

Evaluation of a laboratory rapid test for confirmation and characterisation of carbapenemase-producing bacteria in MSF laboratories

Céline Langendorf, Epicentre, France

Background

Carbapenemase-producing Gram-negative bacilli (CP-GNB) have emerged as a major global health concern. Confirmation and characterisation of CP-GNB are crucial for infection prevention and control (IPC) and antimicrobial stewardship (AMS). However, MSF laboratories rely solely on phenotypic detection of carbapenem resistance. This study evaluated the accuracy and ease-of-use of the rapid laboratory test Carba 5 (NG-Biotech) in confirming and detecting the five most common carbapenemases (NDM, VIM, KPC, IMP, OXA-48 like) in CP-GNB isolated in MSF laboratories.

Methods

The retrospective evaluation included carbapenem-resistant Enterobacterales (CRE, n=252) and *Pseudomonas aeruginosa* (CRPA, n=32) isolated from blood and bone cultures collected in MSF-supported hospitals in DRC, Niger and Jordan between 2019 and 2024. Results were compared to a composite reference method: (i) carbapenem inactivation method (CIM); and (ii) whole genome sequencing (WGS) performed at the American University of Beirut (analyses still ongoing). Trained laboratory technicians performed the Carba-5 test and CIM in the MSF laboratories. We evaluated the usability of the Carba-5 test and CIM through self-administered questionnaires completed post-training and at the end of the study.

Preliminary results

Among CRE, Carba-5 test showed a 98% (152/155) positive and 98% (92/95) negative agreement with CIM. According to partial WGS results, NDM is the main carbapenemase produced by the CP-Enterobacterales in DRC (20/20) and Niger (49/49). In Jordan, we observed NDM (52/54), VIM (1/54) and KPC (1/54). Among

CRPA, Carba-5 test showed a 100% (11/11) positive and 100% (18/18) negative agreement with CIM and WGS. According to partial WGS results, NDM and OXA are the most frequent carbapenemases in DRC and Jordan.

The Carba-5 test was reported as easy to use and interpret, while CIM was time-consuming and challenging to perform and interpret.

Conclusion

This study contributes to the knowledge of CP-GNB epidemiology in 3 MSF projects. Preliminary results showed Carba-5 test as an acceptable and easy-to-use diagnostic tool. However, additional confirmatory results are needed to estimate accuracy for carbapenemase typing, and define the optimal diagnostic algorithm for screening and confirmation of CP-GNB.

The Carba-5 test is a promising laboratory tool to confirm carbapenemase-producing Enterobacterales and *P.aeruginosa* in MSF laboratories according to preliminary results. Complementary results will allow to evaluate its potential integration in routine lab activities.