

An Automated E-mail Notification System to Infectious Disease Specialists and Effect on the Management of *Staphylococcus aureus* Bacteremia in a Community Hospital Setting

Nicole Roe, DO, Michael Wang, MD, Richard Douce, MD

Lakeland Health - Saint Joseph, Michigan and Michigan State University

ABSTRACT

Background:

Staphylococcus aureus is the leading cause of community and healthcare associated bacteremia and carries a high burden with a substantial mortality, ranging from 20-40%. Evidence suggests infectious disease (ID) consultation improves mortality and adherence to the Infectious Diseases Society of America (IDSA) guidelines. Due to complications from a lack of ID consultation, a notification system consisting of automated e-mails to ID providers was implemented. The objective of this study was to review the impact of the automatic notification to ID consultants with positive blood culture results in a community hospital system.

Methods:

Cases of *staphylococcus aureus* bacteremia were identified from the microbiology database by at least one positive blood culture. The automated e-mail notification system was implemented in December 2014. ID providers were encouraged to verbally contact primary providers for positive results. Cases of bacteremia prior to implementation of the automated notification system were compared to those post-intervention. Patients under age 18 were excluded. Data gathered included mortality, re-admission rates, and compliance with IDSA guidelines.

Results:

There were no significant differences in inpatient mortality (9 vs. 18%, p=0.180). 30-day mortality between the two groups (18 vs 20%, p=0.815). The 30-day readmission rate among surviving patients was reduced by 50% (40% vs. 19%, p=0.014). Compliance with antibiotic duration in complicated bacteremia increased post-intervention (57% vs. 85%, p=0.04).

Conclusion:

An automatic notification to ID specialists reporting patients with *Staphylococcus aureus* bacteremia led to improved compliance with IDSA guidelines regarding antibiotic duration, reduced hospital length of stays and 30 day re-admission rates. There was no statistically significant effect on overall mortality.

INTRODUCTION

Background

- *Staphylococcus aureus* is the leading cause of community and healthcare-associated bacteremia with mortality ranging from 20-40%
- Evidence suggests that infectious disease (ID) consultation improves mortality, adherence to the Infectious Disease Societies of America (IDSA) 2011 MRSA guidelines, reduces in-hospital mortality, and results in earlier discharge for patients with *staphylococcus aureus* bacteremia (SAB).
- The IDSA guidelines published in 2011(14) recommend repeat blood cultures should be collected 2-4 days after initial positive cultures, an echocardiogram is recommended (ideally a transesophageal echocardiogram) and an investigation into the source of the bacteremia. For uncomplicated bacteremia the recommended minimum duration of appropriate IV antibiotics is two weeks, and for complicated cases the minimum duration is recommended four to six weeks.

METHODS

- In December of 2014, a new notification system was implemented at Lakeland Health, consisting of an automatic email report of all positive *staphylococcus aureus* blood cultures, which was distributed daily to the Infectious Diseases service.
- Patients were identified from a database from the microbiology laboratory. All patients with at least one positive blood culture for *staphylococcus aureus* who were older than 18 years of age from January 1, 2013 – September 5, 2016 were included.
- Patients were excluded if they were younger than 18 years of age or if blood cultures were positive in the month of December of 2014, as this was the month the email notification system or intervention was initiated.

RESULTS

Table 1: Patient Demographics

	Pre Intervention (N = 57)	Post Intervention (N = 60)	p-value*
Average patient age (years)	64	62	0.448
Male	63%	63%	1
Diabetes Mellitus	46%	50%	0.70
End Stage Renal Disease on Dialysis	23%	27%	0.67
Immunosuppressed	16%	13%	0.80

Table 2: Patient Outcomes

	Pre- intervention (N = 57)	Post- intervention (N = 60)	p-value*
Inpatient Mortality	9%	18%	0.18
30 day Mortality	18%	20%	0.815
Bedside ID Consult	75%	78%	0.888
MRSA Prevalence	54%	57%	0.74
Complicated bacteremia	70%	69%	0.08
Duration of hospitalization (days)	12.2	9.5	0.03
Readmitted within 30 days	40% (19/47)	19% (9/48)	0.014

Table 3: Effect on Treatment Protocols

	Pre-intervention N=57	Post-intervention N=60	p-value*
Blood cultures repeated	79%	88.3%	0.62
Transesophageal echocardiogram	49%	55%	0.47
Source identified	75% (N=43)	75% (N=45)	1.0
Appropriate treatment duration for complicated bacteremia	<28 days: 43% (N=13/30) ≥28 days: 57% (N=17/30)	<28 days: 15% (N=4/26) ≥28 days: 85% (N=22/26)	0.004

DISCUSSION AND CONCLUSIONS

- An automated e-mail notification system was effective in reducing inpatient length of stay and reducing 30 day re-admission rates.
- There was no difference in 30 day mortality.
- There were no differences in percentage of patients receiving Infectious Disease consultation
- Compliance with IDSA's MRSA guidelines regarding duration of antibiotics in complicated *staphylococcus aureus* bacteremia improved with the notification system.

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