STRIDES

BD-USAID Partnership

to

Strengthen TB Resistance Testing & Diagnostic Systems

Overview of Activities in India

October, 2019
Context:

- New WHO-recommended treatment regimens for multidrug resistant (MDR) TB require confirmation of second-line drug resistance (SL DR) to ensure that patients are put on the appropriate regimen.

- Although countries are adopting guidelines on DST, there are significant systemic gaps hindering access to these tests on the field. These include weak specimen referral systems, delay in returning results to clinicians, inadequate action on DST results etc.

Theory of change: BD and USAID plan to implement demonstration projects in a limited number of high DR-burden countries, including India, to identify best practices around DST. The specific objectives include:

- Strengthen TB diagnostic network components to increase and optimize access to diagnostic technologies for complete drug resistance testing

- Create and launch an awareness campaign to promote access to high quality testing, based on global recommendations and national algorithms for early accurate diagnosis of TB, universal DST for all suspects and comprehensive DST for MDR/XDR-TB populations
STRIDES Partnership: India
Jointly planned interventions with MOH

1. **Assessment of Liquid Culture Facilities**
   to help sites and program identify and address the issues

2. **Trainings and Capacity Building for LC-DST**
   training of master trainers and evaluation of new second line DST

3. **Connecting with NIKSHAY**
   demonstrate connectivity solution with EpiCenter/TB-eXiST to gauge feasibility and impact

4. **Strengthening Specimen Transportation**
   assess existing systems for specimen transportation and implement sustainable interventions

5. **Facilitating Development of Guidelines and SOPs**
   for TB laboratories as per program requirement

6. **Promoting Research and Studies**
   in TB diagnostics/laboratory space per program requirement

7. **Open to country’s need**
   continue to deliberate with Central TB Division for other areas of collaboration
STRIDES Partnership: India
Activities completed by March 2019

1. Lab Assessments
Current lab practices & challenges; and help sites to identify and address issues
- Assessed two National and two Intermediate Reference Lab in Bangalore and Agra

2. Training of Trainers
On best practices, troubleshooting, and recent developments in liquid culture and drug susceptibility testing for TB
- Held two training of trainer sessions in December
- Participants from 31 labs across 13 states/UTs

3. EpiCenter/TB-eXiST Training
System to improve workflow, real-time monitoring of tests, data analysis and report generation
- Set up EpiCenter/TB-eXiST system for a National lab in Bangalore
- Trained staff
- Discussed interoperability with Nikshay through LIMS
**STRIDES Partnership: India**

**Insights from the Training of trainers conducted at Bangalore & Agra in Dec’19**

- **Content covered:** Two day training program was designed to share best practices, troubleshooting and recent developments in LC&DST for MTB. The key components covered were on the following topics - (a) specimen collection, transport, receipt; (b) laboratory safety, (c) specimen processing, (d) culture and susceptibility testing and (e) quality control

- **Trainers:** Dr Richard Pfeltz and Jasmine (experts from BD)

- **Attendees:** 57 Microbiologists from 31 labs participated in the ToT at Bangalore and Agra

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**Pre-Post scores from the ToT**

- **Bangalore Training:**
  - Pre Test % (n=25): 54%
  - Post Test % (n=22): 67%
  - ~25% to 40% increase in the knowledge level of master trainers after a two day session

- **Agra Training:**
  - Pre Test % (n=32): 44%
  - Post Test % (n=29): 61%
  - Use of MGIT was found to be biggest gap area; accordingly project team is planning to conduct hands-on training on use of MGIT
Experts from BD are developing training material, tools and checklists which can be used to (a) train the healthcare workers on drug susceptibility testing, (b) assess the skills of the lab personnel, (c) assess the infrastructure, processes etc. at the liquid culture lab.

Team plans to improve the existing laboratory processes and capacity of the staff through activities such as targeted trainings, laboratory assessments, skill assessment and on-site mentorship.

Illustrative Lab assessment and capacity building plan

<table>
<thead>
<tr>
<th>S.No</th>
<th>State</th>
<th>City</th>
<th>Lab Name</th>
<th>Phase</th>
<th>ToT Done</th>
<th>Skill Assessment</th>
<th>Hands on Training</th>
<th>Lab Assessment</th>
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<tbody>
<tr>
<td>1</td>
<td>Delhi</td>
<td>New Delhi</td>
<td>NRL NITRD</td>
<td>Phase 1</td>
<td>Yes</td>
<td>Jul-Aug’19</td>
<td>Sep’19</td>
<td>Sep-19</td>
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<td>2</td>
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<td>Bangalore</td>
<td>NRL NTI</td>
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<td>Jul-Aug’19</td>
<td>Aug’19</td>
<td>Yes</td>
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<td>3</td>
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<td>Agra</td>
<td>NRL Jalma</td>
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<td>Aug’19</td>
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<td>4</td>
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<td>Bangalore</td>
<td>IRL Bangalore</td>
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<td>Aug’19</td>
<td>Yes</td>
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<td>5</td>
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<td>Agra</td>
<td>IRL Agra</td>
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<td>Aug’19</td>
<td>Yes</td>
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<td>6</td>
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<td>Yes</td>
<td>Jul-Aug’19</td>
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<td>7</td>
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<td>Jul-Aug’19</td>
<td>Sep’19</td>
<td>Sep-19</td>
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<td>8</td>
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<td>Phase 1</td>
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<td>Jul-Aug’19</td>
<td>Sep’19</td>
<td>Sep-19</td>
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<td>9</td>
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<td>Hyderabad</td>
<td>IRL Hyderabad</td>
<td>Phase 1</td>
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<td>Jul-Aug’19</td>
<td>Sep’19</td>
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<td>Pune</td>
<td>IRL Pune</td>
<td>Phase 1</td>
<td>Yes</td>
<td>Jul-Aug’19</td>
<td>Sep’19</td>
<td>Sep-19</td>
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</table>
### EpiCenter/TB-eXiST: Discussion

- **EpiCenter** is an application which can help in managing complex data generated in a clinical microbiology laboratory. It monitors the workflow on a real time basis and can be used by several persons simultaneously.

- **TB-eXiST** is a module for EpiCenter with MGIT instrument which provides TB specific functionalities including ability to test different drug concentrations, second line and new drug concentration labeling etc. besides extensive reports.

- **Benefits of EpiCenter/TB-eXiST to the program:**
  - Management of specimen and paperless workflow
  - Improves result management to LIMS; eases dependence on printers
  - Epidemiology and surveillance reporting

- **Next steps:** Collate comprehensive feedback from current users to understand if EpiCenter/TB-eXiST can be useful to the program.

#### EpiCenter/TB-eXiST Discussion: Decision tree

1. **Feedback from existing users**
2. **Is EpiCenter/TB-eXiST useful for the program?**
   - Yes
   - No
3. **Is program considering providing Epicenter to MGIT labs?**
   - Yes
   - No
4. **Discussion on providing EpiCenter/TB-eXiST**
5. **Discussion on replacing or rectifying printers**
Strengthening Specimen Transportation:
Assessment of TB diagnostic network in Mumbai, Maharashtra, India

BD conducted a comprehensive assessment of TB diagnostic network in Mumbai to understand the broad processes and identify systemic gaps in the existing SRS

- Structured SRS assessment tool was developed and reviewed by a sub-committee with members from NACO, CTD, USAID, WHO, CDC, CMAI and BD
- National & state program managers, DMCs, CBNAAT labs, reference labs and delivery agents were interviewed using the assessment tool
- Consultative meetings with APD, MDACS and Dy. Executive Health Officer - Mumbai, RNTCP
Key Findings:

- Purpose of this assessment was to understand the broad processes and identify systemic (not facility specific) gaps in the existing SRS
- Key gaps observed:
  a) lack of visibility in the movement of the sample/result,
  b) limited adherence to SOPs at labs for sample collection, rejection, result communication etc.,
  c) absence of tracking of cool chain maintenance
  d) lack of internal audit of SRS

Action Plan:

1. Sample Loss, turnaround time and costing analysis for SRS system to understand broad systemic gaps
2. Development of an IT enabled application for sample and result tracking across all nodes
3. Development and piloting of a Cost-effective Innovative IT-enabled Referral Network
## Strengthening Specimen Transportation:
### Understanding sample loss, TAT & costing for different SRS

### Broad Assessment Framework

<table>
<thead>
<tr>
<th>Stages</th>
<th>Collection, Storage and packaging</th>
<th>Transportation</th>
<th>Receiving and Testing</th>
<th>Result Sharing</th>
<th>Action on result</th>
</tr>
</thead>
</table>

### Metrics

- **Sample and result Loss cascade**
  - Waterfall charts to capture the entire cascade for DR and DS TB; help in identifying major gaps areas
  - Reporting by type of test (CBNAAT/LPA/LC), diagnostic/follow up testing, EPTB/Pulmonary etc. to allow development of specific action plan for each node

- **Sample and result turnaround time (TAT)**
  - Average TAT by stages will help in identifying impediments to early diagnosis

- **Costing**
  - "Cost per result" to be calculated to identify cost effectiveness of different models
  - Average cost per result to be identified for each stage to identify most efficient sub-processes across different models

### Illustrative:

<table>
<thead>
<tr>
<th>1 day</th>
<th>2 days</th>
<th>5 days</th>
<th>1.5 days</th>
<th>10 days</th>
</tr>
</thead>
</table>

In combination, these analysis will support (a) identification of systemic gaps leading to high LFUs and TATs, (b) understanding cost effectiveness, scalability and sustainability of existing SRS models and (c) development of innovative interventions to address the identified gaps.

- BD has developed the Sample Loss, TAT and Cost effectiveness SRS Tool, and shared with expert group
- BD to conduct this analysis prospectively in a given geography to establish a baseline for these metrics
Strengthening Specimen Transportation: Understanding sample loss, TAT & costing for different SRS

Snapshots from the tool

Mapping of TB diagnostic process

Illustrative charts from the tool

<table>
<thead>
<tr>
<th>i. Collection to CBNAAT testing and action on result</th>
</tr>
</thead>
<tbody>
<tr>
<td>DMIC</td>
</tr>
<tr>
<td>-----------------------------------------</td>
</tr>
<tr>
<td># Patients referred for TB testing from ARTIC</td>
</tr>
<tr>
<td># Samples collected at DMIC</td>
</tr>
<tr>
<td># Samples picked up by STAI from DMIC</td>
</tr>
<tr>
<td># Samples delivered by STAI to CBNAAT</td>
</tr>
<tr>
<td># Samples tested by CBNAAT</td>
</tr>
<tr>
<td>Result of CBNAAT testing</td>
</tr>
<tr>
<td>Other, if negative</td>
</tr>
<tr>
<td>Other, if treatment</td>
</tr>
<tr>
<td>a. CBNAAT Testing</td>
</tr>
</tbody>
</table>

Turnaround time for CBNAAT testing (in days)
Strengthening Specimen Transportation:

Development of an IT enabled, real time application to track samples and results

**Objective:** To capture end-to-end information on (a) sample movement in the system including collection, storage, packaging, transportation and testing; and (b) result movement between different stakeholders

**Functionalities:**
- Role based login access to sample collection sites, transportation agency, testing facility and program managers
- End to end visibility in the sample position; barcode enabled tracking; recording of temperature excursion episodes
- Centralized repository containing relevant info on the samples; will support forecasting efforts as well
- Dynamic mapping functionality between collection sites, transportation agency and testing facilities for CTO/DTO’s perusal
- Data entry and management workload reduction
- Easy to use mobile application to enter sample collection/ testing details; referring labs can track sample movement if reqd.
- Graphical reporting containing info on important parameters associated with SRS; this will improve M&E
- Auto generated SMS or Email or IVRS messages/reminders
- Migration of application on NIC after piloting to enable integration with existing applications such as Inventory Management System (IMS) and Nikshay application

**Timelines: 12 months**
- Development of the application: Nov 2019 to April 2020 (6 months)
- Piloting: May 2020 to Aug 2020 (4 months)
- Final roll out and movement to NIC: by Oct 2020 (2 months)

BD plans to pilot cost-effective SRS with the proposed IT system under the STRIDES partnership
Brief update on other activities:

- **“TB Talk – Unmasked” campaign**
  - BD has selected an international award winning filmmaker and a TB survivor, Rhea Lobo, to develop a series of human interest patient testimonial videos to highlight important aspects related to TB such as drug resistance TB, HIV-TB etc.
  - These videos and other related content will be hosted at a microsite called “TB Talk – Unmasked”
  - Content developed to be circulated to clinicians, program managers, private sector doctors, patient communities etc. via MOH, USAID and BD channels

- **Revising LC DST Modules**: BD experts are reviewing the LC DST e-modules; feedback from the BD experts, if any, will be collated and shared by December 19

- **Power outage study at NRL, Jalma**: Experiment on-going at NRL Jalma to understand the impact of power outage of less than 8 hours in data loss for interrupted tests on MGIT

- **Patient and Provider Focus Group Discussion (FGDs)**: Goal is to understand the reasons for low uptake of follow-up testing across DS and DR TB patients across different geographies