POSITIONING OF TB DX: TIERED SYSTEM, INTEGRATED APPROACH

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An integrated laboratory network can be defined as one that has the ability to provide all needed primary diagnostic services for care and treatment of patients without requiring them to go to different laboratory facilities for specific tests (under one roof...ideally under one ceiling).
Integrated Laboratory Network
laboratory services and emerging infectious diseases

- Specimen collection and transportation/reporting
- Microscopy
- Chemistry/haematology
- Molecular testing
- Growth detection and DST

**TB**
- Reference level: 5% of patients
- Regional and district level: 35% of patients
- Community and health care center: 60% of patients

**HIV**

**Malaria**

- Community and health care center: 60% of patients

- Regional and district level: 35% of patients

- Reference level: 5% of patients
Importance of early diagnosis:
*Sensitivity (cfu/ml) of pulmonary TB tests in portfolio*

- **Target sensitivity range of FIND antigen detection test for TB in sputum**
- **Liquid Culture**
  - 10-100/ml
- **LAMP-TB**
  - 50-150/ml
- **Automated NAAT**
  - 50-150/ml
- **Line-probe***
  - 10,000/ml
- **Capilia*** speciation dipstick (of culture)
  - 1,000,000/ml

*Development completed*
Introducing high tech in low tech settings

Major advantages in workflow

• fully automated with 1-step external sample prep.
• time-to-result 1 1/2 h (walk away test)
• throughput: up to 16 tests / module / run
• no bio-safety cabinet
• closed system (lower contamination risk)

Performance

• specific for MTB
• sensitivity close to culture
• detection of rif-resistance via rpoB gene

A technology platform:
- TB & Rif Resistance
- Potential for HIV viral load
- Potential for HPV STD
GeneExpert Platforms
<table>
<thead>
<tr>
<th>WOMEN’S HEALTH / STDs</th>
<th>CRITICAL INFECTIOUS DISEASE</th>
<th>HEALTHCARE ASSOCIATED INFECTIONS</th>
<th>IMMUNO-COMPROMISED</th>
<th>ONCOLOGY</th>
<th>GENETICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roche</td>
<td>GenProbe</td>
<td>Qiagen</td>
<td>BD</td>
<td>Abbott</td>
<td>bioMérieux</td>
</tr>
</tbody>
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Diverse Testing Needs
Integration of new tools in the tiered health system

Expected 2012 (Gen 1) / 2014 (Gen 2)

- Surveillance
- Reference methods
- Network supervision

- Resolution testing (screening-test negative drug resistance)

- Screening
- Passive case finding
- Detect and treat

- Clinical Screening
- Primary care

Reference Labs

Regional Labs

District Level

SubDistrict Level

Microscopy Level

Community Level

In house DST (MODS, NRA, CRI) Special settings and conditions

Integrated NAAT +40% /2h Sputum neg./HIV pos.

HIV Viral Load – 2012 HPV STD 2012

Legal Test / DST 15d / 30d

LPA Rif / INH 2d

Early Infant DX HIV

Integrated NAAT +40% /2h Sputum neg./HIV pos.

ZN 2-3d

In house DST (MODS, NRA, CRI) Special settings and conditions

LED FM +10%

Manual NAAT+25%

EID HIV – 2011 Malaria HAT

RDT Gen1 / Gen 2
Further questions to be answered

- The eligible patient to be tested
  - Smear + and/or –
  - Low and high HIV settings
  - Low and high MDR settings
  - Any case or only any drug resistant suspect or only MDR suspects

- Backup culture and DST capacity to follow up MDR/XDR patients

- Specimen referral

- EQA

- Adequate diagnostic algorithm
Integrating HIV-TB diagnostics platforms: Lesotho

MDR-TB LPA  \rightarrow  EID for HIV by PCR

Demonstration (Evidence)  \rightarrow  WHO (Policy)  \rightarrow  Implementation (Practice)

- March 2007 LC
- April 2008 LPA
- June 2007 LC
- June 2009 LPA
- November 2007 LC
- November 2008 LPA
- April 2009 EID for HIV by PCR

Partners:
- WHO
- PIH
- MOH (Lesotho)
National TB Reference Laboratory
Maseru, Lesotho: *Integrated TB-HIV (EID) laboratory*

Number of TB diagnostic tests performed (2009 to July 2010)

<table>
<thead>
<tr>
<th>Testing Platform~</th>
<th>Tests performed</th>
<th>MTB Positive</th>
<th>DST tests*</th>
<th>MDR-TB</th>
<th>MDR-patients placed on treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>MGIT 960-Liquid culture</td>
<td>7081</td>
<td>712</td>
<td>241</td>
<td>116</td>
<td>102</td>
</tr>
<tr>
<td>Line probe assay**</td>
<td>652</td>
<td>563</td>
<td>563</td>
<td>117</td>
<td>90</td>
</tr>
</tbody>
</table>

*Only MDR-TB suspects request for DST; ** rapid DST for 'rif' and 'inh'- data includes QA/Training activities
~ In addition: Solid culture and DST for 951 DRS samples and LED FM microscopy demonstration study in 2008-2009
### Number of EID HIV* diagnostic tests performed (Jan- July 2010)

<table>
<thead>
<tr>
<th>Total tests</th>
<th>Positive</th>
<th>Placed on treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>722</td>
<td>137</td>
<td>35</td>
</tr>
</tbody>
</table>

* EID-Early infant diagnosis of HIV-1 DNA

**Early infant Diagnosis of HIV using Dried Blood samples**

- Punching of DBS cards
- DNA extraction
- Hybridization—reading of plate
Thank you