Figure 3: Change in Guideline-Concordant Antibiotic Usage for Streptococcal Pharyngitis

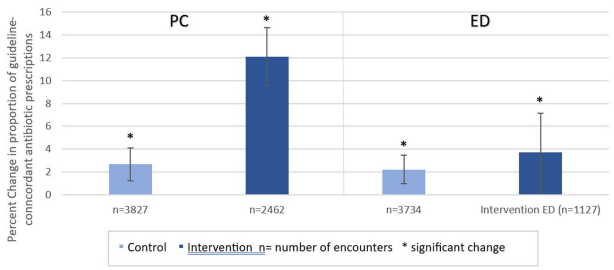


Figure 4: Sinusitis (Primary Care Only)

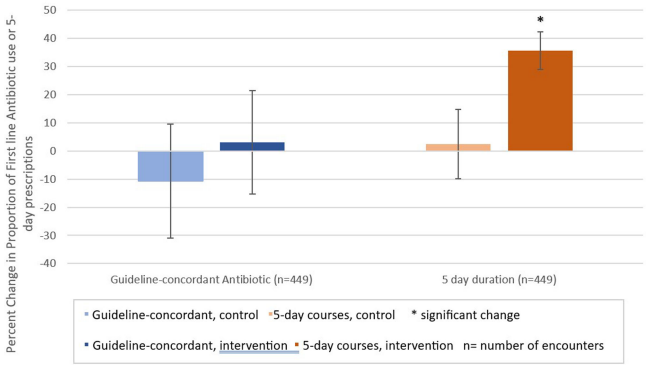
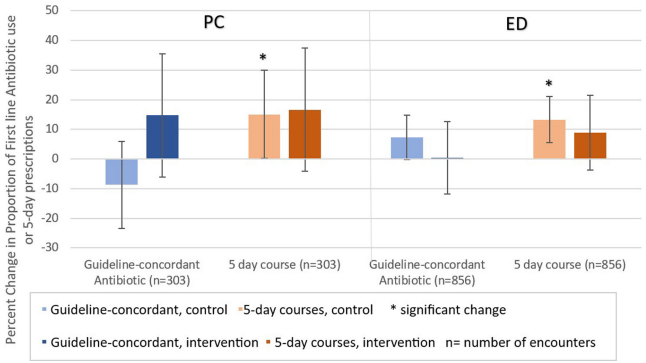
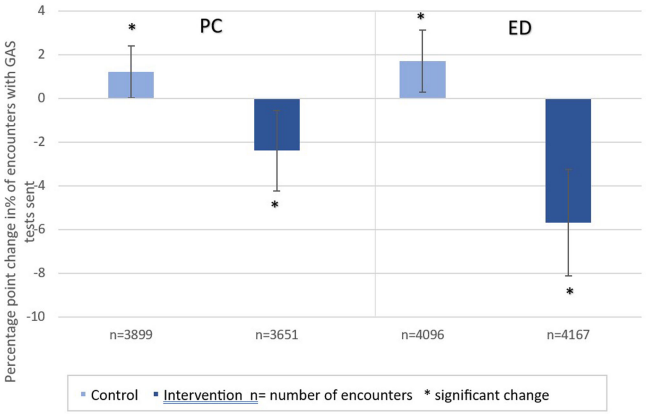


Figure 5: Pneumonia



included as "controls". The primary outcome is percent of encounters that result in an antibiotic prescription. Secondary outcomes include (1) percent of encounters with guideline-concordant antibiotic choice for otitis media (AOM), streptococcal pharyngitis (GAS), sinusitis, and community-acquired pneumonia (CAP); (2) percent of encounters with 5-day antibiotic duration for AOM, sinusitis, and CAP; and (3) percent of encounters with rapid GAS testing. ED sinusitis data not analyzed due to small N. Significance was determined by calculating 95% confidence intervals for the difference of proportions. **Results:** There were 139,474 PC encounters (91,706 baseline and 47,768 intervention) and 94,205 ED encounters (54,138 baseline and 40,067 intervention) among 20 PC prescribers and 38 ED prescribers from January 2022-September 2023. Compared to baseline, the antibiotic prescription rate decreased 1.1% in intervention PCs but increased 0.9% in control PCs (Figure 1). Compared to baseline, the antibiotic prescription rate decreased by 0.4%

Figure 6: Change in Group A Streptococcus Testing Rates



in the intervention EDs but increased 3.1% in the control ED (Figure 1). Secondary outcomes showed significantly increased proportions of guideline concordant ED AOM prescriptions, 5-day PC AOM prescriptions (Figure 2), guideline concordant ED streptococcal pharyngitis prescriptions (Figure 3), and guideline concordant PC sinusitis prescriptions (Figure 4). There was a decrease in GAS tests in intervention PCs and EDs (Figure 6). **Conclusions:** Interim analysis shows bundled implementation strategies using tele-AS led to significantly decreased overall antibiotic use in rural PC clinics compared to control sites. The study is ongoing and will continue to evaluate outcomes over a longer intervention period to reduce seasonal bias.

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Qualitative Evaluation of an Antimicrobial Stewardship Tele-Mentoring Program in US Rural & Critical Access Hospitals

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Background: The University of Washington (UW) Center for Stewardship in Medicine (CSiM) supports a tele-antimicrobial stewardship (AMS) program (TASP) using the ECHO approach (Extension for Community Healthcare Outcomes) in small, rural, and Critical Access Hospitals (primarily in the western U.S.) with education, mentoring, organizational capacity building, and a community of peers. To evaluate the continuing education (CE) component of UW-TASP ECHO, CSiM surveyed individuals receiving CE credits as part of the program. This survey was designed to track individuals' satisfaction with the program and to assess the impact of UW-TASP ECHO on AMS in participating facilities. **Methods:** The CE participants' survey was completed annually by individuals participating in UW TASP ECHO using online survey software. The survey included closed-ended and open-ended questions. Responses to open-ended questions were entered into Atlas.ti qualitative analysis software and coded iteratively according to themes that emerged. When a new code emerged partway through the coding process, earlier surveys were re-coded for the new code. Final codes were grouped into themes and sub-themes and quotes from each theme identified were summarized and attached

Table 1: Example themes and example quotes from CE participant surveys by UW CSiM, 2018-2022

Example Themes	Example Quotes
Strength in community	• "Overall, I think TASP [ECHO] has exceeded its goals and has generated a vast network of professional collaboration on an important topic. Participating has been valuable to my practice, not to mention convenient. I look forward to attending many more calls and staying current on AMS [antimicrobial stewardship]." • "We love participating in TASP [ECHO] because it is an extremely important networking opportunity which gives us a forum for ID [infectious diseases] questions…and to hear what other facilities are doing."
Staff education	• "UW TASP [ECHO] keeps me up to date on new antimicrobial stewardship guidelines that I share with providers in the rural critical access hospital setting during medical staff and P&T [pharmacy & therapeutic] meetings. One significant update this year was the CDC's [Centers for Disease Control and Prevention] new gonococcal treatment guidelines and discussions concerning increased resistance to azithromycin in general." • "We have a PA [physician assistant] from our medical clinic who is scheduled out of patient care during the TASP [ECHO] session so that she can sit in weekly. She then takes the information back to our clinic medical staff via presentation at their monthly meeting."
Change our use of antibiotics	• "One specific example would be regarding us of peri-op antibiotics and the importance of accurate patient history regarding penicillin allergies and appropriate use of cefazolin." • "Since we began participating in TASP [ECHO] in 2017, our Fluoroquinolone DOT [days of therapy]/1000 patient days has steadily declined. In fact, we have been at zero for this measure for the last 6 months!!" • "At the beginning we updated our CAP [community acquired pneumonia] guidelines and order set for CPOE [computerized prescriber order entry]; most recently we developed sepsis orders with what we learned. Also, our use of quinolone antibiotics has dropped dramatically with interventions as a result of drug usage review in TASP [ECHO]."
Peer support for COVID-19	• "It helped me to realize that we were struggling with the same questions as others were. It was reassuring to know that vaccine refusal/policies were a shared topic…it has been extremely valuable to see how other CAHs [critical access hospitals] have handled the different [COVID-19] treatment options, especially in cases where some products are not as readily available as others."

Abbreviations: Continuing Education (CE), University of Washington (UW), Center for Stewardship in Medicine (CSiM), Tele-Antimicrobial Stewardship Program (TASP), Extension for Community Healthcare Outcomes (ECHO)

to the theme and reported. **Results:** Data from three administrations of this survey were available: 2018-2019 (n=66); 2020-2021 (n=27); and 2021-2022 (n=30). These surveys were completed by a total of 95 individuals from 53 hospitals. Seven of these individuals completed a survey in each year, 14 completed a survey in two years, and 74 completed only one survey. Themes identified were COVID-19 support (including procedures and policies, being kept up-to-date, research summaries, and peer support), the antibiotic pocket guide developed by UW, strength in community, staff education, role of CSiM in developing/strengthening the AMS program at the facility, change in use of antibiotics, UW imprimatur, learning/growing as a healthcare provider, and importance for small, rural hospitals (see examples in Table 1). **Conclusions:** This qualitative analysis provides evidence from surveys of individuals participating in CE that UW TASP ECHO has had a meaningful impact in such domains as building a strong community among small, rural and critical access hospitals, educating staff, changing antibiotic use and providing peer support, among others.

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Implementation of Outpatient Automated Stewardship Information System (OASIS©) Audit and Feedback in Two Healthcare Systems

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Background: Combating antibiotic resistance, exacerbated by widespread unnecessary outpatient antibiotic prescriptions, necessitates innovative stewardship solutions. Audit and feedback reports are effective but often resource heavy. We introduced a free, open-source system, Outpatient Automated Stewardship Information System (OASIS©), for automating the creation and distribution of recurring audit and feedback reports to clinicians to improve antibiotic prescribing. **Methods:** We used mixed methods to evaluate implementation of OASIS© across 11 clinics at Denver Health and Hospital Authority (DHHA) and Children's Hospital Colorado (CHCO) from July 2022 to August 2023. Both sites host their own Epic® electronic healthcare and enterprise data warehouse systems. R statistical software was utilized to retrieve and process the data needed to create individual[HCM1] clinician audit and feedback reports with peer comparison. Reports were provided for 1) antibiotics prescribed for respiratory diagnoses, 2) antibiotics prescribed for respiratory diagnoses where antibiotics are never indicated, 3) first-line antibiotic prescribing for acute otitis media (AOM), and 4) five-day duration of antibiotics for children two years and older with AOM. Feedback reports for each metric were emailed to clinicians for three consecutive months. The primary outcome was adaptations needed to implement OASIS©. Secondary outcomes included fidelity (measured by email readership), time to set up and maintain the program, and barriers and facilitators to implementation (assessed by four qualitative interviews with OASIS© stakeholders). **Results:** The most significant adaptations made pertained to the automation of OASIS© reports for organizations not using R for data retrieval and reporting, setting up OASIS© specific email addresses, and validating clinician fidelity via read receipts. Fidelity was higher at DHHA (91-100%) compared to CHCO (10-30%). When interviewed, data analysts expressed that time for initial setup ranged from 1-6 hours. After reporting was automated, the estimated monthly time to send reports was 10 minutes. Views on setup complexity were split, but all recognized the readability of the reports and OASIS©'s value for improving prescribing behaviors. The greatest barriers to implementation included obtaining analytic resources for initial setup and the need to download additional R packages. No interviewee had prior experience creating audit and feedback reports. **Conclusions:** Implementing OASIS© requires addressing system diversity and knowledge gaps in outpatient informatics and antibiotic stewardship. Despite these challenges, the tool proved efficient and beneficial for monitoring and reporting antimicrobial prescribing. This free tool could likely be effectively disseminated to other health systems given the limited time and resources required for adaptations, setup, and monitoring. [HCM1]I

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Characteristics, Treatment, and Outcomes of Invasive Group A Streptococcal Infections

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Background: Group A Streptococcus (GAS; Streptococcus pyogenes) is an important human pathogen that can cause life-threatening invasive disease, ranging from skin/soft tissue infections to infective endocarditis. In the fall of 2022, the Center for Disease Control & Prevention (CDC) issued an alert due to a global increase in invasive GAS infections, particularly among children and adults with co-morbidities. An increase in invasive disease was observed at our five-hospital healthcare system in Southeast Michigan. The objective of this study was to describe characteristics of patients with invasive GAS and characterize treatment and outcomes of disease. **Methods:** This was a retrospective cross-sectional study of patients from June 2013 to August 2023 with positive blood cultures for GAS. Patients were identified using a data query for positive blood cultures for GAS through Microsoft SQL Server. Patients with age < 1 8 years, polymicrobial bacteremia, incomplete data, or who were enrolled in hospice and/or died within 48-hours of admission were excluded. Collected variables included: demographics, infection characteristics (syndrome, duration of bacteremia), microbiological characteristics (antimicrobial susceptibility testing; AST), antimicrobial treatment (empiric and final, antitoxin therapy), and clinical outcomes (length of hospital stay [LOS], treatment-associated adverse events, 30-day mortality and infection-related readmission). **Results:** 250 patients were included (Table 1). More than half were male with median age of 57.5 years. Diabetes mellitus