Integration of an all-in-one bacteriology laboratory (Mini-Lab) in an MSF hospital: evaluation in Carnot, CAR

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Background

The Mini-Lab is a simplified and modular bacteriology laboratory being developed by MSF to improve access to microbiology diagnostics and antibiotic resistance surveillance in resource-limited settings. After a first pilot study in Haiti in 2020, this second evaluation aimed to assess the performance and ease-of use of the Mini-Lab integrated in the clinical routine of an MSF-supported hospital which has had no prior access to microbiology.

Methods

The study was conducted after the implementation of the Mini-Lab in an MSF-supported hospital in Carnot, CAR, along with an antibiotic stewardship program. We included hospitalized patients with successful blood culture sampling on admission or during hospitalization, and who consented to study participation. The bacteria identified from blood culture in the Mini-Lab were shipped to a reference laboratory in Bicêtre hospital, France for identification (ID) and antibiotic susceptibility testing (AST) using reference methods. Laboratory technicians evaluated the usability of the Mini-Lab through repeated ease-of use questionnaires and competency assessment.

Results

Between September 2021 and February 2022, we included 835 patients who had a total of 960 blood cultures. Positivity rate with pathogens was 12.5%. Over 121 pathogens identified in the Mini-Lab, 74 have been tested with reference methods so far and 68 (92.0%) gave ID results concordant with the Mini-Lab with 97.4% agreement to genus. No particular organism-antibiotic combination caused systematic errors on AST. Upon completion of the initial training, the laboratory technicians reported most of the aspects of the Mini-Lab easy to use, except for preparation and reading of ID and AST methods, which were reported to be simple after 3 months of experience. Assessment of the laboratory technicians' competencies after the initial training yielded very high scores (>90%) and 100% after 3 months.

Conclusion

The comparison of the Mini-Lab results with the reference methods for ID and AST showed overall very good results. We did not highlight any major malfunction preventing its deployment in other resource-limited countries.

The performances of the simplified and modular bacteriology laboratory, the Mini-Lab, are overall very good. We did not highlight any major malfunctions preventing its deployment in other fields.