O0257 Rapid diagnostic tests for the detection of antimicrobial resistance determinants in bloodstream Gram-negative infections: a meta-analysis of their accuracy

Giulia De Angelis*[1], Adriano Grossi[2], Stefania Boccia[2], Maurizio Sanguinetti[1], Brunella Posteraro[3]

[1] Institute of Microbiology, Fondazione Policlinico Universitario A.Gemelli, IRCCS, Rome, Italy, [2] Section of Hygiene, Institute of Public Health, Fondazione Policlinico Universitario A.Gemelli , IRCCS, Rome, Italy, [3] Institute of Medical Pathology and Semeiotics, Fondazione Policlinico Universitario A.Gemelli, IRCCS, Rome, Italy

Background: As multidrug-resistant Gram-negative bacteria widespread, a timely detection of resistance determinants is paramount in the clinical management of bloodstream infections. These infections are associated with significant morbidity and mortality risks, which partly depend on delayed culture susceptibilities that may be responsible for delays in optimal antimicrobial therapy. Molecular rapid diagnostics, which includes tests such as PCR, has improved on culture-dependent microbiological methods, especially when directly applied to positive blood cultures (PBCs). We performed a systematic review and meta-analysis aimed at defining the diagnostic accuracy of PCR-based tests for use on Gram-negative PBCs in real-practice.

Materials/methods: We developed a search protocol according to PRISMA statement. We consulted three databases: PubMed, Scopus and Web of Science. We searched terms gram-negative bacteria, sepsis, bloodstream infection and accuracy into human clinical studies published in English up to March 2018. Studies were included if they assessed sensitivity and specificity of PCR-based methods (index test) compared to gene sequencing (reference test). We included all studies that assessed resistance determinants of Gram-negative bacteria from PBCs. Two reviewers independently selected articles, extracted data and performed a quality assessment of the studies according to QUADAS-2. We pooled test estimates using STATA 13.1.

Results: The literature search yielded 2057 articles, of which 82 were selected for full-text screening. We included six studies encompassing 3850 Gram-negative organisms from PBCs that were tested by molecular tests in comparison with the reference test. Three studies focused on VERIGENE® Gram-Negative Blood Culture Test, two on FILMARRAY™ Blood Culture Identification and one on PCR-reverse blot hybridization assay (PCR-REBA). Four studies evaluated KPC (36 positive organisms/1103 tested), 3 studies CTX-M (56/908), 3 studies OXA (8/817), 2 studies VIM (3/205), 1 study NDM (1/703), 1 study IMP (3/114). The pooled sensitivity was 98.0% (95% CI: 92.5%–99.6%) and the pooled specificity was 99.5% (95% CI: 98.5%–99.8%). The positive likelihood ratio was 188.5 (95% CI: 64.5–550.1) and the negative likelihood ratio was 0.02 (95% CI: 0.004–0.08).

Conclusions: This study shows that the widely used molecular tests in clinical laboratory are highly accurate for directly detecting multidrug-resistance determinants in Gram-negative PBCs.