Accelerate PhenoTest™ BC kit: The Experience of the Microbiology and Virology Laboratory - San Camillo Hospital - Rome

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BACKGROUND

The increasing incidence of bloodstream infections due to multidrug-resistant organisms represents a major clinical challenge. Moreover, obtaining rapid diagnostic information, including early microbial identification (ID) of clinically relevant bacterial pathogens as well as some *Candida* species, is one of the most important challenges in clinical microbiology today.

AIM

The aim of this study was to evaluate the performance of a new diagnostic tool, the Accelerate Pheno™ system (AXDX), compared to Standard of Care (SOC) for positive blood cultures (BC) from patients with sepsis or septic shock.

METHODS

Positive BC from patients with sepsis or septic shock were included from 27th February 2017 to 12th June 2017. Blood cultures were processed following standard procedures, according to our internal protocols: Following arrival to the lab, blood bottles (BD BACTEC™ Plus) were incubated in a BD BACTEC™ FX blood culture system. BC were incubated up to 6 days for aerobes/anaerobes and up to 12 days for yeast cultures. For 42 positive blood cultures, Accelerate Pheno™ system results were compared to the SOC: ID of microbial pathogens performed with the Bruker MALDI Biotyper® system and antimicrobial susceptibility testing (AST) performed on the BD Phoenix™ system (NMIC-402 panels for GN, PMIC88 panels for GP). The results of AST followed EUCAST criteria. The microorganisms that can be identified with the Accelerate Pheno™ system (V1.2.0.87) are shown in (Fig. 1).

RESULTS

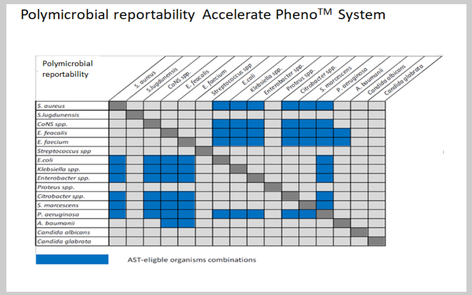


Fig. 1

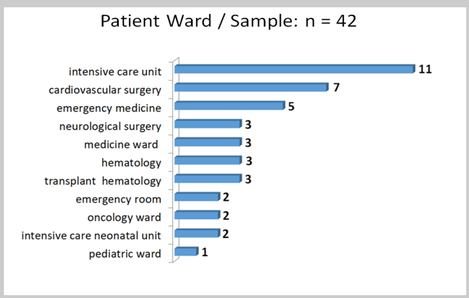


Fig. 2

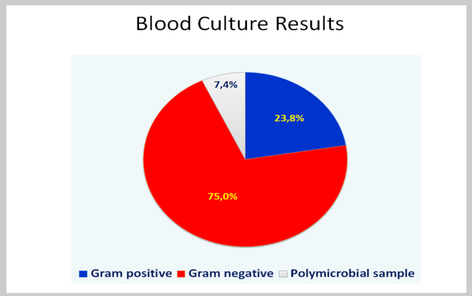


Fig. 3

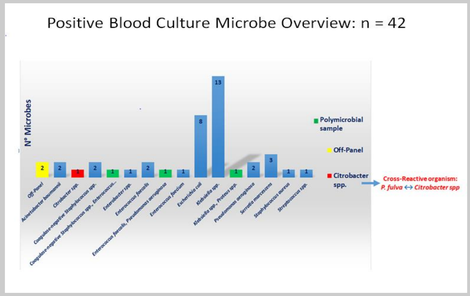


Fig. 4

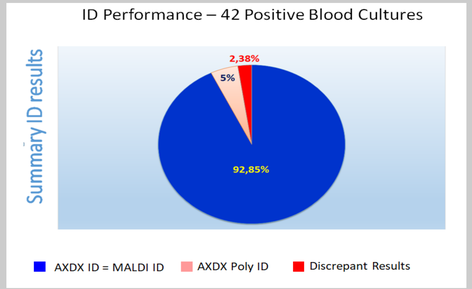
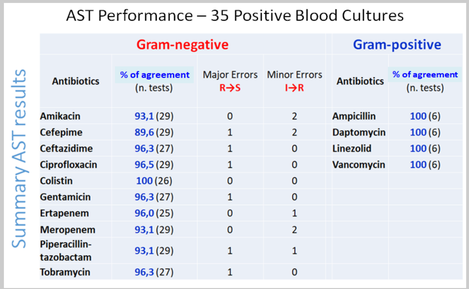


Fig. 5



Gram-negative				Gram-positive	
Antibiotics	% of agreement (n. tests)	Major Errors R→S	Minor Errors I→R	Antibiotics	% of agreement (n. tests)
Amikacin	93,1 (29)	0	2	Ampicillin	100 (6)
Cefepime	89,6 (29)	1	2	Daptomycin	100 (6)
Ceftazidime	96,3 (27)	1	0	Linezolid	100 (6)
Ciprofloxacin	96,5 (29)	1	0	Vancomycin	100 (6)
Colistin	100 (26)	0	0		
Gentamicin	96,3 (27)	1	0		
Ertapenem	96,0 (25)	0	1		
Meropenem	93,1 (29)	0	2		
Piperacillin-tazobactam	93,1 (29)	1	1		
Tobramycin	96,3 (27)	1	0		

Fig. 6

RESULTS

42 blood cultures (BC) were examined from patients affected by serious sepsis from 27th February 2017 to 12th June 2017. The majority of included patients were from ICU departments (Fig. 2). Of 42 BC, 32 (75%) were positive for Gram-negatives, 10 (23.8%) were positive for Gram-positives, and 3 (7.4%) were polymicrobial (Fig. 3); two BC were positive for off-panel bacteria (*M. morganii* and *Brevibacterium* spp). In one positive BC there was a discrepant ID result with the Accelerate Pheno™ system. AXDX result was: *Citrobacter* spp. vs. MALDI result : *P. fulva*. This ID discrepancy was equal to 2,38% (Fig. 4,5). For Gram-positives, AXDX AST results agreed perfectly with the reference tests, and for Gram-negatives, agreement ranged from 89,6% for cefepime to 100% for colistin with an overall agreement of 95.2% (Fig. 6). All AST results were provided by the Accelerate Pheno™ system within 7 hours of the start of the analysis; microbial ID within 90'. For the monomicrobial BC, we obtained the following results: 13 *K. pneumoniae*, of which 3 were ESBL+[a] (23%), 3 were KPC+ (23%); 2 *A. baumannii* MDR[c] (100%); 2 *P. aeruginosa* MDR (100%); 8 *E. coli*, of which 1 was ESBL+ (12,5%); 3 *S. marcescens* of which 1 was ESBL+ (33%), 1 was AmpC β-lactamase+ (33%); 1 MSSA[d]; 3 *Enterococcus* spp; 1 *Enterobacter* spp: this strain was a carbapenemase producer according to AST by the BD Phoenix™ panel. This result was not confirmed by AST results provided by the Accelerate Pheno™ system, by molecular tests (Cepheid GeneXpert™ system) and also by antimicrobial gradient method (Liofilchem®).

CONCLUSIONS

The Accelerate Pheno™ system represents an appropriate solution for determining correct and focused therapy for septic patients by providing complete, clinically relevant and rapid ID and AST results with MIC values. For bloodstream infections, a rapid switch from empiric to optimal antibiotic therapy plays an important role in the reduction of mortality, length of stay and the decrease of antimicrobial resistance.

a. ESBL: Extended-Spectrum Beta-Lactamase
b. KPC: *Klebsiella pneumoniae* carbapenemase
c. MDR: Multidrug-resistant
d. MSSA: Methicillin-sensitive *Staphylococcus aureus*

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