Improving Outcomes and Antibiotic Stewardship for Patients with Bacteremia (IOAS): An interim analysis of Gram-negative bacteremia (GNB) from the Accelerate PhenoTest™ BC Kit (AXDX) Registry Study

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ABSTRACT

Background: Early diagnosis and appropriate antibiotic treatment are important factors in improving clinical outcomes of patients with bacteremia. AXDX provides fast identification (ID) and antimicrobial susceptibility testing (AST) of organisms that cause bacteremia. There is a paucity of data on the clinical impact of early ID/AST on patients with bacteremia.

Methods: This multicenter, quasi-experimental study compares clinical data, before and after implementation of AXDX, to evaluate the impact of AXDX on patients with bacteremia. Laboratory and clinical data from eligible hospitalized patients with a bacteremia that was tested on AXDX (post-AXDX) were compared to a cohort of patients with bacteremia that underwent testing by standard of care (SOC) analysis (pre-AXDX). An interim analysis of patients with GNB from 2 centers was performed. Pre-AXDX ID/AST methods were Verigene®, MALDI-TOF MS, and BD Phoenix™ at hospital A, and MALDI-TOF MS and VITEK®2 at hospital B. Both hospitals had active antimicrobial stewardship programs throughout the study period.

Results: A total of 233 (115 pre-AXDX, 118 post-AXDX) patients with GNB were included in the interim analysis. Demographics, Charlson Comorbidity Score, Pitt Bacteremia Score (PBS), and source of infection were comparable between arms. Median time to optimal antibiotic therapy (TTOT) was 44.0 hours (95% confidence interval; 35.6-61.9) in the pre-AXDX arm and 31.3 hours (95% CI; 27.7-43.0, P=0.13) in the post-AXDX arm. Thirty-day mortality, post-blood culture length of stay, and 30-day hospital readmission were comparable between arms. In an acute severity of illness analysis, moderately ill patients (PBS of 2-3; 49% of patients) at the time of bacteremia had greater reductions in time to optimal therapy in post-AXDX (29.1 h) as compared with pre-AXDX (57.3 h; P=0.003). Whereas, TTOT did not differ between arms for patients with mild (PBS<2; 30%) and severe (PBS≥4; 21%) acute illness.

Conclusions: Based on the interim analysis, AXDX may reduce the TTOT for patients with GNB compared with pre-AXDX ID/AST methods. Patient acute severity of illness (as measured by PBS) appears to be associated with the effect of AXDX on TTOT, with the biggest impact observed in moderately ill patients. These preliminary findings suggest patient severity of illness may influence the willingness of providers to optimize antibiotic therapy based on early ID/AST results. A larger cohort is necessary to determine the significance of these findings. Further patient enrollment is ongoing.

OBJECTIVES

- The Accelerate Pheno™ system provides fast ID and AST of organisms that cause bacteremia. From a positive blood culture, the system identifies organisms within approximately 1.5 hours, and provides AST results within approximately another 5 hours.
- This Improving Outcomes and Antibiotic Stewardship (IOAS) study examines and compares 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 treating bacteremia.
- The objective of this interim analysis is to compare the average time to optimal antibiotic therapy (considered the institution's most preferred treatment option for this patient based on AST, patient's condition and comorbidities, hospital policy, etc.) among patients with gram-negative bacteremia, pre- and post-AXDX implementation.

Inclusion Criteria

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

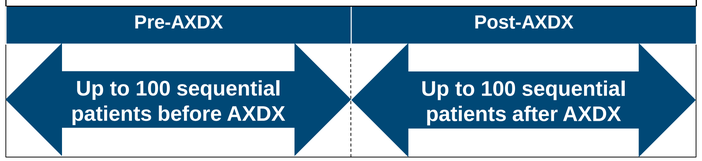
Exclusion Criteria

- 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
- Patient was being treated with palliative care and was not expected to survive

METHODS

- This is an interim analysis of a multicenter, quasi-experimental study designed to compare clinical data, before and after implementation of AXDX, to evaluate the impact of AXDX on patients with bacteremia.
- Optimal therapy was assessed during the first 96 hours after blood culture positivity for patients with AXDX on-panel organisms

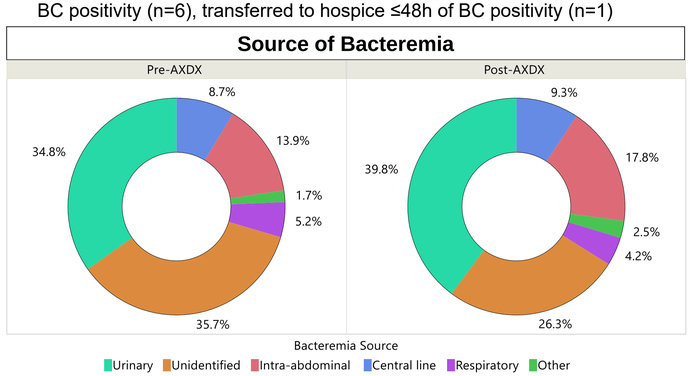
Study Design



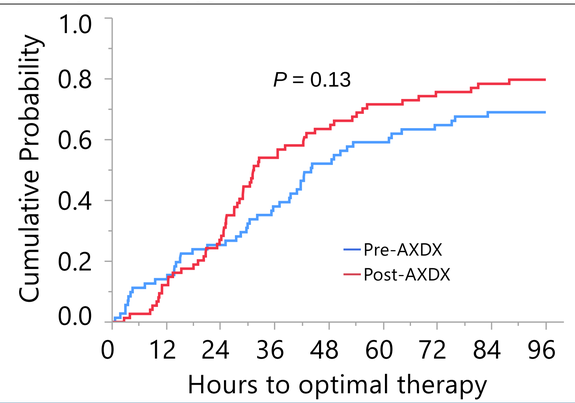
RESULTS

- 250 patients with GNB evaluated; 233 included (17 excluded)
- Exclusions were: deceased ≤48h of BC positivity (n=10), discharged at time of BC positivity (n=6), transferred to hospice ≤48h of BC positivity (n=1)

Source of Bacteremia



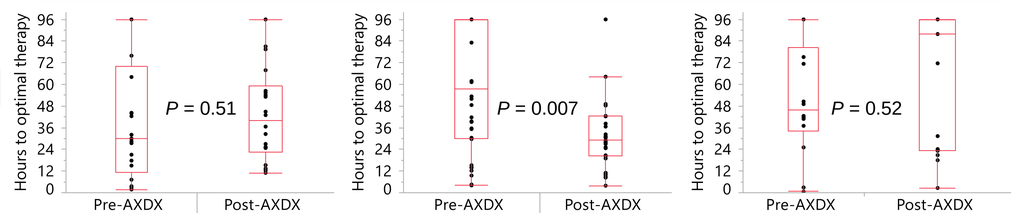
Time to optimal therapy after blood culture positivity (n=145)

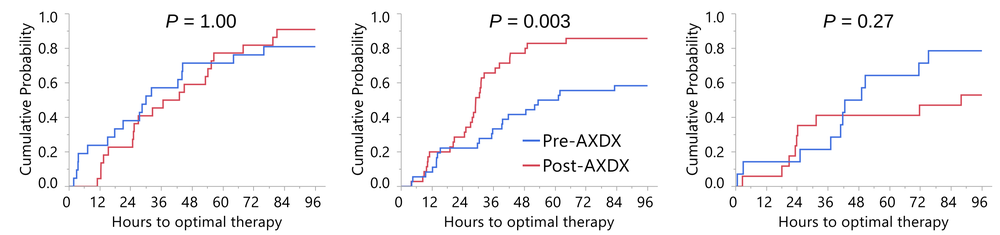


Patient Demographics and Comorbidities

Variable	Pre-AXDX (n=115)	Post-AXDX (n=118)	*P*
Age, y, median (IQR)	66 (52-86)	67.5 (56.5-79)	0.58
Male, n (%)	58 (50.4)	61 (51.7)	0.85
Charlson Comorbidity Score, mean ± S.D.	6.4 ± 3.3	6.1 ± 3.6	0.49
Pitt Bacteremia Score, median (IQR)	2 (1-3)	2 (0-3)	0.49
Vasopressor use, n (%)	34 (29.5)	25 (21.1)	0.14
ICU admission, n (%)	35 (30.4)	32 (27.1)	0.58

Time to optimal therapy stratified by Pitt Bacteremia Score





Outcomes

Variable	Pre-AXDX (N=115)	Post-AXDX (N=118)	*P*
30-day mortality, n (%)	8 (7.0)	4 (3.4)	0.27
Post-blood culture length of stay, d, median (IQR)	6.7 (4.4-11.3)	6.3 (3.6-11.6)	0.47
30-day readmission, n (%)	22 (21.2)	27 (23.7)	0.65

CONCLUSIONS

- Based on the interim analysis of patients with gram-negative bacteremia, acute severity of illness appears to be associated with the effect of AXDX on TTOT, with the biggest impact observed in moderately ill patients.
- A larger cohort is necessary to evaluate the impact of AXDX on clinical outcomes. Further patient enrollment is ongoing.

REFERENCES

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