Optimizing the treatment of *Staphylococcus aureus* bloodstream infection with the implementation of a molecular assay and antimicrobial stewardship intervention

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Introduction

- *Staphylococcus aureus* blood stream infection (BSI) is associated with high morbidity and mortality
- Optimal antimicrobial therapy for methicillin-sensitive *S. aureus* (MSSA): cefazolin or anti-staphylococcal penicillin
  - Vancomycin a common empiric treatment pending sensitivities in case of methicillin-resistant *S. aureus* (MRSA), but associated with poorer outcomes
- Earlier identification of antimicrobial sensitivities using a commercial molecular test (Cepheid Xpert® MRSA/SA BC, or Xpert®) may accelerate therapy optimization (Fig 1.) and improve clinical outcomes

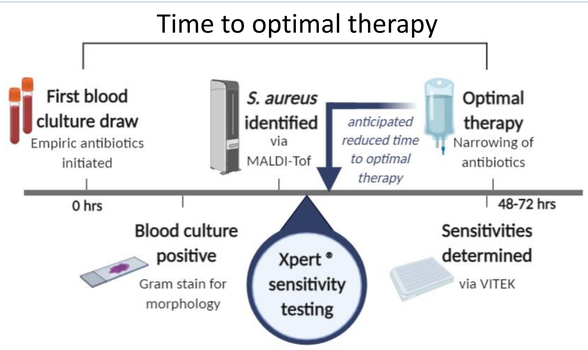


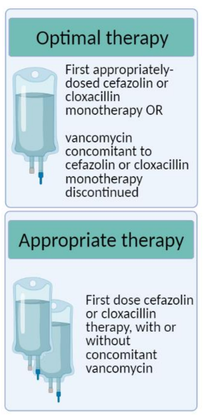
Figure 1. Local microbiology laboratory procedures for *S. aureus* BSI identification and sensitivity testing

Objectives

For MSSA bacteremia, determine the impact of Xpert® molecular testing coupled with an antimicrobial stewardship (AMS) intervention on:

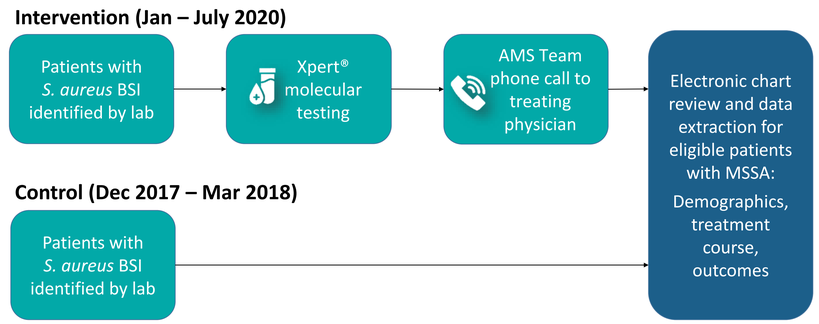
1° Time to optimal antimicrobial therapy

2° - Time to appropriate therapy
- Length of hospital stay
- Duration of vancomycin use
- Mortality, hospital readmission, relapse of bacteremia at 30 days



Methods

- AMS team implemented two-step intervention on lab-identified *S. aureus* blood cultures:
  1. Performed Xpert® molecular assay to confirm sensitivity – MSSA or MRSA
  2. Communicated sensitivity results to treating physician and provided standardized advice: narrowing of antimicrobial therapy, dosage adjustments, timing of surveillance blood cultures, ID consult
- Prospectively-collected cohort of patients compared with historical control from same two hospital centres
  - Excluded: MRSA BSI, polymicrobial BSI, transfer from another hospital with known MSSA BSI, imminent palliation



Discussion

- Small sample size – study powered for time to optimal therapy, not clinical outcomes
- Generalizable to populations with overall low rates of MRSA BSI
- Role of molecular testing particularly useful in rural communities with long delays in sensitivity testing

Conclusion

- Implementing Xpert ® molecular testing with AMS communication for patients with MSSA BSI reduced time to optimal antimicrobial therapy and was associated with a reduced length of hospital stay
- With more robust implementation, expect this intervention to contribute to improved overall survival and treatment success

Results

- 56 patients eligible for inclusion

1°

	Intervention (n = 29)	Control (n = 27)	P-value for equality of K-M curves
Time to optimal therapy, hours *[median (IQR)]*	38.0 (31.5 – 53.0)	50.1 (29.7 – 71.0)	0.0405

Cox Proportional Hazard Model	
HR (95% CI)	**P-value**
1.77 (1.02 – 3.09)	0.0432

➡ *Participants in Intervention group at any time point during the study period were 77% more likely to start optimal therapy than participants in the control group*

2°

	Intervention (n = 29)	Control (n = 27)	P-value for equality of K-M curves
Time to appropriate therapy, hours *[median (IQR)]*	36.4 (27.1 – 53.0)	46.2 (24.8 – 69.5)	0.1682
Length of stay, days *[median (IQR)]*	23.0 (12.0 – 29.0)	91.0 (17.0 – NE*)	0.0244
Duration of continuous vancomycin use, hours *[median (IQR)]*	12.0 (12.0 – 12.0)	14.3 (12.0 – 37.3)	0.0732

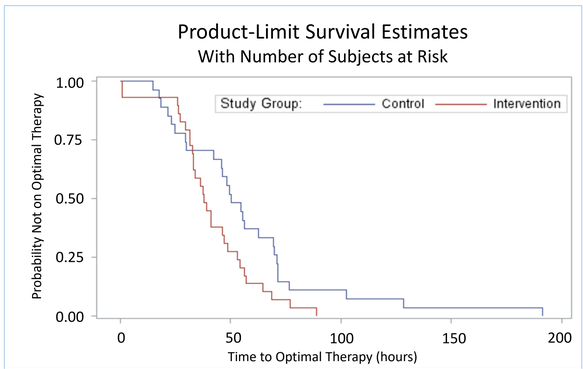


Figure 2. Kaplan-Meier (K-M) curve for primary outcome, time to optimal therapy

- Proportion of ID consults:
  87% Intervention vs 67% Control