

LabCoP Cookbook of best practices

RECIPE #1: SAMPLE TRANSPORT SYSTEM



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DEFINITIONS

Sample referral network: a coordinated system that allows a health facility or laboratory lacking capacity to perform test(s) to safely send a patient's specimen to another or higher-level laboratory with the capacity to perform the requested test(s).

Tiered laboratory structure: reflects varying complexity of tests performed in each tier with decreasing test complexities toward the lower tier within a country healthcare structure. A sample can be referred to a higher tier (vertical referral) or to a similar testing facility at the same level (horizontal referral).

Sample referral network can be:

- Decentralized (specimen are referred from lower levels to higher levels across the lab network)
- Centralized (specimen are referred from spokes to hubs, to the central laboratory)

GOALS

The goal of sample transport is the safe and efficient handling and treatment of specimens during the process, to obtain reliable results without delays, and provide optimal care to patients at the referring facility. The sample referral network aims at being integrated, i.e. designed to serve multiple disease programs (e.g., tuberculosis, HIV, polio, malaria).

1

CENTRAL LABORATORY

KEY CONSIDERATIONS

- Ensure enough laboratory capacity to support hubs & spokes through proper coordination
- Availability of equitable equipment and infrastructure for HIV molecular testing like viral load (VL) and early infant diagnostic (EID) testing
- Presence of biosafety and biosecurity measures and guidelines
- Availability of a laboratory information management system (LIMS) with the ability to manage and organize all VL data
- Proper supply chain management like the Uganda and Kenya technical working group for VL supply planning
- Human resource capacity with staff trained in HIV VL proficiency testing
- Presence of laboratory quality management systems implemented and regularly audited (e.g. SLIPTA/SLMTA)
- Compliance with proper waste management procedures and availability of necessary equipment

BEST PRACTICES

- Improvement of infrastructure at the central laboratory ^(2, 3)
- Laboratory accreditation ⁽¹⁾

2 HUBS

KEY CONSIDERATIONS

- Strategically located for accessibility and coverage (i.e. central to other facilities in the catchment area)
- An ideal number of spokes should be selected (15 to 40 spokes, within a radius of 30 to 40kms)
- Hub's capacity to serve and coordinate the spokes
- Availability of a wider scope of services for spokes (e.g. being a conduit for sample collection materials)
- Presence of infrastructure (cold chain (-20°C), stable power, centrifuge, etc.)
- Presence of adequate and skilled human resources to serve and coordinate the spokes and to manage samples
- Proper waste handling and management
- Public facilities preferred over private ones
- Hubs should take responsibility for pre-analytical sample quality

BEST PRACTICES

- Selection based on comprehensive geographic information system (GIS) mapping data (⁴ experience Kenya; ^{1, 5, 6})
- Improvement of capacity at the hub (⁶)
- Examples of other tests at the hubs: CD4 count, complete blood count, tuberculosis diagnostic with GeneXpert, malaria confirmation test, cryptococcus antigen (CrAg) test, pregnancy test, hematology and biochemistry tests, etc.)

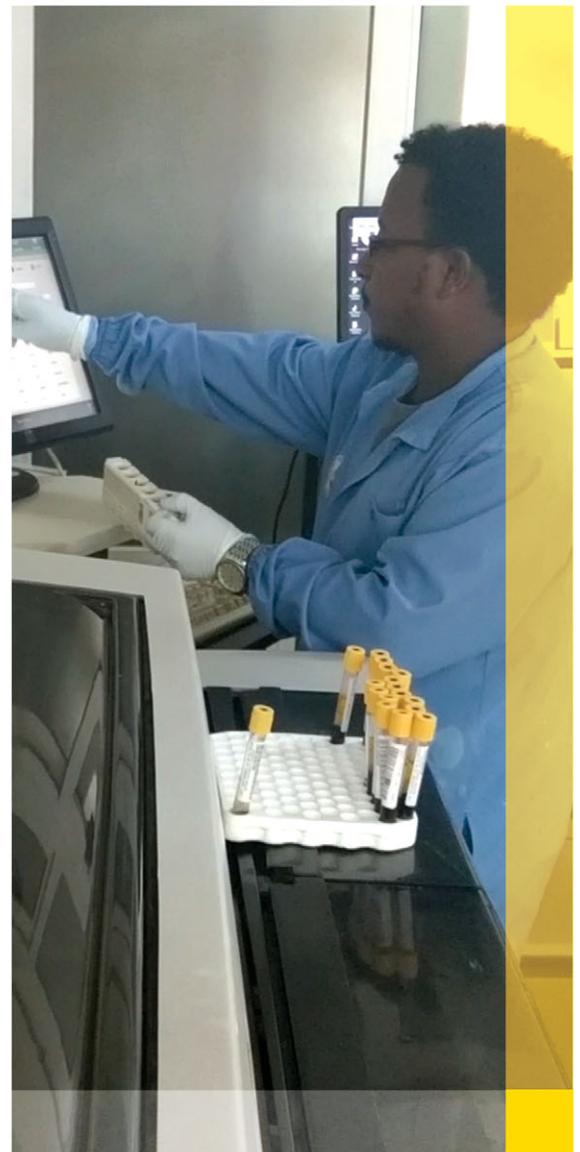
3 SPOKES

KEY CONSIDERATIONS

- The distance of the spoke from the hub should be less than 40 km or a 1 hour drive/ride away
- Accessibility of the spoke to the general public and to the hub
- Presence of VL services at the spoke
- From the lowest tier level with some elementary degree of lab services

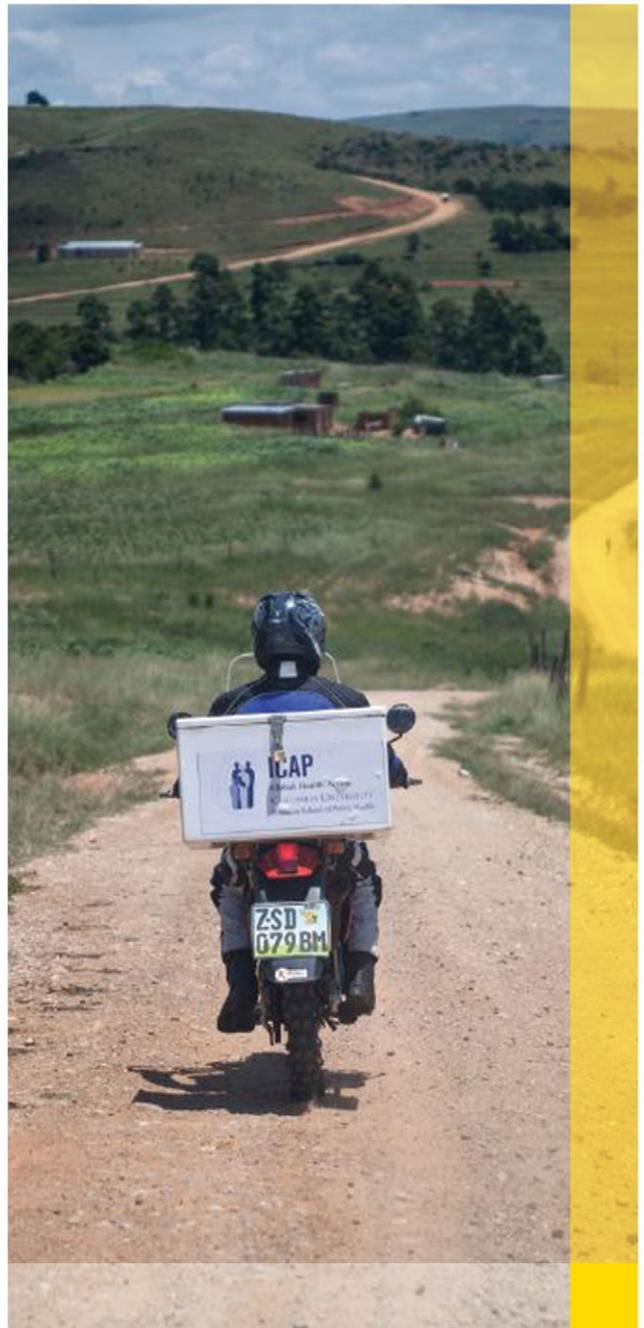
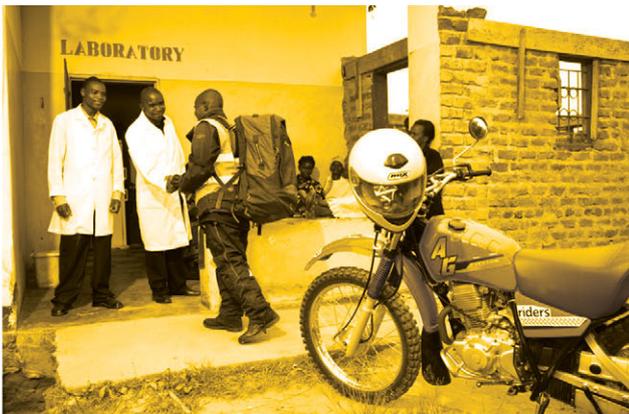
BEST PRACTICES

- Provision of recommended sample collection and packaging materials (⁷)
- Training of different cadres at the spokes in sample collection and handling (^{1, 6})



KEY CONSIDERATIONS

- Distance to be travelled (between the hubs and the spokes or the hubs and the central laboratory) should be reasonable depending on the means of transport to be used (Maximum 150 km a day to and from locations for a motor bike, and 600 km for a motor vehicle)
- Mode of transport chosen should suit the terrain and local settings (e.g. a boat is better for an island)
- Utilization of drones requires regulation (e.g. for the US (<http://uavcoach.com/drone-laws/>) and (<https://www.faa.gov/uas/>))
- Availability of sufficient resources to sustain the transport system
- Capacity to handle cold-chain specimens
- Transport mode should be feasible, readily available, and sustainable (e.g. motorbikes or leasing vehicles)
- Aim to have an integrated sample transport system (e.g. different types of specimen, different types of tests and operations for both routine and emergency situations)
- Use motor bikes for transport between hubs and spokes, and a reliable courier for transport between hubs and central laboratories
- Consider hybrid types of referral, including private vehicles, public transport and postal services



BEST PRACTICES

- Use dried blood spot for hard-to-reach areas (Kenya experience)
- Biosafety training for bike riders and drivers ⁽¹⁾
- Immunization of all sample transporters ⁽¹⁾
- Motor bike transport between hubs and spokes can be tendered to private service providers for cost effectiveness, under strict supervision (Kenya experience)
- Sample transport should be integrated and not disease specific ⁽¹⁾
- Aim at fully transitioning to postal services ^(7, 8, examples in Togo, Ethiopia and Uganda)
- Examples of courier from Tanzania: Skynet (www.skynetworldwide.com) and EMS (<https://www.ems.post/en>)
- Integrate sample and motor tracking into the sample referral system (Tanzania experience)
- Preventive maintenance of motorbikes and vehicles (Riders for Health, www.ridersintl.org)
- Lease but not own motorbikes or cars (Tanzania experience)
- Provision of riding gear and training in defensive riding for the riders ⁽¹⁾



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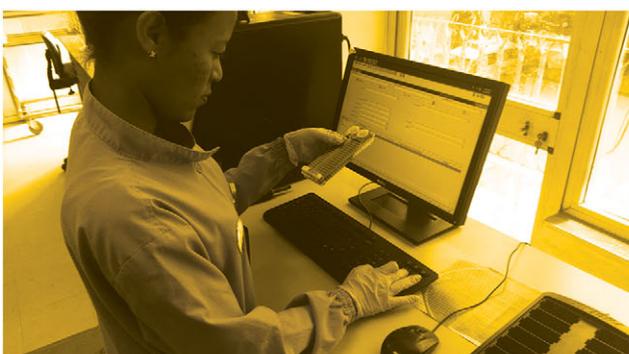
RESULTS RETURNS

KEY CONSIDERATIONS

- Turn-around time for results return < 1 week
- Reduce manual data entry as much as possible

BEST PRACTICES

- Riders pick up samples AND return results ⁽¹⁾
- Electronic transfer of results (e.g. NASCOP EID/VL) from central laboratory back to hubs, using the sample tracking system (Tanzania and Kenya experience)
- Coded-SMS test results sent to clinician (Tanzania experience). Clinician can query the result in the system using the code provided ⁽⁴⁾
- Introduction of barcode systems electronically linking samples to test results ⁽⁶⁾
- Laboratory staff can also access results online using web app/LIS/email, e.g. VL/EID
- For GeneXpert, spokes receive results online via the telephone and email via the GeneXpert LIMS
- For other tests (e.g. CD4 testing) spokes collect hard copy results from testing site with partners facilitating printing and dissemination of results ⁽⁴⁾



6

GOVERNANCE & PARTNERSHIPS

KEY CONSIDERATIONS

- Strong leadership from Ministries of Health for coordination and oversight
- Involvement of stakeholders
- Flexibility to integrate and adapt to innovative technology, and to respond to unforeseen outbreaks
- Development and dissemination of tools (standard operating procedures, guidelines and policies)
- Engage stakeholders for increased uptake, coverage, implementation, and monitoring and evaluation, including public-private partnership

BEST PRACTICES

- Phased approach ^(7, 8)
- PPP with Becton Dickinson (BD) ^(3, 9)
- Establishment of logistics and coordination committee ⁽¹⁰⁾
- Guidelines and policy for specimen referral (Uganda)
- SOPs for safe specimen packaging, and handling ^(5, 11, 12)
- Phased approach ^(3, 4)



7

HUMAN RESOURCES & TRAINING

KEY CONSIDERATIONS

- Identify and train cadres involved in packaging, transportation and reception of specimens at hubs, spokes and central laboratories, including drivers, bikers, and community healthcare workers
- Documentation of requisition forms and transport logs
- Protect shipping personnel, laboratory staff and the general public from exposure to infectious agents
- Presence of human resources that are skilled, well-motivated and adequate in number, to serve at the central laboratory, hub and sample transport

BEST PRACTICES

- Training of different cadres involved in sample preparation ^(1, 7)
- Application of a customized BD training package
- Provide the training in local language (e.g. Portuguese in Mozambique and Amharic in Ethiopia)

8

SUPPLY CHAIN

KEY CONSIDERATIONS

- Procurement of standard transportation containers, packaging materials, and storage materials
- Procurement of computers, tablets, scanners, real-time temperature monitoring devices (e.g., data logger)
- Procurement of vehicles (if not rented), and personal protective equipment

BEST PRACTICES

- Provision of standardized packaging and transportation material ⁽⁴⁾ BD isothermal containers (Becton Dickinson catalog no. 368 562)
- Validated against World Health Organization recommendations and United Nations Transport of Dangerous Goods specifications ⁽⁴⁾

KEY CONSIDERATIONS

- Establish indicators for monitoring specimens and access to testing (e.g. turnaround time, specimen rejection rate, workload, completeness of forms)
- Maintain communication between referring sites and testing site(s) to resolve any problems that are identified
- Maintain communication strategies for sharing best practices, opportunities, and challenges

BEST PRACTICES

- Develop a monitoring and evaluation framework
- Integrate VL monitoring indicators into the health management information system (HMIS) (experience of Uganda)
- Develop dash boards for routine program monitoring (experience of Kenya)
- Establish communities of practice for continued information sharing based on the ECHO model (<http://www.aslm.org/labcop/>)

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