Laboratory Information Considerations for Supporting COVID-19 Response and Beyond

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Who is APHL?

- A non-profit, non-governmental US based organization with a global perspective
- Over 800 members from public health, environmental and agricultural laboratories, federal agencies and academic institutions
- Supports government laboratories that conduct testing of public health significance
- Advocates at the national level to shape public health policy
- Provides training, model practices and technical assistance domestically and internationally
Learning Objectives

Upon completion of this webinar participants will be able to:

• Describe strategies used to support the data management needs of laboratories for COVID-19 testing
• Learn about common challenges faced and lessons learned and implemented in 2 countries
• Describe actions needed to support management of COVID-19 and other immediately notifiable diseases
CHALLENGES ENCOUNTERED

Turnaround Time
Data Quality
Reporting
Data Sharing
Strategies for Laboratory Data Management

**LIMS EXPANSION**
Enhancing LIMS to add COVID-19 testing and reporting

**DATA EXCHANGE**
Linking laboratory analyzers used for COVID-19 testing with LIMS and sharing data between systems

**CENTRALIZED LABORATORY DATA REPOSITORY**
Submitting laboratory data from multiple data sources to a central repository

**ELECTRONIC SAMPLE REFERRAL**
Capturing laboratory data electronically at points of sample collection and submitting to LIMS at testing laboratory; results returned similarly
LIMS: OVERVIEW, BENEFITS, FUNCTIONS AND ROLE IN PUBLIC HEALTH
• To share
  – Best practices development
  – Lessons learned
  – Successes achieved
• We have been doing this for a while
  – Over two decades with multiple experts, staff, various MOH

APHL LIMS Guidebook

What is a LIMS?

LIMS GETS DATA OUT
Reports test results for patient care
Reports data to administration, MOH, national and international agencies

LIMS SUPPORTS WORKFLOWS
Tracks laboratory information during testing
Collects, stores, archives and analyzes laboratory data
DEMAND FOR LIMS

- Technological advances resulting in higher specimen volumes and greater demand and reliance on laboratory data
- Inefficiencies from paper based record keeping and results reporting
- Tremendous growth for LIMS adoption
Role of a LIMS

- Decrease transcription errors
- Meet quality standards
- Reduce Turnaround Time
- Improved patient outcomes and public health
Core Functions of a LIMS

DATA FOLLOWS THE SPECIMEN

PRE ANALYTICAL
Specimen management and tracking
Patient management
Physician management
Testing management
Test Orders
Referral system

ANALYTICAL
Electronic transfer of data
Test queue
Test performed
Test result/QC data from instrument to LIMS
Test results verified and released

POST ANALYTICAL
Reports management
Types of reports
Report distribution
Long term result storage
Data Exchange with other system
Billing

SECURE DATA EXCHANGE WITH OTHER INFORMATION SYSTEMS
Data needs to get into the right hands quickly.

Data must be provided to multiple stakeholders across clinical and public health.

Data must be accurate and consistent.

Informatics solutions to evolve to meet new data sharing demands of laboratory and surveillance.

To be impactful.
CENTRALIZED LABORATORY DATA REPOSITORY
Centralized Laboratory Data Repository

- A single storage location for all data
DATA EXCHANGE

INSTRUMENT INTERFACING
SYSTEM INTEGRATION
Instrument Interfacing

• Capture of COVID-19 test results from PCR analyzers and sharing of these data with LIMS and repository
• Capture of COVID-19 test results from Point of Care/Rapid Diagnostic instruments and sharing of data with repository
LIMS Instrument Interfacing

Sample Reception → LIMS Database → Sample Collection

LIMS Database → Sample Pre Processing

Sample Collection → Barcode Printing

Barcode Printing → LIMS Client PC

LIMS Client PC → Final Reporting / Emailing Results

Final Reporting / Emailing Results → Orders**

Orders** → Results***

Results*** → LIMS Database

LIMS Database → Entry of the Work list (Sample No done Manually on Inst PC / Screen)

NB: Bi-Directional Instrument do not require manual Work list entry
Integration with External Systems

Barcode Capability

Instrument Software

Middleware

Equipment Management

Reporting Database

Analytics Software and QMS

Data Integration Engine

External Systems
ELECTRONIC SAMPLE REFERRAL
GOAL OF ELECTRONIC SAMPLE REFERRAL

Enable patient data and test request information to be transferred electronically from a health facility to a LIMS in a designated testing laboratory.

Enable results from the LIMS in the testing laboratory to be returned electronically to health facilities.
Lessons learned from Electronic Sample Referral

DO
Define critical data elements
Build in data quality checks
Harmonize specimen identifiers
Use standard health facility codes
Establish help desk for resolving requests

AVOID
Build stand-alone systems
Distribute the system without planning for designated collection sites to use it e.g. High volume facilities, hubs
Country Experiences
KENYA EXPERIENCE
COVID-19 Repository Design Summary

Standardize → Automate → Aggregate → Analyze → Share / Report
2. Data Repository at NPHL

Integration Tools
- Standardized Excel data collection tool
- API for system integration with external systems.
LIMS Configuration at NPHL
Lessons Learnt from the Kenya Experience

• Collaboration.
• Enable Systems to “talk” aka system Integration
• Capacity building – Let the MOH team drive!
• Simplicity always wins.
MOZAMBIQUE EXPERIENCE
MOZAMBIQUE EXPERIENCE IMPLEMENTING LABORATORY INFORMATION SYSTEM TO SUPPORT COVID-19 RESPONSE

06.08.2020

SOFIA VIEGAS, DIRECTOR OF PUBLIC HEALTH LABORATORIES
Mozambique repurposed a structure previously established through PEPFAR
• 15 Labs with LIS
• 180 sites with electronic sample referral
• Over 1250 health facilities participating in sample referral
Mozambique Solutions for COVID-19

- Updated the LIMS to include COVID testing
  1. Barcoded samples (tracking)
  2. Equipment interface (result interpretation)
  3. Improved workflow (improved TAT)

- Laboratory Data Repository
  1. Central reporting system (press conference)
  2. Data management and analysis

- Sample referral
  1. Set up electronic COVID test order system
  2. Real time result reporting
Mozambique Solutions for COVID-19 testing

• Reporting
  1. Daily email alerts with individual patient result to surveillance team (Automated)
  2. Summary report to Health authorities on daily basis
  3. Patient results returned through electronic sample referral
Mozambique Solutions for COVID-19 testing

- Dashboard (under improvement)
  1. Real time interactive COVID dashboard - Only lab data.
  2. Several indicators.
Advantages to COVID-19 data management

- Results available in real time for action;
- Reduction of TAT;
- Allows the provinces to manage their own samples;
- Reduces registration time in the testing lab;
- Daily reports allow provincial authorities to follow provincial data before the press conference;
- Daily reports support the preparation of data for the press conference, daily bulletin and other reports;
- Daily reports supports the monitoring of TAT;
- Allows continuous improvement.
Challenges

- Internet connection;
- Registration sometimes is slow;
- Complete registration of all data is a challenge;
- Changing reagents, there is a setup interface;
- IT staff dedicated is essential;
MINISTRY OF HEALTH LEADERSHIP AND ACTIONS

WORKING GROUP CO-CHAIR ED BY EPI AND LAB
Define minimum critical lab data elements
Map workflow
Develop data access guidelines
Develop data sharing agreements
Review national privacy rules
Develop data use policy

NATIONAL LABORATORY DEVELOP PLANS
Assess existing laboratory data systems
Identify specimen collection sites and link with testing laboratory
Document specimen referral
Develop implementation timeline
DATA UTILIZATION

MOH and stakeholders utilize data for informing policy, updating laboratory testing strategy and other response measures.

Expanding infrastructure and applying lessons learned to support other immediately notifiable diseases.
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