

An Antibiotic Stewardship Program within Telehealth to Decrease Inappropriate Antibiotic  
Prescriptions in Acute Uncomplicated Bronchitis

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## Abstract

**Purpose:** Implement and evaluate an antibiotic stewardship program developed by the CDC within the telehealth setting to reduce the rate of antibiotic prescriptions by providers for uncomplicated bronchitis. **Methods:** A quality improvement study was employed within a telehealth practice platform in the Tampa, Florida area. A pre-intervention assessment of the provider's antibiotic prescribing rates for bronchitis was conducted. Implementation included utilization of tools provided by the CDC and a presentation on evidence-based antibiotic prescribing practice guidelines. Post-intervention analysis included an audit with feedback method over a span of three months that assessed provider antibiotic prescribing rates for bronchitis. **Results:** There was a 22.1% decrease from pre-intervention to post-intervention antibiotics prescribed for acute bronchitis. A chi-square test of independence was performed to examine the relationship between antibiotics prescribed for bronchitis and the implementation of an antibiotic stewardship program. The relation between these variables was significant,  $\chi^2(1, N = 175) = 13.8829, p = .000195$ . Antibiotics were less likely to be prescribed for bronchitis after the implementation of an antibiotic stewardship program in this setting. **Discussion:** Results demonstrated that when antibiotic stewardship programs guided by the CDC are implemented and followed, decreased use of antibiotics can result. This project was limited due to sample size and implementation period. **Conclusions:** Implementing an antibiotic stewardship program framed by the CDC within a clinical site that entails provider education and audit with feedback on providers' prescribing practices was shown to accomplish the goal of decreasing the number of inappropriate antibiotics prescribed for bronchitis.

**Key words:** Telehealth, antibiotic stewardship program, uncomplicated bronchitis, antibiotic resistance, stewardship

## **Antibiotic Stewardship Program to Decrease Inappropriate Antibiotic Prescriptions**

Antibiotic resistance is an emerging health concern that has the potential to cause devastating effects. The Centers for Disease Control and Prevention (CDC) estimates that as many as 2.8 million individuals are infected with antibiotic-resistant bacteria or fungi in the United States (U.S.). Of those 2.8 million individuals infected, more than 35,000 of them die per year as a result. Antibiotic resistance occurs when bacteria and fungi acquire the ability to combat the drugs that are used to kill them. Infections that are due to antibiotic-resistant organisms are sometimes impossible to treat, leading to extended hospital stays and expensive alternative treatments. Annually, it costs more than \$4.6 billion to treat antibiotic-resistant infections. Antibiotic stewardship is an organized program that has been shown to improve the usage of antibiotics, boost patient outcomes, reduce antibiotic resistance, and decrease the spread of infections caused by multidrug-resistant (MDR) organisms (CDC, 2020). Antibiotic stewardship programs need to be accepted and utilized to decrease the threat of antibiotic-resistant organisms and preserve the effectiveness of our current antibiotics.

### **Background**

Reducing the rates of antibiotic prescribing is a current global health priority. The 2015 United States National Action Plan for Combatting Antibiotic-Resistant Bacteria established a goal to reduce inappropriate antibiotic use by 50% in outpatient care settings, where most antibiotic prescriptions are written by providers. Of the annual 47 million patients inappropriately prescribed antibiotics in the outpatient setting, 34 million prescriptions are written for acute respiratory infections, such as bronchitis. However, adherence to the treatment guidelines set forth by the CDC for uncomplicated bronchitis could eliminate 7.8 million unnecessary prescriptions annually (Grigoryan et al., 2017).

Adding to the clinical dilemma of over-prescribing antibiotics, telehealth visits have increased by more than 12%-25% per year over the last decade (Li et al., 2021). Studies have shown that the increased use of telehealth care is coupled with the increased use of antibiotic prescriptions. Prescription rates for uncomplicated bronchitis within the telehealth setting have shown to be much higher at 66% when compared to traditional face-to-face visits that routinely have roughly a 14.7% of prescription rate. Globally, data from The National Health Service in England found that between April 2020 and August 2020, there was an increase in over 6% of antibiotic prescriptions even though face-to-face visits had decreased by 50%, indicating that the increase in antibiotic prescribing comes from the telehealth setting (Subramanya et al., 2021). Inappropriate antibiotic use is the most significant modifiable aspect in tackling the crisis of antibiotic resistance (File et al., 2020).

### **Problem Statement**

An estimated 154 million yearly outpatient office visits in the U.S. result in a provider writing an antibiotic prescription. Of those, 47 million antibiotics are prescribed unnecessarily and roughly 44% of those individuals were diagnosed with an acute respiratory infection, such as bronchitis. More than half of the unnecessary prescribing occurs in patients between the ages of 20 and 64. As the use of telehealth is surpassing traditional face-to-face visits, it is important to address the telehealth setting to combat inappropriate antibiotic use. Adhering to the prescribing guidelines and antibiotic stewardship programs could eliminate 7.8 million antibiotic prescriptions annually (CDC, 2021).

### **Purpose of the Project**

The main goal of an antibiotic stewardship program is to improve clinical outcomes while decreasing the adverse effects of antibiotic use. Antibiotic stewardship programs are

designed to measure and improve how antibiotics are prescribed by providers. Improving how antibiotics are prescribed and used includes implementing effective strategies to change current prescribing practices to align them with current diagnosis and management evidence-based recommendations (CDC, 2020). The purpose of this project is to implement and evaluate a CDC-developed antibiotic stewardship program within the telehealth setting to reduce the rate of antibiotic prescriptions by providers for uncomplicated bronchitis.

### **Clinical Question and Project Aims**

Does implementing an antibiotic stewardship program in the telehealth setting decrease the number of inappropriate antibiotic prescriptions in patients diagnosed with acute uncomplicated bronchitis?

The aims of this project included:

1. Improve antibiotic prescribing by providers to ensure antibiotics are only prescribed when deemed necessary within the telehealth setting. This aim will be measured by looking at the treatment plan for those with a diagnosis of uncomplicated bronchitis determined by the ICD10 code of J20.9.
2. Evaluate adherence to evidence-based practice guidelines for treating uncomplicated bronchitis within the telehealth setting. This aim will be measured by assessing prescribing rates and treatment plans for those with a diagnosis of uncomplicated bronchitis determined by the ICD10 code of J20.9.
3. Assess antibiotic prescribing rates within the telehealth setting before, during, and after implementation. This aim will be measured by gathering the prescribing rates for those with a diagnosis of uncomplicated bronchitis determined by the ICD10 code of J20.9.

## **Literature Review**

There are many studies and evidenced-based practice guidelines on the development and application of antibiotic stewardship programs in the telehealth setting. Evidence demonstrates the need for implementing an antibiotic stewardship program in the telehealth setting with a focus on those diagnosed with uncomplicated bronchitis. Available literature provides similar results in the prevalence of inappropriate antibiotic prescribing, complications from inappropriate antibiotic prescribing, current practice guidelines for bronchitis, core elements of an antibiotic stewardship program, and potential antibiotic stewardship program initiatives.

### **Prevalence of Inappropriate Antibiotic Prescription**

The use of antibiotics inappropriately is becoming a widespread concern. In the U.S., 23,000 individuals die annually from antibiotic-resistant infections (McDonagh et al., 2018). McDonagh et al. (2018) and White et al. (2019) assessed the extent of inappropriate antibiotic use in outpatient care settings. McDonagh et al. (2018) conducted an integrative review of current evidence-based practice guidelines for acute respiratory tract infections and assessed the prevalence of inappropriate antibiotic use. This review revealed that healthy adults who visited an outpatient care facility for acute bronchitis were given antibiotics 73% of the time, even though data demonstrates that most cases of acute bronchitis are viral in nature, for which antibiotics are not appropriate (McDonagh et al., 2018). White et al. (2019) conducted a quantitative study to distinguish inappropriate antibiotic use between different diagnoses in 1,063 outpatient visits at the Veterans Affairs Western New York Healthcare System. It was demonstrated that 40% of 1,063 patients were prescribed antibiotics inappropriately. Of the 40% who were inappropriately treated with antibiotics, 20% of them were diagnosed with bronchitis (White et al., 2019).

According to Subramanya et al. (2021), Uscher-Pines et al. (2015), and Yao et al. (2021), the inappropriate use of antibiotics is significantly higher in the telehealth setting when compared to the face-to-face setting. Subramanya et al. (2021) gathered data from The National Health Service in England and found that between April 2020 and August 2020, there was a 6% increase in antibiotic prescriptions, although face-to-face visits had decreased by 50%. This study indicates an increase in antibiotic prescribing coming from the telehealth setting.

Uscher-Pines et al. (2015) conducted a quantitative study demonstrating the increased prescribing rates in a telehealth setting at 58% for bronchitis while face-to-face interactions were only at a 55% prescribing rate for bronchitis. While the overall prescribing rates were similar, it was determined that telehealth providers were more likely to inappropriately prescribe antibiotics for conditions such as bronchitis versus providers in the offices (Uscher-Pines et al., 2015). Yao et al. (2021) conducted a quantitative investigation to look at 191 telehealth visits and 277 emergency department visits for bronchitis and compared antibiotic prescribing rates. Overall, antibiotics were prescribed 59% percent of the time in the telehealth setting compared to 39% of the time in the emergency department (Yao et al., 2021).

### **Complications From Inappropriate Antibiotic Prescription**

Antibiotic resistance is becoming one of the most serious threats to mankind's health today (Medina & Pieper, 2016). Harris et al. (2016) conducted a literature review to determine complications from inappropriately treating patients with antibiotics. This review found between 5% and 25% of patients who are treated with an antibiotic developed adverse reactions, such as diarrhea, rash, or anaphylaxis, and about 1 in 1000 developed a serious reaction such as *Clostridium difficile*, Stevens-Johnson Syndrome, or death.

The inappropriate use of antibiotics is leading to the development of multi-drug resistant (MDR) bacteria. These MDR bacteria include *extended-spectrum beta-lactamase* (ESBL), *carbapenem-resistant Enterobacterales* (CRE), and *multidrug-resistant Acinetobacter baumannii* (MRAB) (Medina & Pieper, 2016). Superbugs that emerged from these MDR bacteria are considered a global epidemic (CDC, 2020). Some examples of these superbugs include *Methicillin-resistant Staphylococcus aureus*, *mycobacterium tuberculosis*, *Klebsiella pneumonia*, *Streptococcus pneumonia*, *Clostridium difficile diarrhea*, *Neisseria gonorrhoea*, *Acinetobacter baumannii*, *Salmonella*, *Escherichia coli*, *Pseudomonas aeruginosa*, and *vancomycin-resistant Enterococcus species*. Patients presenting with MDR bacteria and superbugs are shown to have higher morbidity and mortality rates (Medina & Pieper, 2016). Highly contagious and life-threatening, *Clostridium difficile diarrhea* usually emerges as the result of antibiotic use and is responsible for 29,300 deaths in the U.S. per year, and is attributable to one billion in medical expenses and extra costs (Harris et al., 2016).

### **Current Practice Guidelines for Bronchitis**

Educating providers on the current practice guidelines for bronchitis is one of the main ways in decreasing inappropriate antibiotic use. Smith et al. (2014) conducted a systematic review that included 15 randomized, controlled trials to assess the impact that antibiotics have on those diagnosed with bronchitis. This review demonstrated that there was little evidence that supported antibiotics use for uncomplicated bronchitis and antibiotic treatment leads to an increase in adverse reactions such as nausea, diarrhea, and anaphylaxis (Smith et al., 2014). National guidelines state that patients with bronchitis should not receive antibiotics unless they also have a diagnosis of chronic bronchitis, emphysema, or COPD (Fleming-Dutra et al., 2016).



Guidelines support treatment that is guided toward symptom relief such as cough suppressants, first-generation antihistamines, and decongestants (CDC, 2020).

### **Antibiotic Stewardship Program Core Elements**

Implementing an antibiotic stewardship program should be guided by the core elements that are described by the CDC as an action for policy and practice, tracking and reporting, education, and expertise (CDC, 2020). These core elements were designed to serve as a framework to develop and implement antibiotic stewardship programs in the culture of care delivery within outpatient care settings (Laude et al., 2020). Pedrotti et al (2021) conducted a quantitative study within a telehealth setting to assess antibiotic prescribing rates after a CDC-guided antibiotic stewardship program was implemented. It was found that between January 2019 and February 2020, over 6,050 telehealth visits, antibiotics were only prescribed 2.5% of the time for bronchitis after program implementation. This study demonstrated that adherence to an antibiotic stewardship program can produce positive outcomes (Pedrotti et al., 2021).

### **Potential Antibiotic Stewardship Program Initiatives**

The core elements described by the CDC provide an excellent framework for implementing an antibiotic stewardship program for the telehealth setting. Klein et al. (2017) conducted a mixed methods observational study to determine how provider perception of the risks associated with prescribing antibiotics affected their decision-making regarding the antibiotic prescription. The study demonstrated that when providers believed there was potential harm, or risk, to the patient related to prescribing antibiotics, the providers were less likely to inappropriately prescribe antibiotics (Klein et al., 2017). These findings support antibiotic stewardship programs by emphasizing the potentially harmful side effects of antibiotics (Marcelin et al., 2020).

Marcelin et al. (2020) conducted a literature review to compile evidence-based recommendations to provide a framework for the development of potential antibiotic stewardship programs. Evidence demonstrated that providers are more likely to stand by their commitment if they make their prescribing intentions public by displaying posters with their signatures pledging responsible antibiotic prescribing. In doing so, there was a 19.7% decrease in prescribing rates within the outpatient care setting (Marcelin et al., 2020).

Du Yan et al. (2021) and Tong et al. (2018) conducted randomized control studies to compare antibiotic prescribing rates based on different implementation styles of antibiotic stewardship programs. Tang et al. (2018) split 62 physicians into two randomized antibiotic stewardship intervention groups. ‘Group A’ received best practice guidelines education for bronchitis and ‘Group B’ received the same education plus an individualized audit with feedback on antibiotic prescribing rates over two months. Results demonstrated that ‘Group A’ went from 71% prescribing rates for bronchitis to 63%, while ‘Group B’ went from 69% to 46%. These results demonstrate that an individualized audit with feedback on providers' prescribing practices, coupled with best practice guidelines education, is more effective than education alone in reducing unnecessary antibiotic prescriptions (Tong et al., 2018).

### **Summary of Available Literature**

In conclusion, evidence demonstrates the harmful side effects of inappropriately prescribing antibiotics. The increased rates of inappropriately prescribing antibiotics are leading to harmful multi-drug resistant organisms (MDROs) and superbugs that we aren't able to treat with our standard treatments. The CDC provides a framework for implementing an antibiotic stewardship program in telehealth settings. The CDC also provides many tools, such as posters, to hang in the patient care areas, patient education regarding safe prescribing, and provider

education on the most up-to-date treatment guidelines for bronchitis. Implementing an antibiotic stewardship program framed by the CDC that entails provider education and audits with feedback on providers' prescribing practices is proven to accomplish the goal of decreasing the number of inappropriate antibiotics prescribed for bronchitis in the telehealth settings.

### **Conceptual and Theoretical Framework**

Kurt Lewin's Change Theory provides a foundation for considering the process of planned change (McEwen & Wills, 2011). The foundation of Lewin's Change Theory is based on three concepts: driving forces, restraining forces, and equilibrium (McEwen & Wills, 2011) and includes three phases: unfreeze, change, and refreeze (Cummings et al., 2016). This theory will be used to support the implementation of an antibiotic stewardship program.

#### **Concepts of Lewin's Change Theory**

According to McEwen and Wills (2011), the driving forces are the facilitators and encouragers for change to occur. The driving forces are responsible for the shift in equilibrium that occurs due to change, and they should be accentuated. Restraining forces are the opposite in that they inhibit or impede any progress made toward a change. Restraining forces need to be identified and minimized to achieve the process of change. Equilibrium is the result of effective change when opposing forces, that are driving and restraining forces, are balanced (McEwen & Wills, 2011).

#### **Unfreeze, Change, and Refreeze**

The three stages that must occur for planned change to be successful are unfreeze, change, and refreeze. In the unfreeze stage, individuals are made aware of the need for change and group conformity should occur (McEwen & Wills, 2011). Establishing a change agent and creating a sense of necessity is also part of this stage (Shirey, 2013). This is accomplished by

increasing the driving forces and decreasing the restraining forces. The second stage is change. This occurs when the driving forces surpass the restraining forces, allowing change to occur. The third stage is refreezing. During this stage, stabilization occurs, and the change becomes a habit (McEwen & Wills, 2011). In this stage, if stabilization is successful, then the change is integrated into the system as a whole. In turn, this will produce a new equilibrium within the organization (Shirey, 2013; McEwen & Wills, 2011).

### **Application of the Change Theory**

Current literature reveals that Lewin's Change Theory is used considerably in nursing practice, education, administration, and healthcare operations (Shirey, 2013). This Change Theory provides a framework for the evidence-based project entitled "An Antibiotic Stewardship Program within Telehealth to Decrease Inappropriate Antibiotic Prescriptions in Acute Uncomplicated Bronchitis".

### **Resistance to Change**

Change can be viewed by most as stressful and unnecessary. This often leads to feelings of uncertainty, loss of control, and apprehension (McEwen & Wills, 2011). The first step in Lewin's Change Theory, unfreezing, allows for the providers to be the change agents, and determine what the driving and restraining forces are. A necessity for change is established with provider education, which will be accomplished by offering the providers with current practice guidelines for those diagnosed with uncomplicated bronchitis. This will also involve educating the providers on the importance of an antibiotic stewardship program and what encompasses the intervention, which will lead to providers being less resistant to the change that needs to occur and in turn, becoming the driving forces needed for change to occur.

### **Implementing an Antibiotics Stewardship Program**

The second stage, change, will occur with the implementation of the antibiotic stewardship program. This involves having the providers sign contracts stating that they will prescribe antibiotics according to current practice guidelines. Evidence shows that providers are more likely to stand by their commitment if they make their intentions public (Marcelin et al., 2020).

### **The Decrease in Inappropriate Antibiotic Use**

This last stage, refreezing, will occur with a new equilibrium within the telehealth care setting that will result in stabilization and change throughout the organization in which there will be a decrease in antibiotic prescriptions for uncomplicated bronchitis. This will be accomplished by defining the set expectations that the practice has on antibiotic prescribing by utilizing educational tools from the CDC to educate providers and patients on safe prescribing. Support from all stakeholders should continue for the desired outcome.

### **Methodology and Implementation**

This quality improvement project focused on implementing an antibiotic stewardship program within a telehealth setting to decrease the number of inappropriate antibiotics prescribed for uncomplicated bronchitis. This project took place within a telehealth practice based in Tampa, Florida. The practice included Medical Doctors (MDs), Physician Assistants (PAs), and Nurse Practitioners (NPs) who provide care using a telehealth platform to see patients within Tampa and surrounding areas. Key stakeholders that supported the implementation of this project included the Chief Medical Officer (CMO) and a Doctor of Nursing Practice (DNP)-prepared leadership team member within the organization. Participation in the quality improvement project was voluntary. The timeline for this project can be found in Appendix A.

Pre-intervention began with provider education on current practice guidelines for bronchitis, as well as an overview of the purpose of an Antibiotic Stewardship Program. The education provided included an evidence-based presentation from the Wake Forest University School of Medicine. Permission was obtained by the author to use the material for educational purposes (Appendix B). Then, providers were given their prescribing rates for bronchitis from November 2021 to January 2022. Information on individual provider prescribing rates were obtained from an honest broker that imported the information into the data collection worksheet. All data were de-identified to keep providers' and patient information confidential (Appendix C).

Implementation included utilizing CDC-provided tools to support site adoption of this antibiotic stewardship program. A *Virus or Bacteria poster* (Appendix D) was displayed electronically for patients to see while they waited for their telehealth provider to appear on the screen. Then, a provider *Commitment to Improving Antibiotic Use* (Appendix E) was utilized in the education provided to the patient after their visit to allow providers to demonstrate their commitment to improving the use of antibiotics.

Post-intervention began with utilizing an audit with feedback method over a span of three months (November 2022, December 2022, January 2023). Each month, providers were provided with their prescribing rates for those diagnosed with bronchitis. At the end of the three months, data were summarized to assess the successfulness of the antibiotic stewardship program, demonstrated by a decrease in antibiotics prescribed for bronchitis, within the telehealth setting.

### **Human Subject and Informed Consent**

This quality improvement project was submitted to the Florida State University Institutional Review Board (IRB) for exemption status approval before initiating. All information, including provider and patient identifiers, was secured and the confidentiality of

both the provider and patients was maintained. All information given to the student was collected by an honest broker and de-identified. Collected data was stored on a password-protected device. There was no identified increased risk to patients during this project implementation.

### **Data Analysis**

This quality improvement project assessed prescribing rates from the months of November 2021, December 2021, and January 2022 and was compared with the months of November 2022, December 2022, and January 2023 to determine if there was an improvement in providers' prescribing rates for bronchitis after implementation of the antibiotic stewardship program. The data was collected by an honest broker and imported to an excel spreadsheet in a de-identified manner. The data was then analyzed using a Chi-Square test. Individual provider antibiotic prescribing rates were analyzed using either a Chi-Square test or a Fisher Exact test if the sample size (total number of acute bronchitis diagnoses seen) was less than five.

### **Results**

#### **Demographics**

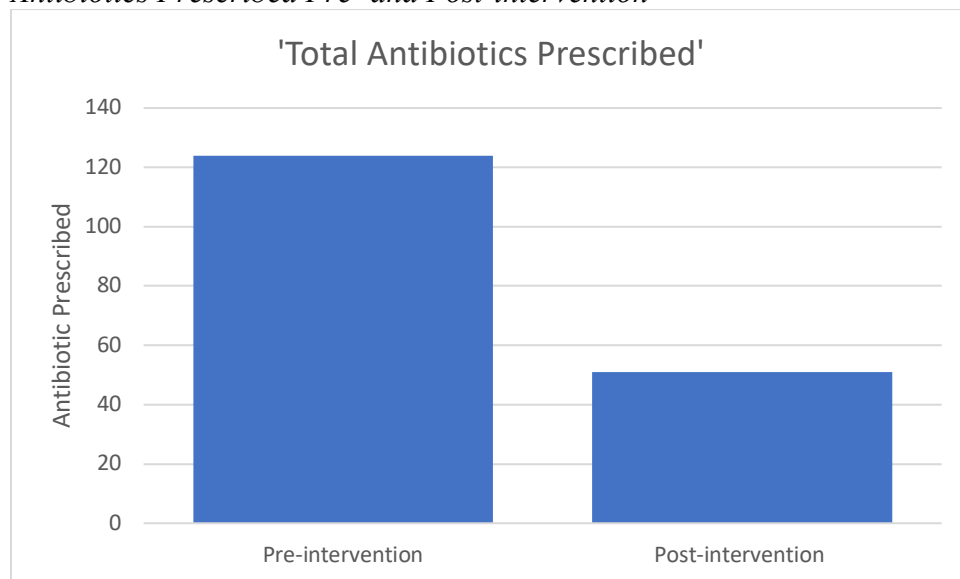
A total of 16 providers participated in the implementation of the antibiotic stewardship program. The providers included MDs, PAs, and NPs who practiced on the telehealth platform. Of the 16 providers that participated, 56% of them were NPs, 38% of them were PAs, and 6% were MDs. Antibiotic prescribing rates were assessed on charts using only the ICD 10 code of J20.9, indicating a diagnosis of acute bronchitis.

#### **Clinical Aim #1.**

The first aim of this project was to improve antibiotic prescribing rates by providers to ensure antibiotics were only prescribed when deemed necessary within the telehealth setting. This was measured by looking at the prescribing rates of each provider for those with a diagnosis

of uncomplicated bronchitis determined by the ICD10 code of J20.9. The initial months of November 2021, December 2021, and January 2022, which demonstrated pre-intervention data, had an antibiotic prescribing rate of 82.1%. The months of November 2022, December 2022, and January 2023, which demonstrated post-intervention data, had an antibiotic prescribing rate of 60%. There was a 22.1% decrease from pre-intervention to post-intervention in antibiotics prescribed for acute bronchitis, which is depicted in Table 1. A chi-square test of independence was performed to examine the relationship between antibiotics prescribed for bronchitis and the implementation of an antibiotic stewardship program. The relation between these variables was significant,  $\chi^2(1, N = 175) = 13.8829, p = .000195$ . At this clinical site, antibiotics were less likely to be prescribed for bronchitis after the implementation of an antibiotic stewardship program.

**Table 1**  
*Antibiotics Prescribed Pre- and Post-intervention*





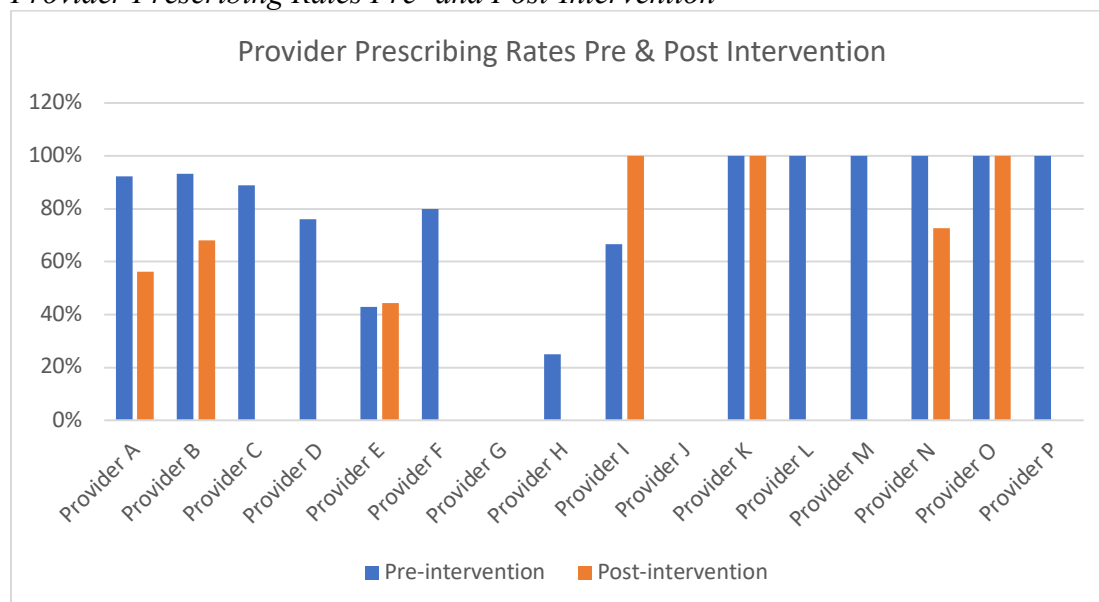
**Figure 1***Cross-tabulation for Antibiotics Prescribed Pre- and Post-intervention*

<b>Antibiotics Prescribed</b>	<b>Pre-intervention</b>	<b>Post-intervention</b>
Yes	124	51
No	27	34
<b>Total</b>	<b>151</b>	<b>85</b>

**Clinical Aim #2.**

The second aim of this project evaluated providers' adherence to evidence-based practice guidelines for treating uncomplicated bronchitis within the telehealth setting. This was measured by assessing each provider's prescribing rates and treatment plan for those with a diagnosis of uncomplicated bronchitis determined by the ICD10 code of J20.9. Individual provider antibiotic prescribing rates were analyzed using either a Chi-Square test or a Fisher Exact test if the sample size (total number of acute bronchitis diagnoses seen) was less than 5. Each test performed used a significance level of 0.05 to determine if there was a significant change to the rates of antibiotics prescribed pre- and post-intervention.

**Figure 2:**  
*Provider Prescribing Rates Pre- and Post-Intervention*



*Providers without a pre-intervention prescribing rate, post-intervention prescribing rate, or both means they had a 0% prescribing rate for patients diagnosed with bronchitis.*

Pre-intervention, provider ‘A’ had an antibiotic prescribing rate of 92.2% which decreased to a rate of 56.3% post-intervention ( $p=.0001112$ ). Pre-intervention, provider ‘B’ had an antibiotic prescribing rate of 93.3% and decrease to a rate of 68% post-intervention ( $p=.005261$ ). Pre-intervention, provider ‘E’ had an antibiotic prescribing rate of 42.9% which increased to 44.4% post-intervention ( $p=.949375$ ). Pre-intervention, provider ‘F’ had an antibiotic prescribing rate of 80% which decreased to 0% post-intervention ( $p=.3333$ ). Provider ‘G’ had an antibiotic prescribing rate of 0% both pre- and post-intervention. Provider ‘H’ had an antibiotic prescribing rate of 25% pre-intervention and decreased to 0% post-intervention ( $p=1$ ). Provider ‘I’ had an antibiotic prescribing rate of 66.7% pre-intervention and increased to 100% post-intervention ( $p=1$ ). Provider ‘N’ had a pre-intervention antibiotic prescribing rate of 100% which decreased to 72.7% post-intervention ( $p=1$ ). Providers ‘K’ and ‘O’ both had an antibiotic prescribing rate of 100% pre- and post-intervention. Providers ‘C, D, J, L, M’, and ‘P’ only had

patients with the diagnosis code of J20.9 in the pre-intervention assessment and not the post-intervention assessment.

### **Clinical Aim #3.**

The third aim of this quality improvement project was to evaluate the provider's antibiotic prescribing rates within the telehealth setting before, during, and after implementation. This was measured by looking at the antibiotic prescribing rates for those with a diagnosis of acute bronchitis determined by the ICD 10 code of J20.9. This was completed by utilizing an audit with feedback method over the span of three months (November 2022, December 2022, and January 2023). Each month, providers were provided with their prescribing rates for those patients diagnosed with bronchitis. From November 2022 to December 2022 the antibiotic prescribing rates decreased from 69% to 26.9%. For the month of January 2023, the antibiotic prescribing rates increased from 26.9% to 80%.

### **Discussion**

An estimated 154 million outpatient office visits in the U.S. result in an antibiotic prescription annually. Of those 154 million outpatient visits, 47 million are prescribed antibiotics unnecessarily. Adhering to the prescribing guidelines and antibiotic stewardship programs could eliminate 7.8 million antibiotic prescriptions annually (CDC, 2020). This quality improvement project was conducted to assess the effectiveness of an antibiotic stewardship program within the telehealth setting in decreasing the number of antibiotics prescribed for bronchitis. This study focused on providers who participated within a telehealth practice platform in the Tampa, Florida area. At the end of a three-month period, where an audit with feedback method was utilized, the providers that were observed decreased their antibiotic prescribing rates from 82.1% pre-intervention to 60% post-intervention. These findings are similar to those in previous studies that

found a reduction in antibiotics prescribed for bronchitis in groups receiving education plus individualized feedback compared with the groups that only received education (Du Yan et al., 2021).

The data that was collected for this quality improvement project supports that the educational intervention, which included a PowerPoint presentation and utilization of tools provided by the CDC, using an audit with feedback method, decreased the number of antibiotics prescribed for bronchitis in the telehealth setting. Pedrotti et al. (2021) demonstrated that when antibiotic stewardship programs guided by the CDC are implemented and followed, positive outcomes can result. It was found that between January 2019 and February 2020, over 6,050 telehealth visits were held and antibiotics were only prescribed 2.5% of the time for bronchitis after the implementation of the antibiotic stewardship program (Pedrotti et al., 2021). Further research should be conducted to assess the effectiveness of an antibiotic stewardship program within the Telehealth setting.

### **Limitations**

There were multiple limitations to this quality improvement project. This project was conducted on a telehealth basis, which may not be representative of other healthcare settings. The sample size of 16 providers was small due to the number of participants within the clinical site. The implementation period was also short in assessing three months pre-intervention and three months post-intervention. Not all providers were able to see patients with a diagnosis of bronchitis during the three months post-intervention, so data were not analyzed on them. An extended timeframe would allow for all providers to have a chance to utilize the tools that were provided to aid in the antibiotic stewardship program. Specific factors that were not assessed that could have influenced this study include patient demographics and provider experience.

## Implications

Antimicrobial resistance is a growing public health issue that could have disastrous consequences. Currently, one of the top global health priorities is lowering antibiotic prescription rates (Grigoryan et al., 2017). As much as 7.8 million antibiotic prescriptions could be avoided each year by following the prescribing guidelines and participating in antibiotic stewardship initiatives (CDC, 2021). Laude et al. (2020) supported the utilization of an antibiotic stewardship program that involved provider education, chart audits, provider feedback, and patient education when their study revealed that antibiotic stewardship interventions that were guided by the core elements defined by the CDC over 2.5 years, provided a 36% reduction in the overall antibiotic prescribing rates. This quality improvement project has demonstrated the effectiveness of an antibiotic stewardship program within the telehealth setting in decreasing the number of antibiotics prescribed for bronchitis. Healthcare organizations should begin implementing evidence-based antibiotic stewardship programs to aid in the combat against antibiotic resistance, and DNP-prepared practitioners are well-positioned to lead this work as experts in implementation science.

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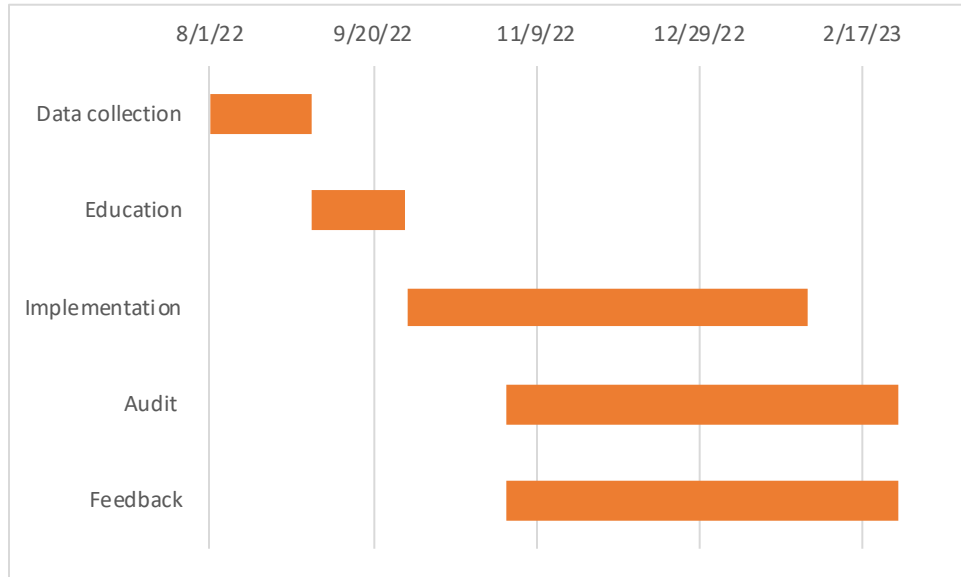
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### Appendix A Project Timeline



Appendix B  
Permission for education use

Jordan Burnam  
Sat 2/26/2022 9:36 AM  
To:

• [REDACTED]

My name is Jordan Burnam and I am currently in a graduate program with Florida State University completing my Doctor of Nursing Practice degree. I am currently working on my DNP project, which focuses on Implementing an Antibiotic Stewardship Program within the outpatient care setting.

I have read your curriculum and would like to ask your permission to use part of your lectures for the education that will be provided to the providers participating in my project.

I will absolutely give credit to you and the Wake Forest School of Medicine for the information within the PowerPoint.

Please contact me should you have any questions.

Thank you for your time,  
Jordan Burnam, DNP Student  
816-804-6075

CO

[REDACTED]  
Mon 2/28/2022 11:55 AM

To:

• Jordan Burnam

Cc:

• [REDACTED]

No problem. Good luck!

[REDACTED]  
Professor of Medicine  
Section on Infectious Diseases  
Wake Forest University School of Medicine  
100 Medical Center Blvd  
Winston-Salem, NC 27157  
336-716-4070, Fax 336-716-3825

## Appendix C Data Collection Worksheet

Column1	Column2	November 2021, December 2021, January 2022	Nov-22	Dec-22	Jan-23	Total 3 months
Provider A	Number of Brochitis diagnosis					
	Number of antibiotics written					
	Antibiotic prescribing Rate(%)					
Provider B	Number of Brochitis diagnosis					
	Number of antibiotics written					
	Antibiotic prescribing Rate(%)					
Provider C	Number of Brochitis diagnosis					
	Number of antibiotics written					
	Antibiotic prescribing Rate(%)					
Provider D	Number of Brochitis diagnosis					
	Number of antibiotics written					
	Antibiotic prescribing Rate(%)					
Provider E	Number of Brochitis diagnosis					
	Number of antibiotics written					
	Antibiotic prescribing Rate(%)					
Provider F	Number of Brochitis diagnosis					
	Number of antibiotics written					
	Antibiotic prescribing Rate(%)					
Provider G	Number of Brochitis diagnosis					
	Number of antibiotics written					
	Antibiotic prescribing Rate(%)					
Provider H	Number of Brochitis diagnosis					
	Number of antibiotics written					
	Antibiotic prescribing Rate(%)					
Provider I	Number of Brochitis diagnosis					
	Number of antibiotics written					
	Antibiotic prescribing Rate(%)					
Provider J	Number of Brochitis diagnosis					
	Number of antibiotics written					
	Antibiotic prescribing Rate(%)					
Provider K	Number of Brochitis diagnosis					
	Number of antibiotics written					
	Antibiotic prescribing Rate(%)					
Provider L	Number of Brochitis diagnosis					
	Number of antibiotics written					
	Antibiotic prescribing Rate(%)					

Appendix D  
Virus or Bacteria Poster

# Viruses or Bacteria What's got you sick?

Antibiotics are often prescribed when they are not needed for respiratory infections. Antibiotics are only needed for treating certain respiratory infections caused by bacteria. Viral illnesses cannot be treated with antibiotics. When an antibiotic is not prescribed, ask your healthcare professional for tips on how to relieve symptoms and feel better.

Common Respiratory Infections	Common Cause			Are Antibiotics Needed?
	Virus	Virus or Bacteria	Bacteria	
Common cold/runny nose	✓			No
Sore throat (except strep)	✓			No
COVID-19	✓			No
Flu	✓			No
Bronchitis/chest cold (in otherwise healthy children and adults)*		✓		No*
Middle ear infection		✓		Maybe
Sinus infection		✓		Maybe
Strep throat			✓	Yes
Whooping cough			✓	Yes

\* Studies show that in otherwise healthy children and adults, antibiotics for bronchitis won't help you feel better.



To learn more about antibiotic prescribing and use, visit [www.cdc.gov/antibiotic-use](http://www.cdc.gov/antibiotic-use).



## Appendix E A Commitment to Improving Antibiotic Use



### A Commitment to Improving Antibiotic Use

Antibiotics are powerful, lifesaving medications. We are **dedicated** to prescribing antibiotics when they are needed, and we will avoid prescribing antibiotics when they are not needed as they may do harm. When your healthcare professional prescribes antibiotics, take them as directed.

Antibiotics fight infections caused by **bacteria**. Antibiotics don't work against **viruses** that cause the common cold, most coughs, and sore throats.

You can experience side effects while taking antibiotics. Common side effects could include a skin rash, diarrhea, or a yeast infection. More serious side effects could include a *C. diff* infection, which causes severe diarrhea that can lead to severe colon damage and death.

Using antibiotics also gives bacteria a chance to become more resistant to them. This can make future infections harder to treat, which means that antibiotics might not work when you really do need them.

Taking antibiotics only when needed helps keep you healthy, helps fight antibiotic resistance, and ensures that these life-saving drugs will be available for future generations.

We will answer any questions about the role of antibiotics in your treatment.

*Sincerely,*



To learn more about antibiotic prescribing and use, visit [www.cdc.gov/antibiotic-use](http://www.cdc.gov/antibiotic-use) or call 1-800-CDC-INFO.

