



Introduction

- Bacterial sepsis affects 1.7 million Americans each year ¹
- In-hospital mortality rates are estimated to be between 30%-50% ¹
- Every 60 minutes antibiotics are delayed after onset of organ dysfunction or shock, odds of mortality increase between 3%-8% ^{1,3}
- Broad-spectrum antibiotics should be initiated as soon as possible when there is suspicion for bacterial sepsis ¹⁻³
- However, prolonged exposure to broad-spectrum antibiotics may result in negative outcomes in patients with bacterial sepsis
- Over utilization of broad-spectrum antibiotics has been associated with the development of resistance, increased risk of adverse events, delayed time to targeted therapy, and increased hospital costs ^{2,3}
- Implementation of rapid organism identification kits can produce preliminary blood culture reports in as little as 24 hours ⁴
- Decreased time to positivity enables healthcare providers to review broad-spectrum antibiotic therapy sooner and identify opportunities for de-escalation, and thereby decrease time to targeted therapy ¹⁻⁵

Objective

- Evaluate changes in time to targeted antibiotic therapy between pre- and post-implementation of a real-time antimicrobial stewardship pharmacist notification and subsequent review of positive blood cultures identified via a rapid organism identification kit

Methods

- Single-center, retrospective, electronic chart review
- Approved by Hartford HealthCare Institutional Review Board

Inclusion Criteria

- ≥18 years of age with no upper age limit
- Admitted to Backus Hospital during pre- (9/1/19 - 12/31/19) or post-intervention (9/01/21-12/31/21)
- Hospital length of stay ≥ 48 hours
- Initial positive blood culture identified via Bruker's MBT Sepsityper® IVD kit

Exclusion Criteria

- Prior positive blood culture within 7 days
- Polymicrobial bloodstream infection
- Receiving active treatment prior to admission for a concurrent bacterial infection
- Hospice or comfort measures within 24 hours of positive blood culture result

Intervention

- Antimicrobial stewardship (AMS) pharmacists utilized an automated Sepsityper® report that was reviewed daily Monday - Friday to identify patients with positive blood cultures
- Positive blood culture results were batched and automatically sent to each pharmacist via an encrypted email every 3 hours between the hours of 6:00 AM and 6:00 PM
- Pharmacists acted within the course of standard practice by making recommendations in accordance with national guidelines (i.e. antibiotic selection, dosing, duration)

Endpoints

Primary Outcome

- Time to targeted antibiotic therapy

Secondary Outcomes

- Days of broad-spectrum antibiotics
- Total duration of antibiotics
- Hospital length of stay

Statistical Analyses

- Normally distributed continuous data was analyzed using a Student's *t* test and represented as mean ± standard deviation and non-normally distributed continuous data was analyzed using a Mann-Whitney U test and reported as median (interquartile range)
- Categorical outcomes were compared using a chi-square test
- Results yielding a *p*<0.05 were considered statistically significant

Results

- A total of 132 patients were screened for inclusion, with 52 patients ultimately excluded

Table 1. Baseline Characteristics

Patient Characteristics	Pre-Intervention (n = 47)	Post-Intervention (n = 33)	P value
Age, years (median, IQR)	67 (55 - 76)	68 (56 - 77)	0.81
Male, n (%)	23 (48.9%)	15 (42%)	0.50
Caucasian, n (%)	44 (93.6%)	30 (90.9%)	0.094
Charlson Comorbidity Index (median, IQR)	2 (0 - 4)	2 (0 - 4)	0.917
Temperature, ° F (mean ± SD)	100.4 ± 2.1	99.6 ± 1.8	0.067
White blood cell, n x 10 ³ cells/mL (mean ± SD)	12.6 ± 6.5	14.5 ± 8.5	0.279

Table 2. Primary and Secondary Outcomes

Endpoints	Pre-Intervention (n = 47)	Post-Intervention (n = 33)	P value
Time to targeted therapy (hrs), (median, IQR)	33.0 (1.7 - 71.0)	5.4 (1.4 - 40.1)	0.15
Total duration of therapy (hrs), (median, IQR)	7.0 (4.1 - 9.6)	6.0 (3.6 - 7.8)	0.176
Anti-MRSA ¹ length of therapy (hrs), (median, IQR)	49.8 (27.6 - 132.7)	27.9 (12.8 - 58.0)	0.035
Anti-PSA ² length of therapy (hrs), (median, IQR)	65.1 (25.2 - 119.3)	54.3 (32.7 - 135.3)	0.944
Hospital length of stay (days), (median, IQR)	7.1 (4.0 - 10.1)	6.7 (4.0 - 9.2)	0.796

¹ MRSA: methicillin-resistant *Staphylococcus aureus*; ² PSA: *Pseudomonas aeruginosa*

Results

Table 3. Pathogens Identified via Bruker's MBT Sepsityper® IVD kit

Organisms	Pre-Intervention (n = 47)	Post-Intervention (n = 33)
Gram-negative isolates		
Enterobacterales, n (%)	30 (63.8%)	19 (57.6%)
<i>P. aeruginosa</i> , n (%)	0 (0%)	3 (9.1%)
Gram-positive isolates		
MRSA, n (%)	5 (10.6%)	1 (3.0%)
MSSA, n (%)	7 (14.9%)	6 (18.2%)
CoNS, n (%)	1 (2.1%)	4 (12.1%)
Streptococcus spp., n (%)	2 (4.3%)	0 (0%)
<i>E. faecalis</i> , n (%)	2 (4.3%)	0 (0%)

Table 4. Antimicrobial Stewardship Pharmacist Interventions

Type of Intervention	No. of Interventions	Acceptance Rate
De-escalation of antibiotics	16	13/16 (81.3%)
Dose optimization of antibiotics	3	3/3 (100%)
Alternative antibiotic therapy	2	2/2 (100%)
Initiate antibiotic therapy	1	1/1 (100%)
Total	22	19/22 (86.3%)

Discussion

- Due to limited sample size, the study was not adequately powered to detect a significant difference in the primary and secondary outcomes
- Patients identified via Sepsityper® and reviewed in real-time by an AMS pharmacist had a numerically shorter time to targeted therapy
- Total duration of therapy and anti-PSA length of therapy was fairly similar between the two groups, however, anti-MRSA length of therapy was significantly shorter in the post-intervention period
- Majority of antimicrobial stewardship interventions focused on de-escalation, with an overall high compliance rate within 24 hours
- This data suggests that the combination of rapid diagnostics and formal stewardship intervention can further optimize antibiotic therapy

References

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Disclosures

Authors of this presentation have nothing 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