Conducting studies in which contributed antiseptic product is provided to participating hospitals and nursing homes.
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Presentation Type:
Oral Presentation
VA Antibiotic Stewardship Intervention to Improve Outpatient Antibiotic Use for ARIs: A Cost-Effectiveness Analysis
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Background: The *Core Elements of Outpatient Antibiotic Stewardship* provide a framework to improve antibiotic use, but cost-effectiveness data on interventions to improve antibiotic use are limited. Beginning in September 2017, an antibiotic stewardship intervention was launched in within 10 outpatient Veterans Healthcare Administration clinics. The intervention was based on the Core Elements and used an academic detailing (AD) and an audit and feedback (AF) approach to encourage appropriate use of antibiotics. The objective of this analysis was to evaluate the cost-effectiveness of the intervention among patients with uncomplicated acute respiratory tract infections (ARI). **Methods:** We developed an economic simulation model from the VA's perspective for patients presenting for an index outpatient clinic visit with an ARI (Fig. 1). Effectiveness was measured as quality-adjusted life-years (QALYs). Cost and utility parameters for antibiotic treatment, adverse drug reactions (ADRs), and healthcare utilization were obtained from the published literature. Probability parameters for antibiotic treatment, appropriateness of treatment, antibiotic ADRs, hospitalization, and return ARI visits were estimated using VA Corporate Data Warehouse data from a total of 22,137 patients in the 10 clinics during 2014–2019 before and after the intervention. Detailed cost data on the development of the AD and AF materials and electronically captured time and effort for the National AD Service activities by specific providers from a national ARI campaign were used as a proxy for the cost estimate of similar activities conducted in this intervention. We performed 1-way and probabilistic sensitivity analyses (PSAs) using 10,000 second-order Monte Carlo simulations on costs and utility values using their means and standard deviations.

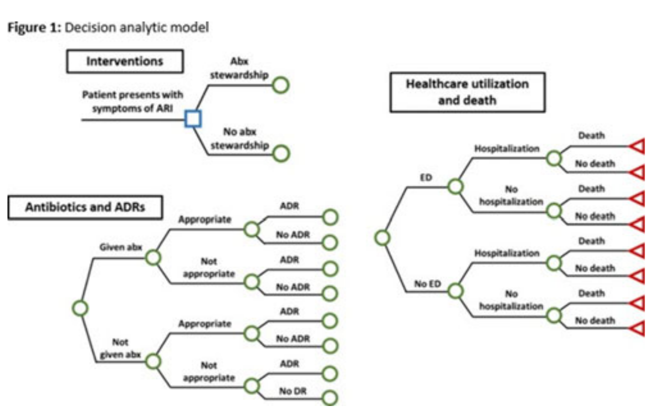

Fig. 1.

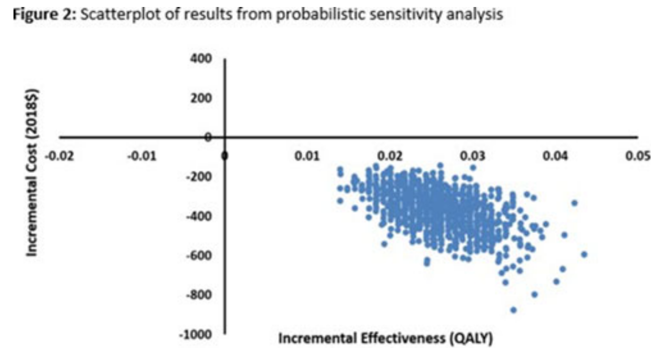

Fig. 2.

Results: The proportion of uncomplicated ARI visits with antibiotics prescribed (59% vs 40%) was lower and appropriate treatment was higher (24% vs 32%) after the intervention. The intervention was estimated to cost $110,846 (2018 USD) over a 2-year period. Compared to no intervention, the intervention had lower mean costs ($880 vs $517) and higher mean QALYs (0.837 vs 0.863) per patient because of reduced inappropriate treatment, ADRs, and subsequent healthcare utilization, including hospitalization. In threshold analyses, the antibiotic stewardship strategy was no longer dominant if intervention cost was > $64,415,000 or the number of patients cared for was <3,672. In the PSA, the antibiotic stewardship intervention was dominant in 100% of the 10,000 Monte Carlo iterations (Fig. 2). **Conclusions:** In every scenario, the VA outpatient AD and AF antibiotic stewardship intervention was a dominant strategy compared to no intervention.
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Validation of a Surgical Site Infection Detection Algorithm for Use in Cardiac and Orthopedic Surgery Research
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Background: Studies of interventions to decrease rates of surgical site infections (SSIs) must include thousands of patients to be statistically powered to demonstrate a significant reduction. Therefore, it is important to develop methodology to extract data available in the electronic medical record (EMR) to accurately measure SSI rates. Prior studies have created tools that optimize sensitivity to prioritize chart review for infection control purposes. However, for research studies, positive predictive value (PPV) with

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reasonable sensitivity is preferred to limit the impact of false-positive results on the assessment of intervention effectiveness. Using information from the prior tools, we aimed to determine whether an algorithm using data available in the Veterans Affairs (VA) EMR could accurately and efficiently identify deep incisional or organ-space SSIs found in the VA Surgical Quality Improvement Program (VASQIP) data set for cardiac and orthopedic surgery patients. **Methods:** We conducted a retrospective cohort study of patients who underwent cardiac surgery or total joint arthroplasty (TJA) at 11 VA hospitals between January 1, 2007, and April 30, 2017. We used EMR data that were recorded in the 30 days after surgery on inflammatory markers; microbiology; antibiotics prescribed after surgery; *International Classification of Diseases* (ICD) and current procedural terminology (CPT) codes for reoperation for an infection related purpose; and ICD codes for mediastinitis, prosthetic joint infection, and other SSIs. These metrics were used in an algorithm to determine whether a patient had a deep or organ-space SSI. Sensitivity, specificity, PPV and negative predictive values (NPV) were calculated for accuracy of the algorithm through comparison with 30-day SSI outcomes collected by nurse chart review in the VASQIP data set. **Results:** Among the 11 VA hospitals, there were 18,224 cardiac surgeries and 16,592 TJA during the study period. Of these, 20,043 were evaluated by VASQIP nurses and were included in our final cohort. Of the 8,803 cardiac surgeries included, manual review identified 44 (0.50%) mediastinitis cases. Of the 11,240 TJAs, manual review identified 71 (0.63%) deep or organ-space SSIs. Our algorithm identified 32 of the mediastinitis cases (73%) and 58 of the deep or organ-space SSI cases (82%). Sensitivity,

Cardiac surgery	Mediastinitis present by chart review	Mediastinitis absent	Total	
Algorithm flagged as mediastinitis	32	118	150	PPV = 21.3%
Algorithm did not flag	12	8641	8653	NPV = 99.9%
Total	44	8759	8803	
	Sensitivity = 72.7%	Specificity = 98.7%		

Orthopedic surgery	Deep/organ-space SSI present by chart review	Deep/organ-space SSI absent	Total	
Algorithm flagged as Deep/organ-space SSI	58	222	280	PPV = 20.7%
Algorithm did not flag	13	10947	10960	NPV = 99.9%
Total	71	11169	11240	
	Sensitivity = 81.7%	Specificity = 98.0%		

Fig. 1.

specificity, PPV, and NPV are shown in Table 1. Of the patients that our algorithm identified as having a deep or organ-space SSI, only 21% (PPV) actually had an SSI after cardiac surgery or TJA. **Conclusions:** Use of the algorithm can identify most complex SSIs (73%–82%), but other data are necessary to separate false-positive from true-positive cases and to improve the efficiency of case detection to support research questions.

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Variation in Hospitalist-Specific Antibiotic Prescribing at Four Hospitals: A Novel Tool for Antibiotic Stewardship

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Background: Hospitalists play a critical role in antimicrobial stewardship as the primary antibiotic prescriber for many inpatients. We sought to describe antibiotic prescribing variation among hospitalists within a healthcare system. **Methods:** We created a novel metric of hospitalist-specific antibiotic prescribing by linking hospitalist billing data to hospital medication administration records in 4 hospitals (two 500-bed academic (AMC1 and AMC2), one 400-bed community (CH1), and one 100-bed community (CH2)) from January 2016 to December 2018. We attributed dates that a hospitalist electronically billed for a given patient as billed patient days (bPD) and mapped an antibiotic day of therapy (DOT) to a bPD. Each DOT was classified according to National Healthcare Safety Network antibiotic categories: broad-spectrum hospital-onset (BS-HO), broad-spectrum community-onset (BS-CO), anti-MRSA, and highest risk for *Clostridioides difficile* infection (CDI). DOT and bPD were pooled to calculate hospitalist-specific DOT per 1,000 bPD. Best subsets regression was performed to assess model fit and generate hospital and antibiotic category-specific models adjusting for patient-level factors (eg, age ≥65, ICD-10 codes for comorbidities and infections). The models were used to calculate predicted hospitalist-specific DOT and observed-to-expected ratios (O:E) for each antibiotic category. Kruskal-Wallis tests and pairwise Wilcoxon rank-sum tests were used to determine significant differences between median DOT per 1,000 bPD and O:E between hospitals for each antibiotic category. **Results:** During the study period, 116 hospitalists across 4 hospitals contributed a total of 437,303 bPD. Median DOT per 1,000 bPD varied between hospitals (BS-HO range, 46.7–84.2; BS-CO range, 63.3–100; anti-MRSA range, 48.4–65.4; CDI range, 82.0–129.4). CH2 had a significantly higher median DOT per 1,000 bPD compared to the academic hospitals (all antibiotic categories $P < .001$) and CH1 (BS-HO, $P = .01$; anti-MRSA, $P = .02$) (Fig. 1A). The 4 antibiotic groups at 4 hospitals resulted in 16 models, with good model fit for CH2 ($R^2 > 0.55$ for all models), modest model fit for AMC2 ($R^2 = 0.46$–0.55), fair model fit for CH1 ($R^2 = 0.19$–0.35), and poor model fit for AMC1 ($R^2 < 0.12$ for all models). Variation in hospitalist-specific O:E was moderate (IQR, 0.9–1.1). AMC1 showed greater variation than other hospitals,