

initial antibiotic administered. Antibiotics were discontinued early in 29/82 (35.4%) of patients. Thirty-one patients (33.7%) were discharged to a skilled nursing facility.

**Conclusion.** These results indicate that the majority of patients aged 65 and older who presented to the emergency department with altered mental status and no other UTI symptoms such as dysuria, urinary frequency, or urgency were treated with antibiotics. When antibiotics are initiated the majority of providers are adhering to organizational guidelines for antibiotic selection and duration. The results will be shared with Emergency Department and Internal Medicine leadership to foster practice change.

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#### 1112. Improving Urine Culturing Practices in a Neurocritical Care Unit through a Multidisciplinary Algorithm-Based Approach

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**Session:** 136. Antibiotic Stewardship: Urine Cultures

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**Background.** Asymptomatic bacteriuria is common in hospitalized patients with urinary catheters. Inappropriate urine culturing as part of reflexive response to fever contributes to unnecessary and excessive antibiotic use, selection for resistant organisms, increased risk for *Clostridium difficile* infections, and false elevation in catheter-associated urinary tract infection (CAUTI) rates. This project aimed to implement an evidence-based urine culture algorithm in a 33-bed neurocritical care unit, a unit with a historically elevated CAUTI rate due to a high prevalence of noninfectious fever.

**Methods.** A multidisciplinary quality improvement project was initiated in August 2018 by the Infection Prevention, Quality and Safety, Neurocritical Care, Trauma, and Neurosurgery teams of an urban academic health center. The group implemented a urine culture algorithm that was adapted from the Infectious Diseases Society of America (IDSA) guidelines that clearly highlighted appropriate indications for sending urine cultures. The team agreed to utilize a urinalysis with reflex to culture as the preferred method to evaluate for CAUTI. The algorithm was implemented in September 2018. Outcomes were compared for pre-implementation (March-August 2018) and post-implementation (September 2018-February 2019).

**Results.** The NHSN CAUTI rate decreased from 4.52/1,000 Foley days to 1.27/1,000 Foley days (P-value 0.037) as a result of the intervention. The number of urine cultures ordered decreased by 82% after implementation. No cases of bacteremia or mortality secondary to a urinary source were identified during the project. Total days of antibiotic therapy for the unit was similar between the pre- and post-implementation time periods (P = 0.631).

**Conclusion.** Implementation of a urine culture algorithm in a neurocritical care unit resulted in reduced CAUTI rate with less financial and operational waste in unnecessary orders and treatment, without resulting in adverse events to patients as a result of missed diagnosis.

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#### 1113. Outpatient Antimicrobial Stewardship: Targets for Urinary Tract Infections

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**Session:** 136. Antibiotic Stewardship: Urine Cultures

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**Background.** Urinary tract infections (UTIs) remain one of the most commonly diagnosed infectious diseases in the United States in both the inpatient and outpatient settings, accounting for 10.5 million outpatient visits in 2007. Of these visits, 5.4 million were seen in primary care offices. Outpatient antimicrobial stewardship programs are emerging and a focused approach to UTIs is needed to help guide new programs.

**Methods.** Data were collected by retrospective chart review of outpatient males at the VA Western New York Healthcare System using encounters from January 2005 to March 2018. Appropriate treatment was defined as antimicrobial prescribing in the setting of at least 2 signs/symptoms of UTI. Categorical data were analyzed using the chi-square test and continuous data using the Student t-test. Factors that differed significantly (P < 0.05) between the comparator groups were built into a multivariate logistic regression model to determine factors associated with inappropriate prescribing, which were presented as an Odds Ratio (OR) and 95% Confidence Interval (CI).

**Results.** A total of 607 outpatients met criteria for inclusion, of which 40% were treated inappropriately. Of the 60% treated appropriately (therapy was indicated and empiric drug choice was correct), 95% of patients received a correct dose and 57% received an appropriate duration. Several risk factors were identified for inappropriate prescribing. Female patients were more likely to be treated inappropriately, OR 4.7 (95% CI, 2.4-9.1). Patients with a higher Charlson Comorbidity Index of 5-10 were 2.9 times more likely to be treated inappropriately (95% CI, 1.8-5.0). Those patients who received a urine culture or imaging were more likely to be treated appropriately: OR 0.6 (95% CI, 0.4-0.9) and 0.5 (95% CI, 0.3-0.7), respectively.

**Conclusion.** Outpatient antibiotic prescribing for UTIs is suboptimal. Outpatient stewardship programs may wish to educate providers on symptoms of UTI. Interestingly, those with signs and symptoms consistent with UTI were more likely to have a urine culture and/or imaging completed suggesting that providers were aware of a true diagnosis of a UTI. Stewardship programs should pay special attention to patients with numerous comorbidities as they are often inappropriately treated.

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#### 1114. Oral $\beta$ -lactams for the Treatment of *Escherichia coli* Bacteremia Secondary to Complicated Urinary Tract Infections Including Pyelonephritis

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**Session:** 136. Antibiotic Stewardship: Urine Cultures

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**Background.** Complicated urinary tract infections (cUTI) including pyelonephritis may result in bacteremia, increasing the rate of morbidity and mortality. The Infectious Diseases Society of America recommends a fluoroquinolone as empiric therapy or trimethoprim/sulfamethoxazole as definitive therapy for acute pyelonephritis (AP). Oral  $\beta$ -lactams (BL) are considered sub-optimal based on historical efficacy data with aminopenicillins and variable bioavailability. Increasing resistance and toxicity with preferred agents, justifies further evaluation of oral BL for *E. coli* bacteremia secondary to urinary source.

**Methods.** This was a single-center, retrospective cohort study of patients with *E. coli* bacteremia secondary to AP or cUTI who received oral step-down therapy with a BL or non-BL. The primary outcome was the rate of clinical success defined by microbiological cure, clinical cure, and infection-related readmission. Secondary outcomes were time to oral step-down, total days of therapy, length of hospital stay, incidence of therapy escalation, 30-day readmissions, and antibiotic-associated adverse events.

**Results.** A total of 46 patients were included, with 23 patients in each group. The difference in clinical success between the BL and non-BL groups was not statistically significant (91.3% vs. 100%, P = 0.489). The most frequent oral step-down agents prescribed were cephalexin and ciprofloxacin. The median time to oral step-down was significantly lower in the non-BL group (4.39 vs. 3.41 days, P = 0.038), and the median duration of therapy in each group was 15 days. No patients required therapy escalation after oral step-down or had infection-related readmission within 30 days of discharge.

**Conclusion.** The observed clinical success rate of 91.3% remains consistent with previous studies evaluating oral BL as step-down therapy for Enterobacteriaceae bloodstream infections. The results of this study support the safety and efficacy of oral BL as step-down therapy for *E. coli* bacteremia due to cUTI, although larger studies may be beneficial.

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#### 1115. Reducing Broad-Spectrum Antibiotics for Uncomplicated Urinary Tract Infections: A Multimodal Stewardship Intervention

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**Background.** Urinary tract infections (UTIs) are the second most common reason for antibiotics in hospitalized patients, with most receiving broad-spectrum antibiotics (BSA) regardless of infection severity. The antimicrobial stewardship program (ASP) conducted a multimodal stewardship intervention targeting reduction in one BSA, ceftriaxone, and promoted narrow-spectrum antibiotics (NSA) such as cefazolin and cephalexin for uncomplicated UTIs.

**Methods.** Phase 1: In February 2018, the ASP created a pocket card (Figure 1) containing (1) a urinary antibiogram outlining the most common urine pathogens and their local susceptibility to NSA and (2) NSA guidelines for UTIs with 0-1 systemic inflammatory response syndrome (SIRS) criteria. ASP performed a daily prospective audit with feedback on all new orders of ceftriaxone and promoted prescription of NSA. Phase 2: In August 2018, a Best Practice Alert (BPA) in the electronic medical record (EMR) was designed to interrupt providers ordering ceftriaxone with the indication of a UTI, and prompted NSA prescription instead. Quarterly didactic sessions on UTI antibiotic use and BPA functionality were done. We compared antibiotics usage rates across the 3 study phases (pre-intervention, phase I and phase II) by computing rate ratios (RRs) using Poisson regression.

**Results.** Compared with pre-intervention, phase 1 resulted in a significant decrease in ceftriaxone DOT (RR: 1.06, CI: 1.03-1.09, P < 0.001) and ceftriaxone orders for UTI (RR: 1.14, P < 0.001) and an increase in cefazolin DOT (RR: 0.89, P = 0.029) and orders for UTI (RR: 0.12, P < 0.001). It also resulted in a significant increase in cephalexin DOT (RR: 0.92, P = 0.002) and orders for UTI (RR: 0.58, P < 0.001). In phase 2, an additional significant reduction in ceftriaxone DOT (RR: 1.04, CI: 1.01-1.08, P = 0.018) and orders for UTI (RR: 1.62, P < 0.001) and an increase in cefazolin

DOT (RR: 0.96,  $P < 0.001$ ) and orders for UTI (RR: 0.56,  $P < 0.001$ ) occurred, when comparing phase 1 to phase 2. It also resulted in a decrease in cephalixin DOT (RR: 0.83,  $P < 0.001$ ) and orders for UTI (RR: 0.70,  $P < 0.001$ ).

**Conclusion.** A multimodal stewardship intervention using a pocket card with guidelines and urine antibiogram, and an EMR BPA successfully reduced BSA and increased NSA for treatment of uncomplicated UTIs.

Figure 1: Stewardship pocket card with urinary antibiogram (top) and narrow-spectrum antibiotic recommendations (bottom).

RGH Urinary Pathogen Antibiogram					
ROCHESTER REGIONAL HEALTH	# of URINE isolates	Nitro-furantoin <sup>a</sup>	Trim-Sulfa	Cefazolin OR Cephalixin	Amoxicillin-Clavulanate
E coli <sup>b</sup>	1081	95	80	95	79
Kleb pneumo	320	47	93	92	96
Proteus mirabilis <sup>b</sup>	144	0	86	94	98
All Enterococcal <sup>b</sup> sp.	275	82	0	0	78
Enterococcus faecalis <sup>b</sup> and spp only	216	97	0	0	98

Any empiric agent should be considered in the context of the patient's historical microbiologic data.

a = use contraindicated in those with CrCl < 30 ml/min

b = if cultures finalize with ampicillin-sensitive bacteria, amoxicillin alone (dosed 500 mg po BID) can be used

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RGH Antibiotic Stewardship Program pager 0065

Empiric antibiotics for Uncomplicated Urinary Tract Infections*	
Clinical scenario	Empiric antibiotic if felt clinically indicated <sup>^</sup>
Asymptomatic *a positive UA with no urinary symptoms does not require treatment	No antibiotics
<ul style="list-style-type: none"> <li>SIRS 0-1 with urinary symptoms</li> <li>SIRS 0-1 without a source (and urinary source is suspected)</li> </ul>	Nitrofurantoin <sup>^</sup> 100 mg po BID x 5 days Trim-Sulfa 1 DS tablet po BID x 3 days Cephalixin 250 mg po BID x 5 days Amox-Clav 500 mg po BID x 5 days  Cefazolin 1g IV q12h
<ul style="list-style-type: none"> <li>SIRS ≥2 with urinary symptoms</li> <li>Complicated UTI</li> </ul>	Ceftriaxone 1g IV once daily

\* Any empiric agent should be considered in the context of the patient's historical microbiologic data

<sup>^</sup> Doses based on normal renal function

a = use contraindicated in those with CrCl < 30 ml/min

February 2018

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#### 1116. Impact of Antimicrobial Stewardship Incentive Goals for Pharmacists on Overall Antibiotic Use and Appropriate Duration of Therapy in Urinary Tract Infections

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**Session:** 136. Antibiotic Stewardship: Urine Cultures

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**Background.** Urinary tract (UTI), skin and soft tissue, and respiratory infections are among the most frequently reported indications for antibiotics, such that focusing stewardship efforts here would expectedly have dramatic effects. Antimicrobial stewardship (AMS) programs vary in structure and available resources. At the University of Colorado Hospital, a 740-bed academic medical center, dedicated resources for AMS are limited to a pharmacist, pharmacy resident, and physician; however, there is a large clinical pharmacist group. For the past 2 years, pharmacy management incorporated AMS targets as group goals tied to performance bonuses.

**Methods.** This is a descriptive report utilizing incentives to achieve AMS goals. The first goal (July 1, 2016 to June 30, 2017) set out to reduce inpatient antibiotic use by 10%. The second goal (July 1, 2018 to June 30, 2018) was a 10% reduction in median antibiotic duration for UTIs. The AMS team provided guidelines, education, and oversight throughout target periods. Antibiotic use was calculated as days of therapy (DOT) per 1000 patient-days. Data related to UTI treatment was collected retrospectively on a quarterly basis. This was compared with baseline data previously collected during a statewide hospital stewardship collaborative project.

**Results.** During the first period, overall antibiotic use declined from 497 to 403 DOT per 1000 patient-days (18.9%), and broad-spectrum antibiotic use declined 22%. During the second period, 30 patient charts were reviewed quarterly, and the median UTI duration declined from 10 to 7 days ( $P = 0.002$ ). The most common UTI diagnoses were similar between periods with complicated cystitis and pyelonephritis comprising 60–70% of cases. The 30-day readmission rate was not different between the baseline and goal period, 11% vs. 6% respectively ( $P = 0.18$ ).

**Conclusion.** The use of group pharmacist goals tied to annual performance bonuses was effective in achieving AMS goals at our institution. In larger facilities with fewer dedicated AMS personnel, clinical pharmacists covering ward and intensive care units are an essential resource to achieving AMS goals. Group performance incentives may be a feasible strategy to generate interest and motivation to achieve AMS program goals.

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#### 1117. A Retrospective Analysis of Paediatric Prescribing in British Columbia from 2013 to 2016

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**Session:** 137. Antibiotic Stewardship (Pediatric): Ambulatory Settings

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**Background.** Antibiotic prescribing in pediatric care is highly prevalent. Often children are prescribed antibiotics for conditions that are commonly self-limiting and viral in etiology such as upper respiratory tract infections. The purpose of this study was to examine the scope of pediatric antibiotic prescribing in British Columbia from 2013 to 2016 and identify potential new provincial antimicrobial stewardship targets.

**Methods.** Antibiotic prescription data for children were extracted from a provincial prescription database, and linked to demographic files in order to obtain patient age, sex and geographic location. Prescription rates were then calculated, and trends were examined by major anatomical therapeutic chemical (ATC) classification.

**Results.** Our cohort included an average of 271,134 children per year and 1,767,652 antibiotic prescriptions. Over the 4 years, rates of antibiotic prescribing increased 4.5% (from 453 to 474 prescriptions per 1,000 population per year). The greatest increase, across all classes of antibiotics, was seen in children aged 0–2 years of age. By 2016, the greatest increase in prescribing, by class, was observed in J01X (e.g., nitrofurantoin, fosfomicin) with a 1360% increase for children aged 3–9. Across all ages, quinolones (J01M) increased 98%. Remaining classes, including  $\beta$  lactams (J01C), and macrolides (J01F), experienced modest reductions in the older age groups.

**Conclusion.** Past studies have illustrated decreasing or static rates of antibiotic prescribing in British Columbia. However, we have identified a paradoxical (4.5%) increase in pediatric antibiotic prescribing since 2013. Although it appears that provincial efforts have been successful in reducing the use of broad-spectrum penicillins (J01C), marked surges in the use of classes like tetracyclines (J01A), quinolones (J01M), and other antibacterials (J01X) identify a new potential target for provincial stewardship.

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#### 1118. Trends of Paediatric Prescribing for Common Infections in British Columbia

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**Session:** 137. Antibiotic Stewardship (Pediatric): Ambulatory Settings

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**Background.** Antibiotic prescribing in pediatric care is highly prevalent, and quite often children are prescribed for conditions which are commonly self-limiting and viral in etiology. The purpose of this study was to examine the scope of pediatric antibiotic prescribing by indication, from 2013 to 2016, and identify potential new targets for provincial antimicrobial stewardship efforts.

**Methods.** Antibiotic prescription data for children were extracted from a provincial prescription database, and linked to physician billing data in order to obtain diagnostic information. Prescription rates were then calculated, and trends were examined by indication. Major categories included: upper respiratory tract infection, acute otitis media, lower respiratory tract, skin and soft tissue, and urinary tract infections.

**Results.** Our database included an average of 244,763 children per year, and 5,896,173 total antibiotic prescriptions. Increased indication-specific rates of prescribing were observed in children aged 0–2 years, for every category. Children aged 3–18 years experienced decreased prescribing across all indications, with the exception of urinary tract infections for those aged between 10–18 years. Urinary tract infections increased by 134% for children aged 0–2 years, and 75% for those aged 10–18 years, from 2013 to 2016. Although antibiotic use for upper respiratory tract infections decreased by 11% for all ages, these diagnoses continue to be prescribed for at rates 2–5 times higher than other conditions.

**Conclusion.** Although this study found a decrease in prescribing over time across all indications, antibiotic use continues to be a concern for upper respiratory tract infections in pediatric care. These diagnoses generally do not require antibiotics, and inappropriate prescribing is a major factor in antimicrobial resistance. The increased prescribing rates in the youngest age group (0–2 years) offers a new target for provincial stewardship efforts.

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#### 1119. Implementation of Pediatric Antimicrobial Stewardship Rounds in a Children's Hospital

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