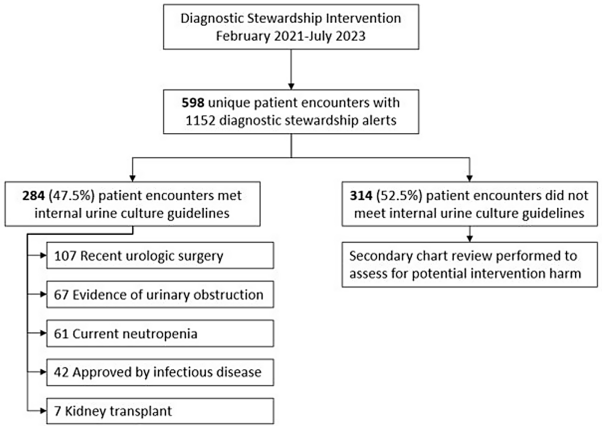
Figure 2. Outcomes of Diagnostic Stewardship Intervention from February 2021 to July 2023



quality metric. We evaluated the impact of a computerized diagnostic stewardship intervention to improve urine culture testing among patients with indwelling urinary catheters. **Methods:** We performed a single-center retrospective observational study at Rush University Medical Center from April 2018 – July 2023. In February 2021, we implemented a computerized clinical decision support tool to promote adherence to our internal urine culture guidelines for patients with indwelling urinary catheters. Providers were required to select one guideline criteria: 1) neutropenia, 2) kidney transplant, 3) recent urologic procedure, 4) urinary tract obstruction; or if none of the criteria were met, then an infectious diseases consultation was required for approval. We compared facility-wide CAUTI rate per 10,000 catheter days and standardized infection ratio (SIR) during baseline and intervention periods using ecologic models, controlling for time and for monthly Covid-19 hospitalizations. In the intervention period, we evaluated how providers responded to the intervention. Potential harm was defined as collection of a urine culture within 7 days of the intervention that resulted in a change in clinical management. **Results:** In unadjusted models, CAUTI rate decreased from 12.5 to 7.6 per 10,000 catheter days (p=0.04) and SIR decreased from 0.77 to 0.49 (p=0.09) during baseline vs intervention periods. In adjusted models, the CAUTI rate decreased from 6.9 to 5.5 per 10,000 catheter days (p=0.60) (Figure 1) and SIR decreased from 0.41 to 0.35 (p=0.65) during baseline vs intervention periods. Urine catheter standard utilization ratio (SUR) did not change (p=0.36). There were 598 patient encounters with ≥1 intervention. Selecting the first intervention for each encounter, 284 (47.5%) urine cultures met our guidelines for testing and 314 (52.5%) were averted (Figure 2). Of these, only 3 (< 1 %) had a urine culture collected in the subsequent 7 days that resulted in change in clinical management. **Conclusion:** We observed a trend of decreased CAUTIs over time, but effect of our diagnostic stewardship intervention was difficult to assess due to healthcare disruption caused by Covid-19. Adverse outcomes were rare among patients who had a urine culture averted. A computerized clinical decision support tool may be safe and effective as part of a multimodal program to reduce unnecessary urine cultures in patients with indwelling urinary catheters.

Antimicrobial Stewardship & Healthcare Epidemiology 2024;4(Suppl. S1):s24–s25
doi:10.1017/ash.2024.129

Presentation Type:
Poster Presentation - Oral Presentation
Subject Category: Infection prevention and environmental sustainability
Perspectives and Awareness of Environmental Sustainability in the Infection Prevention and Control Community Nationally
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Background: Healthcare contributes significantly to waste production and greenhouse gas emissions. This became especially apparent during the COVID-19 pandemic. Yet there is modest recognition of this issue, particularly within decision-making in Infection Prevention and Control (IPC). The aim of our study was to gauge general knowledge and attitudes of hospital epidemiologists (HEs) and infection preventionists (IPs) around the intersection of environmental sustainability and IPC, and to identify related institutional practices. **Methods:** An online survey, composed of ten questions related to environmental sustainability in IPC, was created and emailed to members of the SHEA Research Network (SRN), a national consortium of healthcare facilities collaborating on IPC research, from August - October 2023. Survey answers were collated via Redcap© and descriptive results were obtained. **Results:** Forty-two individuals (33 HEs, 7 directors of IPC, and 2 IPs) from unique institutions completed the survey. Thirty (71.4%) were from academic medical centers, 5 (11.9%) were from VA medical centers and 7 (16.7%) were from community hospitals. Over half of participants correctly estimated the amount of waste and carbon emissions produced annually by the US healthcare system (6 million tons and 8.5% of national emissions, respectively). However, only 42.9% considered environmental sustainability concerns important or very important when making IPC decisions. Fifteen (34.9%) had an environmental sustainability committee at their institution and of these, 8 had an established relationship with the IPC department. The most common techniques to promote sustainability amongst institutions were water/energy conservation (59.5%), reusable personal protective equipment (52.4%) and Leadership in Energy and Environmental Design (LEED) certification (47.6%). When asked which efforts they would support at their institution, 28.6% would eliminate the use of single-use endoscopes and one third would avoid use of ethylene oxide for sterilization. In deciding whether to support environmental sustainability measures, key considerations participants articulated were patient safety concerns, knowledge about effectiveness and costs, and administrative support. **Conclusion:** Although there is growing awareness around the contribution of the healthcare industry to carbon emissions and waste production, IPC professionals have not yet universally adopted measures to promote environmental sustainability. In our survey, many participants acknowledged the importance of balancing patient safety and sustainability concerns. Our study demonstrates the need for more research and education to inform decisions around environmentally sustainable efforts in IPC that also preserve patient safety. Additionally, professional and regulatory bodies must acknowledge and promote the importance of environmental sustainability in IPC decision-making.

Antimicrobial Stewardship & Healthcare Epidemiology 2024;4(Suppl. S1):s25
doi:10.1017/ash.2024.130

Presentation Type:
Poster Presentation - Oral Presentation
Subject Category: Long Term Care
Two Novel Antibiotic Use Metrics for Facilities and Individual Prescribers in Post-Acute and Long-Term Care Settings
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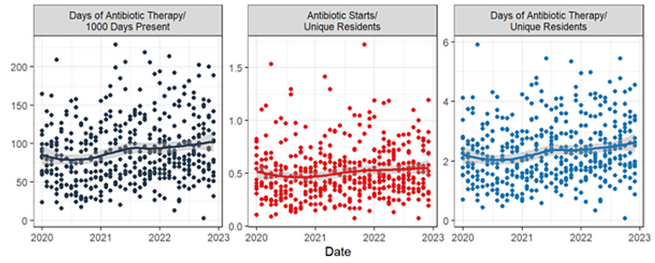
Background: Measuring and reporting antibiotic use are essential to antimicrobial stewardship activities. The most common metric to assess facility-level use is days of antibiotic therapy per 1000 days of care (DOT/1000 DOC). This metric may be difficult to calculate, not be readily comparable, or not provide actionable data to individual prescribers, particularly those that work in post-acute and long-term care (PALTC) settings. Here we use data from a centralized dispensing pharmacy to develop antibiotic use metrics suitable for offering individualized feedback to prescribers working in PALTC settings. **Methods:** We obtained medication dispensing data and resident census data for 13 PALTC settings



within the same network. After omitting non-pharmacologic items and limiting the data to medications dispensed from 1/2020 – 12/2022, we determined the following metrics by month: days of antibiotic therapy (DOT), number of medications prescribed, number of antibiotic courses prescribed (antibiotic starts), and the number of individual residents issued a prescription for any medication (unique residents). These metrics were assessed for each facility (2020 – 2022) and for prescribers responsible for > 1% of prescriptions within that facility (2022 only). Prescriber-level unique residents was the number of residents issued a prescription by the given provider. We obtained facility-level census data to calculate antibiotic DOT/1000 resident days of care (DOC) as a standard to which we compared novel metrics. **Results:** During the 3-year study period, 1718 prescribers at 13 PALTC settings wrote for 672256 medications, including 31087 antibiotic courses. At the facility level, the correlation between monthly antibiotic starts (courses)/unique residents and antibiotic DOT/1000 DOC was 0.83 ($p < 0.0001$). The correlation between monthly antibiotic DOT/unique residents and antibiotic DOT/1000 DOC was 0.98 ($p < 0.0001$). Trends in monthly values of both novel metrics and DOT/1000 DOC were consistent across the examined period (Figure 1). For individual prescribers, both novel metrics permit assessment and comparison of antibiotic prescription rates over time (Figure 2). **Conclusions:** Pharmacy dispensing data can be used to determine antibiotic DOT/unique residents and antibiotic starts/unique residents at the facility level and for individual providers. The novel metric antibiotic DOT/unique residents demonstrated strong correlation with antibiotic DOT/1000 DOC at the facility level. In addition to supporting tracking and reporting of antibiotic use among PALTC settings, these new metrics permit visualization of the antibiotic prescribing rates of individuals prescribers, as well as peer comparison, which in turn can lead to actionable feedback that helps improve antibiotic use in the care of PALTC.

Antimicrobial Stewardship & Healthcare Epidemiology 2024;4(Suppl. S1):s25–s26
doi:10.1017/ash.2024.131

Presentation Type:
Poster Presentation - Oral Presentation
Subject Category: Medical Informatics

Multitask Neural Networks to Predict Antimicrobial Susceptibility Results of Escherichia coli Clinical Isolates

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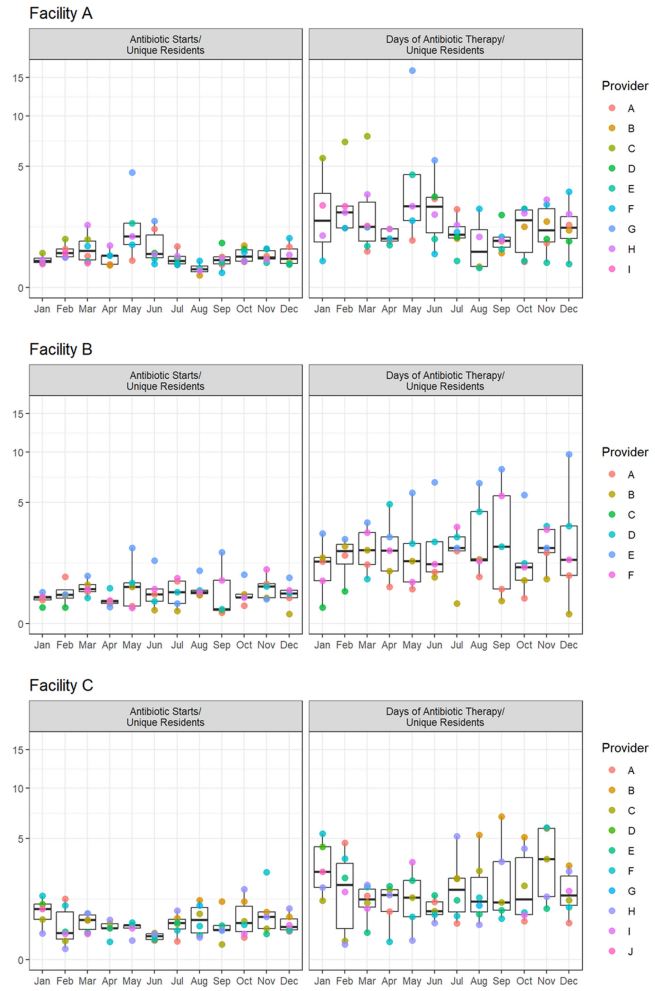

Background: Machine-learning (ML) models, such as neural networks (NNs), have been proposed to predict antimicrobial susceptibility at the patient level while incorporating patient-level information from electronic medical record (EMR) systems. However, NNs often do not perform well in predicting rare outcomes, such as carbapenem resistance. We aimed to apply a novel multitask NN to create personalized antibiograms for individual patients with Escherichia coli clinical isolates to predict antimicrobial resistance (AMR) for four major antimicrobial classes simultaneously with improved accuracy for carbapenem resistance by using shared hidden layers (Figure 1). **Methods:** We analyzed all E. coli clinical isolates from the US Veterans Health Administration's network from January 1, 2017, to December 31, 2019, focusing on AMR profiles of aminopenicillins, narrow-spectrum (NS) cephalosporins, extended-spectrum (ES) cephalosporins, and carbapenems. Patient-level clinical data (demographics, antimicrobial exposure history, previous isolates (if any), comorbidities, and recent procedures) were extracted from EMR. Antibiograms for all hospitals were generated using standard methods for the preceding calendar years. We employed logistic regression to evaluate the efficacy of conventional antibiograms in predicting AMR profiles. We adopted the ML approach using conventional NNs and novel multitask NNs on all extracted clinical data and hospital antibiograms. The models were trained with data from 2017 and 2018 and then tested on 2019 data, assessing their performance using the area under the receiver-operating curve (AUC). **Results:** The study included 257,968 E. coli isolates, split into 171,391 for training and 86,577 for validation. The prevalence of AMR in the test data from 2019 was 49.8% for aminopenicillins, 28.4% for NS cephalosporins, 10.7% for ES cephalosporins, and 0.2% for carbapenems, respectively. Conventional hospital antibiograms showed low prediction accuracy with AUC scores of 0.56 for aminopenicillins, 0.67 for NS cephalosporins, 0.61 for ES cephalosporin, and 0.67 for carbapenem. AUC scores from preliminary models for conventional and multitask NNs were 0.78/0.78 for aminopenicillins, 0.83/0.82 for NS cephalosporins, 0.84/0.85 for ES cephalosporins, 0.68/0.75 for carbapenems. While producing improved accuracy for carbapenem and comparable accuracies for three other classes, multitask NNs took approximately 66% less time for model training than conventional NNs. **Conclusions:** Integrating EMR data with NNs improved their predictive accuracy, potentially leading to a decision-support tool for better empirical antimicrobial therapy guidance in the