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Reducing Time to Optimal Antimicrobial Therapy (OAT) for Bloodstream Infections (BSI) due to Gram Positive Cocci (GPC) in Chains Using Rapid Diagnostics (RDT) Paired with Antimicrobial Stewardship (ASP) Efforts

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Background

- In 2014, the Centers for Disease Control and Prevention released guidance for all hospitals in the United States to implement ASP programs and to prioritize OAT for patients
- RDTs alone have not resulted in decreased time to OAT
- Studies found that when RDT was paired with real-time ASP review for Gram negatives and Staphylococci, there were improvement in clinical outcomes, decrease in time to OAT, and reduced broad-spectrum antibiotic use
- Previous implementation of RDT via BioFire® FilmArray® Blood Culture Identification 2 (BCID2) paired with ASP review for MSSA/MRSA results at our institution resulted in decreased mortality and decreased time to OAT

Objectives

- With the use of RDT via BCID2 to identify bloodstream infections (BSI) due to GPC in chains, we aimed to compare the time to OAT between pre- and post- implementation.

Methods

Study Design
- Retrospective chart review of patients with GPC in chains in blood pre- and post-implementation of BCID2 paired ASP review
- Pre-implementation: January through September 2019
- Post-implementation: May 2021 through January 2022

Primary Outcome
- Average time to OAT

Secondary Outcomes
- Length of stay (LOS)
- 30-day mortality

Inclusion Criteria
- Patients with positive Gram stain for GPC in chains and the following organisms:
  - *Enterococcus faecalis*
  - *Enterococcus faecium*
  - *Streptococcus agalactiae* (GBS)
  - *Streptococcus pneumoniae*
  - *Streptococcus pyogenes* (GAS)

Exclusion Criteria
- < 18 years of age
- Presence of polymicrobial infection
- Presence of Streptococci with unidentified species by BCID2
- Discharged or deceased before rapid diagnostic result
- On comfort measures within 72 hours of result
- Left against medical advice within 72 hours of result

Results

Table 1. Baseline Demographics

	Pre-Intervention (N=117)	Post-Intervention (N= 82)	P-Value
Gender (n, %)			0.76
Male	77 (65.8)	56 (68.3)	
Female	40 (34.2)	26 (31.7)	
Age (n, %)			
Average (± SD)	67.3 ± 16.2	66.2 ± 16.5	0.66
18-49	15 (12.8)	12 (14.6)	
50-64	31 (26.5)	25 (30.5)	
65-74	31 (26.5)	19 (23.2)	
75 and older	40 (34.2)	26 (31.7)	
ID Consult (n ,%)	79 (67.5)	41 (50)	0.02
Pitt Bacteremia Score (avg. ± SD)	1.6 ± 2.1	1.6 ± 2.3	0.48
Charlson Comorbidity Index (avg. ± SD)	4.6 ± 2.3	5.3 ± 2.5	0.08
Admitted to ICU within 48 Hours of Positive Blood Cultures (n,%)	28 (23.9)	22 (26.8)	0.74
Organisms (n, %)			
Enterococcus faecalis	49 (41.9)	37 (45.1)	0.78
GBS	28 (23.9)	21 (25.6)	0.87
Enterococcus faecium	29 (24.8)	13 (15.9)	0.16
GAS	8 (6.8)	4 (4.9)	0.77
Streptococcus pneumoniae	3 (2.6)	7 (8.5)	0.13
Sources of Infection (n, %)			
Intra-abdominal	25 (21.4)	12 (14.6)	0.36
Skin and soft tissue	18 (15.38)	16 (19.5)	0.46
Endovascular	20 (17.1)	9 (11.0)	0.31
Urologic	12 (10.3)	13 (15.9)	0.29
Bone & joint	4 (3.4)	6 (7.3)	0.33
Central line-associated	2 (1.7)	4 (4.9)	0.44
Respiratory	1 (0.9)	5 (6.1)	0.12
Central nervous system	2 (1.7)	0 (0)	0.5
Other	2 (1.7)	0 (0)	0.5
Unknown	31 (26.5)	17 (20.7)	0.41

Table 2. Primary Outcome

	Pre-Intervention (N=117)	Post-Intervention (N= 76)	Difference (95% CI)
Time to OAT (hrs.)*			
Average ± SD	34.8 ± 20.7	18.0 ± 28.7	**16.8** (9.8 - 23.8)

**For time to optimal therapy, only 76 patients out of 82 were included as therapy was not optimized for 6 patients.*

Figure 1. Primary Outcome Between Pre- vs Post-Intervention

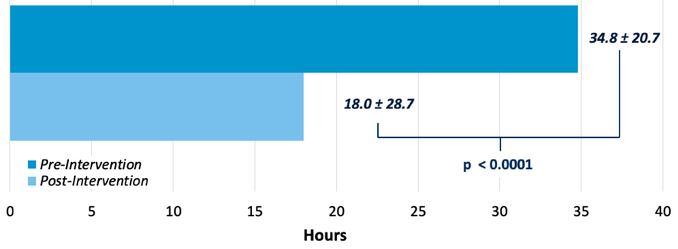

Table 3. Secondary Outcomes

	Pre-Intervention (N=117)	Post-Intervention (N= 82)	P-Value
LOS (days)			
Median (IQR)	9 (6 - 21)	13 (7 - 32)	0.07
30-day Mortality			
n (%)	12 (10.3)	5 (6.1)	0.79

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Discussion

- In terms of baseline demographics, patients were well-balanced between the two arms
- RDT paired with ASP review at our institution showed a significant reduction of **16.8 hours** in average time to OAT between pre- and post-intervention
- This reduces the risk of side effects from unnecessary broad-spectrum antibiotic use, including *Clostridium difficile* infections, and lowers selection for resistant bacterial strains
- The average LOS was potentially confounded by uncensored patients who were outliers and the COVID-19 pandemic

Conclusion

- For BSI due to GPC in chains, RDT via BCID2 paired with 24/7 ASP led to markedly decreased time to OAT.

References

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Disclosures

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