1005. The Antibiotic Optimization DOOR: Refining Assessment of Antibiotic Therapy with Desirability of Outcome Ranking

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Background. Desirability of outcome ranking (DOOR) is a novel methodology for incorporating multiple outcomes into a single value to more comprehensively compare therapeutic strategies. Its primary application has been limited to antibiotic clinical trials, incorporating treatment success and antibiotic toxicity into a single measure. We describe the application of DOOR methodology to a retrospective study evaluating antibiotic optimization.

Methods. This was a single-center, retrospective quasi-experimental study conducted at an academic medical center evaluating the impact of prospective pharmacist review of rapid molecular diagnostic testing (RDT) of blood cultures on antibiotic optimization. Two 8-week time periods were evaluated, corresponding to RDT implementation prior to prospective pharmacist review (RDT-only) and RDT with prospective pharmacist review (RDT-PPR). Patients with a positive blood culture who were not on optimal therapy at the time of gram stain were included in the study. Outcomes included the percentage of patients who received optimal therapy, time to optimal antibiotic therapy, and percentage of patients who had therapy de-escalated. An antibiotic optimization DOOR was created with 3 ordinal ranks. The most desirable outcome, rank one, was patients receiving optimal therapy with no missed de-escalation opportunities. Rank two was patients receiving optimal therapy with a missed de-escalation opportunity. The least desirable outcome, rank three, consisted of patients not receiving optimal antibiotic therapy. Time to optimal therapy was used as a tiebreaker for patients in ranks one and two.

Results. A total of 19 and 29 patients were included in the pre and post-intervention periods, respectively. The percentage of patients reaching optimal therapy was 84% (16/19) and 97% ([28/29], P = 0.16). Median time to optimal therapy was 30:28:26 and 22:40:17 ($P = 0.32$), respectively. DOOR analysis indicated that the probability of a better outcome for the RDT-PPR group than the RDT-only group was 58% (95% CI 54–62).

Conclusion. In this small retrospective study, the use of a novel composite methodology identified the benefit of an intervention that was not detected by standard comparison of individual outcomes.

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1006. Do Antibiotic Choices Made in the ED Influence Inpatient Therapy?

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Background. Inappropriate antibiotic use (AU) is common among inpatients and may begin in the emergency department (ED). ED clinicians often make the first antibiotic decisions in patient care, but it is unknown whether or not these decisions influence inpatient AU. Understanding prescribing practices at transitions of care is critical for implementing effective stewardship initiatives.

Methods. We performed a retrospective cohort study of AU in patients admitted to Duke University Hospital through the ED between July and December 2018. Included encounters had a minimum 2-day length of stay and received an antibiotic in both the ED and inpatient setting. Individual encounter IDs were used to link ED and inpatient AU reports generated from the DASON Antimicrobial Stewardship Assessment Portal. We compared the last ED administration date/time to the first inpatient unit administration for each agent. An antibiotic started in the ED was considered continued upon admission if the first inpatient administration occurred within 30 hours following the last ED administration. Demographic, clinical indication on order entry, length of therapy, and prescriber data were also collected.

Results. We included 3,336 encounters and 2,940 unique patients in the analysis. The median (IQR) patient age was 60 (42–72) years, and the most common indications for AU in the ED were sepsis (23.1%), pneumonia (17.8%), ABSSSI (15.5%), and intra-abdominal infection (12.8%). At least one antibiotic initiated in the ED was continued upon admission within 30 hours in 2,495 (74.8%) encounters. The most common antibiotics continued upon admission were piperacillin/tazobactam (32.8%), vancomycin (24.9%), and ceftriaxone (13.7%). The most common indications for agents continued upon admission were pneumonia (18%), intra-abdominal infection (15%), and ABSSSI (15%). Two or more antibiotics were continued upon admission in 916 (27.4%) encounters.

Conclusion. In our retrospective review of ED antibiotic encounters resulting in admission for at least 2 days, three out of four encounters had at least one antibiotic continued upon admission. This finding highlights the importance of initial appropriate antibiotic selection and suggests stewardship interventions should target EDs as well as inpatient prescribing.

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1007. A novel approach to evaluate antibiotic utilization across the spectrum of inpatient and ambulatory care and implications for prioritization of antibiotic stewardship efforts

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Background. Antibiotic overuse remains a significant problem in inpatient and outpatient settings. The objective of this study was to develop a methodology to evaluate antibiotic use across inpatient and ambulatory care sites in an integrated healthcare system in order to prioritize antibiotic stewardship efforts.

Methods. We conducted an epidemiologic study of antibiotic use across an integrated healthcare system on 12 randomly-selected days between October 1, 2017 and September 30, 2018. Inpatients and perioperative patients were recorded as having received an antibiotic if they were administered ≥1 dose of a systemic antibacterial agent. Outpatients were recorded as having received an antibiotic if they were prescribed ≥1 systemic antibacterial agent.

Results. On the study days, 10.9% (95% CI 10.6–11.3%) of patients received an antibiotic. Of all antibiotics administered or prescribed, 54.1% were from ambulatory care (95% CI 52.6–55.7%), 38.0% were from the hospital, (95% CI 36.6–39.5%), and 7.8% (95% CI 7.1–7.8%) were perioperative. The emergency department/urgent care centers, adult outpatient clinics, and adult noncritical care inpatient wards accounted for 26.4% (95% CI: 25.0–27.7%), 23.8% (95% CI: 22.6–25.2), and 23.9% (95% CI 22.7–25.3) of antibiotic use, respectively. Only 9.2% (95% CI: 8.3–10.1%) of all antibiotics were administered in critical care units. Antibiotics with a broad spectrum of Gram-negative activity accounted for 30.4% (95% CI: 29.0–31.9%) of all antibiotics prescribed. Infections of the respiratory tract were the leading indication for antibiotic use.

Conclusion. In an integrated healthcare system, nearly three-quarters of antibiotic use occurred in the emergency department/urgent care centers, adult outpatient clinics, and adult noncritical care inpatient wards. Antibiotics with a broad spectrum of Gram-negative activity accounted for a large portion of antibiotic use. Analysis of antibiotic utilization across the spectrum of inpatient and ambulatory care is useful to prioritize antibiotic stewardship efforts.

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1008. The Reduction of Fluoroquinolone Prescribing in Rural Vermont Hospitals

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Background. In 2017 The Joint Commission required all hospitals irrespective of size to implement antimicrobial stewardship programs (ASPs) using the CDC core elements (CE) for antimicrobial stewardship (AS). Critical access and rural community hospitals have struggled with developing effective ASPs. Many ASPs seek to reduce fluoroquinolone (FQ) prescribing due to its high risk for drug-drug interactions, risk of Clostridioides difficile infection, and numerous side effects, including five black box warnings from the FDA.

Methods. We contracted with the Vermont Department of Health to help rural VT hospitals develop ASPs that are compliant with the CDC CE for AS. Six of Vermont's 13 hospitals were recruited between June – December 2017 (Table 1). Each hospital obtained antibiotic usage (AU) data in grams (g)/1000 (1k) patient-days (PD) from their electronic medical record (EMR), starting from January 2017. All identified FQ as frequently prescribed antimicrobials. Each hospital had unique interventions to decrease FQ prescribing (Table 1), including orderset changes and pharmacist intervention. Monthly combined FQ (ciprofloxacin + levofloxacin) administration data were collected in g/1K PD. AU data from each hospital were summed and expressed as total FQ g/1000 patient-days. The FQ prescribing trend was analyzed by linear regression.

Results. Prior to implementing ASP, there was a combined FQ rate of 69 g/1K PD. After 20 months of ASP interventions, combined FQ prescribing decreased to 26 g/1K PD (Figure 1, R= 0.9797, $P < 0.001$). This trend is also significant for each individual FQ: ciprofloxacin (R=0.8364, $P < 0.05$) and levofloxacin (R= 0.9801, $P < 0.01$).

Conclusion. Rural and critical access hospitals can have successful antimicrobial stewardship programs. We have shown that rural hospitals in Vermont (1) can extract AU data from their EMR, (2) develop interventions to decrease high use antimicrobial agents, and (3) be successful in decreasing FQ prescribing in less than 2 years.

Table 1. Demographics of Vermont Hospitals involved in Vermont Department of Health Antimicrobial Stewardship

Hospital	Critical access status	Accrediting organization	# beds	Average annual admissions	Intervention to decrease FQ prescribing
A	Yes	CMS	25	1770	Pneumonia order set change, improved Emergency department-hospitalist communication
B	Yes	CMS	25	1646	Emergency department antibiotic guide, medical staff grand rounds, pharmacist intervention
C	No	TJC	70	2484	Newsletter, medical staff grand rounds, pharmacist intervention
D	Yes	CMS	25	1967	Order set changes, pharmacist intervention
E	Yes	CMS	25	1870	Medical staff grand rounds
F	No	CMS	61	1611	Emergency department antibiotic guide, pharmacist intervention