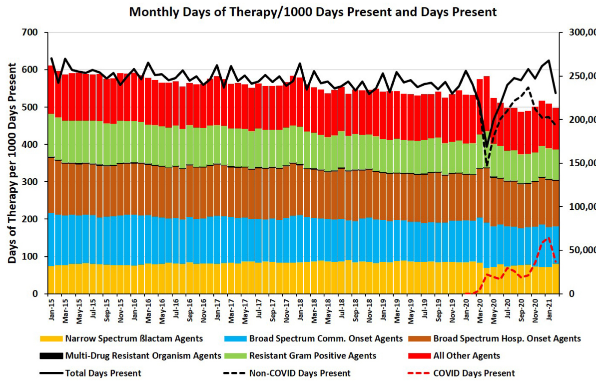

Trends in Yearly Antibiotic Use by CDC Drug Class, 2015 to 2020

Year	Narrow ßlactams	Broad GNR Community	Broad GNR Hospital	Anti-MDRO GNR	Anti-MRSA	All other	Total
	Days of Therapy/1000 Days Present						
2015	78	132	140	1.5	113	126	590
2016	80	124	138	1.1	106	120	571
2017	84	120	137	1.4	102	122	565
2018	86	115	131	1.4	95	122	550
2019	86	108	128	1.4	88	125	537
2020	77	109	125	1.2	83	124	519

Conclusion. Although rates of antibiotic use increased within the VA during the early phases of the COVID-19 pandemic, rates subsequently decreased to below previous baseline levels even as the proportion of COVID-19 DP spiked between 11/2020 and 02/2021. Although the degree to which the initial increase in antibiotic use is attributable to concerns of bacterial superinfection versus changes in case-mix (e.g., decreased elective admission) remains to be assessed, these data support the continued effectiveness of antimicrobial stewardship programs in the VA.

Disclosures. **Matthew B. Goetz, MD**, Nothing to disclose

171. A Multicenter Analysis of Inpatient Antibiotic Use During the 2015-2019 Influenza Season in the US: Untapped Opportunities for Antimicrobial Stewardship

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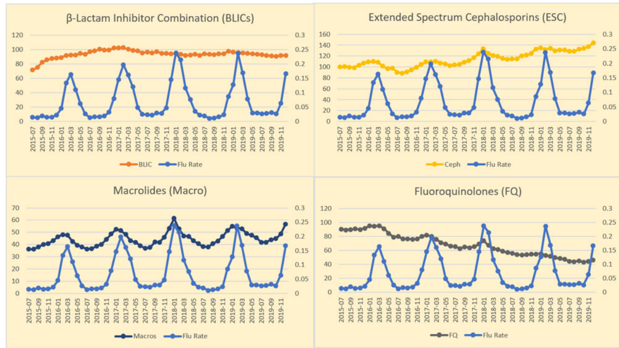
Session: P-09. Antimicrobial Stewardship: Trends in Antimicrobial Prescribing

Background. Inappropriate antibiotic (AB) use for viral respiratory illnesses remains widespread in the United States (US) with strong seasonal fluctuations. In contrast to outpatient AB use, the seasonality inpatient AB utilization (IAU) and its correlation with the influenza season are not well understood. We sought to describe trends, seasonality, and the association between IAU use and the 2015-2019 influenza seasons.

Methods. We used the *BD Insights Research Database* (Franklin Lakes, NJ USA) to identify IAU that were prescribed in patients >17 years old from up to 236 US acute care facilities from July 2015 to December 2019. We included the following AB categories: extended spectrum cephalosporins (ESCs), macrolides, β-lactam inhibitor combination (BLIC), fluoroquinolones, carbapenems, glycopeptides, lipopeptide, tetracyclines, and others. We defined IAU use as days of therapy (DOT) per 1000 patient days present. We used influenza laboratory data to identify facility-level positivity ratio per 100 tests. We used random effect models to estimate IAU: 1) trends overtime, 2) seasonality, and 3) association with influenza positivity rate.

Results. For IAU from 2015 to 2019, BLICs, ESCs, and glycopeptides were the most used [average 91, 107, and 96 DOT/1000 days presents, respectively]. Visually, we observed strong seasonality that matches the influenza season for macrolide, ESC, and quinolone use (See Figure). Unadjusted bivariate results showed ascending trends over time for BLICs [β= 3.8, p= .003], ESCs [β= 11.0, p= .005], and macrolides [β=1.5, p= .005]. Unadjusted bivariate results showed descending trends with quinolones [β= -10.9, p< .001] and others [β= -2.060, p< .001]. In the adjusted analysis, increased influenza positivity rate was associated with use of ESCs, glycopeptides, lipopeptides, macrolides, fluoroquinolone, and tetracyclines (see Table). No correlation was observed with BLICs, carbapenems, lipopeptides, and Others.

IAU (DOT/1000 days presents) and Flu Rate (% Positive) Trends Over Time



	BLICs	Carbs	ESC Class	Glycopeptides	Lipopeptides	Macrolides	Fluoroquinolones	Tetracyclines	Other
Flu + rate (%)	1.253 (.688)	-.108 (.841)	49.349 (.000)***	8.362 (.042)*	2.101 (.027)*	62.612 (.000)***	13.714 (.001)**	11.271 (.000)***	-1.611 (.314)
Reference region – New England									
Midwest	-14.115 (.022)*	.445 (.884)	14.107 (.134)	8.988 (.124)	.579 (.406)	11.800 (.022)*	11.078 (.092)+	-6.122 (.036)*	10.433 (.014)*
South	19.956 (.000)***	9.884 (.000)***	23.869 (.005)**	27.255 (.000)***	1.134 (.069)+	6.235 (.176)	33.532 (.000)***	-3.449 (.185)	7.674 (.043)*
West	7.278 (.326)	1.607 (.661)	16.612 (.143)	10.399 (.139)	-.310 (.713)	10.737 (.084)+	8.718 (.272)	-9.850 (.005)**	4.692 (.360)
Reference Bed Size <100 ref									
100-300	12.032 (.021)*	3.771 (.144)	20.592 (.010)*	6.932 (.162)	-.485 (.415)	11.507 (.009)**	6.839 (.221)	.810 (.743)	1.519 (.674)
>300	5.044 (.410)	4.936 (.053)+	25.078 (.007)**	12.303 (.034)*	.991 (.154)	16.745 (.001)**	20.660 (.002)**	.749 (.796)	5.657 (.179)
Urban	-2.024 (.687)	1.221 (.624)	-.871 (.910)	1.132 (.813)	2.306 (.000)***	4.326 (.306)	21.055 (.000)***	2.429 (.307)	1.174 (.736)
Teaching	-8.155 (.145)	1.750 (.522)	1.710 (.840)	4.867 (.353)	.461 (.459)	-3.728 (.421)	-12.906 (.029)*	3.077 (.239)	-.319 (.933)
Wald chi2	58.78***	54.44***	161.28***	44.66***	49.23***	680.41***	140.92***	100.05***	105.01***

Data in each cell is presented as the coefficient and p-value is in parentheses. + p<.10 *p<.05 **p<.01 ***p<.001

Conclusion. Our study shows that IAU is on the rise for the ESC and BLIC classes. ESC and macrolide use was strongly correlated with influenza season. Monitoring influenza signals may provide more insights that can inform the interpretation of IAU trends and be incorporated into antimicrobial stewardship programs.

Disclosures. **Amine Amiche, PhD**, **Sanofi** (Employee, Shareholder) **Heidi Kabler, MD**, **Sanofi Pasteur** (Employee) **Janet Weeks, PhD**, **Becton, Dickinson and Company** (Employee) **Kalvin Yu, MD, BD** (Employee) **Vikas Gupta, PharmD, BCPS, Becton, Dickinson and Company** (Employee, Shareholder)

172. Inpatient Antibiotic Prescribing Patterns Using the WHO Access Watch and Reserve (AWaRe) Classification in Okinawa, Japan: A Point Prevalence Survey

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Session: P-09. Antimicrobial Stewardship: Trends in Antimicrobial Prescribing

Background. Few studies have been done on inpatient antibiotic use in Japan and antibiotic stewardship programs with dedicated full-time equivalents are rare. We sought to better understand inpatient antibiotic use in Okinawa, Japan. We applied the World Health Organization (WHO) Access, Watch and Reserve (AWaRe) Classification to compare our findings to international literature. Access antibiotics are common front-line antibiotics, Watch antibiotics are high-priority antibiotics with toxicity or resistance concerns, and Reserve antibiotics are last-line treatments for multi-drug resistant infections.

Methods. A point prevalence study was conducted in five hospitals in Okinawa, Japan on Oct 1, 2020. Physicians conducted chart reviews of all patients receiving intravenous antibiotics. Type of antibiotic, reason for use, duration, and microbiologic data was collected. The primary aim was to evaluate the proportion of patients who received antibiotics on the assessment date; secondary aims were to categorize antibiotics according to indication, class and AWaRe classification. Descriptive statistics were used to derive the distribution of AWaRe Classifications and drug class.

Results. 1,728 unique patients were included and 504 (29%) received ≥1 antibiotic on the assessment date. A total of 559 antibiotics were used for 504 patients and 22.0% (n=123) were for prophylaxis. Of those receiving antibiotics for treatment (N=436), 385 (88.3%) patients had a documented infection source. The most common indications for antibiotic use were pneumonia (24.2% n=93), urinary tract infection (19.7% n=76), and intraabdominal (17.9% n=69). Overall, 43.1% (n=241) of the antibiotics were categorized Access and 54.4% (n=304) Watch [Figure 1]. Cephalosporins were the most common antibiotic class (56% n=313), followed by β-lactam inhibitors (18% n=106) and narrow penicillins (8.2% n=46) [Figure 2].

Conclusion. 29% of inpatients in these 5 Okinawan hospitals were prescribed an antibiotic on the survey date. A majority of antibiotics used fall under the WHO AWaRe Watch classification which are antibiotics that may be more likely to cause resistance. Understanding appropriateness of antibiotics used in this population could inform antibiotic stewardship strategies and reduce antibiotic resistance.

Figure 1. Antibiotic Distribution According to World Health Organization (WHO) Access, Watch and Reserve (AWaRe) Classification

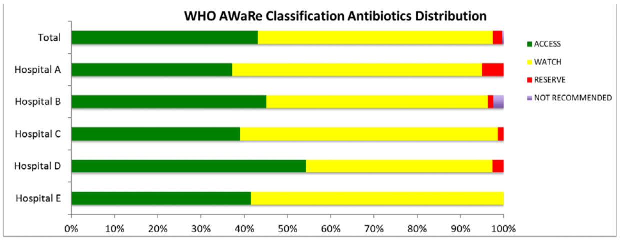
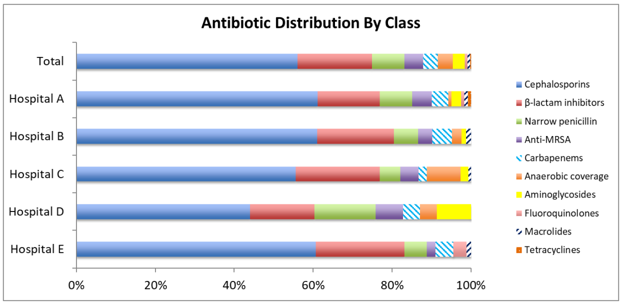


Figure 2. Antibiotic Distribution by Class in Okinawan Hospitals



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

173. Antimicrobial Stewardship Education Changes Prescribing Behavior and Reduces Treatment of Asymptomatic Bacteriuria

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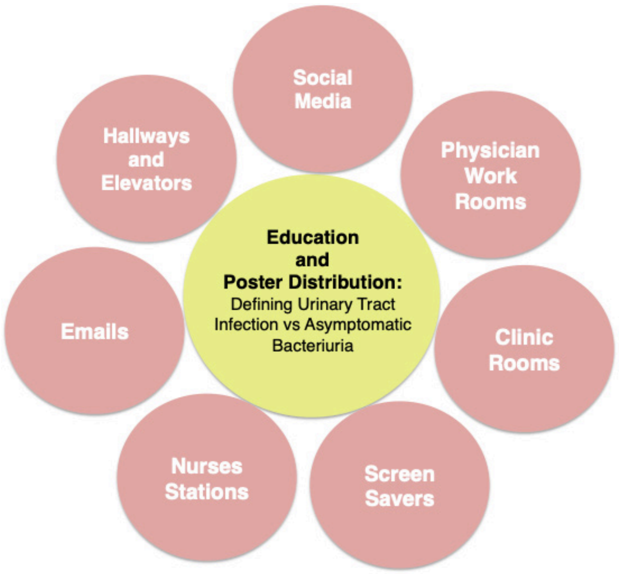
Session: P-09. Antimicrobial Stewardship: Trends in Antimicrobial Prescribing

Background. Treatment of asymptomatic bacteriuria (ASB) outside of pregnancy and urological procedures increases the risk of antibiotic resistance without improving outcomes. At Olive View-UCLA Medical Center (Sylmar, CA), the CDC U.S. Antibiotic Awareness Week (AAW) was utilized as a platform to promote antimicrobial stewardship (AS) for ASB. We evaluated the incidence of antibiotic treatment of ASB pre-AAW vs post-AAW, and the impact of AS education on future prescribing practices for ASB.

Methods. In this single-center retrospective observational study, AS education defining ASB vs urinary tract infection (UTI) was provided via visual aids distributed throughout the hospital during AAW from 11/18/2020 to 11/24/2020 (Figure 1). All positive urine cultures (Ucx) for adult inpatients were reviewed prior to AAW from 9/2020 to 11/2020 and after AAW from 12/2020 to 1/2021. Patients were excluded if they were unable to report UTI symptoms, pregnant, or undergoing urological procedure. The incidence of ASB treatment pre- and post-AAW was compared. A survey was sent to providers to compare the impact on antibiotic prescribing behavior for ASB pre- and post-AAW. Fisher's exact and Chi-squared tests were used for statistical analysis.

Figure 1. Antimicrobial Stewardship Education and Poster Distribution



Results. A total of 260 cases met study eligibility. In the pre-AAW group, 56 of 131 cases presented with ASB, of which 16 were treated with antibiotics (28.6%). In the post-AAW group, 55 of 129 cases presented with ASB, and 5 were treated with antibiotics (9.1%). Antibiotics were prescribed more often for patients with ASB in the pre-AAW group compared to those in the post-AAW group (p=0.014). Forty providers completed the survey, of which 97.5% had seen the visual aids, 70% had found the education "very" or "extremely" useful, and 43.6% reported they "always or sometimes" treated ASB pre-AAW vs 15% post-AAW (p< 0.01).

Conclusion. AS posters and education defining ASB significantly decreased the treatment of ASB. AAW education on ASB antimicrobial stewardship demonstrated a high value and shifted prescribing behavior to avoid antibiotic treatment of ASB. A similar approach to deliver provider education could serve as a valuable model to change provider AS practices for ASB.

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

174. Development of a Machine Learning Prediction Model to Select Empirical Antibiotics in Patients with Clinically Suspected Urinary Tract Infection using Urine Culture Data

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Session: P-09. Antimicrobial Stewardship: Trends in Antimicrobial Prescribing

Background. Increasing antimicrobial resistance and the emergence of superbugs are problems globally. Inappropriate empiric antibiotic use would be a reason to cause antibiotic resistance. However, it has been a challenge to prescribe empiric antibiotics as it is difficult to identify the causative organism beforehand. In this study, we aimed to develop a prediction model to estimate the risk of antibiotics resistance using urine culture tests.

Methods. The study population included adult patients who had at least one of the results from a urine culture test and antibiotic susceptibility tests (from ampicillin, ceftriaxone, ciprofloxacin, gentamicin, levofloxacin, nitrofurantoin, tetracycline, trimethoprim/sulfamethoxazole) on admission to Ajou University Medical Center. Outcomes were defined as a resistant or intermediate susceptibility. Candidate predictors were diagnosis, prescription, visit, laboratory, procedures of the study population. We split data to 75:25 for training and test. Lasso logistic regression (LLR), extreme gradient boosting machine (XGB), Random Forest (RF) were used as model algorithms. The models were evaluated by an area under the curve of receiver operator characteristics curve (AUROC), precision-recall curve (AUPRC), and its calibration. All codes are available in https://github.com/ABMI/AbxBetterChoice

Results. Total 33 covariates were selected for final prediction models. The RF showed the highest AUROC in the ceftriaxone and tetracycline models (0.823, 0.626, respectively). The XGB presented the highest AUROC for ciprofloxacin and nitrofurantoin (0.731, 0.706, respectively). The AUROC of RF and the XGB were the same in an ampicillin model (0.633). For gentamicin, levofloxacin, and trimethoprim/sulfamethoxazole, the AUROC of LLR was the highest (0.838, 0.831, 0.615, respectively). Among the models, the AUROC was the highest in the gentamicin model regardless of algorithms. All calibrations of the models were acceptable.

Table 1 Overall performance of antibiotics susceptibility test prediction model with three different machine-learning algorithms

	Antibiotics susceptibility tests							
	AMP	CRO	CIP	GEN	LVX	NIT	TET	TMP /SMX
Cases in test set (n)	3,613	782	4,162	782	507	1,479	5,054	3,604
Outcome (n, %)	2,474 (68.5)	135 (17.3)	2,077 (49.9)	135 (17.3)	274 (54.0)	366 (24.7)	1,358 (26.9)	1,504 (41.7)
Overall performance								
Lasso logistic regression								
AUROC	0.628	0.758	0.729	0.838	0.831	0.688	0.623	0.615
AUPRC	0.797	0.503	0.722	0.592	0.863	0.469	0.368	0.550
Calibration slope	1.000	0.842	0.988	1.062	1.326	0.966	0.987	0.998
Random forest								
AUROC	0.633	0.823	0.713	0.822	0.773	0.691	0.626	0.601
AUPRC	0.797	0.595	0.718	0.594	0.808	0.479	0.374	0.546
Calibration slope	1.070	1.030	1.190	1.050	1.100	1.030	1.050	1.030
Xgboost								
AUROC	0.633	0.806	0.731	0.803	0.780	0.706	0.625	0.612
AUPRC	0.793	0.539	0.730	0.553	0.817	0.484	0.379	0.556
Calibration slope	0.979	0.980	0.928	0.998	1.544	0.977	1.074	1.108

AMP: ampicillin, CRO: ceftriaxone, CIP: ciprofloxacin; GEN: gentamicin; LVX: levofloxacin; NIT: nitrofurantoin; TET: tetracycline; TMP/SMX: trimethoprim-sulfamethoxazole; AUROC: area under the receiver operating characteristics curve; AUPRC: area under the precision and recall curve; Xgboost: extreme gradient boosting machine

Conclusion. We developed prediction models with competing performances of discrimination and calibration. It would contribute to the proper selection of empiric antibiotics susceptible to those causative pathogens in hospitalized patients with a clinically suspected urinary tract infection.

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

175. Assessment of Institutional Uptake of Vancomycin AUC Monitoring One-Year Post Guideline Publication in Hospitals Across the United States

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