

Session: P045 Molecular diagnostics (blood, stool, sterile sites)

Category: 4b. Diagnostic bacteriology – non-culture based, including molecular and MALDI-TOF

23 April 2017, 13:30 - 14:30
P0997

Performance and diagnostic accuracy of Accelerate Pheno™ system on clinical blood cultures for the rapid diagnosis of bloodstream infections

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Background: Rapid detection of microorganisms responsible of bloodstream infections (BSI) and determination of their resistance profile is of paramount importance for prompt start of optimal antibiotic therapy which impacts on patients' mortality. This is of particular interest in settings challenged by high rates of multidrug-resistant bacteria. Accelerate Pheno™ system (Accelerate Diagnostics, Inc.) is an automated platform that uses single-cell microbiology analysis technology to rapidly identify pathogens (1,5 hour) and to provide information on antibiotic susceptibility (7 hours) directly from positive blood culture (BC) broths. The objective of this pilot study was to evaluate the performance of Accelerate Pheno system compared to culture-based method results of positive BCs collected from patients hospitalized at "A. Gemelli" Foundation, Catholic University of the Sacred Heart, a 1,300-bed tertiary-care hospital in Rome, Italy.

Material/methods: During a 2-week period positive BCs corresponding to unique episodes of BSI were analyzed both by Accelerate Pheno system and standard laboratory testing, which included MALDI-TOF for species identification and microdilution broth for MIC determination. Results were interpreted according to EUCAST guidelines (v 6.0). Comparisons between the Accelerate Pheno system and conventional methods were expressed as agreement, very major error (false susceptibility), major error (false resistance), or minor error (intermediate versus susceptible or resistant).

Results: A total of 24 episodes of BSIs, two of which polymicrobial, were included in the study. Overall 26 microorganisms were recovered, including 19 gram-negative bacteria and 7 gram-positive cocci. The overall species identification agreement was 88.4% (23/26). Three gram negative bacteria were not identified as off-panel pathogens (1 *Stenotrophomonas maltophilia*, 1 *Achromobacter xylosoxidans*, 1 *Aeromonas hydrophila*). Concerning AST testing, a total of 132 microorganism-antimicrobial combinations were analysed. Category agreement was 93,2% (123/132). Disagreement was due to 4 minor errors, 2 major errors and 3 very major errors. False susceptibility emerged exclusively in 3 cases of combination *Enterobacteriaceae*/piperacillin-tazobactam.

Conclusions: Preliminary results show that Accelerate Pheno system is a valid technology to rapidly identify and detect resistance phenotype of microorganisms responsible of BSI. These results will be verified by a larger prospective study. Cost analysis and impact on antibiotic use and clinical outcomes need to be assessed.