EP033

Use of the Nanosphere Verigene® Gram Negative Blood Culture (BC-GN) Test for More Rapid Bacterial Identification and Antimicrobial Optimization

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BACKGROUND

- Rapid initiation of effective antibiotic therapy is strongly associated with decreased mortality in gram negative rod (GNR) bacteremia.[1]
- Rising rates of multi-drug resistance among GNRs necessitates antibiotic choices that are often broad-spectrum
- The use of such broad-spectrum antibiotics carries an increased risk of induction of antibiotic resistance, collateral infections and unnecessarily high financial cost.[2]
- Rapid diagnostic testing (RDT) has the potential to provide results within hours of blood culture positivity, offering a unique collaborative opportunity for antimicrobial stewardship programs (ASP).

OBJECTIVE

- The primary objective was to evaluate the effect of a RDT coupled with an ASP communication on clinical outcomes and antibiotic usage in hospitalized patients with GNR bacteremia.

METHODS

- RDT was performed using the Verigene® Gram Negative Blood Culture System (Nanosphere, Northbrook, IL) which uses specific bacterial DNA target hybridization and gold nanoparticle probe-based detection
- Results were reported to the Infectious Diseases pharmacist who notified the physician and selected an appropriate treatment regimen per protocol.
- A retrospective analysis was conducted comparing the pre-Verigene period, from June to July 2013, with the post-Verigene period, from February to October 2014
- Adult patients (age ≥ 18 years) with a positive blood culture via the BacT/ALERT®3D blood culture system (bioMérieux, Durham, NC) were included. Patients were excluded if they were outpatients, expired prior to the availability of any microbiological results, were transferred from an outside facility with previously positive blood cultures or had duplicate isolates.
- The primary endpoints were time to bacterial identification and time to antibiotic switch. Secondary endpoints were infection-related mortality, defined as death while on antibiotics or within 24 hours of discontinuation, 30-day mortality, intensive care unit length of stay and overall length of stay.

RESULTS

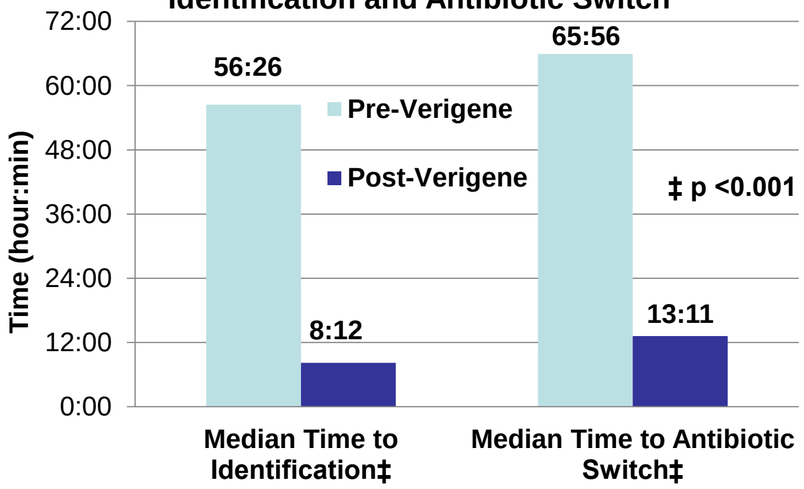
Table 1. Baseline Characteristics and Clinical Endpoints

Baseline Clinical Characteristics and Demographics	Pre-Verigene n = 65	Post-Verigene n = 49
Age, median (IQR) years	56 (51-66)	62 (51-69)
Female, n (%)*	**40 (61.5)**	**19 (38.8)**
Intensive care unit (ICU) stay, n (%)	27 (41.5)	21 (42.9)
Mechanically Ventilated, n (%)	9 (13.8)	10 (20.4)
Nursing home resident, n (%)	10 (15.4)	5 (10.2)
Charlson Comorbidity Index, median (IQR)	4 (2-6)	3 (2-6)
Pitt Bacteremia Score, median (IQR)	1 (0-3)	1 (0-3)
Source of Bacteremia		
Urine	24 (36.9)	25 (51)
Intra-abdominal	19 (29.2)	14 (28.6)
Pneumonia	5 (7.7)	3 (6.1)
Catheter-Related	5 (7.7)	0 (0)
Skin	5 (7.7)	4 (8.1)
Unknown	7 (10.7)	3 (6.1)
Causative Organisms, n (%)	[n=67]	[n=50]
Escherichia coli	30 (44.8)	24 (48)
Klebsiella spp.	16 (23.9	16 (32)
Enterobacter spp.	5 (7.5)	5 (10)
Pseudomonas spp.	6 (9)	4 (8)
Acinetobacter* spp.	**6 (9)**	**0 (0)**
Extended Spectrum Beta lactamase producing Enterobacteriaceae	6 (9)	1 (2)
Kleb. Pneumoniae* carbapenemase producing Enterobacteriaceae	**3 (4.5)**	**9 (18)**
Clinical Endpoints		
Infection-related Mortality, n (%)	6 (9.2)	3 (6.1)
30 Day Mortality, n (%)	7 (12.7) [n=55]	3 (8.1) [n=37]
ICU Length of Stay, median (IQR) days*	**8 (4-17)**	**3 (1-7)**
Hospital Length of Stay, median (IQR) days	10 (5-23)	7 (5-20)

***p < 0.05**

RESULTS

Figure 1: Primary Endpoints: Median Time to Identification and Antibiotic Switch



DISCUSSION

- Implementation of Verigene® led to a statistically significant reduction in time to identification, time to antibiotic switch and ICU length of stay by about 48 hours, 53 hours, and 5 days, respectively.
- Although there was no statistically significant difference in the secondary endpoints, there was a trend toward a reduction in 30 day mortality (8.8% vs. 12.7%, p=0.73).
- Limitations include retrospective study design, unmeasured differences between study and control groups, single centered and small sample population.

CONCLUSION

- RDT coupled with an ASP communication resulted in faster identification of microorganisms, prompt de-escalation and escalation of antimicrobials and reduction in ICU length of stay with potential implications for improved clinical outcomes in patients with bacteremia.

REFERENCES

1. Lodise TP, Patel N, Kwa A, et al. Predictors of 30 day mortality among patients with *Pseudomonas aeruginosa* bloodstream infections: impact of delayed appropriate antibiotic selection. Antimicrob Agents Chemother 2007;51:3510-5.
2. Pittet T, Tarara D, Wenzel RP. Nosocomial bloodstream infections in critically ill patients: excess length of stay, extra costs and attributable mortality. JAMA 1994;271-1598-601.

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