Poster #1186

Beta is Better: Impact of a Multifaceted Stewardship Initiative on the Sequential Timing of Beta-Lactam Administration among patients with Bacteremia

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Background

- Beta-lactams and anti- methicillin-resistant Staphylococcus aureus (MRSA) agents are often empiric regimens for patients with sepsis or septic shock
- Appropriate antibiotic sequence (*i.e.* beta-lactam before vancomycin) may reduce early mortality in patients with bloodstream infections (BSIs) (Amoah, et al. CID 2022)
- AIM: Describe the impact of a multifaceted stewardship initiative on the sequence of antibiotic administration in adults with at least one positive blood culture

Methods

Study Design: Pre-post implementation analysis
Study Period and Comparison Groups:
PRE: March 1, 2021 – May 22, 2022 (~15 months)
POST: May 31, 2022 – Feb 12, 2023 (~8 months)
Setting: Duke University Health System (3 hospitals: 1 university, 2 community)
Primary Outcome: Percent of beta-lactam first administration

Inclusion:
Adult: ≥ 18 years
Concurrent vancomycin and beta-lactam: antibiotic administration within 8 hours of each other
Beta-lactam: cefepime, piperacillin-tazobactam, or meropenem

Statistical Analysis:
Chi-square tests were used to compare rates between groups

Intervention:
1) System-wide adult beta-lactam order panel combining load and maintenance doses for select beta-lactams (Figure 1)
2) Nursing administration instructions facilitating the appropriate sequential order of antibiotic administration (Figure 2)
3) System-wide education to physicians, pharmacists, and nurses

Results

Figure 1. Beta-Lactam Order Panel, piperacillin-tazobactam

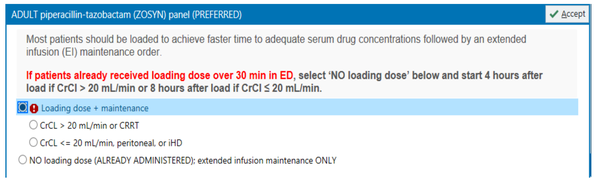


Figure 2. Beta-Lactam First: Nursing Administration Instructions, cefepime

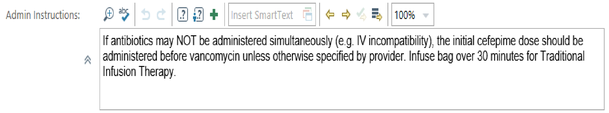


Table 1. Characteristics of Adult Encounters with Positive Blood Cultures Initiated on Combination Therapy

	Pre-intervention (n=224)	Post-intervention (n=137)
Median Age (IQR)	65 (52.8-74.3)	65 (52-74)
Beta-lactam received		
FEP	70 (31.3)	28 (20.4)
MEM	5 (2.2)	0 (0)
TZP	149 (65.5)	109 (79.6)
Blood culture gram-stain		
Gram-positive	147 (65.6)	96 (70.1)
Gram-negative	61 (27.2)	34 (24.8)
Polymicrobial	10 (4.5)	6 (4.4)
Fungus or AFB	6 (2.7)	1 (0.7)

Data reported as n (%) unless otherwise specified
AFB: acid-fast bacilli, FEP: cefepime, MEM: meropenem, TZP: piperacillin-tazobactam

Table 2. Sequence of Antibiotic Administration

	Vancomycin first (n=19)	Beta-lactam first (n=319)	Same time (n=23)	Overall (n=361)
PRE	14 (6.3%)	198 (88.4%)	12 (5.4%)	224
FEP	5	61	4	70
MEM	0	5	0	5
TZP	9	132	8	149
POST	5 (3.6%)	121 (88.3%)	11 (8.0%)	137
FEP	1	27	0	28
MEM	0	0	0	0
TZP	4	94	11	109
OVERALL	19/361 (5.3%)	319/361 (88.4%)	23/361 (6.4%)	

FEP: cefepime, MEM: meropenem, TZP: piperacillin-tazobactam

Figure 3. Timing of Beta-Lactam Administration to Vancomycin by Administration Location

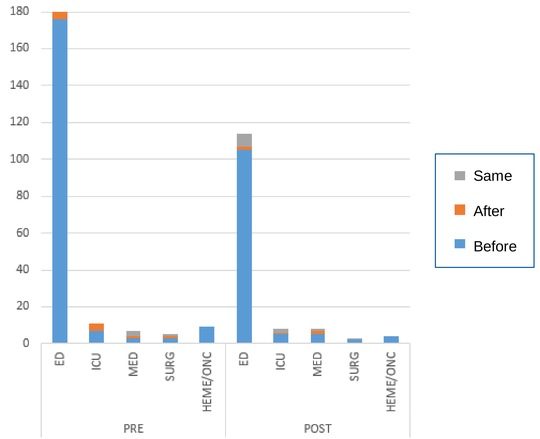
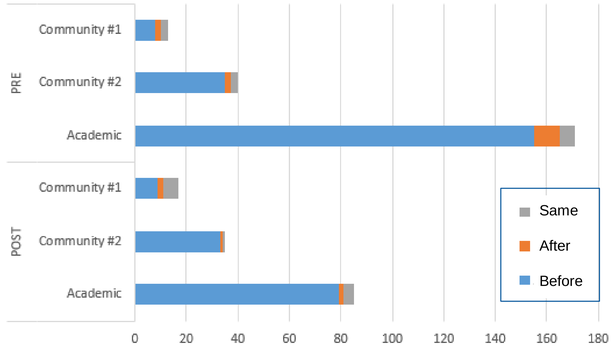


Figure 4. Timing of Beta-Lactam Administration to Vancomycin by Hospital



- Piperacillin-tazobactam (TZP) + vancomycin was the most common combination (71.5%, Table 1)
- Most of the eligible encounters occurred at the academic hospital (70.9%) and the emergency department (ED) (84.8%)
- Receipt of beta-lactam first was high at baseline, then higher post-intervention compared to pre-intervention (96.4% vs 93.8%, p = 0.283) (Table 2)
- Beta-lactam first improvement was most notable in the ICU (63.6% vs 87.5%) and ED (95.8% vs 98.2%)

Conclusion

- A multifaceted stewardship initiative numerically increased the percent of beta-lactam first administrations among patients with positive blood cultures, in the setting of a baseline high beta-lactam first administration rate.
- System change and education regarding antibiotic administration best practices impacted nursing workflow.

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Disclosures: RWM UpToDate, inc. (Author Royalties)