Operationalising TB LAM testing

A use case for standardised implementation in the field

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Helen Joseph Hospital

- 500-bed tertiary hospital
- Infectious diseases division falls under department of internal medicine at Helen Joseph Hospital and Wits University.
- ~750 inpatient consults per year.
- 6000 outpatients – HIV Clinic, TB Clinic, Infectious Diseases Outpatients
Helen Joseph Hospital: Medical patient profile

• ~42% of medical admissions PLWHIV.
  • Median CD4 = 67 cells/µL
  • ¼ diagnosed for the first time
  • Of those previously diagnosed with HIV, ¾ on treatment, but
  • Of those on treatment, nearly ½ are failing ART

• AIDS-defining conditions accounted for 40% of the admissions.

• TB in 25% of PLWHIV at time of data collection (probably closer to 30% in total).

Yudelowitz et al. https://hdl.handle.net/10520/ejc-wjcm-v3-n3-a7
U-LAM as a clinician-performed test
Timing “doesn’t work”: reliability implications

• 25-35 mins “doesn’t work”
  • Clinicians don’t have dedicated time to wait 25 mins
  • Could set an alarm and come back after 25 mins to read strip...
  • ...but in practice adherence to this was difficult: patient emergencies/priorities, etc.)
Reliability Issue #2: interpreting faint lines
Reliability issue #3: urine volume

• 60 µL urine not well-adhered to, even with bulb pipette
• One drop? Two drops? Whole thing?
Stock control

• Strips taken “en masse” frequently – stock shortages
• Reference card taken/lost
• Pipettes taken/lost – clinicians guessing
### Patient Selection

**Can be confusing (needlessly)**

#### WHO STRONGLY RECOMMENDS USING LF-LAM TO ASSIST IN THE DIAGNOSIS OF ACTIVE TB IN HIV-POSITIVE ADULTS, ADOLESCENTS AND CHILDREN

<table>
<thead>
<tr>
<th>Clinical Setting</th>
<th>Previous South African Guidance</th>
<th>WHO Recommendations</th>
<th>Current Recommendations for the South African Context</th>
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</thead>
<tbody>
<tr>
<td><strong>Inpatient Setting</strong></td>
<td>LF-LAM can be administered for seriously ill patients, with advanced HIV in hospitalised settings when they are seen for a medical diagnosis in the emergency room or are admitted to medical wards irrespective of whether TB is suspected or not or the patient’s CD4+ count.</td>
<td>Irrespective of signs and symptoms of TB (pulmonary and/or extrapulmonary) and with a CD4 cell count of fewer than 200 cells/μL.</td>
<td>The guidance adopts recommendations to include the use of LF-LAM to assist in the diagnosis of active TB in HIV-positive patients irrespective of whether TB is suspected or not (i.e. irrespective of signs and symptoms of TB) and irrespective of the patient’s CD4+ count, and irrespective of whether AHD is present or not. A sputum molecular test for TB (e.g. Gene-Xpert) should be performed in parallel. See Algorithm chart on page 17.</td>
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<td></td>
<td></td>
<td>• With AHD Stage 4 or who are seriously ill, irrespective of CD4 count.</td>
<td></td>
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<tr>
<td><strong>Outpatient Setting</strong></td>
<td>For outpatients (ambulatory patients seen in community health care centres, primary health care settings day hospitals, including ART initiation clinics), LF-LAM should only be performed when:</td>
<td>• With signs and symptoms of TB (pulmonary and/or extrapulmonary) or seriously ill</td>
<td>The guidance adopts recommendations to include the use of LF-LAM to assist in the diagnosis of active TB in HIV-positive patients with:</td>
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<tr>
<td></td>
<td>• TB is suspected based on symptoms and/or signs AND</td>
<td>• Irrespective of signs and symptoms of TB and with a CD4 cell count of fewer than 100 cells/mm³.¹</td>
<td>• Signs and symptoms of TB (pulmonary and/or extrapulmonary) and</td>
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<tr>
<td></td>
<td>• CD4 count ≤100 cells.</td>
<td>²</td>
<td>• CD4 count &lt; 200 cells/mm³ or AHD Stage 4 or who are seriously ill.</td>
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¹ CD4 count < 200 cells/mm³ or AHD Stage 4 or who are seriously ill.
Interpretation of Results
Clinical implications of U-LAM results

• A negative result doesn’t rule out TB.
  • NPV of a U-LAM in a high-burden TB setting is poor.
  • Clinicians may struggle with this diagnostic reasoning.

• A positive result doesn’t mean it’s TB.
  • Treat as TB, but what to do about possible false positives due to NTM, Nocardia, etc. hasn’t been well addressed programmatically.
Recording the results
The problem

• All lab-based tests are digitally recorded, and easily accessible in the future, across the healthcare system.

• Not true of clinician-based tests.

• U-LAM result hand-written in file, but file not easy to retrieve quickly if patient is admitted again to our hospital – and impossible to retrieve if healthcare contact at another facility.
Solutions
Centralising who performs the test

- 2 dedicated, trained nurses
- Training, assessment of reliability/validity
- Test performed “opportunistically” when there’s time in their day.
  - In practice, usually performed within 1-4 hours of being dropped off
U-LAM “flow” at our hospital

1. Doctor collects urine sample from patient
2. Urine dropped off at TB clinic area by doctor. Patient details & doctor phone number written on request sheet.
3. Urine LAM test performed by trained nurses
4. Result phoned out to doctor AND transcribed in records book at TB clinic
## Solutions

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<th>PROBLEM</th>
<th>SOLUTION</th>
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<td>Reliability: timing</td>
<td>2 trained nurses perform all the tests</td>
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<td>Reliability: interpreting faint lines</td>
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<td>Reliability: urine volume</td>
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<tr>
<td>Stock control</td>
<td>Nurses keep track of stock &amp; order timeously</td>
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<tr>
<td>Patient selection</td>
<td>Doctor training (ID ward rounds, etc.)</td>
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<tr>
<td>Interpreting U-LAM result implications correctly</td>
<td>Doctor training (ID ward rounds, etc.)</td>
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<tr>
<td>Recording the result accessibly</td>
<td>Results are recorded in one central book (not ideal but better than before)</td>
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Conclusions
Conclusions

• Urine LAM as a clinician-performed test had serious reliability issues in our setting.
  • Implications for patient care
  • Implications for research performed using this data

• Solutions: either lab-based, or ≥2 dedicated, trained healthcare workers.
  • Doesn’t increase workload and vastly improves reliability.

• Training HCWs on patient selection and test result implications isn’t hard but needs to be done.