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Impact of a Rapid Blood Culture Identification Panel at a Community Teaching Hospital: a Pre-Post Quasi-Experiment

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Background

- Over 582,000 people develop bloodstream infections annually in the United States of America, accounting for nearly 80,000 deaths.[1]
- Conventional organism identification and susceptibility reports require 48 to 72 hours to produce final results, causing substantial delay in the delivery of a more targeted antimicrobial regimen.
- The delay has been shown to increase mortality, length of stay, healthcare costs, and antimicrobial resistance.[2-5]
- Rapid molecular diagnostic tests (RDT), such as BioFire FilmArray® Blood Culture Identification (BCID) panel, provides quicker results than conventional organism identification and susceptibility testing.
- In April of 2018, Kaweah Delta Medical Center implemented the BioFire® BCID panel to test blood cultures positive with a gram-positive bacteria.
- The objective of this study was to determine whether there is a difference in clinical and economic outcomes between traditional and RDT methods for confirmed gram-positive organisms in blood cultures.

Materials and Methods

- **Design:** Pre-post intervention, quasi-experimental study
- **Inclusion criteria:** hospitalized adults who had at least one positive blood culture with gram-positive pathogens between June 2018 to August 2018 and June 2019 to August 2019.
- **Endpoint:** Time to targeted therapy from blood culture collection
- The primary and secondary endpoints will be reported using descriptive statistics.
- Chi-square, Fisher's exact test, Mann-Whitney U, or Student's t-test will be used, as appropriate.

Results

Table 1. Demographics and Baseline Characteristics of Matched Patients[a]

	Pre-RDT (n=75)	Post-RDT (n=75)	p-value
Age, mean (SD), y	65.1 ± 16.6	63.5 ± 17.9	0.56
Sex, No. (%)			
Female	31 (41.3)	37 (49.3)	0.33
Organisms, No. (%)			
MRSA	6 (8)	6 (8)	1
MSSA	14 (18.7)	13 (17.3)	0.834
Coagulase negative Staphylococci	41 (54.7)	43 (57.3)	0.74
Streptococcus spp.	16 (21.3)	18 (24)	0.7
Enterococcus spp.	2 (2.7)	2 (2.7)	1

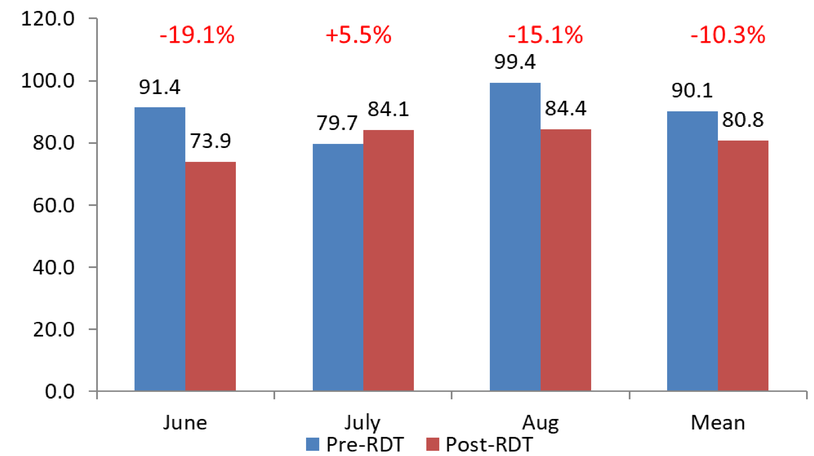
[a]Data are presented as number (percent) of patients, unless specified otherwise.
Abbreviations: RDT, rapid diagnostic test; MRSA, methicillin-resistant *S. aureus*; MSSA, methicillin-sensitive *S. aureus*;

Table 2. Primary and Secondary Endpoints[a]

	Pre-RDT (n=75)	Post-RDT (n=75)	p-value
Time to targeted therapy from blood culture collection, h	49.2 (37.09-76.25)	32.90 (23.19-51.77)	<0.001
Time to targeted therapy from positive culture, h	30.02 (19.41-52.91)	8.45 (0-25.15)	<0.001
LOS from blood culture collection, d	7.3 (5.34-11.09)	7.60 (4.72-14.76)	0.98
Estimated hospitalization cost	$7,202 ($5,270-$10,947)	$7,498 ($4,656-$14,568)	0.98
Length of therapy, d			
Vancomycin			
All patients Pre-RDT (n=69), Post-RDT (n=62)	2.18 (1.37-4.34)	0.86 (0.09-2.38)	0.001
Streptococcus and Enterococcus spp. Pre-RDT (n= 18), Post-RDT (n=16)	1.74 (0.1-2.24)	0.55 (0.09-1.88)	0.44
MSSA Pre-RDT (n=13), Post-RDT (n=13)	2.10 (1.53-2.44)	0.22 (0.06-1.74)	0.02
Contaminants Pre-RDT (n=30), Post-RDT (n=31)	2.2 (2.3-5.61)	0.52 (0.09-2.0)	0.001
Anti-pseudomonal β-lactams			
All patients Pre-RDT (n=62), Post-RDT (n=50)	2.06 (1.26-3.12)	1.7 (0.67-4.34)	0.61
MRSA, MSSA, Streptococcus, Enterococcus Pre-RDT (n=30), Post-RDT (n=28)	1.78 (1.28-2.89)	1.15 (0.06-2.07)	0.026

[a]Data are presented as median (IQR), unless specified otherwise.
Abbreviations: RDT, rapid diagnostic test; LOS, length of stay; MSSA, methicillin-sensitive *S. aureus*

Figure 1. Institutional Use of Vancomycin (DOT per 1000 Patient Days



Conclusion

- Implementation of an RDT resulted in significantly faster times to targeted therapy from blood culture collection and positive culture.
- No significant difference in length of stay.
- Vancomycin length of therapy was significantly shorter as was use of anti-pseudomonal β-lactams with true gram-positive bacteremia after incorporation of RDT.

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