status and inappropriate antibiotic receipt, accounting for patient- and provider-level characteristics.

Results: Of 670,450 women with uncomplicated UTI, 46.7% of antibiotic prescriptions were written for inappropriate agents and 76.1% for inappropriate durations (Figures 1 and 2). Use of inappropriate agents or durations did not change appreciably over the study period (2011–2013 vs. 2014–2015). Of 507,737 prescriptions with inappropriate duration, 501,496 (98.8%) were written for a days' supply longer than recommended. Compared to urban women, rural women had similar risk of receipt of an inappropriate agent (adjusted risk ratio 0.99, 95% CI, 0.98–1.00) but were more likely to receive a prescription for an inappropriate duration (adjusted risk ratio 1.10, 95% CI, 1.09–1.11).

Figure 1. Distribution of antibiotic agent by rural-urban status

Figure 2. Distribution of the antibiotic prescription days' supply by antibiotic agent and rural-urban status

Conclusion: Regardless of rural-urban status, the majority of antibiotic prescriptions for uncomplicated UTI were written for inappropriate agents and durations. Rural women were more likely to receive prescriptions with inappropriately long durations. Antimicrobial stewardship interventions are needed to improve outpatient UTI antibiotic prescribing and reduce unnecessary exposure to antibiotics, particularly in rural settings.

Disclosures: Margaret A. Olsen, PhD, MPH, Merck (Grant/Research Support)Pfizer (Consultant, Grant/Research Support)

242. Seasonality in antibiotic use and resistance across multiple bacterial pathogens and antibiotic classes

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Session: P-8. Antimicrobial Stewardship: Trends in Antimicrobial Prescribing

Background: Antibiotic use is an important driver of antibiotic resistance. Previous studies have shown that this relationship is detectable on a seasonal time-scale, where seasonally cycling antibiotic prescribing corresponds with cycling levels of resistance. Here, we evaluated the seasonal relationship between antibiotic use and resistance across multiple species and antibiotic classes in Boston, Massachusetts.

Methods: To conduct our study, we analyzed antibiotic claims data from the Massachusetts All Payers Claims Database for five antibiotic classes, beta-lactams, macrolides, quinolones, tetracyclines, and nitrofurans, which together account for 74%

of the total outpatient antibiotic claims in this dataset. In addition, we analyzed antibiotic susceptibility data for clinical isolates collected from two tertiary care hospitals, focusing on three clinically important bacterial pathogens. Our analysis included a total of 131,815 *Escherichia coli*, 47,208 *Staphylococcus aureus*, and 27,237 *Klebsiella pneumoniae* isolates collected over the years 2007–2019, with susceptibility testing data for 5–6 antibiotics per species. To determine the extent of seasonality in use and resistance, we fit the antibiotic claims data for each antibiotic class and the minimum inhibitory concentration (MIC) data for each species-antibiotic combination to a sinusoidal model with either a 6 or 12-month period.

Results: We found that use of all 5 antibiotic classes and resistance in 9 out of 15 species-antibiotic combinations showed a significant amplitude of seasonality (p -value < 0.05). Despite different seasonal peaks in antibiotic use across classes, resistance peaked in the winter for almost all species-antibiotic combinations and was most highly correlated with use of winter-peaking antibiotic classes, beta-lactams and macrolides.

Conclusion: Overall, these results suggest that co-resistance and “bystander” selection – selection for resistance in asymptotically colonizing and potentially pathogenic bacteria that are not the direct target of treatment – mediate the effects of antibiotic prescribing on the landscape of resistance.

Disclosures: All Authors: No reported disclosures

243. Temporal Trends in Appropriateness of Ambulatory Antibiotic Prescribing in South Carolina

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Session: P-8. Antimicrobial Stewardship: Trends in Antimicrobial Prescribing

Background: Previous studies have reported high levels of inappropriate ambulatory antibiotic prescribing in the United States. This population-based cohort study examines temporal trends in appropriateness of ambulatory antibiotic prescribing in South Carolina.

Methods: Aggregated pharmacy claims data for oral antibiotic prescriptions among South Carolina residents < 65 years old were matched with primary diagnosis codes from medical claims within 14 days of the pharmacy claim from 2012–2017. Appropriateness of antibiotics was defined as maybe indicated or not indicated based on diagnosis codes. Chi-square tests were used to examine overall temporal trend in appropriateness and the trends across age group and gender.

Results: During the 6-year period, 3,133,379 prescriptions were identified. Overall, 25.6% of antibiotic prescriptions filled were not indicated. This decreased from 27.9% in 2012 to 22.7% in 2017 (p < 0.001). The most common not indicated conditions were viral upper respiratory infections (39.1%), bronchitis (26.7%), and serous otitis (10.9%). The most common maybe indicated conditions were bacterial otitis (27.5%), acute bacterial tonsillitis (24.8%), and sinusitis (23.6%). While females filled more antibiotic prescriptions, they were less likely than males to have a not indicated condition (24.7% vs. 27.1%, p < 0.001). Prescribing for not indicated conditions was more likely in adults aged 40–64 (33.7%) than those aged 18–39 (23.5%) and < 18 (24.2%).

Conclusion: The observed decline in inappropriate ambulatory antibiotic prescribing from 2012 to 2017 in South Carolina represents welcomed news. Further improvements in ambulatory antibiotic stewardship efforts are needed particularly in men ≥ 40 years old with acute respiratory infections.

Disclosures: Julie Ann Justo, PharmD, MS, BCPS-AQ ID, bioMerieux (Speaker's Bureau)TRC Healthcare (Speaker's Bureau)

244. The Double-Edged Sword of Cost Effectiveness in Evaluating Antimicrobial Stewardship Interventions

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Session: P-8. Antimicrobial Stewardship: Trends in Antimicrobial Prescribing

Background: The multiple classical benefits of reducing antimicrobial consumption extend beyond the impact on rates of antimicrobial resistance and infections to include a cost-saving effect of 100,000\$–300,000\$ per intervention as estimated by the CDC. However, the recent introduction of novel antimicrobial molecules with a high price tag and the fall in the prices of older agents presents a substantial challenge in maintaining cost-effectiveness.

Methods: We retrieved from the antimicrobial stewardship program(ASP) database the consumption of the Gram-negative broad-spectrum antibacterial agents (GNBS): imipenem, meropenem, ertapenem, piperacillin-tazobactam, amikacin, colistin, ceftazidime, ceftolozane-tazobactam and cefepime from January 2015–August 2019 at Saint George Hospital(SGH), a 333-bed tertiary care center in Lebanon. The yearly cost of all antibacterials consumed during this period were obtained from SGH billing records. GNBS consumption was calculated as Daily Defined Doses (DDD)/1000 Patient Days(PD) per WHO guidelines.

Results: The carbapenem consumption significantly dropped from a peak of 205 DDD/1000PD in 2015 to 33 DDD/1000PD in 2019. This drop was not accompanied by

an increase in the consumption of other GNBS. The total use of GNBS dropped by 54% from 288 DDD/1000PD in 2015 to 132 DDD/1000PD by August 2019. Currently, SGH serves a yearly average of 82,000 patient-days. Hence, this reduction in total GNBS consumption corresponds to 12,792 fewer daily defined doses of antimicrobial therapy per year.

The average annual cost of all antibacterials at SGH is 1,100,000 \$ (U.S. Dollars), ranging from 955,679 \$ to 1,340,109 \$ for the period 2015–2019. (Table 1)

Consumption of Gram-negative Broad-Spectrum Antimicrobial Agents and Cost of Antibiotics at Saint George Hospital, Lebanon

	2015	2016	2017	2018	August 2019
Imipenem - Meropenem - Ertapenem	205	164	80	56	33
Piperacillin Tazobactam - Ceftazidime - Tigecycline	69	80	48	92	78
Amikacin - Colistin	14	15	9	6	11
Ceftiozane/Tazobactam	0	0	5	13	10
Total (DDD/1000 PD)	288	259	142	167	132
Carbapenems proportion out of GNBS	71	63	56	34	25
Antibiotics (in percent)					
Yearly Cost of All Antibiotics (in U.S. Dollars)	1,237,216	1,127,513	955,679	1,340,109	766,670

Conclusion: The striking decrease in GNBS consumption, namely carbapenems, was not mirrored with a reduction of total antibacterial cost. Although novel antimicrobials carry great potential, they come at a significant increase in overall cost. Modeling ASP interventions solely around cost-effectiveness will limit the better placement of these new agents in institutional therapeutic guidelines. Strict continuous analysis of consumption, antimicrobial resistance, and cost within an ASP provides a proactive and vigilant approach to navigate through the complexity of difficult to treat bacterial infections.

Disclosures: All Authors: No reported disclosures

245. The impact of patient safety report and sentinel events on the prescribing and practice habits of infectious disease physicians

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Infectious Disease Physicians

Session: P-8. Antimicrobial Stewardship: Trends in Antimicrobial Prescribing

Background: Adverse events associated with antimicrobials range from mild to severe and may cause distress or harm to patients, and anxiety for prescribers. The basic tenets of prescribing antimicrobials are based on knowledge of the disease, pharmacokinetics, and pharmacodynamics of the prescribed agent, and effectiveness of the therapy. Inappropriate prescribing can increase costs and may cause reactions or the emergence of resistance. There is a paucity of published data on the prescribing habits of physicians after a sentinel event or patient safety report. Thus, we carried out this study to ascertain whether patient safety reports and sentinel events influence physician antimicrobial prescribing practices

Methods: We invited Infectious Disease physicians at the University of Florida to participate in a survey of their perception of risks and prescribing habits after a sentinel event. Participants were interviewed using a standardized questionnaire. Data were analyzed using Epi Info statistical software. Thematic analyses were performed on the open-ended interview questions.

Results: Of 17 faculty and fellows who participated in the survey, 5 (29.4%) had been practicing infectious disease for 1–3 years, 3 (17.6%) for 4–6 years, 2 (11.7%) for 7–9 years, and 7 (41.1%) for >nine years. Two (11.7%) had a patient safety report filed against them. All participants had experienced at least one sentinel event involving an antimicrobial agent. Sixteen (94%) changed their practice after sentinel events; 8 (47%) increased the frequency of ordering laboratory tests, and 7 (41%) indicated they might change to more expensive antimicrobials with better safety profiles. Eight (47%) participants endorsed hypervigilance when using antibiotics

Conclusion: We found that sentinel events affect physicians' prescribing practices and monitoring of antimicrobial therapy. The most frequent changes included closer follow-up and obtaining more laboratory tests. However, some participants avoided certain antimicrobial agents or used more expensive therapies with better safety profiles. Although physicians use evidence-based medicine to alter their prescribing habits, serious adverse events can have an impact on the way we practice

Disclosures: Jonathan J. Cho, MD, Novartis (Shareholder)

246. Antibiotic Prescribing Patterns for Residents in Assisted Living Facilities

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Session: P-8. Antimicrobial Stewardship: Trends in Antimicrobial Prescribing

Background: Knowledge about antibiotic utilization in Assisted Living Facilities (ALFs) is limited. Studies have primarily focused on aggregate prescribing patterns,

clinical indications for antibiotics, and the types of antibiotics prescribed. Information about individual resident prescribing patterns is limited. This project addresses the gap by using data from a convenient sample of ALFs.

Methods: Data on antibiotic prescriptions from 3 ALFs in Wisconsin were collected for a one-year period. Information included start and stop dates, clinical indication, and antibiotic prescribed. Antibiotic orders for the same resident were categorized as distinct events to capture treatment courses if 1) the days between the end date of the prior antibiotic and the initiation date of subsequent antibiotic orders were > 4 days, or 2) if the identified indications for the prior and subsequent antibiotic were different. Event-level indication was further defined based on (2). Descriptive statistics were used to understand antibiotic prescribing patterns at the individual and event level.

Results: A total of 207 antibiotic events among 110 assisted-living residents were identified. The patterns of antibiotic use at the resident and treatment course levels are described in tables 1 and 2, respectively. On average, each resident was received 1.9 (range: 1 to 10) antibiotic treatment courses for an average of 24.8 (range: 1 to 237) total antibiotic days. The treatment duration of each treatment course averaged 14.5 days (range: 1 to 306). About 10 % of residents had 4 or more antibiotic events and days of therapy over 56 days. 43% of residents were prescribed an antibiotic without a clinical indication and 26% of the antibiotic events were not indicated. UTI was the most common indication for antibiotic treatment (31%) and ciprofloxacin was the most commonly prescribed antibiotic (22%).

Table 1. Characteristics of antibiotic use at individual level (per resident)

No. Event	N	%
1	66	60.0
2	22	20.0
3	10	9.1
4+	12	10.9
Days of Therapy		
≤7	32	29.1
8-14	41	37.3
15-28	12	10.9
29-56	13	11.8
>56	12	10.9
Days of Therapy (identified)		
≤7	53	48.2
8-14	29	26.4
15-28	8	7.3
29-56	10	9.1
>56	10	9.1
Indications (Ever had)		
Prophylaxis	4	3.6
UTI	39	35.5
RTI	12	10.9
SSTI	6	5.5
Dental	19	17.3
UTI Prophylaxis	2	1.8
Other	18	16.4
Unknown	47	42.7

Table 2. Characteristics of antibiotic events.

No. Abx per event	N	%
1	147	71.0
2	46	22.2
3+	14	6.8
Treatment duration per event		
≤7	83	40.1
8-14	98	47.3
15-28	10	4.8
>28	16	7.7
Indication ^a		
UTI	64	30.9
Not Indicated (Unknown)	54	26.1
Dental	24	11.6
Other	19	9.2
SSTI	19	9.2
RTI	16	7.7
Prophylaxis	9	4.4
UTI Prophylaxis	2	1.0
Antibiotics ^b		
1. Ciprofloxacin	45	21.7
2. Cephalexin	38	18.4
3. Amoxicillin	33	15.9

^a defined by using the indication of the antibiotics that is not "unknown" in the same antibiotic event

^b only includes events with the same antibiotic order throughout the entire event.