Overview of the TB diagnostic landscape
What is needed to increase access

Unitaid NGOs Delegation – TB Diagnostics Webinar
11 October 2022

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The right to quality TB screening and diagnostic testing

People at risk of TB have a right to quality TB screening and diagnostic testing in accordance with the World Health Organization (WHO) recommended standard of care.

Yet, many countries with high burdens of TB have limited uptake of WHO-recommended tools, such as rapid molecular tests and urine-LAM tests for people living with HIV.
Overview of available tools

**TB screening**
- 4-symptom screen (coughing, fever, weight loss, night sweats)
- Chest X-ray + computer-aided detection (CAD)
- C-reactive protein (CRP) [among PLHIV]
- Rapid molecular tests [among PLHIV]

**TB diagnosis [bacteriological confirmation]**
- Smear microscopy
- Rapid and high-throughput molecular tests
- LF-LAM [among PLHIV] (with follow-on molecular testing)

**Drug-susceptibility testing**
- Rapid and high-throughput molecular tests [RIF, INH, FQ, AMK, ETH, KAN, CAP]
- Line probe assays (LPAs) [RIF, INH, FQ, AMK, CAP, PZA]
- Mycobacterial culture [RIF, INH, FQ, AMK, ETH, KAN, CAP, PZA, BDQ, DLM, PMD, LZD, CFZ]
TB screening

4-symptom screen
- Not as accurate as other tools listed below; cannot detect subclinical TB

Chest X-ray + computer-aided detection (CAD)
- Ultraportable CXR can be deployed for systematic screening in communities
- CAD can assist clinicians to rapidly and accurately interpret results

C-reactive protein (CRP) [among PLHIV]
- Primary care test for general inflammation; more accurate than symptom screen among ART-naive PLHIV

Rapid molecular tests [among PLHIV]
- Strong recommendation to screen all PLHIV inpatients, conditional recommendation for all PLHIV

Gaps:
- Rapid, inexpensive, and accurate TB screening tools that can be deployed widely in communities, that use non-sputum samples appropriate for different populations (children, PLHIV) and forms of TB (pulmonary TB, EPTB), and that can detect subclinical TB
TB diagnosis

Rapid molecular tests
Accurate, rapid tests; detect TB genetic material; require amplification using complex, expensive instruments; GeneXpert (district level) and Truenat (district/peripheral level) also test for RIF resistance; TB LAMP (district/peripheral level) only tests for TB; scale up has been limited

High-throughput molecular tests
Accurate; run on high-volume centralized instruments; Abbott, Roche, BD, and Hain assays test for TB and resistance to RIF and INH; more appropriate for urban areas with efficient sample transport systems

LF-LAM
Rapid, inexpensive, urine-based test for PLHIV; should be used in combination with rapid molecular tests; proven to reduce TB mortality among PLHIV inpatients by 15%; limited scale up

Gaps:
- Rapid, accurate, inexpensive confirmatory diagnostic tests suitable for use at the point of care that use non-sputum samples appropriate for different populations and forms of TB
Drug-susceptibility testing

Rapid and high-throughput molecular tests
GeneXpert rapid molecular test for XDR-TB tests for resistance to INH, FQ, AMK, ETH, KAN, CAP (district level), requires 10-color modules and is expensive ($20); high-throughput assays test for resistance to RIF and INH in central labs

Line probe assays (LPAs)
Complex central lab molecular tests for drug resistance to RIF, INH, FQ, AMK, CAP, PZA

Mycobacterial culture
Attempting to grow TB bacteria from a sample in a liquid or solid medium in the presence of pure drug substance; takes 2-6 weeks for results; the “gold standard” for accuracy; currently the only available method to test for resistance to BDQ, DLM, PMD, LZD, CFZ

Gaps:
• DST that can be rapidly and affordably implemented at the point of care to minimally test for resistance to RIF, INH, FQ, and BDQ, and to optimally also test for resistance to AMK, PZA, DLM, PMD, LZD, CFZ
What is needed to increase access

Policy
Availability
Affordability
Transparency
Autonomy
Step Up for TB
2020 Tuberculosis Policies in 37 Countries
A survey of prevention, testing, and treatment policies and practices
Availability: the Omni case

- US gov supported Cepheid with a cash injection of at least $86 million to develop Omni
- FIND supported Cepheid with setting up at least 4 trials to evaluate Omni
- HOME trial in South Africa has evaluated the Omni on people suspected of TB
- In August 2021 Cepheid decided unilaterally to cancel commercialization of Omni without explanation nor mitigation of impact
- Do we have enough teeth in the public funding and trial contracts with corporations?
Time for $5 campaign coordinated by MSF and TAG, together with >150 community and civil society organizations
Transparency

- Develop a framework for cost of goods sold (COGS) transparency and methodology
- Develop a framework for fair pricing structures
- A fair price is an all-inclusive price
- A fair price should be for both public and private sector
- Use the frameworks in negotiations with suppliers, pool volumes across diseases in negotiations, facilitate competition
- Attach transparency and access conditions to public resources to R&D and trials

Ten Principles for Access to Multi-disease Molecular Diagnostics: A Global Call to Action
Autonomy

Diagnostic companies in LMICs with test kits, reagents or equipment for diagnosing TB (© PATH)
Resources

• An Activist's Guide to Tuberculosis Diagnostic Tools

• An Activist's Guide to the LAM Test

• GenomeWeb: Highly Anticipated Cepheid Omni Point-of-Care System Falls Off Radar (Madeleine Johnson)
  • https://www.genomeweb.com/molecular-diagnostics/highly-anticipated-cepheid-omni-point-care-system-falls-radar#.Y0Pv1XZBzIw

• MSF & StopTB report: Step Up for TB, TB policies in 37 countries (4th Ed.)
  • https://msfaccess.org/stepupfortb

• MSF technical brief: Local diagnostics to meet local health needs
  • https://msfaccess.org/improve-local-production-diagnostics

• MSF roundtable report: Africa and South Korea, working together on local production of diagnostics
  • https://msfaccess.org/africa-south-korea-roundtable-working-together-local-production-diagnostics

• PATH dashboard: A regional snapshot of diagnostic companies in LMICs across Africa, Latin America, and Southeast Asia

• TAG & MSF roundtable report: 10 principles for access to multi-disease molecular diagnostics

• Time for $5: GeneXpert diagnostic tests
  • https://msfaccess.org/time-for-5