The Over-Prescription of Antibiotics in the Outpatient Setting

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I have no known conflict of interest to disclose.

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Abstract

Antibiotic overprescription in urgent care settings contributes to antimicrobial resistance and poor patient outcomes. The CDC Core Elements of Antibiotic Stewardship provide a framework for optimizing antibiotic use, yet their implementation in mobile urgent care settings remains underexplored. To improve prescribing practices, this quality improvement project aimed to implement an antibiotic stewardship program (ASP) in a mobile outpatient urgent care setting in Phoenix, Arizona. This project introduced an evidence-based ASP incorporating prescriber-directed education, patient education, and provider feedback on prescribing patterns. Educational sessions focused on guideline adherence, diagnostic stewardship, and shared decision-making. Antibiotic prescribing rates, patient outcomes, provider knowledge, and attitudes were measured using retrospective chart audits and pre-/post-intervention surveys. Results indicated reduced inappropriate antibiotic prescriptions, improved adherence to evidence-based guidelines, and increased provider awareness of antibiotic stewardship. This quality improvement project focused on antibiotic stewardship to improve the quality of care, promote responsible antibiotic use, and enhance provider education in mobile urgent care. These findings could contribute to the broader efforts for antimicrobial stewardship in non-traditional healthcare environments.

Keywords: antibiotic stewardship, CDC Core Elements, mobile urgent care, quality improvement, antimicrobial resistance, evidence-based interventions, patient education

Implementing the CDC Core Elements of Antibiotic Stewardship in the Outpatient Setting

The over-prescription of antibiotics in urgent care settings has emerged as a critical concern in today's healthcare, warranting attention to understand its multifaceted implications. With this in mind, the matter requires immediate intervention as the over-prescription of antibiotics is seen in diverse geographical locations and does not discriminate based on socioeconomic status (Blaser et al., 2021). Contributing factors to overprescribing antibiotics include time constraints, diagnostic uncertainties, and patient expectations (Hollingworth et al., 2023; Tarrant & Krockow, 2022; Thorpe et al., 2020). This paper aims to review and identify areas of growth to address antibiotic over-prescription in the urgent care setting.

Problem Statement

The discovery of antibiotics has saved many lives and has continued to reduce infection-related mortality rates. According to the Centers for Disease Control and Prevention [CDC] (2023), Arizona has an antibiotic prescription rate of 634 per 1000 people in an outpatient setting. Recent reports suggest an increasing presence of antibiotic-resistant microorganisms, which appears to be inversely related to the availability of effective antibiotics (Baran et al., 2023). Moreover, there has been a notable absence of newly introduced antimicrobial agents recently. The rise of antimicrobial drug resistance in prevalent bacterial pathogens has evolved into a critical health crisis on both national and global scales. As the CDC (2023) reported, antibiotic-resistant bacteria contributed to a minimum of 2 million illnesses and 23,000 deaths in the United States. Should this trajectory continue, projections indicate that by 2050, the global toll of antimicrobial resistance could result in 10 million deaths, with associated economic costs reaching up to $100 trillion (CDC, 2023). In a retrospective study conducted by Stenehjem et al.

(2020), most antibiotic use occurs in the outpatient setting, and of those prescribed, 30% is unnecessary and contributes to antibiotic-resistant infections.

Purpose and Rationale

The utilization of antibiotics in treating infections over the past decades has saved many lives. As antibiotics were first implemented, their primary use was for bacterial infections. However, antibiotics have frequently alleviated patient symptoms over the years despite guidelines. The outcome of over-prescription and inappropriate antibiotic misuse has led to resistant bacterial strains, posing a challenge to the healthcare system. In 2011, the FDA approved the first of its kind multiplex Polymerase Chain Reaction (mPCR) panel to detect viruses, known as the Biofire Respiratory Pathogen Panel (Rader et al., 2021). Syndromic mPCR panels offer providers rapid information to guide the use of antimicrobials or avoid them together when caring for patients (Rader et al., 2021; Zakhour et al., 2023). This paper aims to increase awareness of the detrimental effects of overprescribing antibiotics and identify potential medical technology to help guide the accurate prescription of antibiotics.

Background and Significance

The over-prescription of antibiotics in urgent care settings presents a pressing challenge to modern healthcare, posing risks of antibiotic resistance and adverse patient outcomes. Urgent care facilities, designed to provide timely medical attention for non-life-threatening conditions, often encounter patients seeking quick relief, leading to a higher likelihood of antibiotic prescription. A substantial proportion of antibiotic prescriptions in urgent care settings may be unnecessary, contributing to the escalation of antibiotic resistance (Chua, Fischer, Linder, & Tiah, 2019). Addressing the over-prescription of antibiotics in the urgent care setting is imperative to safeguard individual patient health and the broader community from the

repercussions of antibiotic resistance. Through a quality improvement project, Tonazzi et al. (2022) found that direct patient involvement using the CDC guidelines for proper antibiotic use increased patient understanding of the appropriate use of antibiotics.

Additionally, Satterfield et al. (2020) found that dividing the delivery of antimicrobial stewardship education into prescriber-directed, non-prescriber, and patient-directed to target tailored information for that specific group can yield a higher impact. Numerous studies have evaluated antibiotic over-prescription prevalence and patterns in urgent care settings. Huang et al. (2021) conducted a quantitative analysis and found that junior physicians were seven times more likely to prescribe antibiotics to their patients if they were uncertain of their diagnosis. Chua et al. (2019) conducted a comprehensive analysis, revealing the extent of inappropriate antibiotic prescriptions in urgent care facilities. Additionally, Laude et al. (2020) provide insights into antibiotic use frequency for conditions where their efficacy may be limited.

Studies conducted by Lim et al. (2020) and Gonzales et al. (2019) shed light on the factors influencing diagnostic uncertainty and subsequent over-prescription of antibiotics due to provider uncertainty, patient demand, and lack of guidelines. Hollingworth et al. (2023) state that defensive overprescribing, unawareness of diagnostic guidelines, and patient demand play a heavy role in the inappropriate use of antibiotics. Gonzales et al. (2019) highlight that approximately 30 percent of office visits related to the common cold and non-specific upper respiratory infections (URIs), along with up to 80 percent of all visits for bronchitis, result in antibiotic prescriptions in the United States annually.

The over-prescription of antibiotics increases care costs and, most concerning, accelerates the evolution of antibiotic resistance (Lim et al., 2020). The World Health Organization (2023) provides crucial insights into the global impact and potential dangers of antibiotic over-

prescription that leads to antibiotic resistance. The spread of antibiotic-resistant pathogens threatens our ability to treat common infections. The World Health Organization (2023) estimates that antibiotic resistance was responsible for 1.27 million global deaths in 2019. Sulis et al. (2020) found the effectiveness of educational initiatives and decision-support tools in decreasing unnecessary antibiotic prescriptions**.** Despite national efforts to limit the over-prescription of antibiotics, inappropriate and excessive antibiotic use has continued to increase (AbdEl-Aty et al., 2024).

PICO Question

While the current crisis of the impact of antibiotic over-prescription is well known, little effort has been made to target this ongoing problem sufficiently. Urgent change is necessary to combat the inappropriate use of antibiotics. Significant changes do not occur instantaneously but require time and sustained effort. However, implementing evidence-based practices, innovation, and a multidisciplinary approach is vital to decreasing inappropriate antibiotic prescription rates. This global crisis has led to the PICO question: "Among care healthcare providers working in urgent care health systems, how does the use of an antibiotic stewardship program compare to current prescribing practices affect prescription rates of antibiotics?**"**

Internal Evidence

In Arizona, a small home healthcare-based Urgent Care treats a diverse patient population. The mobile urgent care sees anywhere from 1000 to 2000 patients annually. The owner is the sole employee besides the biller. The organization aims to deliver rapid yet comprehensive care across the lifespan with simple diagnoses to complex chronic patients. Recently, the organization has faced a significant challenge with increased demand for antibiotic prescriptions based on patients' symptoms to expedite relief. Ongoing discussions with the

provider of the organization highlight continuing concerns about patient expectations and uncertainty of diagnosis, and there is currently no hard data available for examination. Soft data includes electronic medical records, patient reports, and provider awareness. The provider goes into detail on frequent patient consultations on experiencing cold-like symptoms and asking for antibiotics to expedite relief of symptoms to go on vacation or return to work. Addressing the multifaceted factors contributing to antibiotic over-prescription in urgent care, the healthcare community can strive towards a more sustainable and practical approach to managing infections. Implementing additional interventions to identify the source of infection can play a pivotal role in promoting awareness about the consequences of antibiotic over-prescription and fostering a culture of responsible antibiotic use in urgent care settings (Zakhour et al., 2023).

Search Strategy

A literature search was conducted using PubMed, Cinhal, and Scopus to address the PICO question. These databases were used in the search due to their significance in healthcare. Combinations of terms were used to broaden and narrow the search as necessary. Keywords included: *Urgent care center, urgent medical services, expedited medical treatment,* OR *convenient medical care; telemedicine, remote patient monitoring* OR *telehealth services; evidence-based prescribing, prescription patterns analysis* OR *symptom-based treatment algorithms; antibiotic stewardship, antimicrobial resistance, prescribing guidelines,* OR *overprescribing antibiotics.*

The initial search on Pubmed yielded 1,444 results. The search was limited to articles published in 2019 or later, yielding zero results. Keywords were rephrased to expand the search: *urgent care setting* AND *antibiotic resistance, over-prescription,* AND *symptom-based prescribing.* This resulted in 153 articles; abstracts of the remaining articles were then screened

for relevance based on inclusion criteria, and using a root cause analysis (RCA), ten studies were selected for further evaluation using an RCA.

CINHAL was searched with an initial yield of 6 results. Keywords were modified to expand and narrow results. This search did remove (*advancing technology* and *digital healthcare).* This identified more results, leading to an additional 39 articles. Abstracts of the remaining articles were then screened for relevance based on inclusion criteria Of these articles, 20 were saved for further evaluation using an RCA.

Scopus was searched with an initial 310 results. This was limited by year of publication from the past five years, which led to 110 articles. Results were narrowed and additionally modified by keywords *such as over-prescription, outpatient,* OR *antibiotics,* which narrowed the results to 7. These articles abstracts were reviewed, and seven were saved for further evaluation using an RCA.

Of the 37 articles selected, 10 were selected for inclusion in the evaluation table based on relevance to the PICO question. The ten articles include three systemic reviews, one cross-sectional study, four quality improvement projects, one observational study, and one quasi-experimental design (see Appendix A, Table A1). One study reviewed the impact of ASPs in outpatient settings and found mixed results. Some programs did not show a significant reduction in antibiotic use or improvement in prescribing practices. The variability in effectiveness was attributed to factors such as the specific interventions used, the context of the healthcare setting, and the level of engagement from healthcare providers (Avent et al., 2020, Suttels et al., 2022).

Critical Appraisal and Synthesis of Evidence

With the focus on over-prescribing antibiotics in the outpatient setting, this search yielded descriptive, qualitative, and quantitative evidence, including multiple systemic reviews

(see Appendix A, Table A1, and A2). The systemic reviews identified gaps in rural and urban outpatient antibiotic guidelines and staff education interventions. Designs consisted of before and after studies, prospective observational studies, quasi-experimental, cross-sectional study, prospective quality improvement initiatives, literature review, qualitative synthesis, and quality improvement (see Appendix A, Table A1, and A2). Significant homogeneity was evident in setting, study design, and study outcomes. The majority of studies took place in outpatient settings, included a quality improvement project, and resulted in decreased antibiotic prescription rates across studies (see Appendix A, Table A1, and A2).

The main focus of the studies selected was factors influencing the over-prescription of antibiotics. Talking points included the impact on patient satisfaction, diagnostic uncertainty, rural location, and lack of antimicrobial knowledge from patients and providers (see Appendix A, Table A1, and A2). In one study conducted by Simeoni et al. (2022), they highlight that increasing knowledge about antimicrobials may have less impact compared to antimicrobial interventions that aid providers to apply during times of uncertainty or constraints when prescribing antibiotics. The study consisted of a qualitative, exploratory study in Ontario, Canada, indicating a lower level of evidence compared to the quality improvement projects and systemic reviews revealing that antimicrobial knowledge impacts the over-prescription of antibiotics.

Over the past five years, research on over-prescribing antibiotics has focused on patient satisfaction scores, diagnostic uncertainty, and lack of antimicrobial knowledge. However, only a handful of studies have studied the behavioral impact and the effects of education modalities on their own. Of the studies included in this literature review, only one article overviewed the impact of organizational factors on over-prescribing antibiotics (Huang et al., 2021).

Furthermore, of the studies compiled in this review only one study reviewed the effects of education as its own intervention (Satterfield et al., 2020). In the cross-sectional study done by Huang et al. (2021), they found that organizational-related factors, which include the organization's norms and culture surrounding the use of antibiotics, have strong determinants of antibiotic prescribing rates for upper respiratory tract infections that occurred in the emergency department. On the other hand, Satterfield et al. (2020) found in their systemic review that very few studies compare education modalities and educational material, primarily used to support antimicrobial stewardship programs and are rarely studied on their own. A systemic review found that using computer-aided clinical decision support systems in primary care could potentially improve antibiotic prescribing behaviors (Holstiege et al., 2015).

Conclusion

This evidence validates that implementing an antimicrobial stewardship program in the outpatient setting impacts prescription rates. Outpatient settings do not have quick access to diagnostic tools, making prescribing antibiotics easier. Patients also want to feel better quicker, with the expectation of antibiotics to fix that, and when clinically not validated, it creates a barrier between the patient and provider. Another significant factor is provider and patient antimicrobial knowledge and their impact. These elements urge the need for outpatient antimicrobial stewardship guidelines to address the over-prescription of antibiotics in the outpatient setting. The plethora of evidence supporting the implementation of outpatient antimicrobial stewardship guidelines warrants the necessity of such sooner than later.

Antimicrobial stewardship programs and education tailored to patients and providers in the outpatient setting have decreased antibiotic prescription rates (see Appendix A, Table A1, A2). The evidence supports this due to accurate interventions targeting the areas affecting the

over-prescription of antibiotics. For continued success in decreasing rates of antibiotics, education for both the patient and provider must be implemented, and antibiotic stewardship programs must be utilized in the outpatient setting.

Theory/Theoretical Framework Application

The over-prescription of antibiotics has multiple levels of impact. The Social Ecological Model (SEM) is a theoretical framework commonly used in public health to better grasp the complex interactions between individuals and their environment and their impact on health behaviors (Grzywacz & Fuqua, 2000). The different levels of the SEM propose that individual behaviors are influenced by interpersonal, organizational, community, and societal influences (Bronfenbrenner, 1994). This model fits with the over-prescription of antibiotics due to its multifaceted factors affecting the over-prescription of antibiotics in an outpatient setting. This model recognizes that not just one factor influences behavior, but they are interconnected (Bronfenbrenner, 1994).

The SEM model considers multiple levels of influence on behavior, ranging from individual factors to broader societal and environmental influences, providing a comprehensive framework for designing interventions to address antibiotic over-prescription. The SEM offers segmentation strategies, engaging patients in shared decision-making, fostering a culture of antibiotic stewardship within healthcare organizations, implementing policy changes to support appropriate antibiotic prescribing, and raising public awareness about the impact of over-prescribing antibiotics (see Appendix B, Figure B1).

The multiple levels of this model highlight the importance of addressing the problem from multiple driving points. The SEM outlines this project by addressing the individual level, such as knowledge, beliefs, and habits of healthcare providers that play a role in prescribing

antibiotics. The interpersonal level consists of interactions between providers and their patients and wanting to satisfy their patients. At the organizational level, whether it's culture or antibiotic guidelines or organizational norms prioritizing patient satisfaction scores over appropriate antibiotic use, may contribute to over-prescription. Community norms, access to healthcare resources, public awareness about antibiotic stewardship, and over-prescription outcomes can help shape community attitudes and behaviors. Finally, policies at the local, national, and international levels, including regulatory frameworks and antibiotic stewardship initiatives, can significantly impact antibiotic prescribing practices.

Implementation Framework

The quality improvement model that aligns with the SEM framework is the Plan-Do-Study-Act cycle (PDSA) (see Appendix B, Figure B2). PDSA cycles allow for structuring change and testing those outcomes in various settings (Taylor et al., 2014). The SEM framework and PDSA cycle emphasize the importance of understanding systems and context and acknowledge that interventions may need to be revised and adjusted. The SEM framework and PDSA cycle acknowledge that interventions may need to be revised and adjusted to be successful. Additionally, they both consider the entire system or process when identifying areas for improvement and emphasize the importance of evidence-based practice (McLeroy et al., 1988; Taylor et al., 2014).

Implications for Practice Change

After thorough research, it is evident that the over-prescription of antibiotics can have lasting effects on patients, the community, and the way infections are treated in the future. The Center for Disease Control (CDC) offers guidelines for ambulatory practices to fight the ongoing battle of antibiotic over-prescription. The CDC Core Elements of Antibiotic Stewardship can be

implemented in the mobile urgent care as a guide to improve the over-prescription of antibiotics. These guidelines will be especially useful for the mobile urgent care because no guidelines are currently being utilized within the practice. Initial data includes antibiotic prescription utilization from the previous year on four specific diagnosis codes. This project will consist of multiple steps, beginning with a retrospective chart audit on previous antibiotic prescription rates based on four common diagnosis: acute pharyngitis, acute bronchitis, upper respiratory infection, and acute sinus infection. Followed by an initial 60-minute provider education, followed by weekly check-ins over the course of 12 weeks. After the 12 weeks is concluded another retrospective chart audit will be conducted on antibiotic prescriptions prescribed and for what diagnosis. Number of educational handouts that were utilized will be accounted for. This will allow for the collection of internal data within the mobile urgent care, including antibiotic prescribing behaviors, knowledge gaps, and educational material utilized.

With the implementation of the CDC toolkit, outcomes that could be measured include antibiotic prescriptions from September to December of 2024. Before an antibiotic should be prescribed, the CDC guidelines should be considered; does their symptoms require antibiotics, could they benefit from delayed prescribing, does the patient need more education on when antibiotics are necessary (CDC, 2024). Key stakeholders in the over-prescription of antibiotics include healthcare providers and healthcare facilities (inpatients, outpatient, and emergency rooms).

Methods

Ethical Considerations

Institutional Review Board (IRB) approval was received through Arizona State University on September 4, 2024 (see Appendix F). Complete anonymity was maintained for

project purposes for data collection and analysis. The demographic, Center for Medicare & Medicaid Survey Pre and Post survey responses were recorded on paper without any identifiers. Verbal consent was read to each participant before surveys were given (see Appendix G). Every participant was informed they have the right to participate or withdraw from participating at any time during the project without penalty. Participants were to be 18 years of age or older.

Objectives

This project aims to gather data to better utilize the CDC Core Elements of Antibiotic Stewardship in the outpatient setting. Information on healthcare providers' knowledge and attitudes toward prescribing antibiotics will be collected pre- and post-implementation, opportunities for improving antibiotic education for providers and engaging patients in shared decision-making. Provider and patient awareness of antibiotic stewardship will aim to enhance the utilization in the urgent care setting. Empowering patients in shared decision-making will improve communication opportunities for discussing alternatives to antibiotics and setting expectations, including delayed prescribing and symptom-relief prescription pads. Increased awareness of proper antibiotic utilization and practical antibiotic prescriptions options will allow providers to properly utilize the CDC core elements of Antibiotic Stewardship in the urgent care setting. The CDC's Core Elements of Antibiotic Stewardship aim improve antibiotic use, patient outcomes, and patient safety. This project promotes the objectives of this fundamental principle from the CDC.

Population and Setting

This project includes surveys administered to providers of an urgent care in the southwestern United States that offer urgent care services to patients of all ages. This urgent care

serves a diverse patient population. Participants are required to be 18 years of age or older, speak and write English, and hold prescribing privileges.

Instruments

The questionnaires included demographic, pre-implementation, and post-implementation surveys. The first is the demographic survey (see Appendix H), which included seven questions about the provider's experience, patient population, and any specialty training they may have received.

The second survey was adapted from the Center for Medicare & Medicaid Services (CMS) Antimicrobial Stewardship Pre-implementation Provider Survey (see Appendix I). This tool evaluates the provider's knowledge and attitude on antibiotic utilization. The survey includes 25 questions regarding prescribing practices, beliefs, and attitudes. The last survey was questionnaire from the Center for Medicare & Medicaid Services (CMS) Antimicrobial Stewardship Post-Implementation Provider Survey (see Appendix J). After implementing the CDC Core Elements guidelines, this gathered information on the provider's knowledge, attitudes, and antibiotic utilization.

Data Collection

Providers who wished to participate in this project worked in the urgent care. Providers who wanted to participate were read the recruitment letter and informed consent (see Appendix G). If the providers agreed to participate, all three surveys were given to the providers to complete and were reordered on paper copies without any identifiers. The total time to take the demographic survey was approximately 2 minutes; the 25 item multiple choice and fill-in-the-blank Center for Medicare & Medicaid Services (CMS) Antimicrobial Stewardship Survey-PRE took approximately 15 minutes to complete, and the 20 item multiple choice and fill-in-the-

blank Center for Medicare & Medicaid Services (CMS) Antimicrobial Stewardship Survey-POST took approximately 15 minutes to complete. All data collected for this project analysis remained anonymous.

Data Analysis Plan

The PPI collected data from the urgent cares electronic health record examining antibiotic prescriptions from the previous year from September to December 2023 over 12 weeks and then post intervention period from September to December 2024. The PPI looked at four of the most common diagnosis for antibiotics that included acute pharyngitis, bronchitis, upper respiratory infection, and acute sinusitis. Patients' charts were included by diagnosis codes entered by the provider. All identifiable patient information were de-identified. Non-identifiable patient information was utilized for pre and post comparison.

Descriptive statistics, pre and post comparison was utilized due to the small sample size. This allowed for the efficient simplification, summarization and organization of data. Utilization of an excel spreadsheet was used to gather data that included patients' diagnosis, and if any diagnostic test was used during the visit, and if the patient was prescribed antibiotics for the following diagnosis: acute bronchitis, acute respiratory infections, acute pharyngitis, and acute sinusitis.

Funding

Primary funding for this project came from the site director, who donated time. Expenses related to the implementation of the project included simple office supplies such as cardstock and ink for printing educational material and surveys.

Results

Comparative analysis was performed on each of the following to identify a significant change to the rates of prescribing antibiotics pre- and post-intervention. Pre-implementation from September to December 2023 the provider saw 163 patients and 44 antibiotics were prescribed for the following four diagnosis acute bronchitis, acute pharyngitis, upper respiratory infection, and acute sinus infection. Post-implementation from September to December 2024 the provider saw 176 patients and a total of 21 antibiotics were prescribed for the same four diagnosis revealing a 56% relative reduction in antibiotic prescribing after implementation (Figure 1). Patients who received education on antibiotics were 56% of patients, patients who received a delayed prescribing prescription pads was 12%, 13% of patients received symptoms relief prescriptions pads, and 18% of patients were prescribed antibiotics. Pre-implementation, the prescribing rate for antibiotics for acute pharyngitis was 0 and remained at 0, acute bronchitis was 1.84% and decreased to 0%, Upper respiratory infection pre-implementation was 6.13% and decreased to 3.98%, acute sinusitis was 19.02% and decreased to 7.95% (Figure 3).

Figure 1:
Provider Prescribing Rates; Pre/Post Implementations

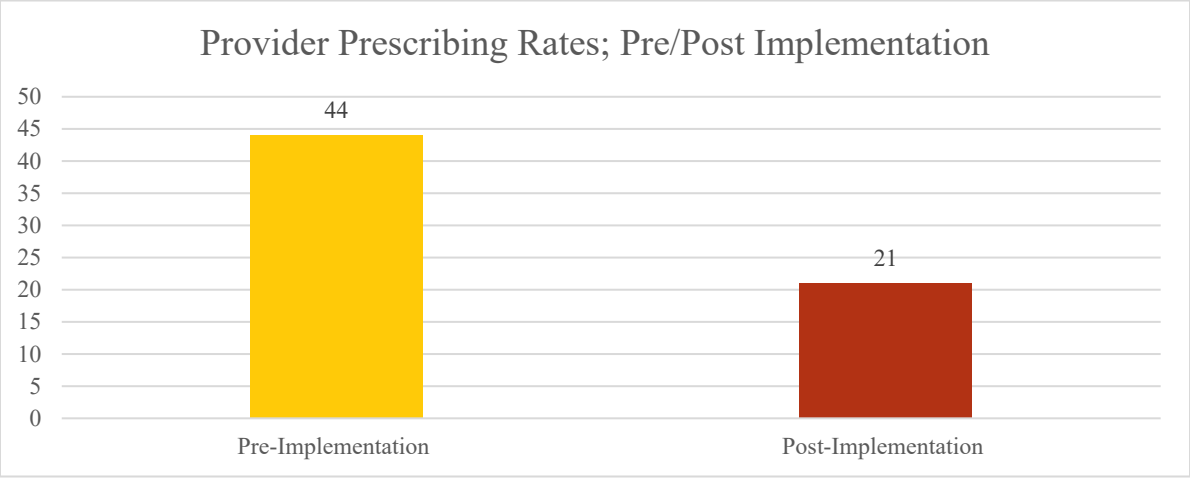


Figure 2:
Antibiotic Prescribing Rates per Diagnosis-Pre/Post Implementation

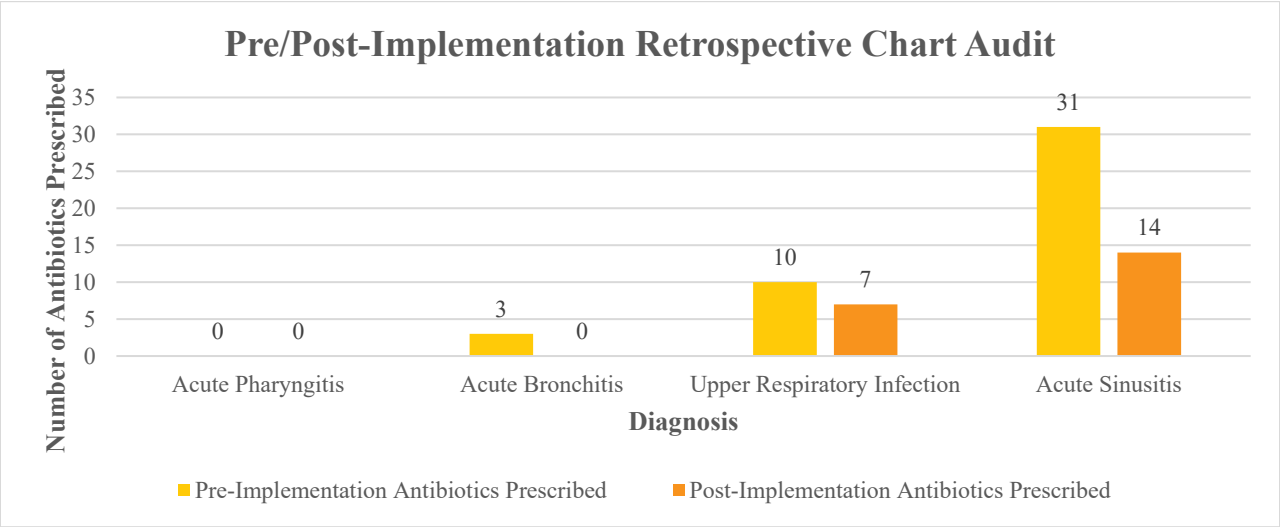
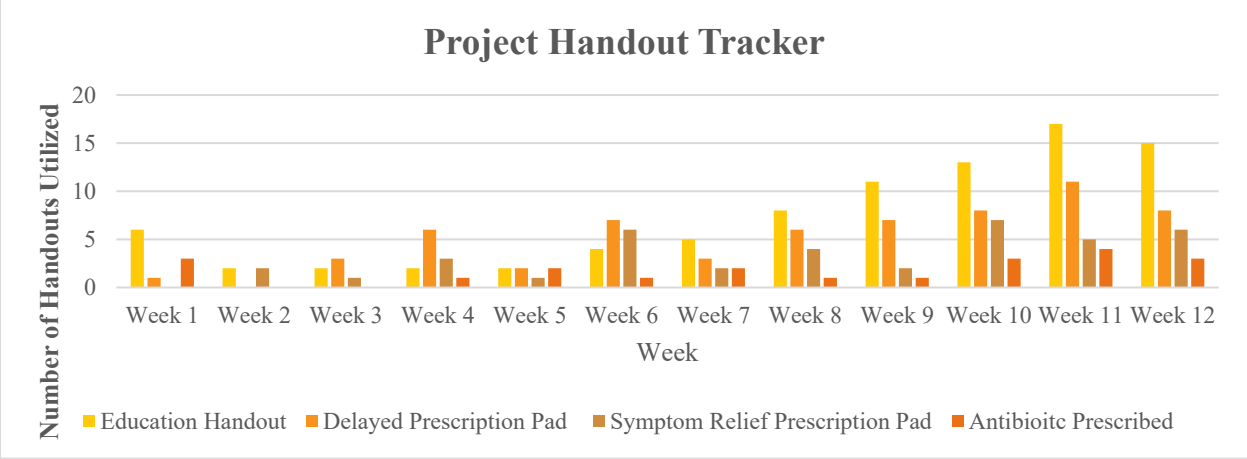


Figure 3:
Project Education Handout Tracker



Impact and Sustainability

Mobile urgent care patients will indirectly benefit by decreasing unnecessary antibiotic use. As the mobile urgent care utilizes antibiotic stewardship guidelines, patients' awareness of adverse events on antibiotics can create a better-informed community that understands appropriate antibiotic use, benefiting patients in the long term. The impact of antibiotic

stewardship on providers within the mobile urgent care includes improved prescribing practices, enhanced clinical decision-making, increased confidence and knowledge, decreased antibiotic resistance in the community, and decreased patient adverse outcomes. Providers continue to utilize the CDC Core Elements of Outpatient Antibiotic Stewardship to decrease unnecessary antibiotic usage.

Discussion

This project aimed to assess the impact of evidence-based antibiotic stewardship guidelines in a mobile urgent care. During the 12-week intervention period, the mobile urgent care saw a total of 176 patients. Only 21 antibiotics were prescribed, and 188 handouts containing education on antibiotics, delayed prescribing, or symptom relief prescription pads were utilized (Figure 3). Compared to the same time the previous year, when the mobile urgent care saw 163 patients and 44 antibiotics were prescribed. A quality improvement project of implementing an antibiotic stewardship program by Stenehjem et al. (2023) of 493,724 urgent care encounters found similar results with a decrease in antibiotic prescription for respiratory conditions from 48% to 33%, with reductions of 22% at the start of the quality improvement project and a continued 5% decrease per month throughout the 1-year intervention. Supporting provider-driven education and implementing evidence-based guidelines positively impacted prescribing behaviors, and providers utilized alternative treatment strategies.

Strengths

Implementation of the CDC Core Elements of Antibiotic Stewardship, which follows evidence-based guidelines, improved antibiotic prescribing practices and reduced unnecessary antibiotic prescriptions in the mobile urgent care. Results demonstrated a decrease in antibiotic prescription post-implementation, showing the effectiveness of utilizing evidence-based

guidelines. Utilization of educational handouts provided patients with clear, evidence-based information on antibiotics, empowering shared decision-making on their treatment options.

Barriers and Limitations

This quality improvement project had various limitations. The project was conducted in a small mobile urgent care, which is unique in its own setting. Sample size was limited due to limited number of providers working for the urgent care. This quality improvement project would benefit from a larger provider population to validate the effectiveness on providers knowledge gap with antibiotic utilization. A mobile small urgent care with one provider will not provide a sufficient or accurate evaluation of antibiotic stewardship. Sites with more providers would be ideal to obtain validation of antibiotic stewardship guidelines and provider knowledge.

Implications and Recommendations for Future Research

Recommendations for future research should be to assess the mobile clinics antibiotics prescription utilization over the course of the entire year capturing both peak season where flu and virus cases are at their highest and non-peak season. While this project did emphasize four specific diagnoses, it did not evaluate factors such as patients picking up antibiotics with the delayed prescribing. Shifting future research on length of patient symptoms can continue to have a positive impact on abiding to antibiotic stewardship guidelines. A site with more providers to increase the sample size should also be considered. Continuing to utilize the CDC's Core Elements of Outpatient Antibiotic Stewardship is recommend as a permanent practice change at the current site.

Conclusion

The goal of implementing the antibiotic stewardship guidelines is to monitor antibiotic prescribing, improve antibiotic prescribed by providers, minimize misdiagnosis, and ensure that

the right drug, dose, and duration is selected when an antibiotic is needed as indicated by the CDC's *Core Elements of Outpatient Antibiotic Stewardship.* Antibiotic overuse continues to be a public crisis. The CDC estimates that at least 28% of antibiotics prescribed in the outpatient setting are not indicated. Implementing evidenced-based practices like the CDC's Core Elements of Outpatient Antibiotic Stewardship are demanded to continue reduction in antibiotic misuse.

Implementing the CDC's Core Elements of Outpatient Antibiotic Stewardship in this mobile urgent care decreased antibiotic prescriptions for acute bronchitis by 100%, upper respiratory infections by 30%, and acute sinusitis by 54.8%. Providers across all settings are the forefront of playing a role in combating antibiotic misuse and can aid in closing the gap by increasing their knowledge and awareness of antibiotic misuse by being vigilant of evidence-based guidelines. Integrating evidenced-based practices like the CDC's Core Elements of Outpatient Antibiotic Stewardship into everyday practice can decrease misuse, minimize diagnosis, and mitigate adverse outcomes in patients.

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Appendix A

Evaluation and Synthesis Table

Table A1

Evaluation Table Quantitative Studies

Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
Appaneal et al. (2023) Antibiotic Prescribing in Outpatient Settings: Rural Patients Are More Likely to Receive Fluroquinolones and longer Antibiotic Courses. **Country**: US **Funding**: VA Health Services Research and Development, Career	Health Communication Theory (Inferred)	**Design:** SR **Method:** Chart audits **Purpose:** Bringing to light the disparities in inappropriate antibiotic prescribing in patients living in rural areas**.**	**N=** 1,405,642 **Demographics:** Veterans, male (Hispanic, African American, white), married. **Setting**: Outpatient clinics **Exclusion:** Antibiotics prescribed inside of a hospital admission**.**	**IV1:** Antibiotic overuse **DV1:** Exposure to longer antibiotic courses in rural-residing veterans**.** **DV2:** Exposure to fluroquinolones in rural residing veterans	**Tools:** Generalized linear models and stratified analyses by region. **Validity/ Reliability:** Per the study using the chi-squared or Fishers exact tests where appropriate, the means were compared using t-tests, and the medians were compared using nonparametric Wilcoxon tests.	**Statistical Tests Used:** Chi-squared or Fishers exact tests, t-tests or nonparametric Wilcoxon tests.	**DV1:** 19% higher exposure to individuals in rural residing veterans compared to urban-residing veterans. **DV2:** 3% higher in rural -residing veterans compared to urban-residing veterans.	**Level of Evidence**: Level III **Strengths**: Setting is rural and US. Search strategy and data analysis adequately discussed. Large population's size. **Weakness**: Focused primarily on fluroquinolones, generalizability of results from VA population compared to the general population is limited due to demographic differences. **Feasibility**: Challenging due to wanting to implement telehealth that

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Development Award, and a Merit Award **Bias**: None								provides patients with an increased access to high-quality specialized ID care antibiotic stewardship-in rural communities this is challenging due to funding. **Application**: Implementing the CDC outpatient antibiotic guidelines requires education to providers and patient educations handouts
Buehrle et al., 2020) Sustained Reductions in Overall and Unnecessary Antibiotic Prescribing at Primary Care Clinics in a Veterans Affairs Healthcare System Following a Multifaceted Stewardship Intervention **Country**:	Health Communication Theory (Inferred)	**Design:** Prospective observational study **Method:** Baseline, intervention, post-intervention comparison **Purpose:** To explore the impact of implementing a antibiotic stewardship program.	**N=**7 primary care clinics **Demographics:** VA hospitals **Setting:** Primary care clinics located At 7 different geographical sites throughout southwestern Pennsylvania and southern Ohio. **Exclusion:** Patients not given an antibiotic prescription.	**IV1:** Antimicrobial stewardship Intervention **DV1:** Antibiotic prescription rates **DV2:** Unnecessary Antibiotic Prescriptions **DV3:** Optimal antibiotic prescribing	**Tools:** HER, descriptive data **Validity/Reliability:** Cohort studies	**Statistical Tests Used:** Fisher exact and Mann-Whitney tests, Comparison	**DV1:** 35.6% reduction post intervention **DV2:** decreased from 58.8% to 37.8% from baseline to intervention. **DV3:** Overall, 19.9%, 36.6%, and 34.9% of prescriptions were written optimally	**Level of Evidence:** Level IV **Strengths:** Large sample pool adequately describes data analysis, first cohort study to examine overall outpatient antibiotic prescribing. **Weakness:** observational study, generalizability of outpatient antibiotic prescribing. **Feasibility:** Costs for educational material for providers. **Application:** Implementation of an

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US **Funding**: None **Bias:** LR								antimicrobial stewardship program
Ford et al. (2023) Use of clinical decision support for antibiotic stewardship in the emergency department and outpatient clinics: an interrupted time series analysis **Country**: US **Funding**: None **Bias**: None	A Shared Mental Framework (Inferred)	**Design:** before and after, quasi-experimental design **Method:** Implementation science methodology **Purpose:** Evaluate the impact of implementing clinical decision support tools in the outpatient setting for antibiotic prescribing.	**N=** 31 **Demographics:** Mixed urban and rural population **Setting**: ED and 31 PCC in CA **Exclusion:** Patients not being seen that required antibiotic use.	**IV1:** Implement ASP to reduce inappropriate antibiotic use URI **DV1:** Prescription rates of azithromycin **DV2:** Prescription rates of ciprofloxacin **DV3**: Prescription rates of levofloxacin **DV4**: Prescription rates of Moxifloxacin	**Tools:** ASP and CDS tools **Validity/ Reliability:** All statistical tests were 2 sided, and P values <.05 were considered significant.	**Statistical Tests Used:** ITS, HER, SAS studio software and SRA.	**DV1:** prescriptions rates for azithromycin fell from 11% to 6% **DV2**: prescriptions rates for ciprofloxacin fell from 4% to 3% **DV3**: prescriptions rates for levofloxacin remained the same at 9% **DV4:** prescriptions rates for moxifloxacin went from <1% to 9%	**Level of Evidence**: Level III **Strengths**: Evidence based guidelines and practices. Adequately describes data analysis. **Weakness**: Pre-implementation and post-implementation periods were not standardized lengths. Small sample size. Did not assess appropriateness of prescription use. CDS had been suppressed for pre-existing personal preference lists which may have limited its effect. Study was performed within a single health system which limits generalizability. **Feasibility**: Implication of an ASP program with education to providers. **Application**: Outpatient, ED, PCS, UCS

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
Huang et al. (2021) Determinants of antibiotic over-prescribing for upper respiratory tract infections in an emergency department with good primary care access: a quantitative analysis **Country:** Asia **Funding:** National Healthcare Group of Singapores Clinician Scientist Career Scheme. **Bias:** High antibiotic prescribers may be less willing to complete the survey, posing potential selection bias but not likely due to an 87% response rate.	Patient factors in healthcare improvement (inferred)	**Design:** Cross Sectional Study **Method:** Survey questionnaire developed based on literature and prior qualitative study **Purpose:** Assess the clinical and non-clinical determinants of antibiotics prescribing for uncomplicated URTIs in a busy adult ED, focusing on junior physicians.	**N=** 150 junior physicians **Demographics:** Patients admitted to Tan Tock Seng Hospital **Setting:** ED of teaching public hospital in Singapore. Exclusion: Senior physicians in the ED **Attrition:** Out of 150 junior physicians working at the ED, 130 completed the survey resulting 87% response rate. 13% (20 physicians) who did not complete the survey	**IV1:** Frequency of self-reported antibiotic prescribing percentage for URTI patients. **DV1**: Previous experience with patients requesting antibiotics. **DV2:** Perceived over prescribing of antibiotics in the ED.	**Tools:** Survey Questionnaire **Validity/ Reliability:** Imputed missing data <3% of the dataset with MICE. Single missing response of the variable' Years of practice as a physician was imputed (Imputations=100, iterations per imputation =1000), PCA for dimension reduction highest factor for loafing of less than 0.5. Cronbach's alpha for each component (factor grouping) a Cronbach's alpha score of >0.7 is considered good**.**	**Statistical Tests Used** Data analysis was performed with factor reduction, descriptive analyses, comparative analysis, and multivariable logistic regression.	**DV1:** 95% were likely to prescribe antibiotics. **DV2:** >30% of U. RTI patients	Level of Evidence: Level VI **Strengths:** Comprehensive approach, mixed methods design, high response rate, statistical analysis. **Weakness:** Single center study, self- reported data, sample size, cross sectional design limitations **Feasibility:** Utilization of available resources such as survey questionnaires and statistical software for analysis. **Application:** Urgent Care/ Emergency Rooms can use these findings to tailor antimicrobial stewardship programs aimed at optimizing antibiotic use. Implementing targeted education on prescribing practices, clinical.

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Laude (2020) Implementing Antibiotic Stewardship in a Network of Urgent Care Centers **Country**: United States of America **Funding**: Not stated **Bias**: None	The CDC Core Elements of Outpatient Antibiotic Stewardship	**Design:** Prospective quality improvement initiative design **Method**: Chart audits **Purpose:** Implement AS initiates within the UCS using the CDCs core elements.	**N=** 204,662 total number of visits during study period **Demographics:** **Setting:** Five UCS within two hospitals, community based academic health care systems. **Inclusion:** Five UCCs in Delaware **Attrition:** NA	**IV1:** Antibiotic stewardship initiated within urgent care settings (CDCs core elements of outpatient antibiotic stewardship) **DV1:** Total prescribing rate **DV2:** Azithromycin prescribing rate.	**Tools:** Electronic medical records data, REDCap surveys (research electronic data capture is secure, web based, electronic data collection software chart audits). **Validity/ Reliability:** REDCap surveys	**Statistical Tests Used:** Joint point regression and confidence intervals.	**DV1:** total reduction of 36.0% compared to preintervention/early intervention period. **DV2:** Total reduction of 77.6% compared to the pre-intervention/early intervention period.	**Level of Evidence**: Level VI **Strengths**: Comprehensive approach, longitudinal analysis, data collection methods, and ethical considerations **Weakness**: Lack of control group, limited generalizability, focus on descriptive analysis. **Feasibility**: Implementation strategies include educational presentations, developing treatment guidelines, and implement tracking systems appear feasible in healthcare settings. **Application**: Urgent care settings can use the insights from this study to design stewardship initiatives that address specific needs and challenges of the over prescription of antibiotics in outpatient settings.

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Lim et al. (2020) Impact of national interventions to promote responsible antibiotic use: a systemic review. **Country**: National **Funding**: Saw Swee Hock School of Public Health ARP, national Medical Research Council Centre Grant Programme-Collaborative Solutions Targeting Antimicrobial Resistance Threats in Health Systems, AMR research grant. **Bias**: LR.	The behavioral model of healthcare utilization (inferred)	**Design:** SR **Method**: PRISMA guidelines, Medline, Embase and Global Health, LICAS, IMSEAR, IMEMR, WPRIM, Africa-Wide Information **Purpose**: Assess the impact of responsible use initiatives implemented at the national level to reduce unnecessary antibiotic consumption.	**N=** 34 **Setting**: All health care settings (primary, secondary, tertiary care) as well as community. **Exclusion:** Studies with no reported outcomes relating to antibiotic consumption and/or prescription were excluded.	**IV1:** National enforced interventions or antibiotics **DV1:** Prescribing restrictions **DV2:** Campaigns for HCP	**Tools:** PRISMA **Validity/ Reliability:** Cochrane Risk of Bias Tool for Non-Randomized Studies of Interventions	**Statistical Tests Used:** Qualitative summary of interventions	**DV1**: Decrease in antibiotic consumption when interventions were implemented. **DV2:** At the primary care level four studies showed an overall decrease in the number of antibiotic prescriptions per physician.	**Level of Evidence:** Level V **Strengths:** Sought studies that brought together evidence on the types of government policy interventions addressing AMR. **Weakness:** Few studies showed limited or no impact post intervention, unable to identify evaluations of national programs that were not published **Feasibility:** Minimal with implementation of established antibiotic guidelines, education for HCP would be a cost outpatient centers would have to consider**.** **Application:** Implementation of National-level interventions to reduce inappropriate prescription to antibiotics education for HCP with already established guidelines.

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Rasmussen AK. (2022) Antibiotic Prescribing Patterns for Sinusitis in an Urgent Care and Convenience Care Setting: A Quality Improvement Project **Country**: United States **Funding**: None reported **Bias**: None	Levin's Change Theory model	**Design:** Pre- and post-study design **Method:** PubMed, MEDLINE, CINAHL, the Cochrane library and government websites LR. **Purpose:** Determine the effect of an educational program on provider antibiotic prescribing practices.	**N= 383** **Setting**: Urban urgent care and convenience care clinics **Exclusion:** 17 or younger of age. Patient with concomitant infection. **Attrition:**	**IV1:** Provider Education **DV1:** Antibiotics prescribed. **DV2:** Guidelines followed.	**Tools:** Excel spreadsheets. **Validity/ Reliability:** CDC sinusitis clinical treatment guideline.	**Statistical Tests Used:** Pre-intervention data compared to postintervention data.	**DV1:** 22.8% decrease in antibiotics prescribed. **DV2:** 6.1% increase in guidelines followed**.**	**Level of Evidence**: Level VI **Strengths**: Did pre-intervention and post-intervention comparison. Evidence based guidelines from CDC, Specific measures were implemented to preserve integrity of data. **Weakness**: Small observation studying window. COVID 19 pandemic could have impact on research validity. **Feasibility**: Can be included in education, email, zoom meeting, and handouts **Application**: Education was delivered via Microsoft teams and handouts. There was also recording of Microsoft Teams meeting made available to staff.

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Satterfield et al. (2020) The role of education in antimicrobial stewardship **Country**: United States **Funding**: None reported **Bias**: None	Health Belief Model (Inferred)	**Design:** Literature review, Qualitive Synthesis **Method:** PubMed and EMBASE search **Purpose:** Outlining the methods and impact of various practical education intervention on antimicrobial stewardship outcomes	**N=** 31 **Setting:** Outpatient, inpatient, community, and long-term care facilities **Exclusion:** Studies without educational intervention as a part of ASP.	**IV1:** Educational interventions for antimicrobial stewardship **DV1:** Antimicrobial prescribing behaviors **DV2:** Patient education impact	**Tools:** Literature search, data collection, categorization o education interventions, comparative analysis **Validity/ Reliability:** CDC guidelines**.**	**Statistical Tests Used** Descriptive statistics, inferential statistics, Mann-Whitney U test	**DV1:** Decrease in antibiotic prescribed for ARI (41.6% vs 27%) **DV2**: 14% decrease in patients ultimately receiving antibiotics among those who had received education on antibiotics. .	**Level of Evidence**: Level V **Strengths**: Thorough literature review, diverse range of studies that address various aspects of antimicrobial stewardship, offers effective EBP educational intervention in antimicrobial stewardship. **Weakness**: Lack of published studies specifically targeting non-prescribers (nurses) with educational interventions, many studies focused on URIs, the study highlights the limited impact of passive patient education tools like educational handouts. **Feasibility**: Minimal with education and educational handouts. **Application:** Staff training and handouts on the benefits of education dedicated to the proper use of antibiotics prescribing.

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
Stenehjem et al. (2023) Implementation of an Antibiotic Stewardship Initiative in a Large Urgent Care Network **Country:** United States **Funding:** CDC Safe Healthcare Epidemiology and Prevention Research Development (SHEPheRD) Program **Bias:** Not stated	Health Communication Theory (Inferred)	**Design:** Quality Improvement **Method:** Implemented interventions based on CDC Core Elements. **Purpose:** Evaluate the impact of an antibiotic stewardship program specifically designed for urgent care settings on antibiotic prescribing for respiratory conditions.	**N=** 493,724 UCS encounters, of which 207,047 were respiratory conditions **Demographics** **Setting:** UCS network with 38 UC clinics and 1 telemedicine clinic included. **Exclusion:** non respiratory condition visits **Attrition:** NA	**IV1:** Implementation of an antibiotic stewardship program specifically designed for urgent care setting. **DV1:** Antibiotic prescribing for respiratory conditions **DV2**: Patient satisfaction **DV3:** Hospitalization within 14 days of UCS	**Tools**: EHR records, **Validity/ Reliability:** CDC core elements guidelines.	**Statistical Tests Used:** Interrupted time series model and binomial generalized estimating equations	**DV1:** Total reduction of 477.8% during the baseline period to 33.3% in the intervention period **DV2**: During the baseline period, the mean response rating as 4.4 (of 2533 surveys) compared with 4.3 (of 2189) during the intervention period. **DV3:** Hospitalizations within 14 days of a UC encounter occurring in 0.4% of the encounters during the baseline period compared with 0.5% of encounters during the intervention period.	**Level of Evidence**: Level VI **Strengths**: Adequately described data analysis and statistical data. Large sample pool. **Weakness**: Not a randomized design which limits interpretation of casualty. **Feasibility**: Guideline already exists feasibility would include implementing guidelines and provider education/training. **Application:** Implementing the CDCD core elements into the urgent care practice, staff education and training.

Key: **AASC**-ambulatory antibiotic stewardship committees; **AMK**-antimicrobial knowledge **ARI**-acute respiratory infection; **AS**- antimicrobial stewardship; **ASP**- antibiotic stewardship program; **CDC**-Centers for Disease Control and Prevention; **CDS**- computerized clinical decision support; **CI**-comparison intervention; **COPD**- chronic obstructive pulmonary disease; **DV**-dependent variable; **ED**-emergency department; **EHR**-electronic health record; **HCP**-health care professionals; **ID**- infectious disease; **ITS**- interrupted time-series **IV**-independent variable; **LR**-limited risk; **MICE**-Multiple Imputation by Chained Equations; **OS**-Observational study; **PC**-primary care; **QES**-quasi-experimental design; **QID**-quality improvement design; **QIP**-quality improvement project; **S**-significant; **SPSS**-IBM Statistical Package for Social Sciences; **SR**-systemic review; **SRA-** segmented regression analysis; **UC**- unchanged; **UCS**-urgent care setting; **URI**-upper respiratory infection;

Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
Tonazzi et al. (2022) Delayed antibiotic prescribing to reduce antibiotic use; an urgent care practice change. **Country:** United States **Funding:** None **Bias:** Not stated	Model for improvement (inferred)	**Design:** Quality Improvement Project **Method:** Implemented a quantitative quality improvement project to determine impact of delayed antibiotic prescribing on antibiotic usage rates for adult patients with URI symptoms in UCS **Purpose:** Evaluate the effects of guidelines on antibiotics prescription rates.	**N=** 927 encounters for URIs **Demographics:** **Setting:** UCS in central Arizona **Exclusion:** Adults without URIs	**IV1:** Implementation of the CDC adult treatment guidelines for URIs in an UCS **DV1:** Antibiotic consumption rates among adult patient withs URIs in the UCS	**Tools:** Follow up phone calls, retrospective chart review. **Validity/ Reliability:** CDC guidelines, patient education strategies, delayed antibiotic prescribing	**Statistical Tests Used:** Mann-Whitney U test SPSS	**DV1:** The implementation of the CDC guidelines for URIs led to a 12% reduction in antibiotic consumption.	**Level of Evidence**: Level VI **Strengths**: Implementation of evidence-based guidelines, quantitative methodology, QIP, patient education, sustainability, ad statistical analysis. **Weakness**: Limited generalizability, data collection limitations, need for a more robust statistical analysis that incorporates demographic details. **Feasibility**: Implementation of CDC guidelines and patient education leaflets and costs of education. **Application:** Resource allocation, staff engagement, patient education.

Key: **AASC**-ambulatory antibiotic stewardship committees; **AMK**-antimicrobial knowledge **ARI**-acute respiratory infection; **AS**- antimicrobial stewardship; **ASP**- antibiotic stewardship program; **CDC**-Centers for Disease Control and Prevention; **CDS**- computerized clinical decision support; **CI**-comparison intervention; **COPD**- chronic obstructive pulmonary disease; **DV**-dependent variable; **ED**-emergency department; **EHR**-electronic health record; **HCP**-health care professionals; **ID**- infectious disease; **ITS**- interrupted time-series **IV**-independent variable; **LR**-limited risk; **MICE**-Multiple Imputation by Chained Equations; **OS**-Observational study; **PC**-primary care; **QES**-quasi-experimental design; **QID**-quality improvement design; **QIP**-quality improvement project; **S**-significant; **SPSS**-IBM Statistical Package for Social Sciences; **SR**-systemic review; **SRA-** segmented regression analysis; **UC**- unchanged; **UCS**-urgent care setting; **URI**-upper respiratory infection;

Table A2

Synthesis Table

Study (Author, year)	Appaneal et al. (2023)	Buehrle et al. (2020)	Ford et al. (2023)	Huang et al. (2021)	Laude et al. (2020)	Lim et al. (2020)	Rasmussen (2022)	Satterfield et al. (2020)	Stenehjem et al. (2023)	Tonazzi et al. (2022)
Design	SR	OS	QES	CSS	QID	SR of VSD	QIP	SR	QIP	QIP
LOE	III	IV	III	VI	VI	V	VI	V	VI	VI
Rural Population	S		S							
Urban Population	S	S	S	S	S	S	S			S
Bias	None	LR	None	None	None	LR	None	None	None	LR
M-Age	58.9								30	39.61
Location	US	PA	CA	Singapore	DE	N	AZ	N	US	AZ
Setting										
ER			S	S		S				
PC	S	S	S			S	S			
UCS					S	S	S			S
Intervention & Findings										
Education for Clinicians	S	S		S	S	S	S	S	S	S
Education for patients					S			S	S	S
ASP	S	S	S		S	S	S	S	S	S
Antibiotic Prescription rates	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
Inappropriate antibiotic prescription		↓	↓		↓	↓	↓	↓	↓	↓
Organizational Norms				S				S		
Outpatient Stewardship Program		↑ AMK	↑ AMK		S		S	↑ AMK	↑ AMK	↑ AMK
Patient satisfaction score					S			S	UC	UC

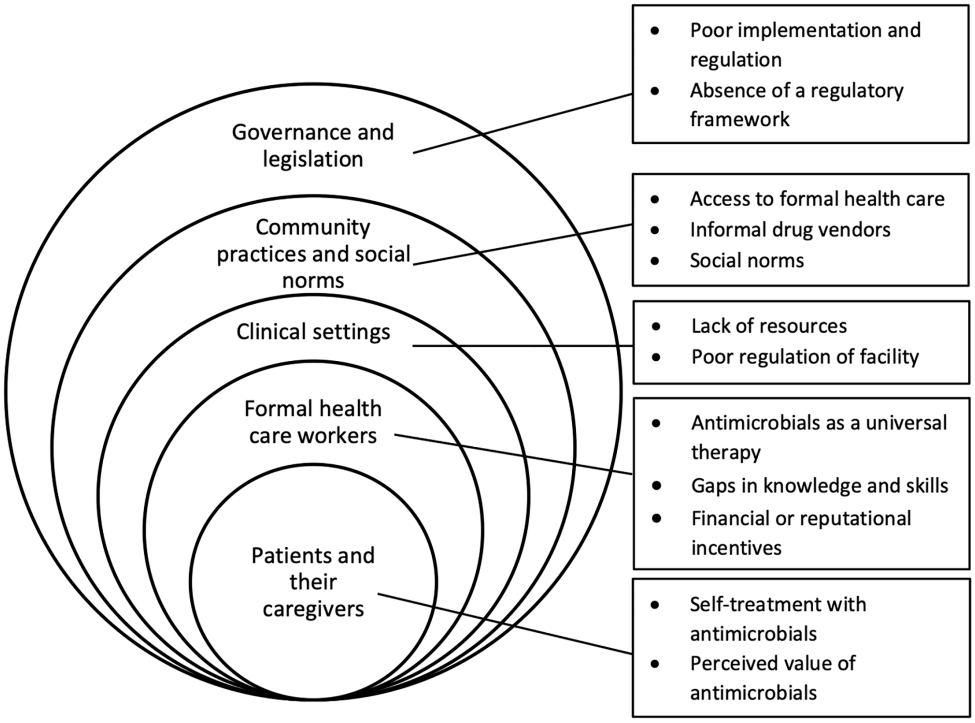
Key: **AASC**-ambulatory antibiotic stewardship committees; **AMK**-antimicrobial knowledge **ARI**-acute respiratory infection; **ASP**- antibiotic stewardship program; **CDC**- Centers for Disease Control and Prevention; **CDS**- computerized clinical decision support; **CI**-comparison intervention; **COPD**- chronic obstructive pulmonary disease; **DV**-dependent variable; **ED**- emergency department; **EHR**-electronic health record; **HCP**-health care professionals; **ID**- infectious disease; **ITS**- interrupted time-series **IV**-independent variable; **LR**-limited risk; **MICE**-Multiple Imputation by Chained Equations; **OS**-Observational study; **PC**-primary care; **QES**-quasi-experimental design; **QID**-quality improvement design; **QIP**-quality improvement project; **S**-significant; **SPSS**-IBM Statistical Package for Social Sciences; **SR**-systemic review; **SRA**- segmented regression analysis; **UC**-unchanged; **UCS**-urgent care setting; **URI**-upper respiratory infection;

Appendix B

Models and Frameworks

Figure B1

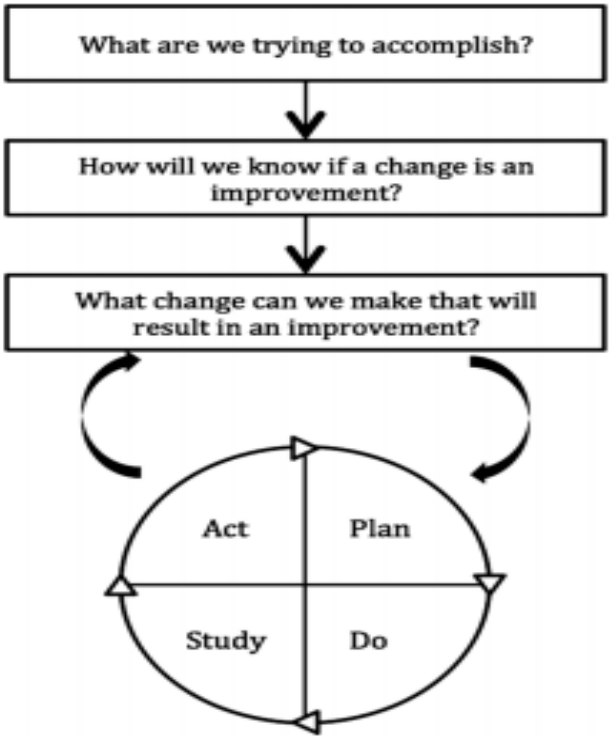
The Social Ecological Model



(Murray et al., 2024)

Figure B2

PDSA Cycle



(Taylor et al., 2014)

Appendix C

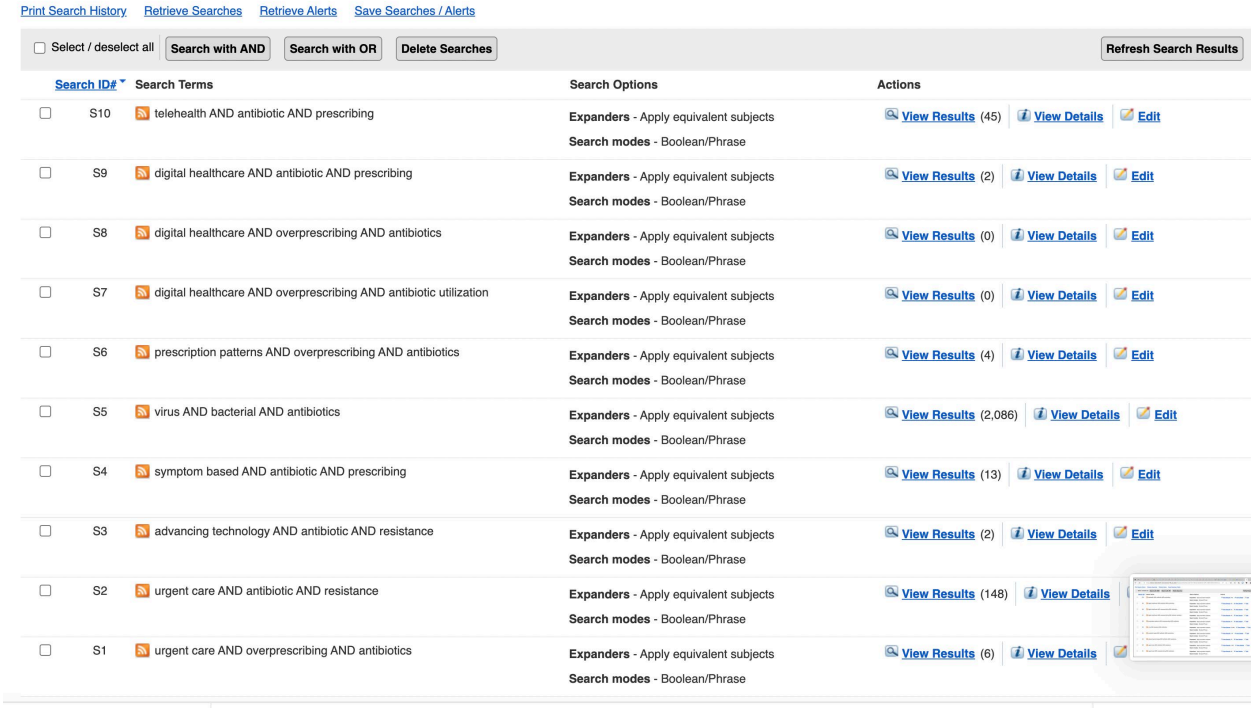
Database Search Screenshot: PubMed

Search	Actions	Details	Query	Results	Time
#15	•••	>	Search: **((urgent care) AND (healthcare technology)) AND (antimicrobial resistance)**	37	18:04:08
#14	•••	>	Search: **(symptom guided prescribing) AND (antibiotic stewardship)**	96	18:03:27
#13	•••	>	Search: **((telemedicine) AND (symptom guided prescribing)) AND (antimicrobial resistance)**	0	18:02:49
#12	•••	>	Search: **((telemedicine) AND (symptom guided prescribing)) AND (antimicrobial resistance) - Schema: all**	0	18:02:49
#11	•••	>	Search: **((urgent care) AND (evidence based prescribing)) AND (antibiotic stewardship)**	26	18:01:42
#10	•••	>	Search: **(((immediate medical attention) AND (biofire)) AND (evidence based prescribing)) AND (antibioitcs stewardship)**	0	18:00:42
#9	•••	>	Search: **(((immediate medical attention) AND (biofire)) AND (evidence based prescribing)) AND (antibioitcs stewardship) - Schema: all**	0	18:00:42
#8	•••	>	Search: **((urgent care) AND (overprescription)) AND (antibiotics)**	14	17:59:51
#7	•••	! >	Search: **(overprescription) AND (antibiotics over use)**	153	17:59:22
#6	•••	! >	Search: **((antibiotic resistance) AND (overprescrption)) AND (symptom base prescribing) - Spellcheck off**	0	17:58:29
#5	•••	>	Search: **((antibiotic resistance) AND (overprescription)) AND (symptom base prescribing)**	1	17:58:29
#4	•••	! >	Search: **urgent care setting and antibiotic resistance**	351	17:41:24
#3	•••	! >	Search: **antibioitc and urgent care setting - Spellcheck off**	0	17:41:03
#2	•••	! >	Search: **antibiotic and urgent care setting**	1,444	17:41:03
#1	•••	>	Search: **((overprescription) AND (antibiotics)) AND (urgent care)**	14	17:40:23

Showing 1 to 15 of 15 entries

Appendix D

Database Search Screenshot: CINHAL



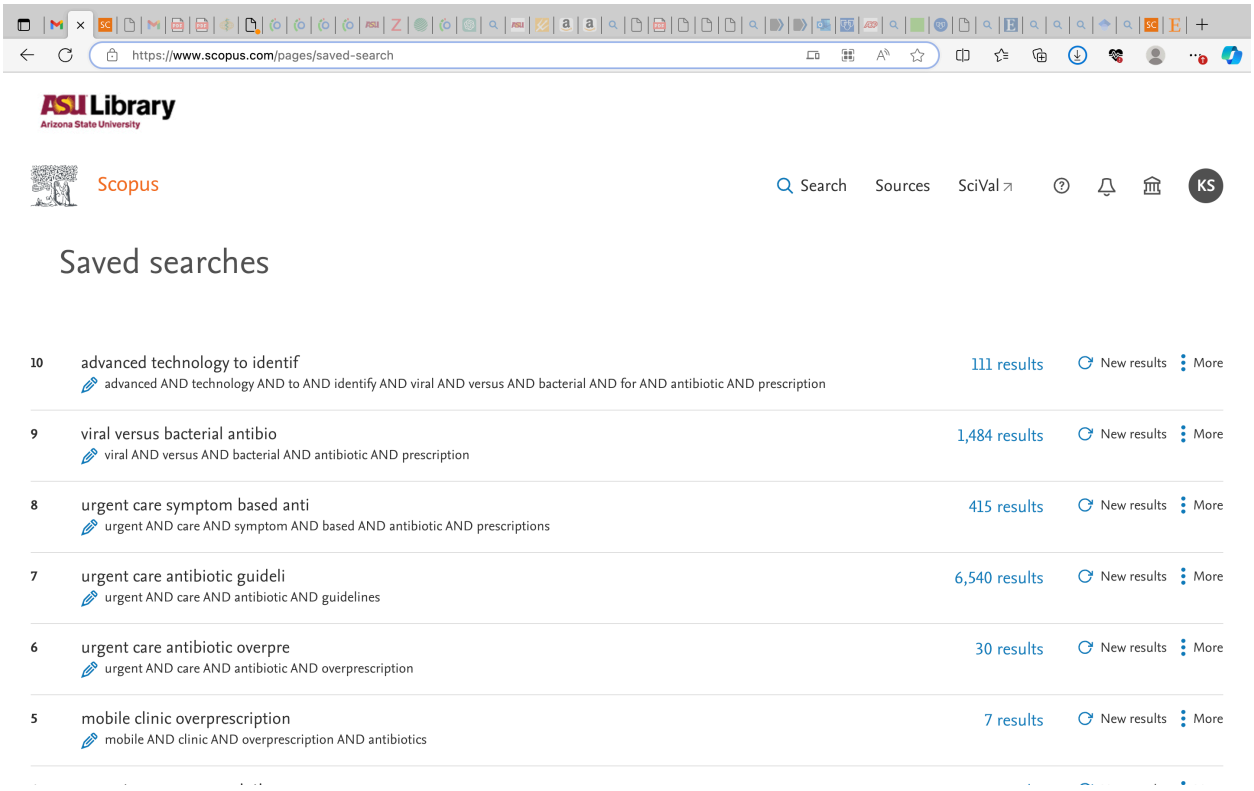
Print Search History | Retrieve Searches | Retrieve Alerts | Save Searches / Alerts

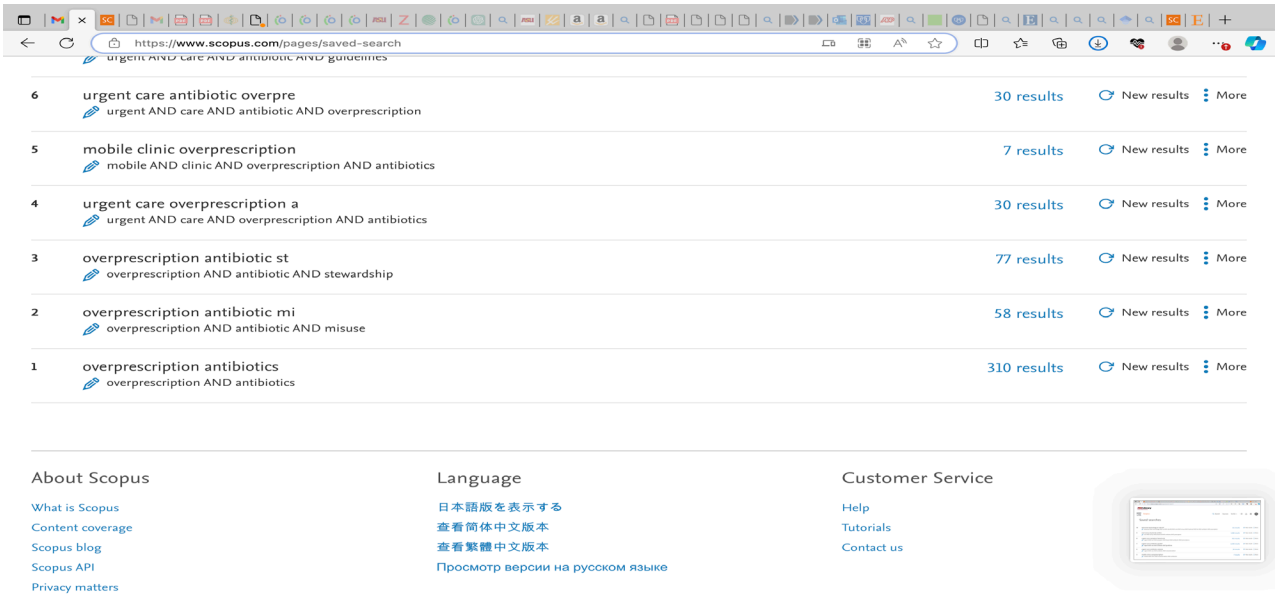
Select / deselect all | Search with AND | Search with OR | Delete Searches | Refresh Search Results

Search ID#	Search Terms	Search Options	Actions
S10	telehealth AND antibiotic AND prescribing	**Expanders** - Apply equivalent subjects **Search modes** - Boolean/Phrase	View Results (45) | View Details | Edit
S9	digital healthcare AND antibiotic AND prescribing	**Expanders** - Apply equivalent subjects **Search modes** - Boolean/Phrase	View Results (2) | View Details | Edit
S8	digital healthcare AND overprescribing AND antibiotics	**Expanders** - Apply equivalent subjects **Search modes** - Boolean/Phrase	View Results (0) | View Details | Edit
S7	digital healthcare AND overprescribing AND antibiotic utilization	**Expanders** - Apply equivalent subjects **Search modes** - Boolean/Phrase	View Results (0) | View Details | Edit
S6	prescription patterns AND overprescribing AND antibiotics	**Expanders** - Apply equivalent subjects **Search modes** - Boolean/Phrase	View Results (4) | View Details | Edit
S5	virus AND bacterial AND antibiotics	**Expanders** - Apply equivalent subjects **Search modes** - Boolean/Phrase	View Results (2,086) | View Details | Edit
S4	symptom based AND antibiotic AND prescribing	**Expanders** - Apply equivalent subjects **Search modes** - Boolean/Phrase	View Results (13) | View Details | Edit
S3	advancing technology AND antibiotic AND resistance	**Expanders** - Apply equivalent subjects **Search modes** - Boolean/Phrase	View Results (2) | View Details | Edit
S2	urgent care AND antibiotic AND resistance	**Expanders** - Apply equivalent subjects **Search modes** - Boolean/Phrase	View Results (148) | View Details |
S1	urgent care AND overprescribing AND antibiotics	**Expanders** - Apply equivalent subjects **Search modes** - Boolean/Phrase	View Results (6) | View Details |

Appendix E

Database Search Screenshot: Scopus





Appendix F

Institutional Review Board Approvals

ASU Knowledge Enterprise Development

EXEMPTION GRANTED

Diane Nunez
EDSON: DNP
602/496-0751
DIANE.NUNEZ@asu.edu

Dear Diane Nunez:

On 9/4/2024 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	Utilization of CDC Outpatient Core Guidelines for Antibiotic Stewardship
Investigator:	Diane Nunez
IRB ID:	STUDY00020641
Funding:	None
Grant Title:	None
Grant ID:	None
Documents Reviewed:	• Antibiotic Stewardship , Category: IRB Protocol; • CDC Delayed Prescribing Pad, Category: Technical materials/diagrams; • CDC Symptom Relief Pad, Category: Technical materials/diagrams; • CDC_CommitmenttoAntibioitcuse.pdf, Category: Technical materials/diagrams; • Center for Medicare & Medicaid Pre Survey , Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Center for Medicare & Medicaid Survey Post, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Demographic Survey, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Education Antibiotics Aren't Always the Answer , Category: Technical materials/diagrams; • Educational Outline , Category: Technical

	materials/diagrams; • Letter of Support, Category: Other; • Pre-Post Chart Audit , Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Project Audit Tracker , Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Recruitment Flyer, Category: Recruitment Materials; • Recruitment Letter, Category: Consent Form;

The IRB determined that the protocol is considered exempt pursuant to Federal Regulations 45CFR46 (2)(ii) Tests, surveys, interviews, or observation (low risk), (4) Secondary research on data or specimens (no consent required) on 9/4/2024.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

If any changes are made to the study, the IRB must be notified at research.integrity@asu.edu to determine if additional reviews/approvals are required. Changes may include but not limited to revisions to data collection, survey and/or interview questions, and vulnerable populations, etc.

It is the research team's responsibility to notify the IRB of 'reportable new information.' (an RNI) During a research study, any adverse events, unanticipated problems involving risk, and non-compliance **must** be reported to the IRB as an RNI. Please see the following link for details: https://researchintegrity.asu.edu/human-subjects/reportable-events. This does not include risks previously identified and listed in the IRB protocol and consent. Any serious events **must** be reported within **24 hours**. Non-serious adverse events **must** be reported within 5 business days.

Sincerely,

IRB Administrator

cc: Kayla Sites
Diane Nunez
Kayla Sites

Appendix G

Informed Consent

ASU Knowledge Enterprise Development
Arizona State University

Improving Antibiotic Stewardship in Urgent Care Settings: Engaging Patients as Partners Consent

Dear Participant,

I am a graduate student under the direction of Dr. Diane Nunez in the Edson College of Nursing and Health Innovation at Arizona State University. I am leading a project on *Improving Antibiotic Stewardship in Urgent Care Settings: Engaging Patients as Partners* project as a way for providers to engage patients on the appropriate use of antibiotics for common upper respiratory infections.

The project will include an educational session that lasts 60 minutes prior to implementation and there will be weekly check ins to assess utilization of project support tools that will last no longer than 10 minutes at a time. The session will include information on delayed antibiotic prescribing practices, symptom relief prescribing, evidence-based practices for prescribing, the effects of antibiotic resistance on public health and much more.

As part of the project, I will be collecting information on healthcare provider's knowledge and attitudes on prescribing antibiotics. The questionnaire tools include a 7-item demographic questionnaire that will take approximately 2 minutes to complete, and a 25 item multiple choice and fill in the blank Center for Medicare & Medicaid Services (CMS) Antimicrobial Stewardship Survey-PRE that will take approximately 15 minutes to complete. I will be able to answer any questions you may have concerning the project or questionnaires prior to your participation. If you choose not to participate or to withdraw from the educational session at any time, there will be no penalty. Withdrawal from the session will not have consequences or impact your position at House Call HealthCare. You must be 18 years of age or older to participate.

At the conclusion of the project, a 20 item Center for Medicare & Medicaid Services (CMS) Antimicrobial Stewardship Survey-POST will be administered. The total time to complete the post- project questionnaire is approximately 15 minutes.

Your participation in this project is voluntary. You have the right not to answer any question and stop participation at any time. If you choose not to participate or to withdraw from the project at any time, there will be no penalty or affect your job or status with the organization. The data collected from your responses will be utilized to assess if this educational session successfully enhances providers' knowledge on antimicrobial stewardship in the urgent care setting.

Your responses will be anonymous and recorded by a personal identification number created with the first two letters of your mother's maiden name and the last two digits of your phone number. The results of this project may be used in reports, presentations, or publications, but your name will not be used. The de-identified data collected may also be shared with other investigators or industry partners for future research purposes or other uses.

If you have any questions concerning the project, please contact the project team at Kayla Sites at klsites@as.edu (623) 261-0639 and Dr. Nuñez at diane.nunez@asu.edu (602) 496- 0751.

If you have any questions about your rights as a subject/participant in this project, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional

Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788.
If you agree to participate, please complete the demographic and pre-survey questionnaires.

Appendix H

Demographic Survey

Please create unique ID#: First two letters of your mother's maiden name and the last two digits of your phone number. Subject ID#:__ __ __ __

Please "***CIRCLE"*** the letter or "***FILL IN***" the blank that best describes your response.

Demographics:

1. Gender

   a. Male
   b. Female

2. What is your clinical role within your hospital ED or urgent care?

   a. Attending physician
   b. Fellow physician
   c. Resident physician
   d. Nurse practitioner
   e. Physician assistant
   f. Other, Please specify _____

3. For how many years have you worked in this position? _____

4. Proportion of pediatric patient's ages 0-17 seen?

   a. 100%
   b. >75%
   c. 50-74%
   d. 26-49%
   e. 11-25%
   f. <10%

5. What is your training? Check all that apply.

   a. Internal medicine
   b. Emergency medicine
   c. Pediatrics
   d. Pediatric emergency medicine
   e. Specialized residency
   f. Other, Please specify _____

6.. Board Certified?

   a. Yes
   b. No

7. How long have you been practicing as an independent provider (since completion of training)? _____ months or years

Data Entry_____ Data Validation_____ Data Analysis _____

Appendix I

Center for Medicare & Medicaid Services (CMS) Antimicrobial Stewardship Survey-PRE

Please create unique ID#: First two letters of your mother's maiden name and the last two digits of your phone number. Subject ID#:__ __ __ __

Antimicrobial Stewardship Pre-Implementation Provider Survey

The following are considered acute upper respiratory infections: the common cold, viral pharyngitis, acute bronchitis, bronchiolitis, croup, laryngitis, acute sinusitis, and acute otitis media.

The following questions ask about your knowledge on antibiotic stewardship and current prescribing patterns. Please "***CIRCLE"*** the letter or "***FILL IN***" the blank that best describes your response.

Practice:

1. How frequently do you prescribe antibiotics to patients with acute bronchitis?

   a. <10% of the time
   b. 10-25% of the time
   c. 26-50% of the time
   d. 51-75% of the time
   e. More than 75% of the time

2. How frequently do you prescribe antibiotics to patients with acute bronchiolitis?

   a. <10% of the time
   b. 10-25% of the time
   c. 26-50% of the time
   d. 51-75% of the time
   e. More than 75% of the time

3. How frequently do you prescribe antibiotics to patients with laryngitis?

   a. <10% of the time
   b. 10-25% of the time
   c. 26-50% of the time
   d. 51-75% of the time
   e. More than 75% of the time

4. How frequently do you prescribe antibiotics to patients with croup?

   a. <10% of the time
   b. 10-25% of the time
   c. 26-50% of the time
   d. 51-75% of the time
   e. More than 75% of the time

Data Entry_____ Data Validation_____ Data Analysis _____

Please create unique ID#: First two letters of your mother's maiden name and the last two digits of your phone number. Subject ID#:__ __ __ __

5. How frequently do you prescribe antibiotics to patients with acute sinusitis?

a. <10% of the time
b. 10-25% of the time
c. 26-50% of the time
d. 51-75% of the time
e. More than 75% of the time

6. How frequently do you prescribe antibiotics to patients with acute otitis media?

a. <10% of the time
b. 10-25% of the time
c. 26-50% of the time
d. 51-75% of the time
e. More than 75% of the time

7. How frequently do you empirically prescribe antibiotics to patients with pharyngitis (without testing for group A strep)?

a. <10% of the time
b. 10-25% of the time
c. 26-50% of the time
d. 51-75% of the time
e. More than 75% of the time

8. How frequently do you think other clinicians in your practice prescribe antibiotics for the treatment of non-specific upper respiratory infections (URIs)?

a. <10% of the time
b. 10-25% of the time
c. 26-50% of the time
d. 51-75% of the time
e. More than 75% of the time

9. Does your emergency department or urgent care center provide guidelines for prescribing antibiotics for acute respiratory infections?

a. Yes, Please specify _____
b. No
c. I don't know

10. Under what clinical conditions would you consider prescribing antibiotics that are non-adherent to professional society practice guidelines?

Comments:

Data Entry_____ Data Validation_____ Data Analysis _____

Please create unique ID#: First two letters of your mother's maiden name and the last two digits of your phone number. Subject ID#:__ __ __ __

11. Which guidelines/resources do you use to make decisions for prescribing antibiotics?

a. Infectious Diseases Society of America (IDSA)
b. American Academy of Pediatrics
c. Centers for Disease Control and Prevention
d. Up to Date
e. Podcasts (e.g. EMRAP)
f. Local or institutional guidelines
g. Other, Please specify _____

12. In your opinion, what are current barriers to appropriate prescribing for acute respiratory infection? Check all that apply.

o Lack of access to guidelines or information on prescribing
o Lack of clear evidence and evidence-based recommendation
o Patient expectations
o Psychosocial barriers
o Electronic Health record
o Other, Please specify _____

13. How often do you consult with other colleagues before prescribing antibiotics for acute upper respiratory infections?

a. <10% of the time
b. 10-25% of the time
c. 26-50% of the time
d. 51-75% of the time
e. More than 75% of the time

14. To the best of your knowledge, which of the following resources for outpatient antibiotic prescribing are currently present in your emergency department? Check all that apply.

a. Pharmacist
b. Direct physician feedback for antibiotic prescribing
c. Formulary restriction/Required antibiotic approval by Infectious Disease (for any antibiotics)
d. Published hospital-wide antibiogram (accessible via web, intranet or in print)
e. Other, Please specify _____
f. I do not know

Attitudes:

15. Antibiotic resistance is a public health problem facing the United States.

a. Strongly Agree
b. Agree

Data Entry_____ Data Validation_____ Data Analysis _____

Please create unique ID#: First two letters of your mother's maiden name and the last two digits of your phone number. Subject ID#:__ __ __ __

c. Neutral
d. Disagree
e. Strongly Disagree

16. Inappropriate antibiotic use contributes to antimicrobial resistance

a. Strongly Agree
b. Agree
c. Neutral
d. Disagree
e. Strongly Disagree

17. To what extent do you feel antibiotics are over or underused for acute infections with 1 being very underused and 10 being very overused?

1 2 3 4 5 6 7 8 9 10

Frequently underused **Frequently overused**

18. For which conditions are antibiotics most frequently over-prescribed (either inappropriate use or overly broad spectrum use)? Check all that apply.

a. Common cold
b. Sinusitis
c. Otitis media
d. Pharyngitis
e. Influenza
f. Acute bronchitis
g. Bronchiolitis
h. Asthma
i. Skin and Soft Tissue
j. Gastrointestinal Infection
k. Urinary tract infection
l. NONE
m. Other

Comments:

19. For which conditions are antibiotics most frequently under-prescribed (either inappropriate use or overly narrow spectrum use)? Check all that apply.

a. Common cold
b. Sinusitis
c. Otitis media
d. Pharyngitis
e. Influenza

Data Entry_____ Data Validation_____ Data Analysis _____

Please create unique ID#: First two letters of your mother's maiden name and the last two digits of your phone number. Subject ID#:__ __ __ __

f. Acute bronchitis
g. Bronchiolitis
h. Asthma
i. Skin and Soft Tissue
j. Gastrointestinal Infection
k. Urinary tract infection
l. NONE
m. Other

Comments:

20. Antibiotic Stewardship programs are important to optimize antibiotic use in the ED and urgent care.

a. Strongly Agree
b. Agree
c. Neutral
d. Disagree
e. Strongly Disagree

21. ED and urgent care patients receive adequate education about the use and duration of antibiotic prescriptions prior to discharge

a. Strongly Agree
b. Agree
c. Neutral
d. Disagree
e. Strongly Disagree

22. What resources do you use to stay up-to-date on current approaches to antibiotic prescribing?

a. Departmental lectures/CME
b. Web-based resources (Up to Date or other)
c. Smart phone App or pocket guide (EMRA, Sanford Guide)
d. Other lectures
e. Other, Please specify _____

23. ED and urgent care based antibiotic stewardship programs would interfere with my usual approach to clinical decision-making in treatment of infectious diseases.

a. Strongly Agree
b. Agree
c. Neutral
d. Disagree
e. Strongly Disagree

Data Entry_____ Data Validation_____ Data Analysis _____

Please create unique ID#: First two letters of your mother's maiden name and the last two digits of your phone number. Subject ID#:__ __ __ __

If yes, why: _____

24. In your opinion, what are the best strategies to decrease inappropriate use of antibiotics? Check all that apply.

- o Better education in pre-clinical training(medical/nursing school)
- o Better education in residency training
- o Developing rigorous practice guidelines for empiric antibiotic treatment of common infections
- o Developing more order sets or decision support tools for the ED or urgent care
- o Other, Please specify _____

25. Based on your preference, please rank, in order (1 being the most preferable), the following methods to implement antimicrobial stewardship for the emergency department or urgent care?

- o Provider continuing education
- o Published institutional or local guidelines
- o Point-of-care clinical decision support via the electronic health record
- o Individual feedback clinicians
- o Other, Please specify _____

If you have any comments about ED or urgent care based antimicrobial stewardship, please provide them below:

Appendix J

Center for Medicare & Medicaid Services (CMS) Antimicrobial Stewardship Survey-POST

Please create unique ID#: First two letters of your mother's maiden name and the last two digits of your phone number. Subject ID#:__ __ __ __

Antimicrobial Stewardship Post-Implementation Provider Survey

The following questions ask about your knowledge on antibiotic stewardship and current prescribing patterns. Please "***CIRCLE***" the letter or "***FILL IN***" the blank that best describes your response.

Attitudes:

1. Antibiotic resistance is a public health problem facing the United States.

   a. Strongly Agree
   b. Agree
   c. Neutral
   d. Disagree
   e. Strongly Disagree

2. Inappropriate antibiotic use contributes to antimicrobial resistance.

   a. Strongly Agree
   b. Agree
   c. Neutral
   d. Disagree
   e. Strongly Disagree

3. Do you feel antibiotics are overused or underused in your emergency department or urgent care center with 1 being very underused and 10 being very overused?

1 2 3 4 5 6 7 8 9 10

Frequently underused **Frequently overused**

4. For which conditions are antibiotics most frequently **over-prescribed** (either inappropriate use or overly broad spectrum use)? Check all that apply.

   a. Common cold
   b. Sinusitis
   c. Otitis media
   d. Pharyngitis
   e. Influenza
   f. Acute bronchitis
   g. Bronchiolitis
   h. Asthma
   i. Skin and Soft Tissue
   j. Gastrointestinal Infection
   k. Urinary tract infection
   l. NONE
   m. Other

Data Entry_____ Data Validation_____ Data Analysis _____

Please create unique ID#: First two letters of your mother's maiden name and the last two digits of your phone number. Subject ID#:__ __ __ __

Comments:_____

5. For which conditions are antibiotics most frequently under-prescribed (either inappropriate use or overly narrow spectrum use)? Check all that apply.

a. Common cold
b. Sinusitis
c. Otitis media
d. Pharyngitis
e. Influenza
f. Acute bronchitis
g. Bronchiolitis
h. Asthma
i. Skin and Soft Tissue
j. Gastrointestinal Infection
k. Urinary tract infection
l. NONE
m. Other

Comments:

6. Antibiotic Stewardship programs are important to optimize antibiotic use in the ED and urgent care.

a. Strongly Agree
b. Agree
c. Neutral
d. Disagree
e. Strongly Disagree

7. ED and urgent care patients receive adequate education about the use and duration of antibiotic prescriptions prior to discharge

a. Strongly Agree
b. Agree
c. Neutral
d. Disagree
e. Strongly Disagree

8. What resources do you use to stay up-to-date on current approaches to antibiotic prescribing?

a. Departmental lectures/CME
b. Web-based resources (Up to Date or other)
c. Smart phone App or pocket guide (EMRA, Sanford Guide)
d. Other lectures

Data Entry_____ Data Validation_____ Data Analysis _____

Please create unique ID#: First two letters of your mother's maiden name and the last two digits of your phone number. Subject ID#:__ __ __ __

e. Other, Please specify _____

ED/urgent Care Stewardship experience:

9. Did you participate in the individual audit/feedback portion of the urgent care stewardship program?

a. Yes
b. No
c. I don't know

10. How bothersome was the audit and feedback?

a. Extremely intrusive
b. Very intrusive
c. Somewhat intrusive
d. A little intrusive
e. Not at all intrusive

11. How willing were you to change your practices based on the audit/feedback, with 1 being unwilling and 10 being very willing?

1 2 3 4 5 6 7 8 9 10

Unwilling **Very willing**

12. Do you believe that ED and urgent care based antibiotic stewardship programs would interfere with your usual approach to clinical decision-making in treatment of infectious diseases.

a. Strongly agree
b. Agree
c. Neutral
d. Disagree
e. Strongly Disagree

If yes, why:_____

13. In your opinion, what are the best strategies to decrease inappropriate use of antibiotics? Check all that apply.

- Better education in pre-clinical training (medical/nursing school)
- Better education in residency training
- Developing rigorous practice guidelines for empiric antibiotic treatment of common infections
- Developing more order sets or decision support tools for the ED or urgent care
- Other, Please specify _____

Data Entry_____ Data Validation_____ Data Analysis _____

Please create unique ID#: First two letters of your mother's maiden name and the last two digits of your phone number. Subject ID#:__ __ __ __

14. Based on your preference, please rank, in order (1 being the most preferable), the following methods to implement antimicrobial stewardship for the emergency department or urgent care?

- Provider continuing education
- Published institutional or local guidelines
- Point-of-care clinical decision support via the electronic health record
- Individual feedback clinicians
- Other, Please specify _____

15. What barriers do you see in appropriate prescribing for acute respiratory infections?

a. Lack of access to guidelines or information on prescribing
b. Patient expectation
c. Psychosocial barriers
d. EHR
e. Other, please specify Why?

16. What are your personal feelings about the emergency department or urgent care stewardship program/intervention?

a. Very helpful
b. Slightly helpful
c. Neutral
d. Wasn't helpful at all
e. Other:_____

17. What additional resources would you like to see available as part of an ED or urgent care stewardship program and why?

18. Has taking part in the stewardship intervention changed or improved your clinical practices?

a. Yes. Please explain _____
b. No. Please explain _____

19.. In what ways do you think we could better present the information to clinicians?

Please explain _____

20. If you have any additional comments about ED-based antimicrobial stewardship, please provide them below:

Data Entry_____ Data Validation_____ Data Analysis _____