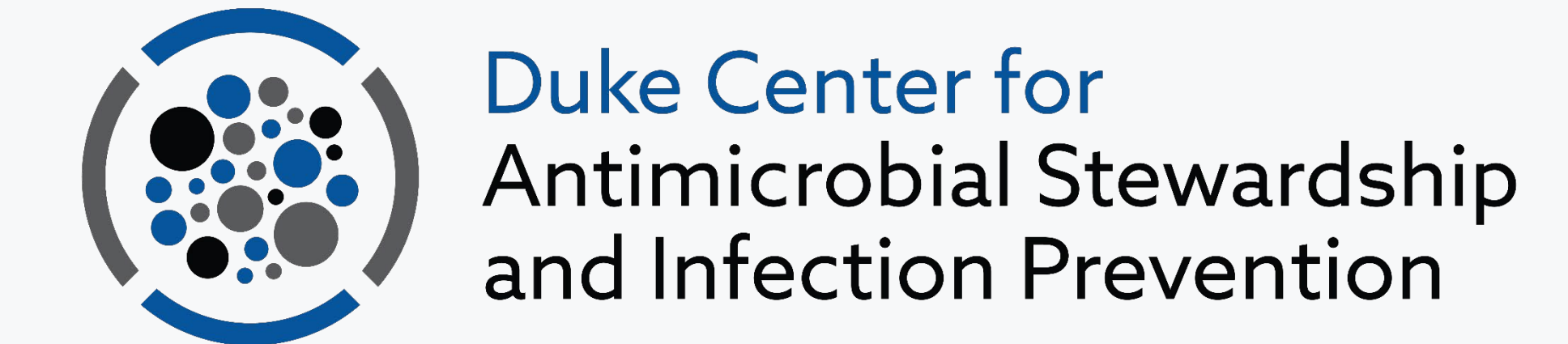


Electronic Assessment of Empiric Antibiotic Prescribing Using Diagnosis Codes



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Abstract (updated)

Background: Antimicrobial stewardship programs (ASPs) must understand empiric choices for specific disease syndromes to assess adherence to local empiric treatment guidelines. Electronically-derived metrics to track empiric therapy choices would allow ASPs to target areas for intervention without significant data collection burden.

Methods: Admissions from 10 community hospitals between 7/1/2016 and 6/30/2019 were reviewed to identify those with common infectious syndromes: pneumonia (PNA), urinary tract infection (UTI) and skin and soft tissue infection (SSTI). Admissions with a syndrome of interest were identified using AHRQ clinical classifications software (CCS) codes based on ICD-10 codes for infection at time of discharge. Admissions were categorized as having the syndrome of interest with or without sepsis. Antibiotics received during the first 48 hours of inpatient admission were obtained from electronic medication administration records. The proportion of syndrome admissions receiving specific antibiotic agents was determined to evaluate initial treatment choices as compared with local empiric guidelines. Antibiotic categories were not mutually exclusive, admissions receiving combination therapy were included in the count for each individual agent as well as the combination group. The denominator was the count of admissions with the syndrome of interest. Distributions were tracked over time to observe the effects of ASP intervention.

Results: The analysis included 61,419 admissions. The most common diagnosis was UTI (30%) followed by PNA (23%). Empiric antibiotic use varied by syndrome (Figure 1). In general, patients with a targeted infectious diagnosis and sepsis received more broad-spectrum agents than those without sepsis. SSTI was an exception, but few patients admitted with SSTI did not also have presumed sepsis. Longitudinal analysis demonstrated shifts from less preferred agents to guideline-concordant choices. For example, for admissions with a diagnosis of PNA, we observed a steady year on year increase in ceftriaxone (preferred) while levofloxacin (avoided in local guidelines) declined.

Conclusion: Syndrome-specific diagnosis codes were helpful in assessing empiric antibiotic selection and may assist ASPs in improving empiric guideline adherence.

Background

- ASPs must understand **empiric choices** for specific disease syndromes in order to understand whether local empiric therapy guidelines are being utilized. Metrics to identify empiric therapy choices would allow ASPs to identify areas to improve.
- Community hospitals often do not have the resources to create high level feedback on AU and ways to better steward antibiotic use. This project's goal was to assist hospitals better understand AU and diagnosis to further identify areas for intervention using discharge diagnosis codes.

Methods

- Data were obtained from 10 community hospitals participating in the Duke Antimicrobial Stewardship Outreach Network (DASON)
- Clinical classification software (CCS)¹ for ICD-10 was used to screen hospital discharge billing data for 3 disease states of interest (pneumonia (PNA), urinary tract infection (UTI), skin and soft tissue infection (SSTI)) with and without sepsis indicators (Table)
- Inclusion criteria:
 - Admissions between 7/1/2016 and 6/30/2019 with a disease syndrome of interest
 - Received antibacterial agents within 48 hours of entry to inpatient unit
- Exclusions:
 - Admission to a behavioral health or rehabilitation unit
 - Admissions in which only topical antimicrobials or oral vancomycin were administered
- Outcomes:
 - Proportion of syndrome admissions with specified empiric antibiotics or combination of antibiotics
 - Distributions of antibiotic use over time were also tracked to demonstrate utility of the metric in assessing impact of stewardship interventions

Infectious Disease Syndromes	CCS Code (single)	Number of Encounters July 2016-June 2017	Number of Encounters July 2017-June 2018	Number of Encounters July 2018-June 2019	Total
Pneumonia	122 not 2	4406	4479	5139	14024
Urinary Tract Infection	159 not 2	5802	5989	6806	18597
Skin and Soft Tissue Infection	197 not 2	2528	2775	3553	8856
Pneumonia + Sepsis	122 and 2	2841	2735	2748	8324
UTI + Sepsis	159 and 2	2779	2862	2980	8621
Skin and soft tissue + Sepsis	197 and 2	919	988	1090	2997

Results

- A total of 61,419 admissions were included (Table)
 - The most common diagnosis was UTI (30%)
- Top 3 antibiotics by indication are displayed in Figure 1
 - UTI and pneumonia admissions without a sepsis indicator received more narrow spectrum empiric treatment regimens compared to admissions with a sepsis indicator
 - Admissions for SSTI had similar trends in antibiotic use, although a higher percent received anti-pseudomonal coverage when sepsis was present

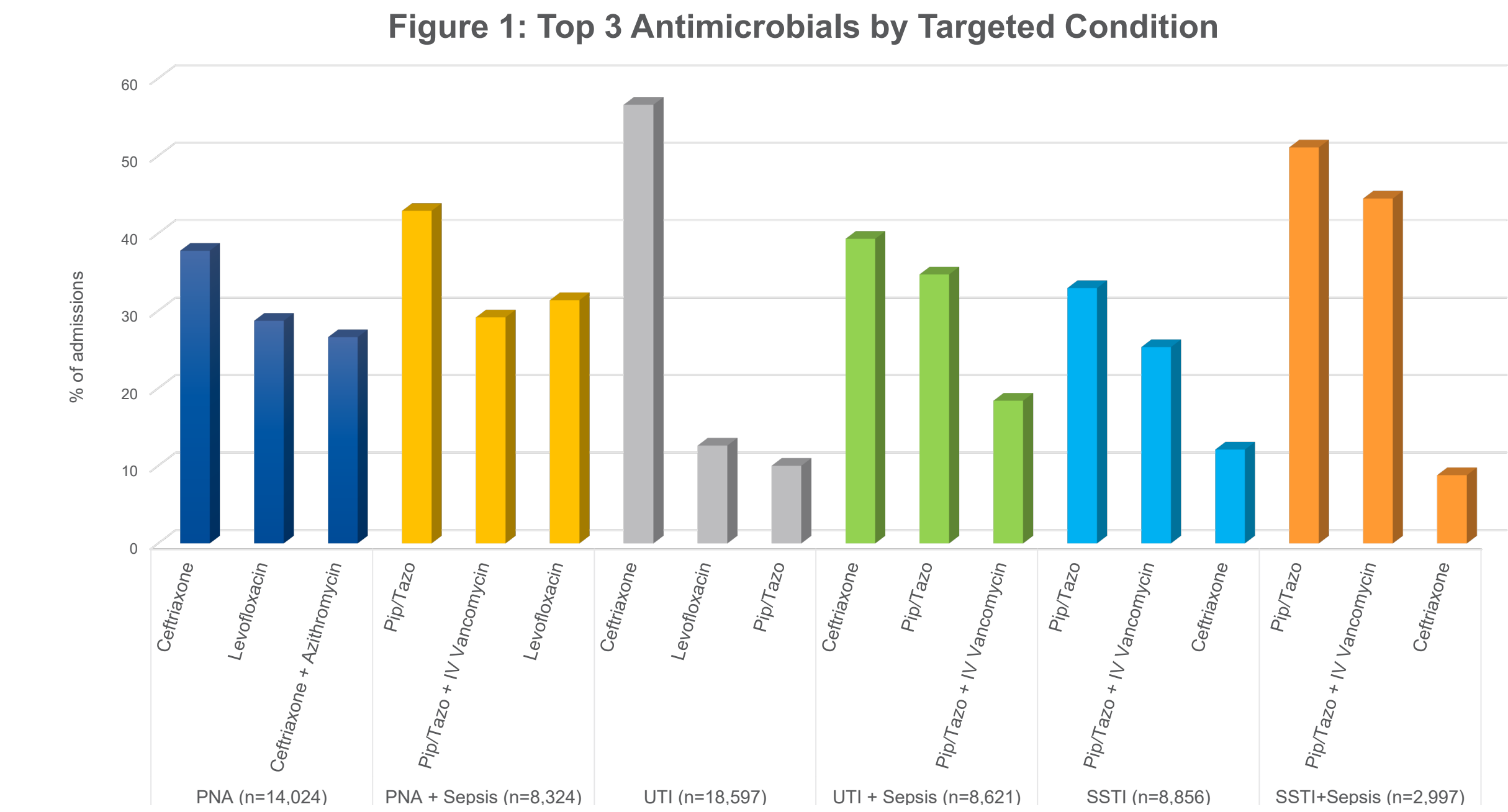
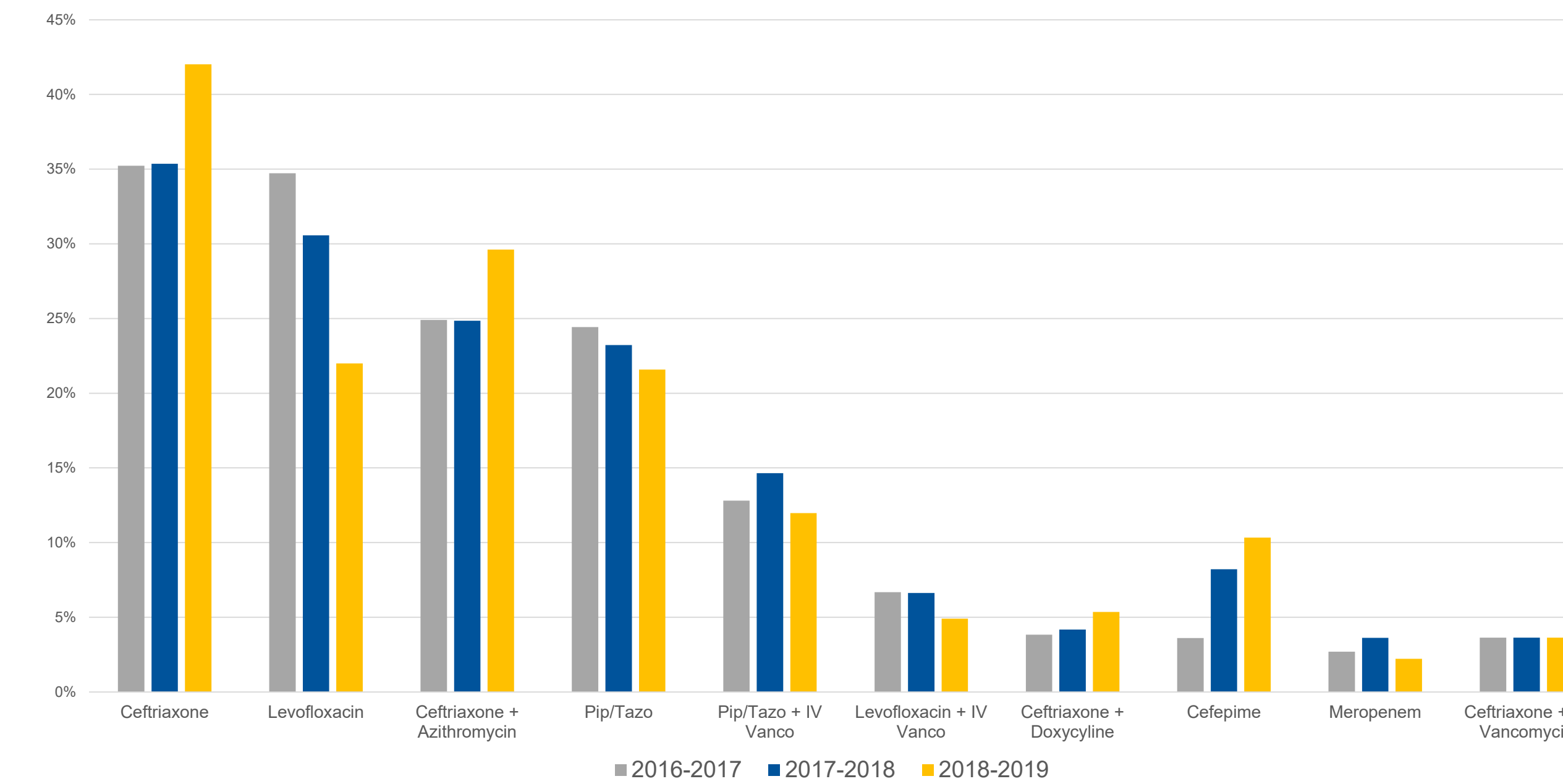


Figure 2: Time-Trended Antibiotic Use for Pneumonia (without sepsis)



Assessment of Stewardship Interventions

- All included facilities were implementing fluoroquinolone sparing empiric treatment guidelines during the period of the analysis
- Longitudinal analysis showed that antibiotic use shifted throughout the study period as noted by an increase in the percentage of admissions for pneumonia without sepsis receiving ceftriaxone that increased in year 3 compared with years 1 and 2 (Figure 2)
- Likewise, use of levofloxacin decreased steadily for pneumonia throughout the study period (Figure 2)

Conclusions

- Using ICD10 based codes for diagnosis were useful to examine empiric treatment regimens for targeted infectious syndromes
- Changes in empiric treatment following implementation of targeted stewardship interventions were observed with this metric, specifically a reduction in fluoroquinolone use.
- Further validation is needed to verify accuracy of discharge ICD-10 codes and prescriber indicated reason for use at the time of order entry.



1. <https://www.hcup-us.ahrq.gov/toolssoftware/ccs10/ccs10.jsp>