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Implementing an Antibiotic Stewardship Education Program to Decrease Antibiotic Prescriptions in an Urgent Care Clinic

James Gramling
Jacksonville State University, jsu5493h@stu.jsu.edu

Jacksonville State University
Graduate Studies
700 Pelham Rd N., 320 Angle Hall, Jacksonville, AL 36265
Phone: (256) 782-5348
http://www.jsu.edu/graduate/index.html

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First Name: * James Last Name: * Gramling Student ID: *

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DNP Clinical Coordinator Signature	Electronically signed by Lori McGrath on 07/06/2021 8:03:38 AM
DNP Program Coordinator Signature	Electronically signed by Donna Dunn on 07/06/2021 10:03:37 AM
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IMPLEMENTING AN ANTIBIOTIC STEWARDSHIP EDUCATION PROGRAM TO DECREASE ANTIBIOTIC PRESCRIPTIONS IN AN URGENT CARE CLINIC

A DNP Project Submitted to the
Graduate Faculty
of Jacksonville State University
in Partial Fulfillment of the
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Doctor of Nursing Practice

By

JAMES RICHARD GRAMLING

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ABSTRACT

Antibiotics are often prescribed for respiratory infections. These infections often have a viral rather than a bacterial source. Overuse of antibiotics is associated with increased potential for adverse effects, increased healthcare costs, and increasing antibiotic resistance. The purpose of this DNP project was to determine if implementing an antibiotic stewardship program at an urgent care clinic would decrease the number of antibiotic prescriptions written for acute respiratory tract infections. An educational session consisting of didactic and PowerPoint presentations was provided to each provider at the urgent care clinic. Medical records were reviewed for four weeks after completion of the session and compared to the same four-week period of the previous year. The data extracted from the review was analyzed for changes comparing the pre-implementation and post-implementation phases. Almost 70% of patients diagnosed with an acute respiratory tract infection received a prescription for an antibiotic. Compared to physicians, nurse practitioners were less likely to prescribe antibiotics. The use of molecular rapid tests significantly reduced the number of antibiotics prescribed. There was also an overall decrease in the number of antibiotics prescribed in the post-implementation phase compared to the pre-implementation phase. These findings support the idea that supplying healthcare providers with up-to-date education regarding antibiotic stewardship can reduce unnecessary antibiotic prescriptions.

Keywords: antibiotic stewardship, antibiotic overuse, respiratory tract infection treatment, antibiotic prescribing practices, molecular rapid tests.

Dedication

I would like to dedicate this project to my family. My children, Emma and Tommy, for their understanding and support while I spent numerous hours on this project. Most importantly to my wife, Serena. Without her continuous support, encouragement, and love I would have never been able to complete this project.

Acknowledgments

I would like to recognize the invaluable assistance and support provided by Dr. Lori McGrath. She kept me motivated throughout this process and refused to let me give up on myself. Additionally, I thank Dr. Jason Junkins for allowing me time to develop this project and giving me the freedom necessary to ensure a successful implementation. To all the instructors I had the opportunity to learn from throughout this experience, I give my thanks. I give my gratitude to the providers who agreed to participate in the implementation of this project.

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Introduction

According to the Centers for Disease Control and Prevention (CDC, 2017), there were 269 million prescriptions written for antibiotics in 2015 alone. It is estimated at least 30% of these were unnecessary. Many of these prescriptions were written for an acute respiratory tract infection (ARTI), which includes acute otitis media, acute rhinosinusitis, pharyngitis, nasopharyngitis (common cold), acute bronchitis, influenza, and pneumonia. Patients diagnosed with an ARTI received an unnecessary antibiotic prescription 50% of the time (CDC, 2017). The use of molecular rapid test (MRT) for ARTIs is becoming more readily available in the outpatient setting (Echacarria et al., 2018). Many of these tests can provide rapid results. Even though viruses are the most common cause of ARTIs, antibiotics are still frequently prescribed. (Echacarria et al., 2018).

Background

In the ambulatory care setting, inappropriate antibiotic prescriptions are common. Office visits for ARTIs account for the most significant number of antibiotic prescriptions written (Fleming-Dutra, Hersh, & Shapiro, 2016). According to the CDC (2017), 47 million unnecessary antibiotic prescriptions are written every year. Needless antibiotic prescriptions put patients at risk for adverse drug reactions, clostridium difficile infection (CDI), and increase the rate of antibiotic resistance. Additionally, there is added unnecessary financial burden (CDC, 2017). In the United States, 23,000 deaths per year are associated with antibiotic-resistant infections (Fleming-Dutra et al., 2016).

Patients with various respiratory illnesses are frequently treated in the ambulatory setting. Achieving patient satisfaction is often cited by providers because an antibiotic is prescribed even when the cause is suspected to be viral (Harris, Hicks, & Qaseem, 2016). Additional factors contributing to unnecessary antibiotic prescriptions include clinicians wishing to avoid damaging repercussions of denying antibiotics, a perceived correlation between the value of the visit and receiving a prescription, pressure placed on clinicians by management, and lack of time to provide education as to why an antibiotic is not needed (Fleming-Dutra et al., 2016).

In 2014, family practice physicians prescribed almost 22% of all oral antibiotic prescriptions in the United States. Physician assistants and nurse practitioners combined account for 20%. Pediatricians were responsible for just under 10% of the oral antibiotic prescriptions (CDC, 2017). In recent years there has been increased focus on reducing inappropriate antibiotic prescriptions. The number of antibiotic prescriptions for children has decreased in recent years. The amount for adults, however, has continued to climb. In the United States, there is significant geographic variability concerning the rates of inappropriate antibiotic prescriptions for ARTIs. The Pacific region of the United States has the lowest rate of antibiotic prescriptions for ARTIs, while the central portion of the southeast has the highest (Hersh, Shapiro, Pavia, Fleming-Dutra, & Hicks, 2018).

Problem Statement

The purpose of this project is to evaluate the effectiveness of implementing an antibiotic stewardship education program, for providers at an urgent care clinic, on the rate of antibiotic prescriptions for ARTIs. The overprescribing of antibiotics is a widespread issue. Antibiotics are often prescribed for an ARTI even when not indicated

(CDC, 2017). For healthcare providers in an urgent care clinic, antibiotic stewardship education for ARTIs compared to no education decreases the amount of prescribed antibiotics during a four-week period.

This Doctor of Nursing Practice (DNP) project evaluated the implementation of antibiotic stewardship education for ARTIs in an urgent care clinic. Education regarding current recommendations for treatment of ARTIs was provided to all providers in the urgent care clinic. Supplemental quick-reference handouts were available and the use of MRTs was encouraged to assist in accurate diagnosis and treatment.

Organizational Description of Project Site

In the current healthcare environment, there is a strong expectation of maintaining customer satisfaction. Maintaining customer satisfaction is often cited as a reason for prescribing antibiotics even when the clinician feels they are not necessary (Fletcher-Lartey, Yee, Gaarslev, & Khan, 2016). These factors can be especially true in the urgent care setting. Patients often think it is necessary to take an antibiotic to feel better. They often do not understand the difference between viral and bacterial infection (Fletcher-Lartey et al., 2016). The site of this DNP project is a high-volume urgent care clinic in a rural area of the southeastern United States. Like many other urgent care clinics, it is common for antibiotics to be prescribed unnecessarily.

Review of the Literature

According to the World Health Organization (WHO [2015]), the world is progressing towards a healthcare crisis due to misuse and overprescribing of antibiotics. This practice is a global threat to people as a post-antibiotic era is quickly approaching.

Common and once easily treated infections will bring death unless an international action plan is implemented to change the way healthcare providers prescribe antibiotics (WHO, 2015). Although there is little evidence in the literature about guidelines and interventions to reduce the overprescribing of antibiotics, efforts are being made worldwide.

Infections in the respiratory tract are the most common admitting diagnoses to healthcare facilities (Widmer, Zhu, Williams, Griffin, Edwards, & Talbot, 2012; Hirsch, Martino, Ward, Boeckh, Einsele & Ljungman, 2013). Decreasing antibiotic use in respiratory patients with viral illnesses plays a significant role in reducing antibiotic resistance. The continual over-prescribing prompted the development of antimicrobial stewardship (AMS) programs that consist of updated education and training about the dangers of over-prescribing and the benefits of utilizing rapid viral testing to guide treatment. Guidelines for these programs were provided by the Infectious Diseases Society of America (IDSA) (Barlam et al., 2016).

Keske et al. (2018) utilized MRT to reduce unnecessary antibiotic use in viral respiratory illnesses. Although this method was still in its infancy, there were some positive results. After 12 months, inappropriate antibiotic use decreased by 13% in pediatric patients. No reduction in antibiotic prescriptions for adults was shown (Keske et al., 2018).

Finkelstein (2008) conducted a study over a three-year period that involved 223,135 pediatric patients across 16 communities. Parents received educational materials by mail, during visits at primary care practices or pharmacy, or from their child-care providers. There was an overall downward trend in both those who were provided

education and those who had no intervention. There was no effect in ages 3-24 months, a 4.2% decrease in ages 24-48 months, and a 6.7% decrease in those 48-72 months (Finkelstein et al., 2008).

Brown (2018) conducted a quasi-experimental study with eight urgent care providers who received an educational intervention on the overuse of antibiotics and appropriate prescribing methods. Following the intervention, the antibiotic prescribing rate decreased from 30% to 20% ($p=.078$). Pre-intervention patients had 3.3 times ($p=.001$) greater likelihood of being prescribed an antibiotic if a physician saw them than if a nurse practitioner saw them. Post-intervention patients had 4.2 times ($p < .005$) greater likelihood of being prescribed an antibiotic if a physician saw them than if a nurse practitioner saw them. Eighty-seven percent of practitioners in the setting believed antibiotics were overused. Ninety-nine percent believed antibiotic resistance is a problem (Brown, 2018).

Fletcher-Lartey, Yee, Gaarslev, and Khan (2016) used a mixed-methods approach to describe how patient's expectations influenced the prescribing of antibiotics for upper respiratory tract infections. The study included general practitioners in Australia, where the prescription rate for oral antibiotics for upper respiratory infections was 295 per 1000 people between 2013-2014. Cross-sectional surveys and semi-structured interviews were used to collect data. More than 50% of providers reported prescribing antibiotics for upper respiratory infections to meet patient expectations. Other findings suggested that many practitioners do not consider antibiotic resistance when prescribing. They appeared to be unaware of the role general practitioners play in over-prescribing antibiotics and antibiotic resistance (Fletcher-Lartey et al., 2016).

Fleming-Dutra, Hersh, and Shapiro (2016) surveyed 184,032 ambulatory care patients concerning antibiotic use in 2010-2011. In the United States, an estimated 154 million prescriptions for antibiotics were written for upper respiratory infections, where more than half were deemed to be likely unnecessary. Collectively, across all conditions, it was estimated that 30% of antibiotics prescribed were unnecessary. It was concluded that the over-prescription of antibiotics resulted from the over-diagnosis of certain conditions (Fleming-Dutra et al., 2016).

Although some countries vary in how people are dispensed medications, efforts are still being made to ensure good antibiotic stewardship while treating acute respiratory illness (ARI). Chowdhury et al. (2018) conducted a study over six months in Bangladesh where 100 pharmacies were surveyed to evaluate dispensing practices. Afterward, employees were given a one-day educational intervention concerning antibiotic recommendations and management of ARI. Dispensing of antibiotics for uncomplicated ARI in children decreased post-intervention, although habits for complicated ARI remained the same. In adults, uncomplicated ARI antibiotic dispensing remained the same. However, ARI antibiotic dispensing increased among those with complicated ARI (Fahmida et al., 2018).

Morley, Firgens, Vanderbilt, Zhou, Zook, Read, and MacGeorge (2020) conducted a retrospective chart review at a large public university in the southeast where on-campus medical care is provided. The purpose was to identify factors associated with inappropriate use of antibiotic therapy in adult acute bronchitis cases, as this occurs in up to 70% of patients. Findings indicated that abnormal lung sounds such as rales or rhonchi and abnormal percussion findings heavily influenced antibiotic prescribing rates for acute

bronchitis. Other factors influencing prescribing rates were gender, worsening symptoms, duration of illness, symptoms associated with viral infections or allergies, and anterior cervical lymphadenopathy (Morley et al., 2020).

Frost, McLean, and Chow (2018) conducted a study over six years to determine the degree of adherence to antibiotic prescribing guidelines between pediatric and non-pediatric providers. Patients with upper respiratory infections and pharyngitis were selected for comparison. Results indicated that pediatricians were more likely to adhere to guidelines for the management of acute respiratory infections. First-line antibiotic treatment did not vary between providers for otitis media. It was also recommended that more antibiotic stewardship efforts be targeted towards non-pediatric providers (Frost, McLean, & Chow, 2018).

Lowe et al. (2017) conducted a quasi-experimental study to evaluate the effectiveness of an antimicrobial stewardship intervention for patients with viral respiratory infections in Canada. Seventy-seven percent of the treating physicians accepted the recommendations and utilized virology testing to determine the need for antibiotic therapy and reduce the duration of antibiotic treatment. For one year, there was a decrease in antibiotic use and no change in the adverse outcomes associated with treatment (Lowe et al., 2017).

Wei et al. (2019) conducted a follow-up study to a randomized controlled trial in rural China where efforts were being made to reduce antibiotic prescribing for childhood upper respiratory tract infections. The original study was conducted due to the large amounts of antibiotics prescribed in low- and middle-income countries, such as China, for upper respiratory tract infections (URTIs) for unnecessary viral illnesses such as the

common cold. Original interventions included clinical guidelines, monthly prescribing review meetings, doctor-patient communication skills training, and educational materials for caregivers. In the long-term follow-up study, 14 facilities had electronic records available to determine the antibiotic prescription rate (APR) in children aged two to 14 years with URTI diagnosis.

Findings suggested a substantial reduction in antibiotic prescribing in both the six months and 18 months. Baseline data compared to 6 months later revealed a 49% reduction in antibiotic prescribing. Although the findings were not as high in the 6-month comparison to the 18 months, there was still a 36% reduction in antibiotic prescribing. To continue good antibiotic stewardship within this community, ongoing educational materials and resources would be needed, as evidenced by the slight increase in antibiotic prescribing from six months to 18 months (Wei et al., 2019).

Globally, we are approaching a crisis due to the misuse and overprescribing of antibiotics. Many bacteria, once easily treated, are now resistant to multiple classes of antibiotics. Antibiotic use in ARTIs is a significant contributor to resistance. Patient expectations and pressures to maintain positive customer satisfaction scores have a significant impact on antibiotic prescribing. The rate of antibiotics prescribing in pediatrics is improving, but not in the adult population. The use of antibiotic stewardship programs and MRT can decrease the rate of inappropriate antibiotic prescribing.

Evidence-Based Practice: Verification of Chosen Option

There is an abundance of evidence supporting the reduction of unnecessary antibiotics. Current evidence indicates a potential threat regarding the overuse of antibiotics. According to CDC estimates, an estimated 47 million unnecessary antibiotic

prescriptions are written every year (CDC, 2017). Antibiotic resistance, adverse drug reactions, and clostridium difficile infections are significant effects of the overprescribing of antibiotics (CDC, 2017). In the United States, there are an estimated 23,000 deaths per year associated with antibiotic-resistant infections (Fleming-Dutra et al., 2016).

Theoretical Framework/Evidence-Based Practice Model

The theoretical framework most well-aligned with the goals of this project is Kurt Lewin's Change Model. He was one of the more prominent psychologists of the early 20th century. Lewin's model is based on three stages of change. These stages are unfreezing, change, and refreezing. Unfreezing involves identifying what needs to be changed and preparing for the change. Change refers to the actual implementation of the new process. New changes must be reevaluated (Burnes, 2020).

Additionally, the changed processes should be reinforced frequently. The last stage of Lewin's Change Model is the refreezing phase. This stage is the process of ensuring the change is sustained. This stage is essential, so regression to the previous process does not occur.

The unfreezing stage of this model took place by educating providers at the project site on the importance of antibiotic stewardship. Educational material was provided, as well as summarized recommendations on treatment to ARTIs. Additionally, information regarding MRTs was provided. The change stage took place as the providers increase the use of current evidence-based practice (EBP) recommendations, including the utilization of MRTs for patients diagnosed with an ARTI. Having timely access to results identifying the cause of an ARTI being bacterial versus viral should prompt

providers to determine if an antibiotic prescription is necessary. The final stage, refreezing, was accomplished as providers adapt to the EBP practice recommendations and adopt new technology in their treatment decisions to manage ARTIs better.

Goals, Objectives, and Expected Outcomes

The purpose of this project was to investigate whether the implementation of antibiotic stewardship education for ARTIs influences the rate of unnecessary antibiotic prescriptions. This project shows an improvement in provider awareness of the risks of overprescribing antibiotics and a decrease in the number of antibiotic prescriptions written for ARTIs. Increasing the use of MRTs to aid in accurate diagnosis is an essential factor.

The objectives for this project were as follows:

1. Review the trends of antibiotic prescribing for ARTIs before the implementation of the educational sessions.
2. Provide educational sessions to providers at the urgent care clinic regarding safe antibiotic use. Include quick reference handouts and patient education flyers.
3. Determine how often an MRT is utilized in patients diagnosed with an ARTI.
4. Compare the number of antibiotic prescriptions written before and after the implementation of the project.
5. Compare provider knowledge regarding antibiotic stewardship before and after the educational session by utilizing a group of test questions.

The primary expected outcome for this project was to show an increase in provider knowledge regarding antibiotic stewardship. Another outcome was to reduce the number of antibiotic prescriptions written for patients diagnosed with an ARTI. A different expected outcome includes an increased utilization of MRTs. By utilizing an MRT, more accurate treatment decisions can be made.

Project Design

This DNP was designed as a process improvement project. The DNP project evaluated the current trends in the use of antibiotics for ARTIs. Providers were asked to complete a short pre-test on antibiotic stewardship. Next, education regarding antibiotic stewardship and the current EBP recommendations for the treatment of ARTIs were presented to providers at the project site. Reference materials were made available to all providers concerning these recommendations.

Additionally, providers were encouraged to utilize the respiratory MRTs available at the project site. Upon completion of the educational session, providers were asked to complete a post-test. A comparison was made on the rate of antibiotic prescriptions for ARTIs before and after implementing antibiotic stewardship education. Quasi-experimental methods were used to obtain the desired data for this DNP project. A cause-effect relationship between two variables was explored.

Project Site and Population

The DNP project was conducted in a high-volume urgent care clinic in the southeastern United States. This clinic provides urgent care services to the local population. The urgent care center provides treatment of minor illnesses, injuries, minor

lacerations, fractures, and sexually transmitted infections. The clinic provides occupational medicine services such as Department of Transportation physicals, urine drug screens, pre-employment physicals, and TB testing. Additionally, routine primary care services are provided. The organizational structure of the project site includes the owner, practice administrators of the three clinics, a billing coordinator/electronic medical record (EMR) liaison, registration personnel, medical staff, nurses, and medical assistants. The typical staffing for an individual clinic consists of 1-2 registration personnel, 1-2 medical staff, and 2-4 nurses or medical assistants. This DNP student primarily interacted with the medical staff to provide the educational sessions and answer questions. The billing supervisor/EMR liaison was utilized to retrieve EMR data necessary for the DNP project. No direct interaction with patients was required.

The clinic serves a diverse urban population. There is a growing percentage of the older adult population in the rural southern county while younger adults are declining. There is also a growing number of female-led households, especially those with young children. The population has a Caucasian majority, but the African American population is steadily growing ("Anniston Snapshot," 2013).

The participants in this DNP project were comprised of physicians and nurse practitioners (NP). For the DNP project, the Group was collectively called providers. Project stakeholders include the clinic owner, the practice administrator of the project site, the providers, and the clinic's patients.

Setting facilitators and barriers

Potential barriers at the project site were considered. Site-specific resources for the DNP project included the billing coordinator/EMR liaison, practice administrator, and

the providers. A potential constraint included the ability to access the EMR information necessary to obtain needed project data. Additional constraints included scheduling participants to achieve an adequate sample size to demonstrate the effectiveness of antibiotic stewardship education. The anticipated primary barrier to implementing the project was the receptiveness of the providers to utilize the antibiotic stewardship recommendations. Overcoming this potential barrier was achieved by providing current EBP guidelines, using a non-judgmental approach when performing education, supplementing the provider education with quick-reference materials, and providing antibiotic stewardship information to the patients.

Implementation Plan/Procedures

The DNP project followed a detailed implementation plan. The providers at the project site typically work 12-hour shifts. Four providers work eight or more shifts per month, while the other four work less than eight shifts per month. Educational information and the provider tests were taken from the Wake Forest School of Medicine Antibiotic Stewardship Curriculum. Permission was obtained from the authors of the curriculum to use their material (Appendix A). This material was presented to the providers in the form of a brief slide presentation (See Appendix A). A short test was completed before (See Appendix B) and after (See Appendix C) the educational session. Reference handouts, regarding treatment recommendations, from the CDC (See Appendix D) were given to the providers. Informational flyers for patients (See Appendix E) were displayed in the clinic exam rooms. Educational material was based on the latest EBP recommendation for the treatment of an ARTI. The dangers of inappropriate

antibiotic prescribing were included in the educational material. Credentials, whether physician or NP, was collected. The project data retrieved from the EMR included date of service, age, sex, race, diagnosis, whether an antibiotic was prescribed, credentials of the treating provider such as physician or NP, and whether an MRT was ordered. The timeframe for collecting the above data was four weeks after the completion of the educational sessions. This data was compared to the same four-week period of the previous year.

Measurement Instruments

An Excel spreadsheet was used to compile project date which was then forwarded to a statistician for analysis. A detailed data analysis was compiled. The statistician also analyzed the pre and post-tests taken by the providers.

Data Collection Procedures

Pre-intervention data collection. Data were collected for four weeks before the implementation of the project intervention. The period for this data was November-December 2019 to January 2020. The data collected included a unique patient identifier, date of service, age, sex, race, diagnosis, whether an antibiotic was prescribed, credentials of the treating provider such as physician or APP, if any point of care (POC) test or MRT was ordered, and if the patient had comorbidities. The patient identifier was HIPPA compliant.

Intervention data. The intervention data was collected. This data comprised the educational material given to the providers, the quick-reference material for the providers, the flyers made available to the patients, and the EBP guidelines for the treatment of an ARTI.

Post-intervention data. The data collected post-intervention was the same as collected pre-intervention. The data were analyzed for comparison to determine if the intervention impacted the rate of antibiotic prescriptions written for ARTIs at the location of the project site and any improvement in the provided test.

Data Analysis

Data collected during the pre-implementation and post-implementation phases of this project were analyzed. A comparison of average age by year, gender, insurance status, antibiotic prescription status, provider type, and whether an MRT was performed was conducted. Of the patients seen during the project period, 672 were female (48.2%), 721 were male (51.8%), and one did not report gender. The average age of all patients was 31.2 years. The youngest patient was one, and the oldest was 85. Of the 1,394 patients, 789 (56.6%) were Caucasian, 499 (35.8%) were African American, 72 (5.2%) were Hispanic, and 34 (2.4%) were Asian. Most patients (90.1%) were insured and prescribed an antibiotic (69.2%). Just over half of the patients (55.4%) were treated by a physician, while a nurse practitioner saw the remaining 44.6%. Of the ARTI diagnoses reviewed, 332 (23.8%) were sinusitis, 300 (23.0%) were influenza, 275 (19.7%) were URI, 128 (9.2%) were AOM, 127 (9.1%) were pharyngitis, 118 (8.5%) were streptococcal pharyngitis, 60 (4.3%) were bronchitis, and 34 (2.4%) were sore throat (Turley, 2021).

Figure 1 Patient Breakdown by Gender

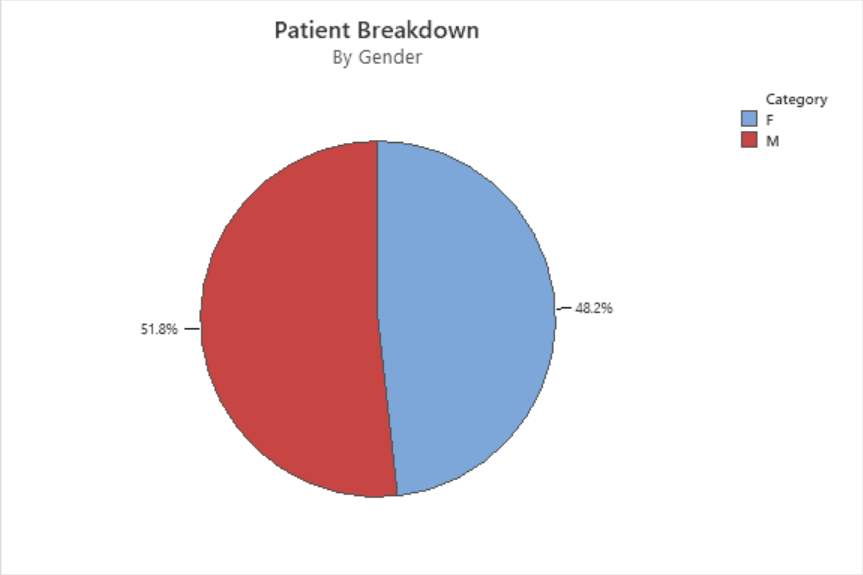


Figure 2 Patient Breakdown by Race

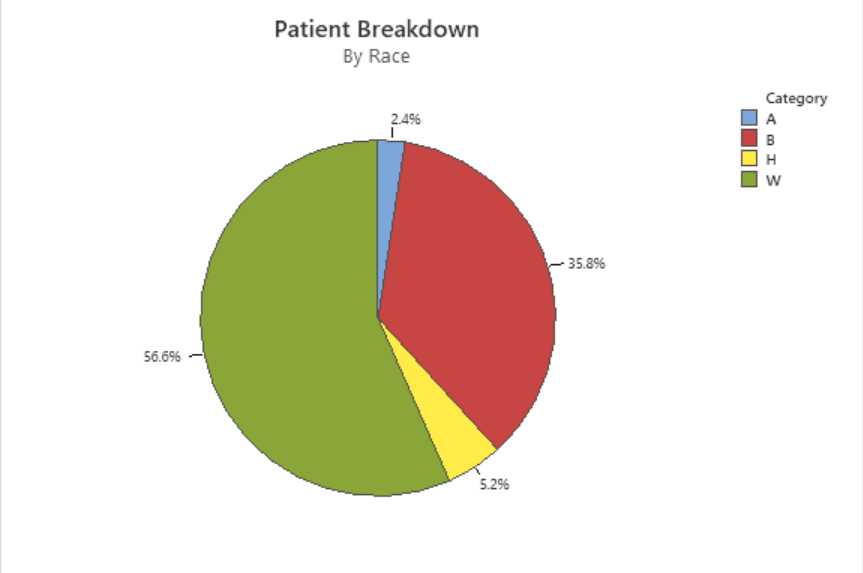


Figure 3 Patient Breakdown by Diagnosis

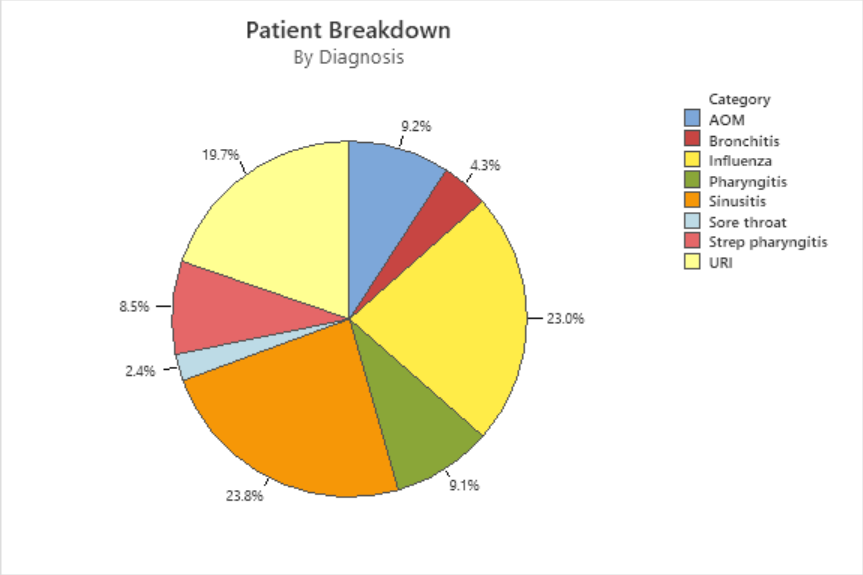
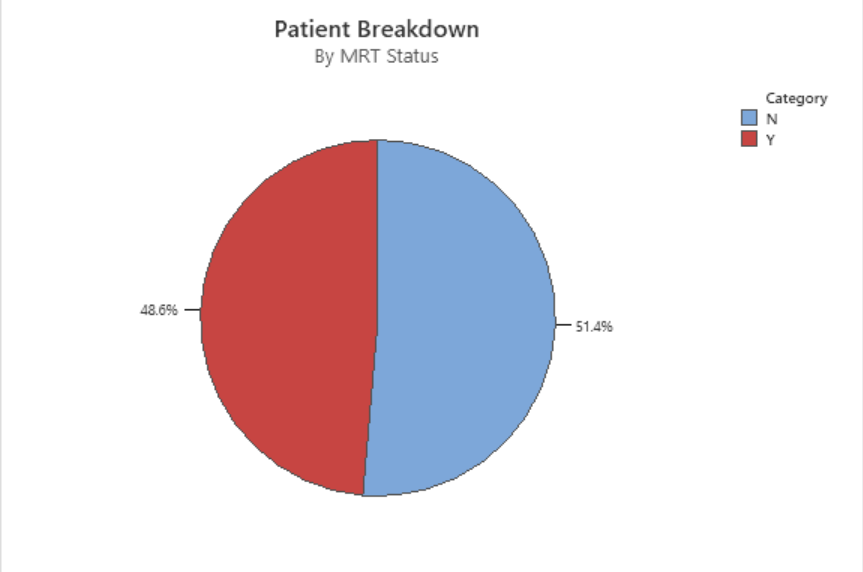


Figure 4 Patient Breakdown by MRT Status



Additionally, a series of two-sample independent t-tests yielded the following results:

Table 1 Results of two-sample independent t-tests

Age Mean (St. Dev)		P-Value
2019	**2020**	
30.9 (20.1)	31.4 (20.3)	0.662
Male	**Female**	
30.1 (20.1)	32.3 (20.4)	0.040*
Insured	**No Insurance**	
31.2 (20.2)	30.5 (20.0)	0.712
Prescribed Antibiotics	**Not prescribed Antibiotics**	
30.6 (20.0)	32.5 (20.7)	0.108
MD	**NP**	
30.1 (20.4)	32.5 (19.9)	0.026*
MRT Yes	**MRT No**	
32.0 (20.4)	30.3 (20.0)	0.116

At the 0.10 level of significance, there is sufficient evidence to conclude female patients were significantly older than the male patients and that patients who a nurse practitioner saw were significantly older than patients seen by a physician (Turley, 2021).

Figure 5 Patient Age by Gender

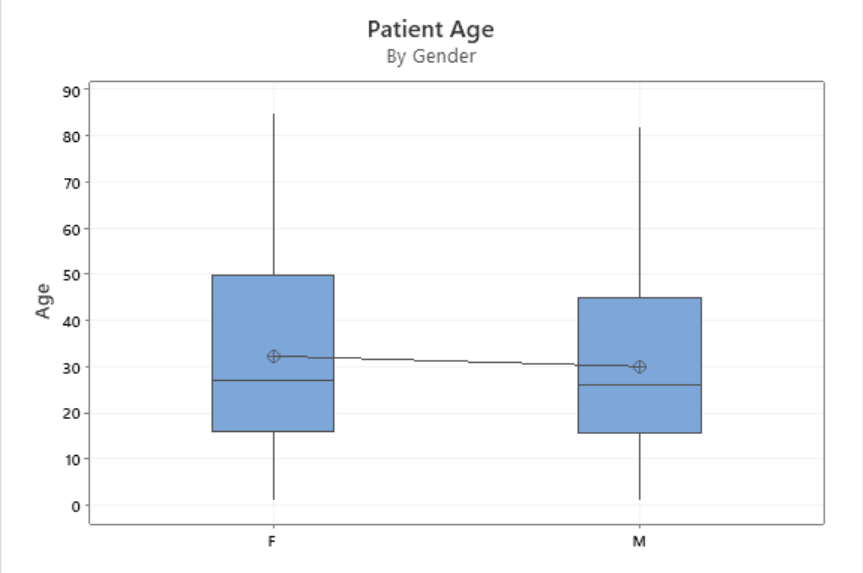


Figure 6 Patient Age by Year

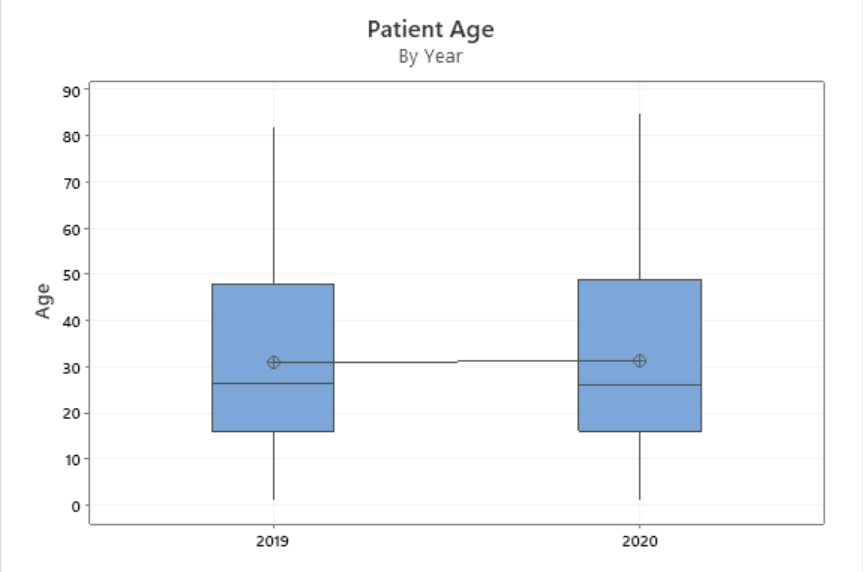


Figure 7 Patient Age by Insurance Status

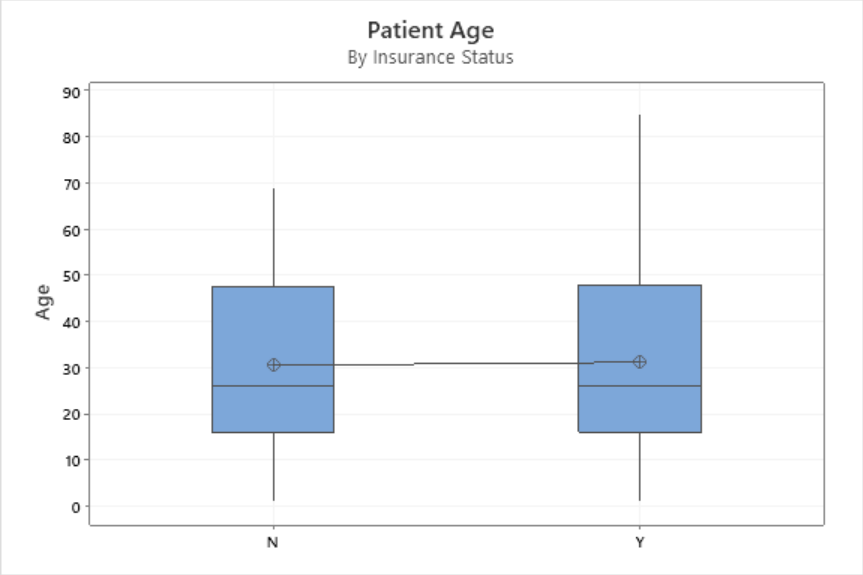


Figure 8 Patient Age by Antibiotic Prescription Status

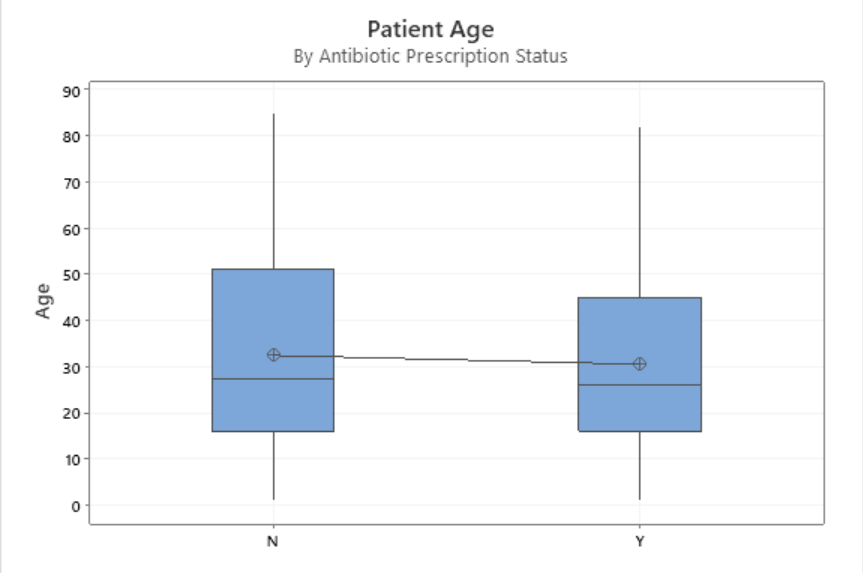


Figure 9 Patient Age by MRT Status

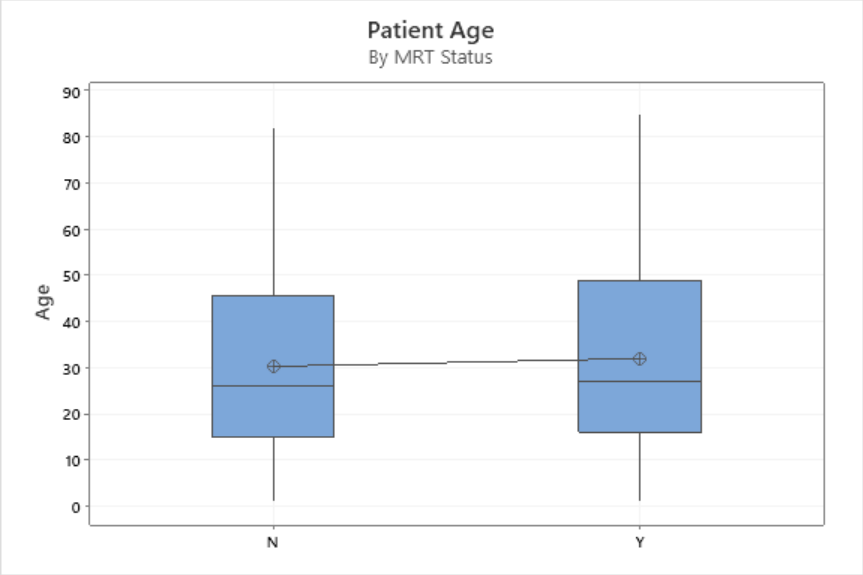
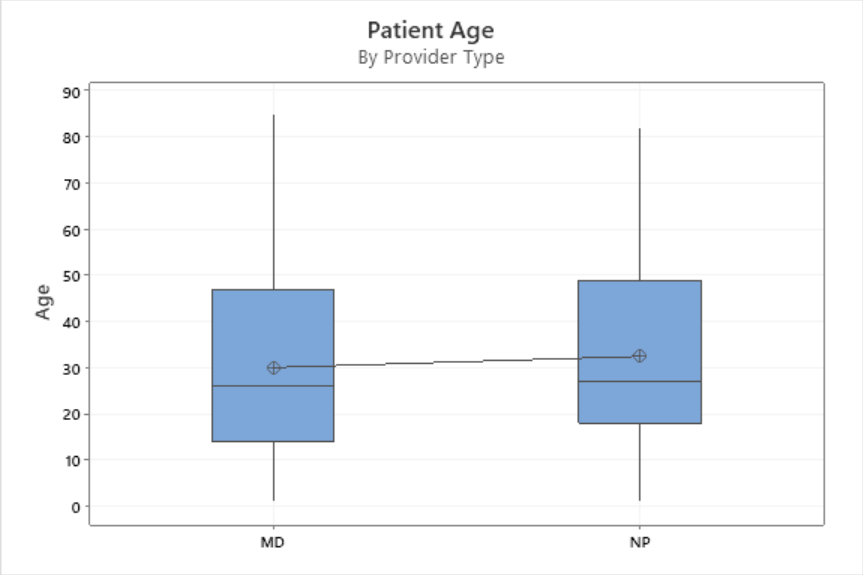


Figure 10 Patient Age by Provider Status



A series of Chi-square tests were conducted to determine if any of the factors collected significantly correlated with whether a patient received antibiotics to treat their illness. The results of the analyses can be seen in the table below:

Table 2 Results of Chi-square tests

Factors Impacting Antibiotics Prescription	P-value
Gender	0.903
Race	0.298
Insurance Status	0.040*
Diagnosis	<0.001*
Provider Type	<0.001*
MRT	0.029*
Year	0.024*

* significant p-value at α = 0.10

Figure 11 Antibiotic Prescription Status by Gender

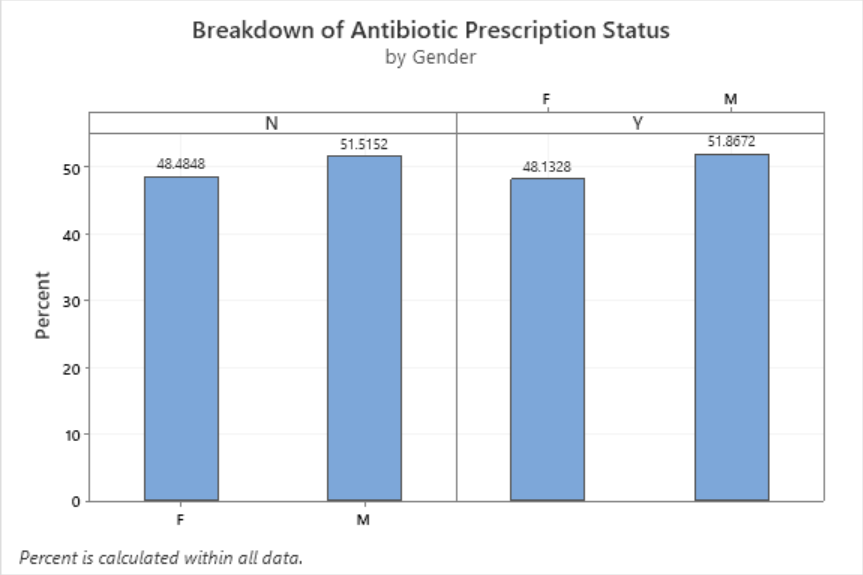


Figure 12 Antibiotic Prescription Status by Race

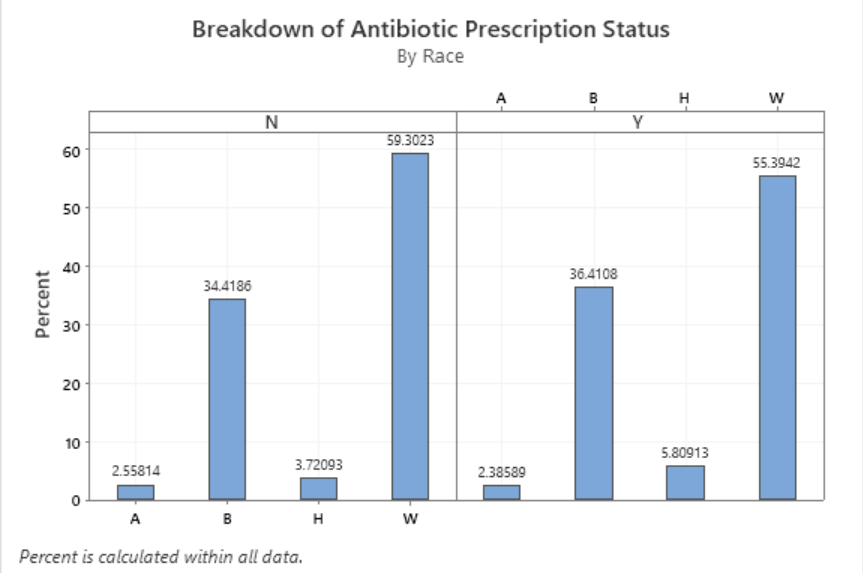


Figure 13 Antibiotic Prescription Status by Insurance Status

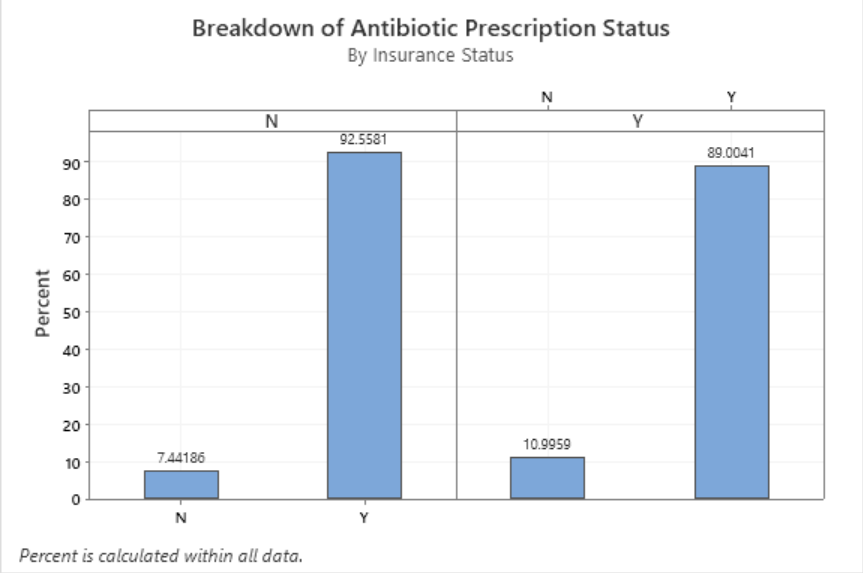


Figure 14 Antibiotic Prescription Status by Diagnosis

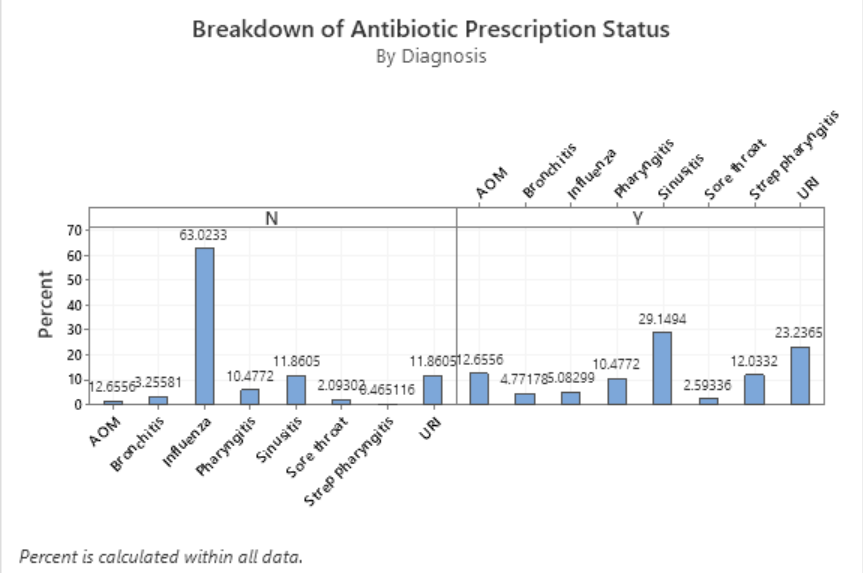


Figure 15 Antibiotic Prescription Status by Provider Type

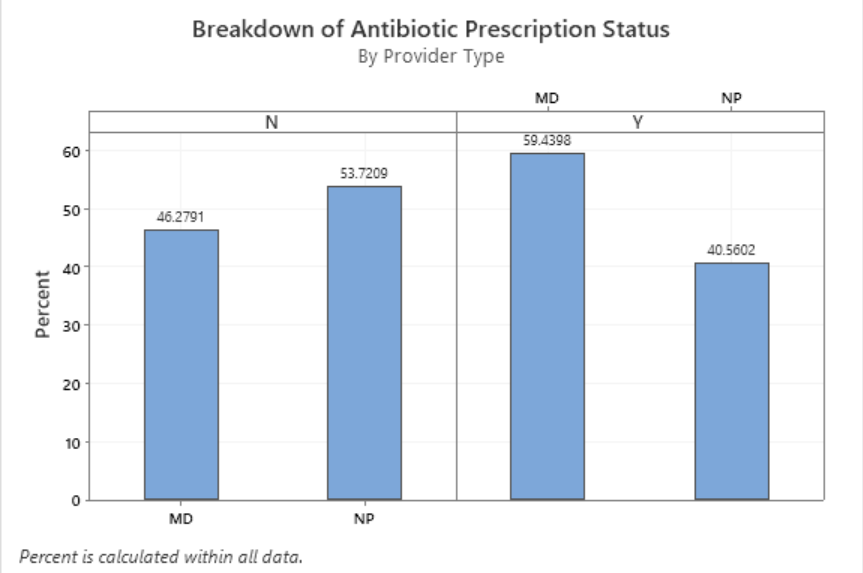
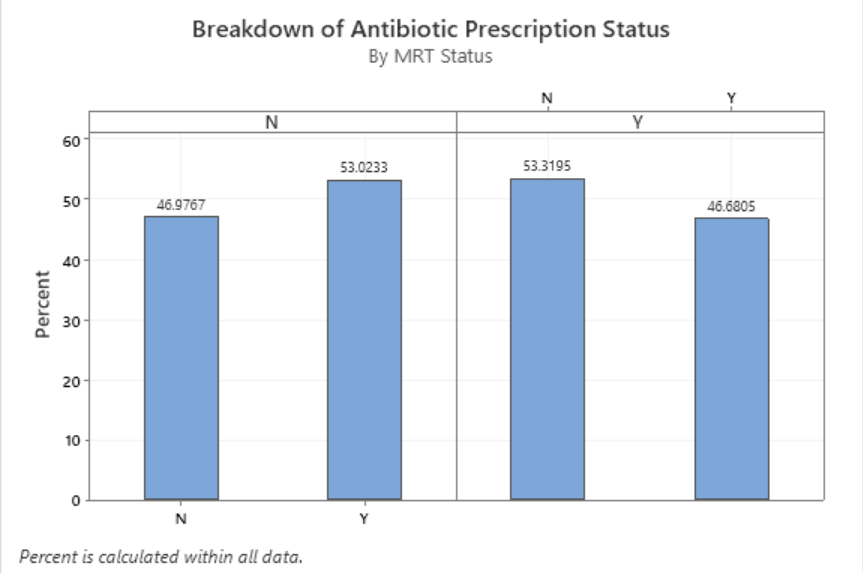


Figure 16 Antibiotic Prescription Status by MRT Status



Results

No significant relationship was detected between gender and antibiotic prescription status. No significant relationship was detected between race and antibiotic prescription status. The results indicate that antibiotic prescription is dependent on Insurance status (χ^2 = 4.21, p = 0.040). Antibiotic prescription is also dependent on diagnosis (χ^2 = 588.1, p <0.001). A diagnosis of Strep Pharyngitis tended to have an increased likelihood of receiving antibiotics compared to other diagnoses. Prescribing antibiotics was significantly associated with Provider type (χ^2 = 20.8, p <0.001). Nurse practitioners were less likely to prescribe antibiotics compared to medical doctors. A significant association was detected between MRT status and antibiotic prescription status (χ^2 = 4.8, p 0.029). Patients who had a molecular rapid test (MRT) were less likely to be prescribed antibiotics than patients who did not have an MRT. There is a significant relationship between antibiotic prescription status and year of visit (χ^2 = 5.1, p =0.024). Patients who were seen in 2020 were less likely to be prescribed antibiotics compared to 2019 (Turley, 2021).

Interpretation/Discussion

The antibiotic stewardship education produced a modest decrease in the number of antibiotic prescriptions at the project site. Insured patients were more likely to receive an antibiotic prescription compared to uninsured. Overall, nurse practitioners were less likely to prescribe an antibiotic than physicians. When an MRT was performed, patients were less likely to receive a prescription for an antibiotic. Of the diagnoses studied, influenza was the least likely to result in an antibiotic prescription. Sinusitis, followed by URI, was the most likely diagnosis to result in a prescription for an antibiotic.

Cost-Benefit Analysis/Budget

There were limited financial costs associated with this DNP project. Anticipated costs include the following:

- Printing provider pre and post-tests $4.00
- Printing provider reference material $5.00
- Printing patient education material $50.00
- Hiring a statistician to perform the analysis of the collected data $200

The time commitment for implementing the project for the providers is estimated to be 20 minutes per education session. Educational sessions were held early in the morning, when the patient volume was lower, on each provider's regularly scheduled shift. This time allowed the providers to participate without needing to go in during off-time to participate in the sessions. Additional time was required for data collection by the DNP student.

Timeline

The initial phase for this DNP project was to obtain approval of the site for implementing the project. Once this was approved obtaining approval from the university review board was completed. Consent to participate in the DNP project was obtained from all providers who completed the educational sessions (See Appendix G). The first phase of the project was to administer a pre-test for each of the participating providers. Implementing the project intervention followed the pre-test. The administration of the post-test was the next phase of the project. Once all the participants completed the pre-test and post-test the data collection phase began. Following data collection, the information was analyzed and information from the pre- and post-intervention records was compared. Finally, the results of the analysis were compiled and prepared for presentation.

Ethical Considerations/Protection of Human Subjects

The Jacksonville State University Institutional Review Board (IRB) approval was obtained before initiating the DNP project (See Appendix H) for a copy of the approval. There were few ethical issues regarding the project participant. Participants were healthcare providers at a rural, southern community urgent care clinic. Identifiable information for the providers was not used. The confidentiality of the provider was maintained. Collected data was stored on a password-protected data drive with a password-protected cloud storage backup account. Access to the files was limited to the student. Other considerations included maintaining patient confidentiality during the chart reviews where the DNP student collected no identifiable patient data. The student had completed training regarding the Health Insurance Portability and Accountability Act

of 1996 (HIPAA). There was no increased risk to patients during this project compared to routine medical risks. Additionally, the DNP student and practice personnel who conducted the project followed standard professional behaviors expected in medical practice.

Conclusion

The overprescribing of antibiotics has gradually increased in recent years. Despite increased knowledge regarding antibiotic resistance, the number of antibiotic prescriptions continues to rise. The inappropriate use of antibiotics for viral conditions is a concern in the urgent care setting. Antibiotic stewardship programs have been shown to decrease the rate of inappropriate antibiotic prescriptions. Implementing antibiotic stewardship education in this urgent care setting decreased the overall number of antibiotics prescribed. In the urgent care clinic where this project occurred, providers often encounter patients with ARTIs. A virus commonly caused these, and yet, antibiotics were frequently prescribed. Successful antibiotic stewardship occurred by presenting providers with the education and tools to have open discussions with patients regarding proper antibiotics use.

During this project, a total of 1,394 patient records were reviewed. There were 640 records used for the pre-implementation, 2019, analysis and 754 for the post-implementation, 2020, analysis. An antibiotic stewardship educational session was conducted, including a didactic portion, a PowerPoint presentation, informational handouts from the CDC, and a pre and post-test evaluation.

Of the total number of patients diagnosed with an ARTI, 69.2% have been prescribed an antibiotic. In the pre-implementation period, 72.2% of patients received an

antibiotic. Of those seen in the post-implementation period, 66.6% received an antibiotic. Patients treated by a nurse practitioner were less likely to be prescribed an antibiotic. Patients who had an MRT performed were less likely to receive an antibiotic. Uninsured patients were more likely to be prescribed an antibiotic. Overall, patients seen during the post-implementation period were less likely prescribed an antibiotic than those seen in the pre-implementation period.

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Appendix A

Permission to Use Antibiotic Stewardship Curriculum

Antimicrobial Stewardship Curriculum

Rick Gramling <rickgramling@gmail.com> Fri, Sep 25, 2020, at 11:51 AM
To: cohl@wakehealth.edu
Dr. Ohl,
I am a nurse practitioner currently working in a combined urgent care / primary care clinic in Alabama. I am also in
graduate school completing my Doctor of Nursing Practice degree. My DNP project is focused on providing education
to other providers in our clinic on antimicrobial stewardship. I read your curriculum and wanted to ask your permission
to use part of your lectures and exam questions as part of my educational sessions. I would be happy to credit you
and Wake Forest for the information.
Feel free to contact me if you have any questions.
Thank you for your consideration,
Rick Gramling, MSN, CRNP, FNP-BC, AGACNP-BC
256-458-6053

Christopher Ohl <cohl@wakehealth.edu> Fri, Sep 25, 2020, at 1:26 PM
To: Rick Gramling <rickgramling@gmail.com>
Cc: Vera Luther <vluther@wakehealth.edu>
Sure, feel free to use what you would like.
Christopher A. Ohl, MD
Professor of Medicine
Section on Infectious Diseases
Wake Forest University School of Medicine
100 Medical Center Blvd
Winston-Salem, NC 27157
336-716-4507, Fax 336-716-3825

Appendix B

Antibiotic Stewardship Educational Material

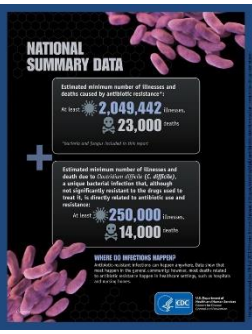
Antibiotic Stewardship: Decreasing Unnecessary Antibiotics in Acute Respiratory Tract Infections

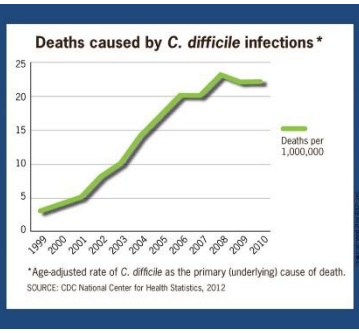
Session Goal

To introduce the concept of antibiotic stewardship and consider strategies for implementation.

Learning Objectives

- Provide statistics on the frequency of inappropriate antibiotic prescriptions
- Define "antibiotic stewardship"
- List the benefits of antibiotic stewardship
- Discuss strategies to decrease unnecessary antibiotic prescriptions





How Big Is the Problem?

- 269 million antibiotic prescriptions written in 2015
- At least 30% of these were unnecessary
- Over 47 million unnecessary antibiotic prescriptions every year
- Many of these were for ARTIs
- 50% of antibiotics prescribed for an ARTI was unnecessary
- Inappropriate and excessive use of antibiotics is a major factor contributing to emerging antibiotic resistance

Adverse Drug Events (ADE)

- 142,505 ED visits per year in the U.S.
- 6% of the patients require hospitalization
- Antibiotics account for 20% of all ADEs
  - 80% allergic events
  - 20% for adverse events (e.g. GI upset, rash, etc.)
- 50% due to penicillin & cephalosporin classes

What is stewardship?
What is antimicrobial stewardship?

What is Stewardship?

"the conducting, supervising, or managing of something; *especially* the careful and responsible management of something entrusted to one's care"

What is Antimicrobial Stewardship?

- A comprehensive, evidence-based program to:
  - Limit inappropriate antimicrobial use
  - Optimize selection, dosing, route, and duration
  - Limit unintended consequences
- Focus for patient safety and quality assurance
  - Accreditation
  - Reimbursement

What is Antimicrobial Stewardship?

- Relevant across the spectrum of healthcare
- Practiced at
  - Patient level
  - Facility and system level
  - Regulatory and compliance level
- Core function of medical staff
- Requires expertise of pharmacists, microbiologists, infection preventionists, & IT

Benefits of Stewardship

- Enhanced patient outcomes
- Reduction in antimicrobial toxicities
- Reduction in *C. difficile* incidence
- Reduction in antibiotic use of 22-36%
- Decreased prevalence of resistant pathogens
- Financial savings

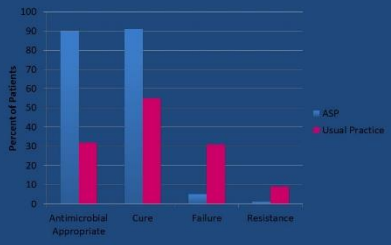
Reasons for Antibiotic Overuse : Conclusions from 8 Focus Groups

Patient Concerns
- Want clear explanation
- Green nasal discharge
- Need to return to work

Physician Concerns
- Patient expects antibiotic
- Diagnostic uncertainty
- Time pressure

Antibiotic Prescription

Clinical Outcomes of Stewardship



Six Goals of Antibiotic Stewardship Programs

1. Reduce antibiotic consumption and inappropriate use
2. Reduce *Clostridium difficile* infections
3. Improve patient outcomes
4. Increase adherence/utilization of treatment guidelines
5. Reduce adverse drug events
6. Decrease or limit antibiotic resistance
   - Hardest to show
   - Best data for health-care associated gram negative organisms

Do not Treat Viral Infections with Antibiotics

- Acute bronchitis
- Common colds
- Sinusitis with symptoms less than 7 days
- Sinusitis not localized to the maxillary sinuses
- Pharyngitis not due to Group A *Streptococcus spp.*

Other Tenets of Antibiotic Stewardship

- Do not give antibiotics with overlapping activity
- Use rapid diagnostic tests if possible
  - Point of care tests (flu, strep, mono, etc.)
  - Rapid PCR tests (Respiratory Panels)
- Limit duration of therapy
  - Most community acquired pneumonia: 5 days
  - Cystitis: 3 days
  - Pyelonephritis: 7 days

Common Respiratory Tract Infections

- AOM
- Acute Rhinosinusitis
- Pharyngitis
- Nasopharyngitis (common cold)
- Acute bronchitis
- Influenza
- Pneumonia

Pathogens

- Respiratory viruses account for the majority of infections
- Bacterial infections are more prominent in acute otitis media and pneumonia
  - *Streptococcus pneumoniae*
  - *Haemophilus influenzae*
  - *Moraxella catarrhalis*
  - *Streptococcus pyogenes*
  - *Mycoplasma sp.*
  - *Chlamydiophila sp.*
- Antibiotic resistance is common among *S. pneumoniae, H. influenzae,* and *M. catarrhalis* isolates

Conclusion

- Antibiotics are frequently given for respiratory tract infections in outpatient and inpatient settings
- Inappropriate antibiotic use is common for these diagnoses
- Misdiagnosis of pneumonia is common
- Most upper respiratory infections are viral and do not need antibiotic treatment
- Observation without antibiotics is an option for children with acute otitis media
- Guidelines exist for the appropriate treatment of respiratory tract infections

Treatment Guidelines and Resources

- Centers for Disease Control and Prevention (CDC)
  http://www.cdc.gov/getsmart/
  - Get Smart: Know When Antibiotics Work
  - Adult Guideline Summaries
  - Pediatric Guideline Summaries
- Infectious Diseases Society of America (IDSA)
  http://www.idsociety.org/IDSA_Practice_Guidelines/
- American Academy of Pediatrics (AAP)
- American Academy of Family Physicians(AAFP)

Appendix C

Antibiotic Stewardship Presentation Pre and Post-Test

(circle the letter for your answer)

1) Which guideline/resources do you use to make decisions for prescribing antibiotics?

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

2) Does your urgent care clinic provide guidelines for prescribing antibiotics?

    a. Yes, please specify _____
    b. No
    c. I do not know

3) Antimicrobial resistance in Streptococcus pneumoniae declined in the United States between the years 2000 and 2008 for most, but not all antimicrobials. For which antimicrobial class did resistance INCREASE over this period, likely due to overprescribing of drugs in the class?

    a. Penicillin
    b. Cephalosporin
    c. Fluoroquinolone
    d. Macrolide
    e. Glycopeptide (vancomycin)

4) A 13-year-old healthy adolescent female is brought to your clinic by her mother for a sore throat and hacking cough over the last 3 days. She coughs up green phlegm in the morning. She has felt feverish, but several oral temperatures have been normal. Physical examination shows an erythematous pharynx without exudates. Lung percussion and auscultation are normal. A throat swab tested for Group A streptococcus is negative and the chest x-ray is normal. In addition to treatment to alleviate her symptoms which of the following is indicated?

    a. Azithromycin (Z-pak)
    b. Trimethoprim-sulfamethoxazole (Bactrim)
    c. Levofloxacin (Levaquin)
    d. Penicillin (Amoxicillin)
    e. No antibiotic

5) A 7-year-old boy is brought to your clinic for evaluation of a sore throat and trouble swallowing of 2 days duration. He had a fever of 101.5°F the evening before presentation and has had no cough. His mother states he has been exposed to "strep throat" at school. He has no allergies. Physical examination shows a fever of 100.9°F, normal tympanic membranes, an erythematous oropharynx with exudates, tender anterior cervical adenopathy, and normal lung auscultation. Which of the following is the most appropriate course of action?

    a. Perform a rapid test for Group A streptococcus (GAS) on a throat swab. If negative, observe without an antibiotic.
    b. Perform a rapid test for Group A streptococcus (GAS) on a throat swab. If negative, perform a throat culture and give penicillin or amoxicillin if the culture is positive for GAS.
    c. Perform a rapid test for Group A streptococcus (GAS) on a throat swab. If negative, perform a throat culture and give azithromycin (a macrolide antibiotic) if the culture is positive for GAS.
    d. Empirically treat with penicillin or amoxicillin without testing as it is likely he has Group A streptococcus (GAS) pharyngitis.
    e. Observe without antibiotics or testing as it is likely he has viral pharyngitis.

Appendix D

Treatment Recommendations

Condition	Epidemiology	Diagnosis	Management
Acute Rhinosinusitis	• About 1 out of 8 adults (12%) in 2012 reported receiving a diagnosis of rhinosinusitis in the previous 12 months, resulting in more than 30 million diagnoses • Ninety–98% of rhinosinusitis cases are viral, and antibiotics are not guaranteed to help even if the causative agent is bacterial.	• Diagnose acute bacterial rhinosinusitis based on symptoms that are: ○ **Severe (>3-4 days)**, such as a fever ≥39°C (102°F) and purulent nasal discharge or facial pain. ○ **Persistent (>10 days) without improvement**, such as nasal discharge or daytime cough; or ○ **Worsening (3-4 days)** such as worsening or new-onset fever, daytime cough, or nasal discharge after initial improvement of a viral upper respiratory infection (URI) lasting 5-6 days.	If a bacterial infection is established: • Watchful waiting is encouraged for uncomplicated cases for which reliable follow-up is available. • Amoxicillin or amoxicillin/clavulanate is the recommended first-line therapy. • Macrolides such as azithromycin are not recommended due to high levels of Streptococcus pneumoniae antibiotic resistance (~40%). • For penicillin-allergic patients, doxycycline, or a respiratory fluoroquinolone (levofloxacin or moxifloxacin) are recommended as alternative agents.

		• Sinus radiographs are not routinely recommended.	
Acute uncomplicated bronchitis	• Cough is the most common symptom for which adult patients visit their primary care provider, and acute bronchitis is the most common diagnosis in these patients.	• Evaluation should focus on ruling out pneumonia, which is rare among otherwise healthy adults in the absence of abnormal vital signs (heart rate ≥ 100 beats/min, respiratory rate ≥ 24 breaths/min, or oral temperature≥ 38 °C) and abnormal lung examination findings (focal consolidation, egophony, fremitus). • Colored sputum does not indicate bacterial infection. • For most cases, chest radiography is not indicated.	Routine treatment of uncomplicated acute bronchitis with antibiotics is not recommended, regardless of cough duration. Options for symptomatic therapy include: • Cough suppressants (codeine, dextromethorphan). • First-generation antihistamines (diphenhydramine). • Decongestants (phenylephrine). Evidence supporting specific symptomatic therapies is limited.
Common cold or non-specific upper respiratory tract infection (URI)	• The common cold is the third most frequent diagnosis in-office visits, and most adults experience two to four colds annually. • At least 200 viruses can cause the common cold.	• Prominent cold symptoms include fever, cough, rhinorrhea, nasal congestion, postnasal drip, sore throat, headache, and myalgias.	• Decongestants (pseudoephedrine and phenylephrine) combined with a first-generation antihistamine may provide short-term symptom relief of nasal symptoms and cough. • Non-steroidal anti-inflammatory drugs can be given to relieve symptoms. • Evidence is lacking to support antihistamines (as monotherapy), opioids, intranasal corticosteroids, and nasal saline irrigation as effective treatments for cold symptom relief.

			Providers and patients must weigh the benefits and harms of symptomatic therapy.
Pharyngitis	• Group A beta-hemolytic streptococcal (GAS) infection is the only common indication for antibiotic therapy for sore throat cases. • Only 5–10% of adult sore throat cases are caused by GAS.	• Clinical features alone do not distinguish between GAS and viral pharyngitis; a rapid antigen detection test (RADT) is necessary to establish a GAS pharyngitis diagnosis • Those who meet two or more Centor criteria (e.g., fever, tonsillar exudates, tender cervical lymphadenopathy, absence of cough) should receive a RADT. Throat cultures are not routinely recommended for adults.	• Antibiotic treatment is NOT recommended for patients with negative RADT results. • Amoxicillin and penicillin V remain first-line therapy due to their reliable antibiotic activity against GAS. • For penicillin-allergic patients, cephalexin, cefadroxil, clindamycin, or macrolides are recommended. • GAS antibiotic resistance to azithromycin and clindamycin are increasingly common. • Recommended treatment course for all oral beta-lactams is 10 days.
Acute otitis media (AOM)	• AOM is the most common childhood infection for which antibiotics are prescribed. • 4-10% of children with AOM treated with antibiotics experience adverse effects.	Definitive diagnosis requires either • Moderate or severe bulging of the tympanic membrane (TM) or new-onset otorrhea not due to otitis externa. • Mild bulging of the TM AND recent (<48h) onset of otalgia (holding, tugging, rubbing of the ear in a nonverbal child) or intense erythema of the TM. AOM should not be diagnosed in children without middle ear effusion	• Mild cases with unilateral symptoms in children 6-23 months of age or unilateral or bilateral symptoms in children >2 years may be appropriate for watchful waiting based on shared decision-making. • Amoxicillin remains the first-line therapy for children who have not received amoxicillin within the past 30 days. • Amoxicillin/clavulanate is recommended if amoxicillin has been taken within the past 30 days, if concurrent

		(based on pneumatic otoscopy and/or tympanometry).	purulent conjunctivitis is present, or if the child has a history of recurrent AOM unresponsive to amoxicillin. • For children with a non-type I hypersensitivity to penicillin: cefdinir, cefuroxime, cefpodoxime, or ceftriaxone may be appropriate choices. • Prophylactic antibiotics are not recommended to reduce the frequency of recurrent AOM. • For further recommendations on alternative antibiotic regimens, consult the American Academy of Pediatrics guidelines.
Community-acquired pneumonia (CAP)	• The clinical presentation of CAP varies, ranging from mild pneumonia characterized by fever and productive cough to severe pneumonia characterized by respiratory distress and sepsis. • CAP is one of the most common and morbid conditions	• The diagnosis of CAP generally requires the demonstration of an infiltrate on chest imaging in a patient with a clinically compatible syndrome • The combination of a compatible clinical syndrome and imaging findings consistent with pneumonia are sufficient to establish an initial clinical diagnosis of CAP. • Most patients who are otherwise healthy with normal vital signs (apart from	For healthy outpatient adults without comorbidities or risk factors for antibiotic-resistant pathogens: • Amoxicillin 1Gm three times daily, or • Doxycycline 100 mg twice daily, or • A macrolide (azithromycin 500 mg on the first day then 250 mg daily or clarithromycin 500 mg twice daily or clarithromycin extended-release 1,000 mg daily) only in areas with pneumococcal resistance <25% For outpatient adults with comorbidities such as chronic heart, lung, liver, or renal disease; diabetes

	encountered in clinical practice • Combinations of risk factors, such as smoking, COPD, and congestive heart failure, are additive in terms of risk	fever) and no concern for complication are considered to have mild pneumonia and can be managed in the ambulatory setting.	mellitus; alcoholism; malignancy; or asplenia: • amoxicillin/clavulanate 500 mg/125 mg three times daily, 875 mg/125 mg twice daily, or 2000 mg/125 mg twice daily, or a cephalosporin (cefpodoxime 200 mg twice daily or cefuroxime 500 mg twice daily); **AND** • macrolide (dose as above), or doxycycline 100 mg twice daily; **OR** • respiratory fluoroquinolone (levofloxacin 750 mg daily, moxifloxacin 400 mg daily, or gemifloxacin 320 mg daily

Appendix E

Patient Information Flyers

Why does taking antibiotics lead to antibiotic resistance?

Any time antibiotics are used, they can cause side effects and lead to antibiotic resistance. Antibiotic resistance is one of the most urgent threats to the public's health. Always remember:

1. Antibiotic resistance does not mean the body is becoming resistant to antibiotics; it is that bacteria have become resistant to the antibiotics designed to kill them.
2. When bacteria become resistant, antibiotics cannot fight them, and the bacteria multiply.
3. Some resistant bacteria can be harder to treat and can spread to other people.

More than 2.8 million antibiotic-resistant infections occur in the United States each year, and more than 35,000 people die as a result.

What is the right way to take antibiotics?

If you need antibiotics, take them exactly as prescribed.

Improving the way healthcare professionals prescribe antibiotics, and the way we take antibiotics, helps keep us healthy now, helps fight antibiotic resistance, and ensures that these life-saving drugs will be available for future generations.

Talk with your doctor if you have any questions about your antibiotics, or if you develop any side effects, especially diarrhea, since that could be *Clostridioides difficile* infection (also called *C. difficile* or *C. diff*), which needs to be treated. *C. diff* can lead to severe colon damage and death.

What are the side effects?

Common side effects range from minor to very severe health problems and can include:

- Rash
- Dizziness
- Nausea
- Diarrhea
- Yeast infections

More serious side effects can include:

- *Clostridioides difficile* infection
- Severe and life-threatening allergic reactions

To learn more about antibiotic prescribing and use, visit **www.cdc.gov/antibiotic-use**.

Antibiotics Aren't Always the Answer.

BE ANTIBIOTICS AWARE

SMART USE, BEST CARE

Why is it important to Be Antibiotics Aware?

Antibiotics save lives. When a patient needs antibiotics, the benefits outweigh the risks of side effects or antibiotic resistance.

When antibiotics aren't needed, they won't help you, and the side effects could still hurt you. Reactions from antibiotics cause 1 out of 5 medication-related visits to the emergency department.

In children, reactions from antibiotics are the most common cause of medication-related emergency department visits.

What do antibiotics treat?

Antibiotics are only needed for treating certain infections caused by bacteria. Antibiotics are critical tools for treating common infections, such as pneumonia, and for life-threatening conditions including sepsis, the body's extreme response to an infection.

What don't antibiotics treat?

Antibiotics do not work on viruses, such as colds and flu, or runny noses, even if the mucus is thick, yellow or green. Antibiotics also won't help some common bacterial infections including most cases of bronchitis, many sinus infections, and some ear infections.

How can I stay healthy?

You can stay healthy and keep others healthy by:

- Cleaning hands
- Covering coughs
- Staying home when sick
- Getting recommended vaccines, for the flu, for example

Talk to your doctor or nurse about steps you can take to prevent infections.

A Commitment to Our Patients About Antibiotics

Antibiotics only fight infections caused by bacteria. Like all drugs, they can be harmful and should only be used when necessary. Taking antibiotics when you have a virus can do more harm than good: you will still feel sick and the antibiotic could give you a skin rash, diarrhea, a yeast infection, or worse.

Antibiotics also give bacteria a chance to become more resistant to them. This can make future infections harder to treat. It means that antibiotics might not work when you really do need them. Because of this, it is important that you only use an antibiotic when it is necessary to treat your illness.

How can you help? When you have a cough, sore throat, or other illness, tell your doctor you only want an antibiotic if it is really necessary. If you are not prescribed an antibiotic, ask what you can do to feel better and get relief from your symptoms.

Your health is important to us. As your healthcare providers, we promise to provide the best possible treatment for your condition. If an antibiotic is not needed, we will explain this to you and will offer a treatment plan that will help. We are **dedicated** to prescribing antibiotics **only** when they are needed, and we will avoid giving you antibiotics when they might do more harm than good.

If you have any questions, please feel free to ask us.

Sincerely,

To learn more about antibiotic prescribing and use, visit **www.cdc.gov/antibiotic-use**.

What Is Delayed Prescribing?

BE ANTIBIOTICS AWARE
SMART USE, BEST CARE

WAIT. DO NOT FILL YOUR PRESCRIPTION JUST YET.

Your healthcare professional believes your illness may resolve on its own.

First, follow your healthcare professional's recommendations to help you feel better without antibiotics. Continue to monitor your own symptoms over the next few days.

- ◯ Rest.
- ◯ Drink extra water and fluids.
- ◯ Use a cool mist vaporizer or saline nasal spray to relieve congestion.
- ◯ For sore throats in adults and older children, try ice chips, sore throat spray, or lozenges.
- ◯ Use honey to relieve cough. Do not give honey to an infant younger than 1.

If you **do not feel better in ____ days/hours or feel worse,** go ahead and fill your prescription.

If you **feel better, you do not need the antibiotic,** and do not have to risk the side effects.

Waiting to see if you really need an antibiotic can help you take antibiotics only when needed. When antibiotics aren't needed, they won't help you, and the side effects could still hurt you. Common side effects of antibiotics can include rash, dizziness, nausea, diarrhea, and yeast infections.

Antibiotics save lives, and when a patient needs antibiotics, the benefits outweigh the risks of side effects. You can protect yourself and others by learning when antibiotics are and are not needed.

To learn more about antibiotic prescribing and use, visit **www.cdc.gov/antibiotic-use.**

CDC

Viruses or Bacteria
What's got you sick?

Antibiotics are only needed for treating certain 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 Condition	Common Cause			Are Antibiotics Needed?
	Bacteria	Bacteria or Virus	Virus	
Strep throat	✓			Yes
Whooping cough	✓			Yes
Urinary tract infection	✓			Yes
Sinus infection		✓		Maybe
Middle ear infection		✓		Maybe
Bronchitis/chest cold (in otherwise healthy children and adults)*		✓		No*
Common cold/runny nose			✓	No
Sore throat (except strep)			✓	No
Flu			✓	No

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

BE ANTIBIOTICS AWARE
SMART USE, BEST CARE

To learn more about antibiotic prescribing and use, visit www.cdc.gov/antibiotic-use.

Appendix F

Project Timeline

Task	October	November	December	January	February	March	April
Selection and approval of project site	X						
IRB Approval	X						
Recruitment of eligible participants		X					
Pre-test for participants			X				
Intervention Evaluation		X	X	X	X		
Post-test for participants				X	X	X	X
Analysis of outcomes							X
Results presented							X

Appendix G

Consent for Participation in DNP Project

Title of project: Implementing an Antibiotic Stewardship Education Program to Decrease Antibiotic Prescriptions in an Urgent Care Clinic

Purpose: To see if providing antibiotic stewardship education to providers of an urgent care clinic reduces the number of antibiotic prescriptions written.

Description: A brief presentation will be provided. A pre and post-test will be provided. Information on the number of antibiotic prescriptions written before and after the education will be collected and studied.

Location: The project will take place at Southern Immediate Care, 4100 McClellan Blvd, Anniston, AL 36201.

Time expectation: 20-30 minutes, including taking the pre and post-tests and viewing the presentation

Description of risks: There are no anticipated risks for the participants in this project.

Confidentiality: No identifiable information will be collected. All data collected and stored by the DNP student will be stored on a password protected drive. The student will have primary access to the data. A statistician will be used to help with the analysis. No identifiable information will be shared with the statistician.

Benefits: Providing current antibiotic stewardship education to the providers. Another benefit is using this information to provide evidence-based care to their patients.

Participation: Participation in this project is voluntary. There will be no penalty to those who choose not to participate. A participant may withdraw from the project at any time without penalty.

Contact: Any question regarding this project may be directed to the DNP student.

James Gramling, MSN, CNRP
700 Pelham Rd North
Jacksonville, AL 36265
256-458-6053
jsu5493h@stu.jsu.edu

SIGNATURE PAGE OF CONSENT FORM
FOR RESEARCH INVOLVING ADULTS

Permission Form for
Research on
Title of Project

I have read a description of the research project/study, and I understand the procedure described on the attached pages. I also have received a copy of the description.

I _____ agree to participate in the study.

Complete Name

_____ _____

Signature Date

Jacksonville State University, AL
Consent Form: Research Involving Adults

Appendix H

IRB Approval Letter

OFFICE OF THE VICE PROVOST
JACKSONVILLE STATE UNIVERSITY

October 30, 2020

Dear James Richard Gramling:

Your proposal submitted for review by the Human Participants Review Protocol for the project titled: "Implementing an Antibiotic Stewardship Education Program to Decrease Antibiotic Prescriptions in an Urgent Care Clinic" has been approved as exempt. If the project is still in process one year from now, you are asked to provide the IRB with a renewal application and a report on the progress of the research project.

Sincerely,

Joe Walsh
Executive Secretary, IRB

JW/dh

201 Bibb Graves Hall
700 Pelham Road North
Jacksonville, AL 36265-1602
P. 256.782.5284
P. 800.231.5291
F. 256.782.5541
ejwalsh@jsu.edu
www.jsu.edu