

health record (EHR) of patients discharged on oral antibiotics from the Medical Service at the William S Middleton VA Hospital for appropriateness of antibiotic choice and total duration of therapy. Depending on availability of team members, reviews occurred twice weekly and included patients discharged within the previous 4 days. If an antibiotic was felt to be inappropriate, the case was discussed with the prescribing service and/or pharmacist. Recommendations were documented in the form of a note placed in the EHR with an emphasis on education. These interventions were logged and information regarding prescribing team/provider, antibiotic, indication, and type of intervention was collected. Intervention types included (but were not limited to) antibiotic stop, change of antibiotic, dose, or duration, and laboratory recommendations.

**Results.** Stewardship rounds evaluated 463 patients discharged on oral antibiotics from the Medical Service over 177 hospital days. Forty-one interventions were logged in 38 (8.2%) patients, i.e., approximately 1 intervention for every 12 patients discharged on oral antibiotics. The most common intervention type was antibiotic stop (49%), followed by a change in duration (15%). Interventions occurred most commonly in patients treated for COPD (27%), UTI (22%), and pneumonia (15%). Azithromycin (27%), cefpodoxime (12%), and trimethoprim-sulfamethoxazole (12%) were the antibiotics most frequently intervened upon.

**Conclusion.** Assessing postdischarge antibiotic therapy with feedback to prescribers is an additional area where Stewardship programs can focus to better optimize usage of antimicrobials.

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### 238. Sharing Unit-Specific Stewardship Metrics With Front-line Providers to Improve Antibiotic Prescribing

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**Background.** Inpatient antibiotics are estimated 30–50% inappropriate and novel antimicrobial stewardship (AS) strategies to engage prescribers are needed. The objective of this study was to describe the implementation of a customized antibiotic use and outcome report with family medicine (FAM) providers and the impact on prescribing behaviors for routine infections in hospitalized adults.

**Methods.** Single-center quasiexperiment before and after AS/FAM collaborative intervention. January–March 2017 Standard of Care: routine audit and feedback. FAM leadership worked with AS pharmacists to design reporting process. January–March 2018 Monthly Interventions: reports of antimicrobial use, appropriateness, harms; positive-deviance cases highlighting successful stewardship; education and survey of rotating FAM providers; handheld prescribing tools/guidelines. Consecutive admissions to the adult FAM ward with respiratory, urinary, and skin infections were evaluated. Primary endpoint: duration of optimal prescribing. Each day of therapy (DOT) was classified as optimal, suboptimal, unnecessary, or inappropriate. Antimicrobials were stratified by spectrum and propensity to cause harm. Secondary endpoints: use of broad-spectrum agents, appropriate duration of therapy, and safety.

**Results.** Adults ( $n = 150$ , 76 pre, 74 post) were similar in age, comorbid conditions, and antimicrobial indications (Figure 1). Following intervention, unnecessary antimicrobial days decreased from 2 to 0 days ( $P < 0.001$ ) per patient, optimal therapy selection increased from 25% to 58% ( $P < 0.001$ ). Narrow-spectrum agents increased from 41% to 59% ( $P = 0.05$ ) while use of broader (52 vs. 48%) and extended spectrum agents (57 vs. 44%) were not significantly different in the cohort. Guideline concordant duration of therapy improved from 37% to 57% ( $P = 0.015$ ). Concurrent unit-wide DOTs of broad and extended agents decreased (Figure 2).

**Conclusion.** Reporting unit-specific antimicrobial use, harms and successes, without change in standard audit and feedback, improved antimicrobial prescribing and quality of care. These findings support the need to engage front-line providers like FAM in stewardship interventions and reporting.

Figure 1.

	Pre n=76	Post n=74	p-value
Age, years ±SD	60.9 ± 19.4	61.4 ± 18.7	0.937
Charlson score, median (IQR)	2 (1–4)	2 (1–4)	0.537
Unit census, median (IQR)	77.9 (72.1–85.5)	81.4 (77.7–90.7)	0.009
Length of stay, median (IQR)	2 (2–4)	3 (2–4)	0.142
Infection, n (%)			
• Urinary tract	31 (40.8)	22 (29.7)	0.157
• Skin/soft tissue	10 (13.2)	13 (17.6)	0.454
• COPD exacerbation	9 (11.8)	14 (18.9)	0.229
• Community-acquired pneumonia	29 (38.2)	28 (37.8)	0.968
• CURB-65, score (IQR)	2 (0–2.5)	2 (1–3)	0.437
Duration of therapy, days (IQR)	8 (6–10.75)	6 (5–8)	0.001
• Optimal	4.5 (1–7)	5 (4–7)	0.055
• Unnecessary	2 (0–6)	0 (0–1)	<0.001
• Inappropriate	0 (0–1)	0 (0–0)	0.341
Optimal empiric selection, n (%)	52 (68.4)	59 (79.7)	0.114
Optimal definitive selection, n (%)	19 (25)	43 (58.1)	<0.001
Guideline concordant duration, n (%)	28 (36.8)	42 (56.8)	0.015
• Prolonged	42 (55.3)	23 (31.1)	0.003
• Short	6 (7.9)	9 (12.2)	0.384
Severe adverse drug-event, n (%)	7 (9.2)	6 (8.1)	0.810
C. difficile, n (%)			
• Tested	6 (7.9)	4 (5.4)	0.746
• Positive	1 (1.3)	0 (0)	---
Clinical resolution at follow-up (when follow-up available), n (%)	49/61 (80.3)	51/55 (92.7)	0.053
30-day readmission, n (%)	18 (23.7)	13 (17.6)	0.355
• Infection related	8 (10.5)	4 (5.4)	0.248

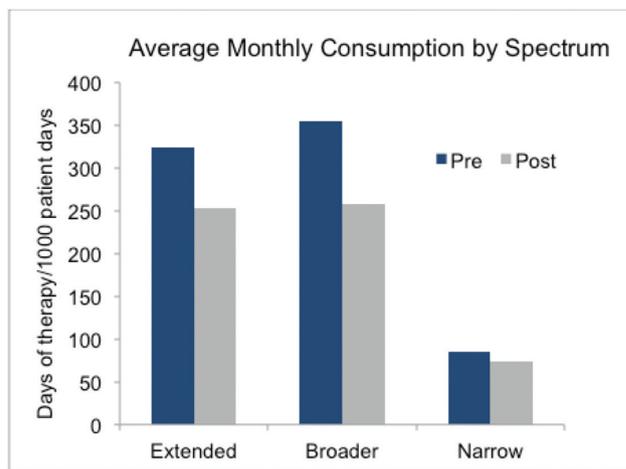


Figure 2: Monthly average of DOT/1000 patient days by spectrum of activity. Extended= carbapenems, antipseudomonal cephalosporins/penicillins, aminoglycosides, clindamycin, linezolid, vancomycin, daptomycin; broader= 2<sup>nd</sup>/3<sup>rd</sup> generation cephalosporins, ampicillin/amoxicillin + sulbactam/clavulanate, sulfonamides, macrolides; narrow= natural penicillins, aminopenicillins, nitrofurantoin, tetracyclines, 1<sup>st</sup> generation cephalosporins

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### 239. Implementation of a Vertical Antimicrobial Stewardship Intervention for Patients Colonized with *Clostridium difficile*

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**Background.** *Clostridium difficile* remains a pathogen of importance as global infections steadily rise. While traditionally thought of as a nosocomial infection, *C. difficile* prevalence is increasing in the community. This may be due partly to asymptomatic gastrointestinal colonization with *C. difficile*. Disruption of the gut microbiome in colonized patients (patients) through the use of antibiotics (ABX) and acid-suppressive therapy (AST) may lead to active colitis. In an effort to prevent progression to active disease, a novel vertical antimicrobial stewardship (AMS) intervention was initiated at our hospital on May 1, 2017. This study aims to describe our experience with this intervention.

**Methods.** This single-center, descriptive study evaluated the impact of a vertical AMS intervention for patients colonized with *C. difficile* as identified by surveillance nucleic acid amplification test (NAAT) upon hospital admission. Between May 1 and December 10, 2017, patients on five units [two hematology/oncology (HO), solid-organ transplant (SOT), intensive care unit (ICU), medicine ward (MED)] were screened, with surveillance results reported to the AMS team. Positive results prompted the AMS pharmacists to evaluate patients for potential ABX and AST de-escalation interventions (INTV) daily until discharge.

**Results.** Of the 37 patients who developed active colitis, ABX INTVs were made on 6 (16%) with 33% acceptance and AST INTVs were made on 10 (27%) with 50% acceptance.

Hospital Unit	Total Patients no.	Patients on		ABX INTV		Patients on AST INTV		Patients that Developed Active Colitis	
		ABX no. (%)	ABX INTV no. (%)	Accepted no. (%)	AST INTV no. (%)	Accepted no. (%)	Active Colitis no. (%)*		
SOT	50	36 (72)	4 (11)	3 (75)	35 (70)	8 (23)	6 (75)	6 (12)	
HO	106	86 (81)	15 (17)	9 (60)	84 (79)	23 (27)	16 (70)	18 (17)	
MED	48	27 (56)	7 (26)	5 (71)	29 (60)	8 (28)	7 (88)	6 (13)	
ICU	61	44 (72)	7 (16)	6 (86)	42 (69)	10 (24)	5 (50)	7 (11)	
ALL	265	193 (73)	33 (17)	23 (70)	190 (72)	49 (26)	34 (69)	37 (14)	

\*Active colitis: (NAAT+/Enzyme Immunoassay [EIA]+) or NAAT+/EIA- with symptoms.

**Conclusion.** The rate of progression from colonization to colitis was low in all patient populations studied, despite high rates of ABX and AST use. Further research into what causes progression from colonization to colitis is needed.

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**240. Estimated Clinical and Economic Impact Through Use of an Initial Specimen Diversion Device to Reduce Blood Culture Contamination: A Cost-benefit Analysis**

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**Background.** Blood culture contamination results in increased hospital costs and unnecessary patient-exposure to antimicrobials. We sought to evaluate the potential clinical and economic benefits of a novel blood culture diversion device when routinely utilized for blood culture collection in the emergency department (ED) of a quaternary care medical center.

**Methods.** A decision analysis model was created. Probabilistic costs were determined from published literature and direct observation of pharmacy/microbiology staff. The primary outcome was the expected per-patient cost savings (microbiology, pharmacy, and indirect hospital costs) after initial specimen diversion device (e.g., SteriPath) implementation in the ED using a hospital perspective. Indirect hospital costs included increased hospital length of stay, additional procedures, adverse drug reactions, and hospital-acquired infections. Models were created for hospitals that routinely or do not routinely use rapid diagnostic tests (RDT) on positive blood cultures.

**Results.** The routine implementation of an initial specimen diversion device for blood culture collection in the ED was cost-beneficial compared with conventional blood culture collection methods and was also associated with a reduction in antibiotic usage, adverse drug reactions and hospital-acquired infections. When implemented in a hospital utilizing RDT with a baseline contamination rate of 6%, initial specimen diversion device use was associated with a cost savings of \$272 (3%) per blood culture in terms of overall hospital costs and \$28 (5.4%) in direct-only costs. Main drivers of cost included the baseline rate of contamination in the ED and the duration of antibiotics given to patients with negative blood cultures.

**Conclusion.** Implementation of an initial specimen diversion device is estimated to be a cost-beneficial strategy to reduce the clinical and economic impact of blood culture contamination in terms of microbiology, pharmacy, and wider indirect hospital costs.

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**241. Reducing Fluoroquinolone Use Through Implementation of a Urinary Tract Infection (UTI) Treatment Pathway and Healthcare Provider Education: A Pre- and Postintervention Study**

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**Background.** Fluoroquinolones are associated with significant adverse effects, including tendinitis, *Clostridium difficile* infection, and central nervous system side effects, especially when used in older adults. Additionally, there is a trend of increasing resistance of *Escherichia coli* and other Gram-negative organisms to fluoroquinolones. The objective of this study was to decrease the inappropriate use of fluoroquinolones for treatment of urinary tract infections in patients either admitted to or seen in the outpatient setting of this institution through implementation of a UTI treatment pathway and targeted provider education.

**Methods.** A retrospective chart review was conducted. A query of the electronic medical record was used to identify patients with a diagnosis of UTI who were prescribed a fluoroquinolone. Data collected included baseline demographics, antibiotic allergies, culture data, days of therapy, and reported adverse events. A letter to healthcare providers focusing on fluoroquinolone avoidance in UTI treatment was distributed, and a new UTI treatment pathway was published in a newsletter sent to healthcare providers and posted throughout the institution. The primary endpoint of the study was the appropriateness of fluoroquinolone use for treatment of UTI before and after the intervention. Secondary endpoints included duration of therapy and percentage of patients prescribed a fluoroquinolone for UTI vs. other antibiotics.

**Results.** A total of 212 patient charts were reviewed, 159 patients in the preintervention group and 53 in the postintervention group. In the preintervention group, use was appropriate in 19% (30/159) of patients who received a fluoroquinolone vs. 47.2% (25/53) in the postintervention group ( $P < 0.001$ ). In the inpatient setting, appropriateness of use increased from 24.1% in the preintervention group to 57.1% in the postintervention group ( $P = 0.007$ ). In the outpatient setting, appropriateness of use increased from 16% to 40.6% ( $P = 0.005$ ).

**Conclusion.** Implementation of a clinical pathway, along with provider education, demonstrated a statistically significant reduction in the inappropriate use of fluoroquinolones for the treatment of UTI in both the inpatient and outpatient setting.

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**242. Evaluating the Effectiveness of Antimicrobial Restriction at an Academic Medical Center**

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**Background.** Antimicrobial Stewardship Programs (ASPs) promote the optimal use of antimicrobial agents with the goal of preserving the effectiveness of existing drugs. One core ASP strategy is formulary restriction and preauthorization (PA). We evaluated restricted antimicrobial use at an academic medical center in Virginia; our program has a comprehensive restriction program that applies to adults only.

**Methods.** Data from August 2012 to June 2017 were evaluated at the hospital unit level by month in days of therapy (DOT) per 1,000 patient-days. Ordinary least squares regression was used to compare the time trend of restricted use with that of nonrestricted agents within the same unit.

**Results.** Across the study period significant decreases in restricted antibiotic use were detected for medical and pediatric units with no significant increases in use. However, significant increases were identified for surgical units.

**Table 1:** Results of Time Trend Analysis by Unit for Restricted Drugs.

Type	Unit	Restricted	
		Time Trend	P
Medical	Oncology	0.64	0.0924
	Acute Care Medicine	0.39	0.4058
	Cardiac ICU	-0.37	0.1057
	Medical ICU	-2.06	0.0002
	Bone Marrow Transplant	0.52	0.5002
	Digestive Health	-0.14	0.3004
	Progressive Care	-0.93	0.0002
Pediatric	General Pediatrics	-0.36	0.1363
	Neonatal ICU	-0.29	0.0007
	Pediatric ICU	-0.12	0.7849
	Progressive Care	-0.29	0.0993
Surgical	Acute Care Surgery	-0.30	0.1574
	Burn ICU	0.84	0.0021
	Cardiac Surgery ICU	-0.50	0.2766
	Surgical Trauma ICU	-0.52	0.1019

**Table 2:** Significant Increases/ Decreases in Restricted Antimicrobials by Unit Type

Unit Type	Restricted	
	Increase	Decrease
Medical	0/7 (0%)	2/7 (29%)
Pediatric	0/4 (0%)	1/4 (25%)
Surgical	1/4 (25%)	0/4 (0%)

**Conclusion.** These data suggest that the PA strategy for medical wards was effective across the time period whereas the PA strategy for surgical wards was sub-optimal. However, it is unclear why pediatric wards (that were not subject to PA activities) also saw reductions in use; more research into this is needed. These data will help us to refine our PA strategy by targeting use on surgical wards. We believe that this type of analysis may be useful for other ASPs utilizing the PA strategy.

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**243. Prioritization of Antibiotic Administration for STAT Orders in the Septic Patient: A Retrospective Analysis**

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**Background.** Appropriate antibiotic (AB) therapy is crucial in sepsis and septic shock. Two central factors govern patient survival: adequate empiric coverage and rapid initiation of therapy. The administration of broad-spectrum antibiotics in sepsis and septic shock play an important role diminishing patient morbidity and mortality.<sup>1</sup> The sequence of antibiotic administration has been suggested to affect patient outcomes.<sup>2</sup>

**Methods.** This is a retrospective study to assess the impact of a pictogram (Figure 1) in the emergency department medication rooms on nurses' antibiotic administration order in the septic patient. The study population included patients prescribed at least two concomitant AB between January 2017 and January 2018. Each patient's AB regimen, indication and administration sequence were reviewed using a standardized form. Sequence of administration was deemed appropriate if the sequence followed the pictogram: broad to narrower spectrum AB, and was deemed