Figure 2: Interrupted Time Series Analysis Results: Percent of Antibiotic Prescriptions Written per Month Stratified by Intervention Time Period with slopes pre- (solid line) and post-intervention (dashed line).

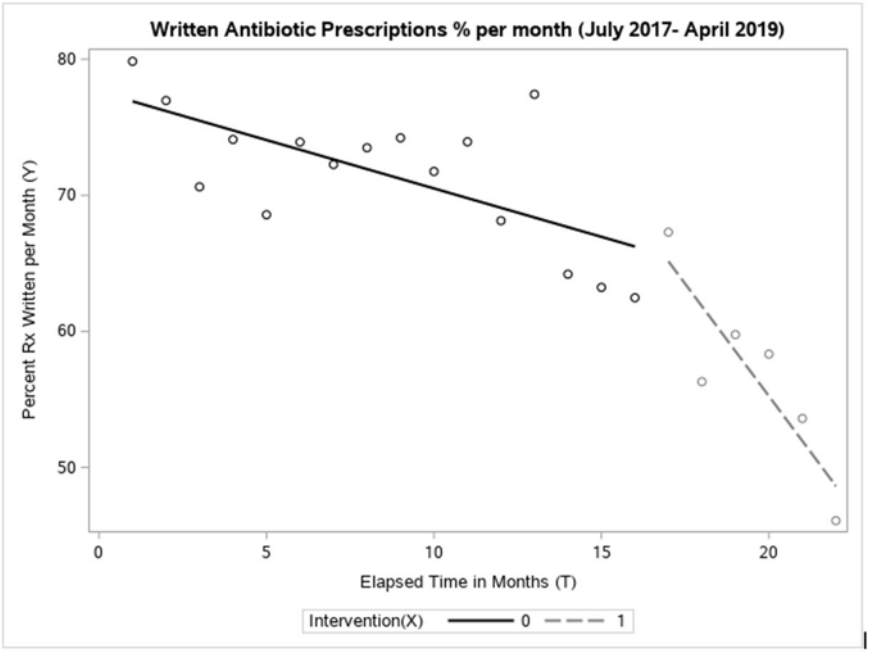

Fig. 2

education print materials were distributed to the 3 locations coupled with news media and social media. We utilized the CDC "Be Antibiotics Aware" campaign materials, with our hospital's logo added, and posted them in patient rooms and waiting areas. For the peer comparison behavioral intervention, providers were sent individual feedback e-mails with their prescribing data during the intervention period and a blinded ranking e-mail in which they were ranked in comparison to their peers. In the blinded ranking email, providers were placed into categories of "low prescribers," those with a ≤23% inappropriate antibiotic prescribing rate based on the *US National Action Plan for Combating Antibiotic-Resistance Bacteria* 2020 goal, or "high prescribers," those with a rate greater than the national average (45%) of inappropriate antibiotic prescribing for ARTI. **Results:** Our results show that fewer inappropriate antibiotic prescriptions were written during the intervention period (58.8%) than during the preintervention period (73.0%), resulting in a 14.5% absolute decrease in rates of inappropriate prescribing among urgent-care locations over a 6-month period (Fig. 1). The largest percentage decline in rates was seen in the month of April (−35.8%) when compared to April of the previous year. The ITS analysis revealed that the rate of inappropriate prescribing was statistically significantly different during the preintervention period compared to the intervention period (95% CI, −4.59 to −0.59; $P = .0142$). **Conclusions:** Using interventions outlined in the MITIGATE tool kit, we were able to reduce inappropriate antibiotic prescribing for ARTI in 3 rural, urgent-care locations.

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Presentation Type:
Poster Presentation

Validation of Administrative Codes for Identification of *Staphylococcus aureus* Infections Among Electronic Health Data

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Background: Epidemiological studies have utilized administrative discharge diagnosis codes to identify methicillin-resistant and methicillin-sensitive *Staphylococcus aureus* (MRSA and MSSA) infections and trends, despite debate regarding the accuracy of utilizing codes for this purpose. We assessed the sensitivity and positive predictive value (PPV) of MRSA- and MSSA-specific diagnosis codes, trends, characteristics, and outcomes of *S. aureus* hospitalizations by method of identification. **Methods:** Clinical microbiology results and discharge data from geographically diverse US hospitals participating in the Premier Healthcare Database from 2012–2017 were used to identify monthly rates of MRSA and MSSA. Positive MRSA or MSSA clinical cultures and/or a MRSA- or MSSA-specific *International Classification of Diseases, Ninth/Tenth Revision, Clinical Modification* (ICD-9/10 CM) diagnosis codes from adult inpatients (aged ≥18 years) were included as *S. aureus* hospitalizations. Septicemia was defined as a positive blood culture or a MRSA or MSSA septicemia code.

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Figure 1. Proportion of MRSA and MSSA events that were identified using a code and culture, code only, or culture only, overall and for septicemia hospitalizations.

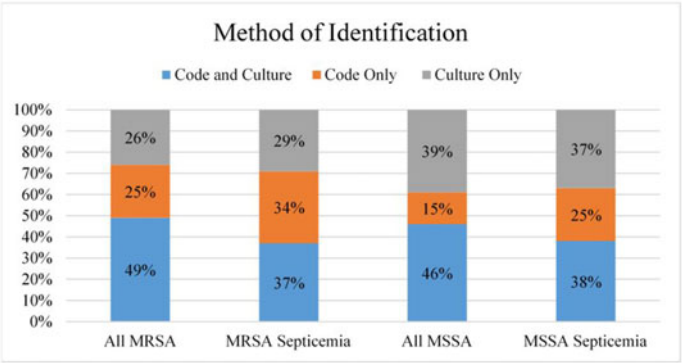

Fig. 1.

Figure 2. Trends in MRSA and MSSA code and culture rates, overall and for septicemia hospitalizations; observed rates shown as points, modeled trends shown as lines.

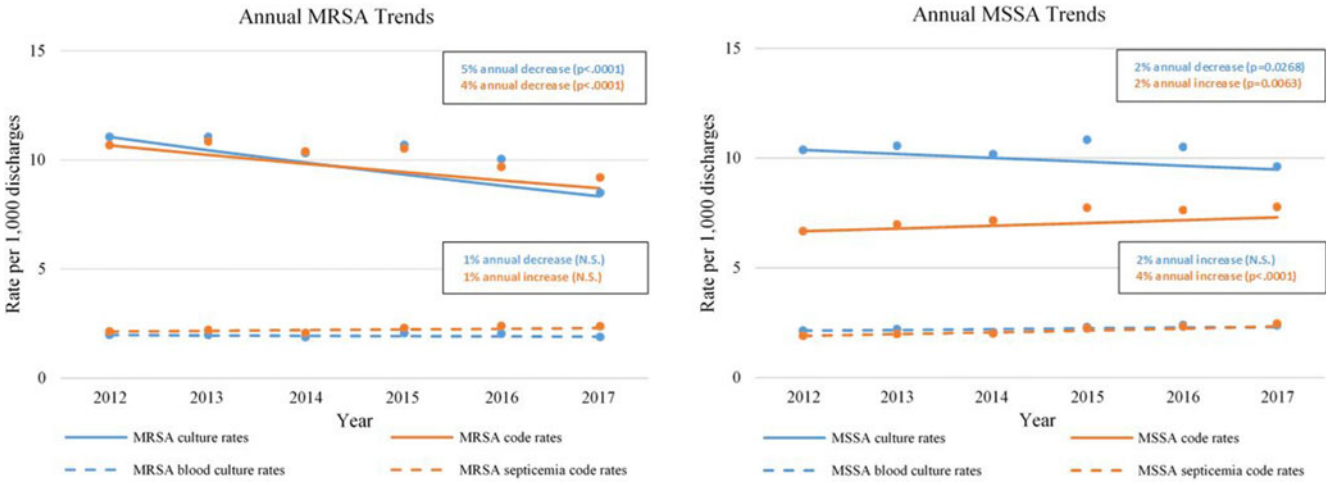

Fig. 2.

Sensitivity and PPV for codes were calculated for hospitalizations where admission status was not listed as transfer; true infection was considered a positive clinical culture. Negative binominal regression models measured trends in rates of MRSA and MSSA per 1,000 hospital discharges. **Results:** We identified 168,634 MRSA and 148,776 MSSA hospitalizations in 256 hospitals; 17% of MRSA and 21% of MSSA were septicemia. Less than half of all *S. aureus* hospitalizations (49% MRSA, 46% MSSA) and *S. aureus* septicemia hospitalizations (37% MRSA, 38% MSSA) had both a positive culture and diagnosis code (Fig. 1). Sensitivity of MRSA codes in identifying positive cultures was 61% overall and 56% for septicemia, PPV was 62% overall and 53% for septicemia. MSSA codes had a sensitivity of 49% in identifying MSSA cultures and 52% for MSSA septicemia; PPV was 69% overall and 62% for septicemia. Despite low sensitivity, MRSA trends are similar for cultures and codes, and MSSA trends are divergent (Fig. 2). For hospitalizations with septicemia, mortality was highest among those with a blood culture only (31.3%) compared to hospitalizations with both a septicemia code and blood culture (16.6%), and septicemia code only (14.7%). **Conclusions:** ICD diagnosis code sensitivity and PPV for identifying infections were consistently poor in recent years. Less than half of hospitalizations have concordant microbiology laboratory results and diagnosis codes. Rates and trend estimates for MSSA differ by method of identification. Using diagnosis codes to identify *S. aureus* infections may not be appropriate for descriptive epidemiology or assessing trends due to significant misclassification.

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Presentation Type:
Poster Presentation

Variability in Antimicrobial Use Among Hospitals Participating in the Canadian Nosocomial Infection Surveillance Program

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Background: The association between antimicrobial use (AMU) and emergence of antimicrobial resistance is well documented. The Canadian Nosocomial Infection Surveillance Program (CNISP) has conducted sentinel surveillance of AMU at participating Canadian hospitals since 2009 resulting in the largest pan-Canadian hospital database of dispensed antimicrobials. **Objectives:** Describe interhospital variability of AMU across Canada. **Methods:** Hospitals submit annual AMU data based on patient days (PD). Antimicrobials were measured in defined daily doses (DDD) for adults using the WHO Anatomical Therapeutic Chemical (ATC) system. The AMU data among pediatric patients have been available since 2017 using days of therapy (DOT). Surveillance includes systemic antibacterial agents (J01 ATC codes), oral metronidazole, and oral vancomycin. AMU was assessed using quintiles, interquartile ranges (IQR), and relative IQRs (upper- and lower-quartile values divided by the median). **Results:** Between 2009 and 2018, 20–26 hospitals participated in adult surveillance each year (35 teaching hospitals and 3 nonteaching hospitals participated in ≥1 year). Over this period, overall AMU decreased by 13% at participating adult hospitals from 645 to 560 DDD per 1,000 PD. AMU varied substantially between hospitals, but this variability decreased over time (Fig. 1). In 2009, the IQRs for overall AMU spanned 309 DDD per 1,000 PD, and in 2018 it spanned only 103 DDD per 1,000 PD. This decrease in variability was due to large decreases in use among hospitals with high use in 2009–2010. Among hospitals in the highest use quintile in 2009–2010, AMU decreased, on average, 44 DDD per 1,000 PD each year. Among hospitals in the lowest use quintile in 2009–2010, AMU increased, on average, 6 DDD per 1,000 PD each year. In 2018, antibiotics with the largest absolute IQR variability were cefazolin (61–113 DDD per 1,000 PD), piperacillin-tazobactam (32–64 DDD per 1,000 PD), and vancomycin (24–49 DDD per 1,000 PD). Among antibiotics with ≥1 DDD per 1,000 PD, antibiotics with the largest relative IQR variability were tobramycin (0.3–6 DDD per 1,000 PD), cefadroxil (0.08–9 DDD per 1,000 PD), and linezolid (0.2–3 DDD per 1,000 PD). In 2018, the IQR for overall pediatric AMU (n = 7 teaching hospitals) was 426–581 DOT per 1,000 PD. Antibiotics with the largest IQRs were vancomycin (0.6–58 DOT per 1,000 PD), cefazolin (33–88 DOT per 1,000 PD), and tobramycin (3–57 DOT per 1,000 PD). Among antibiotics with ≥1 DOT per 1,000 PD in 2018, antibiotics with the largest relative IQRs were tobramycin (3–57 DOT per 1,000 PD), cefuroxime (1–6 DOT per 1,000 PD), and amoxicillin (8–42 DOT per 1,000 PD). **Conclusions:** There is wide variation in overall antibiotic use across hospitals. Variation between AMU at adult hospitals has decreased between 2009 and 2018; in 2018, antibiotics with the largest IQRs were cefazolin and piperacillin-tazobactam. Benchmarking AMU is crucial for informing antimicrobial stewardship efforts.

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Disclosures: Allison McGeer reports funds to her institution from Pfizer and Merck for projects for which she is the principal investigator. She also reports consulting fees from Sanofi-Pasteur, Sunovion, GSK, Pfizer, and Cidara.
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Figure: Boxplot of overall rate of antimicrobial use (AMU) in defined daily doses (DDDs) per 1000 patient days among adult inpatients at hospitals participating in the Canadian Nosocomial Infection Surveillance Program, 2009–2018

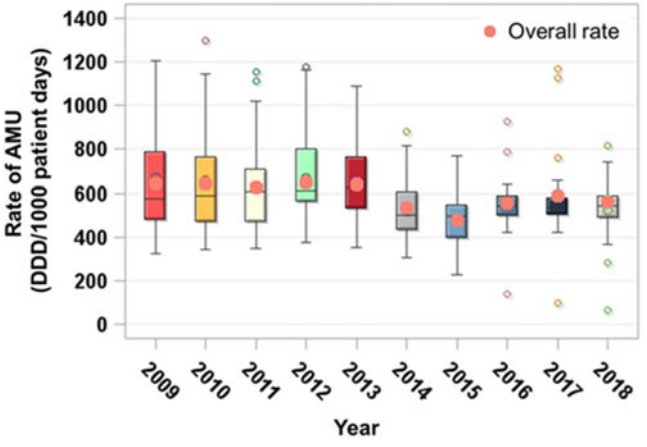

Fig. 1

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