboratory workforce.

**Conclusion:** These leaders are the future advocates for laboratory services specifically addressing the challenges of workforce issues, technical advances in laboratory science, effective communications with stakeholders and other strategic management initiatives. This ELP model, implemented in other countries, would positively impact workforce and human resource development to further the goals of the GHSA and contribute to the implementation of the International Health Regulations (2005).
**Challenges Faced During Accreditation in Resource Limited Setting in Kenya**

**Background:** KEMRI – Alupe HIV lab is currently undergoing a WHO stepwise model of accreditation using SLIPTA to aid in improvement of laboratory QMS. Here we report challenges facing a resource limited Laboratory in their process toward improving laboratory services and seeking accreditation.

**Methods:** Through a mentorship program, a laboratory baseline assessment was performed in Oct 2015 and has since gone through several assessments to determine the level of progress. Quality indicator monitoring was used as a tool to determine the level of progress overtime and documented. This included performance on external and inter-lab quality assurance for HIV viral load, HIV PCR and CD4 counts, customer satisfaction survey reports, Number of Occurrence of Non- conformances, sample rejection rates, work load, and results TAT. Financial resource and human resource input and output were assessed for effective QMS implementation.

**Results:** The laboratory recorded significant improvement. In a span of 7 months, the laboratory moved from a 0 STAR, to a 4 STAR. Significant improvements on quality indicators of measure and staff attitude towards the implementation of the QMS were recorded. However, there were challenges with staff turnover; minimum financial support for QMS supportive service affected the rate of implementation. Occasional equipment break downs affected laboratory output thus affecting the TAT. Prolonged TAT resulted in creation of backlogs, resulting in extra workload for personnel and more pressure on staff to perform beyond their capacity.

**Conclusion:** There is a need for Institutional and lab management commitment in terms of provision of financial and human resource to facilitate the process of QMS implementation as a continuous process otherwise gains made can easily be lost in a flash.

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**Gaps in Laboratory Quality Management Systems in the Volta Region of Ghana**

**Background:** Laboratory plays a key role in control of diseases and prevention through the provision of accurate, reliable and timely results. The laboratory results are used for patient management and disease surveillance. Therefore quality management systems implementation in laboratories is critical.

**Methods:** This was a non-intervention exploratory study. Stepwise Laboratory Quality Improvement Process Towards Accreditation (SLIPTA) checklist by World Health Organization’s Regional office for Africa (WHO/AFRO) was used to assess six district laboratories in the Volta Region of Ghana. The six facilities were randomly selected to include the three sectors (northern, middle, and southern) of the region. The northern sector laboratories were N1-HMH and N2-NDH, middle sector (M1-HMH, M2-ADH), and southern sector (S1-SDH, S2-ADH).

**Results:** The total SLIPTA scores for the facilities were < 55% (0-142points) which grades a zero star. The S1-SDH laboratory recorded a total score of 17.4% (45points), S2-ADH 11.6% (30points), M1-HMH 17.8% (46points), M2-ADH 9.7% (25points), N1-HMH 5.4% (14points), and N2-NDH 4.7% (12points). M1-HMH had the highest SLIPTA score whilst N2-NDH reported the least score. The Quality System Essentials measured were below 50%. None of the facilities performs Management Reviews, Internal Audit, Corrective Action, Client Management and Customer Service whilst Organization and Personnel was highly performed. On the average SLIPTA score, the southern sector laboratories performed better whilst the northern sector laboratories exhibited the least performance in relation to quality management systems.

**Conclusion:** The star level recorded by the facilities is zero. This implies that the total laboratory quality management systems is very weak in the region and various stakeholders are encouraged to focus on strengthening district laboratories for effective healthcare delivery. This is a detailed baseline data for measuring improvement through future interventions.
Impact of In-service Training Courses on Malaria Microscopy Competency

Background: Microscopy is the primary diagnostic method for malaria in health centers and hospitals settings in Ethiopia. However, poorly performed microscopy and misdiagnosis, could lead to prolonged morbidity and death of infected patients if false negative test results are issued, and a false positive test result could lead to irrational use of antimalarial drugs and delayed workup of the underlying cause of fever. We assessed knowledge and skills of laboratory technicians and technologist who are providing microscopy testing services in health centers and hospitals in Ethiopia.

Methods: This was a cross-sectional observational study involving 567 medical laboratory technicians and technologists from 397 health centers and hospitals from five regions of Ethiopia, and the capital city, Addis Ababa. We assessed their theoretical knowledge and technical skills on malaria parasite detection, species identification and quantification of parasite density. Post-training improvements were assessed using standardized slides and competency assessment tool.

Results: Pre-training, 33.6% of the malaria positive slides were missed by the assessed lab professionals, which is reduced to 13.9% post hands-on training. The increase in accurate malaria detection between baseline and post-training assessments was 19.4% (95% confidence interval, 14.6%–24.2%; P < .00001). Accurate identification of malaria species has significantly increased from baseline of 34.6 % to 43.9%, with an increase of 9.3% (95% CI, 5.14% - 13.46%; p < 0.0001). Prior to the training, only 1% of the malaria slides had been quantified accurately, which improved to 29.4%. Post training, theoretical knowledge was increased to 80.8% from baseline 60.7 %. 

Conclusion: We observed alarming rates of missed diagnosis and incorrect species identification, and extremely low competency in parasite density estimations. Although the hands-on training has significantly improved assessed knowledge and skill sets on malaria microscopy, the relatively low post-training competencies in species identification and parasite density count could result in selection of incorrect antimalarial drug and mismanagement of severe malaria cases. Our findings indicate that the in-service malaria microscopy trainings need to be augmented with follow up mentorship and quality control efforts.

HIV Proficiency Testing Programme and Areas of Improvement for Testers

Background: The use of rapid test kits (RTK) for detecting HIV have reduced the turnaround time and the volume of samples used for the assay. Although, most RTKs are easy to use, it is also important to always evaluate the proficiency of the tester to ensure that accurate and reliable results are delivered to clients. The use of dried tube specimen (DTS) for HIV proficiency testing (PT) in resource limited setting has contributed to improving the quality of testing and monitoring the performance of testers. The objectives of this work is to identify areas of improvement for testers during PT analysis and reporting.

Methods: Six vials of DTS and phosphate buffer in tween 20 were prepared, packed and delivered to 178 testing points supported by AIDS Prevention Initiative in Nigeria (APIN) in the CDC scale up priority local government areas in Lagos, Nigeria (Alimosho: 50; Ifako Ijaiye: 36; Mushin: 53; and Ikeja: 39). Each package contains reporting form, instructions for reconstitution and reporting. Testers were advised to submit their results via post or electronic attachment (email or WhatsApp). Results submitted were reviewed for properly filled form, use of expired kits and non-adherence to instructions and national algorithm. An aggregate score of 80 or above is judged as satisfactory.

Results: A total of 157 (88.2%) results were received (Alimosho 44 (28.0%); Ifako Ijaiye 34 (21.0%); Ikeja 30 (19.1%); and Mushin 49 (31.2%)); while 135 (85.9%) were considered satisfactory. Satisfactory performance across the areas: Alimosho 36 (81%); Ifako Ijaiye 34 (100%); Ikeja 27 (90%) and Mushin 38 (77.5%). For non-adherence to instructions and algorithm: Alimosho, 6 (13.6%); Ifako Ijaiye, 3 (8.8%); Ikeja, 4 (13.3%); Mushin, 5(10.5%). Improper filled form: Alimosho, 1 (2.2%) and Ikeja, 4(6.6%). Use of expired kit: Alimosho 1 (2.2%).

Conclusion: Proficiency testing helps to identify areas of improvement and it is important that testers adhere strictly to instructions, algorithm and fill the report form properly.
**Five-pronged Mentoring Approach for a Sustainable Implementation of the Quality Management in Public Hospital Laboratories: A Case of Port Reitz Hospital Laboratory (PRHL) in Mombasa, Kenya**

*Background:* Strengthening Laboratory Management toward Accreditation (SLMTA) has enhanced the implementation of Quality Management Systems (QMS) in Public Hospital Laboratories in Africa and a number of African Hospital laboratories have attained International Accreditation facilitated by the SLMTA approach. Similarly, many facilities have failed to progress to the next level, thus necessitating innovative strategies to maintain the gains and ultimate accreditation. This report focused on the results of a five-pronged approach implemented in PRHL in Mombasa, Kenya.

*Methods:* We developed a five-pronged strategy that included: 1) fostering QMS ownership through culture and behavioral change with a view to improve Laboratory performance; 2) involvement of staff in decision-making and problem-solving processes; 3) capacity building techniques, benchmarking and inter-laboratory attachment; 4) networking and stakeholder engagement for resource mobilization to support SLMTA activities and; 5) Quality Improvement Projects. These strategies were implemented over a period of 15 months.

*Results:* The PRHL in Mombasa-Kenya mentorship strategy resulted in Laboratory performance improvement from a baseline of 0-stars (6/258 points) to 2-stars (174/258 points) during the final assessment. Improvements in staff motivation and ownership were also observed through increases in work contact hours per day from 3-hours to 6-hours. QMS ownership was evidenced by staff defining their own indicators and quality improvement projects and improved QMS elements scores of between 10-35% (Figure 1). However, we also identified elements that required further mentorship, including implementation and resolution of internal audit findings. Through this approach PRHL: 1) increased in capacity to gradually maintain QMS; 2) attracted the resources needed to establish their Chemistry and Microbiology capacity and; 3), increased their test menu from 9 tests at baseline to 20 tests at exit. Overall, the number of non-conformances reduced by 32% from baseline to the exit assessment.

*Conclusion:* The 5-pronged Mentorship Approach can result in successful implementation of QMS and sustenance of SLMTA in resource-limited public laboratories. Replicating these mentorship strategies can result in improved quality of care, culture change and increased stakeholders involvement.

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**Effectiveness of Proficiency Testing as a Tool to Measure Improved Performance of Peripheral Laboratories Participating in the Strengthening Laboratory Management Towards Accreditation program**

*Background:* Participation in proficiency testing (PT) schemes is an objective way of evaluating laboratory performance. The East African Regional External Quality Assessment Scheme (EA-REQAS) was initiated by the East African Ministries of Health in 2008 to evaluate laboratory performance in peripheral health facilities. In this study, laboratory performance was evaluated in health facilities in Kenya undergoing the Strengthening Laboratory Management Towards Accreditation (SLMTA) process and compared to laboratories that were not enrolled in a formal quality improvement program.

*Methods:* In 2010, Amref Health Africa, in collaboration with Management Sciences for Health (MSH), enrolled 62 health facilities in Kenya into EA-REQAS. Facilities were hospitals and health centres owned by the government. Sixteen of these facilities were also enrolled in the SLMTA process. PT materials were submitted twice per year accompanied by questions addressing laboratory, clinical and public health issues. Each survey comprised seven laboratory materials, including serum for human immunodeficiency virus (HIV) and sputum smears for tuberculosis (TB). Data were analysed descriptively and using InStat version 3.0 for windows statistical software. Laboratory performance in PT was compared between SLMTA-enrolled and non-SLMTA-enrolled laboratories.

*Results:* All 62 facilities participated in 12 PT surveys. The mean response rate was 80% for SLMTA-enrolled facilities and 56% for non-SLMTA-enrolled facilities (p=0.093). There was no significant difference in performance between SLMTA-enrolled and non-SLMTA-enrolled facilities. Performance in examination of HIV and TB specimens also showed no significant difference between SLMTA-enrolled and non-SLMTA-enrolled facilities.

*Conclusion:* PT is a tool for evaluating laboratory performance and identifying poorly performing areas in laboratory practice. Enrollment in the SLMTA quality improvement program did not show improved performance as measured by regular participation in a basic PT scheme. Use of PT programs to measure the effectiveness of SLMTA participation needs to be further evaluated.
Quality Management System (QMS) Implementation: The TDRC Experience

Background: The TDRC, initially a World Health Organization (WHO) collaborating Centre in 1975, became a national institution in 1982. Zambia relies on TDRC for research and training in tropical and other diseases of public health importance in the country and the sub-Saharan region. During a one year review (January, 2015 to February, 2016), we chronicle the lessons learnt, challenges met and approaches employed to resolve them in implementing a QMS in the TDRC Biomedical Sciences laboratories towards attainment of ISO 15189 accreditation.

Methods: A phased approach was employed for QMS implementation. First, a Quality Committee was set up and this was followed by training of all staff in QMS through external and internal training programs. Then, policy and other supporting documents were developed in line with the requirements of ISO15189:2012. Third, staff were trained in implementing set policies and procedures.

Results: Audits conducted in the period under review showed an overall notable percentage increase of 21.7% in SLIPTA scores. Six out of 8 laboratories increased in star level. Two laboratories moved from zero stars to 3 stars, 1 from 1 star to 2 stars, 1 from zero stars to 2 stars, 1 from zero stars to 1 star and 2 remained at zero stars.

Conclusion: Progress towards accreditation requires recognition and participation of important stakeholders. The process must be supported by strong facility specific policies covering all the key quality system essentials. The TDRC laboratory has shown tremendous progress towards attainment of accreditation. Critical to this has been effective mentorship, team dedication towards a common goal, management commitment and budget support for QMS. Several challenges remain in equipment service maintenance, absence of key management staff during mentorship due to duty travel and other commitments, lack of trained internal auditors and absence of Proficiency panels for some laboratory assays.

Système de Management de la Qualité dans les Laboratoires des Forces Armées togolaise : Évaluation avec l’outil SLIPTA des Progrès Réalisés par le Laboratoire Central au bout d’une Année

Background: Les laboratoires de biologie médicale des Forces Armées togolaises (FAT) expérimente une démarche qualité depuis janvier 2015 avec l’aide du département d’Etat à la Défense des USA et sous la houlette de GSSHealth. C’est ainsi que le laboratoire central des FAT a bénéficié de deux audits internes. Le présent travail rapporte les progrès réalisés par ce laboratoire au bout d’une année.

Methods: Il s’agit d’une étude comparative de deux audits internes réalisés en janvier 2015 par GSSHealth et en mars 2016 par le Ministère en charge de la santé. L’outil d’audit interne utilisé était le SLIPTA, un outil de l’OMS basé sur la norme ISO 15189. Entre janvier 2015 et Mars 2016, la quotation en nombre de points du SLIPTA est passée d’un total de 258 points à 275 points mais le score en nombre d’étoiles est toujours 0-5 étoiles.

Results: Le laboratoire est resté à 0 étoile entre les 2 évaluations mais une évolution considérable en nombre de points a été observée passant de 20/258 points en 2015 à 76/265 points en 2016, soit de 7,75% à 28,68%. Il fallait au moins 55% pour obtenir la première étoile. Certains domaines, tels que la gestion de l’information (00% à 69%), l’acquisition et l’inventaire (6,67% à 46%) et l’installation et la sécurité (18,60% à 44%), ont connu une évolution spectaculaire entre 2015 et 2016. Ce programme qualité nous a permis de disposer de nouveaux outils comme les procédures opératoires standardisées, les séances de formation, la traçabilité de la température des réfrigérateurs et divers formulaires.

Conclusion: L’évolution du système de management de la qualité a été remarquable en une année. Toutefois, certains aspects restent à améliorer, notamment la rédaction du Manuel Qualité, l’organisation des audits internes, la gestion des clients, la revue de direction et les actions correctives.
**Achieving a Reduction in Laboratory Equipment Downtime through Strengthening Laboratory Management Towards Accreditation (SLMTA) Improvement Project – NAUTH Experience**

**Background:** Lack of effective corrective action process to resolve laboratory equipment breakdown often prolong equipment downtime, increases turnaround time (TAT) of laboratory results thereby causing delays in enrollment of clients into HIV care and support. Nnamdi Azikiwe University Teaching Hospital (NAUTH) PCR Laboratory is one of the centers in the National EID network in Nigeria providing services to 497 Health facilities in South East Nigeria. FHI 360 with funding from PEPFAR through USAID supported the enrollment of NAUTH Laboratory in the SLMTA Nigeria cohort # 3. The site carried out a SLMTA improvement project on reducing the downtime of Roche COBAS 48 equipment being used for Early Infant Diagnosis (EID) of HIV in exposed babies and viral load quantification for the monitoring of HIV-positive patients on antiretroviral treatment (ART).

**Methods:** A retrospective study of equipment downtime on COBAS 48 was carried out from July to September 2015. Forms were developed to chart operator’s maintenance, days of equipment downtime, root cause analysis (RCA) & corrective action (CA) processes. Plan-do-check-act cycle (PDCA cycle) principle was applied for effective RCA to identify the actual cause of the frequent equipment breakdown. Corrective action was initiated to prevent reoccurrence. Average equipment downtime and TAT of EID and viral load results were analyzed pre and post interventions. Information on the project was documented using the SLMTA Improvement Project (I.P).

**Results:** The laboratory average equipment downtime and TAT of EID were reduced from 57.1% to 0% and 8 weeks to 1.51 weeks, respectively, after intervention. The average TAT of EID results was lower than the national TAT of 2 weeks. The laboratory observed a lower number of complaints from clients after the intervention.

**Conclusion:** Reduced TAT is key to improving patient outcomes and customer satisfaction. Using SLMTA improvement methods (PDCA), and well documented CA process can significantly reduce equipment downtime in the laboratory.

**Implementation of a Custom-designed Laboratory Information Management System in the Uganda National Viral Hemorrhagic Fevers Laboratory**

**Background:** Laboratory Information Management Systems (LIMS) support laboratory workflow operations such as specimen registration, processing, archiving and retrieval. It allows to effectively manage biological specimens and all associated data to improve laboratory efficiency. In 2013, the Uganda National Viral Hemorrhagic Fever laboratory in Entebbe, Uganda, opted to implement a custom-designed LIMS software, as opposed to the prohibitively available commercial versions in order to manage its laboratory samples and testing data.

**Methods:** We performed a laboratory needs assessment so as to forge a way for the architectural design of an electronic system that would replace the existing manual systems. Using Microsoft® Access as the backend and Microsoft® Visual Basic as its front end, we developed modulated software with functionality for sample registration, worksheet or work order management and capture of testing data. The developed software can connect to Microsoft® SQL Server as well.

**Results:** We have fully adapted the developed LIMS as our primary information management platform. All sample data obtained from outbreaks and surveillance has been entered. The system has features for double entry of data and barcode reading, which significantly has had a reduced effect on transcription errors. In addition, the turn-around-times for laboratory results has significantly dropped to within 12hrs of sample reception. Having developed the system ourselves, we are able to troubleshoot it whenever any challenges arise - without engaging external assistance. This has had positive implications on our financial budget.

**Conclusion:** Implementing LIMS is vital for managing biological samples and laboratory data. Our custom-designed LIMS has been able to keep track of all the samples from reception through testing and storage. It allows simplified sample archiving and retrieval for further testing. This system is ideal for organizations that demand for rapid data retrieval and quality workflows especially those that work with viral hemorrhagic fevers.
Compagnies d’Assurances et Renforcement de l’Assurance Qualité dans un Laboratoire Privé de Biologie Médicale au Bénin

Background: Le Bénin compte plus d’une centaine de laboratoires de biologie médicale (LBM) régulièrement enregistrés. Toutefois, il existe encore plusieurs laboratoires non enregistrés fonctionnant sous le couvert de structures sanitaires privées. En 2015, les Compagnies d’Assurance du Bénin ont pris la décision de n’accorder désormais l’agrément qu’aux laboratoires utilisant les services d’un biologiste de haut rang. Le laboratoire privé DiMed à Cotonou s’y est conformé en signant un contrat avec un médecin biologiste.

L’objectif de la présente étude est de décrire l’évolution de la qualité des prestations dans ce laboratoire pendant la période du 02 janvier 2015 au 31 mars 2016.

Methods: Nous avons suivi l’évolution du paramètre « Modes opératoires » sur les cinq paramètres du diagramme d’ISHIKAWA que sont : le Milieu de travail, le Matériel, la Main d’œuvre, la Matière et les Modes opératoires. En effet, les quatre autres paramètres sont assez bien pris en compte dans ce laboratoire.

Results: Les principaux résultats sont : la confection d’un manuel de procédures remplaçant les notices d’utilisation initialement collées au mur, une meilleure interprétation des résultats des examens, le contrôle périodique des frottis sanguins accompagnant les héogrammes, la relecture de lames colorées au Gram sélectionnées au hasard, la systématisation des réunions de service. La conséquence directe est une augmentation de la fréquentation du laboratoire sur les 15 mois d’évaluation par rapport aux quatre années précédentes, passant de 737 à 1005 patients, soit un accroissement de 36%.

Conclusion: La mise en œuvre du management de la qualité dans les LBM ne peut être effectuée à l’échelle nationale par le seul fait du réseau officiel des laboratoires. Tous les secteurs d’activités devraient y contribuer efficacement en fonction de leurs spécificités. Aussi, l’exemple de ce laboratoire mérite t’il d’être suivi par les autres laboratoires ne bénéficiant pas encore du suivi d’un biologiste qualifié.

Strengthening Laboratory Management Towards Accreditation (SLMTA): Ethiopian Experience

Background: The Ethiopian Public Health Institute developed its first laboratory Master Plan in 2005 with a focus on building laboratory systems in the country. One of the strategic objectives was to expand and strengthen the national laboratory quality management system. As a result, World Health Organization Regional Headquarters for Africa’s Stepwise Laboratory Quality Improvement Process Towards Accreditation was adopted and subsequently rolled out the Strengthening Laboratory Management Towards Accreditation programme at 109 laboratories.

Methods: The 109 laboratories were divided into three consecutive cohorts and laboratory managers and quality officers from each laboratory participated in SLMTA training and given improvement projects. Performance was tracked using the WHO–AFRO-SLIPTA checklist, with assessments carried out at baseline and at the end of SLMTA. The traditional ‘three workshops’ approach was used. Four, one and six follow-up visits were provided to cohort I, II and III facilities respectively. The program was completed in eleven months.

Results: At baseline all 23 laboratories of cohort I and 21 laboratories of cohort II attained a rating of zero STAR. Whereas six of the 47 cohort III facilities attained a rating of one STAR at the baseline audit. At the exit audit, 61% (n = 14/23) of the cohort I, 48% (n = 10/21) of the cohort II and 62.5% (n = 30/48) of the cohort III laboratories attained one to four STARs. Three and Six laboratories has achieved three and two STARs respectively by ASLM SLIPTA Audit. According to 2015 national SLIPTA re-assessment (n=32) improvements ranging from 4 to 32 percentage points were noted in 20 laboratories, whilst decreases were recorded in16 facilities ranging from 3-22 percentage points. Those laboratories which receive adequate mentorship attained better STAR and maintain their STAR levels.

Conclusion: SLMTA brings substantial improvement in laboratory service quality. SLMTA is an important tool to help laboratories seek accreditation to ISO 15189. Periodic follow up and coaching is vital to maintain STAR achievements.
Implementation of ISO 9001 in the NHLS Support Service Departments [Human Resource, Finance, AARQA, Communication, Information Technology]: Supporting laboratories with compliance to the Quality Management System

**Background:** An effective Quality management system (QMS) will enhance the organizations capability to meet customer requirements and improve satisfaction. The NHLS laboratories operate under the requirements of ISO 15189:2012. It is essential to align support service departments to these requirements by operating in compliance with the QMS and ultimately obtain ISO 9001 certification. NHLS support departments include Human Resource, Finance, Communication, Marketing & Public Relations, Information Technology and Academic Affairs, Research & Quality Assurance, consisting of 36 units. QMS Implementation is facilitated by the Quality Assurance Department.

The objective is to implement an effective QMS in support departments in alignment to NHLS strategies and is essential in enhancing effective laboratory operations.

**Methods:** During the period June 2014 and April 2016 managers and staff in each department were introduced to ISO 9001 through overview presentations and selected staff attended the implementation training courses on ISO 9001:2008 and ISO 9001:2015 QMS. Gap assessments were conducted using the in-house developed checklist, and gaps identified were allocated with target dates for completion of actions. Follow-up of implementation was conducted.

**Results:** Awareness meetings were completed in 33(92%) and gap assessments conducted in 18(50%) of the 36 units. Pre-implementation conformity to the ISO 9001:2008 standard clauses ranged from 5% -100%. Average conformity across all 18 units was 57% at baseline and 64% at the final follow-up. Only 28% (5/18) of the units managed to implement actions from the gap analysis and final follow-up indicated improvement from 57% to 79% conformity within a period of 10 months.

**Conclusion:** Baseline results indicated existence of varying pre-implementation compliance to ISO 9001 QMS. QMS is a new concept to NHLS support departments and improvements to implement identified gaps will be continuously encouraged and compliance monitored. The indicated management commitment is key to the success of this initiative.

Evaluation of Care, Maintenance and User Practices of Medical Laboratory Equipment and Their Impact on the Effectiveness of Laboratory Operations at Four Central Hospitals in Malawi

**Background:** Laboratory services are essential to supporting and improving health service delivery and are dependent upon the availability of functional equipment. Medical equipment is indispensable for the prevention, diagnosis, treatment, and management of all diseases. Functional equipment requires maintenance, spare parts, reagent supplies and proper use. Lack of preventive maintenance, user training and proper care of equipment in hospitals in developing countries has negatively impacted delivery of laboratory services. This study was conducted to evaluate care, maintenance and user practices of medical laboratory equipment in Central Hospital Laboratories in Malawi.

**Methods:** A cross-sectional study was implemented with self-administered questionnaires completed by 42 professional and certified laboratory personnel at four central hospital laboratories in Malawi at work on the day of data collection. The response rate was 100%. Office Excel software was used to calculate means on indicators of inventory, maintenance and repair, and donations.

**Results:** 78% of personnel (n=33) reported keeping equipment inventory and that more equipment inventories are now kept electronically. 95% (n=40) of personnel reported doing preventive maintenance. 100% (n=42) reported that on-job user and care trainings are conducted. 52% reported that their hospitals have a formal policy on equipment procurement. 90% of all equipment is procured through donor funds and usually comes with all the required resources.

**Conclusion:** This study found improvements in care, use and maintenance of laboratory equipment in central laboratories. Donor support and implementation of SLMTA/SLIPTA programs were seen to have contributed to the observed improvements. Most equipment is on service contracts with improved availability of reagents, repair technicians, spare parts and user training. This is in sharp contrast to what used to be the case previously as reported in the literature. With continued donor support equipment management will continue to improve, which will directly improve access to suitable laboratory services in Malawi.
POINTER 394

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Improving the Quality of a Large Scale Xpert® MTB/RIF Program in South Africa

Background: National roll out of the Xpert® MTB/RIF assay was initiated in 2011. 314 GeneXpert instruments (GX4: 115; GX16:191; GX48: 1; GX80:8) have been placed in 211 NHLS sites across 9 provinces, including seven correctional facilities and six mobile vans. A large scale GeneXpert program requires extensive monitoring to ensure that quality is maintained through all stages of processing.

Methods: Monitoring and evaluation of the GeneXpert program is achieved through various quality tools: verification and EQA programs (each GeneXpert module is verified upon installation, and each site receives an EQA panel three times a year); Standard Operating Procedures; training (A training program was designed for Clinicians, technologists and technicians including process flow charts, laboratory aids and information pamphlets); operational dashboard development (performance of laboratories is reviewed on a monthly basis through data collected from the Laboratory information system (LIS) and the Cepheid Remote connectivity software); and site visits (conducted for laboratories that report a high GeneXpert user-related error rate). In addition, sites are required to adhere to instrument minimum operational requirements such as using brushes to clean the instrument optics and performing annual checking of GeneXpert modules.

Results: Over 4000 GeneXpert modules have been verified as fit for purpose. Modules are also verified upon replacement or when an instrument is moved. Consolidated EQA reports are distributed to regional quality assurance officers for action. 2,054 laboratory staff and 10,447 health care workers have been trained since December 2011. Data has been monitored using the LIS and Cepheid’s RemoteXpert system as to instrument down time, errors, TB positivity and Rifampicin Resistance rates. 7 985 206 specimens have been processed to date (31 March 2016).

Conclusion: The South African GeneXpert program requires continuous Quality improvement and development of data monitoring tools in order to ensure sustainability of the program.

POINTER 395

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Outcomes of Point of Care Testing Services

Background: The Laboratory modernization/ improvement processes in Kenya now includes Point of Care Testing (POCT) as one of its central tenets. Point-of-care testing is now possible in many areas of clinical medicine. Such areas include self-monitoring, community testing primarily in the pharmacy, general practice (in the doctors room), and the emergency department. Recent studies show that Point of Care testing in Kenya has not received a lot of attention with regards to quality in the testing outcomes which affects patient care and patient outcome. The high rate of wrong results has become very wanting in an industry that is experiencing high rates of growth.

Methods: Questionnaires were randomly distributed to clinicians and medical laboratory personnel in selected hospitals in Nairobi, Kenya on the quality of results from POCT. Key issues to be addressed were internal quality control (IQC), External Quality Assurance (EQA), and use of approved devices.

Results: Forty of a possible 50 clinicians and medical laboratory staff responded. 10% of the respondents from hospitals said that they had EQA in place for POCT. 60% of the respondents did not have an idea of existence of regulation of POCT and approval of the POCT devices in Kenya. 30% responded that they actually were aware of the need to use IQC in POCT.

Conclusion: Point of Care Testing remains under-resourced, despite the roll out of these devices throughout the health service including primary care. This translates to high standards of laboratory medicine being implemented in Kenya which may not be maintained. Kenya needs to come up with national guidelines and adequate resources to ensure patient safety in the delivery of healthcare. There is also need to embrace accreditation of ISO 22870 +ISO 15189 to ensure quality of results from POCT facilities.
**POSTER 396**

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**Performance of Microscopy for the Diagnosis of Malaria and Human African Trypanosomiasis by Diagnostic Laboratories in the Democratic Republic of the Congo: Results of a Nation-Wide External Quality Assessment**

**Background:** External quality assessments (EQA) are an alternative to cross-checking of blood slides in the quality control of malaria microscopy. The present EQA assessed microscopy of blood parasites among diagnostic laboratories in the Democratic Republic of the Congo.

**Methods:** This was anonymous, cross-sectional and experimental investigations concerning clinical laboratories in DRC. The EQA addressed 445 participants in 10/11 provinces (October 2013–April 2014). Participants were sent a panel of five slides and asked to return a routinely stained slide which was assessed for quality of preparation and staining.

**Results:** Response rate was 89.9% (400/445). For slide 1 (no parasites), 30.6% participants reported malaria, mostly Plasmodium falciparum. Only 11.0% participants reported slide 2 (Plasmodium malariae) correctly, 71.0% reported “malaria” or “Plasmodium falciparum” (considered acceptable). Slide 3 contained Plasmodium falciparum (109/µl) and Trypanosoma brucei brucei trypomastigotes: they were each reported by 32.5% and 16.5% participants respectively, 6.0% reported both. Slide 4 (Trypanosoma) was recognised by 44.9% participants. Slide 5 (Plasmodium ovale) was correctly reported by 6.2% participants, another 68.8% replied “malaria” or “Plasmodium falciparum” (considered acceptable). Only 13.6% of routine slides returned were correctly prepared and stained. The proportion of correct/acceptable scores for at least 4/5 slides was higher among EQA-experienced participants compared to first time participants (40.9% versus 22.4%, p = 0.001) and higher among those being trained < 2 years ago compared to those who were not (42.9% versus 26.3%, p = 0.01).

**Conclusion:** Among diagnostic laboratories in Democratic Republic of the Congo, performance of blood parasite microscopy including non-falciparum species and Trypanosoma was poor. Recent training and previous EQA participation were associated with a better performance.

**POSTER 397**

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**A New Approach to Setting Up and Continuously Improving a QMS: The TEN-RE Model**

**Background:** More often laboratories tend to fall in the “NOW WHAT?” situation when they don’t know the first or next step to take to have an effective QMS in place. The Ten-Re Model is a stepwise tool that helps laboratories to set up, monitor, and troubleshoot/eliminate gaps in the QMS. It works all the way from the overall QMS down to an individual test process.

**Methods:** A case study was done for 1 month in 2016 on 5 laboratories in Uganda that had completed the 3 SLMTA workshops. Their performance in SLIPTA audits before and after application of the Ten-Re Model was observed and analysed with an F-Test. This model involved:

- Re-define: the system’s applicable standards for example ISO 15189:2012, national guidelines, manuals etc.
- Re-check: perform an intensive gap analysis based on the defined system.
- Re-standardize: the processes (SOPs).
- Re-train/Re-assess competence: in the newly standardized system or process.
- Re-calibrate/Re-adjust: tools/equipment/forms etc to suit the new range of operation.
- Re-constitute: new materials for example reagents, QC materials, prints etc.
- Re-control: perform and monitor QC.
- Re-test: implement the new system or process
- Repeat: 2 to 8 if the system or process is not conforming to the requirements
- Retain/Remove/Refer: this is the final management decision on the new system or process.

**Results:** All laboratories were at 0-star but when the Ten-Re model was applied 1 month to the next audit, two got 3-stars, 2 got 2-stars, and 1 got 1-star in the exit/post SLMTA audit.

**Conclusion:** The F-test confirmed that the drastic improvement in the short time was not by chance but by the method used in setting up the new system. Therefore the Ten-Re Model if applied by laboratories will not only help in setting up and improving systems but also useful in problem solving of identified procedural non-conformities.
Challenges in Attaining Accreditation in Public Health Laboratories

Background: By the end of 2014, only 17% of public health laboratories (PHL) in SSA were accredited to international quality standards. Although poor Laboratory Quality Management Systems (LQMS) have led to substantial negative impact on health care delivery in the region, World Health Organization and member countries are working towards improving service delivery through implementing the Stepwise Laboratory Quality Improvement Process Towards Accreditation (SLIPTA). The Makerere University Walter Reed Project laboratory in Kampala, Uganda accredited by the College of American Pathologists (CAP), provides technical support in strengthening LQMS at several district health laboratory hubs in Uganda.

Methods: We considered two previous SLIPTA audits conducted from June 2015 to March 2016. A book of evidence based on the SLIPTA checklist was developed and used to prepare the lab for upcoming audits. The main challenges in attaining five stars was determined based on the audit outcomes.

Results: The laboratory received 3 stars for the initial audit conducted in June 2015 and 4 stars for the audit conducted in March 2016. Elements most cited included (i) Document reviews, retrieval and retention. (ii) Purchasing and inventory (iii) Equipment and or test assay validation and verification.

Conclusion: Local governments and central medical stores need to collaborate with laboratory management to ensure prompt delivery of required materials and strengthen supervisory oversight to allow public health laboratories to meet all requirements of the SLIPTA checklist.

Building Capacity to Increase Access to and Uptake of Quality-assured HIV Laboratory Services in Eastern Uganda.

Background: The current USAID/PEPFAR-funded ‘Strengthening TB and HIV & AIDS Response in Eastern Uganda (STAR-E) Project, established in 2009 and managed by Management Sciences for Health, aims to increase access to, coverage and utilization of quality HIV/TB prevention, care and treatment services. It provides laboratory strengthening and improvement initiatives for a regional network of 121 laboratories across 12 districts in Eastern Uganda. These include the ‘Strengthening Laboratory Management Towards Accreditation (SLMTA) program and the national sample referral and sample results transport network, utilizing a ‘hub-and-spoke’ referral mechanism.

Methods: To build laboratory capacity and increase access to quality-assured testing services, fourteen staff from five ‘hub’ laboratories were supported to participate in the SLMTA Program during 2015. Five of these received additional training in laboratory mentorship. Between July 2015 and April 2016, health workers from 104 (86%) of the supported facilities were trained on Viral Load testing, specimen handling and transportation.

Results: By March 2016, two out of five (40%) ‘hub’ laboratories had attained Star 1 or Star 2 accreditation status. All had a baseline assessment rating of zero. The number of people tested for HIV started to increase from 413,176 in 2014 to 425,918 in 2015. (3.1% increase). Between July 2015 and April 2016, 9,713 Viral Load specimens were correctly collected and tested, compared with the pre-training baseline of 506 specimens between July 2014 and June 2015. Final results showing the total 12-month increase will be collected and analyzed at the end of June 2016.

Conclusion: We demonstrated that building overall capacity in laboratory quality management systems and training health workers to operate and utilize a specimen collection and transport system for Viral Load samples, quickly increased access to quality-assured HIV diagnosis and monitoring, thus opening the door for improved coverage of care and treatment.
**Poster 400**

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**WHO Laboratory Standards Training in Haiti: A 5-year Journey**

**Background:** In 2011, Heart to Heart International and corporate partner Becton Dickinson began a five-year stepwise program in collaboration with the National Laboratory to strengthen laboratory services and to raise the quality of clinical and public health laboratories throughout Haiti to uniform standards.

**Methods:** Descriptive: The program was based on the WHO Laboratory Standards two-pronged approach:

1) Major training events based on the SLMTA model for strengthening laboratory management, using the 12 pillars of Laboratory Quality Improvement as the foundation, and

2) Use of a stepwise auditing and accreditation platform utilizing the WHO SLIPTA accreditation checklist. These audits were conducted at a representative sampling of laboratories following each training session, both to monitor the effectiveness of the training and to assess the effectiveness of the trainees in implementing process improvements in their laboratories as a result of the training.

**Results:** Baseline audits were conducted in three representative laboratories utilizing the SLIPTA checklist; the average score indicated 6% compliance or 0 stars. Post-training audits showed impressive improvements, with results after the initial training session averaging 60%. One laboratory, after attending just two training sessions, had improved to 77% or 3 stars. The final year of the program was the “train the trainer” component, so that those completing training can not only implement best practices in their laboratories, but also teach and mentor other laboratory managers. Mentoring networks for lab managers have developed and now include collaboration with their American and international counterparts through the Clinical Laboratory Managers Association (CLMA). This year’s CLMA-Haiti chapter meeting had over 200 in attendance.

**Conclusion:** This model ensures continuation of the quality improvement process and helps develop a network of laboratory managers committed to working together to strengthen quality laboratory operations countrywide. Strengthened laboratory services in Haiti means increased access to quality laboratory services, better patient care, and an improved overall healthcare system.

**Poster 401**

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**Implementation of a Mentored Professional Development Program in Laboratory Leadership and Management in Zambia**

**Overview:** Laboratories need leaders who can manage their resources effectively, maximize the laboratory’s capacity, communicate effectively with stakeholders and ensure their laboratory meets the service delivery needs of the community. To address this need, we created the Certificate Program in Laboratory Leadership and Management (CPLLM), an in-service program for mid-career laboratory managers and directors. Its purpose is to teach leadership and management skills to laboratory staff in supervisory positions, with the goal of enabling participants to make substantive and impactful improvements in laboratory testing quality and operations. It employs a mentored, blended learning approach utilizing both in-country and online training, and participants complete 5 courses and a laboratory improvement Capstone Project over the course of 9 months. The program was developed in 2013 at the University of Washington and has been implemented in 10 countries in the Middle East and North Africa in 2014 and in Zambia from March-December 2016.

**Program Design:** The CPLLM is delivered through 2 in-person meetings and 4 distance-learning courses, and program curriculum is organized and managed in a robust learning management system called Canvas™ which is capable of delivering diverse multimedia content, enabling discussion, group collaboration and communication, and surveying learner capacity and enabling course and program evaluations. The curriculum addresses key competencies such as: laboratory quality management, laboratory systems, leadership skills and management practices, analysis and communication of laboratory information, law and regulation of laboratory practice, and appropriate implementation of diagnostic technology. Participants also complete a Capstone Project which is an applied effort towards improving their home laboratory operations and visibility in the health system. In addition, each participant is paired with a local or regional mentor who helps create and sustain a supportive and positive learning environment for each of the participants throughout the entire program.
Program Implementation in Zambia, 2016: 17 laboratory managers from 16 national referral and provincial level hospital laboratories were selected in February 2016 through a competitive nomination process and 8 senior mentors from Zambia, Botswana and Zimbabwe were also recruited and paired with participants. The CPLLM Orientation and Laboratory Systems course was delivered in March. Following this meeting, participants returned to their laboratories to conduct a comprehensive internal laboratory audit using the SLIPTA checklist and complete the 4 online courses. SLIPTA audit results allowed participants to identify gaps in quality management in their laboratories and develop individualized Capstone Projects based on these findings and other gaps in their laboratory’s service delivery. Over the following 8 months, participants developed project proposal work plans and implemented their projects, culminating in a second internal audit of their laboratories in October and a 20-page project report and presentation summarizing their work and results at the program finale meeting in November.

Conclusions: The CPLLM is an effective in-service blended-learning solution that strengthens the skills of laboratory directors and managers and encourages networking and collaboration, strengthening the laboratory system at the national and regional levels.

POSTER 402
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Evaluation of the Accuracy of Instrument Generated Flags for Automated Differentials

Background: Manual peripheral blood smear (PBS) review is the gold standard. However, owing to shortages of qualified technologists and clinicians’ demands for improved turnaround time it is increasingly difficult to manually review all requested PBS. Automation has significantly improved laboratory performance over the last 50 years. Automated haematology analysers can produce accurate and precise counts on normal specimens and specimens with numerical abnormalities thus eliminating the need for manual review. Depending on the analyser’s sensitivity and specificity morphologic descriptions of red blood cells, white blood cells and platelets are generated. At the NHLS Complex at the Charlotte Maxeke Johannesburg Academic Hospital, full blood count (FBC) and differential analysis is performed on the ADVIA(2)120 Haematology Analyser(Siemens Healthcare Diagnostics, IL, USA). In order to ensure the quality of the reported automated differentials, a prospective comparative study was performed.

Methods: The specimens used for the validation included differential tests which did not trigger the consensus rules (proposed in 2005 by the International Consensus Group) and were autoverified by the haematology analyser. Manual PBS review was independently performed by at least two competent morphologists. The automated differential was compared to manual PBS review with regards to instrument generated morphologic descriptions.

Results: Two hundred and forty two ADVIA morphology descriptions were reviewed: three platelet, 48 white cell and 91 red cell descriptions. The false negative rate was <1.5% and no critical pathology was missed. Descriptions graded as +1 were associated with a high false positive rate (FPR) namely, left shift, 38.3%; immature granulocytes, 34.62%; hypochromia, 33.68%; microcytosis, 39.65%; macrocytosis, 44.44% and anisocytosis, 32.26%. In contrast, descriptions graded as ≥2+ for left shift; hypochromia; microcytosis; macrocytosis and anisocytosis showed an improved specificity of 81.8%, 69.44%, 71.43%, 100% and 70.59% (P<0.05).

Conclusion: Adjusting the flagging threshold to ≥2+ increased the specificity of the morphology descriptions and thereby reduced the manual review rate.
Reducing the Error Rate in HIV Viral Load Testing and Does Training on a National Level Provide Any Positive Outcomes?

**Background:** The National Health Laboratory Service (NHLS) utilizes a centralised model for viral load testing and is committed to the delivery of quality test results. HIV viral load testing is performed on automated platforms supplied by either Roche Molecular Systems or Abbott Molecular based on a tender award. The NHLS, facilitated by its National Priority Program Unit (NPP) and the above mentioned suppliers provide in-house technical training on a regular basis to staff as well as biannual training on an advanced level with the intention of maintaining quality assurance.

**Methods:** This is a retrospective study to assess whether national training has any impact on the volume of errors, type of error codes produced and number of operator related errors, as well as whether training had any positive outcomes in reducing the overall error rate. Records of error codes collected from all viral load instruments were studied. The different types of error codes were logged, analysed and the percentage difference was calculated.

**Results:** At the onset of viral load testing prior to the implementation of national training the total error rate was ≥5%. Initially, one training session was conducted per annum in 2012 but this was then further increased to two sessions per annum. Training was targeted at staff who worked on the instruments on a routine basis with the intention of equipping staff with skills to manage and troubleshoot errors. Training addressed skills required for day-to-day testing and included establishing the use of viral load protocols, sample-to-sample and daily instrument quality control, theory review, updates on latest changes, instrument maintenance and extensive trouble-shooting modules. Since the onset of training, the percentage error rate has reduced to ≤2.5%.

**Conclusion:** A reduction in the total error rate was observed since the introduction of national training as seen by the reduction in error codes.

**MOH – Driven Strengthening Laboratory Management Toward Accreditation Exemplifies Success in Country Ownership of Laboratory QMS in Kenya**

**Background:** Quality medical laboratory services play a key role in ensuring accurate test results for public health systems. In 2010, the Kenya Ministry of Health (MOH), U.S. Centers for Disease Control and Prevention (CDC) and various the U.S. President’s Emergency Plan for AIDS Relief (PEPFAR) Implementing Partners (IPs) commenced Strengthening Laboratory Management Toward Accreditation (SLMTA) in 12 public health laboratories to implement Stepwise Laboratory Quality Improvement Process towards Accreditation (SLIPTA) as defined by the World Health Organization, Africa Region. Whereas MOH and CDC played a coordinating role, the IPs conducted training and provided site level mentorship. After the National HIV Reference lab (NHRL) attained accreditation to International Standards Organization (ISO) 15189, in 2012, the MOH took over the responsibility in 2014 to directly train and mentor laboratories to further scale-up SLIPTA.

**Methods:** NPHL established a unit to support QMS implementation at peripheral laboratories and enrolled six county laboratories into the SLMTA process. Each laboratory went through the standard three SLMTA workshops separated by defined improvement projects and focused site level mentorship. Audits based on WHO SLIPTA checklist were conducted at baseline and after completion of each of the three SLMTA mentorship sessions. To evaluate improvement, a regression model of the SLIPTA scores over time was fitted using data from all the facilities on the 12 QMS elements, with baseline scores as the intercept.

**Results:** At the final audit, all 6 laboratories improved at least one SLIPTA star from the baseline. One laboratory achieved 5 stars and has applied for ISO 15189 accreditation. The regression model showed an upward change of 2.7 (p <0.0001) in score between the three after mentorship audits and an overall change of 8.0 (p <0.001) between baseline and final audit. In 2015, MOH enrolled additional five laboratories in SLMTA.

**Conclusion:** Our findings demonstrate that MOH can successfully take ownership of laboratory QMS implementation thereby institutionalizing quality practices and enabling systematic scale-up.
Strengthening Quality Management Systems in TB Laboratories in Africa

Background: Quality TB diagnostics are essential for meeting global goals for TB control. Quality results are essential to ensure patients are correctly diagnosed in a timely manner and rapidly initiated on appropriate treatment. The Quality Management System (QMS) monitors the various aspects of the diagnostic process ensuring that the results it produces are accurate, reliable and timely. Currently there are only four accredited National TB Reference Laboratories on the continent (Botswana, Mozambique, South Africa & Uganda). 54% of National TB Reference Laboratories in Africa reported implementing a QMS towards accreditation, however the extent of implementation remains unclear.

Methods: FIND is supporting the strengthening of QMS in TB laboratories through the TB Strengthening Laboratory Management Toward Accreditation (TB SLMTA) structure training and mentoring approach. We report on the status of implementation of TB SLMTA on the African continent.

Results: Two African regional Training-of-trainer workshops have been conducted since 2013. Thirty-two participants from 10 countries in Africa have been trained. Nineteen participants were certified as trainers. Three TB-SLMTA Master Trainers resident on the continent have led roll out of the programme. TB SLMTA workshops involving 17 TB laboratories in three countries (Ethiopia, Lesotho and Tanzania) have been conducted. Pre- and post-assessment scores using the using the TB Laboratory Quality Management Systems Towards Accreditation Harmonized Checklist (TB SLMTA Harmonized Checklist) are reported for 16 laboratories. Fourteen laboratories showed improvement (87.5%)- the scores in two laboratories decreased. An average improvement of 20.9% from baseline to exit audit was achieved within an average of 16 months. Further mentoring towards accreditation is ongoing.

Conclusion: The TB SLMTA approach has shown promising results in several countries in Africa. Continued support of countries is needed post TB-SLMTA to support laboratories through to accreditation. Building country capacity, increasing the pool of trainers and building stronger partnerships for expanded implementation are a priority to ensure continued quality improvement in TB laboratories in Africa.

Evaluation of the Impact of Periodic Monitoring of Non Conformities in Improving Efficiency of a Testing Laboratory

Background: According to ISO 15189, clinical laboratories must comply with high quality of patient testing. Monitoring nonconformities help to identify underlying problems in testing systems or processes leading to quality improvements. Here we describe how monitoring of corrective and preventative actions (CAPAs) to nonconformities improved efficiency in testing systems and processes in a College of American Pathologists accredited laboratory.

Methods: To evaluate the impact of CAPAs in improving the laboratory’s efficiency in patient testing, nonconformities associated with haematology and chemistry tests were retrospectively assessed for a period of five years. Nonconformities were based on pre-analytic, analytic and post analytic phases of testing.

Results: CAPAs included erroneous sample requisitions, specimen mislabelling, improper documentation, equipment operation, maintenance and erroneous result reporting. Out of the total errors cited, 63% were found during the analytical phase, whilst 33% and 4% were cited during the pre and post-analytic phases of testing, respectively. We observed a high error to sample ratio with chemistry compared to haematology testing. However, procedural errors were higher for haematology testing. After several interventions, error to sample ratio for haematology testing reduced from 15.2 to 2.2%, whilst equipment associated errors for chemistry testing reduced from 22 to 4.4%.

Conclusion: The majority of procedural errors on the chemistry analyser were associated with control deterioration after reconstitution and long service periods (semi-annual), whereas lack of staff adherence to standard operating procedures caused majority of haematological errors. CAPAs to reduce errors included, improving control preparation and storage, increasing calibration and servicing frequencies in addition to evaluation of staff adherence to SOPs. Documentation of CAPAs is not a punitive practice, however it helps to identify solutions to re-occurring nonconformities which leads to improving and maintaining a laboratory’s quality management system.
**POSTER 407**

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**Management Review Meetings, an Impetus to Laboratory Quality Improvement: Case Study of Bungoma County Referral Hospital Laboratory**

**Background:** Bungoma County Referral Hospital Laboratory (BCRHL), which supports a 200-bed referral facility, began its Strengthening Laboratory Management Toward Accreditation (SLMTA) journey in 2011 together with eight other laboratories in the second round of SLMTA rollout in Kenya. This paper describes how the integration of regular planned management review meetings led to sustained improvement processes at BCRHL.

**Methods:** SLMTA implementation followed the standard three-workshop series, mentorship site visits and audits. Bungoma County Referral Hospital Laboratory recognized that integrating planned regular management review meetings into its operations would ensure rapid improvement and sustainability long after the training program ended. The lab undertook a process of ensuring all stakeholders participate in quarterly management review meeting – to a mission ensuring continual improvement.

**Results:** After 16 months in the SLMTA program, Bungoma County Referral Hospital Laboratory (BCRHL) rose from a zero- to 4-star rating, saw an improvement in all twelve Quality System Essentials and later attained accreditation status after 42 months. During the process, it saw improved EQA results from 47% to 87%; staff punctuality from 49% to 82%; clinician complaints decreased from 83% to 16%; and sample rejection rates decreased from 12% to 3%.

**Conclusion:** Management review meeting is vital in engaging stakeholders, creating an inclusive environment, and developing processes to sustain a culture of continuously improving laboratory services quality. To build sustainability and continual improvement, the authors recommend total stakeholders involvement in regular management review forums and using progress-monitoring tools and feedback systems. BCRHL incorporated regular (quarterly) management review forums into the process, and considers this important in quality improvement.

**POSTER 408 CANCELLED**

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**Building Partnerships to Develop In-Country Biosafety Cabinet Training Programs**

**Background:** The Eagleson Institute has worked in partnership with other organizations, both in the United States and Africa, to teach Biosafety Cabinet certification in several African countries. For approximately five years the Institute’s Global Biosafety Cabinet training program consisted of two phases taught in the United States followed by mentoring in-country. This past year the program has been revised to be offered completely in-country; by December 2016 three countries will have participated in this new adaptation.

**Methods:** This past May the Eagleson Institute worked with APHL, CDC, and the Ethiopian Public Health Institute to create an in-country Biosafety Cabinet Certification program. Training usually offered in the United States was adapted for this Institute’s training facility and training needs. Challenges included equipping the training facility with the equipment needed for offering this technical, hands-on program, as well as revising course materials to be more global and less US focused. Eleven students participated. Upon completion of Phase I, students continued to be mentored via email with Eagleson Instructors. The plan is to return to Ethiopia for two more phases of training.

In the coming months, the Eagleson Institute will offer a similar program with APHL and CDC in Sierra Leone, in French. This will require both on-site translation as well as translation of all course materials. A third program will be taking place in Uganda with different partners.

**Results:** At this point in time, Phase I of the Ethiopian training has been completed successfully. Teaching on-site at the Ethiopian Public Health Institute offered much opportunity for the students to practice their new certification skills in “real world” situations. It also provided the instructors an opportunity to learn more about the design of Ethiopian laboratories and the types of ventilation equipment present in-country, which led to customization of the training.

In conclusion, this new training program is off to a strong start. Benefits of teaching in-country vs in the United States include: more students from an individual country are able to be trained, and the program can be better customized to meet an individual country’s needs. By December, Phase II of the Ethiopian program, and Phase I of similar classes in Sierra Leone and Uganda will be completed. Much more will be known about the successes and challenges.
Collaboration is Essential; Delivering Good Clinical Laboratory Practice Training Where it is Needed the Most

Background: All personnel in a clinical trial laboratory should understand the principles of Good Clinical Laboratory Practice (GCLP) and how each principle is applied within the laboratory. This ensures that laboratories are all working to the standards of GCLP and assures the reliability, quality, consistency and integrity of the data generated by the laboratory. This is important to the outcomes of all clinical trials so it is essential that laboratory personnel receive GCLP training. There are initiatives providing GCLP training in low- and middle-income countries; but much of this training is face to face which can be costly and cannot be accessed widely enough.

Methods: The Global Health Network collaborated with multiple clinical trial laboratory experts across a number of countries to share training materials in order to produce a high quality, peer reviewed online training course in GCLP. Launched in June 2015, the Introduction to GCLP course is a free and open access online course providing a background to GCLP, summaries of the principles of GCLP, an overview of the implementation of GCLP and discusses the impact implementation has on a clinical trial. The course is hosted within the trusted and well-regarded Global Health Training Centre and designed to be accessible from areas with low band width internet connection to ensure access by individuals in low- and middle-income countries.

Results: The course has been formally recognised for its quality and content by the Global Health Clinical Consortium, a group consisting of several Product Development Partners who receive funding from the Bill & Melinda Gates foundation. By the end of April 2015, the Introduction to GCLP course had been taken 3,300 times by 2,145 individuals across 146 different countries. Overall, 142 individuals provided feedback on the course and over 96% stated they would recommend the course to a friend or colleague.

Conclusion: There is a clear demand for free, easily accessible, high quality online training in Good Clinical Laboratory Practice as well as many other laboratory focused topics for which no such training is available. Increased collaboration and sharing of training materials between organisations is required to produce more online training resources to support laboratory capacity and conduct in some of the world’s poorest areas where accurate and reliable clinical research is needed the most.

Impact of Introducing an Effective Surveillance System for Drug Resistance Tuberculosis in Tanzania

Background: Surveillance Systems of Tuberculosis (TB) are essential for monitoring the effectiveness of TB programmes.[i] Rapid detection of drug resistance is important to prevent future transmission.[ii] The Routine Surveillance System (RSS) in Tanzania is intended to help identify individuals with drug resistance so patients can start treatment as early as possible. The current RSS policy specifies that 25% of smear positive new TB cases and 100% of smear-positive treatment TB cases should be referred for additional testing. The study aims a) to explore the perception of the key stakeholders on the performance for the current RSS and b) to identify the barriers to effective performance of the RSS.


Methods: Qualitative analysis using NVIVO 10™ on 16 in-depth interviews and 6 focus group discussions with TB health workers, program staffs, partners and Ministry staff were conducted in 4 regions (Shinyanga, Morogoro, Arusha and Dar es Salaam) with rates of TB infection from July to December 2014.

Results: Positive and negative comments on the RSS were noted. The system of sending specimens via post was said to be of help in identifying the barriers to effective performance of the RSS. The routine surveillance system works well for some regions there are systemic constraints that need addressing affecting other regions. The next step will be to pilot a new RSS that addresses some of these constraints and takes into account the ongoing implementation of new diagnostic technology i.e. Xpert MTB/RIF. The main objective will be to develop and implement a RSS that can provide timely information for individual patient care and to monitor trends MDR-TB prevalence.
**POSTER 411**

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**Biological Safety Initiatives in Africa: Gaps, Challenges and Improvements**

**Background:** The lack of expertise and risk management systems remain the most concerning issues in Africa. Objective: To identify and assess the laboratory biosafety gaps in Africa and suggest sustainable ways to build cooperative biosafety opportunities.

**Methods:** A cross-sectional study was conducted thorough review of biosafety/biosecurity-related activity literature in Africa such as workshops, symposia, conferences, guidelines and policy to collect biosafety and biosecurity data and gaps during 2010-2015. A series of questions were asked: Who possess the process?; What is its aim?; What are the metrics for achievements?; Why is it so important?; What are the financial impact, environmental impact and expertise needed?; What is poor laboratory biosafety and biosecurity practice, and how can we improve them?; How are decisions communicated, and to whom?. Such investigation “after documenting all details,” may reveal opportunities to reinvent laboratory biosafety and biosecurity practices.

**Results:** Seven components can help laboratory biosafety and biosecurity practices: (1) bright thinking, (2) low-cost, (3) effective procedures, (4) equipment are easy to maintain (5) creative principles can release new advances, (6) models that can release new advances, and (7) examples and comparison that help redefine what can be done.

**Challenges:** Need for protocol and policies: (1) to provide protection for healthcare workers, patients and community at large (2) sufficient financial and human resources, (3) monitoring and control, and (4) clear responsibility.

**Conclusion:** Addressing the issues: This is a long-term process, sustained by gradual improvements that need to build-up to a comprehensive system and address: (1) resource allocation, (2) monitor laboratory biosafety and biosecurity practices, (3) manpower needs and other resources.

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**POSTER 412**

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**Evaluating Engineering World Health’s Program to Build Sustainable Training Programs for Biomedical Engineering Technicians in Low-Resource Environments**

**Background:** In low-resource countries, laboratories typically rely on maintenance contracts with Original Equipment Manufacturers or third party vendors. However, this poses multiple limitations: OEM technicians can service only their own company’s equipment, and then only for a limited time. Additionally, they do not service less complex but equally vital equipment necessary for laboratory effectiveness: pipettes, refrigeration, microscopes, etc. Independent technicians can service any equipment but may have limited experience or knowledge with sophisticated equipment and may be underqualified. As a result, billions of dollars of laboratory equipment in low-resource countries is not functioning.

Over the past 5 years, in partnership with local colleges, hospitals, and Ministries of Health, Engineering World Health (EWH) has built sustainable training programs in 6 countries for local Biomedical Engineering Technicians (BMETs) and their faculty trainers, so that vital laboratory equipment can be repaired and maintained. In addition to guided instruction in laboratory equipment repair and maintenance, the program teaches management skills so that a laboratory-based BMET can work not only in repair and maintenance, but can communicate effectively with chief medical officers and effectively manage OEM work.

This paper shares the results of mid-term evaluations of EWH programs in Honduras, Rwanda, Ghana and Cambodia that surveyed 3210 pieces of clinical laboratory equipment and the programs’ impact on the percentage of working clinical laboratory equipment.

**Methods:** For each country, researchers compared matched cohorts of hospitals, with and without trained technicians. Information collected including the source, age and functionality of both low and high complexity laboratory equipment.

**Results:** Hospitals with EWH-trained technicians have 57% less out-of-service equipment ($p < 0.01$) when compared to hospitals without EWH training. Service contracts, on the other hand, were ineffective. There was a non-significant difference ($p>0.05$) between service contracted equipment that was out-of-service (15%, $n=1562$) and non-contracted equipment that was out-of-service (18%, $n=644$).

**Conclusion:** The EWH BMET Training Program has shown a dramatic increase in the percentage of working equipment in EWH-trainee staffed hospital.
Productive Partnerships: Kenya’s Experience in Implementing Individual-Based Proficiency Testing for Rapid HIV Testing

**Background:** In Kenya, approximately 9 million rapid HIV tests were performed in 2015. This number is bound to increase to meet the UNAIDS 90:90:90 targets. This success has largely been achieved through task-shifting, with trained counsellors and lay workers performing most of the testing. The estimated number of rapid HIV testers in Kenya is 20,000, and ensuring correct HIV test results is a priority. In 2007, Kenya established an HIV proficiency testing (PT) program to provide quality assurance services, initially targeting HIV testing facilities. We describe how we transformed this PT scheme from facility-based to individual-based assessment, to assure closer monitoring of quality.

**Methods:** The National Public Health Laboratory Services (NPHLS) engaged multiple stakeholders including county health coordinators and in-country President’s Emergency Plan for AIDS Relief (PEPFAR) implementing partners (IPs), sensitizing them on the need to closely monitor quality of HIV testing through individual-based PT. At least two trainer-of-trainers were trained from each county to cascade the change in strategy to service providers. Roles were defined for each stakeholder including PT production, courier and provision of corrective interventions.

**Results:** County health teams worked collaboratively with IPs to enroll service providers to the HIV PT scheme. There was a gradual, phased scale-up of sites initially targeting all providers in the existing 3054 sites by June 2011. By October 2011, 4639 service providers were enrolled. By early 2016, just under 10,000 had been enrolled. To assure sustainability, IPs were tasked to closely monitor quality of HIV testing through individual-based PT. We describe how we transformed this PT scheme from facility-based to individual-based assessment, to assure closer monitoring of quality.

**Conclusion:** Collaboration between NPHLS, county teams and IPs was crucial to the success of scale up in QA activities. The success and lessons learned in the implementation of individual-based HIV PT can readily be replicated in other countries where HIV testing is being scaled up.

Systematic Research Capacity Building for Laboratory Personnel: Swaziland’s Experience

**Background:** Laboratory Research Training and Mentorship Program (LRTMP) implementation provide an opportunity to build the research capacity within public health laboratories, thereby enabling the laboratories better respond to public health needs and contribute to the body of evidence to inform decision, policy and laboratory program improvement efforts. Different capacity building approaches have been used with varying levels of success. We provide preliminary results and experience from a phased implementation in Swaziland.

**Methods:** Funded by PEPFAR through CDC, a contextualized LRTMP was collaboratively implemented by the Ministry of Health, University Research Co., LLC and African Society for Laboratory Medicine between April 2014 and September 2015. A 5 phased practical based laboratory research training was adopted and delivered in 5 phases, coupled with 2 months of intervening mentoring by research experts between workshops (phases: I-II covering research methodology; III covering protocol development & data collection; IV-V covering data analysis, evaluation and scientific writing). Mentees were twined with mentors at a ratio of 1:3. Participants were enrolled in the program if they at least had a diploma in Laboratory Medicine and one year of practical experience. A pre/post-test evaluation was used to assess knowledge and skills gained. Small research grants were provided to facilitate protocol development, seeking of ethical review and implementation.

**Results:** At the beginning, 15 participants were enrolled, achieving an average score of 30% and 65% scores in pre and post-test evaluation respectively. At the end of phase 3, 8 participants were still in the program. Participants had gained knowledge as demonstrated by satisfactory post-test scores. Three out of 4 assigned research protocols were developed, approved by the local ethics committees. Data collection is underway, though slow due to time constraints and attrition of both the mentees and mentors.

**Conclusion:** This program has demonstrated the feasibility of designing and implementing a contextualized LRTMP. The impact of this program was observed to address local public health needs through research findings conducted by mentees of the program. However, sustaining the program to improve laboratory research capacity requires local ownership, leadership support, personnel time commitment both from the mentor and mentee and continued funding.
**Poster 415**

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**Strengthening the Kenya Rapid HIV Testing Quality Assurance Program through Utilization of the Standardized National HIV Testing Logbook**

**Background:** Kenya has expanded HIV Testing Services (HTS) capacity through community and facility-based settings. The clients who have received HTS increased from 860,000 in 2008 to 9,800,000 in 2015. Following adoption of Option B+, the National HIV Testing Services Guidelines (2015) emphasize the need for strengthened Quality Assurance (QA) program through use of sustainable and practical HIV rapid testing quality monitoring and improvement tools. The national QA program is implemented through complimentary QA elements that include the use of a national standardized logbook to capture rapid HIV testing quality-related data. Although the standardized logbook is widely used since 2011, full implementation has not been done. QA data is not routinely analyzed and used for improvement of the quality of services.

**Methods:** In 2015, 210 HTS sites were selected for the Rapid Testing Quality Improvement Initiative where the full cycle of monitoring rapid HIV testing is implemented. For 71% (150/210) of these sites using standardized HTS logbook, its full implementation was assessed at baseline (July) and in August and September 2015. Collected QA data was transmitted through a web-based system. Analysis for agreement rates between test 1 and 2 was done real-time by an automated analytic system. Using access credentials allocated to QA officers, results were accessed online. Sites with agreement rates of <98% were targeted for technical interventions. Changes in agreement rates were monitored.

**Results:** The proportion of sites with test 1 and 2 agreement rates of > 98% progressively increased from 96.2% at baseline in July to 98.7% and to 99.3% in the months of August and September, respectively.

**Conclusion:** Closely monitoring the QA-related data from the standardized logbook and timely corrective interventions improved the agreement rates. The Standardized HTS logbook is useful in improving rapid HIV testing quality if fully implemented.

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**Poster 416**

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**Using Health Commodity Management Platform (HCMP) Improve Laboratory Commodity Reporting Rates in Kenya**

**Background:** Accurate quantification, timely reporting and requisition of HIV rapid test kits (RTKs) has been a perennial challenge for the health system in Kenya. We introduced an online reporting system for HIV RTKs in Nakuru County in October 2013 to streamline the reporting, requisition and monitor consumption of HIV RTKs. We report here the process used in setting up this system and how data was collected and used to monitor stock levels.

**Methods:** The Sub-County medical laboratory technologists (SCMLTs) were trained on the online commodity reporting and requisition platform, the report submission process and individual tracking of the reports. This was a day-to-day training and mentorship provided by the project laboratory technical officers to ensure timely and accurate submission of reports. After the launch of the system data on reporting rates, stock levels, commodity consumption, timeliness and accuracy of reporting was collected from October 2013 to May 2015.

**Results:** The reporting trends improved considerably from 2013 to 2015, as summarized below: Oct 2013 (83%); Nov 2013 (82%); Dec 2013 (84%); Jan 2014 (83%); Feb 2014 (89%); Mar 2014 (100%); Apr 2015 (91%); May 2015 (94%); Jun 2014 (96%); July 2014 (96%); Aug 2014 (97%); Sep 2014 (99%); Oct 2014 (93%); Nov 2014 (99%); Dec 2014 (100%); Jan 2015 (99%); Feb 2015 (100%); Mar 2015 (100%); Apr 2015 (100%); May 2015 (100%).

**Conclusion:** The new system allows real-time visualization of data by the supply side upon entry by the consumer. This has led to improved reporting rates, timely redistribution of kits to facilities that are facing stock outs, better monitoring of kit consumption by administrators as well as monitoring of the number of people tested across the region.
**Improving Polymerase Chain Reaction (PCR) Supply Chain Performance in Nigeria through Collaborative Interventions**

**Background:** In 2007, the Nigerian Government, with support from PEPFAR, began early infant diagnosis of HIV-1 and viral load monitoring of clients on ART using the Polymerase Chain Reaction (PCR) technique. However, access to PCR testing was impeded by inefficiencies of a fragmented HIV/AIDS supply chain, including weak logistics coordination, duplication of effort, and poor resource utilization. SCMS, through collaboration with the Nigerian Government and partners, implemented interventions to promote PCR commodity security.

**Methods:** SCMS provided technical assistance to implement:
- Pooled procurement and streamlined distribution of PCR commodities.
- Review of logistics tools, transfer of skills to service providers, and institutionalization of bimonthly logistics data reporting to inform resupplies.
- National quantification exercise in August 2014 and quarterly supply plan reviews.
- Harmonized and standardized equipment to minimize variability in commodity requirements.
- Capacity building to enhance local vendors’ performance in cold-chain warehousing and distribution.

**Results:** To determine these interventions’ effectiveness, SCMS assessed supply chain performance based on warehouse stock reports and laboratory LMIS reports from September 2014 to October 2015, and findings from two visits to PCR laboratories in January and August 2015, and found that:
- Order fill rates were 100%, with no stockouts, expiries, or wastages at regional warehouses.
- Stockout rate was less than 10% at PCR laboratories, with only one expiry valued at $19.
- On-time delivery rates increased by 9%.
- PCR logistics data reporting rates and timeliness increased by 61% and 53%, respectively.
- Service providers’ supply chain management capacity improved, with 21% increase in number of laboratories with staff formally trained in logistics management.
- Number of local vendors with adequate cold-chain management capacity increased by 14%.

**Conclusion:** Collaborative implementation of holistic supply chain interventions significantly improved PCR commodity security in Nigeria. This was key to an effective framework adaptable to the significant commodities needs of the ongoing HIV/AIDS program scale-up for young children and adults.

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**Effective Implementation of the Global Health Initiative, the 90-90-90 Targets, and Long-term Forecast and Quantification in Developing Countries — the Zimbabwe Experience**

**Background:** Several developing countries have embarked on laboratory system interventions to test 90% of exposed individuals, provide treatment to 90% of seroconverted persons, and attain 90% viral suppression for those in treatment. Many laboratory programs are underfunded and unresponsive to this UNAID’s initiative. Accurately predicting supply demand and instruments capacity is an ongoing challenge. SCMS, a project under PEPFAR administered by USAID, in collaboration with the Zimbabwe Ministry of Health, conducted a comprehensive multimethod laboratory forecast to assist in HIV viral load implementation plans to meet 90-90-90 targets.

**Methods:** We conducted a five-year multimethod forecast of key laboratory commodities, including CD4, EID, and viral load, using the ForLab forecasting tool. To develop a forecast, we used two years’ historical consumption and service statistics from 120 laboratories and matched them with HIV patient demographic targets from the HIV care and treatment program. Forecasted test numbers and cost of the multimethod forecasts from ForLab were compared with the country’s HIV Viral Load Implementation Plan 2015–2020. Instrument capacity, utilization, and human resources were also reviewed.

**Results:** The five-year estimated cost of commodities for HIV testing services was $44 million, 45% of this for viral load. The estimated five-year viral load tests the country can offer with the existing instrument capacity was 686,000 tests, which is less than 20% of demographic estimated need. If 90-90-90 is to be realized, the five-year estimated viral load testing demand would be 2.9 million, a 76% increase in viral load testing. To meet this need, instrument capacity would have to increase from two to 10.

**Conclusion:** Accurately predicting the need and understanding diagnostic capacity for viral load testing is critical in implementing the 90-90-90 interventions. Multimethod laboratory forecasts allow for comparative analysis of need, cost, and capacity of diagnostics services to improve planning and effectively implement national health initiatives.
**Health Laboratory Quality Management System Support Towards Accreditation in Resource Constrained Setting: Experience from Tanzania**

**Background:** Tanzania’s laboratory accreditation target through PEPFAR support, under GHI was to ensure 39 laboratories receive WHO AFRO SLIPTA star rating and at least 5 internationally accredited by 2015. In support to this initiative, TUNAJALI program introduced laboratory accreditation support activities in 5 regions where it operates. Challenges observed were weak understanding and lack of commitment to implementation of laboratory QMS by HCWs. Consequently, laboratories enrolled in the Strengthening Laboratory Management towards Accreditation (SLMTA) program was slow at the beginning before taking strides in 2011. In SLMTA cohort I in 2011, program supported 3 laboratories of which two scored zero and one got only 1 star and in 2012 one laboratory supported by program scored 2 star only. With poor performances observed TUNAJALI program changed its approach of supporting laboratories participating in SLMTA program in order to reasonably utilize resources including time.

**Methods:** TUNAJALI program through USAID support, using trained laboratory technical staff, created a pool of regional resource persons (mentors) through classroom training on Quality Management System and hands-on, on-job coaching. The resource persons deployed for joint mentorship and supportive supervision in laboratories participated in SLMTA for direct transfer of knowledge, experience and skills for 2 weeks each quarter. Facility management and other HCWs buy in presentation and discussions was done for local commitment creation

**Results:** Among 18 laboratories assessed by the African Society of Laboratory Medicine (ASLM) in SLMTA cohort IV, Singida and Turiani scored 128 and 84 respectively at baseline equivalent to zero stars and 200 and 195 at exit assessment equivalent to 3 Stars for each. The attainment when compared to other laboratories in the country assessed in the same cohort. Local resource persons were accepted by mentees as peer trainers.

**Conclusion:** Health laboratories support towards accreditation using a local pool of resource persons from within the facilities saves money, time and provides better way of accreditation in a sustainable means.

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**Survey of Laboratory Practices and Policies Guiding the Storage, Maintenance and Re-Use of Dried Blood Spot Samples Collected for Infant Diagnosis of HIV and HIV Viral Load Monitoring in Six Sub-Saharan Countries**

**Background:** Remnant dried blood spot (DBS) samples collected for infant virologic HIV diagnosis and/or HIV viral load (VL) quantification in resource-limited countries hold public health potential, such as HIV drug resistance surveillance or non-HIV disease screening/detection, if collected, stored, and managed under standardized, optimal conditions.

**Methods:** Directors of 13 mostly high-volume DBS-processing laboratories in six sub-Saharan African countries participated in a cross-sectional survey addressing management, storage, discardment, and re-use of remnant DBS and their associated data. Participants completed the survey in paper form or via an online survey tool; responses were analyzed in aggregate form using Excel 2010.

**Results:** All 13 laboratories conduct infant virologic diagnosis and eight conduct VL testing. All laboratories store remnant infant DBS and seven store remnant VL DBS. Storage conditions for remnant DBS vary from room temperature to -80 Celsius. Criteria used to determine storage and discardment practices for DBS vary; seven laboratories do not discard any remnant infant DBS. Regarding remnant infant DBS, two laboratories have national policies for storage, and one has a national policy on discardment. Seven laboratories have systems for tracking remnant infant DBS and one has a system for tracking remnant VL DBS. Data fields captured in these tracking systems vary; consent for storage is not included. Four of 12 responding laboratories have used remnant infant DBS for research and two of eight responding laboratories have used remnant VL DBS for research; only 2 laboratories have a national policy on research on remnant DBS.

**Conclusion:** There is a lack of standardization in the storage, discardment, and re-use of remnant DBS; global guidance is needed to recognize the full public health potential of these specimens. Countries should work with relevant stakeholders, including community, research and ethics bodies to develop an ethical and culturally-appropriate approach for storage and re-use of remnant DBS.
Monitoring the Site Level Performance of Facilities Conducting HIV Rapid Testing Using Proficiency Testing

Background: In South Africa, the large number of public health facilities (>4,000) and non-laboratory personnel (>20,000) providing HIV testing services (HTS) impacts the provision of accurate and reliable results. Following the recent introduction of the rapid test quality improvement initiative, facilities were monitored for testing quality using proficiency testing (PT) for the first time in South Africa.

Methods: Performance of facilities providing HTS was assessed between May and June 2016 using HIV PT panels containing 6 serum specimens of varying HIV antibody reactivity. These panels were produced by the Quality Assurance Department at the National Health Laboratory Services (NHLS) and were distributed to 852 facilities in 8 provinces. Facilities were given 4 weeks to test the PT panels and return the completed results form to the NHLS by either fax or email. Participating facilities received results through their respective District Health Coordinators office.

Results: An overall response rate of 62% was attained with 85% of those achieving a satisfactory result. The province with the highest response rate was Gauteng (82%), and the lowest was Western Cape (45%). The best performing provinces in terms of satisfactory results were Eastern Cape, North West and Free State at 99%, while performance scores were lowest in Western Cape (60%). Some contributing factors to facilities receiving an unsatisfactory performance results could be panel integrity as well as cross-contamination and deviations from testing algorithm. Logistical challenges included inability of couriers to locate some rural facilities, delivery to wrong facilities and facility staff declining to accept panels.

Conclusion: Assessment of testing sites using PT revealed areas resolvable with innovative solutions and improved awareness.

Introducing HIV Self-testing to Rural Communities in Malawi: Cognitive Interviewing May Alert Implementers to the Need for Additional Support Beyond That Provided By Manufacturer’s Instructions-for-Use (IFU)

Background: Self-testing devices provide a convenient option for home testing, but comprehension of manufacturer’s IFUs is likely to be highly variable.

Methods: Commercial OraQuick ADVANCE® Rapid HIV-1/2 Antibody Test Kits packaged for self-testing were procured with pictorial IFUs accompanied by text in both English and Chichewa (Malawian language). Ease-of-use was assessed by cognitive interview of literate adults (≥16 years) attending rural HIV testing services (HTS) in Blantyre. Participants were provided with packaged kits containing IFUs but no other assistance. A standardised questionnaire and observation record was administered during self-testing. Feasibility was then evaluated in two villages aiming for 250-300 participants from randomly-selected households and community peer groups (age ≥16 years, not taking antiretrovirals). Baseline and exit questionnaires were administered. HIVST followed brief demonstration of contents and kit usage. HIVST results were compared to a reference standard (3 commercial OraQuick ADVANCE® Rapid HIV-1/2 Rapid HIV-1/2). Results: Numerous problems occurred in 20 cognitive interviews, including difficulty opening packaging, and misinterpretation of translated phrases (“two pouches”; “test stand”) and imagery. Abstract symbolisation (e.g. knife/fork for eating; traffic signal “do not”) was poorly recognised. Although 18/20 completed HIVST, these difficulties greatly affected timeliness and confidence in validity. In contrast, all 281 feasibility participants (60.0% literate) completed HIVST following standardised demonstration. Self-read results agreed with reference for 11/12 HIV-positive participants (sensitivity 91.70%, 95%CI 61.5%-99.8%) and 268/269 HIV-negative participants (specificity 99.60%, 95%CI 97.9%-100%). 81.0% of randomly selected adults and all peer group members opted to self-test. Perceived ease and satisfaction were high, with 100% recommending HIVST to friends/family.

Conclusion: In settings where commercially packaged self-assembly products are rarely encountered, literacy may not guarantee ability to follow IFUs unless accompanied by a demonstration of use. Cognitive interviewing of clinic HTS attendees provides a rapid and convenient way to alert implementers to the need for such supportive measures in their communities. Funders: UNITAID
**POSTER 424**

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**Zimbabwe Integrated Sample Transportation System (ISTS) Case Study**

**Background:** The existing national sample transportation network is fragmented and costly resulting in suboptimal rates of testing for diagnosis and monitoring. It relies on multiple disjointed transportation mechanisms and uncoordinated service providers. We piloted an ISTS using a low cost local courier service - ZimPost. The objective of the pilot was to evaluate the acceptability, effectiveness, and cost of ISTS for HIV and TB laboratory services.

**Methods:** ZimPost transported samples and results between 68 primary care facilities and 5 laboratories. Data on cost, turn-around time (TAT), and testing rates were abstracted from ZimPost records as well as laboratory and clinic registers for a baseline and post-pilot comparison. Semi-structured qualitative interviews with clinic and laboratory staff were conducted to assess acceptability. The pilot was completed on 30 April 2016.

**Results:** On average, sample collection increased by 70% with the highest increase in CD4 samples (121%). Early Infant HIV Diagnosis (EID) TAT decreased by 24 days and an 8 day TAT was achieved for CD4 and TB sputum testing. A 44% per sample cost reduction and 35% per facility cost reduction was observed between the baseline and post-pilot period. Cost-savings were driven by the decrease in the number of courier service providers and trips required as a result of combining sample types. Clinical and laboratory staff reported that the ISTS had strengthened the diagnosis and management of TB and HIV.

**Conclusion:** The ISTS has been demonstrated to be an effective and affordable sample transportation system. The pilot also demonstrated the importance of a courier function that is dedicated solely to specimen transportation. However, the main limiting factor is that the courier roles may not be easily transferable to MOHCC given the current low staffing levels and high workloads which are exacerbated by the economic environment. It is recommended that MOHCC consider prioritizing specimen transportation in other health budgets e.g. results-based financing.
Improving Quality Assurance in Malaria Diagnosis at Lodwar County and Referral Hospital Laboratory in Turkana County, Kenya

**Background:** Lodwar County and Referral Hospital laboratory is one of the sites undergoing the Accreditation process, currently at three stars according to the previous KENAS assessment. Malaria diagnosis has been a major challenge due to a deficiency of staff training on quality assurance. This led to substandard patient care and management. Among the improvements included excellent preparation of thick and thin smears, reagent preparation, staining, parasite quantification, species identification, and performance of daily IQC. On Job training and staff competence was done. The laboratory was also enrolled on EQA.

**Methods:** With the application of the PDCA cycle, ten staffs were trained on malaria quality assurance. EQA focal person was appointed. An implementation plan was laid down through a lab meeting which involved SOP development, CMEs to discuss critical areas including proper sample collection, serialization of samples, preparation of thin and thick smears, reagent preparation, staining, parasite quantification, species identification, and performance of daily IQC. On Job training and staff competence was done. The laboratory was also enrolled on EQA.

**Results:** After implementation of malaria quality assurance, there was a tremendous improvement in malaria diagnosis and management. Among the improvements included excellent preparation of thick and thin blood smears, excellent staining, improved quantification of results, species identification, serialization of slides, archiving of slides for EQA sampling. Slide re-examination showed a tremendous reduction of false results to 2 percent.

**Conclusion:** Quality assurance in malaria microscopy was successful. Compliance to the standard operating procedures, planning, and involvement of the hospital management is key. EQA performance acts as a standard measure since what can be measured can be fixed.

A Smartphone-based Communication Program for Critical Alert Lab Values Within a Kenyan Regional Referral Hospital

**Background:** Timely care of severely ill patients is often delayed by a lack of infrastructure or protocols for communication between the clinical lab and the wards or clinics in low and middle-income countries (LMIC). This is especially true for critical lab values requiring immediate action by the ordering clinician. With over one billion users, WhatsApp is free and widely available in sub-Saharan Africa to bridge this communication gap. This study is the first to test the feasibility and acceptability of using WhatsApp for clinical lab-related communications.

**Methods:** We implemented a WhatsApp-based protocol to communicate critical alert lab values in real time between the clinical laboratory and the inpatient ward or outpatient clinics at Naivasha Sub-County Hospital (NSCH), a Kenyan regional referral hospital. A standard operating protocol was developed to guide and standardize the documentation and reporting of critical lab values for haematology, chemistry, microbiology, serology, and blood bank/transfusion services. The program’s impact was evaluated via semi-structured interviews of inpatient and clinic providers, as well as laboratory staff.

**Results:** The NSCH WhatsApp critical alert lab value program launched in September 2015. Clinicians report that WhatsApp critical lab value alerts improved patient management by decreasing the time between initial lab value reporting and appropriate management changes. Examples include rapid admission of sick outpatients from clinic, diagnosis and treatment of diabetic ketoacidosis, cryptococcal meningitis, and acute leukemia, thereby helping clinicians prioritize the sickest patients amidst a large census.

**Conclusion:** Clinicians report that the critical alert lab value program decreased time to making necessary, and often life-saving, changes in patient management and prioritizing the sickest patients for care. Future work will focus on obtaining quantitative data on time between reporting and clinician action, strengthening protected access to confidential patient data, and developing approaches to scale up the program within Kenya and in other countries.
The Impact of QMS on Biosafety at Lodwar County and Referral Hospital Laboratory, Turkana County in Kenya

Background: Biosafety plays a critical role in a medical laboratory setup. Biosafety at Lodwar county and referral hospital laboratory has been substandard before they began the SLMTA/SLIPTA process. Documentation of safety exposures was at zero. Through a questionnaire subjected to 20 staff who were working in the laboratory by 2013, a total of 40% had suffered safety associated incidents in the form of accidental pricks, TB infection, Chemical Burns and electrical shocks. The purpose of this study is to determine the impact of QMS implementation at LCRH lab. Baseline SLIPTA assessment done in January 2014 scored the lab 12 points.

Methods: This is a retrospective kind of study. A survey was carried out in the form of a questionnaire to the staff who were working in the laboratory between January 2013 to December 2014. Among the variables addressed by the questionnaire include the average number of injuries, those who were on PEP, availability of an occurrence book. Also, the assessment of the laboratory using the WHO SLIPTA checklist was also done. The gaps identified paved way for trainings and mentorship on QMS. This was done with the support of the hospital and county management. Staffs were empowered to do implementation.

Results: Great improvement was noted in the final assessment to 40 points. Safety related injuries reduced drastically to 2%. Documentation is now >95% updated. MSDS is in place and Biosafety cabinet now routinely serviced and certified.

Conclusion: Implementation of QMS is key in improving the Biosafety and reducing incidents and accidents in a medical laboratory. Staff commitment is also an important factor without which implementation can be a challenge.

Integrated External Quality Assurance in Support of SLMTA Implementation in Kenya

Background: The implementation of quality management systems (QMS) in laboratories improves the quality of results. Participation in External quality assurance (EQA) offers regular checks and confidence to laboratories. Recent scale up of Strengthening Laboratory Management Toward Accreditation in the country has created a great need for EQA enrolment. However, this has met several challenges for example high costs of enrollment, uncoordinated enrollment, lack of interventions and troubleshooting skills. This is due to lack of an integrated national EQA policy and programme.

Participation in EQA schemes is skewed towards same facilities leaving out others, tending particularly towards reference laboratories, private and high tier laboratories.

Methods: To address this challenges the Ministry of Health through National Public Health Laboratories embarked on the development of an integrated national EQA strategy. The strategy involves establishment of an integrated management and coordination structure at national and county levels, creation of a centralized database, coordinated interventions and a national proficiency production centre.

Results: The successful creation of national and county coordinating committees involving stakeholders. The development and adoption of an integrated national database that captures EQA providers, sites enrolled, analyte and performance. The database assists in tracking performance and feedback. Their involvement has improved performance and participation rates by 70 and 80 % respectively.

Conclusion: An integrated, standardized, and sustainable EQA system will significantly improve the quality of laboratory services and support SLMTA implementation in Kenya. The information generated is used to guide evidence-based decision making on quality of laboratory testing.
**Improving Patient’s Waiting Time Using the Challenge Model at Bungoma County Referral Hospital Laboratory**

**Background:** Patient’s waiting time is one of the quality indicators that the laboratory should monitor to continually improve the effectiveness of the quality management system. Prolonged waiting time affects customer satisfaction. Challenges related to coping with marked growth in demand, an ever increasing scope of tests and low staff level affects the waiting time. In this study patient’s average waiting time before and after applying the challenge model was assessed to measure the impact of intervention taken.

**Methods:** This study was conducted from March to July 2015. The challenge model was used to identify the project. The priority challenge was identified by scanning through the challenges, assessing the current situation and identifying the obstacles and their root cause. An action plan was developed implemented and the effectiveness of the responses assessed. Assessment of waiting time was done before and after implementing the action plan. Baseline patient waiting time was done using point in time survey.

**Results:** 2,200 cases enrolled 2190 cases analyzed Total cases tested- 47604 Using Fishbone analysis allowed identification of three key areas of opportunity: 1. staffing levels and scheduling— one staff covering from 1-2pm (peak time) 2. Waste in process – shift change over and morning staff meetings 3. Negative attitude from staff. Members of staff were requested to give suggestions. Lab Staff meetings were improved and burnout reduced. Clocking in and out was strengthened. Five additional lab staffs were recruited on one year contract and this enabled scheduling where two staff covered during lunch hour and three over the weekend. The point in time baseline average patient waiting time was 22 minutes and by the end of July 2015 the average waiting time was 10 minutes. In addition to waiting time turnaround time increased from 52% to 80%, staff punctuality from 52% to 96% and test statistics increased which led to improved revenue.

**Conclusion:** Significant reduction in patient waiting time was achieved using the challenge model approach. In addition to the overall reduction in waiting time turnaround time, staff punctuality and test statistics increased which led to improved revenue. This confirms that waiting time though not monitored regularly by most labs is an important quality indicator to ensure the effectiveness of quality management system.
**POSTER 431**

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**Smashing the Glass Ceiling to ISO 15189 Accreditation:-the SLMTA Experience in Kenya**

**Background:** When the Strengthening Laboratory Management Towards Accreditation (SMLTA) approach was launched in 2010, it was observed that of 320 internationally accredited laboratories in Africa, only 8% were in sub-Saharan Africa. In Kenya, there were only three internationally accredited laboratories. It seemed that an unseen, yet unbreakable barrier kept laboratories from rising to the ultimate measure of quality systems. Kenya embraced the opportunities offered by SMLTA. The SMLTA process was designed to catalyze international accreditation of laboratories in low resource settings where laboratory quality management systems have lagged significantly behind the developed world.

**Methods:** Beginning with 12 SMLTA medical laboratories in 2011, Kenya incrementally engaged more laboratories each year to a total of 110 by 2015. After completion of SMLTA training workshops and improvement projects, Stepwise Laboratory Improvement Towards Accreditation (SLIPTA) audits were conducted. Laboratories that attained four or five SLIPTA stars applied for ISO 15189 accreditation assessment.

**Results:** The National HIV Reference Laboratory attained accreditation in 2012 followed by two laboratories in each subsequent year in 2013, 2014 and 2015. In 2016, nine public sector laboratories have been recommended for ISO 15189 accreditation. To maintain a competitive edge, private sector laboratories independently spearheaded quality management systems improvements leading to accreditation of at least nine of them within the last six years.

**Conclusion:** Pivotal factors for this achievement were SLMTA, peer pressure, and availability of an accreditation service. SLMTA has had a catalytic effect on accreditation of medical laboratories in Kenya with an increase from three in 2010 to 27 in 2016. Whereas prior to the launch of SLMTA, laboratory practitioners may have known the tenets of quality management systems (QMS), the how-to remained evasive. SLMTA was key to allowing the delivery of quality services with attestation by an independent third party.

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**POSTER 432**

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**Integrating Human Immune Virus and Tuberculosis Care in Kabarole District Uganda, 2009–2012**

**Background:** The STOP TB strategy emphasizes TB/HIV collaboration activities to ensure all (100%) HIV-infected TB patients are identified and treated appropriately to reduce the incidence of TB. The study aimed at analyzing the trends of HIV testing among patients with TB, initiation of antiretroviral treatment and TB incidence to assess TB/HIV collaboration programme performance in Kabarole district.

**Methods:** We conducted a descriptive study between June and July 2014. Reviewed secondary TB data from quarterly TB/HIV reports sent to the district TB focal person from 2009 to 2012. We obtained the number of TB patients notified to the district, number tested for HIV and initiated on antiretroviral therapy (ART). TB incidence was calculated as a proportion of new cases and total population at risk per 100,000 population. Proportions of TB patients tested for HIV and initiated on ART were calculated.

**Results:** Males were most affected, with a cumulative incidence of 656 TB cases per 100,000 population. The annual trend of the proportion of TB patients who tested for HIV steadily increased during the study period 2009, 82%; 2010, 87%; 2011, 86%; and 97% in 2012. Also, the proportion of TB patients initiated on ART, steadily increased during the study period with a marked increase between 2011 and 2012 (34% to 58%). The district TB incidence for the study period was 472 cases per 100,000 population. There was a sharp decline from 230 to 140 TB cases per 100,000 population between 2010 and 2012.

**Conclusion:** There was an increase in HIV testing and ART initiation among TB patients, although initiation of ART was lower than 100% Stop TB program target. The incidence of TB declined during the study period. HIV testing and ART initiation among eligible TB patients should be scaled up to reduce risk of TB and improve program performance.
**Turnaround Time for Early Infant Diagnosis (EID) in North-Central Nigeria: A Time Quality Evaluation of Logistics**

**Background:** With >40,000 HIVExposed Infants (HEI) infected annually, Nigeria’s Early Infant Diagnosis (EID) program requires good logistics. Delays impact initiation of antiretroviral therapy, thus knowledge of logistic weaknesses enables targeted solutions to improve efficiency. This study evaluated EID logistics of Health Facilities (HFs) in North-Central Nigeria using turn-around time (TAT) as a quality metric.

**Methods:** Dry Blood Spot (DBS) samples are transported to PEPFAR-supported central laboratories for DNA-PCR testing. This retrospective study used data from a laboratory which received DBS from HFs in 5 North-Central Nigerian states between July2015 and May 2016. EID-TAT comprising HF and Lab TAT was determined and defined as median time from DBS collection to PCR-result receipt at HF. Mann-Whitney U & Kruskal-Wallis tests were used to explore variations and associations in EID-TAT.

**Results:** In total, 3,600 results from 192 HFs were analyzed. Overall EID-TAT was 33 days (IQR: 21, 49), of which 63.7% was spent at HFs. Lab TAT was 13 days (IQR: 9, 17), with 81.3% spent awaiting PCR assay[10 days (IQR: 7, 14)]. EID-TAT was significantly higher for secondary and tertiary level[p=0.0001]; comprehensive[p=0.0001] and for public and privateHF[p=0.0000] compared to primary health centers (PHC); PMTCT stand-alone and Faith Based Organization (FBO) HFs respectively. Median age at DBS collection was >8 weeks [24 weeks (IQR: 16, 40)] for 41.8% of samples and was significantly lower for PHCs [7 weeks (IQR: 6, 20) p=0.01] and Faith-Based Organizations [6 weeks (IQR: 6, 20) p=0.03] vs secondary or tertiary facilities and public or private HF respectively. EID-TAT was significantly higher for HIV+PCR results [38.5 (27, 56) p=0.00].

**Conclusion:** Logistics-time-quality standards for EID-TAT should be set and monitored at HFs and laboratories. Referral laboratories and HFs (especially public secondary and tertiary) should be targeted with continuous quality Improvement (CQI) initiatives e.g. integrated sample transport aimed at reducing TAT.
PMTCT Service Delivery and Elimination of Mother-to-Child HIV Transmission in North Central Nigeria

Background: In Nigeria, an estimated 85,450 exposed infants are at risks of mother-to-child transmission (MTCT) annually, resulting in >40,000 annual HIV positive births. Yet in 2011, only 32% of HIV positive pregnant women received antiretroviral therapy (ART) to prevent MTCT. Here we present data on the prevalence of HIV positive infants born to mothers that received ART before and during pregnancy.

Methods: Dried blood spot (DBS) samples were collected at 458 healthcare facilities supported by the Institute of Human Virology, Nigeria in North Central Nigeria and sent to the molecular diagnostic laboratory for EID assay using Roche COBAS Amplicon / Cobas TaqMan Analyzer. Data was retrieved from the Laboratory Information Management System (LIMS). We expressed our results with two-sided values, with p<0.05 being statistically significant.

Results: Between October 2015 and August 2016, a total of 5,045 DBS samples from babies born to ART exposed and unexposed mothers were assayed, while 43 samples were rejected due to improper collection techniques and insufficient sample quantity for testing. Of the assayed samples, 264 (5.2%) were positive; 4755 (94.2 %) were negative and 26 (0.5%) samples had no results (p=0.0, 95 % CI: 1.64, 1.69). All positive samples were retested for confirmation. Our data showed that 2751 (97.7 %) babies born to mothers who received ART before pregnancy were negative and 63 (2.3%) were positive. A total of 4,586 babies were breastfed, while 248 were not. Of the breastfed babies, 239 (5.2%) were positive, 4343 (94.8%) were negative (p=0.897, 95 % CI: 1.04, 1.06).

Conclusion: The study showed low prevalence of HIV transmission to babies whose mothers received treatment. There was no statistical difference in the EID result outcome between exclusively breastfed and non-breastfed babies.

Introduction of a Competency-based Selection Criterion for the WHO External Competency Assessment of Malaria Microscopists

Background: Since 2009 the President’s Malaria Initiative has supported microscopists to participate in the World Health Organization External Competency Assessment for Malaria Microscopists. While most participants met entry requirements, overall performance was poor resulting in low certification rates suggesting a need for more rigorous selection criteria. In 2015 we introduced a second selection criterion for WHO ECAMM candidates. This article describes a modification to the existing entry requirements which can be used to identify the best-qualified candidates for ECAMM.

Methods: Pools of candidates were initially selected based on existing WHO ECAMM course entry requirements. A second selection criterion was added based on passing scores from a five-day pre-ECAMM refresher-training course.

Results: Of the 130 participants in the data set, 106 (81.5%) were assessed prior to 2015 and did not participate in a pre-ECAMM course (unscreened microscopists), 24 (18.5%) microscopists participated in a pre-ECAMM course (competency screened microscopists) and were selected for WHO ECAMM courses based on attainment of prescribed competency levels. Post-test pass rates for WHO ECAMM course components among unscreened microscopists were 83.0% for parasite detection, 28.3% for species identification, and 45.3% for parasite quantitation. Among competency screened microscopists, post-test pass rates for parasite detection were 100.0% and 95.8% for species identification and parasite quantitation. Competency screened microscopists participating in WHO ECAMM courses were 3.9 times more likely to have attained WHO certification than their unscreened counterparts. All but two competency screened microscopists (91.7%; 22 out of 24) attained WHO certification based on their accreditation levels.

Conclusion: The WHO ECAMM courses are an important component to malaria diagnostic quality assurance programs as they provide an unbiased method for identifying highly-skilled staff for reference level laboratories. We show that the current entry requirements need review and may contribute to low certification rates. To identify the best qualified participants, our results suggest that WHO ECAMM course administrators consider using an additional selection criterion based on attainment of passing scores at a five-day pre-ECAMM refresher-training course.