Evaluation of the impact of rapid diagnostic testing on vancomycin utilization for contaminated blood cultures

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Background

Positive blood cultures may be the first sign of life-threatening sepsis. However, contaminated blood cultures are common with rates ranging from 0.6% – 6%.[1,2] Coagulase-negative staphylococci (CoNS) account for the majority of contaminated cultures. Vancomycin is commonly used for the empiric coverage of Staphylococcal organisms, but is associated with nephrotoxicity.[3]

Bacterial identification and susceptibility testing with conventional laboratory methods can take up to 72 hours. Rapid diagnostic testing (RDT) significantly decreases time to bacteria identification and can lead to reduced duration of antibiotic therapy. Previous studies have demonstrated a decrease in vancomycin use post-RDT implementation (51% vs 36%, P = 0.09) and significantly shorter median time to appropriate therapy (15h v. 0h, P < 0.001).[4,5]

GenMark ePlex® Blood Culture Identification (BCID) panel was implemented at our institution in February 2021. The antimicrobial stewardship team developed guidance on optimal antimicrobial therapy based upon BCID results and educated providers regarding probable contaminants (Figure 1).

Purpose

The purpose of this study is to evaluate the impact of GenMark ePlex BCID panel implementation on the duration of vancomycin therapy for contaminated blood cultures.

Methods

This pretest-posttest, single-center study was approved by the Institutional Review Board at Emory Healthcare. Patients meeting inclusion criteria were analyzed during a six month period prior to and post BCID implementation, from 03/01/2019 to 08/31/2019 and 03/01/2021 to 08/31/2021. Patients were included if they had two or more sets of blood cultures collected, had a single set positive for CoNS, and were not receiving vancomycin for an indication other than suspected bacteremia (Figure 2).

The primary outcome analyzed was duration of vancomycin therapy (in hours) in patients with a single contaminated blood culture prior to and post BCID implementation. Secondary outcomes included time to organism identification, hospital length of stay, readmission for treatment of a contaminated blood culture, and nephrotoxicity.

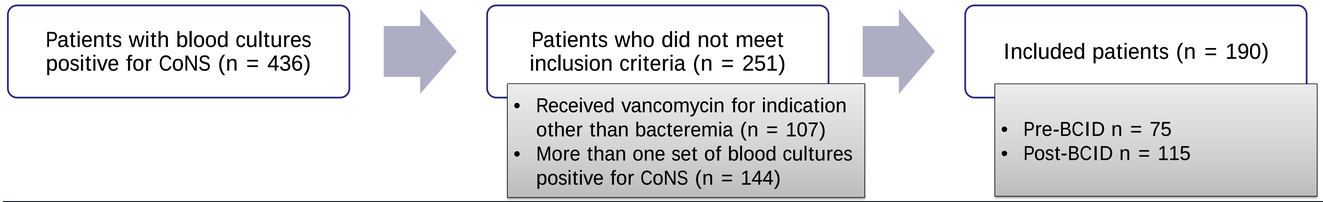
Statistics were performed using two-sample independent t-test for continuous data and Chi-square or Fisher's exact for nominal data.

Methods (cont.)

Figure 1: ESJH Rapid Blood Culture Diagnostic Guidance – Probable Contaminants

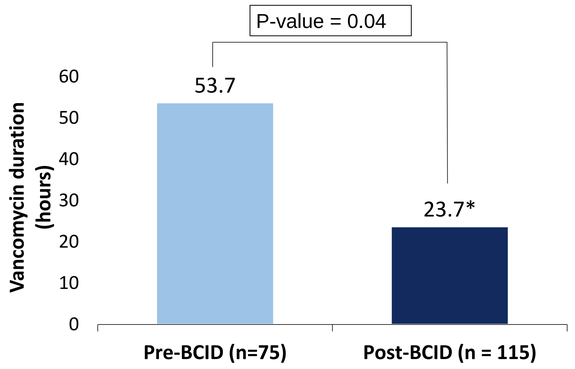
Organism	Preferred Empiric Therapy	Alternative Empiric Therapy	Additional Comments
Probable Contaminants			
Bacillus species *Corynebacterium* *Cutibacterium acnes* *Lactobacillus* *Micrococcus* *Staphylococcus epidermidis* *Staphylococcus,* not speciated	Consider withholding or discontinuing therapy as likely contaminant	In severely ill patients or high clinical suspicion of true bacteremia, consider starting/continuing therapy until more definitive results return: • Vancomycin	Treat only if clinical scenario compatible with bacteremia (i.e. indwelling lines); more than 1 set of positive blood cultures; presence of prosthetic valve; neutropenia

Figure 2: Study Population

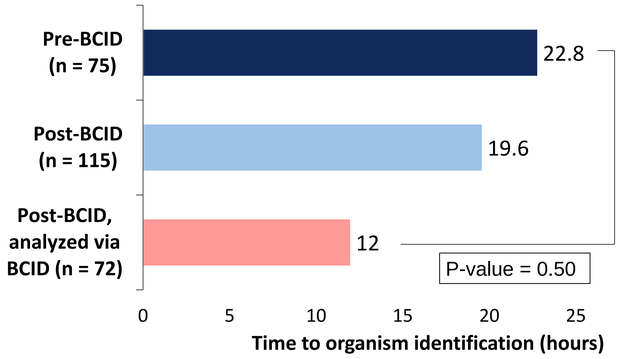


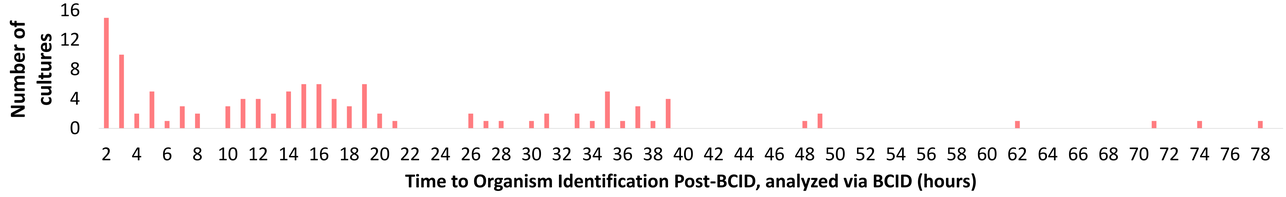
Results

Primary Outcome – Duration of Vancomycin Therapy



Secondary Outcome – Time to Organism Identification





Results (cont.)

	Pre-BCID (n=75)	Post-BCID (n=115)	P-value
Hospital length of stay (days), mean (SD)	9.3 (9.7)	13.0 (18.2)	0.08
Readmissions, n (%)	0 (0.0)	0 (0.0)	1
Nephrotoxicity, n (%)	4 (5.6)	3 (2.6)	0.44

Limitations

Due to the need to train microbiology staff, BCID was run on blood cultures during day shifts only throughout the study. As a result, not all blood cultures in the post-BCID group were analyzed via BCID. In addition, the critical nature of positive blood cultures resulted in providers being notified of gram stain results, but not BCID results. While the antimicrobial stewardship pharmacist reviewed blood cultures and communicated BCID results to providers, this only occurred Monday through Friday.

Conclusions

After implementation of BCID, the duration of empiric vancomycin therapy for contaminated blood cultures significantly decreased. When comparing only those analyzed by BCID to the pre-BCID group, we found mean time to organism identification decreased by almost half. BCID implementation did not appear to impact hospital length of stay, readmission, or nephrotoxicity.

Disclosures

The authors of this presentation have nothing to disclose concerning potential financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation.

References

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