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Evaluation of a multiplex PCR assay for the rapid identification of bacteria and yeasts in positive blood cultures

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OBJECTIVES:

The FilmArray platform is an automatic diagnostic system allowing multiplex PCR analysis for the direct and rapid (1 hour) identification of 20 bacteria, 5 yeasts and 4 antimicrobial resistance genes (*mecA, vanA/vanB and blaKPC*) included in a Blood Culture Identification (BCID) panel. The aim of this study was the evaluation of the FilmArray BCID test performance in positive blood culture bottles.

METHODS:

Positive blood cultures (n=49) carried out by BacT/Alert 3D system (bioMérieux, Italy) were analysed with FilmArray System (FA; BioFire, Salt Lake City, UT, USA) for a molecular identification in association to conventional method (Vitek2 System, bioMérieux, Italy). The molecular technique included the transfer by syringe of 0.5 ml of sample from the positive bottle to BCID FilmArray diluent and addition to sample port of the pouch. This pouch was placed in the FilmArray processor. This system combines nucleic acid extraction from clinical specimens, high-order nested multiplex PCR, post-PCR DNA melt curve for isolate identification and antibiotic resistance analysis in 1 hour of run time.

RESULTS:

A percentage of 89.8 % of the conventional culture positive samples were also positive with FilmArray, regardless the genus/species identification and the mono- or poly-microbial isolate(s) grown.The remaining 10.2 % conventional culture positive, but FilmArray negative samples may be accounted for the lack of genus/species in the FilmArray panel. For a more detailed comparison of the conventional and molecular methods, the cultures were divided in mono-microbial (n= 40) and poly-microbial (n=9). Besides 5 mono-microbial cultures, where the isolates identified by conventional methods were absent from FilmArray panel, the remaining 35 (100%) were correctly identify by molecular assay. Conventional culture and molecular system were able to identify 100% of 9 poly-microbial blood cultures. The two methods consistently identified *S. aureus*, *E. coli* and *C. albicans* as the most frequent Gram-positive, Gram-negative and yeast pathogens respectively in samples studied. Traits of resistance were identified by both assay used. However in two blood bottles, not included in the previous percentages, we found Serratia by FilmArray and *Pseudomonas aeruginosa* by Vitek2; *E. coli* by FilmArray and *E. coli* plus *C.albicans* by Vitek2.

CONCLUSIONS:

The FilmArray System is a rapid, sensitive and specific molecular method with high performance in the direct identification of microbial species and of some traits of resistance of the most important pathogens causing sepsis directly from positive blood cultures. However the two inconsistent results found with the methods used warrant further investigations.