

Benchmarking the Use of New β -lactams Utilizing a Novel Metric of Microbiological Burden



Poster # 408

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BACKGROUND

- Several methods are used to account for various hospital characteristics when comparing antimicrobial use (AU) between heterogenous hospitals
- Recently, a new antimicrobial stewardship metric that adjusts AU by microbiological burden of the bacteria was proposed [Figure 1], where AU_{local} is the raw AU of antibiotic of interest (*i.e.* new β -lactams) at a particular local institution, I_{local} is the incidence of the relevant organism(s) (*i.e.* Gram-negative bacteria (GNB) with difficulty-to-treat resistance (DTR)) at that local institution, and $I_{overall}$ is its average incidence within the overall network or region (*i.e.* all Gram-negative bacteria)

Figure 1. Adjusted Antibiotic Use (a-AU) Equation

$$Adjusted\ AU = \frac{AU_{local}}{\left(\frac{I_{local}}{I_{overall}}\right)}$$

- The primary objective of this study was to examine the use of new β -lactams for Gram-negative bacteria (GNB) with difficult-to-treat resistance (DTR) by both AU and a-AU metrics in the southeastern United States

METHODS

Study Design

- Multicenter, retrospective, cohort study
- 10 hospitals geographically spread within the Southeastern Research Group Endeavor (SERGE-45) between 2015-2020
- Each participating hospital was randomly assigned a number in the study

Data Collection

- Incidence of GNB with DTR at each hospital
- Cumulative AU of new β -lactams: ceftolozane/tazobactam, ceftazidime/avibactam, cefiderocol, meropenem/vaborbactam, and imipenem/cilastatin/relebactam
- AU = DOT per 1,000 patient-days present

Key Definitions

- GNB with DTR: Enterobacterales, *Pseudomonas aeruginosa* (*P. aeruginosa*), and *Acinetobacter* species nonsusceptible to all of the following: extended-spectrum cephalosporins (either ceftazidime or cefepime), carbapenems (either meropenem or imipenem/cilastatin), fluoroquinolones (either ciprofloxacin or levofloxacin), and piperacillin/tazobactam (if tested/reported)

Statistical Analysis

- Hospitals were ranked by AU and a-AU from lowest to highest
- Descriptive statistics were utilized

RESULTS

Table 1. Hospital Characteristics

State	Bed Size	Automated System	EHR System
Alabama	200-500	MicroScan	Cerner
Florida	≥ 501	Vitek II	Allscripts
Georgia	≤ 200	MicroScan	CPRS
Georgia	201-500	Vitek II	Meditech
Georgia	≥ 501	Vitek II	Cerner
Mississippi	≥ 501	Vitek II	Epic
South Carolina	≥ 501	Vitek II	Cerner
South Carolina	201-500	Vitek II	Cerner
Texas	201-500	MicroScan	Cerner
West Virginia	≥ 501	Vitek II	Epic

Abbreviations: EHR, electronic health record

- Cumulative mean AU from 2015 to 2020 were 1.91 (range 0.1 to 6.44) DOT/1,000 patient-days present
- Cumulative mean a-AU from 2015 to 2020 were 2.36 (range 0.22 to 8.83) DOT/1,000 patient-days present

CONCLUSIONS

- Overall, AU of new β -lactams increased after adjusting for local microbiological burden, suggesting potential higher use of antibiotics in relationship to observed prevalence of GNB with DTR
- More than half of hospitals had shift in ranking after microbiological adjustment reflecting more balanced comparison of antibiotic use across heterogenous hospitals
- Adjusting antimicrobial use by microbiological burden is a valid method to evaluate the use of new β -lactams for GNB with DTR in a multi-hospital network

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DISCLOSURES

The authors of this presentation have no disclosures concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation

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RESULTS

Figure 2. Comparison of cumulative AU and a-AU of new β -lactams, ranked by AU from lowest to highest, 2015-2020

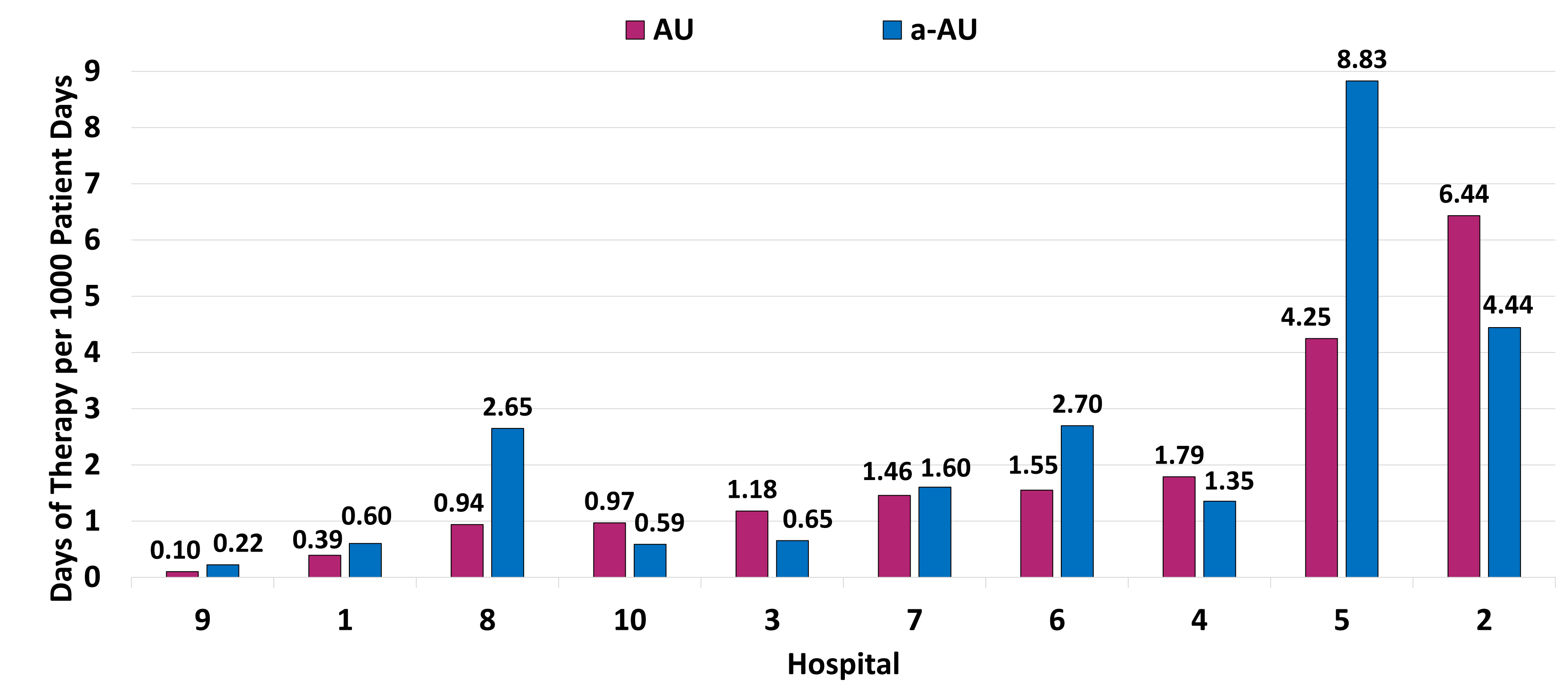


Figure 3. Comparison of cumulative AU and a-AU of new β -lactams, ranked by a-AU from lowest to highest, 2015-2020

