Development of a Pharmacy Resident Implemented Prospective Audit and Feedback Antimicrobial Stewardship Intervention

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Abstract (amended)

Introduction: Antimicrobial stewardship programs (ASPs) implement activities to improve antimicrobial use and patient outcomes. Prospective audit and feedback (PAF) has demonstrated effectiveness over sole preauthorization (PA) interventions. PAF implementation utilizing non-infectious diseases (ID) trained pharmacists including residents is not well characterized.

Methods: We aimed to evaluate use of a post-graduate year one pharmacy resident to implement PAF at a 602-bed tertiary academic medical center. Monday through Friday mornings, a report was generated within the electronic health record (EHR) to identify patients on select antimicrobials for ≥48 hours. The resident reviewed patients and made recommendations to the medical teams or clinical pharmacy specialists. Complicated patients were discussed with an infectious disease (ID) clinical pharmacy specialist.

Results: 227 patients were reviewed with the report identifying a mean (SD) 24 (±6.7) patients per day. Subsequently, ~20% of patients necessitated review with an ID clinical pharmacy specialist. Of all patients reviewed, 179 (79.2%) were intervened upon. Almost half (46.3%) of interventions were in patients with pneumonia or intra-abdominal infections. Ceftriaxone 49 (27.3%), intravenous vancomycin 35 (19.6%) and piperacillin-tazobactam 23 (12.8%) were intervened upon the most. Recommendations were primarily made to Medicine 74 (41.3%), Surgery 43 (24%), and Critical Care 26 (14.5%) services. Primary recommendations were duration of therapy or de-escalation for Medicine [36 (48.6%), 24 (32.4%)], Surgery, [24 (55.8%), 9 (20.9)], and Critical Care [7 (26.9%), 10 (38.4%)], respectively. ID was consulted on 35 (19.6%) patients with interventions. For select antimicrobials, days of therapy per 1000 patient days decreased from 741.8 to 677.9 from March 2017 to March 2018.

Conclusion: Non-ID trained clinical pharmacists or residents may perform PAF activities effectively. This informs potential PAF targets and may allow ASPs to reach more patients while optimizing escalation of complicated cases to an ID specialist.

Background

- Ochsner Medical Center is a 767-bed, tertiary care, academic medical center, that houses Ochsner's Multi-Organ Transplant Center
- 34 Clinical Pharmacy Specialists including 2 ID Pharmacists
- Local ASP activities supported by ID Pharmacist (1.0 dedicated FTE) and ID Physician (0.2 dedicated FTE)
- PAF programs improve antibiotic use and reduce antibiotic resistance
- Designing and maintaining a PAF program can be a labor intensive process
- ID Specialist resources are limited
- Different interventions require different levels of training
- Optimal PAF program design is not well defined

Objective

To develop a model for a PAF program that utilizes available resources outside of infectious disease pharmacy specialists and effectively communicate ASP recommendations to the care team to expand stewardship program efforts

Methods

Table 1. Definitions of Recommended ASP Interventions

De-escalation	Change from broader to more narrow agent
Discontinue	Stopping any antimicrobial without starting another in its place
Duration	Define duration of therapy for agent/regimen
ID Consult	Further ID physician specialist input may be warranted
Microbiology	Further microbiology work-up (e.g., culture) warranted
Optimization – PK/PD/Dose	Alternative dosing based on patient's clinical status, infection type, and/or, location
Optimization – Coverage	Alternative coverage (usually broader) based on clinical status, infection type, or location
Optimization – Formulation	Alternative dosage form recommended (i.e., IV to PO conversion)
Optimization – Indication/Site	Alternative agent based on indication and/or penetration to infection site (i.e., blood brain barrier)

Table 2. Select Antibiotics Included in Report

Anti-*Pseudomonal* β-Lactams	Aztreonam, Cefepime, Ceftazidime, Ceftazidime/Avibactam, Ceftolozone/Tazobactam, Meropenem, Piperacillin-Tazobactam
Anti-MRSA Agents	Ceftaroline, Daptomycin, Linezolid, Vancomycin IV
Anti-*C. difficile* Agents	Fidaxomicin, Metronidazole, Vancomycin PO
Antifungal Agent	Micafungin
Other High Risk Antimicrobials	Ciprofloxacin, Levofloxacin, Moxifloxacin, Ceftriaxone, Cefotaxime

Results

Table 3. Descriptive Summary

Total Patients Reviewed, n	227
Total Patients Intervened Upon, n (%)	179 (78.9)
Mean Number of Patients Identified by Report per Day, n (SD)	24 (6.7)
Mean Number of Patients Reviewed with ID Specialist per Day[1], n (%)	5 (20)
Number of Patients with ID Consult[2], n (%)	35 (19.6)

[1]Weeks 3 and 4
[2]At time of review

Table 4. Frequency of Intervention by Category[1], n (%)

Duration	84 (46.9)
Discontinue	50 (27.9)
De-escalation	15 (8.4)
Microbiology	10 (5.6)
ID Consult	6 (3.4)
Optimization – PK/PD/Dose	6 (3.4)
Optimization – Coverage	3 (1.7)
Optimization – Indication/Site	3 (1.7)
Optimization – Formulation	2 (1.1)

[1]Primary interventions collected for patients

Figure 1. March 2018 – Proportion of Overall Antimicrobial Use

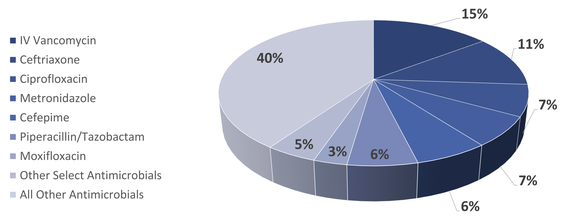


Figure 2. Top 6 Antibiotics Intervened Upon

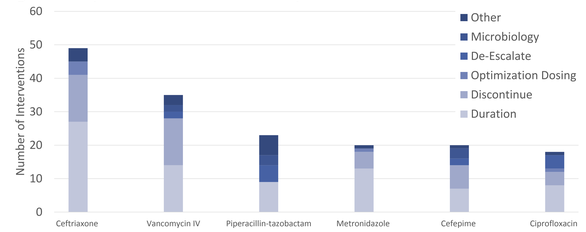
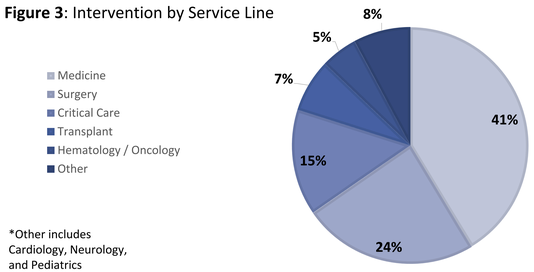
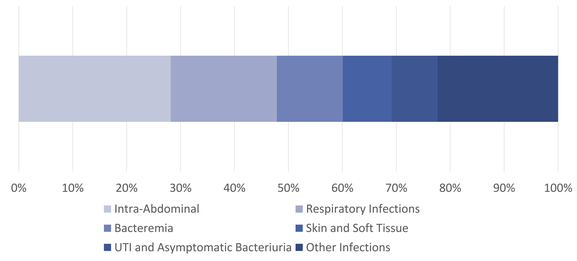


Figure 3: Intervention by Service Line



*Other includes Cardiology, Neurology, and Pediatrics

Figure 4. Frequency of Infectious Diagnoses



Conclusions

- Antimicrobial stewardship opportunities identified through Prospective Audit & Feedback (PAF) vary in complexity requiring differing degrees of infectious diseases/antimicrobial stewardship expertise and experience for intervention/recommendation
- Less complex or nuanced interventions may not require ID-trained pharmacist/physician involvement
- When encountering more complex patients, an escalation process is necessary to overcome potential experiential and/or knowledge gaps that may be present in the non-ID trained reviewer
- Decentralized clinical pharmacists and pharmacy learners (e.g., PGY-1 Resident) may be used in this manner to expand ASP patient reach
- Streamlined antimicrobial stewardship documentation is beneficial and important particularly when you may have multiple individuals performing activities
- Specific processes and procedures (i.e., antibiotics/interventions targeted) should be tailored to the specific resources & needs of the institution
- Future work should focus on quantifying additional patient impact/benefit, outcomes associated with PAF expansion, & identifying specific target strategies