Improving Antimicrobial Prescribing and Rate of ID Consult Utilizing a Best-Practice Alert and Targeted Education for *Staphylococcus aureus* Bacteremia

Katherine Yang, PharmD; Tejal Gandhi MD; Chris Zimmerman, PharmD1,2; Robert Chang, MD; Jerod Nagel, PharmD, BCPS (AQID)1,3

1University of Michigan College of Pharmacy, 2University of Michigan Health System: Dept. of Internal Medicine, Division of Infectious Diseases, 3University of Michigan Health System: Dept. of Pharmacy, University of Michigan Health System: Dept. of Internal Medicine, Information Technology

### Background

- Previous published literature demonstrate patients with *Staphylococcus aureus* bacteremia (SAB) have improved outcomes when an infectious diseases consult is ordered.
- Beta-lactam therapy with ceftazolin or nafcillin is associated with improved mortality for patients with methicillin-resistant *Staphylococcus aureus* (MSSA) bacteremia.
- Multiplex array (Verigene®) can accurately detect the presence of *MecA* gene that confers resistance to methicillin in *Staphylococcus aureus* (MRSA) within 3-hours of Grams stain results.

### Objectives

- Evaluate time to optimal therapy for patients with SAB in patients before and after intervention.
- Evaluate incidence of Infectious Diseases consult.
- Pre-post quasi-experimental study following implementation of best practice alert and education to pharmacists and infectious diseases physicians.
- History Control Group: 10-months (Oct 2016-July 2017)
- Intervention group: 5-months (Aug 2017-Jan 2018)
- Exclusion: adult patients with *Staphylococcus aureus* bacteremia
- Duration: death before Verigene® results, patient demise or hospice care
- Multiple time periods, Verigene® results were available and pharmacists receive real-time notification of results and were responsible for providing treatment recommendations
- Time to optimal therapy defined as:
  - *MSSA*: Nafcillin or methicillin
  - *MRSA*: Vancomycin acceptable if beta-lactam allergy/intolerance
- Exclusion:
  - *MSSA*: Vancomycin
  - *MRSA*: Vancomycin or Daptomycin or linezolid if vancomycin intolerance
- Discontinue unnecessary empiric antibiotics targeting gram-negative pathogens (e.g. piperacillin/tazobactam, cefepime or meropenem)
- Statistical analysis:
  - Student T-test for primary outcome: time to optimal therapy
  - Chi-square for secondary outcomes: incidence of ID consult

### Methods

- Empirical Antibiotic Recommendations Following Rapid Molecular Testing with Verigene
- Practice alert for *S. aureus* bacteremia, or *S. epidermidis* bacteremia with positive blood cultures (who provide real-time recommendations for positive blood cultures). Infectious diseases physicians and implementation of the best-practice alert. Fortunately, it’s impossible to evaluate the weight to which each aspect of the intervention contributed to the success.
- Data available from the orders linked to the best-practice alert could not quantify which orders were selected in the alert, at the time of this poster. Future direction will include obtaining better data on the success and functionality of the best-practice alert.

### Results

- 134 Patients with bacteremia
  - 77 Patients with MSSA
  - 57 Patients with MRSA
  - 55 Patients with MSSA
  - 34 Patients with MRSA
- 89 Patients with bacteremia
  - 65 Patients that had BPA-related order
  - 24 Patients that did not have BPA-related order
- Orders included blood cultures, antibiotic change or ID consult
- 77/78 (86.5%) BPA fired for patients with SAB
  - 65/66 (84.4%) BPA ordered for patients with SAB
- 67% (84% among those with BPA ordered) of patients with SAB were treated with appropriate antibiotic therapy

### Discussion

- Implementation of a best-practice alert for SAB, plus education resulted in improvements to the incidence of infectious diseases consultation, and time to optimal therapy.
- The strongest driver of improvements in time to optimal therapy was appropriate de-escalation for patients with methicillin-susceptible *Staphylococcus aureus*

### Limitations

- Patient charts were not reviewed to assess for improvements in clinical outcomes, and assess all confounders that could also influence outcomes.
- The intervention consistent of education to clinical pharmacists (who provide real-time recommendations for positive blood cultures), infectious diseases physicians and implementation of the best-practice alert. Unfortunately, it’s impossible to evaluate the weight to which each aspect of the intervention contributed to the success.

### Conclusions

- Implementation of a best-practice alert plus education to clinical pharmacists and infectious diseases physicians significantly improved the rate of ID consultation and time to optimal therapy.
- The best-practice alert was utilized to order repeat blood cultures, infectious diseases consultation, or modify antibiotic therapy in the majority of patients.

### References