**KEY MESSAGES**

- Diagnostic algorithms should start with appropriate screening policies to identify persons at risk.
- Recommended diagnostics are not mutually exclusive and should be combined based on country epidemiology, the existing laboratory network (see Figure 1), and available resources.
- Implementation of any recommended diagnostic requires all core laboratory components to be in place (see box below).
- Culture-based, drug susceptibility testing (DST) is accurate and reproducible for detection of resistance to isoniazid and rifampicin, i.e. multidrug-resistant (MDR-TB) and fluoroquinolones and second-line injectable drugs, i.e. extensively drug-resistant (XDR) TB. For other drugs DST is problematic and the clinical relevance of results are unclear.
- In 2015-2016 WHO issued recommendations on use of new tests to diagnose TB: LF-LAM (diagnostic aid in HIV positive patients with low CD4 count or seriously ill HIV positive patients) and TB-LAMP (manual molecular assay to replace microscopy in settings where Xpert® MTB/RIF assay cannot be used)
- In 2016 WHO issued recommendations on use of rapid molecular tests to detect MTBC, resistance to isoniazid and rifampicin (LPA), as well as resistance to fluoroquinolones and second-line injectable drugs (SL-LPA),
- Even with new, rapid molecular diagnostics, conventional laboratory capacity (microscopy, culture and DST) must be maintained for monitoring patient response to treatment and detecting resistance to drugs other than rifampicin.
- Scale-up of diagnostic capacity must be matched with access to appropriate treatment and care.

**BOX: CORE LABORATORY COMPONENTS FOR UPTAKE OF DIAGNOSTICS**

- Sufficient funding.
- Adequate human resources and training.
- Country-specific diagnostic algorithms.
- Appropriate infrastructure and biosafety.
- Specimen transport and referral mechanisms.
- Equipment validation and maintenance.
- Management of laboratory commodities.
- Laboratory information management systems.
- Laboratory quality management systems.

Figure 1: Currently recommended TB diagnostics require different levels of laboratory sophistication due to technical complexity and biosafety concerns.
WHO-RECOMMENDED DIAGNOSTIC TOOLS

RECOMMENDED FOR USE (detailed policy guidance: http://www.who.int/tb/areas-of-work/laboratory/policy_statements/en)

- **LED microscopy**: For use at all laboratory levels as replacement of conventional fluorochrome and light microscopy.
- **Commercial liquid culture and DST systems**: For use at central/regional reference laboratory level, as current reference standard.
- **Rapid speciation strip technology**: For use with conventional culture and DST at central/regional reference laboratory level, to identify *Mycobacterium tuberculosis*.
- **Automated real-time nucleic acid amplification - Xpert MTB/RIF system**: For rapid detection of pulmonary and extrapulmonary TB and rifampicin resistance in both adults and children at decentralised laboratory and health care centres.
- **Lateral flow urine lipoarabinomannan (LF-LAM) assay**: May be used to assist in the diagnosis of TB in HIV positive patients with signs and symptoms of TB (pulmonary and/or extrapulmonary) who have a CD4 cell count less than or equal to 100 cells/µL, or HIV positive patients who are seriously ill regardless of CD4 count or with unknown CD4 count.
- **Loop-mediated isothermal amplification test kit for TB (TB-LAMP)** - manual molecular assay to replace microscopy to diagnose TB in settings where automated molecular tests cannot be used.
- **Line probe assay (LPA)** as a rapid diagnostic test for detection of rifampicin and isoniazid resistance. The WHO recommended commercially available tests include GenoType MTBDRplus VER 1 and 2 (Hain Lifescience, Germany), Nipro NTM+MDRTB detection kit 2 (Nipro, Japan). Suitable for use on smear-positive specimens or culture isolates.
- **Second-line line probe assay (SL-LPA)** as a rapid diagnostic test in patients with confirmed rifampicin-resistant TB or MDR-TB to detect resistance to fluoroquinolones and the second-line injectable drugs.

NOT RECOMMENDED DUE TO CURRENT INSUFFICIENT EVIDENCE

- Phage-plaque technology for rapid rifampicin resistance.
- Thin-layer agar methods for rapid culture and DST.
- Interferon-gamma release assays as replacement for the tuberculin skin test for detection of latent TB in low- and middle-income (typically high TB and/or HIV) settings.

RECOMMENDED NOT TO USE (detailed policy guidance: http://www.who.int/tb/areas-of-work/laboratory/policy_statements/en)

- **Commercial TB serodiagnostic tests**.
- **Interferon-gamma release assays for detection of active TB (all settings)**.

TARGET PRODUCT PROFILES

Consensus on the minimal and optimal specifications of four different types of TB diagnostic tests has been reached. Full report is available at http://www.who.int/tb/publications/tp_report/en/

For more information please visit: http://www.who.int/tb

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