

Table 3. Prospective Intervention Data

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Total patients	13	
Indications		
Bacteremia	1	
Cellulitis	2	
Empiric/Sepsis	1	
Pneumonia	6	
Urinary tract infection	3	
Route of administration		
Intravenous (IV)	20	
Oral (PO)	0	
Specific antimicrobials		
Azithromycin	2	
Cefepime	2	
Ceftriaxone	5	
Clindamycin	1	
Daptomycin	1	
Meropenem	1	
Metronidazole	1	
Piperacillin-tazobactam	4	
Vancomycin	3	
Total interventions	16	
	Accepted	Not accepted
De-escalation	1	1
Discontinuation	3	1
Dose adjustment	2	0
Duration of therapy	5	0
Regimen optimization	2	1
Total	13 (81.3%)	3 (18.8%)

Conclusion: Close to half of patients receiving antimicrobials at the end of life are eligible for interventions to improve antibiotic regimens. These patients are often overlooked in antimicrobial stewardship, and, despite small sample size, our study shows the benefit of targeted stewardship in palliative care populations with an intervention acceptance rate of over 80%.

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161. Assessing Antimicrobial Stewardship Engagement among Frontline Oncology Nurses and Chartering a Path Forward

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Session: P-6. Antimicrobial Stewardship: Program Development and Implementation

Background: Developing robust, multidisciplinary antimicrobial stewardship programs to combat drug resistance is a priority of healthcare institutions, in accordance with Joint Commission standards and national legislature. However, the involvement of nurses in stewardship programs has trailed behind that of physicians and pharmacists, despite their unique position as frontline providers. In particular, oncology nursing staff can play a key role in extending stewardship to their high acuity patients, who frequently require antimicrobials. We sought to conduct a survey study of oncology nursing providers on their understanding, perceptions, and attitudes about antimicrobial stewardship.

Methods: A voluntary and anonymous survey was emailed to oncology nursing staff on adult and pediatric oncology wards and clinics throughout our hospital system. We used an adapted 28-item Likert scale-based survey to assess understanding of antimicrobial stewardship attitudes and perceived barriers to greater involvement in stewardship programs. A survey reminder was emailed weekly for 8 weeks and completion was encouraged by nursing leadership in unit staff meetings.

Results: The survey was emailed to 281 nurses, of whom 39% (n=109) responded. 54.1% of nurses believed that an antibiotic stewardship program was very important in their healthcare setting. However, 56% of respondents were unfamiliar with the meaning of antibiotic stewardship, and 83.5% were not aware of how to contact the antimicrobial stewardship team with questions. More than 75% felt that nurses could help with antibiotic use, though 76% indicated wanting to know more about which antibiotics treat different infections and 74% wanted to know more about appropriate durations of antibiotics.

Conclusion: Oncology nurses have the potential to play a valuable role in antimicrobial stewardship. Barriers to nursing involvement include knowledge gaps on antibiotics and unfamiliarity with existing stewardship programs and their functions within hospital systems. Nursing education and orientation to available resources are key steps to involving nursing staff in antimicrobial stewardship programs, maximizing benefits for both patients and hospitals.

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162. Assessment of Beta-lactam Allergies as Rationale for Receipt of Vancomycin for Surgical Prophylaxis

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Session: P-6. Antimicrobial Stewardship: Program Development and Implementation

Background: Beta-lactam (BL) antibiotics are first-line agents for most patients receiving antimicrobial prophylaxis in surgical procedures. Despite evidence showing low cross-reactivity between classes of BLs, patients with allergies commonly receive vancomycin as an alternative to avoid allergic reaction. The objective of this study was to identify potentially inappropriate use of vancomycin surgical prophylaxis among patients with reported BL allergies.

Methods: Adult patients (≥18 years) receiving vancomycin for surgical prophylaxis with a reported penicillin and/or cephalosporin allergy at our institution between August 2017 to July 2018 were retrospectively evaluated for potential eligibility for penicillin allergy testing and/or receipt of standard prophylaxis. Surgery type and allergy history were extracted from the electronic medical record. Per our institution's penicillin-testing protocol, patients with IgE-mediated reactions < 10 years ago were eligible for penicillin skin testing (PST), mild reactions or IgE-mediated reaction > 10 years ago were eligible for direct oral amoxicillin challenge, and severe non-IgE mediated allergies were ineligible for penicillin allergy evaluation or BL prophylaxis.

Results: Among 830 patients who received vancomycin for surgical prophylaxis, 196 reported BL allergy and were included in the analysis (155 with penicillin allergy alone; 21 with cephalosporin allergy; 20 with both cephalosporin and penicillin allergy). Approximately 40% of surgeries were orthopedic. Six patients were ineligible for BL prophylaxis. Per institutional protocol, 73 of 155 patients (48%) may have qualified for PST; 81 of 155 (52%) patients may have received a direct oral amoxicillin challenge. Only 3 of 22 patients with history of methicillin-resistant *Staphylococcus aureus* appropriately received additional prophylaxis with vancomycin and a BL.

Conclusion: Patients with BL allergies often qualify for receipt of a first-line BL antibiotic. An opportunity exists for improved BL allergy assessment as an antimicrobial stewardship intervention. Future studies should evaluate outcomes associated with BL allergy evaluation and delabeling in patients receiving surgical prophylaxis.

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163. Automation of an Inpatient Provider Specific Antimicrobial Use Report

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Session: P-6. Antimicrobial Stewardship: Program Development and Implementation

Background: The use of individual prescriber report cards has shown to be an effective strategy in optimizing antimicrobial use in the pediatric outpatient setting. This is more difficult in an inpatient setting with prescribing often being done by a resident, but the decisions regarding antimicrobials are often made by the attending physician. This concept was tackled at a tertiary children's hospital but was a manual and time-consuming process. The purpose of this review is to compare provider specific antimicrobial use between a manual chart review and an automated report.

Methods: An automatic report was developed that calculates antimicrobial days of therapy per 1000 patient days for each Pediatric Intensive Care Unit (PICU) attending provider. The software used was Business Objects that interfaces with the Electronic Medical Record. The provider is attached to daily antimicrobial use based on the attending to write a note that day. The provider was attached to patient days based on the number of days per patient they wrote notes.

Results: One week including 96 patients was chart reviewed and compared to the automated report prospectively. The automatic report days of therapy and patient days per PICU provider were within 10% of the chart review. Two months of the previous manual chart review was compared to the same two months with the automated report, which was also within 10%. Average quarterly hospital PICU antimicrobial days of therapy per 1000 patient days during the calendar year of 2019 in the Pediatric Health Information System (PHIS) were compared quarterly to the automated report, which was also within 10%.

Conclusion: An automated report that connects the attending to antimicrobial orders by attaching it to the note writer was found to be comparable to manual chart review as well as an average of use for the PICU compared to the national database PHIS. This automation can help decrease workload and optimize efforts for specific interventions and education that can be distributed with the PICU attending antimicrobial use report.

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164. Avoiding Complacency: Assessing the Perceived Impact and Value of Antimicrobial Stewardship at a Academic Medical Center

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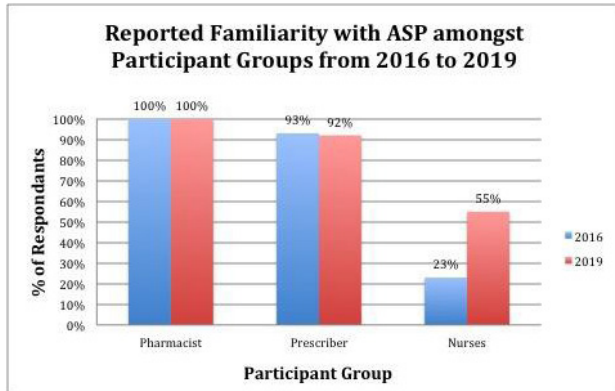
Session: P-6. Antimicrobial Stewardship: Program Development and Implementation

Background: Multi-disciplinary engagement and education remain key measures for Antimicrobial Stewardship Programs (ASPs). Over 3 years, our ASP has undergone key changes to pre-authorization review, post-prescriptive activities, and core team members, coinciding with a 30% increase in stewardship interventions.

The objectives of this study were to evaluate the familiarity of Nursing, Pharmacy and Prescribers at our academic medical center regarding ASP activities and services, as well as perceived impact on patient care and value. Secondary objectives were to determine what resources are currently utilized and areas for improvement.

Methods: Distinct surveys were distributed to three participant groups: Nurses, Pharmacists, and Prescribers (Housestaff, Advanced Practice Providers, and staff physicians). Questions were developed to assess familiarity, perceived value, and overall satisfaction with the ASP. Additional items included questions on the current use of ASP resources and educational engagement. Survey results were compared to a similar survey conducted 3 years amongst the same participant groups.

Results: The survey was delivered electronically to 3367 Prescribers, Nurses and Pharmacists. 403 responders completed the survey (208 Nurses, 181 Prescribers, and 18 Pharmacists). Familiarity was lowest amongst Nurses, but almost doubled compared to 2016 (Figure). Prescribers cited “restricted antibiotic approval”, “de-escalation”, and “alternative therapies relative to allergies” as the three most common interaction types, similar to 2016. ASP interactions continued to be rated “moderate” or “high” value (88.4% vs 89.15% in 2016), however, face-to-face interactions were preferred by only 4% of responders (unchanged compared to 2016). Prescribers also responded uncommon use of ASP online resources (20%) and clinical decision support tools (34%). 78% of responders expressed desire for increased ASP-related education.



Conclusion: As ASPs evolve, it is important to constantly evaluate impact and value, and identify areas for growth. Despite ASP familiarity being high and interactions valued, we need to further optimize ASP provided resources, clinical support tools, and educational offerings.

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166. Barriers to implementing antimicrobial stewardship programs in low- or middle-income country settings: findings from a multi-site qualitative study

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Session: P-6. Antimicrobial Stewardship: Program Development and Implementation

Background: Antimicrobial resistance has been named as one of the top ten threats to health in the world. The World Health Organization has endorsed the implementation of hospital-based antimicrobial stewardship programs (ASPs) to reduce antimicrobial resistance. We conducted a qualitative study to determine perceived barriers to the development and implementation of ASPs in low- and middle-income countries (LMICs).

Methods: We conducted 46 interviews with medical doctors at tertiary care hospitals in Sri Lanka (22 doctors), Kenya (12), and Tanzania (12). Interviews assessed knowledge and receptiveness to ASPs and barriers to implementing ASP protocols. Interviews were conducted in English, audio recorded, and transcribed. The interviews discussed knowledge of antimicrobial resistance and ASPs, current antimicrobial prescribing practices, access to diagnostics, receptiveness to ASPs, and perceived barriers to implementing ASPs. Data analysis followed procedures of applied thematic analysis, and used NVivo software. A codebook included structural themes based on the interview questions and emerging inductive themes. Two independent reviewers coded the interviews, and the coding was combined and reviewed for consensus. Themes were synthesized, with comparisons made across the three sites.

Results: Medical doctors from all three sites discussed multiple barriers to improving antimicrobial prescribing: prohibitively expensive antimicrobials, limited antimicrobial availability, resistance to change current practices regarding

antimicrobial prescribing, and limited diagnostic data. The most frequent of these barriers discussed in all three locations was limited drug availability, mentioned by 12/22 physicians in Sri Lanka, 5/12 in Tanzania and 8/12 in Kenya. Improved education was a suggested component of ASPs in all three sites: 7/22 in Sri Lanka, 6/12 in Tanzania, and 6/12 in Kenya.

Conclusion: The study highlighted several important issues in determining the next steps for the implementation of ASPs in these LMIC hospitals. Improving drug availability and improving education to change physicians’ antimicrobial prescribing practices are important targets that could be addressed by ASPs in these facilities.

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167. Communication is Key: A Multifaceted Approach to Improving Essential ASP Metrics in Surgical Services

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Session: P-6. Antimicrobial Stewardship: Program Development and Implementation

Background: Despite widespread antimicrobial resistance, suboptimal antimicrobial use is common, particularly among surgical services. Studies show that antimicrobial stewardship programs (ASPs) effectively improve antimicrobial use and decrease adverse events. However, evidence for optimal ASP intervention in surgical departments is lacking, and some surgical services perceive ASPs negatively. This study aimed to evaluate the effect of several collaborative ASP interventions and workflow changes on the non-acceptance rate (NAR) of ASP recommendations and antimicrobial use among surgical services.

Methods: This was a retrospective, pre-post study of services in the department of surgery at a 681-bed, academic medical center between 12/01/2018 and 5/31/2020. Throughout 10/2019 and 11/2019, the core ASP, which consists of two infectious diseases physicians and two infectious diseases pharmacists, performed several interventions with surgical services. These included meetings with the chairman, vice chairs, and division chiefs of the surgery department, a grand rounds presentation to surgical house staff, and monthly surgeon NAR reporting to the chairman. Also, per feedback from surgeons, the ASP began to communicate recommendations directly to attending surgeons instead of residents or via ASP notes in the medical record. Data for the pre-period was collected from 12/2018 to 9/2019; data for the post-period was collected from 12/2019 to 5/2020. Wilcoxon rank sum, chi-square, and Fisher’s exact tests were used to compare outcomes.

Results: The ASP communicated 353 recommendations to surgical services in the pre-period, and 181 in the post-period. ASP offered most recommendations to trauma (n=244), cardiothoracic (n=60), and plastic surgery (n=54) during the study periods. NAR decreased post-intervention overall (43% vs 29%, p=0.0013) and in trauma surgery (63% vs 47%, p=0.03). Mean monthly days of therapy per 1000 patient days trended towards a decrease post-intervention (1105 vs 1044, p=0.26). Cost per 1000 patient days decreased post-intervention (\$27,677.91 vs \$19,766.31, p=0.0075).

Conclusion: A communicative and adaptive approach to ASP in surgical services improved NAR and antimicrobial costs and trended towards a reduction in antimicrobial use.

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168. Creation and Internal Validation of a Clinical Predictive Model for Fluconazole Resistance in Patients with Candida Bloodstream Infection

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Session: P-6. Antimicrobial Stewardship: Program Development and Implementation

Background: IDSA guidelines on candidemia recommend fluconazole as first-line therapy in patients considered low risk for fluconazole resistant infections. However, there is currently no mechanism to determine risk of resistance, and most community hospitals cannot perform rapid sensitivity testing, leading to prolonged use of echinocandin therapy. This study aims to develop a clinical predictive model to identify patients at low risk for fluconazole resistance where first-line use of fluconazole therapy would be acceptable without requiring resistance testing.

Methods: We performed a retrospective cohort analysis of all hospitalized adult patients with a positive blood culture for *Candida* spp. from 2013 to 2018. Fluconazole resistance was determined using Sensititre™ YeastOne™ YO9 AST Plate, with cutoffs defined for each *Candida* species based on Clinical and Laboratory Standards Institute performance standards for antifungal testing (M60) in all patients. Using backwards stepwise regression, we developed a multivariable logistic regression model to identify factors associated with fluconazole resistance in patients in *Candida* bloodstream infection, including only variables with clinical plausibility and $p < 0.1$ in bivariable analysis. Stepwise regression was performed on bootstrapped samples to test individual variable stability and estimate confidence intervals. We used graphs of observed vs expected values to assess model performance across the probability spectrum.

Results: We identified 539 patients with *Candida* bloodstream infection from 2013–2018, of which 13.4% (72/539) were fluconazole resistant. Increased risk of fluconazole resistance was associated with age (1.12 [1.01, 1.24]), bacterial septicemia