Impact of the Accelerate PhenoTest® BC Kit on Time to Results for Pathogens from Bloodstream Infections: IOAS (Improving Outcomes and Antibiotic Stewardship) Study Experience of 4 Hospitals

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ABSTRACT

Background: Identification (ID) and antimicrobial susceptibility testing (AST) results guide treatment decisions in patients with bloodstream infections (BSI). Reducing time to ID and AST results is critical to outcome. The Accelerate PhenoTest® BC kit (AXDX) has addressed this need providing ID and AST directly from positive blood cultures for common BSI in approximately 7 hours.
Materials: Time to result for positive blood cultures was compared using data from 4 hospitals after the implementation of AXDX. Pre-AXDX standard of care (SOC) for ID and AST included MALDI-TOF MS (n=3 centers), VITEK® 2 (n=3), BD Phoenix™ (n=2), Sensititre™ (n=1), and Verigene® (n=1). Of the 4 hospitals included, 2 hospitals implemented AXDX for gram-positive, gram-negative, and yeast organisms. The other 2 hospitals implemented AXDX for gram-negative organisms only. Time to result metrics such as time to Gram stain, ID, and AST were evaluated from the common starting point of blood culture positivity (t=0). Distribution of organisms observed in SOC methods compared to the AXDX was also evaluated.
Results: A total of 760 positive blood cultures were included (n=385 in SOC, n=375 AXDX) of which 84.9% were monomicrobial in the SOC and 88.5% in the AXDX. In the SOC group, 65.2% were gram-negative and 28.3% were gram-positive. In the AXDX group, 63.7% were gram-negative and 28.8% were gram-positive. Median times to blood culture positivity were similar in both groups [SOC 15.4 h (IQR, 13.0-21.6) vs. AXDX 15.1 h (12.9-19.4)]. Median times to Gram stain were also similar in both groups [SOC 0.5 h (0.08-1) vs. AXDX 0.5 h (0.15-0.83)]. Median time to ID in the SOC group was 26.6 h (14.8-37.8) and 2.5 h (2.1-2.9), p<0.0001 in the AXDX group. Median time to AST in the SOC group was 39.7 h (31.3-51.3) vs. 7.9 h (7.4-9.7), p<0.0001 in the AXDX group.
Conclusion: AXDX provided significant reductions in time to ID and AST. These reductions in time to ID and AST offer rapid results that are used to inform treatment decisions and optimize antimicrobial therapy in patients with BSI.

BACKGROUND

- The Accelerate Pheno™ system provides fast ID and AST of organisms that cause bacteremia. From a positive blood culture, the system identifies organisms within ~2 hours, and provides AST results in an additional ~5 hours.

OBJECTIVES

- Examination and comparison of data prior to, and following implementation, of the AXDX system across several hospital clinical microbiology laboratories to determine the effects of the AXDX system in management of patients with bacteremia.
- Comparison of time to result metrics between AXDX and SOC methods used for positive blood cultures.

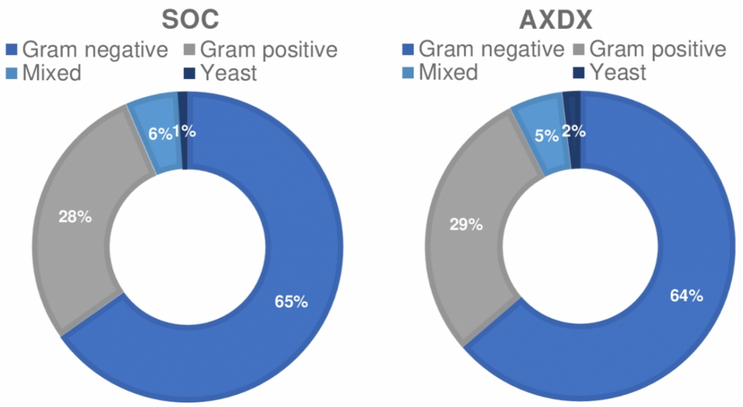
METHODS

- Laboratory and clinical data from hospitalized patients with BSI (excluding contaminants) were compared between two groups, one that underwent testing on AXDX and one that underwent alternative organism identification and susceptibility testing (SOC).

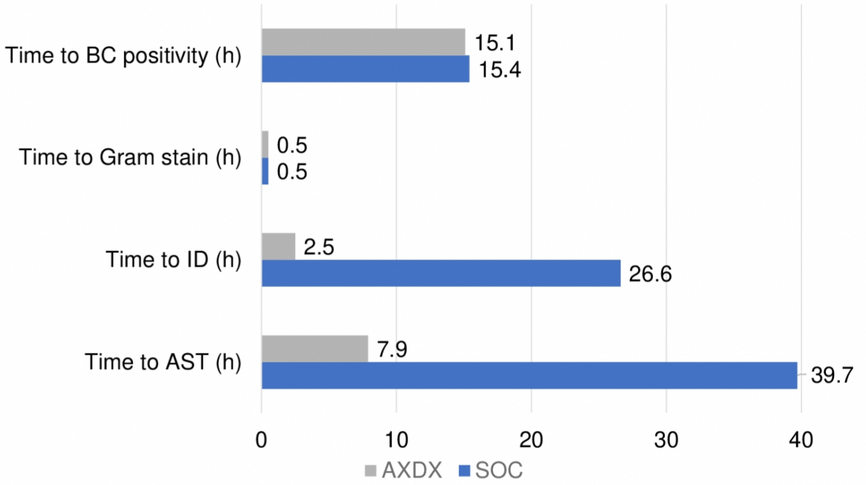
Inclusion Criteria
- ✓Positive blood culture deemed not to be a contaminant
- ✓Hospitalized at the time of positive blood culture

Exclusion Criteria
- × Positive blood culture in the 14 days prior to positive blood culture collection that contained the same organism
- × Patient expired less than 48 hours of positive blood culture

RESULTS



RESULTS



Time to Result	SOC (n=385)	AXDX (n=375)	Difference	*P*
Time to blood culture positivity (h)	15.4 (13.0-21.6)	15.1 (12.9-19.4)	0.3	0.14
Time to Gram stain (h)	0.5 (0.08-1)	0.5 (0.15-0.83)	0	0.84
Time to organism identification (h)	26.6 (14.8-37.8)	2.5 (2.1-2.9)	24.1	<0.0001
Time to AST (h)	39.7 (31.3-51.3)	7.9 (7.4-9.7)	31.8	<0.0001

Data reported as median, IQR

CONCLUSIONS

- In patients with bloodstream infections, AXDX provides essential information such as organism identification and antimicrobial susceptibility information significantly faster than standard methods.
- The speed at which this information is obtained is critical to clinical decision-making and optimization of antibiotic therapy.

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