Table 2. Characteristics of Patients With and Without Antibiotic Overuse at Hospital Discharge

Variable	Had Antibiotic Overuse at Discharge; (N=7,486), N(%)	Did Not Have Antibiotic Overuse at Discharge; (N=9,671), N(%)	P value
Race, White; N (%)	5775 (77.1%)	7350 (76.0%)	0.08
Gender, Female; N (%)	4201 (56.1%)	5865 (60.7%)	<.0001
Age; Median (IQR)	71 (59-82)	74 (61-84)	<.0001
Charlson Comorbidity Index; Median (IQR)	3 (1-4)	3 (1-5)	<.0001
Sepsis;[a] N (%)			
Sepsis (SIRS)	3691 (49.3%)	3573 (37.0%)	<.0001
Severe Sepsis	1017 (13.6%)	1209 (12.5%)	0.04
Length of Stay (Days); Median (IQR)	4 (3-6)	5 (4-7)	<.0001
Disease State			
Hospitalized Patients with Bacteriuria[c]; N (%)	2459 (32.8%)	4824 (49.9%)	<.0001
Asymptomatic Bacteriuria	1024 (13.7%)	1165 (12.1%)	
Complicated Urinary Tract Infection	1007 (13.5%)	2031 (21.0%)	
All Other Urinary Tract Infection	428 (5.7%)	1628 (16.8%)	
Hospitalized Patients Treated for Pneumonia; N (%)	5027 (67.2%)	4847 (50.1%)	
Not Meeting Criteria[d]	720 (9.6%)	404 (4.2%)	
Community-acquired Pneumonia	3229 (43.1%)	2691 (27.8%)	
Healthcare-associated Pneumonia	1078 (14.4%)	1752 (18.1%)	
Antibiotic Treatment and Documentation			
Total Antibiotic Duration Documented in Discharge Summary; N (%)	2139 (28.6%)	2774 (28.7%)	0.87
Received a Fluoroquinolone at Discharge; N(%)	3181 (42.5%)	587 (6.1%)	<.0001
Total Antibiotic Duration (Days); Median (IQR)	9 (8-12)	6 (4-8)	<.0001
Antibiotic Overuse at Discharge (Days); Median (IQR)	4 (2-6)	N/A	
Hospital Characteristics			
Hospital Bed size; Median (IQR)	305 (186-443)	327 (189-520)	<.0001
Hospital Profit Type; N (%)			
For Profit	552 (7.4%)	689 (7.1%)	0.006
Governmental	366 (4.9%)	581 (6.0%)	
Nonprofit	6568 (87.7%)	8401 (86.9%)	
Self-reported Academic Hospital, N (%)	6375 (85.2%)	8707 (90.0%)	<.0001

Table shows characteristics of patients who had antibiotic overuse at discharge compared to those who did not. Antibiotic overuse at discharge was defined as any unnecessary antibiotics, excessive antibiotic duration, or avoidable fluoroquinolones prescribed at hospital discharge. Patient variables were collected from chart review. Hospital characteristics were collected by annual hospital survey. **Abbreviations:** IQR, interquartile range; SIRS, severe inflammatory response syndrome;

[a] Sepsis defined as two or more of the following: temperature >38°C or <36°C, heart rate >90 beats/min, respiratory rate >20/min, white blood cell count >12,000/mm3 or <4000/mm3 or >10% immature bands. Severe sepsis was defined as sepsis plus evidence of organ dysfunction as defined by any of the following: systolic blood pressure <90 mmHg, lactate > 2 mmol/L, INR >1.5 (in a patient not on anticoagulant), platelet <100,000/μL, bilirubin > 2 mg/dL, creatinine > 2 mg/dL (without documentation of moderate or severe chronic kidney disease). Quick SOFA score: systolic blood pressure <100 mmHg = 1, respiratory rate >22 breaths per minute = 1; glasgow coma score <15 = 1.

[b] Clinical stability defined as: afebrile (temperature < 37.9°C) for at least 48 hours plus no more than one sign of clinical instability (heart rate >100 beats per minute, respiratory rate >24 breaths per minute, systolic blood pressure < 90 mmHg, arterial saturation <90% on room air or oxygen requirement higher than baseline, or mental status altered from baseline).

[c] Patients with bacteriuria but without symptoms attributable to a UTI were considered to have asymptomatic bacteriuria. Uncomplicated UTI consisted of women without a urinary catheter or comorbid conditions associated with complicated UTI. Complicated UTI included all men and any women with immunosuppression or urologic conditions which may necessitate different antibiotic treatment.

[d] Patients with a discharge diagnosis of pneumonia who lacked symptoms of pneumonia on hospital day 1 or 2 or who had normal imaging tests were considered not to meet criteria for pneumonia (and therefore antibiotic use at discharge in these patients was considered unnecessary).

Disclosures. **All Authors:** No reported Disclosures.

2891. Trends in Inpatient Antibiotic Use in US Hospitals, 2012–2017

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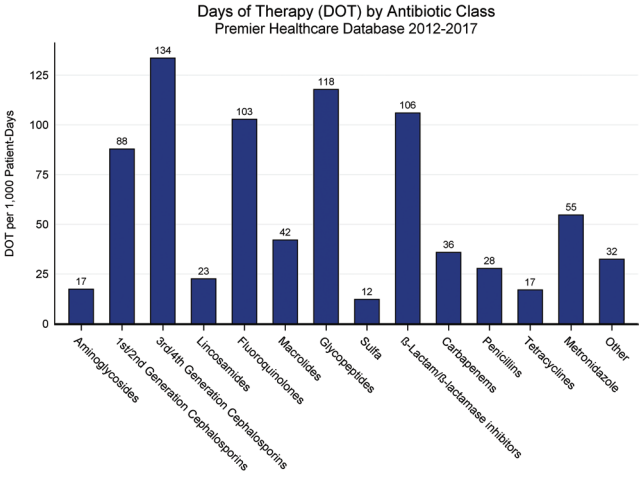
Session: 309. Glass Half Full or Half Empty? Trends in Antimicrobial Prescribing
Saturday, October 5, 2019: 3:30 PM

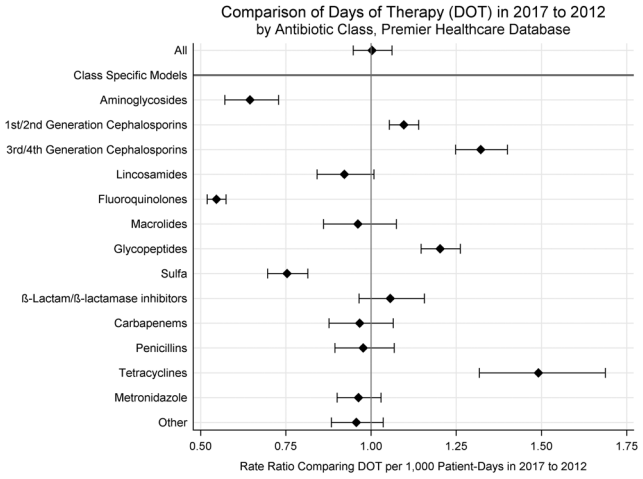
Background. The National Action Plan for Combating Antibiotic-resistant Bacteria calls for monitoring inpatient antibiotic use to inform stewardship efforts. We estimated national trends in inpatient antibiotic usage from 2012 to 2017 in a large cohort of US hospitals.

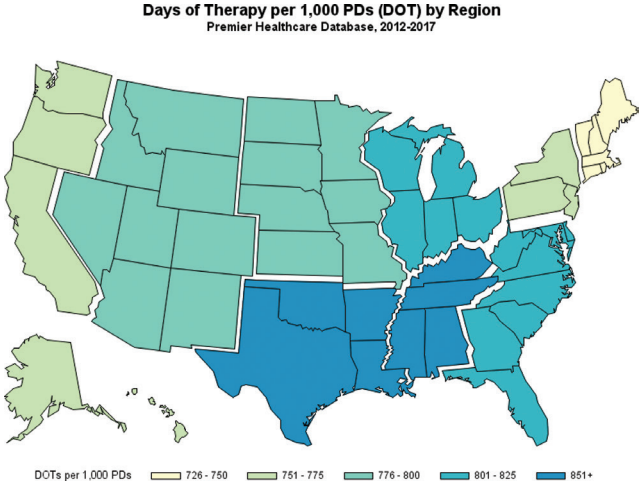
Methods. We utilized the Premier Healthcare Database, containing detailed administrative records available by census region, including inpatient drug utilization data based on billing records, for all patients discharged from a convenience sample of over 700 US hospitals annually, approximately 20% of US inpatient discharges. We retrospectively estimated days of therapy (DOT)/1,000 patient-days (PDs) by year overall and by antibiotic class. To examine trends over time, we created multivariable models adjusting for hospital-specific location of antibiotic use (ICU vs. other) and hospital-specific summary measures including average patient age, average co-morbidity score, case mix index, number of hospital beds, teaching status, urban/rural location, US census division, proportion of discharges with a surgical diagnosis-related code, and proportion of PDs with an infectious disease primary ICD-9/10-CM discharge code. Estimates and models were weighted to be nationally representative using projected weights from the database.

Results. 58% of patients had at least one antibiotic DOT, and the overall DOT for all hospitals was 810 DOT/1,000 PDs (interquartile range 701 to 913 DOT/1,000 PDs). Glycopeptides and third-/fourth-generation cephalosporins were the most common antibiotic classes (Figure 1). Overall antibiotic DOT did not change significantly over time, $P = 0.9133$. However, class-specific DOT varied with large decreases in fluoroquinolones from 2012 to 2017 (55% decrease, $P < 0.0001$), and large increases in third-/fourth-generation cephalosporins and tetracyclines (32% and 49% increase, respectively, $P < 0.0001$) (Figure 2). Overall antibiotic DOT significantly varied among US census divisions (Figure 3).

Conclusion. Estimated overall inpatient antibiotic DOT did not change in US hospitals from 2012 to 2017, but there were significant class-specific changes. The large decrease in fluoroquinolone use may reflect increased awareness of adverse events.







Disclosures. **All Authors:** No reported Disclosures.

2892. The Relationship Between Inpatient and Post-discharge Antimicrobial Use at the Hospital-level Across an Integrated Healthcare Network

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Session: 309. Glass Half Full or Half Empty? Trends in Antimicrobial Prescribing
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Background. Hospital-based antimicrobial stewardship interventions and metrics have typically focused only on inpatient antimicrobial exposure. However, single-center studies have found a large portion of antimicrobial exposure occurs immediately after hospital discharge. We sought to describe antimicrobial-prescribing upon hospital discharge across the Veterans Health Administration (VHA) and to compare inpatient and post-discharge antimicrobial use at the hospital-level.

Methods. This retrospective study used national VHA administrative data to identify all acute-care admissions from January 1, 2014 to December 31, 2016. Post-discharge antimicrobials were defined as oral outpatient antimicrobials prescribed at the time of hospital discharge. We measured inpatient-days of therapy (DOT) and post-discharge DOTs. At the hospital-level, inpatient DOTs per 100 admissions were compared with post-discharge DOTs per 100 admissions using Spearman's rank-order correlation.

Results. Among 1.7 million acute-care admissions across 122 VHA hospitals, 46.1% were administered inpatient antimicrobials and 19.9% were prescribed an oral antimicrobial at discharge. Fluoroquinolones were the most common antimicrobial prescribed at discharge among 335,396 antimicrobial prescriptions (38.3%). At the hospital-level, median inpatient antimicrobial use was 331.3 DOTs per 100 admissions (interquartile range (IQR) 284.9–367.9) and median post-discharge use was 209.5 DOTs per 100 admissions (IQR 181.5–239.6). Thirty-nine percent of the total duration of antimicrobial exposure occurred after hospital discharge. The metrics of inpatient DOTs per 100 admissions and post-discharge DOTs per 100 admissions were weakly correlated at the hospital-level (rho = 0.44, $P < 0.0001$).

Conclusion. Antimicrobial-prescribing at hospital discharge was common and contributed substantially to the total antimicrobial exposure associated with an acute-care hospital stay. A hospital's inpatient antimicrobial use was only weakly correlated with its post-discharge antimicrobial use. Antimicrobial stewardship interventions should specifically target antimicrobial-prescribing at discharge.

Disclosures. **All Authors:** No reported Disclosures.

2893. The Michigan Hospital Medicine Safety Consortium: Improving Patient Care by Reducing Excessive Antibiotic Use in Patients Hospitalized with Community-Acquired Pneumonia

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Session: 309. Glass Half Full or Half Empty? Trends in Antimicrobial Prescribing
Saturday, October 5, 2019: 4:00 PM

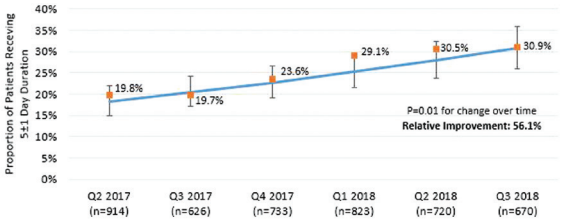
Background. Most patients hospitalized with community-acquired pneumonia (CAP) can be safely treated with 5 days of antibiotics, but many are not. We determined whether a hospitalist-collaborative can reduce excess antibiotic duration in patients with CAP through partnership with antibiotic stewardship teams (AST), data feedback, pay-for-performance, and sharing best practices.

Methods. From April 2017 to October 2018, abstractors collected data (medical record, phone calls 30-days post-discharge) on adult, non-ICU patients hospitalized with CAP at 43 hospitals in Michigan. We used a guideline-based algorithm[1] to determine appropriate antibiotic duration based on patient factors (e.g., clinical stability). All hospitals received a) quarterly reports on appropriate 5-day treatment rates (2016—current), b) best practice recommendations (2017—current) including toolkit and webinar (3/2018), and c) pay-for-performance based on 5-day CAP metric (2018—current). Generalized linear mixed models were used to evaluate change over time in a) proportion of patients with CAP eligible for 5-day treatment who received 5 ± 1 days and, after adjusting for patient factors and weighting by inverse probability of treatment, b) patient outcomes 30-days post-discharge.

Results. Of 6,229 patients hospitalized with CAP, 4,769 (76.6%) were eligible for 5-days of antibiotic treatment; 283 (5.9%) were excluded due to inability to determine antibiotic duration. Between April 2017 and October 2018, the proportion of patients eligible for a 5-day duration of antibiotic treatment who received 5 ± 1 days increased from 19.8% (181/914) to 30.9% (207/670; $P = 0.01$), a relative improvement of 56.1% (Figure 1). During this time period, there were no changes in 30-day post-discharge death, readmission, emergency room visit, *Clostridioides difficile* infection, or provider-documented antibiotic-associated adverse-events (Table 1). However, there was a decrease (3.3% to 1.7%, $P = 0.03$ for change over time; relative reduction: 48.5%) in patient-reported antibiotic-associated adverse events (Figure 2).

Conclusion. A hospitalist collaborative partnering with AST can safely reduce excess antibiotic duration and antibiotic-associated adverse-events in hospitalized patients with CAP.

Figure 1. Change Over Time in Proportion of Patients Hospitalized with Community-Acquired Pneumonia who were Eligible for 5-day Antibiotic Treatment and Received 5 ± 1 Day Duration, N=43 hospitals, 4,486 patients



Proportion of patients with community-acquired pneumonia eligible for 5-day antibiotic duration who were treated with 5±1 day of antibiotics are shown by quarter (e.g., Q1: January through March) and determined by a guideline based algorithm[1]. Orange squares and accompanying proportions represent raw results from quarterly samples. The blue line (and 95% confidence intervals) represents the adjusted linear mixed model, with hospital specific random intercepts, demonstrating a statistically significant increase over time in the proportion of patients eligible for 5-days who receive 5±1 days (P<0.001). P<0.05 is significant.

Abbreviations: Q- quarter

1. Vaughn V, Flanders S, Conlon A, et al. Factors Associated with Excess Duration of Antibiotic Therapy for Patients Admitted with Pneumonia in Michigan Hospitals: A Cohort study [abstract]. 2017;12 (suppl 2). https://www.shmabstracts.com/abstract/factors-associated-with-excess-duration-of-antibiotic-therapy-for-patients-admitted-with-pneumonia-in-michigan-hospitals-a-cohort-study/. Accessed April 11, 2018.

Table 1. Adjusted 30-day Post-Discharge Outcomes in Patients Hospitalized with Community-Acquired Pneumonia who Were Eligible for 5-day Antibiotic Treatment Duration, by Quarter; N=43 hospitals, 4,486 patients

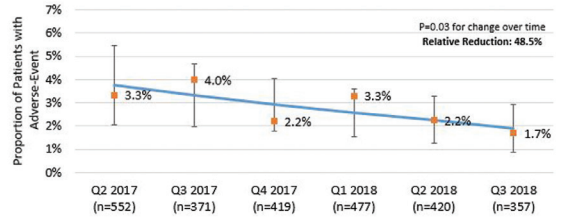
30-Day Post-Discharge Outcomes	Quarter 2, 2017 (N=914)	Quarter 3, 2017 (N=626)	Quarter 4, 2017 (N=733)	Quarter 1, 2018 (N=823)	Quarter 2, 2018 (N=720)	Quarter 3, 2018 (N=670)	P-Value[a]
Death	7 (0.8%)	11 (1.7%)	8 (1.1%)	8 (1.0%)	9 (1.3%)	11 (1.6%)	0.21
Readmission	81 (8.9%)	60 (9.6%)	62 (8.4%)	58 (7.1%)	63 (8.7%)	74 (11.0%)	0.08
Emergency Room Visit	73 (8.0%)	58 (9.2%)	81 (11.1%)	88 (10.7%)	58 (8.1%)	74 (11.1%)	0.10
Antibiotic-Associated Adverse-Event	32 (3.5%)	27 (4.3%)	19 (2.6%)	30 (3.7%)	19 (2.7%)	14 (2.1%)	0.02
Clostridioides difficile Infection	3 (0.3%)	1 (0.1%)	3 (0.4%)	1 (0.2%)	1 (0.1%)	1 (0.1%)	0.43
Physician-Reported Antibiotic-Associated Adverse-Event	12 (1.3%)	12 (1.9%)	8 (1.1%)	16 (2.0%)	9 (1.3%)	7 (1.1%)	0.10
Patient-Reported Antibiotic-Associated Adverse-Event,[b] N=2596	18 (3.3%)	15 (4.0%)	9 (2.2%)	16 (3.3%)	9 (2.2%)	6 (1.7%)	0.03
Composite Adverse Outcome	180 (19.7%)	137 (21.9%)	152 (20.8%)	159 (19.3%)	134 (18.6%)	146 (21.8%)	0.96

Proportions of patients experiencing an adverse-event over time are shown using linear mixed models adjusted for patient characteristics associated with excessive duration (length of stay, sputum production, auscultator findings, leukocytosis, positive sputum culture or non-sputum diagnostic test, and congestive heart failure exacerbation), adjusted for patient characteristics known to be associated with each outcome, and inverse probability of treatment weighting.

[a] P-values reflect change over time in proportion of patients who experienced an outcome at 30-days post-discharge using linear mixed models, adjusted for patient characteristics and inverse probability of treatment weighted. P< 0.05 is significant.

[b] N's differ from overall analysis. Patient-reported adverse-events were collected via phone call 30-days after discharge based on the answer to the following question: "Have you had any side effects from your prescribed antibiotic?" Between Q2 2017 and Q3 2018, 4275 (95.3%) of CAP patients eligible for 5-day antibiotic treatment were eligible for a phone call and 2596 (60.7%) of eligible patients were contacted by phone.

Figure 2. Patient-Reported Antibiotic-Associated Adverse-Events Over Time in Patients Hospitalized with Community-Acquired Pneumonia who Were Eligible for 5-day Antibiotic Treatment Duration, N=43 hospitals, 2,596 patients



Adjusted linear mixed model (blue line) demonstrating change in the proportion of patients with community-acquired pneumonia eligible for 5-day antibiotic duration who reported a 30-day post-discharge antibiotic-associated adverse-event, by quarter (e.g., Q1: January through March). Model adjusted for patient characteristics associated with excessive duration (length of stay, sputum production, auscultator findings, leukocytosis, positive sputum culture or non-sputum diagnostic test, and congestive heart failure exacerbation), controls for age, Charlson-comorbidity index, and gender, and weights by inverse probability of treatment. Orange squares and accompanying proportions represent raw results from quarterly samples.

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