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CHALLENGE TB

TECHNICAL HIGHLIGHT



Photo credit: Warren Zelman

Introduction of point-of-care testing for multidrug-resistant tuberculosis patients

BACKGROUND

The USAID-funded Challenge TB (CTB) project is a major partner of the National TB Program (NTP) of Ethiopia. Together, the partnership has made important contributions to the decentralization of multidrug-resistant (MDR) treatment and follow-up sites.¹ MDR-TB is a public health crisis and a national health security risk, carrying grave and sometimes fatal consequences. Electrolyte disturbance is the most common adverse drug event encountered by MDR-TB patients during treatment. The NTP introduced electrolyte instruments that helped ensure follow-up of MDR patients in treatment initiating

centers (TICs). However, these instruments did not function most of the time because of frequent instrument failure, shortage of reagents, lack of technical capacity and an established system to provide regular preventive maintenance, lack of trained lab personnel, and lack of uninterruptible power. In addition, the instrument has a long turnaround time (TAT) and is not cost effective because it runs for 24 hours and consume reagents, even when it is not running a sample.

¹ Challenge TB technical brief: Expanding ambulatory care to treat drug resistant TB in Ethiopia. 2019

STRATEGIC RESPONSE



In an effort to alleviate the challenges related to electrolyte analysis, CTB supported the efforts of the Ministry of Health and Ethiopian Health Research Institute (EPHI) and introduced the i-STAT point-of-care (POC) analyzer to be used at TICs to ensure bedside laboratory follow-up tests to improve the quality of care.

About the test

i-STAT is lightweight, portable, and easy-to-use and features single-use disposable test cartridges that can be used to perform a broad menu of diagnostic tests, including sodium, potassium, chloride, calcium, glucose, creatinine, blood urea nitrogen, urea, total carbon dioxide, and hematocrit. Testing using i-STAT is easy—a nurse enters patient information into the handheld device, places two or three drops of blood on the testing cartridge, inserts the cartridge into the device, and views the test results at the patient's bedside in just two minutes (www.pointofcare.abbott).

IMPLEMENTATION

With financial and technical assistance from CTB, EPHI collaborated with the NTP to build the capacity of 13 TICs (28.8% of the total number of TICs). The goal of the capacity-building effort was to provide POC electrolyte test service within facilities, which has been accomplished through the following interventions:

- Procured and donated 13 i-STAT analyzers and 60 testing cartridges (with 25 tests) to EPHI to implement POC electrolyte testing service at 13 high-workload TICs located in four large regions and two city administrations of the country
- Provided on-site technical assistance to each TIC regarding validation of the i-STAT analyzer before implementation
- Organized on-the-job training for each TIC and oriented 51 laboratory personnel and nurses on the operation of the i-STAT analyzer, including troubleshooting
- Prepared and provided customized standard operating procedures and job aids to each TIC for quick reference
- Placed i-STAT analyzers in TB clinics to be operated by trained nurses; TIC laboratory personnel assisted nurses with troubleshooting and served as backup
- Provided remote support to TIC nurses and laboratory technicians to fix any problems and provide advice via telephone
- Provided supportive supervision (by CTB laboratory advisor) to ensure competence of nurses and ensure quality of POC service provided in TICs

On-site training of nurses and laboratory personnel on i-STAT analyzer (Photo credits: Challenge TB Ethiopia)



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ACHIEVEMENTS

- 371 patients were offered POC testing using i-STAT for electrolyte abnormalities; of these, 4 had hypokalemia (potassium level <3.5 mEq/L)
- Immediately available laboratory results with a TAT within two minutes when performed by a trained nurse (however, when the i-STAT analyzer is placed in the laboratory, testing is done by the lab technicians and it takes at least 24 hours to get results)
- No downtime because the i-STAT analyzer has an external battery pack that works during power interruptions (the current electrolyte analyzer needs battery backup, which is an additional expense and only lasts for about two hours)

“The use of this point-of-care device in TB clinic is more effective to manage the side effects during MDR-TB patient follow-up days.”

—Nurse working at a TB clinic in Addis Ababa ALERT hospital

WAY FORWARD

The i-STAT analyzer POC is suitable for MDR-TB patient monitoring during the MDR-TB days. Expansion to more TICs could be considered for enhanced MDR-TB patient quality of care and improved system efficiency. The introduction of this POC electrolyte instrument helped nurses perform successful, timely screening and management of hypokalemia in their TICs. Introducing the i-STAT to monitor MDR patients during follow-up and engaging non-laboratory professionals, such as nurses in the TB clinic, is a feasible approach to ensuring the use of POC tests and providing real-time information to make clinical decisions.

Currently, i-STAT analyzers in hospitals and health center laboratories use automated or semi-automated analyzers versus electrolyte analyzers that require well-trained and experienced lab personnel, a larger workspace, and an uninterrupted power supply; these larger analyzers also have longer TAT. Thus, i-STAT has great potential to improve the quality of the current lab system in Ethiopia. The future of laboratory services should be simple, fast, and at the POC to reduce waiting for test results and improve patient care. Therefore, we recommend the use of i-STAT in other TICs and larger-scale implementation of the instrument in Ethiopia's laboratory system, particularly in hospital emergency units, TICs, and health center laboratories to improve the efficiency of lab service and general patient care beyond TB services.

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