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Decennial 2020 Abstracts

Presentation Type:
Top Oral Award

Development of an Electronic Tool to Measure Daily Appropriateness of Inpatient Antibacterial Use

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Background: Assessing antimicrobial use (AU) appropriateness is a cornerstone of antimicrobial stewardship, largely accomplished through time-intensive manual chart review of specific agents or diagnoses. Efforts to evaluate appropriateness have focused on assessing the appropriateness of an entire treatment course. An electronic measure was developed to assess the appropriateness of each day of inpatient AU leveraging electronic health record data. **Methods:** We extracted contextual data, including risk factors for resistant organisms, allergies, constitutional signs and symptoms from diagnostic and procedural codes, and microbiological findings, from the electronic health records of patients in Veterans' Health Administration inpatient wards reporting data to the National Healthcare Safety Network (NHSN) AU option from 2017–2018. Only the antibacterial categories shown in Figure 1 were included. Respiratory, urinary tract, skin and soft-tissue, and other infection categories were defined and applied to each hospital day. Algorithm rules were constructed to evaluate AU based on the clinical context (eg, in the ICU, during empiric therapy, drug–pathogen match, recommended drugs, and duration). Rules were drawn from available literature, were discussed with experts, and were then refined empirically. Generally, the rules allowed for use of first-line agents unless risk factors or contraindications were identified. AU was categorized as appropriate, inappropriate, or indeterminate for each day, then aggregated into an overall measure of facility-level AU appropriateness. A validation set of 20 charts were randomly selected for manual review. **Results:** Facility distribution of appropriateness, inappropriateness, and indeterminate AU by 4 of the adult, 2017 baseline NHSN Standardized Antimicrobial Administration Ratio (SAAR) categories are shown in Figure 1. The median facility-level inappropriateness across all SAAR categories was 37.2% (IQR, 29.4%–52.5%). The median facility-level indeterminate AU across all SAAR categories was 14.4% (IQR, 9.1%–21.2%). Chart review of 20 admissions showed agreement with algorithm appropriateness and inappropriateness in 95.4% of 240 antibacterial days.

Conclusions: We developed a comprehensive, flexible electronic tool to evaluate AU appropriateness for combinations of setting, antibacterial agent, syndrome, or time frame of interest (eg, empiric, definitive, or excess duration). Application of our algorithm in 2 years of VA acute-care data suggest substantial interfacility variability; the highest rates of inappropriateness were for anti-MRSA therapy. Our preliminary chart review demonstrated agreement between electronic and manual review in >95% of antimicrobial days. This approach may be useful to identify potential stewardship targets, in the development of decision support systems, and in conjunction with other metrics to track AU over time.

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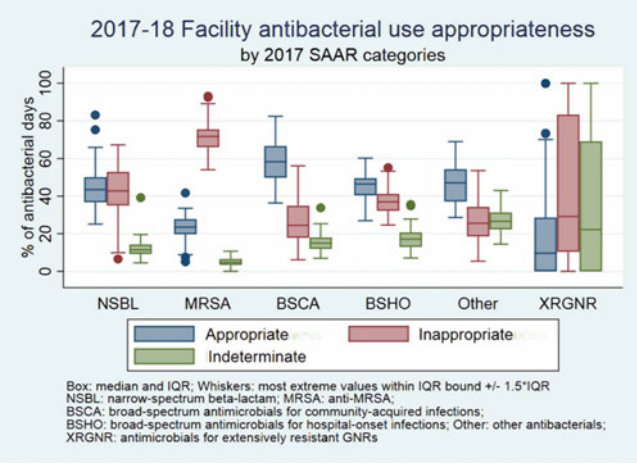

Fig. 1.

Presentation Type:
Top Oral Award

Measuring Empiric Antibiotic Spectrum Patterns Across Space and Time

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Background: Quantitative evaluation of antibiotic spectrum is an important, underutilized metric in measuring antibiotic use (AU) and may assist antimicrobial stewards in identifying targets and strategy for intervention. We evaluated the spectrum of initial antibiotic choices by hospital location, day of the week, and time of day to determine whether these factors may be associated with broad-spectrum antibiotic choices. **Methods:** We identified all admissions with antibiotic exposure in medical and surgical wards and critical care units in a tertiary academic medical center between July 1, 2014, and July 1, 2019. The antibiotic spectrum index (ASI), proposed by Gerber et al, is a numeric score based on the number of pathogens covered by a particular agent. We defined ASI for initial antibiotic choice as follows: ASI for each unique antibiotic administered within 24 hours of the first antibiotic administration was summed and assigned to the administration time of the first dose. We categorized time into 4 distinct categories: weekday days (Monday–Friday, 7 A.M.–7 P.M.), weekday nights, weekend days, and weekend nights. Weekend time began 7 P.M. Friday and ended 7 A.M. Monday. We constructed heatmaps stratified by hospital location. Mann-Whitney U tests were applied to evaluate differences in the distributions of ASI using weekday days as a reference. **Results:** Data included 90,455 unique antibiotic admissions with initial antibiotic starts in medical and surgical wards and critical care units. Patterns of ASI for initial antibiotic choice varied between unit locations and time (Figs. 1 and 2). Mean and median ASIs for initial antibiotic choices were higher for medical ward and medical ICUs than for surgical wards and surgical ICUs. Initial antibiotic choices had higher ASIs during overnight hours for all units except the surgical ICU. Notable differences in ASIs were identified between weekday and weekend prescribing for surgical units, whereas medical units demonstrated less extreme differences. **Conclusion:** We observed a "weekend effect" across hospital units; the most extreme occurred in surgical wards. This observation may be due to differences in patient volume and rounding patterns. For example, hospitalist and critical care units have 7-day schedules, whereas surgical wards are highly influenced by operating room schedules. Antimicrobial stewardship teams may use these data to identify strategies targeting the most opportune time and place to intervene on the spectrum of initial antibiotic choice.

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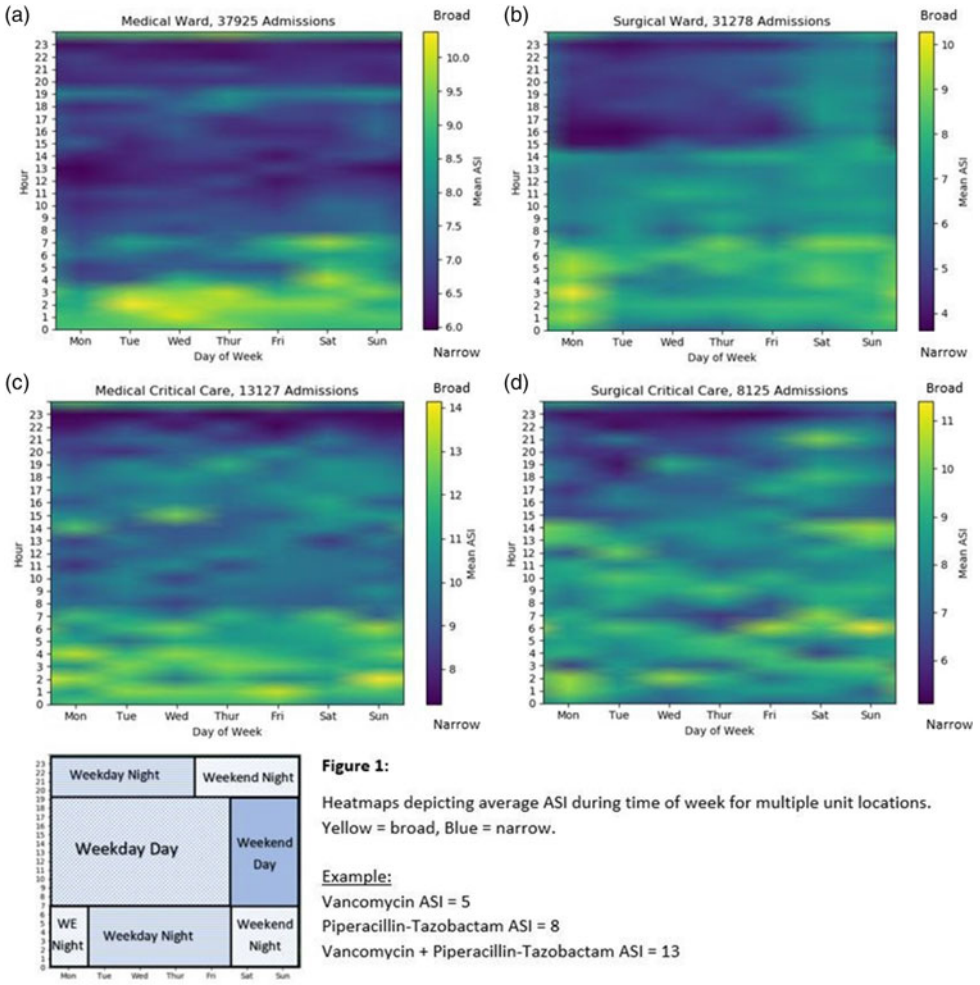

Figure 1:

Heatmaps depicting average ASI during time of week for multiple unit locations. Yellow = broad, Blue = narrow.

Example:

Vancomycin ASI = 5

Piperacillin-Tazobactam ASI = 8

Vancomycin + Piperacillin-Tazobactam ASI = 13

Fig. 1.

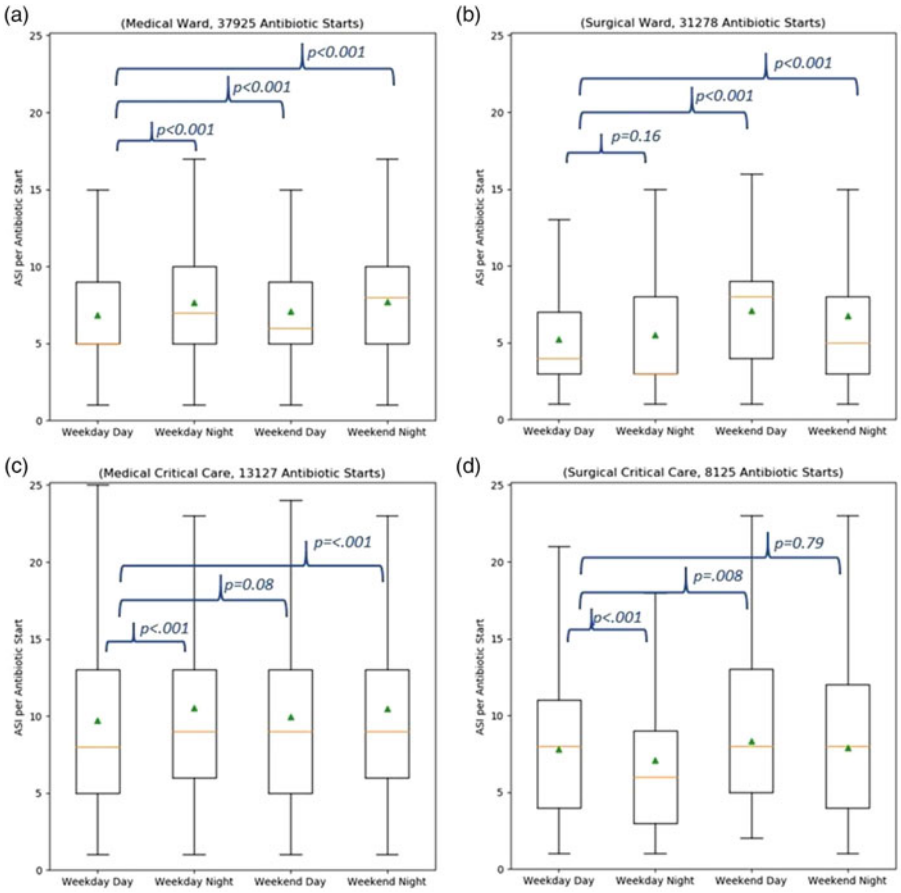

Fig. 2.

Presentation Type:
Top Oral Award

Targeted Assessment for Prevention Facility Assessments: The Most Common CAUTI and CLABSI Infection Prevention Gaps

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Background: The Targeted Assessment for Prevention (TAP) strategy is a quality improvement framework created by the Centers for Disease Control and Prevention (CDC) to facilitate the reduction of healthcare-associated infections (HAIs). TAP facility assessments are a component of the TAP strategy and are completed by staff across the facility to help identify perceptions of and target infection prevention gaps. We have described the gaps most commonly reported by facilities completing TAP facility assessments for catheter-associated urinary tract infections (CAUTIs) and central-line–associated bloodstream infections (CLABSIs). **Methods**: TAP CAUTI and CLABSI assessments were completed by acute-care facilities across the nation, with CDC technical assistance, from December 2014 to August 2019. Similar questions across 2 versions of CAUTI assessments and 3 versions of CLABSI assessments were combined. Analysis was limited to facilities with ≥10 assessments. Infection prevention gaps were defined as ≥33% respondents answering Unknown, ≥33% respondents answering "no," or ≥50% of respondents answering "no" and "unknown" or "never" and "rarely" "sometimes" "unknown." The analysis was completed at the facility level, and the gaps most commonly reported across facilities were identified. **Results:** In total, 1,942 CAUTI assessments from 42 facilities in 12 states and 1,623 CLABSI assessments from 29 facilities in 11 states were included for analysis. The mean numbers of assessments per facility were 46.2 for CAUTIs and 56.0 for CLABSIs. Across both CAUTIs and CLABSIs, commonly reported perceptions about infection prevention gaps included lack of physician and nurse champions for prevention activities, failure to conduct competency assessments, and inconsistency in select device insertion practices (Fig. 1). For CAUTIs, lack of practices to facilitate timely removal of urinary catheters were also commonly reported, with one-third of facilities reporting inconsistency in use of alerts for catheter removal, 78.6% reporting lack of physician response to these alerts, and 90.5% reporting deficiencies in removing unnecessary catheters in the postanesthesia care unit. For CLABSIs, 79.3% of facilities reported failure to replace central lines within 48 hours after emergent insertion, and 62.1% reported that feedback was not provided to staff on central-line device utilization ratios. **Conclusion:** For both assessments, absence of CAUTI and CLABSI prevention

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