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Antibiotic Prescribing Habits of Urgent Care Providers

Mellisa Thompson
Walden University

Walden University

College of Health Sciences

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Mellisa Thompson

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Review Committee
Dr. Barbara Niedz, Committee Chairperson, Nursing Faculty
Dr. Oscar Lee, Committee Member, Nursing Faculty
Dr. Cathleen Colleran, University Reviewer, Nursing Faculty

Chief Academic Officer
Eric Riedel, Ph.D.

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Abstract

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MS, University of South Alabama, 2012

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Abstract

Antibiotics are commonly prescribed and requested for viral illnesses despite evidence-based research studies and societal guidelines that advise against this practice. Literature has indicated that antibiotic decision-making comes from a provider's experience or exposure to illness, uncertainty of illness, or from being pressured by the patient. Nurses and advanced practice nurses are important participants in the antibiotic stewardship initiative. The purpose of this project was to examine potential knowledge deficits responsible for inappropriate antibiotic prescribing at a rural urgent care clinic in the southeastern United States, which when addressed could promote an educational in-service to decrease the number of antibiotics prescribed during a high-volume cough, cold, and flu months. The health belief model was used as a foundational model and a knowledge, attitude, and practice survey to collect data. Antibiotic prescribing habits were evaluated in the preintervention group (n = 250) and a year later in the postintervention group (n = 265). Antibiotic prescribing decreased positively from 80% to 70% and watchful waiting also increased positively from 4% to 30%; X^2 (1) = 12.302, p = .000. The increase in educational awareness from these results can support a decrease in inappropriate antibiotic prescriptions, which prevents the emergence of antibiotic-resistant bacteria, contributing to positive social change.

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Dedication

This manuscript and the never-ending hours reflect the amount of support that I received from my home family and my work family to engage deeply into this endeavor of antibiotic social change.

Acknowledgments

A special thank you goes out to all the people in my life that kept my fire lit or threatened to blow it out, held my hand or pushed me down, cheered me on or doubted me. For without you, I wouldn't have become the empowered woman I am today.

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Section 1: Nature of the Project

Introduction

Antibiotics are useful prescription medications for bacterial infections because they prevent, stop the replication of, or destroy the bacterial cell wall. Common bacterial infections such as streptococcal pharyngitis, urinary tract infections, and many ear infections require antibiotic interventions to relieve painful symptoms and stop the infectious process. Viral illnesses are even more common and produce symptoms that cause patients with viral illnesses such as sinusitis, bronchitis, and the common cold to often seek medical care to stop symptoms and improve their quality of life. However, they request antibiotics because they believe that this medication is effective in eliminating their ailment when it is not. Improper prescribing of antibiotics can be descreased if healthcare providers work together to become more selective during antibiotic decision-making.

Problem Statement

Antibiotic dispersal from providers and use among patients are growing trends. Increasing the use of antibiotics is directly related to the growth of drug-resistant "superbugs." The term *superbug* is given to certain infectious microbes that have developed resistance to historically effective antibiotics (Llor & Bjerrum, 2014). Antimicrobial resistance is recognized as one of the most significant threats to human health worldwide. For example, one of the most common skin bacterium, *Staphylococcus aureus*, has become the superbug known as methicillin-resistant *Staphylococcus aureus* (MRSA). It is responsible for killing more Americans every year

than emphysema, HIV/AIDS, Parkinson's disease, and homicide combined (Llor & Bjerrum, 2014).

These superbugs are resistant to commonly used antibiotics and require medications that may cause severe and problematic side effects. The medical and nursing education for doctors, physician assistants, and advanced practice nurses is similar with regard to clinical decision-making. Guidelines and algorithms are published by medical colleges and associations that help guide the decisions of clinicians when ordering diagnostic studies, treatments, and prescribing medications. Despite these guidelines, providers continue to prescribe antibiotics for viral illnesses such as the common cold, sinusitis, and bronchitis. This is not only a local issue in the southeastern United States but also extends worldwide.

Antibiotic misuse and overuse is a significant problem that is documented in the literature from numerous countries and on most continents. Each year, the United States will develop approximately 2 million multidrug-resistant infections that will prove fatal for approximately 23,000 patients (Krans, 2014; Michaelidis et al., 2016). Cambodia is an example of a country that does not impose restrictions on antibiotics, and 60% to 100% of all visits to primary healthcare providers result in an antibiotic prescription for a cough, fever, sore throat, or diarrhea (Orn, Daily, Vlieghe, McLaughlin, & McLaws, 2017). Because of this overuse, E. coli resistance is 48% in Cambodia, and the cases of methicillin-resistant *Staphylococcus aureus* is at 22% (Orn et al., 2017). The microorganism itself becomes resistant to antibiotics not the human host. This puts the host (the patient) at risk for being incurable with any of the current antibiotic choices.

These patients may need life-supporting measures and many will not survive their infection.

This doctoral project is significant to medical providers but even more so to nurses. Nurses are responsible for the constant observation and assessment for improvements or decline in patients. It is the nurses who become concerned in a situation and alert the attending provider that there may be an infection that needs testing or medicating. Nurse practitioners continue to be needed to fill gaps in healthcare. According to the American Academy of Nurse Practitioners (2018), there were 248,000 nurse practitioners in the United States at the end of 2016 with 23,000 new graduates, which is double since 2010.

Purpose

The purpose of this DNP project was to positively influence the prescribing patterns of urgent care providers employed at a small, private clinic in the southeastern United States. The clinic evaluates the urgent needs of patients with an average daily census of approximately 70 clients per day. Addressing the overall unnecessary antibiotic prescribing habits may aid in decreasing the rising incidences of global antibiotic-resistant organisms. A majority of patients complain of common viral illnesses, and most receive an antibiotic as part of their treatment.

These prescribing patterns represent a significant gap in practice, which has been established in the literature. The spread of antibiotic resistance has a direct correlation to the use of antibiotics in upper respiratory illnesses/infections (URIs) that have a viral association (Alsan, Morden, Gottlieb, Zhou, & Skinner, 2015). For example, in a

comparison of weekly influenza activity and respiratory-associated antibiotics written during the same timeframe, a direct correlation existed between the rise in influenza cases and antibiotic prescriptions written, and the highest concentration was in Mississippi and Florida (Alsan et al., 2015). Patient demands or expectations for antibiotics can be the driving force when initiating treatment. The patient and the provider may also have misconceptions that affect antibiotic prescription writing attitudes and habits. The National Committee for Quality Assurance (2015) even published recommendations and advice to providers when dealing with patients who pressure them for antibiotics. Thus, the practice-focused question guiding this DNP project was: Will an educational program offered to providers at a private clinic in the southeastern United States change prescribing patterns to reduce the inappropriate use of antibiotics during flu season?

There is a knowledge deficit in both the patient population and the medical provider population. Patients routinely ask for an antibiotic because they either believe that an antibiotic will cure their cold or that their illness is something worse. Providers will sometimes prescribe antibiotics because they are uncertain with their diagnosis or feel pushed to prescribe. Whatever the circumstance, increasing antibiotic education can decrease the amount of inappropriate antibiotic prescriptions.

This gap-in-practice can become narrower with a stronger knowledge base. Providers need to become more familiar with microbiology, antibiotic choice, and antibiotic resistance. They need to acknowledge that there is a growing problem with antibiotic misuse and many patients are dying. They will also need to become better

teachers to their patients and promote watchful waiting for normal viral and bacterial patterns.

Nature of the Doctoral Project

Antibiotic resistance is a phenomenon that reflects the ability of bacteria to evolve resistance mechanisms by which the bacterial cell wall can escape the lethal action of antibiotics (Rossolini, 2015). Although evolution will allow bacteria to change in time, the overuse and overprescribing of antibiotics are forcing this change to occur sooner. It is predicted that the list of bacterial infections that become resistant will begin to grow exponentially if action is not taken. *Antibiotic stewardship* is the term used to describe the responsible use of antibiotics. This healthcare issue has been recognized in the National Action Plan for Combating Antibiotic-Resistant Bacteria issued by the White House in March 2015 (Barlam et. al, 2016). This plan of action is recommended to be in place by the year 2020 as outlined by the Centers for Disease Control and Prevention's (CDC) Core Elements of Hospital Antibiotic Stewardship Programs (Barlam et. al, 2016).

A training program was developed using materials from the CDC's Core Elements of Antibiotic Stewardship (CDC, 2016). This DNP project training was developed for and provided to two nurse practitioners, 11 physician assistants, and two medical doctors who staff the urgent care clinic that was the site for the DNP project. The training program included tools for managing the demanding patient who requests an antibiotic when there is no need. Following the training program and during flu season, quality improvement data were collected during one of the high flu months and compared to the same period a year prior to the training. Data were extracted from the medical

records during a peak influenza month and repeated 1 year later after a provider educational program. The records with chief complaints of sinusitis, pharyngitis, upper/lower respiratory illness, or flu-like illness was be included as well as vital signs and length of illness. A provider questionnaire was administered before and after the educational intervention to measure knowledge and attitudes toward antibiotic stewardship. The purpose of this doctoral project was to collect observations of antibiotic prescribing habits and further investigate the providers' opinions regarding antibiotics. Using this information, I developed an educational in-service and reassessed opinions and medical record data and observed for a decrease in antibiotic prescriptions for URIs and an increase in the recommendations for watchful waiting.

Significance

The benefits of decreasing the overuse and misuse of antibiotics can positively affect everyone, including patients and providers equally. For instance, patients spend a large amount of money to help alleviate symptoms of URIs. The Agency for Healthcare Research and Quality (AHRQ; 1999) reported that in 1992 Americans spent $2 billion in over-the-counter medications and $200 million of prescription medications for rhinosinusitis. The cost of rhinosinusitis has increased to $11 billion annually, and with more than 30 million diagnoses, it is the fifth most common diagnosis for which an antibiotic is prescribed (Aring & Chan, 2016). The overuse of antibiotics is a major cause for multidrug-resistant bacteria. These bacteria cause "super infections" and typically require an inpatient stay for treatment. These inpatient stays add to the cost of healthcare, produce a societal burden, expose well patients and staff to developing

infection, and result in time lost for the patient, discomfort, and sometimes painful complications. The societal cost of antibiotic resistance increases healthcare use and shifts antibiotic use toward costlier second-line agents but can lead to the development of antibiotic stewardship programs (Michaelidis et al., 2016). For example, in 2013, the estimated U.S. annual hospitalization costs due to antibiotic resistance was $41 billion (Michaelidis et al., 2016).

The potential contributions of this doctoral project will be the local social change in the southeastern United States. Antibiotic usage may slowly decrease in this area which can in turn decrease the illnesses and deaths related to antibiotic misuse. This project outcome can be presented to other local urgent care clinics, retail clinics, family practice offices, or health departments. With other projects like this one and more visibility of the guidelines from establishments such as the CDC by way of patient pamphlets, office posters, and social media exposure, antibiotic prescribing habits can continue to change.

Summary

Antibiotic resistance is becoming a worldwide problem that has effects within and outside of a medical establishment. The misuse and overuse of antibiotics is a major contributor to bacterium that are becoming tolerant and can no longer be halted by antibiotics. The societal attitudes toward antibiotics will need to change on a global scale to produce positive social change that is sufficiently meaningful. Providers of medicine need to become better educated about antibiotic choices and improving interactions with patients if they demand an antibiotic when it is not clinically indicated. The public also

needs to be educated about the difference between a viral and bacterial illness and the potential harmful untoward effects of improper use and overuse of antibiotics.

Section 2: Background and Context

Introduction

The overuse and misuse of prescriptive antibiotic therapies have inadvertently led to superbugs, multidrug-resistant bacteria, undesired side effects, and sometimes even death. Despite the negative and poor patient outcomes, providers continue to prescribe, and patients return requesting an antibiotic for a quick fix for their upper respiratory complaints. Because overprescribing antibiotics supports the growth of resistant bacteria, antibiotics have turned from a 20th century miracle drug into a drug that is potentially fatal. In this section, I expand on various concepts, models, and theories, the relevance to nursing practice, antibiotic background and context, and my role as a DNP student.

Concepts, Models, and Theories

Antibiotic stewardship should be the responsibility of everyone in healthcare, including the patient. Concepts are used as a tool to assist in explaining the phenomena. The concepts that I explore in this section are from multiple perspectives. Concepts will include the reasoning behind why providers continue to prescribe an antibiotic for a viral illness and why patients tend to routinely demand an antibiotic prescription for a viral illness that will eventually heal with time.

Definitions of Terms

Antibiotic: Agents that specifically target bacteria (CDC, 2015).

Antibiotic resistance: When drugs that have been used widely and for a long time lead to the infectious organisms that the antibiotics are designed to kill to adapt to them, making the drugs less effective (CDC, 2016).

Antibiotic stewardship: Coordinated interventions designed to improve and measure the appropriate use of antibiotic agents by promoting the selection of the optimal antibiotic drug regimen, including dosing, duration of therapy, and route of administration (Fishman, 2012).

Antimicrobial: Agents targeted at bacteria, viruses, fungi, and parasites (CDC, 2015).

Antimicrobial resistance: Occurs when microorganisms (such as bacteria, fungi, viruses, and parasites) change when they are exposed to antimicrobial drugs (such as antibiotics, antifungals, antivirals, antimalarials, and antihelmintics; World Health Organization, 2016).

Bacteria: A member of a large group of unicellular microorganisms that have cell walls but lack organelles and an organized nucleus, including some that can cause disease.

Provider: any provider of medical care that also has prescribing privileges such as physician (M.D., D.O.), physician's assistant, nurse practitioner.

Upper respiratory illness/infection (URI): Viral illnesses that may include sinusitis, pharyngitis, rhinitis, otitis media, and bronchitis.

Virus: Small infectious agent that can only replicate inside the cells of another organism.

Antibiotic Overuse: Patterns of Practice

Providers choose antibiotics based on (a) their educational program instruction; (b) their opinions or attitudes about antibiotics; (c) uncertainty about whether the illness

is caused by a virus, allergy, or bacterium; or (d) the perceived desire for antibiotics from the parent or patient. Numerous published reports have shown that the antibiotics that are prescribed for URIs are rarely necessary, so it remains unclear as to why the prescriptions are provided. When informally speaking with providers at my practicum clinic they admit that most of the coughs and colds do not need antibiotics. But they explain that when they try to explain to the patient that an antibiotic will not be prescribed, the patient can become hostile and threatening in some cases. Writing an antibiotic takes only a few seconds and providing a microbiology lesson takes too much time.

However, this habit of overprescribing is not just common at this study site. Hicks et al. (2014) examined the antibiotic prescribing habits during 2011 and the patterns and found that healthcare providers prescribed 262.5 million courses of antibiotics with a higher incidence located in Southern states. First-line treatment for the bacterial infections associated with bacterial rhinosinusitis, streptococcal pharyngitis, and otitis media is with the β-lactam amoxicillin. The highest prescription rate was the common medication azithromycin or more popularly known as a Z-pak. The increased rate of this medication is probably explained by effective marketing strategies, patient demand, convenient packaging, and dosing for only 5 days (Hicks et al., 2014). Other research has indicated a 10% higher incidence of return visits for sinusitis and otitis media when azithromycin is prescribed because it is not first-line therapy (Hersh, Dutra, Shapiro, Hyun, & Hicks, 2016).

There are a few common illnesses that cause patients to ask for antibiotics to relieve symptoms, which is part of the problem with over prescription. Bronchitis, the

common chest cold, is an inflammatory condition associated with bronchial swelling, mucus production, and a cough that can typically last up to 3 weeks. Although bronchitis is almost always viral, 60% to 90 % of patients who seek care are prescribed an antibiotic (National Committee for Quality Assurance, 2015). This diagnosis became part of the Healthcare Effectiveness Data and Information Set in 2006. This measure is used by insurance companies to measure performance on important dimensions of care and service.

Another common illness that patients go into clinics for it rhinosinusitis, which is an inflammatory condition within the nose and sinus cavities that causes swelling, mucus production, or nasal and sinus congestion with difficulty breathing through the nose. This may, in turn, cause a postnasal drip and subsequent sore throat. Rhinosinusitis is predominately a viral illness in 98% of cases, totaling more than 30 million per year (CDC, 2015). The American Academy of Otolaryngology-Head and Neck Surgery takes the position of and published guidelines "watchful waiting" for rhinosinusitis and otitis media for 7 to 10 days (Aring & Chan, 2016). After a period of watchful waiting, fever, and severe facial pain, the antibiotic of choice is amoxicillin. Azithromycin, Z-pak, is discouraged due to high rates of *Streptococcus pneumoniae* resistance (CDC, 2016).

Pharyngitis is another common complaint and was added in 2004 to the HEDIS measured diagnosis. Sore throats can be viral or bacterial but the Group A β-hemolytic streptococcal (GAS) infection is treated with amoxicillin or penicillin. Again, azithromycin is discouraged for strep throat as it is increasingly becoming more resistant

(CDC, 2016). It is recommended that a rapid strep test be conducted and if negative a throat culture be obtained before initiating antibiotic therapy.

The Incidence of Antibiotic Resistant Microorganisms

Antibiotic or antimicrobial resistant microorganisms are a microbe's ability to become resistant to the effects of an antibiotic. Antibiotics stop bacterial growth and replication by either destroying its cell wall or interrupting the duplication process of the DNA strands within the cell. Antimicrobial resistance is a worldwide concern. In the United States, more than 2 million people will develop an infection that is difficult to treat due to antimicrobial resistance; of these cases, 23,000 will die (CDC, 2013). *Klebsiella pneumoniae* (K. pneumoniae) is a common bacterium found in the intestinal tract. This bacterium can migrate or spread to the urinary bladder, lungs, and blood stream and cause fatal infections. The antibiotic classification of choice was from the carbapenem group but has now become less than 50% effective (World Health Organization, 2016). Urinary tract infections are commonly caused by *Escherichia coli* (E. coli) from the normal intestinal flora that inadvertently migrates into the urethra superiorly and further infect the kidneys. Fluoroquinolones are now less than 50% effective as well (World Health Organization, 2016). The intestinal bacterium, *Clostridium difficile* (C. diff.) has also become increasingly resistant to antibiotic therapy to the point that fecal transplants must be collected from healthy patients and placed into the intestinal tracts of the diseased. There are at least 250,000 cases each year in the United States, and 14,000 of these cases may not survive their infection (CDC, 2013).

One of the issues leading to antibiotic resistance is that antibiotics are available in some countries without a prescription. Cambodia and Vietnam have antibiotics available over-the-counter and given by pharmacists, pharmacy assistants, and nurses. This antibiotic "freedom" is directly linked to the 48% of extended spectrum beta-lactamase resistance to E. coli. Methicillin resistance in *Staphylococcus aureus* in this area is as high as 22% (Om, Daily, Vlieghe, McLaughlin, & McLaws, 2017). The most common desire for the OTC antibiotics is for cough, sore throat, fever, and diarrhea.

Antibiotic Stewardship: Strategies

Antibiotic stewardship is a strategy that is being adopted by healthcare organizations worldwide to decrease the overuse and misuse of antibiotics. An antibiotic steward will choose antibiotics only when appropriate and for the proper duration. The CDC and the U.S. Department of Health and Human Services began their initiative in response to President Obama's 2015 National Action Plan for Combating Antibiotic Resistant Bacteria. The Core Elements of Hospital Antibiotic Stewardship Programs published by the CDC and supported by The Joint Commission describe how nurses can be educators, advocates, and ambassadors for widespread behavioral change to more vigilant antibiotic awareness in U.S. society (American Nurses Association, 2017). To help with this, The Joint Commission announced a standard for medication management (MM.09.01.01), which addresses the antimicrobial stewardship standard for hospitals, critical access hospitals, and nursing care centers and became effective January 1, 2017 (The Joint Commission, 2016).

Another initiative toward antibiotic stewardship was started by Kaiser Permanente in Southern California. When they identified sinusitis as the one viral diagnosis with the highest rate of prescription antibiotics, they initiated the "Much Ado about Snot" campaign, using interviews to form a consensus of the opinions of physicians who treat patients frequently for sinusitis complaints. The campaign was an educational presentation that targeted primary care and urgent care providers with an aim to identify and treat acute sinusitis within the recommended guidelines. Kaiser Permanente incorporated a best practice alert into their electronic medical record that will immediately notify the prescriber in a drop-down box when an antibiotic is chosen with a diagnosis of sinusitis (Munoz-Plaza et al., 2016). This best practice alert has been used elsewhere with positive results. Upon prescribing an antibiotic with unsupported evidence, an electronic alert would require a free texted justification response. If no response was given, no antibiotics could be dispensed. This intervention reduced their inappropriate antibiotic prescribing from 23.2% to 5.2% (Fleming-Dutra, 2016; Meeker et al., 2016). The diagnosis also triggered the publication "Treating Sinusitis: Don't Rush to Antibiotics" that would be included in patients' discharge paperwork (Munoz-Plaza et al., 2016).

Another organization, the American Board of Internal Medicine, identified the overuse of antibiotics for viral URI as a national problem and began the "Choose Wisely" initiative. Kaiser Permanente Washington partnered with the "Choose Wisely" initiative in 2014. Their antibiotic prescription writing began at 37% and fell to 27% with a goal to less than 20% by 2018 (Sparks, 2017). Kaiser Permanente Washington has been able to

successfully attack this national problem by distributing monthly reports to providers that compares their totals to their peers, antibiotic stewardship presentations, and antibiotic and URI management CME courses. Kaiser Permanente Southern California has adopted a similar course of action in their emergency department in Los Angeles and have had a 22% reduction in antibiotics dispensed for sinusitis (Sparks, 2017). The addition of educational interventions and the computerized alerts for potential unnecessary antibiotics had an overall 2016 decrease of about 3,800 antibiotic prescriptions and 1,600 outpatient visits with a cost-savings of $12,000 and $270,400 respectively (Sparks, 2017).

The United Hospital Fund launched its own Outpatient Antibiotic Stewardship Initiative and Stage II in 2016. The initiative began with nine New York hospitals and thirty-one of its outpatient clinics to address the inappropriate use of antibiotics in adults with acute URIs. Stage II began in May 2017 with goals of practice-driven change through provider and patient education on appropriate use of antibiotics and the dangers of antimicrobial resistance and a closer examination of provider prescribing practices. This research and change initiative will be based upon the Antibiotic Stewardship Certificate Program developed by the United Health Fund and the Greater New York Hospital Association and the Get Smart: Know When Antibiotics Work initiative by the Centers for Disease Control and Prevention.

Hingorani, Mahmood, and Alweis concluded that 25 million people in the United States will seek care annually for an acute URI (antibiotic resistant illnesses) and 73% of adults will be prescribed an antibiotic. These three physicians began their own initiative

to increase the adherence to antibiotic guidelines for antibiotic resistant illnesses. They posted antibiotic resistant illness guidelines in frequented provider areas (break room, bathrooms, and exam rooms), incorporated a clinical decision support (CDS) tool into the electronic medical record, and distributed individual report cards to providers that reflected guideline adherence. Patients with the diagnoses of URI, sinusitis, and pharyngitis were electronically identified for pre/post intervention antibiotic prescribing habits. The adherence rate improved after the intervention period for sinusitis (90.90%, $p<.001$), pharyngitis (64.28%, $p=0.003$), and URI (96.18%, $p=0.008$) (Hingorani, Mahmood, & Alweis, 2015).

Health Belief Model

The Health Belief Model (HBM) can be usefully applied to this doctoral project, and the model will help examine the beliefs of the providers and the patients. The six constructs of the HBM are perceived seriousness, perceived susceptibility, perceived threat, perceived benefits, perceived self-efficacy, and cue to action (Heid, Knobloch, Schultz, and Safdar, 2016). Providers perceive the seriousness of the illness and evaluate the patients' susceptibility to becoming sicker. They determine if there is a perceived threat from the patient for an antibiotic prescription. Will the patient benefit from an antibiotic? The provider will question his or her own self-efficacy by contemplating how sure they are of the diagnosis. Cues to action are also important in labeling an illness caused by a viral source instead of a bacterial source. The same constructs of the HBM are used by the ill patient presenting for treatment. They perceive their illness as serious. They fear their susceptibility and threat of becoming sicker. Prior exposures to

antibiotics for coughs or colds determine their feelings of self-efficacy and benefits of another course of antibiotic therapy. The cue to action is usually a prolonged cough, fever, or yellow-to-green mucus. The Health Belief Model will serve as a guide in the development of an applicable KAP survey tool.

Knowledge, Attitude, Practice (KAP) Model

The Knowledge, Attitude, and Practice Model is a tool that can be used to examine the opinions and beliefs of medical providers when evaluating a patients' chief complaint of URI, sinusitis, pharyngitis, or bronchitis. The Médicins du Monde developed this quantitative method in 2011 and it consists of standardized questionnaires. This survey tool is helpful in revealing any possible misconceptions or misunderstandings in medicine. The responses and data collected and interpreted may give insight into barriers that may cause providers to stray away from evidence-based treatment guidelines. The KAP survey model has been used to better understand treatment decision making for URI, tuberculosis, Ebola, sexually transmitted diseases, and mosquito-borne illnesses (Zajmi, et al., 2017).

Core Elements of Outpatient Antibiotic Stewardship

The Core Elements of Outpatient Antibiotic Stewardship is a framework developed by members of the CDC and published in 2016. This framework outlines the recommendations for outpatient medical establishments in becoming antibiotic stewards. The four core elements are commitment, action for policy and practice, tracking and reporting, and education and expertise (Sanchez, Fleming-Dutra, Roberts, & Hicks, 2016). The Core Elements encourage providers to make a commitment and become part

of the worldwide movement in antibiotic stewardship. Stewardship goals are to maximize the benefit of antibiotic treatment while minimizing harm both to individual persons and to communities (Sanchez, Fleming-Dutra, Roberts, & Hicks, 2016). Providers will be challenged to change their current ways of practice and examine their present prescribing policies. Some providers will find it most challenging to change many decades of bad habits and improper antibiotic prescriptions. Widespread education to providers, all staff members, and to all patient populations will need to be included in this initiative to prevent the overuse of antibiotics and spread of antibiotic resistance. The Core Elements have been adopted by hospitals and clinics nationwide. These elements have been tailored by medical facilities in Illinois, Texas, and New York. A simple poster intervention with a providers' pledge of high-quality healthcare that includes thoughtful antibiotic use, a photo of the provider, and a signature of the provider was displayed in waiting rooms and exam rooms. After this nudging intervention, there was a 20% decrease in inappropriate antibiotic prescriptions (Meeker et al, 2014).

Relevance to Nursing Practice

Nurses represent first access care givers. We are frequently asked to look or listen to a concerning ailment from a friend, family member, coworker, or sometimes even a random stranger. The public depends on us for comfort and medical answers. In the hospital or clinic setting, nurses are also first to assess or triage a patient's new, improving, or declining status. In an antibiotic workgroup conducted by the American Nurses Association, nurses self-identified knowledge gaps within their own antibiotic stewardship. They were primarily uncomfortable with microbiology and the

pathophysiology of bacteria and viruses, their life cycles, and how each organism is eradicated. They welcomed more education on antibiotics and their role in becoming better stewards (American Nurses Association, 2017).

Nurses are key providers of interventions and observers of the improvement or decline in illness. Yet, nurses have not been formally included or fully utilized in the algorithms of antibiotic treatments. Nurses begin to assess for infection at the time of triage or upon admission to a hospital unit. We are deciding upon the need for culturing a particular body fluid or reporting a recommendation for an advanced radiological study to assess a more insidious source of infection. We also review and begin ordered therapies that include antibiotics and continually assess for effectiveness. The central role of the nurses in routine patient care and communication makes it clear that they perform numerous functions critical to the successful operation of antibiotic stewardship programs (Olans, Olans, & DeMaria, 2016).

The Core Elements of Outpatient Antibiotic Stewardship developed and published by the CDC are aimed at the physician/provider. There isn't a specific area that focuses on the roles and responsibilities of the nurse, but it seems that nurses, especially advanced practice nurses with prescriptive rights should be included. Nurses make up the largest segment of healthcare workers and stand at the center of patient care. We spend more time with patients than any other healthcare professionals. We form the cornerstone of the patient-care team, providing consistency, continuity, and coordination of care (Manning, 2016). The World Health Organization task shifting initiative encourages nurses to assume skills and develop roles traditionally held by other professionals

(Charani, Castro-Sanchez, & Holmes, 2014). Nurses are monitoring patients for signs of infection, calling providers to recommend lab and radiology studies, and evaluating results as they return. If an antibiotic is ordered intravenously, nurses then monitor for improvement and encourage a change to the oral route as soon as possible.

Local Background and Context

The practicum site is a free-standing urgent care clinic located in a rural community in the southeastern United States. It is independently owned by a physician's assistant and has been opened since 2013. This clinic is physically located across the street from a small medical center that offers emergency treatment and primary care. It is also within the geographical area of many large military installations. The provider population consists of 12 physician assistants, two nurse practitioners, and two physicians. Each workday there is 1 provider, 1 triage assistant (medical assistant, LPN, or RN), and one front desk person who also serves as the x-ray technician. During cough, cold, and flu seasons, the clinic will evaluate 60 or more patients daily. The numbers of patients that present with sneezing, runny nose, sore throat, and cough will complete their evaluation and almost always exit with an antibiotic prescription in hand.

In a 2011 study, the South census region consistently had the highest prescribing rates across all age groups (931 prescriptions per 1000 persons) and were greater than three times higher than those in the Northeast and West regions (647 prescriptions per 1000 persons) (Hicks et al., 2015). The statistical trend showed a higher increase in antibiotic prescriptions as the age of the patient increased with the highest population in the patients greater than 65 years old (1048 prescriptions per 1000 person ≥65 years, 685

prescriptions and 790 prescriptions per 1000 persons aged 20-39 or 40-64 years; both P<.001) (Hicks et al., 2015).

Role of the DNP Student

As a DNP student, I have observed the influx of upper respiratory based chief complaints and the outflow of inappropriate antibiotic prescriptions. This creates the perfect situation to analyze the problem and identify a need for additional education to the providers, staff, and patients. Accordingly, I led the project team, developed the educational interventions, served as an informational source, and supervised provider-staff-patient interactions. I received de-identified patient information from the QA department in order to facilitate data comparison during two flu seasons one year apart and determined whether the educational program was successful in changing attitudes and prescribing patterns.

My motivation for this project came from so many patients coming to my practice with cold symptoms and asking for an antibiotic again as it worked for their prior cold. It was becoming increasingly more difficult to explain that they were experiencing typical cold symptoms. I would explain the normal bell curve patterns and how to symptomatically attack each phase of the illness. I would review watchful waiting and discussed at what point we should both become concerned and an additional exam be warranted. The most difficult part of this discussion was how to nicely explain these concepts without making my prior antibiotic-prescribing colleague appear incompetent. I remained unbiased as I did not include myself or my opinions in the project.

Role of the Project Team

The project team consisted of the team leader (me), all providers, and nursing staff. The QA representative provided de-identified patient data to me. I observed team interactions and input data into a SPSS program for secondary analysis. Providers attended the educational program and completed a pre-and-post intervention questionnaire that provided insight into their knowledge, attitudes, and practice habits. Nursing staff were also provided educational resources about antibiotic stewardship to assist when patients ask them about antibiotics as part of their treatment plan.

Summary

Antibiotic resistance is quickly rising due to the continued low-quality antibiotic prescribing habits from physicians, physician assistants, and nurse practitioners. New bacterium is withstanding treatment to the point that many patients are dying. The only solution to this social problem is through education. Patients will need more exposure to learning how to do viral symptom control and know the warning signs of a bacterial illness. Prescribers must stay current in their viral, bacterial, patient teaching, and medication recommendations to become better antibiotic stewards. Section 3 will provide an extensive evaluation of the collected evidence with a concluded analysis.

Section 3: Collection and Analysis of Evidence

Introduction

Antibiotic prescribing for self-limiting viral illnesses continues to occur despite the published recommendations from expert panels and professional organizations. This negative prescriptive habit directly contributes to the increasing incidences of antibiotic resistant organisms (Alsan et al., 2015; Marc et al., 2016). The purpose of the doctoral project was to influence the improper antibiotic prescription writing habits for viral illnesses at my practicum site, introducing an educational program, and assessing for a positive change toward antibiotic stewardship as the result of the education. In the next section, I further clarify and provide more details to the evidence that are part of this doctoral project.

Practice-Focused Question

Too many antibiotic prescriptions are written for illnesses that are not proven to be caused by a bacterium by a positive culture or other diagnostic study and are most likely produced by a virus. More than 200 cold viruses can cause upper airways to become irritated, swollen, and uncomfortable, with associated mucus production (Johns Hopkins Medicine, 2017). The typical length of a cold virus is approximately 10 days and will resolve with symptomatic relief of symptoms. Often patients will suffer for a few days of nasal congestion, sore throat, and cough and then seek care in hopes of a diagnosis and a rapid cure. It can be difficult for providers to explain that viral colds are treated with time combined with symptomatic control and not an antibiotic. Prescribers will write a prescription for an antibiotic for various reasons. Antibiotics are given

because it is quicker, they are unsure if it is viral or bacterial, or they fear it may morph into a bacterial infection. Providers also fear that patients will not like them, give bad reviews, produce poor patient satisfaction surveys, or from litigious fears. In a 2016 systematic review of 28 studies, antibiotic prescription writing habits of physicians with URI complaints were evaluated, revealing that fever, productive cough, and rhinitis were symptoms that had the highest correlation of antibiotic prescriptions dispensed (McKay, Mah, Law, McGrail, & Patrick, 2016). Four of the studies addressed an association between antibiotics and patient demand and one study showed a strong correlation (aOR of 9.9; 95% CI, 3.1 to 31.4), whereas the other three found a weaker or no association (McKay et al., 2016). There may be barriers to openly ask patients if they have a goal of receiving and antibiotic out of confrontational fear (McKay et al., 2016).

The purpose of this doctoral quality improvement project was to evaluate if the antibiotic stewardship educational program will have a positive effect by decreasing antibiotic prescriptions and increasing patient education and symptomatic relief options. The practice-focused question guiding this DNP project was: Will an educational program offered to providers at a private clinic in the southeastern United States change prescribing patterns to reduce the inappropriate use of antibiotics during flu season?

Operational Definitions

Over the past few years, and occasionally during my time as a student nurse practitioner, I would ask physicians, physician assistants, and other nurse practitioners how they chose the right antibiotic. Common answers I received included “that’s what the patient is here for,” “it will make them happy,” “I’m a people pleaser,” “I don’t want

them to get any worse," "it could turn into something bad," "it keeps them from coming back," "that's just how I was taught, sinusitis gets Augmentin and bronchitis gets a Zpak," and "I'm not really sure, so I will err on the side of caution." I used the knowledge, attitude, and practice (KAP) model to conduct provider surveys at the practicum site. The KAP survey tool was conducted twice during my DNP project. It was completed before and after an educational intervention to evaluate the providers' current knowledge, attitudes, and practice habits when choosing antibiotics for common respiratory complaints. I analyzed the surveys for a positive change in knowledge and attitude.

KAP surveys have been often used in medicine as they can be altered to accommodate the studied issue. They have also been used in prelicensure settings with medical and nursing students and with physicians in many countries. They can also reflect any medical phenomena from antibiotic use to osteoporosis. The KAP survey model has even been validated within evidence- based medicine and peer-reviewed journals (Huang et al., 2013; Khan, Sarriff, Khan, & Mallhi, 2014; Rodrigues et al., 2016; Zajmi, et al., 2017). In a cross-sectional survey of antibiotic use in Greece, a KAP survey tool was approved by the educational institute of The Ministry of Education and General Assembly of the Medical Faculty at the University of Thessaly (Panagakou et al., 2011).

Raw statistical data were analyzed from information collected and compiled out of medical records that were coded with a common respiratory complaint. This was obtained from electronic medical records and this de-identified information was then presented to me from a QA employee at the practicum site. Patients with a common

respiratory complaint such as cough, sore throat, sinus congestion, chest congestion, or flu symptoms were evaluated for a viral or bacterial etiology and reviewed to determine if a prescription of an antibiotic was documented in the plan of treatment. After educational interventions, similar data was requested in hopes of a positive decrease in prescription antibiotics and an increase in patient education and offering of symptomatic relief.

Sources of Evidence

The goal in my literature review was to search out the most current prescribing habits of antibiotics for common viral illnesses. In addition, I also wanted to explore what is published regarding the reasons why prescribers are ultimately devising treatments that are outside of many published guidelines for practice. Scholarly literature was searched through the Cumulative Index to Nursing & Allied Health Literature (CINAHL), Medline, PubMed, Ovid, Google Scholar, and various nursing journals. The following key terms were used *antibiotic awareness, antibiotic steward(ship), antibiotic resistance, antimicrobial resistance, antibiotic guidelines for upper respiratory illness, antibiotic prescribing attitudes, KAP survey model,* and *patient demand for antibiotics.*

Published Outcomes and Research

Through my literature search and review process there was commonality in many countries: Patients want URIs gone quickly and providers are overprescribing antibiotics for these common viral complaints. The prescribing habits for viral-associated illnesses is a major contributor to the rise and spread of antibiotic resistance (Alsan et al., 2015). The outpatient clinic settings write more than 60% of all antibiotics each year and 58% of

those antibiotics are written for illnesses that have a viral etiology (Hicks et al., 2015). In an examination of 262.5 million outpatient antibiotics, the highest amount was written by the pediatric specialty (32.4 million or 12%) and the lowest amount was actually written by the infectious disease specialty (1.3 million or 1%; Hicks et al., 2015].

Patient demand, or the perceived perception of an antibiotic, is a contributing factor in the habit of improper prescription writing. In a 2014 focus group of parents, interviews of the parents revealed a decrease in a desire for antibiotics and are comfortable with a "watchful waiting" approach. Watchful waiting is closely monitoring symptoms for a few days with symptomatic relief then reevaluating the need for an antibiotic. Still, there were many parents who believed a high fever and a yellow-to-green nasal discharge meant it was time for an antibiotic (Finkelstein, Dutta-Linn, Meyer, & Goldman, 2014).

Another contributing factor to improper prescription writing is providers' past experience. Providers continue to duplicate what has worked for them in prior experiences and use this habit in their continuing treatment plans. For instance, a top reason for the unjustified use of antibiotics for a respiratory tract infection is due to pressure from patients and their families (Strumilo et al., 2016).

Archival and Operational Data

URIs are the leading cause of 1 billion clinic visits per year in the United States (CDC, 2016). Adults will average colds about 2 to 4 times per year and children will commonly get 6 to 8 or higher if they attend daycare (CDC, 2015). Acute bronchitis or a "chest cold" will almost always get better on its own and within 3 weeks, yet 60% to 90%

of patients with acute bronchitis will be given an antibiotic prescription (National Committee for Quality Assurance, 2015). Over half of all antibiotic prescriptions written in the United States are for a respiratory infection that are predominantly viral in etiology (Hicks et al., 2015). The Healthcare Effectiveness Data and Information Set (HEDIS) scoring system is slowly showing an improvement in adults with acute bronchitis since 2010 from 22.5% not prescribed to 27.7% not prescribed in 2014 (National Committee for Quality Assurance, 2015). The National Strategy for Combating Antibiotic-Resistant Bacteria aims to reduce HEDIS scoring by 50% by 2020 for pharyngitis and acute bronchitis in children and adults (Sanchez, Fleming-Dutra, Roberts, & Hicks, 2016).

Because the clinic typically participates in providing HEDIS data to various managed care companies serving patients who use the clinic, access to these data through the EHR in the clinic is readily available. Daily patient totals on each Monday in a single month during flu season in one year previous to the project year will be compared to the individual totals on Mondays in the same month of the project year. Percentages of total URI complaints will be compared to the percentages of antibiotics written. Guideline criteria for bacterial infection such as fever, length of illness, and diagnostic studies will be tallied as well. Symptomatic control methods and classification of antibiotics will be recorded into a visual interpretation. Patients who were diagnosed with an URI during the flu season weeks in the project and their treatment plan (the presence or absence of a culture and sensitivity test, a prescribed antibiotic) will be identified and compared to like weeks in the prior year.

Evidence Generated for the Doctoral Project

Antibiotics are becoming ineffective against some bacterium strains. Antibiotic resistance is directly linked to the overuse of antibiotics that are unnecessarily being prescribed for viral illnesses. Further education for all healthcare providers as well as the public needs to be increased to change many generations of cultural norms that antibiotics are the "go to" when you have a "bad cold" and need to get better in a hurry. Antibiotic stewardship is one way that the CDC has recommended to combat this world-wide health issues. Each member of the healthcare team must analyze their own antibiotic awareness and attitudes to provide high-quality and accurate patient care.

Participants. The participants in this doctoral project were willing medical providers with prescriptive authority employed at my practicum site. I contacted each of the 12 physician assistants, two nurse practitioners, and two physicians via email with a background statement about my DNP project and politely asked them to anonymously participate in the KAP survey and the educational intervention. They were assured that their identities would be protected and their prescription habits or opinions would not be shared as to cause any undue harm or discord within the practice. That is, their participation was anonymous and confidential.

Procedures. All medical record data was collected by the clinic's QA representative and given to me de-identified as to protect patients' identities and comply with the Health Insurance Portability and Accountability Act of 1996 (HIPAA). De-identified data also prevents bias. My primary data collection from the medical record was from a typical flu season period on consecutive Mondays. Operational and archival

medical record data from this period will then be compared to data from that same four-week period in the year prior to the provider education on antibiotic stewardship. The winter months have an increase in respiratory illness complaints, Mondays are the busiest days, and double provider coverage is scheduled instead of single coverage. The dataset will include all patients with a respiratory illness complaint. Length of illness, measurement of temperature, the extent to which an antibiotic was prescribed and if so, which one, and the extent to which symptomatic control options were documented. The expected sample size of medical records collected in each four-week period is between 150 to just over 300. In flu season, the Monday clinic averages close to 80 patients during the 0800 to 1800 hours of operation.

An educational in-service was given to 16 of the providers in the clinic who see patients and have prescriptive rights. The Power Point presentation was developed and based off the recommendations from authorities such as the CDC and the World Health Organization (see Appendix A). A provider questionnaire was developed and then administered which assessed each clinic prescribers' knowledge, attitudes, and practices (KAP) regarding URIs, standard treatment guidelines, and antibiotic use (see Appendix B). The KAP survey tool measures the knowledge (what people know), attitude (how they feel) and practices (how they behave) of the population under study (Panagakou, et. al., 2011). This survey tool can be altered and customized to collect information about the decision-making insights of providers. The survey was provided before and after the educational sessions to evaluate for positive change in knowledge and attitudes. The medical record data analysis was used to determine the impact of the educational

program on practice. The KAP survey tool that I developed was presented to local pharmacists that possess over thirty years of PharmD experience and antibiotic stewardship awareness that can attest to face validity and reliability of the tool. A copy of the KAP survey tool is listed in the Appendix and answered for correctness.

I examined the medical record data given to me and evaluated if the rate of antibiotic prescribing decreases, symptomatic recommendations increase, and the pre-and-post test data to see if a positive change in provider knowledge and attitudes occurred. There were also open-ended opportunities on the post-test survey for opinions to be expressed and recommendations for any knowledge needs.

Protections. The respect and protection for patient privacy was maintained fully throughout this doctoral project. No information will be shared with the staff of the practicum site. My professional responsibility was upheld as to maintain the well-being of protected patient information and the statistical data only served a purpose for awareness and future social change. I have stored the individually-deidentified patient criteria in a safe area that only I have access to and it will not be available to anyone without authorization. I have obtained granted access from the clinic's business manager and clinic owner. Permissions to proceed with the project were sought from the Walden Institutional Review Board (IRB). The Walden IRB approval number is 04-26-18-0605544. All patients seen for the chief complaint of "URI" during the scheduled data collection period were included. They were not excluded due to gender, age, ethnicity, religious preference, or insurance status.

Analysis and Synthesis

The compilation of provider questionnaire answers from the KAP survey was scored with No/Never = 1 or Always/Yes = 3; the sample was small (n=16) and analyzed in SPSS using a non-parametric Levene's Analysis of Variance to determine if there is a statistically significant change in providers' knowledge, attitudes toward antibiotic stewardship, and antibiotic prescription writing percentages before and after the education. To evaluate the impact on practice at the clinic, the deidentified medical record patient data received from the QA department will be evaluated using the non-parametric Chi square. This will determine the extent to which the education resulted in a decrease in the amount of antibiotic prescriptions, an increase in orders for recommended diagnostic studies, and an increase in the number of patients who had documented teaching on comfort measures for symptom control. Cronbach's Alpha will be used to measure internal consistency. Test/re-test reliability was used as it is the most common measure of reliability. T_1 (pre) and T_2 (post) will signify each KAP survey.

The integrity of the project data was evaluated for outliers by evaluating for any values the fell outside of the normal frequency distribution. The KAP survey was originally assigned the three answer choices of No/Never (1), Sometimes (2), and Yes/Always (3). But, after a more in-depth data analysis, the "sometimes" variable became was determined to be an outlier as it skewed the overall survey results. The "sometimes" category was then absorbed to indicate either the No or Yes category and then reanalyzed. The SPSS system also checked for missing values and none were found. Further recommendations will be addressed in Section 4.

The antibiotic prescribing habits were collected and compared between the time span of a year both before and after an educational presentation. This data was entered I in SPSS and the results were analyzed. Demographic data from two separate population groups was collected from the QA department representative and given to me in a deidentified format to protect patient and provider confidentially. The variables were gender, length of illness (in days), temperature (tympanic), diagnosis, treatment, and provider. The diagnosis variable was further delineated into antibiotic or watchful waiting.

Summary

Antibiotic misuse has been frequently cited as the leading cause of antibiotic resistance (Alsan, Morden, Gottlieb, Zhou, & Skinner, 2015; Hicks, et al., 2015; Sanchez, Fleming-Dutra, Roberts, & Hicks, 2016; The Joint Commission, 2016). A change must be made. Without a significant change, people will continue to develop secondary infections, and many will die. Nearly half a million people will develop the deadly C. difficile intestinal infection and approximately 29,000 will die within 30 days of their life-ending diagnosis (American Nurses Association, 2017). Even conservative estimates from the CDC predict nearly two million Americans will develop a serious multi-drug bacterial infection with a direct result of at least 23,000 deaths (American Nurses Association, 2017; Center for Disease Control and Prevention, 2015). The graduate DNP can be instrumental in leading this change agent of antibiotic stewardship. Recognizing opportunities to improve the practices of antibiotic prescriptions, identifying barriers in this improvement, and establishing standards is the first step in becoming an antibiotic

steward. The information gained from this doctoral project may further trigger additional transformation in practice patterns and develop educational programs that will address the needs of both the provider and the patient. This will be expanded upon in Section 4.

Section 4: Findings and Recommendations

Introduction

The foundational basis for this DNP project was envisioned after a culmination of my observations while working in emergency departments and in urgent care clinics. The span of nearly three decades in nursing produced the numerous questions that led to this project. Why do so many patients who present with cough and cold symptoms request or expect a course of antibiotics as treatment? Why are so many medical providers prescribing antibiotics for URIs that are most likely viral and not bacterial? I endeavored to pursue an analysis of antibiotic prescription writing habits for URIs and provide an evidence-based in-service to promote social change. While speaking with coughing and congested patients, I have been told, "I get these three or four times a year and I always get a Zpak," "I need a really good antibiotic because I have plans this weekend," and "I thought I would come in to get an antibiotic, so I could nip it before it gets any worse." Likewise, I have heard and been advised by other prescribing medical providers that "I give them what they want so they don't come back." However, antibiotics when given just to meet a patients' expectations or ensure satisfaction can be harmful and sometimes deadly. Thus, the practice-focused question that guided the DNP project was: Will an educational program offered to providers at a private clinic in the southeastern United States change prescribing patterns to reduce the inappropriate use of antibiotics during flu season?

Findings and Implications

Statistical data were collected from various sources. A baseline data analysis included four Mondays during a busy cough and cold season. Demographic data included age and gender. Illness specific data included length of illness, temperature measurement, diagnosis, and the treatment plan. The treatment plan was focused on whether an antibiotic was given or if watchful waiting was recommended. A total of 250 patients presented during the four measured days (preintervention) and 117 patients had a chief complaint of a URI (47%). Antibiotics were prescribed to 94 of the 117 (80%). After the educational intervention with the providers, a second analysis of 265 patients during four measured days and of these, 92 had a chief complaint of an URI (36%). Antibiotics were prescribed to 64 of the 92 (70%). This reflects a positive decrease in antibiotic prescription writing by 10%. There was also a positive increase in the watchful waiting patients from 11(4%) in the preintervention group to 28 (30%) in the postintervention group (Table 1). Nonparametric Chi-Square testing reveals that these changes are statistically significant X^2 (1) = 12.302, p = .000 (Table 2).

Table 1

Antibiotics Versus Watchful Waiting Pre- and-Post Intervention

	Antibiotics	Watchful Waiting	Total URI
2017	94	11	117
2018	64	28	92

Table 2

Chi-square Results

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (2-sided)
Pearson Chi-square	12.302	1	.000		
Continuity Correction	11.077	1	.001		
Likelihood Ratio	12.537	1			
Fisher's Exact Test				.001	.000
Linear-by-Linear Association	12.240	1	.000		
N of Valid Cases	197				

An educational PowerPoint presentation was given and may be viewed in Appendix B. The PowerPoint was an overview of the problem of antibiotic resistance, improper antibiotic prescribing, and the published guidelines that outline antibiotic criteria for URIs. The in-service lasted just over 3 hours and many heated debates arose. Concerns from providers included the stance that patients do not come to the clinic to be told what over-the-counter medicine to take. Patients want to feel better fast and believe that after a day or so on an antibiotic, they begin to feel better. Most often, a few days on an antibiotic will overlap with the end of a viral illness, which makes it appear that the antibiotic was the cure. This contributes to a patient's reasoning in seeking an antibiotic again for subsequent viral illnesses. There were also concerns that it is sometimes hard to determine if a cough or sinus congestion is due to a virus or bacteria. Because of this uncertainty, they admit to prescribing an antibiotic "just in case."

Although prescribing patterns changed for the better from 2017 to 2018, the results of the KAP survey did not change in a statistically significant way, which was supported by the debates that arose during the educational session. A preintervention KAP survey (Appendix A) was distributed to the 16 providers who are employed at the DNP project site, an urgent care clinic. Three areas of provider beliefs and habits were surveyed before and after an educational PowerPoint presentation. These areas included knowledge (what you know), attitude (how you feel), and practice (how you behave). These surveys were returned within 2 weeks. There was a low return in the preeducation dispersal with only seven responses of the 16 total providers. The posteducation yielded a higher return with 14 responding to the KAP surveys. In addition to the Likert scoring of *Never/No* (1), *Sometimes* (2), *Always/Yes* (3), there were areas added after each section that allowed for questions and comments. The most common comments included the knowledge of guidelines but indicating that clinical judgement can override a guideline. Two providers also stated that they were taught that all asthmatics, COPD patients, and smokers should receive antibiotics for bronchitis. The KAP survey was administered 1 month before and immediately following the Power Point educational presentation. There were no inferential statistical findings demonstrating an increase in knowledge, attitudes or practices on the KAP survey when preeducation responses were compared 2 weeks later to responses after the in-service educational session. Descriptive percentages are summarized in Table 3.

Table 3

KAP Survey Before and After Power Point Educational Intervention

Knowledge (K), Attitude (A) and Practice (P) items	Pre-inservice Number of Participants	Post-inservice Number of Participants
(K1) Antibiotics are sometimes needed to treat viral infections	Never/No 7 (100%) Sometimes Always/Yes	Never/No 14 (100%) Sometimes Always/Yes
(K2) Productive cough, fever, and sinus congestion are hallmark signs to begin an antibiotic on day 3.	Never/No 4 (57%) Sometimes 3 (43%) Always/Yes	Never/No 10 (71%) Sometimes 4 (29%) Always/Yes
(K3) Over 60% of sinus congestion is bacterial sinusitis	Never/No 5 (71%) Sometimes 2 (29%) Always/Yes	Never/No 10 (100%) Sometimes 4 (29%) Always/Yes
(K4) Fever over 100.4 indicates a bacterial infection	Never/No 2 (29%) Sometimes 5 (71%) Always/Yes	Never/No 3 (21%) Sometimes 11 (79%) Always/Yes
(K5) Otitis Media (OM) can resolve on its own with watchful waiting	Never/No Sometimes 7 (100%) Always/Yes	Never/No Sometimes 14 (100%) Always/Yes
(K6) Acute bronchitis should be prescribed antibiotics	Never/No Sometimes 7 (100%) Always/Yes	Never/No 3 (21%) Sometimes 11 (79%) Always/Yes
(K7) Bronchitis may last for over a month	Never/No Sometimes 7 (100%) Always/Yes	Never/No Sometimes 14 (100%) Always/Yes
(A1) Patients have predetermined antibiotic goals before they arrive for a URI evaluation	Never/No Sometimes 4 (57%) Always/Yes 3 (43%)	Never/No Sometimes 10 (71%) Always/Yes 4 (29%)
(A2) Azithromycin (Z-pak) is a universal URI antibiotic	Never/No 7 (100%) Sometimes Always/Yes	Never/No 13 (93%) Sometimes 1 (7%) Always/Yes
(A3) Pharyngitis complaints should be swabbed and all negative rapid strep should be sent for culture and sensitivity	Never/No Sometimes 5 (71%) Always/Yes 2 (29%)	Never/No Sometimes 11 (79%) Always/Yes 3 (21%)
(A4) Symptomatic control should be instituted with URI for at least 7-10 days before evaluated for an antibiotic	Never/No Sometimes Always/Yes 7 (100%)	Never/No Sometimes 11 (79%) Always/Yes 3 (21%)

(table continues)

Knowledge (K), Attitude (A) and Practice (P) items	Pre-inservice Number of Participants	Post-inservice Number of Participants
(P1) I write prescriptions for antibiotics if I feel pressured to do so	Never/No Sometimes 6 (86%) Always/Yes 1 (14%)	Never/No Sometimes 12 (86%) Always/Yes 2 (14%)
(P2) I write prescriptions for antibiotics if I am unsure of my diagnosis	Never/No 2 (29%) Sometimes 5 (71%) Always/Yes	Never/No 2 (14%) Sometimes 12 (86%) Always/Yes
(P3) I write for antibiotics for fevers over 100.4	Never/No 3 (43%) Sometimes 4 (57%) Always/Yes	Never/No 2 (14%) Sometimes 12 (86%) Always/Yes
(P4) I write antibiotics and describe watchful waiting	Never/No 5 (71%) Sometimes 2 (29%) Always/Yes	Never/No 1 (7%) Sometimes 13 (93%) Always/Yes
(P5) I follow published prescriptive guidelines when prescribing antibiotics	Never/No Sometimes 4 (57%) Always/Yes 3 (43%)	Never/No Sometimes 10 (71%) Always/Yes 4 (29%)
(P6) I follow published prescriptive guidelines when prescribing antibiotics	Never/No Sometimes 4 (57%) Always/Yes 3 (43%)	Never/No Sometimes 10 (71%) Always/Yes 4 (29%)
(P7) I am aware of antibiotic super bugs (VRE, MRSA, C. diff)	Never/No Sometimes Always/Yes 7 100%)	Never/No Sometimes Always/Yes 14 (100%)
(P8) I feel comfortable educating my patients about viral/bacterial symptoms and when antibiotics are necessary	Never/No Sometimes 1 (14%) Always/Yes 6 (86%)	Never/No Sometimes 2 (14%) Always/Yes 12 (86%)
(P9) I would like more education on antibiotic super bugs	Never/No 4 (57%) Sometimes 1 (14%) Always/Yes 2 (29%)	Never/No 1 (7%) Sometimes 1 (7%) Always/Yes 12 (86%)
(P10) I would be interested in additional education about how to handle patients that desire antibiotics for viral illnesses	Never/No 3 (43%) Sometimes Always/Yes 4 (57%)	Never/No 1 (7%) Sometimes 1 (7%) Always/Yes 12 (86%)
(P11) I am a good antibiotic steward	Never/No 1 (14%) Sometimes 4 (57%) Always/Yes 2 (29%)	Never/No 1 (7%) Sometimes 2 (14%) Always/Yes 11 (79%)
(P12) Patients can talk me into writing an antibiotic prescription	Never/No 2 (29%) Sometimes 4 (57%) Always/Yes 1 (14%)	Never/No 2 (14%) Sometimes 4 (29%) Always/Yes 8 (43%)

Note. N = 16 participants (pre = 7/16, post = 14/16)

Overall, the KAP survey indicated antibiotic stewardship awareness when treating URIs both before and after the education. In the "Knowledge" section, there was no evidence of positive change; that is, the providers had a good grasp of the proper answers for antibiotic stewardship. The "Attitude" section remained nearly neutral with but with an increase in providers believing that patients have a predetermined antibiotic goal before arriving for a URI complaint from 51% to 73% (sometimes) and a decrease from 43% to 29% (always/yes). The "Practice" section reveals the most evidence for prescription writing habits and the need for more continuing education. Providers (86%) feel pressured to write for an antibiotic even when it isn't needed; this was true both before and after the educational program. If they are unsure of their diagnosis, their answers on the survey indicated that they will prescribe an antibiotic for URI complaints 71-86% of the time. A fever over 100.4 is more likely to result in a prescribed antibiotic 57-86% of the time among the providers who participated in the project. The most promising result was from the introduction of the concept of watchful waiting. The item "I write antibiotics and describe watchful waiting" had a positive change from 71% to 7% (never) and from 29% to 93% (sometimes). Providers will write a prescription for an antibiotic with specific instructions to hold onto it until their illness meets bacterial criteria. This is known as watchful waiting. The concept of "watchful waiting" is allowing a patient to hold onto an antibiotic prescription until a certain timeframe or to return if symptoms progress rapidly and then prescribe antibiotics. The use of Zpak decreased from 35.09% to 15.79%. The published antibiotic guidelines unfortunately

reveal that providers are not following published antibiotic guidelines: (sometimes) 57 to 71% and (always) 43 to 29%.

The independent t test when comparing results of the survey from before the education to after the education did not yield statistically significant results. This is largely related to several methodological factors. The first factor is related to the small sample size, which may have contributed to a type 2 error, not finding significance when it is truly there. The second issue may be related to the fact that the knowledge and attitudes have not really changed as a result of the education provided in the DNP project. Although changes in prescribing patterns are very evident in the data of how patients are managed at the clinic, these changes may have been more related to informal discussions, attendance at professional conferences that occurred between 2017 and 2018, and related to other continuing educational offerings. Regardless, the lack of change in the survey certainly indicates the need for continued vigilance regarding antibiotic awareness and stewardship.

Recommendations

The fields of medicine and healthcare are always changing due to the developing research in new diagnoses, medicines, and treatments. Providers and nurses alike need to constantly maintain the most diligent level of continuing education and passion for new knowledge. A mandatory number of continuing education hours or courses about antibiotic stewardship may prove to be needed to stay current and remain in compliance with prescribing and administering guidelines.

Healthcare informatics and technology are aiding in clinical decision making. Drop-down menus within the electronic medical record have been proven useful (Bernstein, Whitaker, Winograd, & Brennan, 2015; Javaid, et al., 2017). When an antibiotic is chosen, a drop-down box will request the provider to justify the need for an antibiotic. These drop-downs can be programmed according to current guidelines. So, if a provider chooses an inappropriate antibiotic, incorrect dosage, or improper duration a recommendation will be given and an opportunity to change to an alternative treatment. Another useful determinant is the availability of rapid point-of-care testing. Rapid strep, rapid flu, rapid mycoplasma, rapid mono spot, and rapid RSV are all a fast swab of the nasopharynx and throat or a few drops of blood to obtain a quick answer. These results can be available within 10-15 minutes and then the correct decision can be made if an antibiotic is needed. Chest radiographs and CT scans of the sinuses are also helpful in diagnosing pneumonia or sinusitis. The advancement of medicine, medical technology, and diagnostic testing negates the need to make our best educated guess anymore. We should use all of our availabilities to the extent needed to make the correct diagnosis and develop the best plan of treatment. This will make our practice stronger and our patients safer.

Strengths and Limitations of the Project

The strengths of this DNP project were considerable, since I found a statistically significant improvement in antibiotic prescribing pattern at the DNP project site UCC. Antibiotic stewardship is on the frontline at a world-wide level and many healthcare organizations are researching and developing task forces to decrease the inappropriate

use of antibiotics. The United States has begun the "Get Smart: Know When Antibiotics Work campaign along with Sweden's (STRAMA) Swedish Strategic Programme for the Rational Use of Medicines, Vietnam's (VINARES) Vietnam Resistance Program, and South Africa's Best care…Always! Second, urgent care clinics are often used for URI complaints, so the potential for influencing antibiotic use is great. Urgent Care Associations of America states urgent care clinics have grown to over 10,000 facilities. A mature urgent care can expect to average 48 patients per day. The large percentage of visits to an UCC are for cough, sore throat, or sinus congestion. Palms et al. (2018) recently conducted a retrospective cohort study and found that out of the 2.7 million urgent care visits, upper respiratory complaints (n=441,605) and 45.7% (n=201, 682) were URIs and given antibiotic treatment that was inappropriate. Inappropriate antibiotic prescriptions at urgent care clinics were much higher than emergency departments (24.6%), medical offices (17.0%), and retail clinics (14.4%) (Palms, et al., 2018).

The DNP project did have some limitations around the lack of findings in the KAP survey. The pre-intervention KAP surveys were returned in a blank envelope to the business manager and then given to me. The post-intervention KAP surveys were collected in a covered box outside of the conference room out of my view to remain anonymous. The first KAP surveys only had a 7 out of 16 return rate but the post-inservice had a return rate of 14 out of 16. So, the low response rate coupled with the small sample both may have contributed to the lack of statistically significant findings. The KAP survey tool itself had a very low Cronbach α score which also made the results questionable. This notwithstanding, I was able to use descriptives from the KAP survey

and additionally, I was able to identify qualitative themes from each question and from the discussion with providers at the UCC. This provided me with more insight into prescribing habits and antibiotic opinions. The study sample size is a significant limitation as it only represented 16 providers in the southeastern United States and likely resulted in a Type 2 error (not finding significance when it was really there).

The potential recommendation would be focused around increasing the provider discussion around antibiotic stewardship. I might incorporate a meet-and-greet coffee/pastry session to discuss antibiotic stewardship, to discuss relevant recent research on the topic and to challenge ways to present the topic to patients and families. Though practice patterns are changing at the UCC, there are still prevalent attitudes among clinic providers that may interfere with antibiotic stewardship goals.

Section 5: Dissemination Plan

Antibiotic stewardship is an important concept for all providers who deliver healthcare. The antibiotic resistance crisis is evident worldwide. The evidence collected and the data analyzed during this quality improvement project can add benefit to further studies. This DNP project was completed in a small clinic, with a small number of provider participants and small number of patient evaluations. I would predict an increase in significance on a larger scale if all three aspects were increased.

Medical providers including medical assistants, RNs, advanced practice RNs, physician assistants, and physicians can all benefit from continued or further education about the role they each play in keeping patients protected from the negative side-effects of antibiotics. A continued effort is warranted within clinics, online continuing education courses, annual conferences, and most importantly public media to be a successful nation at decreasing the millions of annual antibiotics that are written and inappropriately prescribed. Scheduled educational sessions, educational posters displayed in widely viewed areas, and pamphlets developed for patients that can be personalized at each visit can increase exposure to the concept of antibiotic stewardship.

Analysis of Self

My role in this doctoral project was multifactorial. I was an unbiased visual collector of data. I observed patients entering the clinic with coughs and sore throats and leaving with a plan to treat their ailments. I was once in a position where I thought that an antibiotic prescription was not a big deal and it gave the patient what they wanted. But through this deep exploration of the scientific evidence, I discovered how severe the

negative impact of prescribing incorrect or unnecessary antibiotics can be. Now, antibiotic stewardship has become my passion and I spend many hours per day educating patients about viral and bacterial illnesses, purchasing educational resources for exam rooms, waiting areas, and bathrooms, and making pamphlets to disperse upon discharge from my clinic.

The challenges to complete this DNP project were plenty and difficult to overcome. Nearly all my research was completed during "down times" during the 50 or more hours I spent at work each week. Much of the "pre-writing" occurred in my head while driving to-and-from work, doing farm chores, or while lying in bed at night. So, finding time to physically write was the main challenge. I overcame this challenge by taking trips. These vacations weren't typical. A week in the mountains, on a cruise ship, and at DNP intensives were dedicated times away to focus on the project without distractions. The second challenge was from within my family. I am the crisis interventionist for all the peaks and valleys that occur being married with five grown children. During this DNP project I have had a son graduate high school and a daughter graduate college. I have a son starting his senior high school year and a daughter finishing her college as a veterinarian. My oldest daughter moved away with her military husband and had our second grandson. Another daughter added to her family by having our granddaughter last year and we just concluded an arduous, year-long court battle for her to keep custody. My home office area has been an area of jealousy, both spoken and unspoken. One of my daughters states it is the "poltergeist of the house, it just pulls you in there and you come out a different person." So, both of my daughters have plans to

turn it into something bright and cheery like a playroom after the completion of the DNP project. I guess it will be a closure and healing period for everyone in the house.

I have grown personally within my family at home, my work family, and in my larger family of nurses and other medical providers. As a scholar, I can now confidently read through research articles and further spark ideas for new research topics. The Latin and Greek letters or symbols are no longer intimidating. The science of research statistics and design is somewhat enjoyable after being a part of an actual study that I was so personally involved in. I speak differently. I read differently. I think differently.

This DNP level of education forced me to not only focus on the problems but to create solutions. I took on small, semester-length problems to increase communication, collaboration, and meaningful use. My final DNP project on the educational intervention and antibiotic reduction in respiratory illnesses was quite painful. I took a hit to my sleep, sanity, and wallet which is obvious. But, I secretly put my reputation and comradery at risk by speaking up and addressing such a secret practice that so many providers are not willing to admit to. I knew that I wouldn't be able to change some providers' practice habits and this would be an arduous undertaking. But, I am over-joyed to announce that I have been approached in person by one and email corresponded with two others wanting me to debunk some medical myths and tell them more ways to become better stewards.

I plan to continue this passion for antibiotic stewardship by improving myself and offering more education to coworkers and patients. I have started an antibiotic binder that is located beside the provider's computer station. I have made sections for common

respiratory complaints, published antibiotic algorithms, and patient education materials. On the desktop I have created a document with hyperlinks to commonly referenced infectious disease sites. I am working with the business manager and web designer to incorporate some antibiotic awareness tips on our clinic's Facebook page. These small interventions are endless and all sparked from each semester of this DNP program. I have become a better researcher and a lover of research thanks to Walden and their deep philosophy of social change. I am an antibiotic change agent.

Summary

Antibiotic stewardship encompasses the wise attitude and practice about monitoring infectious bacterial and viral illness and correct antibiotic prescribing. Only through continuous education will a provider be mindful and be able to provide high-quality care for URIs. A highly educated provider will be able to confidently recognize a viral or bacterial respiratory illness. A highly educated provider will also be able to teach their patients how to properly care for their illness and if antibiotics are appropriate. I am hopeful that other healthcare providers that have prescribing privileges will read through this DNP project and further analyze their own perspective on prescribing habits. I would hope that they review the most up-to-date guidelines and share them with other colleagues. I was able to significantly decrease the amount of antibiotic prescriptions written and increase more visits with watchful waiting. Throughout this DNP project I have gained a deeper understanding of microbiology and antibiotic biograms. I believe that I am now able to be a high-quality antibiotic steward and continue to encourage additional positive social change by promoting more antibiotic stewards.

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Appendix A: Knowledge, Attitudes, and Practice (KAP) survey

The KAP survey investigates your current antibiotics beliefs and prescribing habits. This survey is intended ONLY as a comparison to state and national trends. All data collected will remain confidential and will never be shared with anyone other than my doctoral committee. A returned survey will represent your implied consent for participation.

Knowledge (what you know**)**

	Never/No	Sometimes	Always/Yes
Antibiotics are sometimes needed to treat viral infections	X		
Productive cough, fever, and sinus congestion are hallmark signs to begin an antibiotic upon day 3	X		
Over 60% of sinus congestion is bacterial sinusitis	X		
Fever over 100.4 indicates a bacterial infection	X		
Otitis Media (OM) can resolve on its own with watchful waiting			X
Acute bronchitis should be prescribed antibiotics	X		
Bronchitis may last for over a month			X

Open for questions/comments:

Attitude (how you feel**)**

	Never/No	Sometimes	Always/Yes
Patients have pre-determined antibiotic goals before they arrive for a URI evaluation			X
Azithromycin (Z-pak™) is a universal URI antibiotic	X		
Pharyngitis complaints should be swabbed and all negative rapid strep should be sent for culture and sensitivity			X
Symptomatic control should be instituted with URI for at least 7-10 days before evaluated for an antibiotic			X

Open for questions/comments:

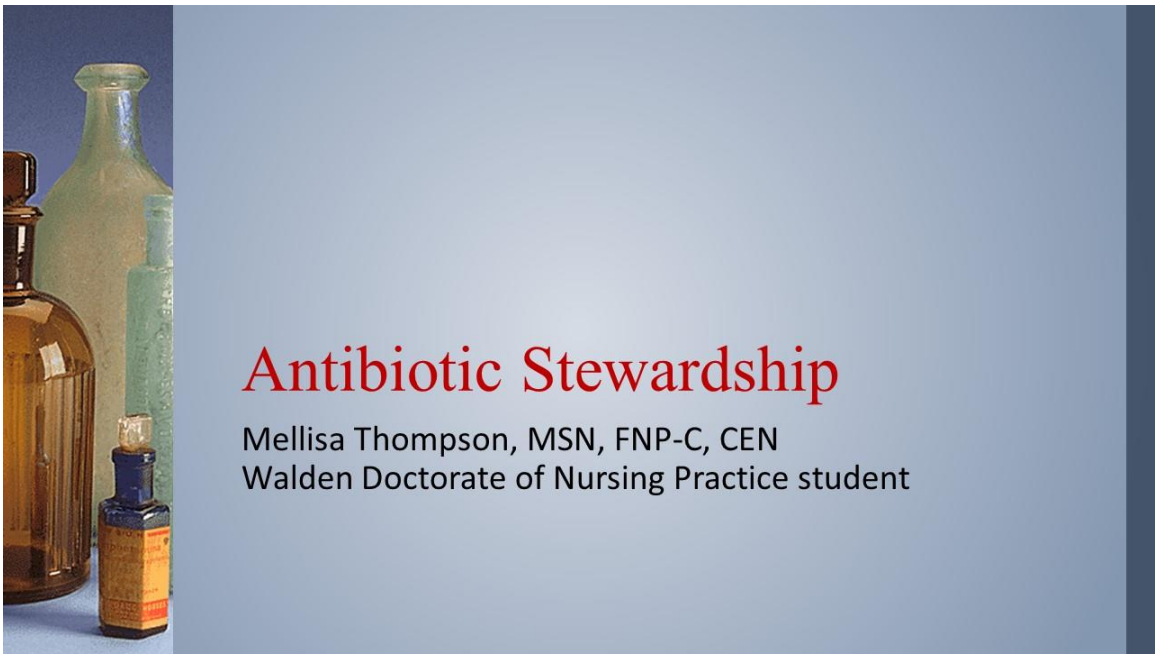
Practice (how you behave**)**

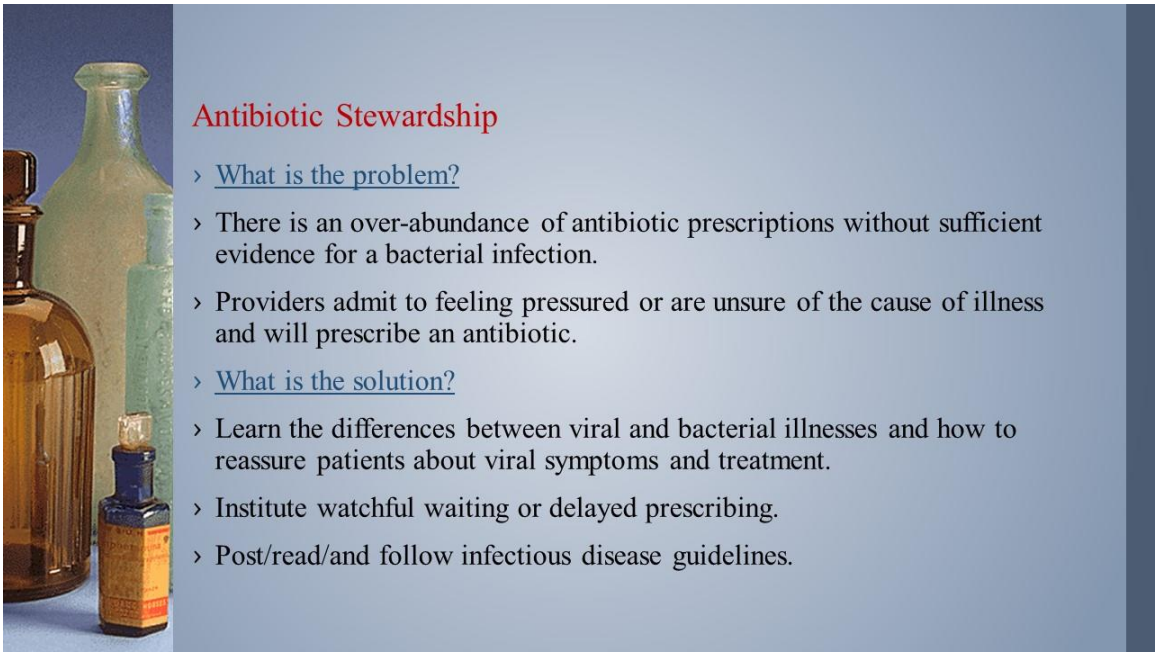
	Never/No	Sometimes	Always/Yes
I write prescriptions for antibiotics if I feel pressured to do so	X		
I write prescriptions for antibiotics if I am unsure of my diagnosis	X		
I write antibiotics for fevers over 100.4	X		
I write antibiotics and describe watchful waiting to patients			X

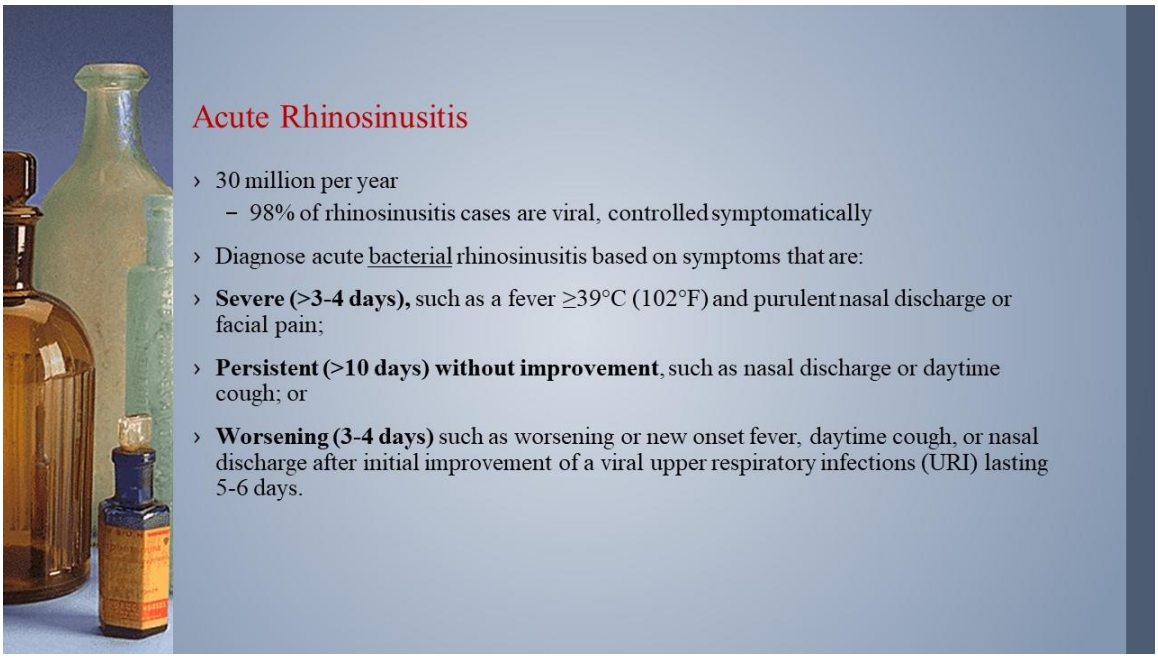
I follow published prescriptive guidelines when prescribing antibiotics			X
I am aware of antibiotic super bugs (VRE, MRSA, C. diff)			X
I feel comfortable educating my patients about viral/bacterial symptoms and when antibiotics are necessary			X
I would like more education on antibiotic super bugs			X
I would be interested in additional education about how to handle patients that desire antibiotics for viral illnesses			X
I am a good antibiotic steward			X
Patients can talk me into writing an antibiotic prescription	X		

Open for questions/comments:

Appendix B: Educational PowerPoint

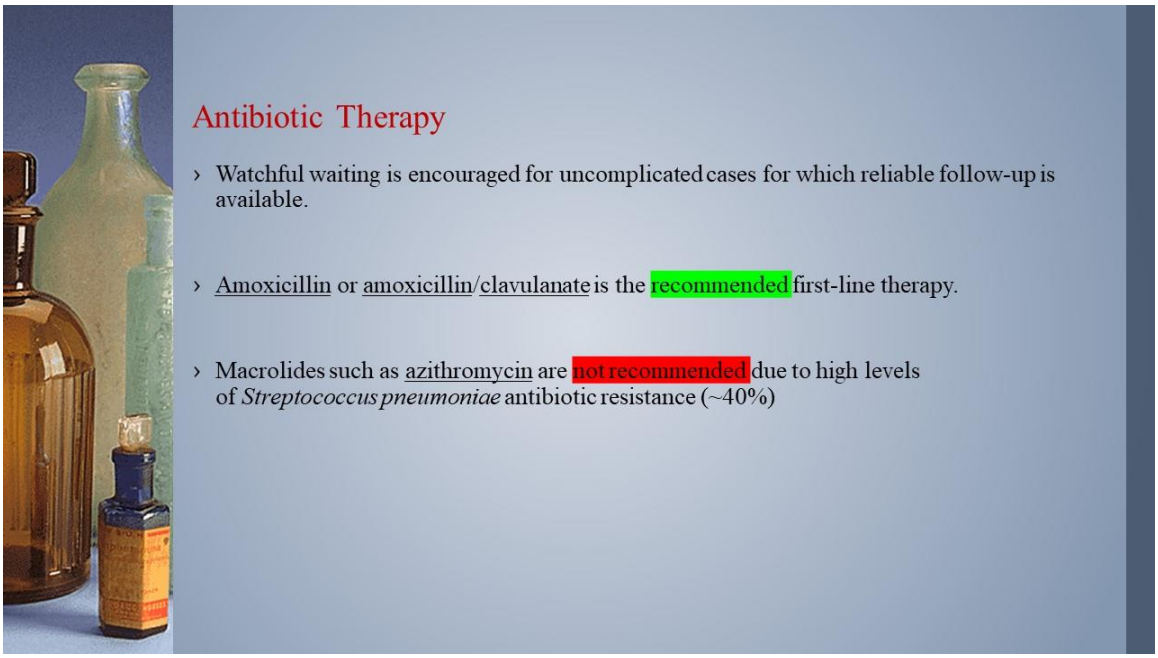






Acute Rhinosinusitis

- 30 million per year
  - 98% of rhinosinusitis cases are viral, controlled symptomatically
- 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 infections (URI) lasting 5-6 days.



Antibiotic Therapy

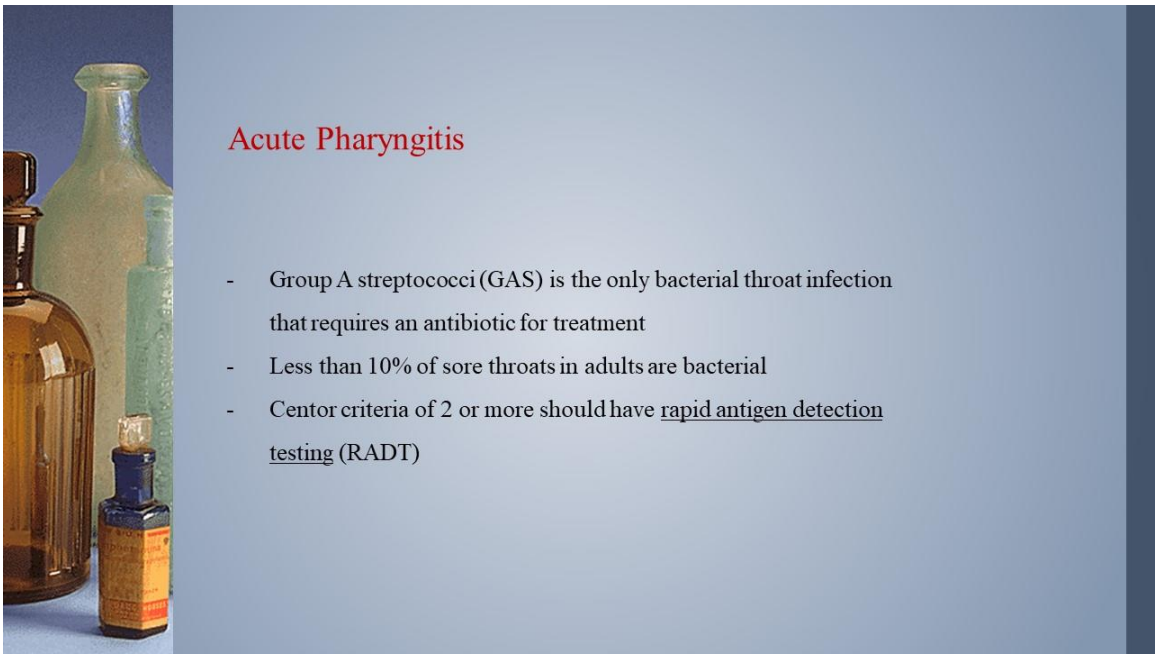
- Watchful waiting is encouraged for uncomplicated cases for which reliable follow-up is available.
- Amoxicillin or amoxicillin/clavulanate is the recommended first-line therapy.
- Macrolides such as azithromycin are not recommended due to high levels of *Streptococcus pneumoniae* antibiotic resistance (~40%)

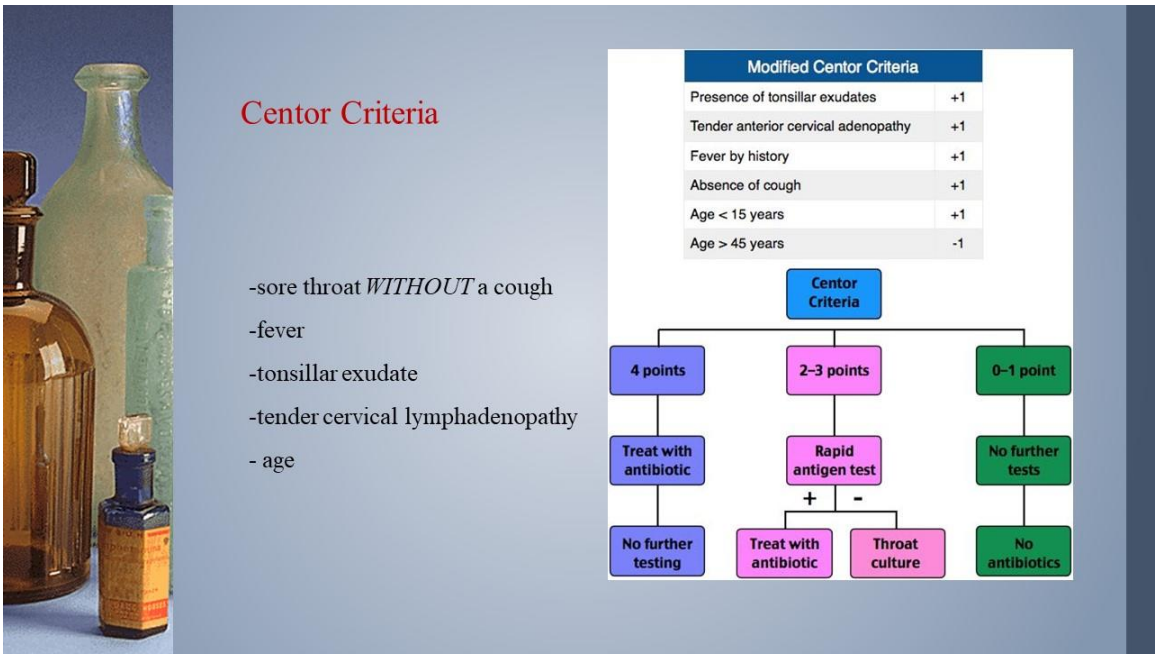
Acute Bronchitis

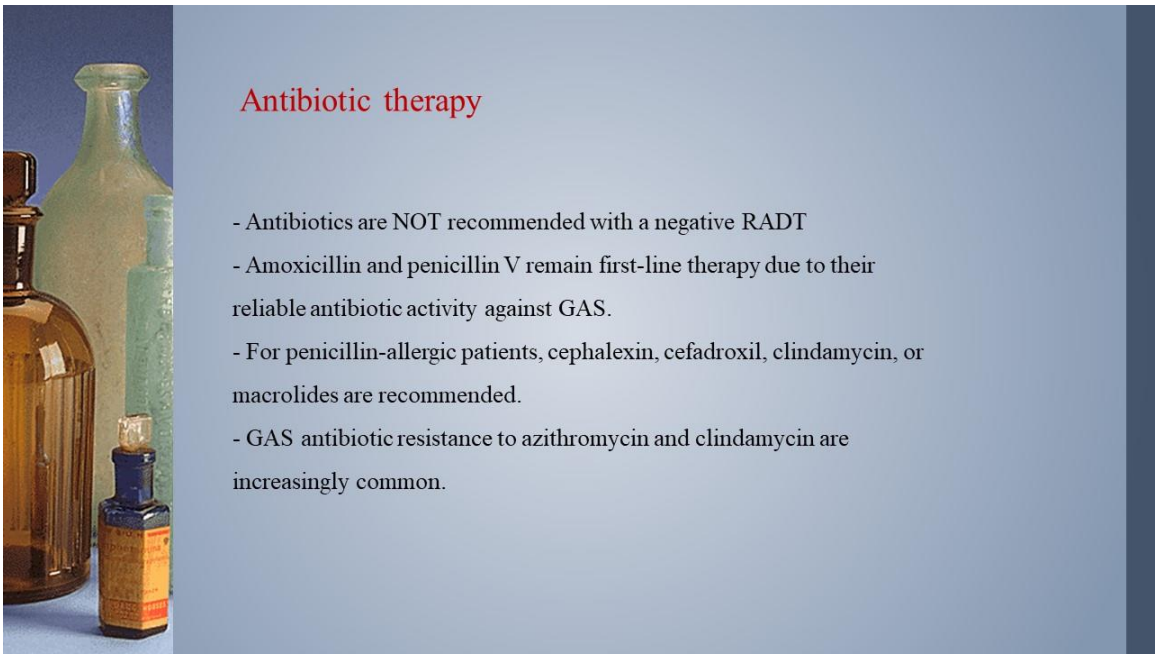
- Prolonged cough is the presenting complaint
- Color of sputum *DOES NOT* indicate infection
- Antibiotics are *NOT INDICATED* no matter the duration of the cough
- Cough can last many weeks

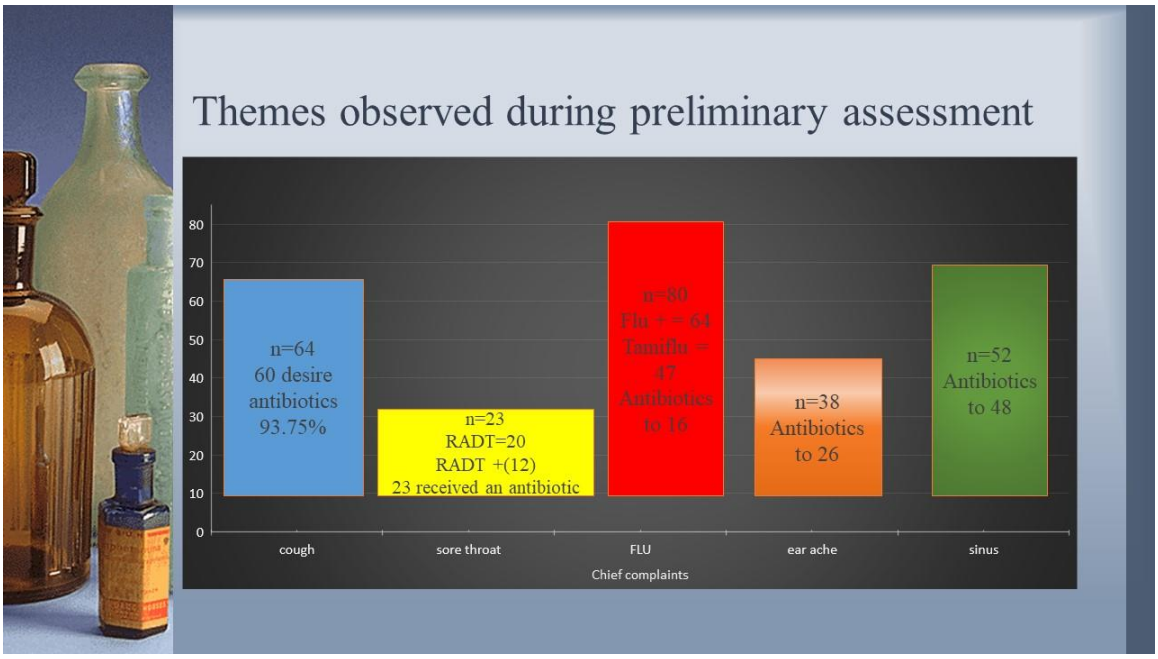
Bronchitis treatment

- Rule out pneumonia
- Evaluate environmental causes and decrease exposure
- Cough suppressants, first-line antihistamines, decongestants
- Humidify the air
- Stay hydrated
- Get plenty of rest


Acute Pharyngitis
- Group A streptococci (GAS) is the only bacterial throat infection that requires an antibiotic for treatment
- Less than 10% of sore throats in adults are bacterial
- Centor criteria of 2 or more should have rapid antigen detection testing (RADT)


Centor Criteria
-sore throat *WITHOUT* a cough
-fever
-tonsillar exudate
-tender cervical lymphadenopathy
- age
Modified Centor Criteria
Presence of tonsillar exudates +1
Tender anterior cervical adenopathy +1
Fever by history +1
Absence of cough +1
Age < 15 years +1
Age > 45 years -1
Centor Criteria
4 points
2–3 points
0–1 point
Treat with antibiotic
Rapid antigen test
No further tests
+
-
No further testing
Treat with antibiotic
Throat culture
No antibiotics


Antibiotic therapy
- Antibiotics are NOT recommended with a negative RADT
- 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.


Themes observed during preliminary assessment
80
70
60
50
40
30
20
10
0
n=64
60 desire antibiotics
93.75%
n=23
RADT=20
RADT +(12)
23 received an antibiotic
n=80
Flu + = 64
Tamiflu = 47
Antibiotics to 16
n=38
Antibiotics to 26
n=52
Antibiotics to 48
cough
sore throat
FLU
ear ache
sinus
Chief complaints

Illness demographics

Complaint	Length of illness	Fever	Testing	Treatment
Cough (n=64)	3d	98.7	CXR x 4	Antibiotics to 60
Sore throat (n=23)	1d	99.7	RADT x 20 12 + strep	Antibiotics to 20
Flu (n=80)	3d	101.4	64 + flu	Tamiflu to 47 Antibiotics to 16
Earache (n=38)	2d	98.2	0	Antibiotics to 34
Sinus (n=58)	3d	99.0	0	Antibiotics to 48