Evidence-Based Pilot for Improved Antibiotic Prescribing

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Abstract

The nature and burden of inappropriate antibiotic prescribing for self-limiting respiratory tract infections (RTIs) in primary care settings, continues to pose great threats to public health. This high prevalence leads to an increase of antimicrobial resistant infections, which calls for more Evidence-Based Practice (EBP) educational strategies. The practice's problem was identified as high rates of antibiotic prescribing for acute RTIs, without specific indications for antibiotic treatment. This project was implemented with multi-faceted approaches by identifying strategies to improve provider-patient communication; increasing providers' knowledge and awareness of current treatment guidelines, and disseminating educational information to patients about the importance of appropriate antibiotic treatment. These educational strategies are the core principles in addressing quality care concerns within this practice, which aimed to reduce unnecessary antibiotic prescriptions in eight weeks. This study used a descriptive observational method where the pre- and post-interventional design was used to measure the effectiveness of EBP educational information through the delayed antibiotic prescribing strategy. The findings supported the prominence of delayed antibiotic strategy for self-limiting RTIs recommended by the EBP Clinical Guidelines No. 69, entitled "Respiratory Tract Infections – Antibiotic Prescribing" developed by the National Institute for Health and Care Excellence (NICE). These findings suggested that there was a change in knowledge and awareness in prescribing practices through the combined-educational interventions for providers and patients in delaying the antibiotic treatment. This change in knowledge and awareness of antibiotic indications demonstrated that education affects providers' awareness about their prescribing practices, as evident by antibiotic prescribing rates dropped immediately post-intervention stage.

Evidence-Based Pilot for Improved Antibiotic Prescribing

Overuse of antibiotics in primary care settings has been a long-term problem, which continues to pose significant public health threats. Sanchez et al. (2016) suggested that antibiotic resistance leads to an estimated two million infections in the United States (U.S.) which caused 23,000 deaths annually. Further statistical data from Sanchez et al. (2016) indicated that inappropriate antibiotics use in the outpatient care setting in the U.S. alone is 30%, and approximately 60% of the U.S. antibiotic expenditures are received in this care setting. Despite some significant statistical data about the magnitude of the unnecessary antibiotic use in primary care settings, the emerging prescription rates for antibiotics for respiratory viral pathogens continue to remain at a significantly high percentile for multiple reasons.

According to the Center for Disease Control & Prevention (CDC) (2012), patient education was thought to be one of the most significant contributing factors in facilitating a drop in inappropriate antibiotic use up to 18.5%. As a result, this quality improvement project aimed to develop an effective intervention in addressing a substantial proportion of inappropriate antimicrobial drug use, which was through the implementation of various educational measures to promote antibiotic stewardship interventions within this specific outpatient primary care setting. This method mentioned was one of the educational strategies that was implemented by adopting the Evidence-Based Practice (EBP) guidelines for delayed antibiotic prescribing for uncomplicated respiratory tract illnesses. Other measures included an effort to understand barriers that potentially have an impact on practitioners' decisions to prescribe, their clinical support system, as well as disseminated evidence-based educational materials to primary care adult patients during their visits for self-limiting RTIs. The project aimed to reduce the

unnecessary or inappropriate antibiotic prescribing through a combined-educational method for the providers and patients in primary care setting.

Significance of the Practice Problem

It is important to first recognize and discuss the significance of the antimicrobial resistance rates from a macrosystem level prior to discussing the effects of the antimicrobial resistance on the microsystem level. In 2013, it was documented that 269 million antibiotic prescriptions were dispensed from outpatient pharmacies, which is a daunting number (Sanchez, 2016). Not only is this a substantial impact in terms of costs alone, it was indicated in the report of the Division of Healthcare Quality Promotion, Center for Disease Control and Prevention (CDC) that Clostridium Difficile (C. diff) was documented at an estimated 453,000 cases in the U.S. in 2011 (Sanchez et al., 2016). The Agency for Healthcare Research and Quality (AHRQ) has documented a significant number of acute respiratory tract infections (ARTIs) seen in an outpatient care setting, in which it has accounted for approximately 70% of primary diagnoses in adults, who have a chief complaint of cough (AHRQ, 2014). These ARTIs include some viral syndromes, such as acute bronchitis, otitis media, rhinitis, sinusitis, and pharyngitis. Many evidence-based practice guidelines have been developed that discouraged practitioners not to indicate antibiotic treatment for certain circumstances. For example, no antibiotic is recommended for self-limiting viral cases, unless there is a clear indication for bacterial infections, or only for some extraordinary circumstances defined as per standardized guidelines.

The practice's problem was identified as high rates of antibiotic prescribing for acute respiratory tract infections, without specific indications for the antibiotic treatment. This practice provides healthcare services for employees and their dependents. The population includes children, as young as two years old, as well as adults. One of the greatest benefits that brings

people here to utilize these medical services is a low-priced $5.00 co-pay. This lowered co-pay fee covers sick or wellness visits, some laboratory studies, minor invasive procedures, and other onsite point-of-care (POC) tests. It also covers routine generic medication refills, including common antibiotics that are being dispensed onsite at no additional costs to patients. Since the practice offers both primary care and urgent care services, a large portion of patients are seen for acute conditions instead of preventative care. They utilize the practice quite frequently for ARTI visits, where the antibiotics can be distributed onsite at no additional cost.

The providers had a good understanding of ARTIs management and were well-aware of the delayed prescribing strategy, however, it was highlighted for multifactorial etiologies in terms of influential factors as to how this delayed antibiotic strategy was not implemented successfully. It was documented in several studies that one of the biggest reasons that this delayed prescribing strategy was not fully implemented as an alternative approach, was thought to be the pressure of time constraints within busy primary care practice sites, which does not allow sufficient time to fully educate patients on the ineffectiveness of antibiotic treatment on the course of viral respiratory illnesses. Some other reasons also included a sense of obligation to prescribe antibiotics to young children when they are confronted with aggressive parents. In the adult population, there is often a greater level of uncertainty about the severity of their presenting symptoms.

In order to maintain a good patient-provider relationship, and more importantly a quality change in prescribing practices, a combined evidence-based education for providers and patients about antimicrobial resistance was developed.

Financial Implications

Whether the financial implications are inflicted on this practice or on the healthcare system at a general level, the impact related to the lost productivity cannot be underestimated. The impact of lost productivity is referring to the antibiotic-resistant infections that adds considerable costs to the U.S. healthcare system. Ventola (2015) indicated that when "first-line and then second-line antibiotic treatment options are limited or unavailable, health care professionals may be forced to use antibiotics that are more toxic to the patient and frequently more expensive" ("The Clinical and Economic Burden of Antibiotic Resistance", para 2"). Even in cases of effective antibiotic treatments, the medical expenditures for patients with resistant infections are still significant. These expenditures include longer hospital stays, lengthier recuperations, which may lead to potential long-term disability because of the antimicrobial resistant infections. Therefore, the indirect long-term effects of these infections are linked to other implications of patients' work productivity, such as missing more workdays, subsequently leaving them with substantial financial hardships. According to a report published by the CDC (2013), the economic burden of resistant antimicrobial cases was estimated at $20 billion annually and an additional cost of $35 billion lost in productivity. Froth (2013) performed a similar study to examine the impacts of the antimicrobial overuse in primary care settings. It was interesting to look at Froth's report about the productivity loss in this student's residential area, Kentucky. Although the exact statistics of productivity lost were not indicated in Froth's report, it was reported that Kentucky ranks as one of the highest regions in the U.S. for use of antibiotics. Given this fact about the high rates of antibiotic treatment in Kentucky at a general level, coupled with other significant economic impacts at the healthcare macro-system level, it

will take a considerable approach from a micro-system level to address this dilemma of the antimicrobial misuse.

One of the considerations taken for the high numbers of antibiotic prescribed in this practice is the limited amount of cultural sensitivity methods with immediate results. For example, when a patient comes in with a complaint of acute pharyngitis for two days and has been around some family member with active streptococcus pharyngitis, the patient convinces herself that she is likely to have a bacterial pharyngitis and would need to see a provider for antibiotic treatment. The provider's assessment reveals some mild exudates on bilateral tonsils; however, the other remaining classic symptoms are negative (classic symptoms for strep pharyngitis are fever, cervical lymphadenopathy, and absence of cough). These clinical findings may be interpreted as viral pharyngitis from the provider's perspective and the pharyngeal specimen will be sent out for culture. At the same time, the patient indicates that she had similar symptoms in the past and she was treated with an antibiotic, therefore, she requests to receive antibiotic treatment, similar to previous encountered visits. This specific example and immediate result of cultured specimen, accompanied with sensitivity limitations, sometimes puts providers in a tough position. It is often difficult for providers to not prophylactically treat patients who present with moderate to severe respiratory symptoms with antibiotics. Similarly, patients may experience difficulty revisiting the clinic because it requires extra time away from work and have many obligations. A very similar barrier leading to inappropriate antibiotic prescribing was noted in Froth's (2013) study, where some providers feel "the pressure to satisfy patients and meet their demands. Primary care providers also stated that the pressure was due to tight schedules and seeing many patients in a day. It is also thought that prescribing an antibiotic

inappropriately for ARTI is faster than educating patients about why an antibiotic won't help. It is a way to stay on schedule for the day" (Froth, 2013, "Barriers", para 1").

Given the above facts, the stakeholders of the organization have recognized this problem and agreed to allow this student to initiate a quality improvement project to optimize antibiotic prescribing and patient safety. By identifying this opportunity to address the practice's issue in improving antibiotic prescribing, some core elements of outpatient antibiotic stewardship were borrowed from Sanchez et al. (2016), which served as a framework for promoting the antibiotic stewardship interventions. The antibiotic stewardship program has been established by the CDC, which comprised of interventional measures to improve appropriate antibiotic prescribing by clinicians. This antibiotic stewardship program is defined as a cornerstone of efforts used to halt the overuse of antibiotics, and ultimately, slow down the spread of antimicrobial resistance. These identified core elements of antibiotic stewardship include: commitment, action for practice, tracking and reporting system, education and expertise.

The first core element of commitment pertained to our stakeholders, including providers (physicians, physician assistants, and nurse practitioners), who have demonstrated dedication and willingness to optimize antibiotic prescribing and patient safety. In this project, unnecessary or inappropriate antibiotics prescribed for ARTIs without specific indications were specifically addressed.

The second core element of action for practice pertained to educational initiatives, which were aimed directly at the providers to practice delayed prescribing antibiotics through the implementation of the evidence-based education and EBP Clinical Guidelines No. 69 (NICE, 2008) indicated for self-limiting RTIs, and other clinical decision support provided to providers through printed materials.

The third core element pertained to the tracking and reporting system, in which the tracking methods for the RTI cases and antibiotic rates were discussed in detail under the "Plan for Piloting the Study: Phase II" section of this paper. This tracking and reporting method referred to the call back system and electronic health records (EHRs) reviews.

The fourth core element pertained to education and expertise, in which various of educational materials from the CDC website were disseminated to patients. These included printed brochures, handouts, and one-on-one provider-patient education during each visit.

The above core elements served as important fundamental measures for establishing effective EBP interventions. These interventions helped to promote safe prescribing practices among providers, and dissemination of essential educational components to educate patients in primary care settings. As a result of these educational interventions, the change in prescribing patterns have contributed to better management of ARTIs and improved patient safety.

Ethical Implications

The ethical implications of antibiotic treatments lie in the welfare of current patients and their future health outcomes. Leibovici, Paul, and Ezra (2011) indicated two models that the authors believe to be applicable to providers in reaching the balance: cost-effectiveness analysis and bioethics. They further suggested that two ethical dilemmas exist when considering patients with moderate to severe infections, who are given less than maximum empirical antibiotic treatment to reduce bacterial resistance. Among these ethical dilemmas, protecting the patients' rights to decrease future resistance was underscored as the sole duty of providers.

PICOT Question

A formulated PICOT question for this project is: For the providers in a primary care setting, does the implementation of the Evidence-Based Practice (EBP) Clinical Guidelines and evidence-based education, reduce the numbers of unnecessary antibiotic prescribed for self-limiting respiratory tract infections (RTIs) over eight weeks?

The primary focused-population identified in this PICOT question are the providers. There is clear evidence of the need to maintain the efficacy of antibiotics, due to the potential threats of antimicrobial drug resistance that public health is facing. Therefore, following a review of the evidence among these studies, implementation of the EBP guidelines to delay antibiotic prescribing has been chosen as one of the important objectives of this study, which aimed at the providers' knowledge and awareness about their prescribing practices. The other secondary population, who were not manipulated in the study, were the adult primary care patients, and their dependents, which included immediate family members, such as spouses or children as young as two years of age, who presented with ARTIs.

Interventions for the practitioners involved a delivery of various educational components. One of these included the implementation of the National Institute of Health and Clinical Care Excellence (NICE) Clinical Guidelines, No. 69, entitled "Respiratory Tract Illness – Antibiotic Prescribing" (2008). The criteria for appropriate antibiotic treatment that was covered under these Clinical Guidelines were strongly recommended within the contexts of appropriate prescribing practice, versus the current standard of practice without relying on evidence-based studies. These specific guidelines were shared with the providers as a clinical resource when encountering ARTI cases, which aimed at the delayed antibiotic prescribing strategy. In addition to these guideline recommendations, an educational binder was put together with evidence-based

information that supported the mission of this project, as well as evidence proven to be effective for delaying antibiotics prescribing in managing uncomplicated or nonspecific RTI cases. Educational interventions indicated for the patients included the dissemination of printed educational materials from the CDC, posters, handouts, provider-patient communication, and call-system on day one and day five post visit to follow up on patients' symptoms progression.

The primary outcome identified in the PICOT question was the immediate reduction of the unnecessary and/or inappropriate antibiotics indicated for uncomplicated ARTIs, which was a result of evidence-based education piloted during this project. Other outcomes that may not be directly mentioned in the PICOT question included: increased saving costs for the institution, increased practitioners' knowledge and awareness about the magnitude of antimicrobial resistance, and an increase in patients' knowledge about smart antibiotic use, and a decrease in patients' demand for antibiotic on providers. The potential long-term benefit of this project will be many lives saved, as well as reduced financial burdens to the healthcare system.

Theoretical Framework

As we mature throughout our lifetime, our world view also grows with different reflections through personal and work experiences. The nursing profession has been found to evolve around different theories as a fundamental foundation in nursing practice, and different levels of theory provide different applications toward the practice one works at. Because of the theoretical foundation that guides us in practice, nursing philosophy is another division that walks hand in hand with nursing practice, which serves as the backbone for individual nursing care. This student has found Swanson's caring theory model to be relevant to nursing practice. This theory is an example of the middle range theory that has been designed to support practices that aim to promote patient satisfaction, and transform cultural norms. This caring approach that

is translated into practice within this organization from Swanson's Caring Theory is found in the values that put patient satisfaction first.

This caring approach integrates caring processes and expectations to promote the patient satisfaction is also found to be congruent with the organization's mission. The Carolina Care Model, derived from Swanson's theory, was developed at the University of North Carolina Hospital and has demonstrated the desired outcomes of the caring theory (Tonges & Ray, 2011). The Swanson theory embraces five interrelated caring concepts, which are grounded in a culture of: "maintaining belief, combining nursing compassion (knowing and being with), competence (doing for and enabling), and leading to the intended outcomes of patient healing and well-being" (Tonges & Ray, 2011, p. 375). Descriptions of caring behaviors of patients served as the fundamental foundation for the development of the Carolina Care Model. It was recognized for other areas that were highly correlated to improving patient satisfaction, including concern for privacy, meeting emotional needs, attention to special and personal needs, such as pain control and responding to call lights, all showed positive trends. This implementation of Swanson's model has shown a substantial improvement in patient satisfaction. Among several contexts within her model of application in nursing practices, the authors have mentioned the extra time spent with patients combine elements of caring processes of "being with" and "doing for". The idea is that the patient's needs are anticipated and met on a timely basis, which will lead to more patient satisfaction (Tonges & Ray, 2011).

According to Alligood (2014), Swanson mentioned that the universal component of good nursing must be "caring for the client's biopsychosocial and spiritual well-being," (p. 694). It was further suggested that:

> Caring is grounded in maintenance of a basic belief in human beings, supported by knowing the client's reality, conveyed by being emotionally and physically present, and enacted by doing for and enabling the client. The caring processes overlap and may not exist in separation. Each is an integral component of the overarching structure of caring (Alligood, 2014, p. 694).

There has been an urgent call on the overuse of inappropriate antibiotic prescribing in primary care settings. This problem has provoked this student to further explore multiple contributing factors, including a clinical support system that relates to the practitioners' quality of prescribing practices. In order to reduce the numbers of inappropriate antibiotics, a collaborative approach was needed to look at various educational strategies, such as the dissemination of teaching methods within the context of the antibiotic stewardship measures. Related to the needs of addressing overuse of antibiotics in primary care settings, this student found the caring theory relevant for providing this project with the theoretical framework to combine the '"knowing and being with" aspect' with the '"doing for and enabling" aspect'. This theoretical framework has enabled this student to further understand and reflect the clinical perspective from a deeper, caring viewpoint. The caring theory helped to integrate necessary interventions, which led to desirable outcomes in reducing inappropriate antibiotic use for uncomplicated respiratory tract illness.

Synthesis of the Literature

The literature review included articles from nursing, pharmacology, and medical journals that discussed EBP clinical strategies to reduce inappropriate antibiotic use in common ARTIs in ambulatory care settings. Other studies have been gathered from EBSCOhost, databases of CINAHL, the CDC website, and Health Source: Nursing/Academic Edition. In addition to the

searches above, Google Scholar was used extensively when searching for delayed prescriptions for ARTIs, viral respiratory infections, or overuse of antibiotic for self-limiting respiratory tract symptoms. There were sufficient numbers of studies found that supported appropriate deprescribing practices (see Appendix F).

Several merged themes were found among this extensive review of the literature in terms of recommendations for the combined educational components for providers and patients to reduce unnecessary antibiotic rates for ARTIs, without specific criteria met for antibiotics treatment. These studies have proposed the use of a decision-support system through educational interventions to reach such desired outcomes: Butler et al. (2012); Mainous, Lambourne, & Nietert (2013); Spurling et al. (2013); Hayes et al. (2011); Francis et al. (2012); Peters et al. (2011); Gonazeles et al. (2013), Montes, (2012), Muhia (2016).

Through all literature studies above, much of the evidence has supported substantial benefits for delaying antibiotics prescribing for patients with ARTIs. Many of these strategies used to promote the antibiotic stewardship interventions, include the integration of a clinical support system into an electronic health record (EHR) in primary care (Mainous, et al., 2013; Francis et al., 2013). Other benefits for this strategy included increased patient satisfaction and empowerment. Some of the specific studies support combined provider-patient education about appropriate antibiotics use, which lessens the patient's demands for unnecessary antibiotics (Little et al., 2012; Francis et al., 2013; Spurling et al., 2013). Evidence shown to strongly support delayed antibiotics prescribing in uncomplicated respiratory tract illness mostly derived from the level I studies (Butler et al., 2012; Francis et al., 2012; Gonazeles et al., 2013; Little et al., 2013).

When considering the decreased effects of the broad-spectrum antibiotics, a decrease in inappropriate antibiotic prescriptions was seen at a rate of 16.6% in those practices that involved educational interventions. Many of these studies have reflected on the practices' antibiotic dispensing and resistance data, online educational elements, and practicing consulting skills in routine care. A statistical number for respiratory tract infections, specifically for acute bronchitis did decrease over decades, but the prevalence of prescribing for antibiotics remains above 50% with an increased in broad-spectrum antimicrobials. A similar effect was found on broad-spectrum antibiotic prescribing in pediatric patients. Antibiotic use was found at a declined rate of 19.7% among intervention practices, compared to an increase of 0.9% in control practices. This shows a substantial impact on changing the broad-spectrum antibiotics prescribing in both populations of adult and pediatric (Mainous et al., 2013; & Butler et al., 2012; Vinnard, et al., 2013). Adding on to these significant findings related to the use of broad-spectrum antibiotics in primary care settings, a study by Murphy (2012) also showed that approximately 76% of primary care practitioners prescribed inappropriately, despite the existing evidence-based guidelines. In summary, given this magnitude of the inappropriate antibiotics prescribing in ambulatory care settings above, the educational impacts on both the providers and the patients cannot be underestimated. After education, the providers made extra efforts to explain with patients the natural course of their uncomplicated respiratory tract illness and educated them about the negative effects of taking unnecessary antibiotics. The value of provider-patient education during this project mitigated the potential dissatisfaction from patients who did not receive the antibiotics as expected, as well as other misconceptions about the benefit of antibiotics. There are opportunities for standardizing the interventions to reduce the overuse of antibiotics consumption for self-limiting respiratory tract infections, which were found to be feasible

strategies by General Practitioners (GPs). These recommended interventions were found specifically in the NICE (2008) Clinical Guidelines, No. 69. Additionally, studies by Francis et al. (2012) and Hayes et al. (2011) also have shown to support these delayed antibiotic guidelines, specifically in cases of acute otitis and sinusitis.

Synthesizing these facts from the above studies about the widespread evidence of overuse of antibiotics, significant emphasis has been placed on public health by the threat of antibacterial resistance. These studies reviewed have strongly suggested that we find venues to lower this rate of antibiotic overuse in outpatient care settings, and that combined education for providers and patients should be seriously considered as a viable method to further facilitate such desired outcomes (Montes, 2012; Muhia, 2016). Lack of evidence-based research, unproven clinical experience, and over-estimation of patient demands were some of the barriers seen as contributing factors to the overuse of antibiotics (Montes, 2012). Wynn (2016) noted that out of 184,032 outpatient visits between 2010-2011 in the U.S., it was found that 12.6% resulted in taking the antibiotics. Additionally, for every 1,000 people in the population across all medical conditions and ages, an estimate of 506 antibiotic prescriptions were given annually and 353 out of these were deemed appropriate. These statistical numbers also have been released in various reports found in the CDC this year, 2016. A large body of evidence was apparent for the need to educate both providers and patients, therefore, much emphasis has been put on “delayed antibiotic prescribing”, which highlighted the clinical NICE’s clinical guideline (2008) to practice appropriate antibiotics for managing the ARTIs.

A substantial rate of overused antibiotics, such as shown from the Health Benchmarks for Clinical Quality Indicator (2005), suggested that over 90% of upper respiratory tract infections are caused by viruses, in which the antibiotics were found to be ineffective. However, 70% of

patients still received antibiotic treatment. These significant statistical rates shown strongly suggested the need to educate healthcare providers to practice prescribing according to the EBP guidelines. Another research study also noted the negative impacts on diseases after the inappropriate use of antibiotics worldwide. It is estimated that 20-25% of this overuse antibiotics typically takes place in outpatient care settings (HB, 2005). Although this data was retrieved from 2005, the study showed there was an urgent need to act on the evidence of this epidemic problem of overusing antibiotics. Additionally, the study illustrated that a need exists to educate the public and health sectors to modify and further improve on the prescribing practices of practitioners, as well as the needs to disseminate essential educational components to the public for this prudent use of antimicrobial drugs.

These clinical recommendations above have been addressed by many regulatory agencies, including the World Health Organization (WHO). The evidence from the summarized studies with relevant clinical findings for the benefits of delayed antibiotic prescribing, supported the consensus recommendations made by the NICE Clinical Guideline, No. 69. The indications were that antibiotics are of limited efficacy in treating patients with uncomplicated respiratory infections, provided that the clinical guidelines were formulated as mentioned (see Appendix A & B).

Practice Recommendation

Future practice recommendations may be not to pre-issue the prescription in case of worsening symptoms since the patients will be in control of filling the prescription. As this study outcome has shown positive results, it is recommended that the practice continue to reinforce the educational components to educate patients by distributing the informative handouts upon discharge for self-limiting RTIs. Further recommended clinical algorithm or

pathway, in addition to activities logic model illustration, can be found in Appendix E & K. By providing consistent educational reinforcement overtime, it will also help to lessen patient demand or pressure for unnecessary antibiotic treatment.

It is also recommended that the stakeholders reinforce this educational component for providers by sending email communications or holding conferences/trainings regarding various antimicrobial stewardship promotion programs. Informing the director of the Get Smart antibiotic campaigns would help emphasize the seriousness of over-prescribing of antibiotics, as this student's state of residence, Kentucky, ranks among the highest states for antibiotics use, according to the CDC's list of states.

The combined-educational method for patients and providers mentioned above will help increase patient safety without compromising patients' future health outcomes. Finally, this will position the providers on the frontlines to reduce unnecessary antibiotic expenditures for the practice, which is also a benefit to America's financially strained healthcare system.

Project Setting

The project took place in a primary care and semi-urgent care setting. The medical services are provided to primary care adults and children, which entail: comprehensive wellness checkups, acute episodic or sick visits, laboratory studies, point-of-care diagnostic tests with immediate results, minor invasive procedures, and onsite distribution of generic and routine medications, including antibiotics. These services mentioned are included in the $5.00 visit fee. An average of 40 to 50 patients are seen on weekdays and 15 – 20 patients on weekends.

Organization's Vision and Mission

This practice organization's vision statement is that "Every patient is treated Concentra's Way: Quality clinical care and positive customer experience from welcoming, respectful, and

skillful colleagues". Their mission statement is to "Improve the health of America's workforce, one patient at a time".

Organization Culture

Concentra is a healthcare company found in 1979 by a group of physicians, whose commitment is clinical expertise. They value an evidence-based, outcomes-focused approach that cultivates a standard and productive workforce. Patient satisfaction is a central focus for this organization to sustain the viability of the company, therefore, patients' ideas of social norms play a big role in the patient and provider relationship. Concentra strives to improve initiatives that bring excellent levels of patient care, patient experience, and a corporate culture that puts people first. Further information about this healthcare organization's cultural values can be found on the website noted in the reference section ("The Concentra Difference", n.d.).

Organizational Need

This healthcare organization strives to provide a speedy recovery to bring patients back to their baseline, which is one of their main goals. Regarding the importance of appropriate antibiotic prescribing for patients with ARTIs, this consideration has been identified as one of the potential areas of need for clinical quality improvements. Most providers in this practice believe that a patient's perception of financial value of the visit is very important. On the other hand, the patients' general perception may be the misconception that receiving antibiotics may get them back to baseline health quicker, because when they experienced similar acute respiratory symptoms in the past, certain antibiotics were given. Therefore, social norms are an important consideration in this organization's culture to validate the patient's health needs, as well as validate the decision to seek care. This unhealthy social norm was identified as one of the practice issues, in addition to the standard of care without relying on the practice that is

evidence-based in the management of self-limiting RTIs, which necessitated the initiative for this quality improvement study.

Organization Stakeholders

The identified primary stakeholders were the providers, whose decisions were impacted in terms of appropriate antibiotics prescribing. Secondary stakeholders were the administrative staff who assisted this student to facilitate approval processes, in terms of clinical affiliation agreement contract between the school, and coordinated staff meetings to ensure the success of this project.

Organizational Support

There was no financial support needed from the institution to initiate the project, other necessary related costs involved were minimal and assumed by this student (such as posters, print materials, etc.). The outcomes of this project were proven to save costs for the practice and saves lives to decrease antimicrobial resistance. The success of this project could not have been happened without the interprofessional collaboration among these clinicians, which further reinforced the importance of joint responsibility for the values of quality practice that put patients at the centered-care.

Sustainability

This project's sustainability will continue to rely on an-ongoing efforts from the providers and understanding from the patients to reduce the rates of inappropriate antibiotics usage. This student believes that the project will continue to sustain its viability for positive, future health outcomes for patients, and evidence-based prescribing practices of providers, as the awareness of appropriate antibiotic treatment was heightened during these past eight weeks during the implementation phase. In order to sustain this positive change in prescribing practice,

there will need to be persistent reinforcement of evidence-based information, clinical guidelines for providers, and the dissemination of informative handouts, coupled with patient-provider education during the encounter of RTI visits. In addition to the above mentioned, the providers may also need continuous reinforcement and guidance on how to provide adequate education to effectively address patients' concerns for not receiving the antibiotic treatment, and still maintain a positive patient-provider relationship.

Project Vision, Mission, and Objectives

The vision of this scholarly project was to reduce the rates of unnecessary antibiotics for ARTIs without specific indications for antibiotics in primary care setting. The mission of this project was to explore effective educational strategies of delaying antibiotic prescribing for patients with uncomplicated ARTIs as a safety net for avoiding antibiotic resistance. This mission was accomplished by implementing a combined educational intervention for practitioners and patients. The intervention was through the implementation of an essential educational binder with evidence-based information and the best EBP guidelines for practitioners to promote higher clinical values and standards of care, as well as dissemination of educational materials to adult patients in a primary care setting.

It was suggested by the CDC (2012) report that patient education was thought to be one of the most significant contributing factors in facilitating a drop rate in inappropriate antibiotic use, up to 18.5%. From this CDC finding, which was thought to be a result impact from the patient education, it is this student's mission to reduce the practice's antibiotic prescribing rates by 10% from baseline. As this organization values EBP for their standard of clinical practice, this project's educational initiatives have brought excellent levels of patient care and patient experience within the organization. Additionally, it was in the practice's interest to invest in the

best optimized health for their patients. At the same time, this project integrated the EBP Clinical Guidelines and an educational package to promote the standard of prescribing practices of practitioners. The vision and mission statements of the organization and this project were found to be congruent for practicing evidence-based care. This EBP component also was congruent with the Essentials of the American Association of College of Nursing's Essentials of Doctoral Education (2006). These Essentials include: Essential I, the scientific underpinnings for practice, Essential II, organization and systems leadership for quality improvement and systems thinking; Essential III, clinical scholarship and analytical methods for EBP; and Essential VI, inter-professional collaboration for improving patient and population health outcomes.

Risks and Unintended Consequences

The anticipated risks and unintended consequences for this project have been discussed throughout this paper, where one of the potential risks with this project was the chance that providers may have been reluctant to change their prescribing habits due to time constraints involved in educating patients about the natural course of viral or ARTIs. However, although more time was involved for looking up the clinical guidelines and adhered to their recommendations in terms of an evidence-based prescribing practice, these anticipated risks did not occur during the implementation stage. The other risks anticipated prior to initiating the project was the instant decrease in patient satisfaction scores due to patients not receiving the antibiotic treatment, and this anticipation did occur in the first four weeks implementation phase, however, it was quickly improved the following four weeks. This delayed antibiotic prescribing strategy initially has caused some patients to be more emotionally upset as they had to deal with the acute symptoms, despite misconceptions that antibiotics may cure their illness at the time.

Some of the patients had to miss more work days due to not feeling well, however, we did not lose any patients where we thought it was unpleasant enough for them to change the practice.

As stated, reduced prescriptions of antibiotics could lead to either increased clinic visits, longer duration of symptoms the patients will endure, or even patients leaving the practice, etc., all depend on how patients perceived their illness and understanding about the appropriateness of antibiotic indication. Satisfaction rates were monitored during this project implementation period. We have taken a collaborative approach with efforts to provide patients with understanding for delayed antibiotic strategies by educating them about the ineffectiveness of treating ARTIs with antibiotics, coupled with treatments for the acute symptoms relief to ease their suffering during the waiting period. This approach, in terms of the collaborative efforts, have helped to reverse the initial low satisfaction scores from patients, while offering alternative treatments for ARTI discomfort.

Project Objectives

Antimicrobial prescribing has been found to be ineffective in most uncomplicated respiratory tract infections. However, widespread antibiotic utilization in the outpatient care settings has remained a challenge. Therefore, the primary objective of this quality improvement project was to formulate essential educational strategies related to antimicrobial stewardship practice, and implemented these educational interventions to address appropriate antibiotic prescribing for practitioners, including physicians, and nurse practitioners. The objective was through the implementation of an educational package and recommended EBP clinical guidelines, No. 69, entitled “Respiratory Tract Infections – Antibiotic Prescribing”, developed by NICE (2008). The primary objective outcome was to increase providers’ self-efficacy and

awareness about the magnitude of the antimicrobial resistant infections, which was measured by a reduction in numbers of antibiotic prescribed at the end of this project timeline.

The secondary objectives included dissemination of informational materials to patients with acute respiratory infections, which facilitated the achievement of the primary objective in reducing unnecessary antibiotic use for uncomplicated acute respiratory infections. Another secondary objective included the cost reduction associated with the antibiotics dispensed on site, in which the practice has absorbed in the $5.00 copay at each visit.

In an ongoing development for this quality improvement project with some strategic plans to address the current practice issue, it was important to provide a method for evaluating these strengths, weaknesses, opportunities, and threats (SWOT), in which this analysis chart has been developed prior to the project implementation phase (see Appendix I). A SWOT analysis is a tool that can provide the stakeholders of the project concept analysis in terms of what is effective versus ineffective in clinical systems and procedures, in preparing for any future impact on the current practice (Morrison, 2011). A timeline schedule has also been developed to assist the student with time management to breakdown step-by-step tasks, so goals can be achieved in a timely manner (see Appendix C).

Project Description

This project aimed to deliver the educational initiatives for providers and patients in managing uncomplicated ARTIs (see Appendix O). Specifically, it was the focus on facilitating and promoting practical implementation of EBP guidelines and the adoption of essential principles of antimicrobial stewardship principles that were recommended by the CDC's Get Smart: Know When Antibiotics Work program. Some of the objectives and interventions for the practitioners and patients were developed as follows:

Practitioners' Objectives and Interventions

The identified objectives for the practitioners included: adherence to the appropriate antibiotic prescribing clinical guideline, No. 69, which was provided to practitioners in this project and utilization of the evidence-based educational binders. This objective aimed to increase self-efficacy and awareness about appropriate management of ARTIs and antibiotics prescribing practices.

The interventions indicated for the practitioners included the execution of the actual EBP clinical guidelines by distributing the laminated NICE clinical pathway and NICE guidelines. This student has printed the principles of antibiotics from the CDC website and verbally shared in person with the providers prior to the project implementation phase. Each practitioner was given a "triage form or symptoms checklist", which served as a quick reference for proper viral versus bacterial diagnosis. This checklist identified the most common symptoms related to uncomplicated respiratory illness symptoms (see Appendix G). Each practitioner was provided with the evidence-based educational binder that was used for clinical resources, which included important and up-to-date statistical rates of antibiotics in primary care setting, national action plan for combatting antibiotic-resistant bacteria, evidence-based literature evidence that supported the delayed antibiotic prescribing for ARTI cases, and other CDC antibiotic stewardship interventions indicated for practitioners (see Appendix J).

Patients' Objectives and Interventions

The patient's objectives were to: increase awareness of unnecessary antibiotics for the treatment of uncomplicated ARTIs and decrease antibiotic demand. When the providers spent time with the patients to educate them on the nature of viral respiratory illnesses, it helped them understand the difference between viral and bacterial infections and the potential side effects of

antibiotics overuse. Informative handouts were also provided to the patients. These interventions have led to the decreased numbers of inappropriate antibiotic treatment and created a cycle of decreased antibiotics consumption. The interventions indicated in this project was the display of educational posters in the main waiting room and in each exam room, brochures, and other printed materials to be distributed upon discharge visit. A copy of the "Get Smart Antibiotic" checklists was provided at discharge and was referred to as the "clinical summary" (see Appendix D). This summary provided the patient with instructions for monitoring symptom progression and informed them of what to expect in the coming days.

Provider-Patient Communication Objectives and Interventions

The provider-patient communication identified objective included the provider-patient relationship improvement via various communication methods. The interventions indicated for improving their relationship through communication modes included: more time allowed for practitioners to educate patients and answer questions about delayed antibiotic prescribing, and a call back system was implemented for monitoring symptom progression. On day 5 post visit, the student called each patient to follow up on their care. A logic model was developed to create a visual of the project's objectives and interventions, which can be found in Appendix K.

Resources and Budget

The student did not anticipate any financial support from the institution since the cost was minimal for reproducing educational materials, laminated guidelines, and posters. The reproduced copies for the educational materials from the CDC website were made from workplace at no cost. Each poster (28 x 40") was developed was $72, which totaled $432.00. An additional poster (size 28x40") was developed for the post-implementation phase

presentation, which was $72.00. The carbon-copies for the triage forms (one went to the patient upon discharge and one copy for the practitioner' records) costed $240.

The fee anticipated for hiring a statistician was $80 an hour; however, this time was given gratis. As a token of appreciation, the student purchased gift certificates as a form of thanks. Therefore, the total budget spent was approximately $900 (see Table 1).

Evidence-Based Practice Model of Change

One of the primary objectives of this project was to decrease the incidence of inappropriate antibiotic use for respiratory tract infections that do not meet criteria for antibiotic treatment. Therefore, one of the essential interventions began at educating and reinforcing the practitioners to adhere to the recommended guidelines. The theory of change derived from Kurt Lewin's change model (1958), was found to be valid in this project. There were three stages needed to occur in order to reach the desired outcomes. Kurt Lewin (1958) proposed three stages of change to examine behavior, which is driving forces that facilitate change, and restraining forces as conflicts that hinder change. The goal described in this theory was to find the dynamic balance among these forces. Therefore, this student found his theory relevant to this project since it aimed to change the prescribing practice or behavior of practitioners, as well the misperceptions of patients perceiving antibiotic treatment for ARTIs.

The first stage in Lewin's theory is to unfreeze. For example, in this case, it pertained to a process of unfreezing, or letting go of the old pattern of practitioners' prescribing inappropriate antibiotics for nonspecific ARTIs, while increasing their driving forces to exit the current situation. It was through the educational reinforcement, such as presenting evidence-based literature that supports the change actions, allowed them to further recognize the magnitude of

the dangers of inappropriate antibiotic prescribing for most respiratory tract infections without the indicated criteria, and the need to educate their patients (Kaminiski, 2011).

The second stage referred to change. In order for practitioners to find the dynamic balance to seek new change, several actions must be taken to achieve this goal: (1) encourage a new perspective for behavioral change that is more effective, such as improve antibiotic prescribing by adhering to recommended evidence-based guidelines, (2) collaboration efforts needed for a new balance in change behavior, and (3) find someone to lead or initiate the change process (such as this student, serving as a leader or a project agent) (Kaminiski, 2011). In this stage, all the stakeholders, nurses, and patients came together for actual educational sessions to further reinforce the change process.

The third stage was to refreeze to sustain the change (Kaminiski, 2011). This was when the balance between the first (unfreeze) and second (change) stage must be maintained to ensure sustainability of the new change.

In summary of Lewin's change theory, this student initially started to convince the practitioners of the practice's current issues and the need to change their prescribing practices, and assessed their attitudes toward the change to see if they were ready or not. Next, evidence that strongly supported the need for change was presented through substantial educational materials. Finally, the student presented them with expected or desired outcomes from the change, which aimed at a reduction in numbers of unnecessary antibiotics, while increasing cost savings for the practice (see Appendix L).

Project Evaluation Results

Sample of Population

The inclusion criteria for the participants included those primary care providers who have prescriptive authorities. These providers included three internal medicine physicians and three nurse practitioners. Their working status included full-time, part-time, and prn in a primary care setting. Eligibility for the participation required the providers to be directly involved in the evaluation of patients with acute respiratory tract infections, the ability to teach patients, prescribe medications, and collaborate with other providers.

Exclusion criteria for the participants included specialists and support staff who were not directly involved in treating the patients, other than distributing patient education materials upon discharge.

Protection of Human Rights and Privacy

Since the project entailed educational initiatives aimed to improve the quality of prescribing practices, the educational interventions were aiming directly at the providers, not the patients. The providers' participation was voluntary but strongly encouraged. All the information collected or reviewed from the electronic health records (EHRs) was kept confidential. In order to protect the patient identity, the student used the patients' medical record numbers as identifying information during the data analysis process. If a concern was identified, the chart was retrieved by the student for further information. The data collected from the EHRs is retained in the spreadsheet program and will be permanently deleted in ten weeks post-implementation phase. Regardless of whether one adopts the recommendations of the study or not, no one was ruled out because of bias or attitude toward the overuse of antibiotics.

Comparison

The outcome proposed for this EBP quality improvement study was compared to the standard of care without EBP in terms of appropriate antibiotic management for the uncomplicated ARTIs, nor having a designated clinical decision support for certain educational resources on site. This comparison as mentioned was to determine if there would be any significant decrease in the numbers of antibiotic for patients with ARTIs, over eight weeks.

Method of Study

A descriptive analysis has been identified as one of the most appropriate methods suggested for this study. The basic metric units and percentages were used to determine and compare the numbers of antibiotic prescribed for all respiratory viral illnesses, numbers of antibiotic prescribed for each category of viral respiratory tract illness, numbers of encountered ARTIs (including viral and bacterial respiratory tract infections) at two phases of the pre- and post-intervention (see Appendix H). Financial expenditures associated with the cost of dispensing antibiotics onsite was also compared during the above two phases. The data was collected daily and analyzed using excel spreadsheets.

Summative Evaluation Criteria and Data Collection

Instruments that were used to implement this study included the following: EBP clinical guidelines for delayed-antibiotic prescribing strategy, entitled: “Respiratory Tract Infections – Antibiotic Prescribing”, evidence-based educational binders, which entailed those necessary action plans for antibiotic stewardship, up-to-date statistical rates related to the inappropriate antibiotic dispensations in primary care settings, and other Get-Smart-Antibiotic information provided by the professional organization of the CDC. These educational tools were used to facilitate the educational interventions of the project. The recommended EBP clinical guidelines

of the NICE, derived from the Guideline Development Group (GDG), developed a simple, practical guideline for appropriate antibiotic prescribing strategies for ARTIs ("Respiratory tract infections (Self-limiting) – reducing antibiotic prescribing", 2015). The guidance was based on the best clinical evidence for managing self-limiting respiratory tract infections (RTIs). The RTI cases mentioned in this guideline specifically pertained to acute otitis media, common cold, acute rhinosinusitis, acute cough, acute bronchitis, and acute pharyngitis. These guidelines recommended alternative prescription strategies for ARTIs, which included no antibiotic prescribing (for those RTI cases mentioned above), delayed antibiotic prescribing, and immediate antibiotic prescribing (See Appendix B).

The recommendation of the NICE clinical guidelines, No. 69 has been underpinned by numerous systemic literature searches, using the PICO model to reflect the inclusion criteria that were critically appraised by the Short Clinical Guidelines Technical Team (SCGT) (NICE, 2013). The scope that defined the areas of this guideline was prepared by the SCGT on the basis of several sources, such as the Department of Health, consultations with relevant experts, and a preliminary search of the literature (NICE, 2013). The focus of this guideline review was to identify existing clinical practice guidelines, key systematic reviews and other relevant publications (NICE, 2013). This "Respiratory Tract Infections – Antibiotic Prescribing" guideline also underwent several steps during its development stage to refine the scope into a series of key clinical questions and the recommendations were evidenced-based as much as possible. If evidence was not apparent during the review process, informal consensus of opinion within the GDG was used. Their review of the evidence explicitly contained critical evaluating criteria such as the internal validity, consistency, clinical impact, ease of implementation, overall synthesis of evidence, and cost effectiveness (NICE, 2013). The method of "Respiratory Tract

Infection – Antibiotic Prescribing" guideline validation includes both external and internal peer review. It was also validated by the NICE guideline and Quick Reference Guide, which were consulted with stakeholders and other comments considered from the GDG (NICE, 2013).

The NICE clinical guideline has been shown to be effective in primary care settings for delaying antibiotic treatment that specifically applies to patients with ARTIs. In order to validate its reliability and effectiveness for the best clinical outcomes, the practitioners are still ultimately responsible as individual clinicians to make decisions appropriately based on their clinical judgement and the circumstances of each individual patient. This rationale holds true for any other standardized or EBP guidelines established. The guideline was updated most recently in 2013 and it has also granted the National Guideline Clearinghouse (NGC) permission to include summaries of their clinical guidelines for dissemination and implementation purpose. This informational guideline can be distributed or replicated in its original content for non-profit educational purposes without permission of the Institute.

Other tools that were utilized for the project interventions included essential educational materials that were printed from the public domains of CDC website, posters, and the "Get Smart Antibiotic" checklists. This checklist is for the providers' use to have a summarized note for a proper diagnosis of viral or uncomplicated respiratory tract illness (see Appendix D). This form along with Microsoft Excel also served as a tracking method for recording the data over eight weeks. By utilizing these educational tools, primary and secondary outcomes were identified.

Primary and Secondary Outcomes

The primary outcome has been identified as a reduction in numbers of unnecessary antibiotics used for ARTIs without specific indications for antibiotic treatment. The secondary outcomes have been identified as: (1) Reduction in expenditures for dispensing unnecessary

antibiotics, (2) Increase in the providers' awareness and knowledge for delayed antibiotic prescribing in managing patients with uncomplicated ARTIs.

Data Collection and Analysis

The data collection for this study was analyzed using descriptive statistics to compare the significant impacts of antibiotic quantities and financial expenses associated with the antibiotic prescriptions at pre- and post-intervention. The data was analyzed in a statistical fashion that was shown graphically to measure and compare the number of different categories of viral ARTI cases and antibiotic dispensed at pre- and post-intervention. This statistical data was expressed in ordinary numbers and percentages (see Appendix G). At the end of each week, throughout the entire eight weeks of this implementation stage, the student calculated numbers of ARTIs and the number of antibiotics prescribed for these ARTI cases, reviewed charts and then tabulated these findings into the spreadsheet program to analyze the data.

As stated, the data analysis began with calculations of descriptive statistics by presenting the table of distributions, such as graphical figures (bar graphs to show comparison among categories of ARTI cases and prescribing rates). These statistical graphic displays were generalized from the data that was being imported into the Microsoft Excel 2016 program. In addition, the student indicated general discussions to explain the meaning of the analyzed data.

Prior to the implementation stage, the student generated eight weeks of clinical reports for the purpose of pre- and post-intervention data comparison, which entailed the following: (1) Total number of encountered patients with ARTIs over eight weeks, (2) Total number of antibiotics prescribed related to these ARTI cases. The ARTI cases were broken down into the following six categories: Acute otitis media, acute pharyngitis, common cold, acute rhinosinusitis, acute cough/bronchitis, and "other" general respiratory tract infections (see

Appendix M). As explained above, the descriptive statistics analysis method was used to calculate the differences at baseline values of antibiotic prescriptions and ARTI cases. The total expenses for dispensing antibiotics on site were analyzed at the pre- and post-intervention stages. This data was provided by the practice's Center Operations Director.

Plan for Piloting the Study

A letter was sent via email to inform all personnel, staff, and practitioners of the concept of the project and tentative workflow (see Appendix N).

Phase I. The student shared important statistical data that emphasized the problem of overuse of antibiotics and numbers of inappropriate antibiotic prescribed in their current practice, which was generated from the most recent eight weeks' charts. By utilizing this information, the student was able to address the need for a practice change. This discussion aimed to unfreeze the providers' perception about antibiotic prescription rates.

The recommended EBP of NICE Clinical Guidelines No. 69 was reviewed with the providers in a live meeting. A laminated copy of these guidelines was given to each practitioner for their own references (see Appendix D). The educational package, including those principles of antibiotic use printed from the CDC information website, "Adult Appropriate Antibiotic Use Summary", was also shared with providers during this educational meeting (see Appendix F).

Phase II. The implementation stage began at the time the practitioners confirmed a viral respiratory infection, which included common colds, bronchitis/chest cold, pharyngitis, middle ear fluid, rhino-sinusitis, and runny nose. Each provider used use the checklists form for quick references to diagnose viral syndromes accordingly. The provider educated/explained to patients the rationale for delaying the antibiotic prescribing for several days (the number of days varied with certain conditions). The provider gave patients the opportunity to answer any questions the

patient may have about ARTIs and the reason for not prescribing antibiotic during this visit. The "Get Smart Antibiotic" checklists will be kept in a folder by the provider's desk as a tracking method for follow-up with patient's symptoms progression on day five post visit. A copy of this checklists sheet was given to the patient, which also served as clinical discharge information. The patient was then to be discharged by the medical assistant. The provider let the medical assistant know to give the patient the educational handouts, including brochures and other printed educational materials (see Appendix J).

As the medical assistant gave the handouts, it was further reinforced to the patient about the potential risks for taking unnecessary antibiotics. At the same time, the patient was reminded that the medical assistant would call the patient 24 hours later (day one post visit) for follow-up. The provider would also call again on day five and if the antibiotic is needed, as per the delayed antibiotic guidelines, the provider may then prescribe accordingly.

Phase III. The student gathered data and prepared to analyze. Around eight weeks into the project time, steps similar to the pre-implementation stage took place for the purpose of data analysis. The data collection included a total of ARTI cases over eight weeks, numbers of antibiotic prescribed for those ARTI cases, reviewed various categories of upper respiratory infections, included how many cases of AOM, acute pharyngitis, common cold, acute rhinosinusitis, cough, and a total of other general respiratory tract illnesses. The sum of these ARTI cases and related antibiotics were calculated via the spreadsheet program and compared to the pre-education interventional stage to see if implemented changes occurred.

Results

Prior to piloting this EBP project, pre-implementation data was collected to measure prescribing rates to establish a baseline during the month of January – February. The same

measurements were taken from March 1st, 2017 to April 26, which was a total of eight weeks. The following outcomes were observed:

Pre- and Post-Implementation Clinical Results. The total acute RTI visits in the first eight weeks pre-implementation phase was 534, the total acute RTI occurrences was 613, and the total antibiotics dispensed for all of these RTI encountered visits was 258. For the following 8-weeks post-implementation phase, we had 525 acute RTI visits with a total of 596 acute RTI occurrences, and a total of 172 antibiotics prescribed out of these total RTI cases. Per RTI occurrence is explained as follows: One patient at a visit may have more than one acute RTI occurrences. For example: one patient may be diagnosed with *acute pharyngitis* and *cough* at the same time. In this instance, there are two RTI occurrences counted per visit. The total RTI cases above with the antibiotics prescribed are dissected into each sub-category as follows (see Figure 1).

AOM: According to the recommendations suggested by the National Institute of Health and Clinical Care Excellence (abbreviated as NICE), 60% of the AOM cases are better in 24 hours without antibiotics and antibiotics do not reduce pain in the first 24 hours either. The AOM clinical reviews determine the appropriateness of antibiotic treatment found during pre-implementation phase, which revealed some vague and inadequate documentation noted in the EHRs. However, we have seen significant improvement for the 8-weeks post-implementation as evident by a reduced prescribing rate from 10% down to 6%.

Common Cold: There were three prescriptions given for the total 18 common cold cases during the pre-implementation phase, despite no antibiotic treatment should be prescribed for this self-limiting condition. One of the explanations for this was that the clinical documentation in this specific instance, were found to be inadequate in terms of limited presenting symptoms

reported, coupled with unremarkable physical assessment noted in the EHRs, however, the antibiotic was still considered for the patient during the 8-weeks pre-implementation stage. During the actual implementation phase, we have seen a significant rise in numbers of this common cold due the seasonal changes, and quite a few confirmed diagnoses under this condition besides the common cold, which included viral RTI, viral bronchitis, and nonspecific acute RTIs. There was no prescription given during this implementation phase. This positive result has proven to be a tremendous effort for the evidential basis for no antibiotic disposal, under this specific condition of the RTI, which has met this project's objectives.

Acute Rhinosinusitis: The guidelines advised no antibiotics as 80% resolved in 14 days and that we should reassure patients that sinusitis often lasts on an average of two and a half weeks. The providers should consider a seven-day delayed antibiotic treatment or unless purulent nasal discharge with other more serious symptoms indicated on this guideline recommendation. However, many cases were found during the pre-implementation phase where there were only a couple of days of mild to moderate sinus symptoms and the patients were discharged with unnecessary antibiotics. However, it was found that the providers have made significant progress over the following eight weeks. This result suggested that they did incorporate their experience and knowledge to implement the delayed prescribing strategy. This was shown through the patient education and utilization of the evidence-based education by a credible source, such as the clinical guidelines provided.

Cough: Several of these RTI cases were found to be a single cough diagnosis upon each RTI encountered visit. Other related diagnoses of cough and other RTIs, such as acute bronchitis, were coded together during the same visit. Although these both are self-limiting RTIs and the guidelines do not recommend antibiotic treatment, antibiotics were sometimes provided.

Cough symptom resolution can take up to 3 weeks and it was recommended that the providers should delay prescribing for 7-14 days and only symptomatic relief should be prescribed. By comparing two pre- and post-implementation phases, it was found that the providers did apply the recommendations of the NICE clinical guidelines for symptomatic therapy for cough or bronchitis during the post phase. Instead, the providers offered patients other acute relief remedies, such as antitussive medications, corticosteroid inhalers in some cases, and other evidence-based educational discussions with patients to explain that cough symptoms can linger up to 21 days. If other serious or progressive symptoms occurred, they were to re-consult the providers for further evaluation.

Acute Pharyngitis: The guidelines advised to avoid antibiotics as 90% resolve in seven days and pain will only be reduced by 16 hours. However, in many cases reviewed during the first 8-weeks (pre-implementation phase), this student found negative point-of-care test results, such as strep screenings, yet, antibiotics were still prescribed for these non-specific acute pharyngitis complaints. However, it was found that clinical support in terms of effective communication was essential in improving inappropriate prescribing rates, as evident by the results seen in these last 8-weeks post-implementation phase. Only a small portion was still seen in terms of unnecessary prescribing during the post-implementation phase, which can be explained from a perspective of defensive medicines practice. Some providers expressed concerns about different guidelines and others were concerned over a few patients' complaints for not prescribing antibiotics, which was influenced by the patients' pressure or demands.

Others: The result findings in this specific category did not influence or impact results because the cases were more serious respiratory illnesses, such as acute bacterial sinusitis, streptococcal tonsillitis, pneumonia, chronic obstructive pulmonary disease (COPD)

exacerbation, influenza, asthma exacerbation, etc. Others also included cases where patients were immunocompromised and were at higher risks for developing complication in early stages of RTIs symptoms. In these cases, it was acceptable to consider immediate antibiotics as per clinical guidelines.

Patient Satisfaction Result. The average patient satisfaction survey at the eight-weeks pre-implementation phase was 91% and 96% post-implementation (see Figure 2). Many of these patients with RTIs seem to seek reassurance and information from the expert professionals; however, many of them also overestimated the effectiveness of antibiotics. In addition, many lacked proper education on the natural course of viral illnesses and how they should be managed, which led to the misconception about the effectiveness of antibiotics. The average satisfaction rate for the post eight weeks interventions supported the idea that satisfaction did not depend upon on whether the patients received antibiotics. The providers perceived that this change in practice would negatively impact patient satisfaction, however, the findings did not support this. Instead, the satisfaction depends on whether the providers did address the patients' clinical concerns or showed personal interest in them by discussing the expected course of the ailment and treatment.

Another consideration for justifying a better patient satisfaction rate is that providers were using an alternative terminology to suggest a viral etiology, which helped patients understand the inappropriateness of antibiotic use and lessened their manipulation for unnecessary antibiotic treatment. For example, if the patient was diagnosed with acute bronchitis, it was thought that if the terminology of chest cold was used, or instead of acute sinusitis, perhaps it may be more effective to convey their illness confirmed as a viral in origin by using the term "sinus cold", rather than "acute sinusitis".

Phone Tracking Results. After viral RTI illnesses were confirmed by the provider, the student had been making telephone calls to follow up on symptom progression for those patients where the delayed antibiotic strategy was applied (see Figure 3). The telephone questionnaires on day five post visit included:

1) Are you feeling any better after your visit five days ago?
2) Did you think you needed an antibiotic at your time of visit?
3) Did you receive the educational material related to your diagnosis at the time?
4) Do you have any questions about the delayed prescribing strategy based on your diagnosed respiratory problem?

There was a total of 345 (66%) patients who did not received the antibiotic treatment as part of the delayed prescribing strategy for undetermined RTI cases. After day five post-visit at the time and it was found that 338 (97%) of these patients felt better without the need to re-consult the providers or for antibiotic call-in. There were 3 (0.01%) patients who were asked to return to the clinic for further evaluation for newly developed symptoms that occurred, such as fever, increased shortness of air, etc., There were 4 (0.01%) antibiotics called in to the pharmacy from these follow up calls.

Those patients who received the antibiotics with similar acute RTIs were randomly called to determine if their symptoms progression were unchanged or better. For example, the student called a patient for acute bacterial sinusitis (received the antibiotic treatment) and acute rhinosinusitis (received no antibiotic treatment). The findings indicated that the response rates were similar in which they both felt better in seven days post visit, however, those who received the antibiotics reported more side effects and led to other medical issues, such as vulva candidiasis or other gastrointestinal issues. They were asked to return to the clinic for further

evaluation of potential new medical problems, which were secondary to the initial antibiotic treatment for acute RTIs.

Antibiotic Expenditure Results. During the pre-implementation phase, the expenditures associated with the antibiotics dispensed onsite that were responsible for the viral or self-limiting RTI cases was $2,335.65 (see Figure 4). The antibiotics that were filled at a local pharmacy by patients was $334.78 and those antibiotic costs that were dispensed onsite was $2000.87. The total antibiotic expenditure during the post-implementation phase was $1,054.89. The antibiotics that were filled at a local pharmacy by patients was $295.17 and the rest that was dispensed onsite costs $759.72.

Facilitators and Barriers

The Physician Medical Director of this organization served as one of the most important stakeholders and facilitators for this student to carry out the quality improvement project. He has shown significant support to ensure the success of this student's project. The institution served as an excellent resource, where much of the educational materials were displayed for visual and tactile teaching tools to educate a high volume of adult patients with ARTIs. Initially the patient satisfaction scores were a concern that may limit the success of these educational interventions. The Physician Medical Director, who strongly promoted this study and supported antibiotic stewardship programs, thought the patient satisfaction would depend more on the patient-centered quality during their encountered visits, instead of inappropriate or unnecessary antibiotic treatment. This initial perception of patient dissatisfaction (prior to the project implementation) was likely reflected from the patients' inaccurate perception of their acute illness. This feeling was also related to the value of their time. Many patients take time off from work to visit the practice, they walk out without the antibiotics and may feel that their time was

wasted. In addition, if patients have to return for additional visits because of progressing symptoms, causing them to miss more days, may make the patients truly unhappy and not return at all. However, the Physician Medical Director thought it would conciliate in cases we may need to mitigate the patient demands or their unsatisfaction by spending an adequate amount of time with the patient to explain the nature of their viral illnesses, and the ineffectiveness and inappropriateness in issuing unnecessary prescriptions that are against the principles of the evidence-based practice of medicines. Therefore, the anticipated barriers initially perceived were overcome by his positive attitude about educating and reassuring patients in the fight to limit the antimicrobial resistance dilemma. This belief or collaborative approach is one of the important fundamental prescribing practice that promotes the EBP guidelines to best optimize patients' health outcomes.

Another barrier that was thought to be a potential impact in terms of workflow interruption was the time constraints during the implementation phase. This is a very busy practice with an average of at least 40 primary care patients a day, therefore, the request for engaging in group educational sessions was not feasible. However, this student was able to arrange one-on-one meetings with individual practitioners to avoid the interruption in the daily workflow of the practice. With a busy schedule anticipated during the spring time when this project took place, this student visited the practicum site frequently to support, encourage, and offer additional assistance to practitioners for facilitating a smoother transition during this project.

Discussion and Implications for Nursing and Healthcare

The study findings have proven that consistent evidence-based messages, coupled with encouragement for the delayed prescribing strategy for self-limiting RTIs, can substantially

reduce unnecessary or inappropriate antibiotics. In this student's perspective, the continued success of this piloted evidence-based study greatly depends on the buy-in of clinicians across the practice within this company. It will also require persistent reinforcement of the message to the clinicians. During the implementation phase, there were still some antibiotics prescribed for viral infections. In these instances, some explanations for prescribing were patient expectations, time constraints, and the practice of defensive medicine. Some of these specific prominent contributing factors were not excluded, they are:

- Inappropriate diagnoses coded for RTIs
- Insufficient or vague documentations for some RTI cases that may have been appropriately considered for the antibiotic treatment
- Time pressure amid high caseloads of patients encountered with RTIs in addition to other regular follow-up visits, which limited the time to thoroughly educate the patients about the natural course of viral illnesses and the ineffectiveness for antibiotic treatment.
- The pressure of patient demand for receiving antibiotics was still seen as among the contributing factors, which was observed in this study.

Despite the limited external validity of this study due to the sample size of participants, the result findings supported the increased awareness in the appropriateness and evidence-based prescribing practice of clinicians. The educational interventions implemented in this study was considered the most effective in improving prescribing rates, addressing patient concerns, and facilitating the delayed prescribing strategy.

When this student shared the final results of this project, some of the uncertain thoughts received from one of the participants was that the numbers of patients returning for further re-

evaluation after the initial RTI visit ended up received the antibiotic treatment. This 0.01% shown under the phone tracking patient response rate (Appendix H) was likely underrepresented or misled compared to the actual numbers of patient re-visitation seen on the floor. The rationale for this uncertainty is that when this student called patients for follow-up on day five post visit, quite a few of these patients stated that symptoms have not significantly improved nor worsen either; however, they continued to follow the providers' advice for supportive care measures. This response was tabulated into the section of "patient felt better." In the meantime, these patients could have called in right after the fifth day follow-up call. These returned visits could have underrepresented the result outcome that was questioned by the participant above. It was recommended that for future studies, the follow up call be repeated twice, such as five days and again ten days post-visit. Because of the uncertainty raised, the student entered these patients into the "others" category, which did not impact the study goal outcomes.

In terms of implications indicated for nursing and healthcare practice, this study emphasized that not all overprescribing cases entailed wrong treatment decisions, as we certainly cannot rely 100% on clinical guidelines as strict laws. However, the data presented in this study advocates for the need to improve prescribing practices with some restrictive guidelines, with the intention of promoting the prudent antibiotic use for these self-limiting RTI cases.

As mentioned above, there are many factors for inappropriate antibiotics to satisfy patients. This study suggests that future improvements on antibiotic stewardship programs that put a focus on the educational reinforcement and provider-patient communication. By doing so, this will further validate the study outcomes. Another recommendation would be more externally and internally validated by replicating the study on a larger scale and over a longer time frame.

Weaknesses and Strengths

The immediate reduction in the prescribing rates has proven to be one of the biggest strengths and has highlighted the greater need for further development, design, and implementation of future antimicrobial stewardship educational interventions. The providers increased knowledge and awareness of appropriate prescribing practices as they spent more time to educate the patients. This showed that knowledge was essentially affected. This was proven by the fact that both providers and patients have the ability to gain and retain knowledge. Another strength identified in this study was the free distribution of informative materials that allowed the participants to have access to evidence-based results. The study yielded specific quantitative information that helped the providers to consider the likelihood of viral versus bacterial illnesses. A large number of detailed EHR reviews covered a wide range of RTIs, which enabled this student to specifically compare these cases to those guideline recommendations.

Although there are noticeable strengths as mentioned above, the student recognized that this study has some significant limitations or weaknesses, such as the short time frame of the study. The result findings showed progress over a relatively short period of time, however, it is hard to know how well improvements might be sustained over the long term. The improvements shown from early indications were due to persistent reiteration of the messages. Furthermore, the primary goal of this project was to focus on the educational components. It is probable that over time better understanding of the natural courses of self-limiting RTIs will enable self-management and a reduction in patient demands at the practice.

Other limitations included the time constraint of this project implementation. The providers dealt with a significant amount of RTI cases and had limited time for patient

consultation for acute RTIs. This pressure of limited time was correlated to the inappropriate prescribing rates, which often leads to the cycle that perpetuates the patients demand for antibiotics. These patients will likely request antibiotics for subsequent RTIs because it was prescribed previously. The providers were not given specific tools to rate the severity of RTI illnesses. Instead, this study allowed them to base it on each provider's clinical interpretation of presenting symptoms or appearance of the patients, which is considered a subjective measure. Each provider's subjective feeling that validates his or her decision to prescribe or not, could have provided valid reasons to deviate from the Clinical Guidelines. For example, in some RTI cases that were coded for bronchitis as "acute bacterial bronchitis" or even pneumonia in order to legitimate the prescribed antibiotic decision, may have impacted the actual inappropriate or unnecessary prescribing rates.

Plans for Dissemination

The development of a dissemination plan helps to facilitate the translation of one's subjects being studied into evidence-based practices. To further support of this statement, Wilkes, Mannix, & Jackson (2013) indicated that the key component of clinical scholarship work is that it must be made public to replicate its study, therefore, one should disseminate the information to far-reaching audiences. The dissemination plans for this piloted study included submission for publication in the Virginia Henderson Global Nursing e-Repository Journal: Sigma Theta Tau International Nursing Honor Society; other dissemination plans are not excluding the presentation of the study outcomes to the Chamberlain College of Nursing, and poster presentations to the stakeholders and clinicians of this organization. Once the permission has been granted from the Virginia Henderson Global Nursing Library, this final publication for the evidence-based pilot study will be forwarded to other colleagues and stakeholders across

other states at various clinical sites within this practice organization. A peer-reviewed poster of this evidence-based project has been demonstrated at the Doctoral of Nursing Practice (DNP) Showcase in July 2017, at the Renaissance Schaumburg Convention Center in Illinois.

Summary and Conclusion

A large body of evidence has been shown throughout many studies that strongly supports the need for improving appropriate prescribing of antibiotics. This improvement can be made through the use of evidence-based guidelines, specifically for ARTIs and by understanding misconceptions and potential barriers that hinder the decisions-making of practitioners when it comes to prescribing practices. The literature studies have demonstrated that the professional interventions and essential educational strategies are found to be effective in alleviating the crisis of antimicrobial drugs resistance. Further emphasis on these educational strategies can provide practitioners with the clinical support needed for making appropriate prescribing decisions, while respecting their ethical principles of autonomy and beneficence. These are quality health indicators that define our EBP standard of care. These efforts are made to practice evidence-based care, also falls under the 'nursing' context of evaluating a patient's comfort. These interlocking with the philosophy of Swanson's caring theory and address a core component of nursing care which is based on the human needs. This concept of caring for the patient's good health, exerts the sense of morality and ethics in our profession.

As mentioned throughout this paper, the magnitude of antimicrobial drug resistance poses a threat to the worlds' population, demonstrating the importance of appropriate antibiotics prescribing. The information given to the patients about the natural course of viral respiratory illnesses can empower their knowledge to practice self-care for symptoms management, which ultimately, lessen their demands on receiving unnecessary or inappropriate antibiotic treatment.

These employed evidence-based educational tools indicated for providers and patients, together with consistent reinforcement of key messages by all staff, can substantially impact the longer-term benefits, and promotion for antibiotic stewardship. The vision of this scholarly project has been highlighted through these educational interventions to be utilized to their fullest potential in primary care settings.

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Table 1: Balanced Budget

EXPENSES		**REVENUE**	
Supplies (Professional posters, reprinted educational materials)	$504.00	Billing	$0.00
		Grants	$0.00
Services (600 carbon copies clinical data summary sheets "$40.00/100 sheets")	$240.00	Institutional budget support	$0.00
Miscellaneous	$230.00		
Total Expenses	$974.00		
Net Balance	$974.00	**Total Revenue**	$0.00

Figure 1: Pre- & Post-Implementation Comparison: RTI Cases & Antibiotic Prescribing Rates

ARTI Diagnosis	Pre-implementation		Post-implementation	
	Total Count (%)	Antibiotics	Total Count (%)	Antibiotics
AOM	48 (8%)	27 (10%)	33 (5%)	10 (6%)
Common Cold	18 (3%)	3 (1%)	124 (21%)	0 (0%)
Acute Rhinosinusitis	126 (21%)	74 (29%)	82 (14%)	8 (5%)
Cough	103 (17%)	32 (12%)	72 (12%)	9 (5%)
Acute Pharyngitis	120 (20%)	73 (28%)	117 (20%)	35 (20%)
Others	198 (32%)	85 (33%)	168 (28%)	118 (69%)

Figure 2: Pre- & Post-Implementation Patient Satisfaction Rate

Parameters	Satisfaction
Pre-Implementation	
January	90%
Feb	92%
Post-implementation	
March	93%
April	98%

Figure 3: Delayed Prescribing Strategy: Response Rates

DELAYED PRESCRIBING STRATEGY APPLIED: FOLLOW-UP CALLS			
TOTAL DELAYED PRESCRIBING CASES	FEEL BETTER	SYMPTOMS WORSEN: ANTIBIOTIC CALLED IN WITHOUT A RETURN VISIT	NEED RETURN VISIT
345 (66%)	338 (97%)	4 (0.01%)	3 (0.01%)

Figure 4: Pre- & Post-Implementation Antibiotic Expenditures

	Onsite Antibiotic Expenditure
Pre-Implementation	$ 2,335.65
Post-Implementation	$1,054.89

Appendix A

Summary of Primary Research Evidence

Citation	Question or Hypothesis	Theoretical Foundation	Research Design (include tools) and Sample Size	Key Findings	Recommendations/ Implications	Level of Evidence
Sanchez, G. V., Flemming-Dutra, K. E., Roberts, R., & Hicks, L. A. (2016). Core elements of outpatient antibiotic stewardship. Centers for Disease Control and Prevention, 65(6).	What are the core elements of outpatient antibiotic stewardship?	None	A systemic review study.	Core elements provide a concrete framework for outpatient antibiotic stewardship through identifying, developing, testing and evaluating stewardship interventions	By establishing effective antibiotic stewardship interventions that tailor to each practice's needs can protect patients and optimize clinical outcomes in primary care settings.	Level II-Good quality evidence
Butler, C. C., Simpson, S. A., Dunstan, F., Rollnick, S., Cohen, D., Gillepse, D., …Hood, K. (2012). Effectiveness of multifaceted educational programme to	How effective is the multifaceted educational programme help reduce antibiotic dispensing in primary care: practice?	None	Randomized controlled trial with general practices. 34 practices were randomized to receive educational programme and 34 practices to be controls. 139 clinicians from	There was 5.5% reduction in the cost of dispensed antibiotics in the intervention group compared with the control group. Educational intervention programme led to reductions in all	Multifaceted educational programme leads to reductions in practice-wide oral antibiotic.	Level I-Good quality evidence

reduce antibiotic dispensing in primary care: Practice based randomized controlled trial. BMJ, 334, d8173			the intervention practices and 124 from control practices participated before randomization.	cause of oral antibiotics.		
Mainous, A. G., Lambourne, C. A., & Nietert, P. J. (2013). Impact of a clinical decision support system on antibiotic prescribing for acute respiratory infections in primary care: A quasi-experimental trial. *Journal of American Medical Informatics Association, 20*(2), 317-324.	What is the impact of a clinical decision support system on antibiotic prescribing for acute respiratory tract infections in primary care?	None	Quasi-experimental design with 9 intervention practices and 61 control practices.	A modest effect was found in changing prescribing for adults where antibiotics were inappropriate, but had a substantial impact on changing the overall prescribing of broad-spectrum antibiotics among pediatric and adult patients.	A modest effect was found in changing prescribing for adults where antibiotics were inappropriate, but had a substantial impact on changing the overall prescribing of broad-spectrum antibiotics among pediatric and adult patients.	Level II-Good quality evidence
Spurling, G. K., Del Mar, C. B., Dooley, L., Foxlee, R., & Farley, R. (2013). Delayed	How effective is the delayed antibiotic strategy compared to immediate or no	None	Randomized control trials. 3157 participants in 10 studies reviews.	Although the delay of antibiotic treatment slightly reduces patient satisfaction compared to	The literature provides evidence supporting the delayed antibiotic treatment for ARTIs without	Level I-Good quality evidence

antibiotics for respiratory infections. The Cochrane Database of Systemic Review, 30(4). doi:10.1002/14651858.CD004417.pub4	antibiotic strategy for ARTIs?			immediate antibiotics (87 vs 92%) but not compared to none (87 vs 83%). There was no difference in re-consultation rates for immediate and delayed groups	increasing complications, while maintaining similar patient satisfaction and clinical outcomes.	
Hayes, S., Frisch, J. C., & Lindbaek, M. (2011). Use and feasibility of delayed prescribing for respiratory tract infections: A questionnaire survey. BMC Family Medicine Practice, 12(34). doi:10.1186/1471-2296-12-34	Does delayed antibiotic prescribing a feasible strategy used to reduce antibiotic prescriptions for respiratory tract infections?	Kurt Lewin's Change Theory	The study utilized questionnaire survey/58 general practitioners participated	The GP found delayed prescribing a very reasonable strategy, and 89% of patients would prefer to receive a wait-and-see prescription in a similar situation in the future.	Delayed prescribing was found to be a reasonable approach and educational efforts should be emphasized or encouraged to promote antimicrobial stewardship interventions.	Level I/Good quality evidence
Francis, N. A., Gillespie, D., Little, P., Verheij, P., Goossens, H., Coenen, S., & Butler, C. C.	Delayed antibiotic prescribing and associated antibiotic consumption in	None	Perspective observational cohort/General practitioners recorded clinical features and antibiotic	Evidence supported the use of delayed prescribing and recommendations to adopt this strategy.	Delayed prescribing is an effective approach to reduce antibiotic prescribing for RTIs. Effective	Level II-Good quality evidence

(2012). Delayed antibiotic prescribing and associated antibiotic consumption in adults with acute cough. The British Journal of General Practice, 62(602), e639-646.	adults with acute cough		prescribing for adults with acute respiratory tract infections.	However, little evidence about evidence how often this strategy is used in everyday clinical practice.	communication and patient education is essential in reducing overprescribing antibiotics.	
Peters, S., Rowbotham, S., Chishom, A., Wearden, A., Moschogianis, S., Cordingley, L., …Chew-Graham, C. (2011). Managing self-limiting respiratory tract infections: A qualitative study of the usefulness of the delayed prescribing strategy. British Journal of General Practice, 61(590), e579-589.	Does delayed prescribing perceive as a reasonable approach as an alternative strategy to no prescribing?	None	Qualitative interview and focus group study. Semi structed interviews (49) and six focus groups with general practitioners, trainee GP, & NPs.	Delayed prescribing was not considered to be a helpful strategy for mating patient with self-limiting respiratory tract infections and the findings do not support the guidelines.	This is the only study out of all literature chosen that did not support the delayed prescribing for ARTIs and that further training about these guidelines should be considered for future studies. At the same time, this result or conclusion of this study suggested delayed prescribing may not be the only alternative	Level III-Fair quality finding.

					strategy to manage these ARTIs issue.	
Gonzales, R., Anderer, T., McCulloch, C. E., Maselli, J. H., Bloom, F. J., Graft, T. R., & Metlay, J. (2013). A cluster-randomized trial of decision support strategies for reducing antibiotic use for acute bronchitis. JAMA, 173(4), 267-273	What is the impact of overuse of antibiotics for uncomplicated acute bronchitis?	None	Cluster-randomized trial among 33 primary care practices. Compared baseline period, the % of adolescents and adults prescribed antibiotics in an intent-to-treat analysis.	The impact of printed & computerized strategies for providing decision support was equivalent. Implementation of a decision support system for acute bronchitis decreased the overuse of antibiotics in primary care setting	The literature showed strong evidence that supported the use of a decision-support system will help to decrease the overuse of inappropriate antibiotics.	Level I-Good quality evidence.
Montes, M. (2012). Decreasing antibiotic overuse in upper respiratory tract infection through an educational intervention aimed at nurse practitioners. The University of	Does educational interventions aimed at nurse practitioners help reduce antibiotic overuse in upper respiratory tract infections?	Kurt Lewin's Change Theory	51 nurse practitioners/pre- and post-test measuring knowledge and intention using questionnaire results, intention was measured by reviewing Likert-type rankings.	It was concluded that continue to promote educational components, specifically pertaining to practicing evidence-based guidelines, patient safety and health will be optimized at best.	Overuse of antibiotic in URIs is an ongoing problem, educational intervention aimed at nurse practitioners was found to be effective, however, in order for research to be able to transition	Level II – Fair quality evidence

Arizona. Retrieved from http://hdl.handle.net/10150/265342					into practice, NPs will continue to need this practice support.	
Muhia, C. L. (2016). Using a delayed antibiotic-prescribing education intervention to prevent antibiotic overuse in the treatment of respiratory infections. Umass: Amherst. Retrieved from http://scholarworks.umass.edu/nursing_dnp_capstone	Does delayed antibiotic prescribing strategy reduce antimicrobial use for respiratory tract infections?	Kurt Lewin's Change Thoery	The study utilized the pre- and posttest design to measure providers' knowledge of delayed antibiotic-prescribing Strategy/ Sample of 30 general practitioners	Delayed antibiotics educational intervention can improve providers' knowledge, increase their likelihood to adopt intervention in practice, which may prevent complications related to antibiotic overuse	Ongoing education for providers and patients is essential intervention in reducing inappropriate antibiotic prescriptions.	Level II/Good quality evidence
Little, P., Stuart, B., Francis, N., Doughlas, E., Tonkin-Crine, S., Anthierens, S., ... Yardley, L. (2013). Effects of internet-based training on antibiotic prescribing rates	What is the impact of the internet-based training on antibiotic rates for acute respiratory tract infections?	None	Clustered randomized study//259 practices provided data for 6771 patients with lower-respiratory-tract infections.	Internet training was considered to be important intervention to help reduce antibiotic prescribing for respiratory-tract infections across language and	Education for providers and patients can significantly impact the antibiotic prescribing rates for managing acute respiratory tract infections.	Level 1/Good quality evidence

for acute respiratory-tract infections: a multinational, cluster, randomized, factorial, controlled trial. Journal of National Institutes of Health, 382(9899), 1175-1182. doi: 10.1016S0140-6736(13)60994-0.				cultural boundaries.		
Vinvard, C., Linkin, D., Localio, R. A., Leonard, C. E., Teal, V. L., Fishman, O. N., & Hennessy, S. (2013). Effectiveness of interventions in reducing antibiotic use for upper respiratory infections in ambulatory care practices. *Population*	Does academic detailing study lead to reduction of inappropriate use for acute respiratory tract infections?	None	The study used quasi-experimental pre-post (cross-sectional) study with concurrent control groups for each intervention./ The study selected 14 Clinical Care Associates providers based on the number of acute bronchitis visits, matching each one to the 14	Academic detailing has been found to reduce unnecessary antibiotic prescribing in the setting of a multidimensional intervention	In order to further promote the antimicrobial stewardship, organizations that seek to reduce inappropriate use of antibiotics should use proven approaches, even when they are more expensive.	Level 1/Good quality evidence

Health Management, 16(1), 22-27. doi:10.1089/pop.2012.0025			total selected Clinical Practices of the University of Pennsylvania providers.			

Appendix B

Summary of Systematic Reviews (SR)

Citation	**Question**	**Search Strategy**	**Inclusion/ Exclusion Criteria**	**Data Extraction and Analysis**	**Key Findings**	**Recommendation/ Implications**	**Level of Evidence**
Francis, N. A., Gillespie, D., Little, P., Verheij, P., Goossens, H., Coenen, S., & Butler, C. C. (2012). Delayed antibiotic prescribing and associated antibiotic consumption in adults with acute cough. The British Journal of General Practice, 62(602), e639-646.	Does delayed antibiotic prescribing an effective approach in everyday clinical practice?	British Journal of Nursing/EBSCO-Academic Search	General practitioners who recorded their record diagnosis & prescribing strategy/Specialists	The proportion of patients prescribed immediate, delayed, and no antibiotics overall and by network was calculated. Two level hierarchical logistic regression model was used.	Evidence supported the use of delayed prescribing and recommendations to adopt this strategy. However, little evidence about evidence how often this strategy is used in everyday clinical practice.	Delayed prescribing is an effective approach to reduce antibiotic prescribing for RTIs. Effective communication and patient education is essential in reducing overprescribing antibiotics.	Level II-Good quality evidence
Butler, C. C., Simpson, S. A., Dunstan, F., Rollnick, S., Cohen, D.,	How effective is the multifaceted educational programme help reduce antibiotic dispensing in	CINHAL	General practices/Specialty practices	Analysis of covariance. The main analysis was intention to treat and compared the	There was 5.5% reduction in the cost of dispensed antibiotics in the intervention group compared	Multifaceted educational programme leads to reductions in practice-wide oral antibiotic.	Level I-Good quality evidence

Citation	Question	Search Strategy	Inclusion/ Exclusion Criteria	Data Extraction and Analysis	Key Findings	Recommendation/ Implications	Level of Evidence
Gillepse, D., …Hood, K. (2012). Effectiveness of multifaceted educational programme to reduce antibiotic dispensing in primary care: Practice based randomized controlled trial. BMJ, 334, d8173	primary care: practice?			two group's annual rates of total oral antibiotic dispensing.	with the control group. Educational intervention programme led to reductions in all cause of oral antibiotics.		
Peters, S., Rowbotham, S., Chishom, A., Wearden, A., Moschogianis, S., Cordingley, L., …Chew-Graham, C. (2011). Managing self-limiting respiratory tract infections: A qualitative study of the usefulness	Does delayed prescribing perceive as a reasonable approach as an alternative strategy to no prescribing?	EBSCO-Academic Search	General practitioners/Specialty	Data analyzed through semi-structured interviews	Delayed prescribing was not considered to be a helpful strategy for mating patient with self-limiting respiratory tract infections and the findings do not support the guidelines.	This is the only study out of all literature chosen that did not support the delayed prescribing for ARTIs and that further training about these guidelines should be considered for future studies. At the same time, this result	Level III-Fair quality evidence

Citation	Question	Search Strategy	Inclusion/ Exclusion Criteria	Data Extraction and Analysis	Key Findings	Recommendation/ Implications	Level of Evidence
of the delayed prescribing strategy. British *Journal of General Practice, 61*(590), e579-589.						or conclusion of this study suggested delayed prescribing may not be the only alternative strategy to manage these **ARTIs issue.**	
Gonzales, R., Anderer, T., McCulloch, C. E., Maselli, J. H., Bloom, F. J., Graft, T. R., & Metlay, J. (2013). A cluster-randomized trial of decision support strategies for reducing antibiotic use for acute bronchitis. JAMA, *173*(4), 267-273	What is the impact of overuse of antibiotics for uncomplicated acute bronchitis?	EBSCO-Academic Search	All clinicians caring for patients with acute bronchitis, MDs, NPs, PAs./Specialists.	3-arm cluster randomized trial of different implementation strategies to reduce antibiotic use for uncomplicated acute bronchitis./Exclude 4 practices because the annual number of visits with a primary diagnosis of bronchitis.	The impact of printed & computerized strategies for providing decision support was equivalent. Implementation of a decision support system for acute bronchitis decreased the overuse of antibiotics in primary care setting.	The literature showed strong evidence that supported the use of a decision-support system will help to decrease the overuse of inappropriate antibiotics.	Level I – Good quality evidence

Citation	Question	Search Strategy	Inclusion/ Exclusion Criteria	Data Extraction and Analysis	Key Findings	Recommendation/ Implications	Level of Evidence
Hayes, S., Frisch, J. C., & Lindbaek, M. (2011). Use and feasibility of delayed prescribing for respiratory tract infections: A questionnaire survey. *BMC Family Medicine Practice, 12*(34). doi:10.1186/1471-2296-12-34	Is delayed prescribing strategy a feasible method for acute respiratory tract infections?	Academic Search Tools/CINHAL	General practitioners and patients with respiratory tract infections/Specialty practices	Chi Square test was used; logistic regression analysis was performed with the dependent variable being whether the patient reported to consume the antibiotics or not.	Although the delayed antibiotic prescribing was found to be feasible for both patients and providers, educational efforts should still be the main focus to further promote and sustain such desired outcome in reducing the rates of overuse antibiotics for respiratory tract infections.	The study supported evidence found for delaying antibiotics used for nonspecific respiratory tract infections to be feasible strategy, ongoing educations will help to sustain and promote such intervention above in primary care setting.	Level III – Good quality evidence
Mainous, A. G., Lambourne, C. A., & Nietert, P. J. (2013). Impact of a clinical decision support system on antibiotic prescribing for acute respiratory	What is the impact of a clinical decision support system on antibiotic prescribing for acute respiratory tract infections in primary care?	EBSCO-Academic Search	General practitioners/Specialists.	Statistical analysis shown study outcomes by measured quarterly practice level observations weighted by the number of ARTI	A modest effect was found in changing prescribing for adults where antibiotics were inappropriate, but had a substantial impact on	The clinical significance findings in this study indicated a successful strategy for changing prescribing practices on the use of broad	Level II – Good quality evidence

Citation	Question	Search Strategy	Inclusion/ Exclusion Criteria	Data Extraction and Analysis	Key Findings	Recommendation/ Implications	Level of Evidence
infections in primary care: A quasi-experimental trial. *Journal of American Medical Informatics Association, 20*(2), 317-324.				during the quarter.	changing the overall prescribing of broad-spectrum antibiotics among pediatric and adult patients.	spectrum antibiotics for acute respiratory tract infections.	
Montes, M. (2012). Decreasing antibiotic overuse in upper respiratory tract infection through an educational intervention aimed at nurse practitioners. The University of Arizona. Retrieved from http://hdl.handle.net/10150/265342	Does educational interventions aimed at nurse practitioners reduce antibiotic overuse in upper respiratory tract infections?	EBSCO-Academic Search	General Nurse Practitioners/ Specialists	Descriptive statistic and measures of central tendency. ANOVA statistics of total knowledge scores at pre- and post-tests.	It was concluded that continue to promote educational components, specifically pertaining to practicing evidence-based guidelines, patient safety and health will be optimized at best.	Overuse of antibiotic in URIs is an ongoing problem, educational intervention aimed at nurse practitioners was found to be effective, however, in order for research to be able to transition into practice, NPs will continue to need this practice support.	Level II-Fair quality evidence.

Citation	Question	Search Strategy	Inclusion/ Exclusion Criteria	Data Extraction and Analysis	Key Findings	Recommendation/ Implications	Level of Evidence
Muhia, C. L. (2016). Using a delayed antibiotic-prescribing education intervention to prevent antibiotic overuse in the treatment of respiratory infections. Umass: Amherst. Retrieved from http://scholarworks.umass.edu/nursing_dnp_capstone	Does educational intervention help reduce overuse of antibiotic in primary care settings?	EBSCO-Academic Search	Primary care practitioners/Specialists	Pre- and post-test designs knowledge questionnaire using paired-t test to analyze data.	The delayed antibiotics educational intervention can improve providers' knowledge and their likelihood in adopting the guidelines, which lead to reduction rates of inappropriate antibiotic prescribing.	his study reinforced the practice implication in terms of educational components needed to disseminate essential information or guidelines to providers for appropriate management of antibiotics for ARTIs.	Level II – Good quality evidence
Peters, S., Rowbotham, S., Chishom, A., Wearden, A., Moschogianis, S., Cordingley, L., …Chew-Graham, C. (2011). Managing self-	Does delayed prescribing perceive as a reasonable approach as an alternative strategy to no prescribing?	EBSCO-Academic Search	General practitioners/specialists	An iterative analysis approach, using grounded theory principles, was used to generate theme from the data set	Delayed prescribing was not considered to be a helpful strategy for mating patient with self-limiting respiratory tract infections and the findings do	This is the only study out of all literature chosen that did not support the delayed prescribing for ARTIs and that further training about these guidelines	Level III – Fair quality evidence

Citation	Question	Search Strategy	Inclusion/ Exclusion Criteria	Data Extraction and Analysis	Key Findings	Recommendation/ Implications	Level of Evidence
limiting respiratory tract infections: A qualitative study of the usefulness of the delayed prescribing strategy. British Journal of General Practice, 61(590), e579-589.					not support the guidelines.	should be considered for future studies. At the same time, this result or conclusion of this study suggested delayed prescribing may not be the only alternative strategy to manage these ARTIs issue.	
Spurling, G. K., Del Mar, C. B., Dooley, L., Foxlee, R., & Farley, R. (2013). Delayed antibiotics for respiratory infections. The Cochrane Database of Systemic	Does the delayed prescribing strategy impact patient satisfaction?	EBSCO CINAHL	9 trials compared immediate antibiotics with delayed antibiotics./Five trials have been excluded.	10 trials were eligible for inclusion, included 1159 participants in their delayed antibiotic arm, 1067 participants in the immediate antibiotic arm of nine trials and 465 participants	Although the delay of antibiotic treatment slightly reduces patient satisfaction compared to immediate antibiotics (87 vs 92%) but not compared to	The literature provides evidence supporting the delayed antibiotic treatment for ARTIs without increasing complications, while maintaining	Level I – Good quality evidence

Citation	Question	Search Strategy	Inclusion/ Exclusion Criteria	Data Extraction and Analysis	Key Findings	Recommendation/ Implications	Level of Evidence
Review, 30(4). doi:10.1002/14651858.CD004417.pub4				in the no antibiotic arm of three trials.	none (87 vs 83%). There was no difference in re-consultation rates for immediate and delayed groups	similar patient satisfaction and clinical outcomes.	
Tan, T., Little, P., Moore, M., Kelly, J., Williamson, I., Leydon, G., McDermott, L., …Stuart, B. (2014). Delayed antibiotic prescribing strategies for respiratory tract infections in primary care: Pragmatic, factorial, randomized controlled trial. BMJ, 384(g1006), 1-8.	What are the opportunities in primary care to alleviate the crisis of antimicrobial resistance?	EBSCO CINAHL	General practitioners in primary care settings	Systematic Reviews.	Delayed antibiotic prescribing was found to significantly impact in the numbers of patients who used antibiotics compared to immediate antibiotics prescribing	The study resonates the need to educate patients about knowledge deficits for overusing unnecessary antibiotics for ARTIs. This strategy obviously involves much education about symptom-relief measures and when to re-consult providers if changes in respiratory conditions.	Level I – Good quality evidence

Appendix C

Project Schedule

	NR702								NR705								NR707								NR709					
Activity	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Meet with preceptor		X		X		X			X	X			X		X			X	X	X	X	X	X	X			X			
Prepare project proposal						X	X	X						X																
Prepare educational handouts										X	X	X				X							X							
DNP proposal due							X																							
Final DNP paper due																													X	
Meet statistician								X			X					X				X					X	X				
Analysis process																									X	X	X			
Dissemination of project findings																										X			X	
Imple-ment project																	X	X	X	X	X	X	X	X						

	NR702								NR705								NR707								NR709					
Activity	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Meet with stake-holders			X				X			X			X				X	X	X	X	X	X	X	X	X	X				
Submission of DNP (publication)																							X				X			
PPT final prescentation																													X	
IRB approval										X		X																		
PPT presenta-tion						X																								

Appendix D

NICE Clinical Guidelines, No 69 "Respiratory Tract – Antibiotic Prescribing"

NHS Cumbria Clinical Commissioning Group

NICE CLINICAL GUIDELINE 69
ANTIBIOTIC PRESCRIBING FOR RESPIRATORY TRACT INFECTIONS

No antibiotic (or delayed prescription) for:

- Acute otitis media
- Acute sore throat/acute pharyngitis/acute tonsillitis
- Common cold
- Acute rhinosinusitis
- Acute cough/acute bronchitis

Consider immediate antibiotic prescribing strategy, depending on clinical assessment of severity for:

- Bilateral acute otitis media in children under 2 years
- Acute otitis media in children with otorrhea
- Acute sore throat/acute pharyngitis/acute tonsillitis when 3 or more Centor criteria are present:
  - Temperature >38°C
  - Absence of cough
  - Swollen anterior cervical nodes
  - Tonsillar swelling or exudate

Immediate antibiotic prescription should only be offered if:

- Patient is systemically unwell
- The patient has signs/symptoms of serious illness and/or complications (pneumonia, mastoiditis, peritonsillar abscess, peritonsillar cellulitis, intraorbital and intracranial complications)
- Patient is at high risk of serious complications because of pre-existing co-morbidity (heart, lung, renal, liver, neuromuscular disease, immunosuppression, cystic fibrosis and young children born prematurely)
- The patient is >65 years with acute cough + 2 or more of the following or >80 years with acute cough + 1 or more of the following:
  - Hospitalisation in last year
  - Type 1 or type 2 diabetes
  - History of congestive heart failure
  - Current use of oral glucocorticoids

This guidance does not override the individual responsibility of health professionals to make decisions in the exercise of their clinical judgement in the circumstances of the individual patient.

Abbreviated antibiotic choices overleaf

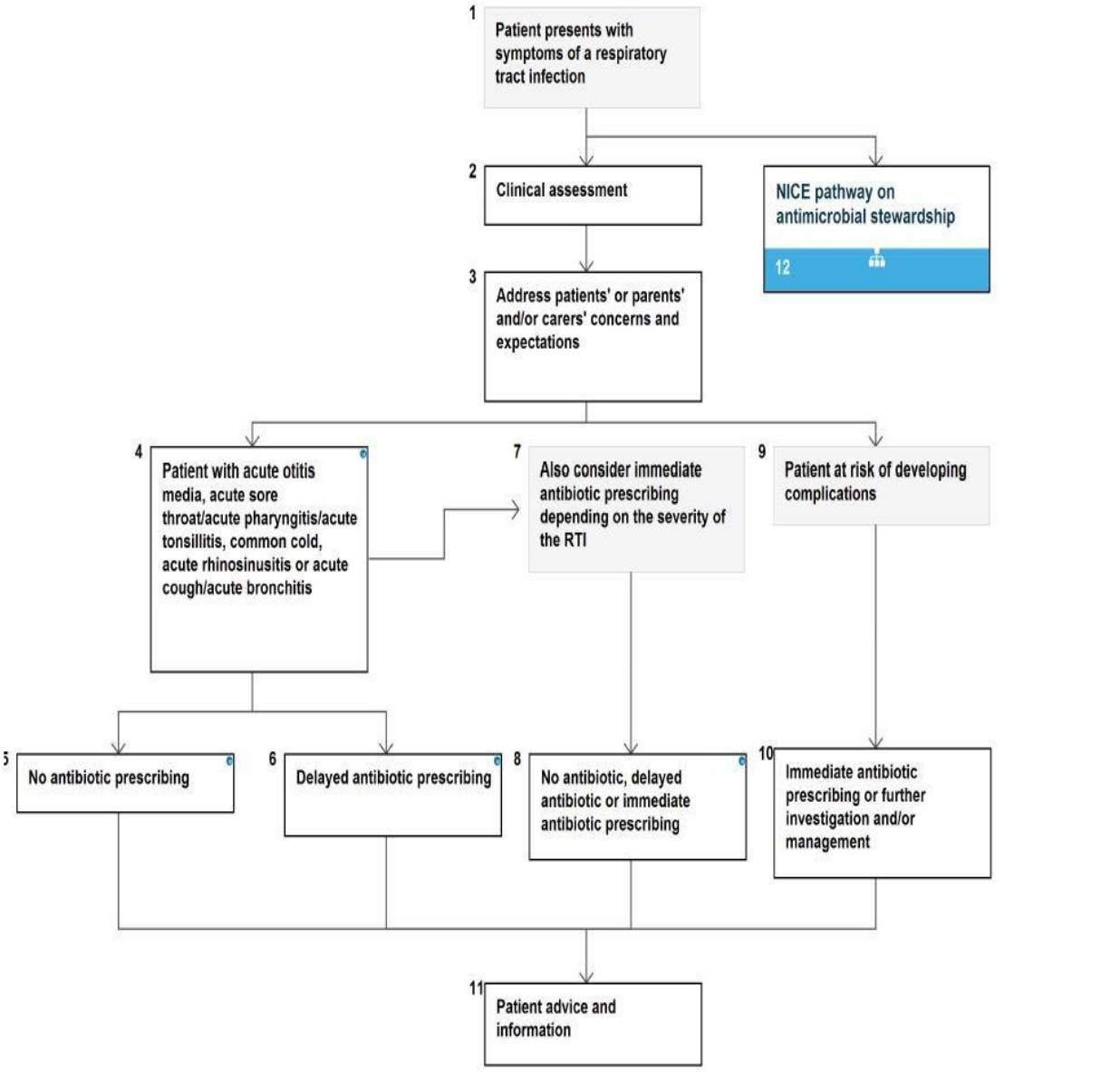
The FULL antibiotic guidelines can be found at:
http://www.networks.nhs.uk/nhs-networks/nhs-cumbria-ccg/medicines-management/lothian-formulary-1

Abbreviated Respiratory tract antibiotic guidelines

Condition	Comments	Drug and dose (listed in order of preference)	Duration (days)
UPPER RESPIRATORY TRACT/ENT			
Tonsillitis/ pharyngitis/ sore throat	**AVOID ANTIBIOTICS** as 90% resolve in 7 days without and pain only reduced by 16 hours. If Centor score 3 to 4: • lymphadenopathy • history of fever • tonsillar exudate • no cough consider 2 or 3-day delayed antibiotics or immediate antibiotics. *Antibiotics to prevent quinsy, NNT >4000* *Antibiotics to prevent otitis media, NNT 200*	**ANTIBIOTIC TREATMENT NOT ROUTINELY RECOMMENDED** If antibiotic is required, PHENOXYMETHYLPENICILLIN 500mg QDS (severe), **or** CLARITHROMYCIN 250-500mg BD	 10 5
Acute rhinosinusitis	**AVOID ANTIBIOTICS** as 80% resolve in 14 days without, and they only offer marginal benefit after 7 days (NNT 15) **Use adequate analgesia** Consider 7-day delayed or immediate antibiotic when purulent nasal discharge (NNT 8) In persistent infection use an agent with anti-anaerobic activity e.g., co-amoxiclav	**ANTIBIOTIC TREATMENT NOT ROUTINELY RECOMMENDED** If antibiotic is required, AMOXICILLIN 500mg TDS, **or** DOXYCYCLINE 200mg stat, then 100mg daily, **or** CLARITHROMYCIN 250mg BD **2nd line** – CO-AMOXICLAV 625mg TDS	 5 5 5 5
Otitis media (acute) – child doses	Antibiotics do not reduce pain in first 24 hours, subsequent attacks or deafness. Use paracetamol or NSAID. Otitis media resolves in 60% of patients in 24 hours **without** antibiotics. Antibiotics reduce pain at 2 days (NNT 15) Consider antibiotics (2 to 3 days) if: • <2 years AND bilateral otitis media (NNT 4) or marked otoscopic signs and ≥ 3 symptoms • All ages with otorrhea (NNT 3) Immediate prescribing may be appropriate for the following groups: • otorrhoea • <2 years with bilateral acute otitis media Haemophilus is an extracellular pathogen so macrolides (e.g., erythromycin), which concentrate intracellularly, are less effective therapy.	**ANTIBIOTIC TREATMENT NOT ROUTINELY RECOMMENDED** If antibiotic is required, AMOXICILLIN 40-90mg/kg/day in 3 divided doses up to 1 gram TDS, **or** CLARITHROMYCIN <8kg - 7.5mg/kg BD 8-11kg – 62.5mg BD 12-19kg – 125mg BD 20-29kg – 187.5mg BD 30-40kg – 250mg BD **2nd line** - CO-AMOXICLAV 1-6yrs - 156mg TDS 6-12yrs - 312mg TDS	 5 5 5
LOWER RESPIRATORY TRACT			
Lower respiratory tract infection (including acute bronchitis) in otherwise healthy individuals	Antibiotics are not routinely indicated. Consider prescribing an antibiotic if the person has a significantly impaired ability to fight infection (e.g.,immunocompromised status, cancer, or physical frailty) or if acute bronchitis is likely to significantly worsen a pre-existing condition (e.g. heart failure, angina, or diabetes). Alternative antibiotics may be used on the basis of sputum results.	**ANTIBIOTIC TREATMENT NOT ROUTINELY RECOMMENDED** If antibiotics are required, AMOXICILLIN 500mg TDS, **or** DOXYCYCLINE 200mg stat, then 100mg daily	 5 5
Exacerbations of COPD	Treat exacerbations promptly with antibiotics if: • purulent sputum **and** • increased shortness of breath **and/or** • increased sputum volume *Risk factors for antibiotic resistant organisms include co-morbid disease, severe COPD, frequent exacerbations, antibiotics in last 3 months*	 AMOXICILLIN 500mg TDS, **or** DOXYCYCLINE 200mg stat, then 100mg daily, **or** CLARITHROMYCIN 500mg BD	5 5 5
Community acquired pneumonia	Assess the person's need for admission by determining CRB65 score: • Confusion (AMT<8) • Respiratory rate > 30/minute • Age >65 years • BP systolic <90 or diastolic ≤60 Score 0, suitable for home treatment Score 1-2, hospital assessment or admission Score 3-4, urgent hospital admission **Give immediate Benzylpenicillin 1.2 grams IM or Amoxicillin 1 gram oral if delayed admission or life-threatening**	**If CRB65=0** AMOXICILLIN 500mg TDS, **or** DOXYCYCLINE 200mg stat, then 100mg daily, **or** CLARITHROMYCIN 500mg BD **If CRB65=1 & AT HOME** AMOXICILLIN 500mg TDS **AND** CLARITHROMYCIN 500mg BD, **or** DOXYCYCLINE 200mg stat, then 100mg daily	 5 5 5 5-7 5-7

Appendix E

NICE Clinical Pathway



Appendix F

Principles of Appropriate Antibiotic Use

Adult Appropriate Antibiotic Use Summary

Diagnosis	CDC Principles of Appropriate Antibiotic Use
Upper respiratory infections, not otherwise specified	1. The diagnosis of nonspecific upper respiratory tract infections or acute rhinopharyngitis should be used to denote acute infection that is typically viral in origin, and in which sinus, pharyngeal, and lower airway symptoms, although frequently present, are not prominent. 2. Antibiotic treatment of nonspecific upper respiratory infections in adults does not enhance illness resolution or prevent complications, and is therefore not recommended. 3. Purulent secretions in the nares and throat (commonly reported and seen in patients with an uncomplicated, upper respiratory tract infection) neither predict bacterial infection nor benefit from antibiotic treatment.
Acute pharyngitis	1. Group A beta hemolytic streptococcus (GABHS) is the etiologic agent in approximately 10% of adult cases of pharyngitis. The large majority of adults with acute pharyngitis have a self-limiting illness, which would do well with supportive care only. 2. The benefits of antibiotic treatment of adult pharyngitis are limited to those patients with GABHS infection. All patients with pharyngitis should be offered appropriate doses of analgesics, antipyretics and other supportive care. 3. Limit antibiotic prescriptions to those patients with the highest likelihood of GABHS. A. Clinically screen all adult patients with pharyngitis for the presence of the 4 Centor criteria: (1) history of fever, (2) tonsillar exudates, (3) no cough, and (4) tender anterior cervical lymphadenopathy (lymphadenitis). B. Do not test and do not treat patients with none or only one of these criteria. These patients are unlikely to have GABHS infection. C. Test patients with 2 or more criteria using a rapid antigen test. Limit antibiotic therapy to patients with a positive test. 4. Throat cultures are not recommended for the routine primary evaluation of adults with pharyngitis, nor for the confirmation of negative rapid antigen tests. Throat cultures may be indicated as part of investigations of outbreaks of GABHS disease, for monitoring the development and spread of antibiotic resistance, or when pathogens such as gonococcus are being considered. 5. The preferred antibiotic for treatment of acute GABHS pharyngitis is penicillin, or erythromycin for a penicillin-allergic patient.
Rhino-sinusitis	1. Most cases of acute rhinosinusitis diagnosed in ambulatory care are due to uncomplicated viral, upper respiratory tract infections. 2. Bacterial and viral rhinosinusitis are difficult to differentiate on clinical grounds. The clinical diagnosis of acute bacterial rhinosinusitis should be reserved for patients with rhinosinusitis symptoms lasting 7 days or more and who have maxillary facial/tooth pain or tenderness (especially when unilateral) and purulent nasal secretions. Patients who have rhinosinusitis symptoms for less than 7 days are unlikely to have a bacterial infection. 3. Sinus radiographs are not recommended for diagnosis in routine cases. 4. Acute bacterial rhinosinusitis resolves without antibiotic treatment in the majority of cases. Symptomatic treatment and reassurance is the preferred, initial management strategy for patients with mild symptoms. Antibiotic therapy should be reserved for patients meeting the criteria for the clinical diagnosis of acute bacterial rhinosinusitis who have moderately severe symptoms, and for those with severe rhinosinusitis symptoms—especially those with unilateral face pain—regardless of duration of illness. Initial treatment should be with the most narrow-spectrum agent that is active against likely pathogens *Streptococcus pneumoniae* and *Haemophilus influenzae*.
Bronchitis	1. The evaluation of adults with an acute cough illness, or with presumptive diagnosis of uncomplicated acute bronchitis, should focus on ruling out pneumonia. In the healthy, non-elderly adult, pneumonia is uncommon in the absence of vital sign abnormalities or asymmetrical lung sounds, and chest radiography is usually not indicated. In patients with cough lasting 3 weeks or longer, chest radiography is warranted in the absence of other known causes. 2. Routine antibiotic treatment of uncomplicated bronchitis is not recommended, regardless of duration of cough. In the unusual circumstance when pertussis infection is suspected, a diagnostic test should be performed and antimicrobial therapy initiated. 3. Patient satisfaction with care for acute bronchitis is most dependent on the doctor-patient communication rather than on whether or not an antibiotic is prescribed.

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

Appendix G

Upper Respiratory Viral Versus Bacterial Diagnosis Checklist

Name: _____ DOB: _____ Date: _____

GET SMART: KNOW WHEN ANTIBIOTICS WORK

Diagnosis	**Viruses**	**Bacteria**	**Antibiotic Needed**
Common Cold □ Cough, rhinorrhea, nasal congestion, postnasal drip, sore throat, headache, and myalgias			**NO**
Bronchitis/Chest Cold (in otherwise healthy adults & children) □ Chest soreness, fatigue, cough, body aches, sore throat, fever <101F			**NO**
Strep Throat □ Fever, absence of cough, cervical nodes swelling, tonsillar exudates.			**YES**
Sore Throat □ Hoarseness, red tonsils, scratchy throat, plus other cold symptoms			
Middle Ear Fluid (Otitis Media with Effusion) □ Ears fullness, pressure, muffle hearing			**NO**
Rhino-Sinusitis □ <10 days, nasal congestion, loss sense of smell, plus other cold symptoms			**NO**
Runny Nose □ (With green or yellow mucus this is not a sole criterion for infection that requires an antibiotic.)			**NO**
Others:			**YES/NO**

Follow Up & General Instructions:

- Drink extra water and fluids. Use cool mist vaporizer or saline nasal spray to relieve congestion. For sore throats in older children and adults, use ice chips, sore throat spray, or lozenges. Use honey to relieve cough. Do not give honey to an infant less than 1 year of age.
- If not improved in 5-7 days, new symptoms or changes occur, or if you have other concerns, please call 502-574-2273 returning to the office for further evaluation.
- Discharged instruction & other educational information attached for your diagnosed illness today.

Signed:_____

Appendix H

Pre- & Post-Implementation Results

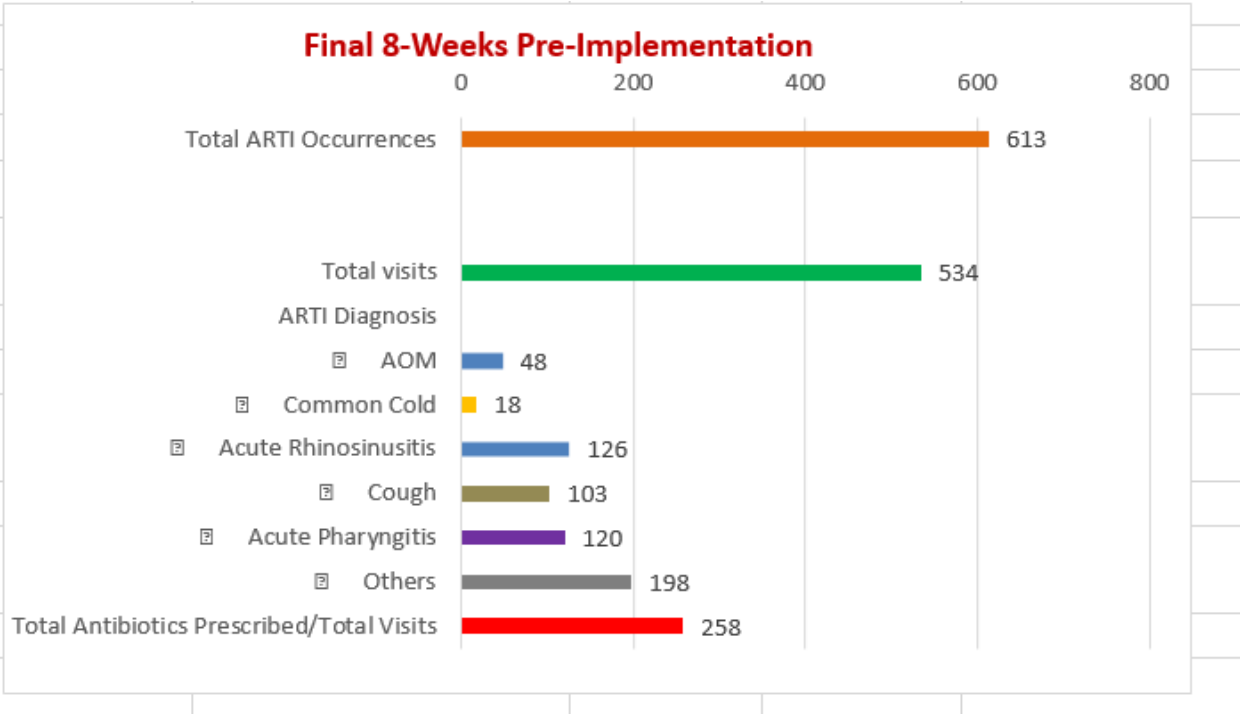
	PRE-IMPLEMENTATION		POST-IMPLEMENTATION	
PATIENT SATISFACTION RATES	91%		96%	
8 WEEKS ABX EXPENDITURES ($)	$2,335.65		$1,054.89	
TOTAL RTI VISITS	534		525	
TOTAL ABX PRESCRIBED	258		172	
ACUTE RTI DIAGNOSIS	**TOTAL CASES**	**ABX RATE (%)**	**TOTAL CASES**	**ABX RATE (%)**
AOM	48 (8%)	27 (10%)	33 (5%)	10 (6%)
ACUTE RHINOSINUSITIS	126 (21%)	74 (29%)	82 (14%)	8 (5%)
ACUTE PHARYNGITIS	120 (20%)	73(28%)	117 (20%)	35 (20%)
COMMON COLD	18 (3%)	3 (1%)	124 (21%)	0 (0%)
COUGH	103 (17%)	32 (12%)	72 (12%)	9 (5%)
OTHERS	198 (32%)	85 (33%)	168 (28%)	118 (69%)

DELAYED PRESCRIBING STRATEGY APPLIED: FOLLOW-UP CALLS			
TOTAL DELAYED PRESCRIBING CASES	**FEEL BETTER**	**SYMPTOMS WORSEN: ANTIBIOTIC CALLED IN WITHOUT A RETURN VISIT**	**NEED RETURN VISIT**
345 (66%)	338 (97%)	4 (0.01%)	3 (0.01%)

Pre-implementation Results:

FINAL 8-weeks Pre-implementation

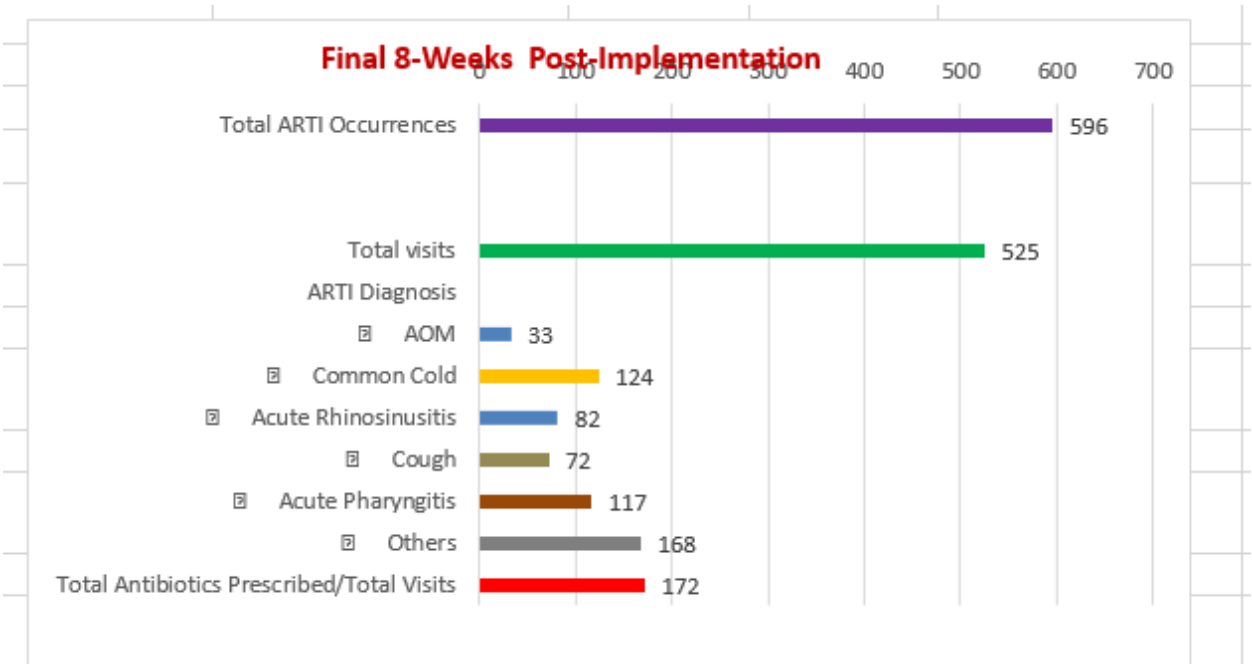
				Comment	
Total ARTI Occurrences	613				
Total visits	534				
ARTI Diagnosis	Total Count	Percentage	Antibiotics Prescribed Per Diagnosis	Percentage	
AOM	48	8%	27	10%	
Common Cold	18	3%	3	1%	
Acute Rhinosinusitis	126	21%	74	29%	
Cough	103	17%	32	12%	
Acute Pharyngitis	120	20%	73	28%	
Others	198	32%	85	33%	
Total Antibiotics Prescribed/Total Visits	258				



Post-Implementation Results:

FINAL 8-weeks Post-implementation

Total ARTI Occurrences	596		Comment	
Total visits	525			
ARTI Diagnosis	Total Count	Percentage	Antibiotics Prescribed Per Diagnosis	Percentage
AOM	33	5.54%	10	6%
Common Cold	124	20.81%	0	0%
Acute Rhinosinusitis	82	13.76%	8	5%
Cough	72	12.08%	9	5%
Acute Pharyngitis	117	19.63%	35	20%
Others	168	28.19%	118	69%
Total Antibiotics Prescribed/Total Visits	172			

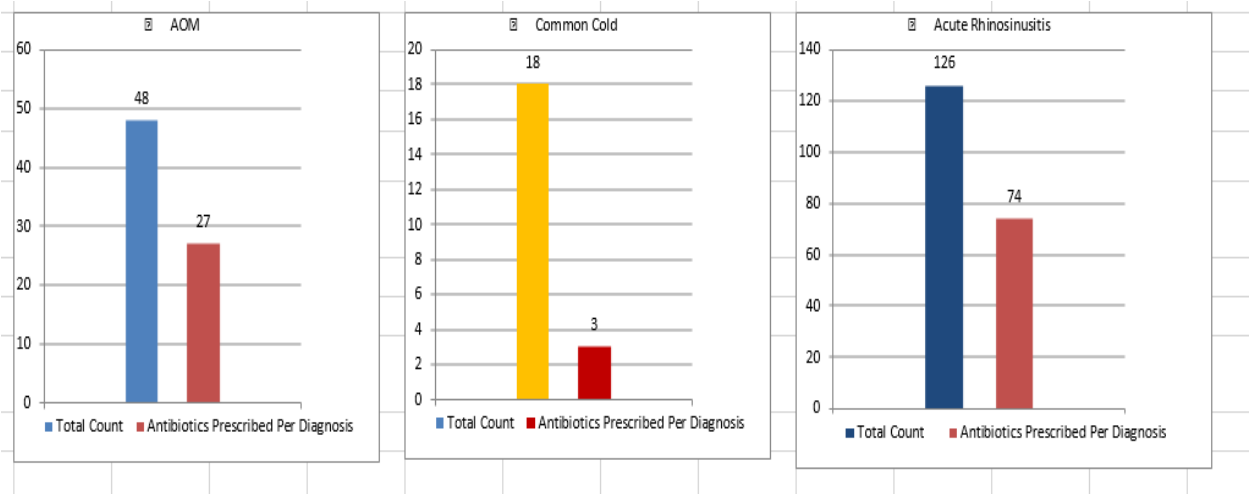


Pre- & Post-Implementation Results

Graphical Bars: Diagnosis Cases: Antibiotic Prescriptions

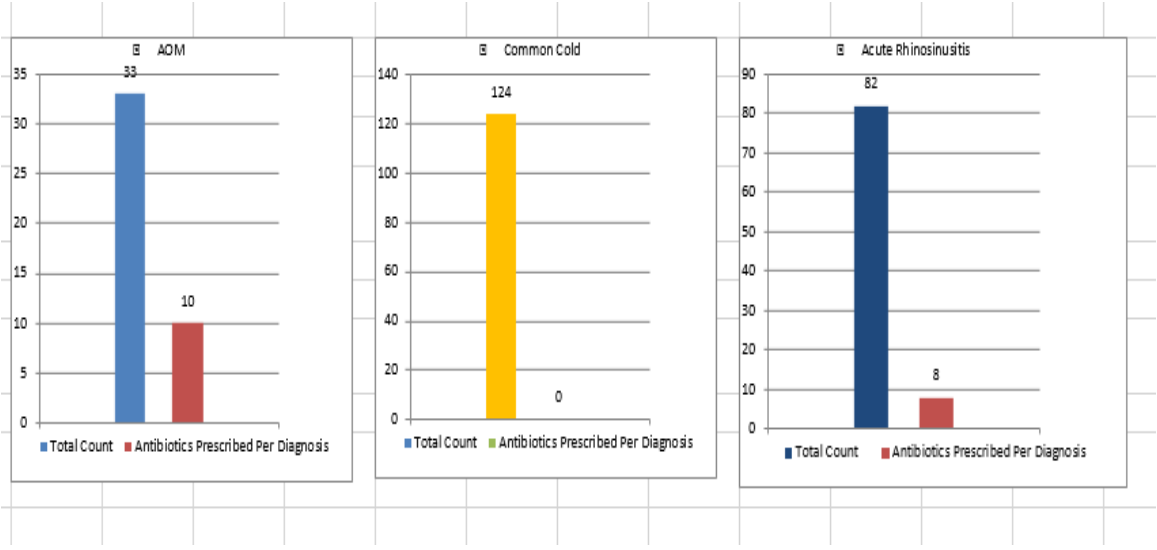
Pre-Implementation

AOM Common Cold Acute Rhinosinusitis



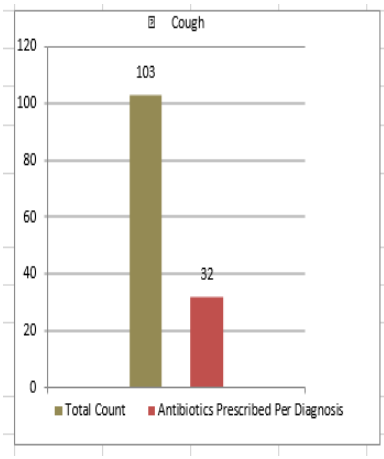
Post-Implementation

AOM Common Cold Acute Rhinosinusitis

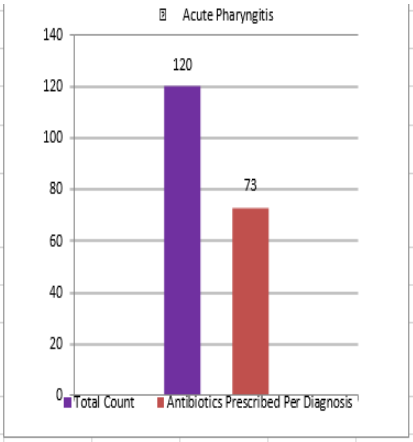


Pe-Implementation

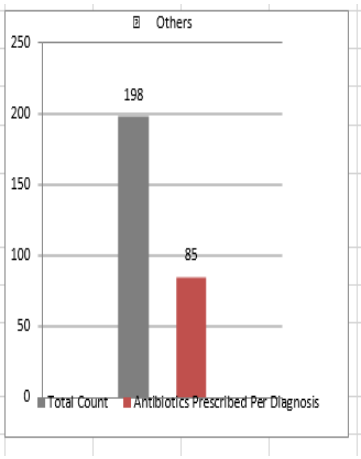
Cough



Acute Pharyngitis

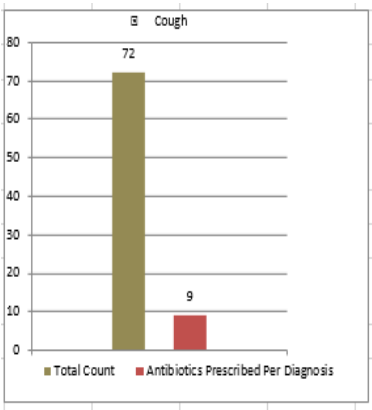


Others

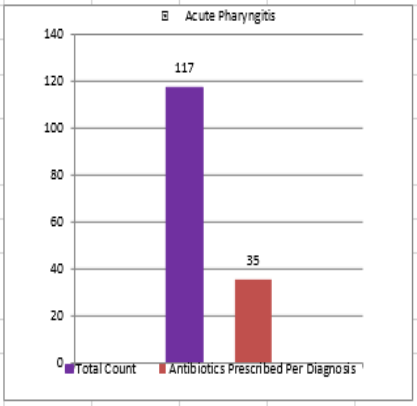


Post-Implementation

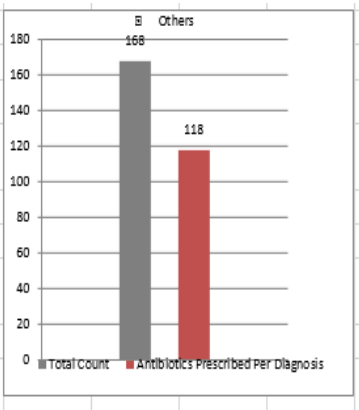
Cough



Acute Pharyngitis



Others



Appendix I

SWOT Analysis

Internal Forces (project)	**External Forces (organization or environment)**
Strengths	*Opportunities*
Support from stakeholders Large body of evidence Well recognized problem Motivation to instigate patient education Low cost to implement the project U Foster provider-patient relationships Immediate project's benefits may be apparent if practitioners strictly adhere to practice guidelines	Restore lost productivity/increase saving costs for practice Potential long-term benefits save people's lives Opportunity to reinforce providers the serious threats of antimicrobial resistance through actions Serves as educational opportunities for both patients and stakeholders (nurses, practitioners, medical directors, etc) Executing a successful quality improvement project will yield to opportunity in improving institutional integrity
Weaknesses	*Threats*
Time constraints that may hinder providers to offer patient education about the appropriate antibiotic use Lack of motivation to practice evidence-based guidelines	Patient satisfaction may be decreased Practitioners may decline to adopt EBP guidelines potentially due to time constraints in busy practice, which does not allow sufficient time to educate patients

Appendix J

Patient Education: Handouts & Posters

GET SMART…

- Antibiotics are strong medicines, but they don't cure everything.
- When not used correctly, antibiotics can actually be harmful to your health.
- Antibiotics can cure most bacterial infections. Antibiotics cannot cure viral illnesses.
- Antibiotics kill bacteria – not viruses.
- When you are sick, antibiotics are not always the answer.

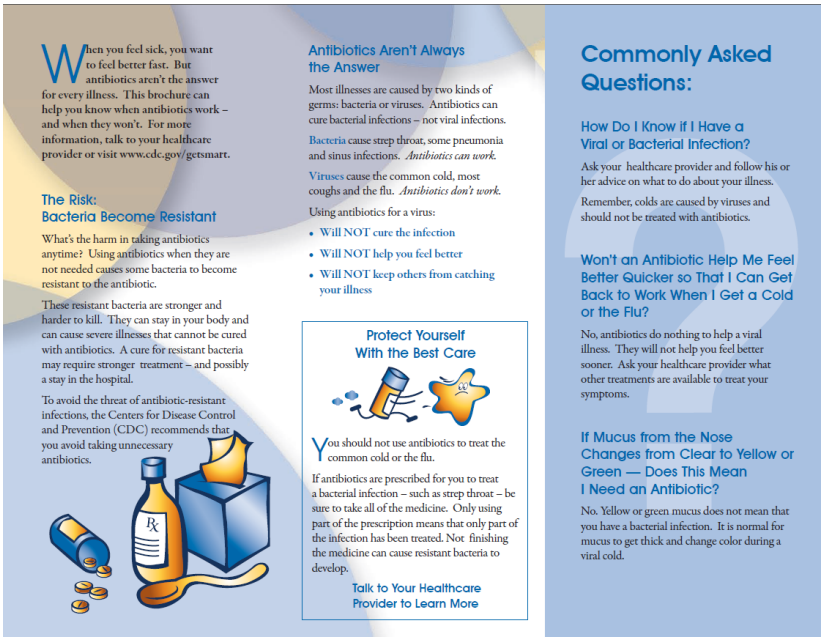
USE ANTIBIOTICS WISELY

Talk with your healthcare provider about the right medicines for your health.

GET SMART
Know When Antibiotics Work

Cold or Flu.
Antibiotics Don't
Work for You.

For more information, see the Centers for Disease Control and Prevention website at:
www.cdc.gov/getsmart or call 1-800-CDC-INFO



When you feel sick, you want to feel better fast. But antibiotics aren't the answer for every illness. This brochure can help you know when antibiotics work – and when they won't. For more information, talk to your healthcare provider or visit www.cdc.gov/getsmart.

The Risk: Bacteria Become Resistant

What's the harm in taking antibiotics anytime? Using antibiotics when they are not needed causes some bacteria to become resistant to the antibiotic.

These resistant bacteria are stronger and harder to kill. They can stay in your body and can cause severe illnesses that cannot be cured with antibiotics. A cure for resistant bacteria may require stronger treatment – and possibly a stay in the hospital.

To avoid the threat of antibiotic-resistant infections, the Centers for Disease Control and Prevention (CDC) recommends that you avoid taking unnecessary antibiotics.

Antibiotics Aren't Always the Answer

Most illnesses are caused by two kinds of germs: bacteria or viruses. Antibiotics can cure bacterial infections – not viral infections.

Bacteria cause strep throat, some pneumonia and sinus infections. *Antibiotics can work.*

Viruses cause the common cold, most coughs and the flu. *Antibiotics don't work.*

Using antibiotics for a virus:

- Will NOT cure the infection
- Will NOT help you feel better
- Will NOT keep others from catching your illness

Protect Yourself With the Best Care

You should not use antibiotics to treat the common cold or the flu.

If antibiotics are prescribed for you to treat a bacterial infection – such as strep throat – be sure to take all of the medicine. Only using part of the prescription means that only part of the infection has been treated. Not finishing the medicine can cause resistant bacteria to develop.

Talk to Your Healthcare Provider to Learn More

Commonly Asked Questions:

How Do I Know if I Have a Viral or Bacterial Infection?

Ask your healthcare provider and follow his or her advice on what to do about your illness.

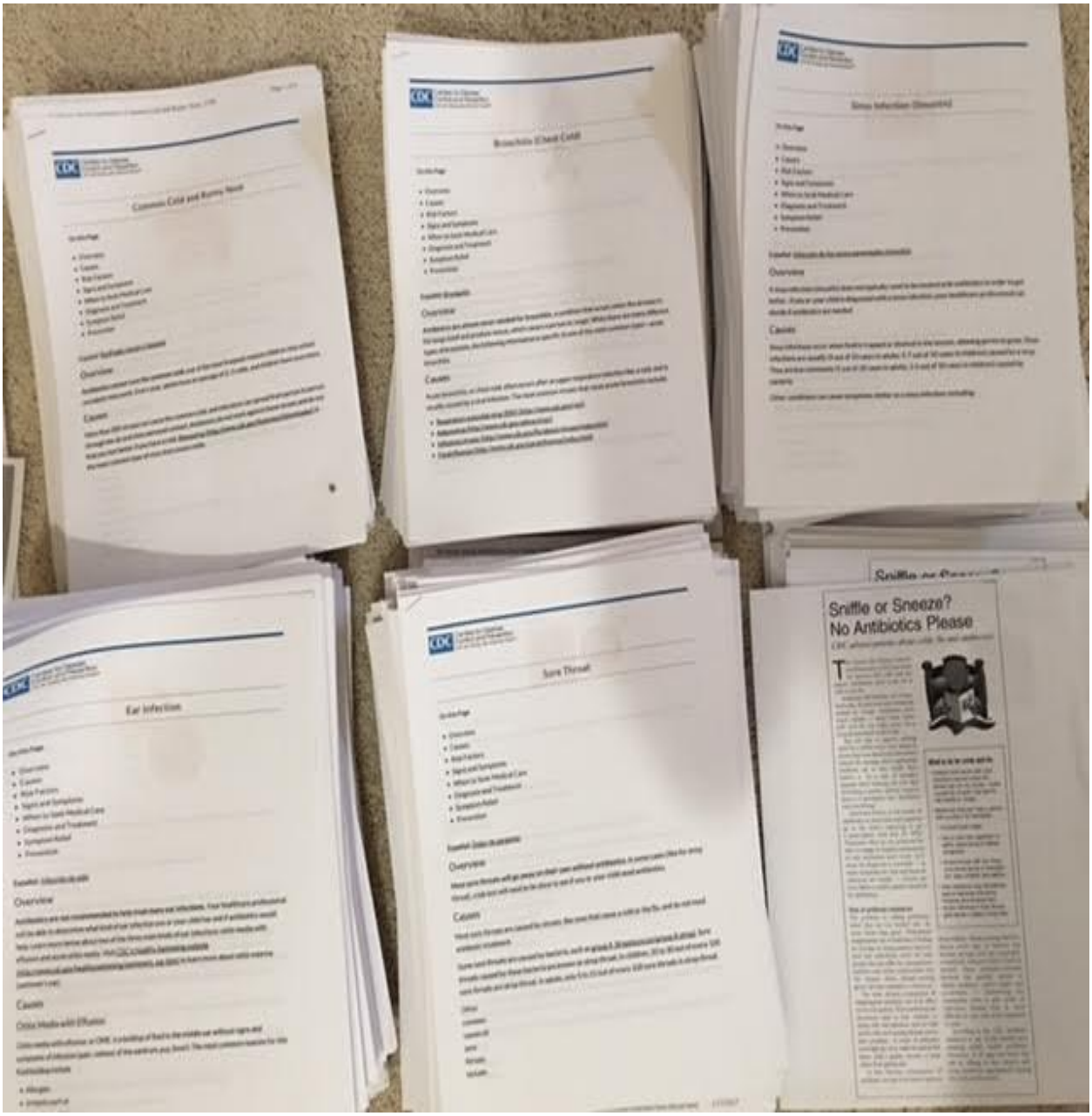
Remember, colds are caused by viruses and should not be treated with antibiotics.

Won't an Antibiotic Help Me Feel Better Quicker so That I Can Get Back to Work When I Get a Cold or the Flu?

No, antibiotics do nothing to help a viral illness. They will not help you feel better sooner. Ask your healthcare provider what other treatments are available to treat your symptoms.

If Mucus from the Nose Changes from Clear to Yellow or Green — Does This Mean I Need an Antibiotic?

No. Yellow or green mucus does not mean that you have a bacterial infection. It is normal for mucus to get thick and change color during a viral cold.


Common Cold and Runny Nose
Bronchitis (Chest Cold)
Ear Infection
Sore Throat
Sniffle or Sneeze?
No Antibiotics Please

Sniffle or Sneeze? No Antibiotics Please

CDC advises parents about colds, flu and antibiotics

The Centers for Disease Control and Prevention (CDC) has news for parents this cold and flu season: antibiotics don't work for a cold or the flu.

Antibiotics kill bacteria, not viruses. And colds, flu and most sore throats are caused by viruses. Antibiotics don't touch viruses — never have, never will. And it's not really news. It's a long-documented medical fact.

But tell that to parents seeking relief for a child's runny nose. Research shows that most Americans have either missed the message about appropriate antibiotic use or they simply don't believe it. It's a case of mistaken popular belief winning out over fact. According to public opinion research, there is a perception that "antibiotics cure everything."

Americans believe in the power of antibiotics so much that many patients go to the doctor expecting to get a prescription. And they do. Why? Physicians often are too pressured for time to engage in lengthy explanations of why antibiotics won't work. And, when the diagnosis is uncertain — as many symptoms for viral and bacterial infections are similar — doctors are more likely to yield to patient demands for antibiotics.

Risk of antibiotic-resistance

The problem is, taking antibiotics when they are not needed can do more harm than good. Widespread inappropriate use of antibiotics is fueling an increase in drug-resistant bacteria. And sick individuals aren't the only people who can suffer the consequences. Families and entire communities feel the impact when disease-causing germs become resistant to antibiotics.

The most obvious consequence of inappropriate antibiotic use is its effect on the sick patient. When antibiotics are incorrectly used to treat children or adults with viral infections, such as colds and flu, they aren't getting the best care for their condition. A course of antibiotics won't fight the virus, make the patient feel better, yield a quicker recovery or keep others from getting sick.

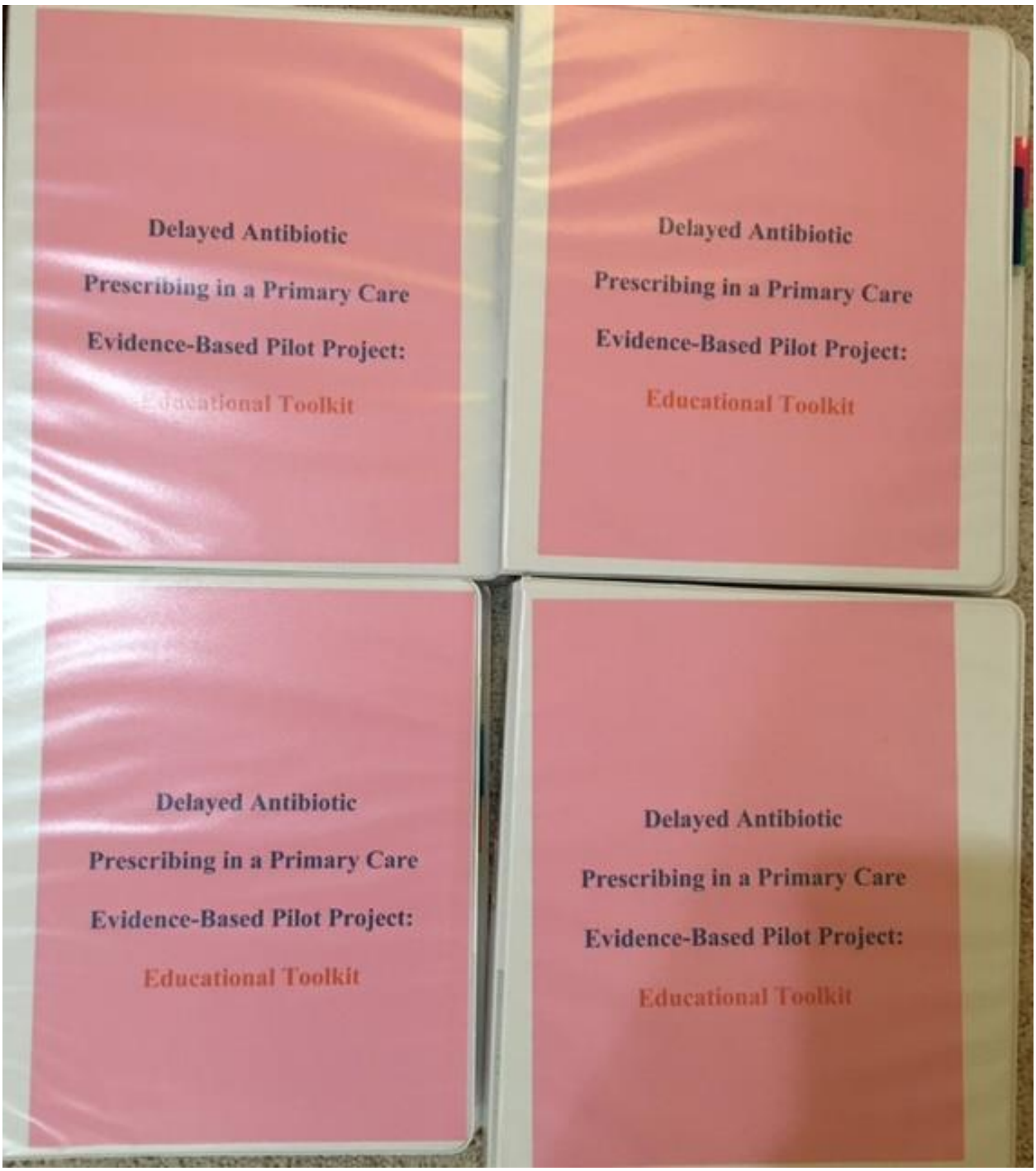
A less obvious consequence of antibiotic overuse is the boost it gives to drug-resistant disease-causing bacteria. Almost every type of bacteria has become stronger and less responsive to antibiotic treatment when it really is needed. These antibiotic-resistant bacteria can quickly spread to family members, school mates and co-workers — threatening the community with a new strain of infectious disease that is more difficult to cure and more expensive to treat.

According to the CDC, antibiotic resistance is one of the world's most pressing public health problems. Americans of all ages can lower this risk by talking to their doctors and using antibiotics appropriately during this cold and flu season.

What to do for colds and flu

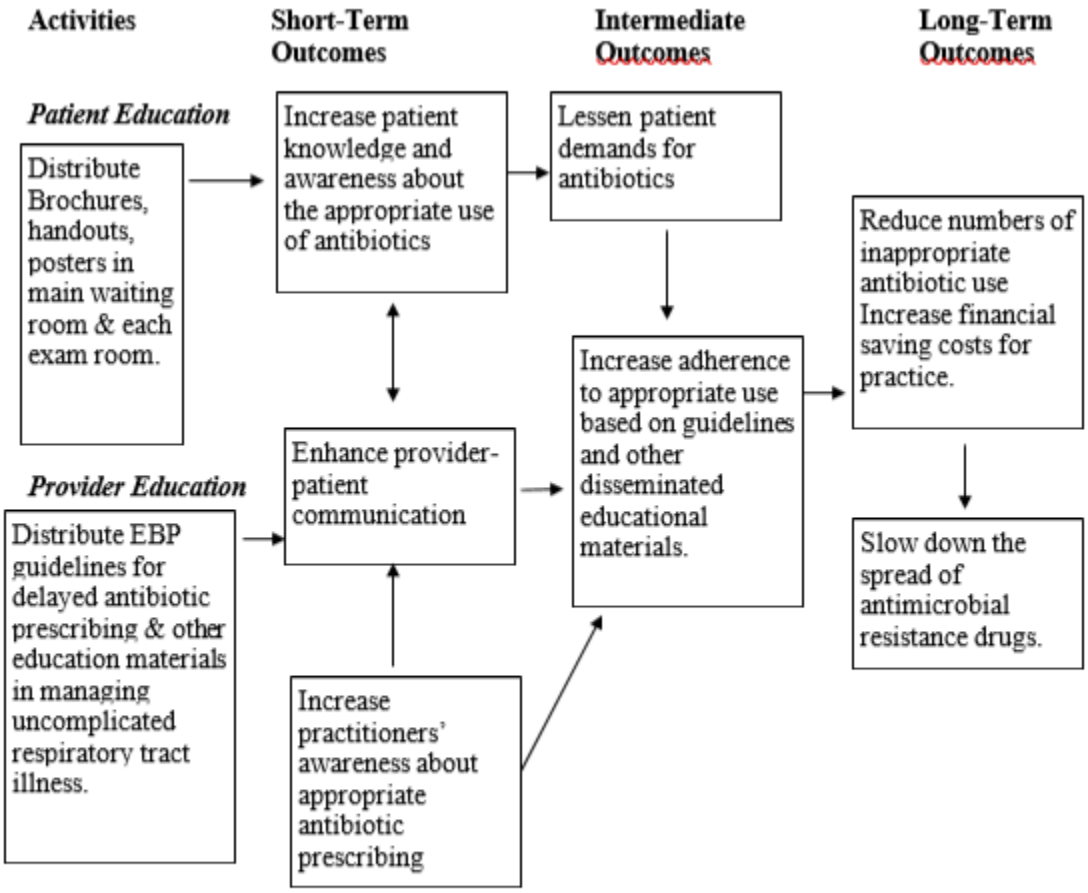
- Children and adults with viral infections recover when the illness has run its course. Colds caused by viruses may last for two weeks or longer.
- Measures that can help a person with a cold or flu feel better:
  - Increase fluid intake
  - Use a cool mist vaporizer or saline nasal spray to relieve congestion
  - Soothe throat with ice chips, sore throat spray or lozenges (for older children and adults)
- Viral infections may sometimes lead to bacterial infections. Patients should keep their doctor informed if their illness gets worse or lasts a long time.

Providers: Educational Binders



Appendix K

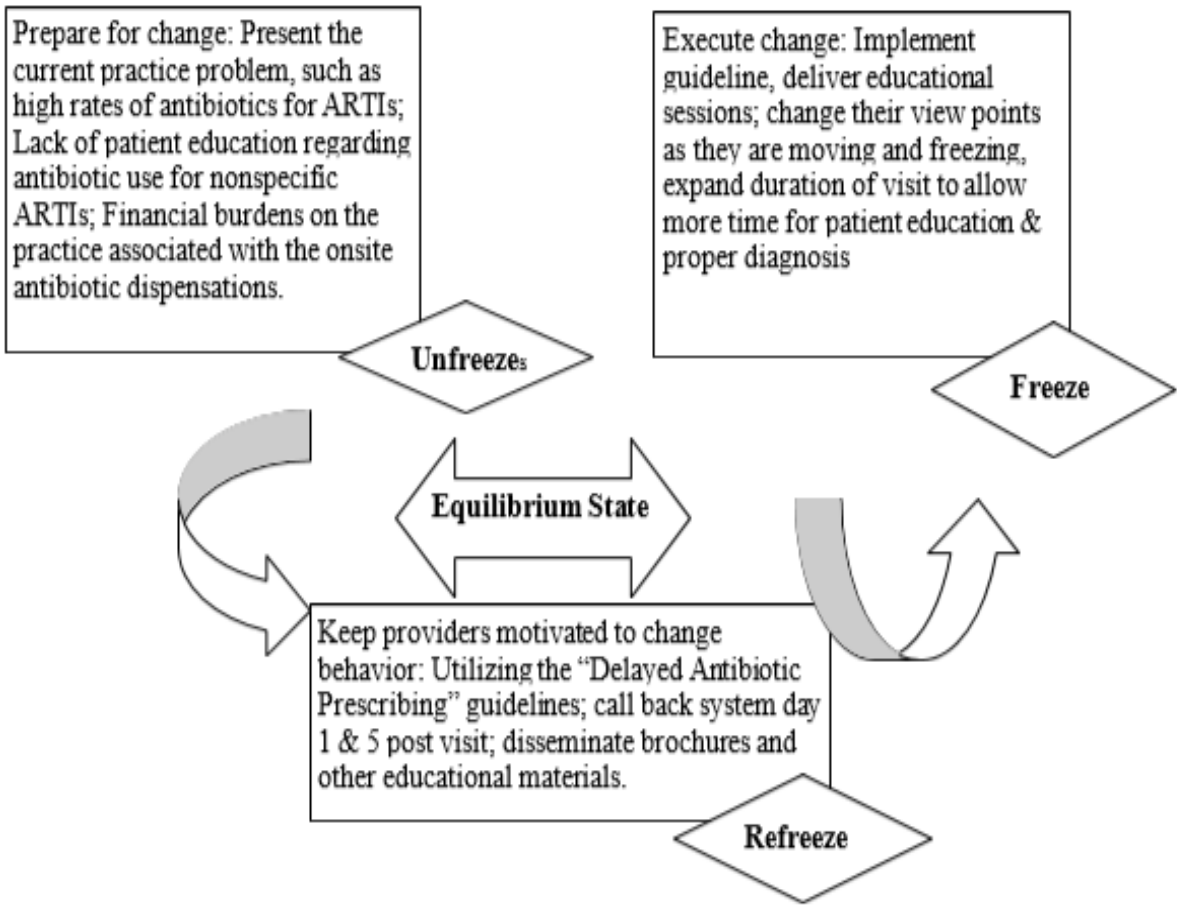
Logic Model



Modeled after CDC's Antibiotic Stewardship Logical Model. For more information, visit www.cdc.gov.

Appendix L

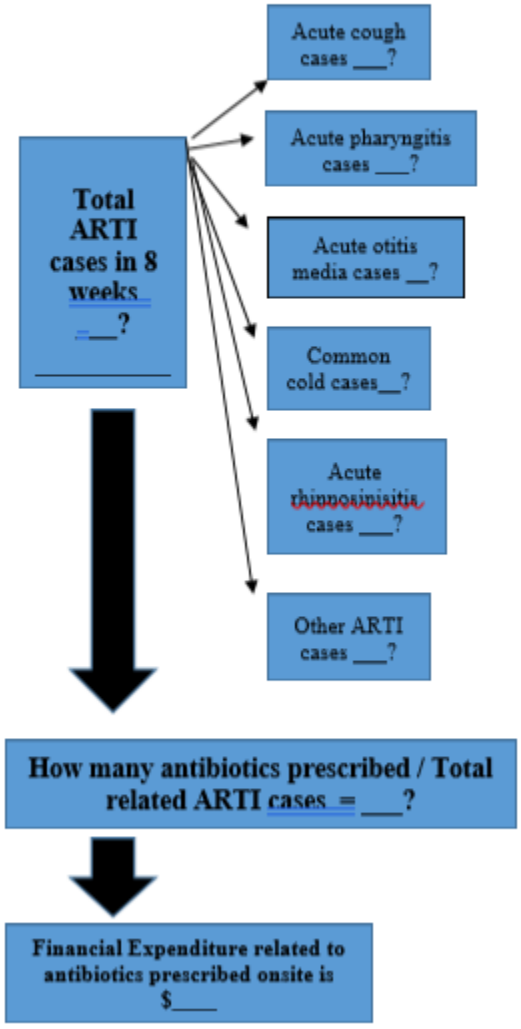
Kurt Lewin's Change Theory



Appendix M

Summarized Formula for the Pre-Intervention Data Analysis

1. **Pre- and post-implementation Data Collection** (numbers of ARTI cases; six categories of these related ARTI cases: Acute cough, acute pharyngitis, acute otitis media, common cold, acute rhinosinusitis, and other respiratory syndromes; total numbers of antibiotic; and financial expenditure amounts related to the antibiotics dispensed onsite)



Tracking Method: Spreadsheet Program

(Data was tabulated into this illustrated spreadsheet program from January-February and March-April as part of the pre- and post-implementation phase)

# Patient Visit	D.O.S.	#MR	Diagnosis						Antibiotic Prescrib
			AOM	Acute Pharyngitis	Common Cold	Acute Rhinosinusitis	Cough	Others	(Y/N)
1	1/5/2017					1			N
1	1/5/2017					1			Y
1	1/5/2017					1			Y
1	1/5/2017			1					Y
1	1/5/2017			1					N
1	1/5/2017					1			N
1	1/5/2017						1		Y
1	1/5/2017					1	1		Y
1	1/6/2017			1					y
1	1/6/2017			1					N
1	1/6/2017			1					Y
1	1/6/2017			1			1		Y

Appendix N

Letter to Providers

Dear Doctors and Nurse Practitioners,
This is Nina Nguyen, I hope you find this letter well. As some of you are aware, I am currently attending the last semester of my Doctor of Nursing Practice (DNP) degree at Chamberlain College of Nursing. I have proposed a quality improvement (QI) project at our worksite, [redacted] This is part of the DNP graduate expectation for completing the QI scholarly project. The project, is the "Delayed-Antibiotic Prescribing" in patients with acute respiratory tract infections (ARTIs). This project aims to deliver combined educational interventions to both providers and patients in addressing an identified need for reducing antibiotics use in primary care settings, specifically for uncomplicated ARTIs.

My primary goal is to decrease the numbers of unnecessary antibiotics used for ARTIs over eight weeks, through the implementation of various educational interventions. The secondary goal outcome is to reduce the burdens of the antibiotics expenditures that our practice absorbs, and I hope to increase the financial savings as one of the ultimate outcomes. These educational strategies to promote antibiotic stewardship programs will put a focus on delayed antibiotics prescribing for those ARTIs, such as acute otitis media, common cold flu-like symptoms, acute bronchitis, and acute pharyngitis in an otherwise, healthy adult patients. I will provide you with an Evidence-Based-Practice (EBP) Clinical Guideline, No. 69, developed by the National Institute of Health and Clinical Excellence (2008), and I strongly recommend you to utilize this as a clinical resource, more information will be shared upon the project implementation time. The project is anticipated to take place around early spring time of 2017 and lasts a total of eight weeks. This project would not be success without your support for the followings:

1. If a patient presents with acute respiratory tract symptoms, please kindly take some time to educate, answer questions, and explain to patients the course of viral illness and that the need for antibiotics is not needed. This approach is strongly encouraged through the delayed antibiotic prescribing strategy for the self-limiting respiratory tract infections.
2. Distribute educational handouts, and brochures about delayed prescriptions and antibiotics use (I will supply these printed materials) to patients upon the visit discharged.
3. Utilize the "Get Smart Antibiotics" checklists sheet by circling the appropriate viral ARTIs diagnosis accordingly, as noted on this sheet. Give patient a copy and retain this copy in the designated folder as a tracking method for me to follow-up.
4. The nursing assistant will call the patients day one post visit and I will call them on day five post visit for symptoms progression follow-up.

This project will be carried out accordingly to the expectations of Chamberlain College of Nursing DNP Program and the ethical principles of utilizing collected data by way of methods and tools developed, as per standardized guidelines of my school DNP Program. Your support and participation are very much appreciated.

Kind Regards,

Nina Nguyen, APRN, MSN, FNP-C
DNP Student

Appendix O

Plan for Educational Offering

OBJECTIVES	**CONTENT**	**TEACHING METHODS**	**TIMEFRAME**	**EVALUATION METHOD**
Practitioners (Physicians & Nurse Practitioners): Increase knowledge & awareness about appropriate antibiotic prescribing via EBP guideline for patients with ARTIs without specific indications for antibiotic treatment.	EBP NICE Clinical Guideline, Principles of antibiotic use from CDC Get Smart Antibiotic Stewardship Program, and NICE Clinical Algorithm/Pathway	Laminated sheet to be given to each provider for reference, verbal discussion of guideline and algorithms via group or inidividual meeting (depending on providers' schedule or time availability)	8 Weeks	Chart reviews and also evaluate at the numbers of antibiotic dispensation within each indication during the project implementation stage.
Patients: Decrease demand of unnecessary or inappropriate antibiotic use, increase knowledge of appropriateness or true therapeutic of antibiotic treatment in ARTIs	Appropriateness of antibiotic treatment for ARTIs	Posters displayed in waiting room and exam rooms, handouts such as brochures and other necessary informational materials to be distributed to patients	8 Weeks	Not measurable; however, we hope to see a significant decrease in inappropriate request for antibiotic treatment for ARTIs cases, ultimately, this may be evident in the total numbers of antibiotic dispensed onsite.
Provider-Patient Communication: Improve relationship of provider and patient through	Appropriateness of antibiotic treatment, symptoms relief methods for managing ARTIs	Allows more time during the visit encounter with patients to explain the rationales why	8 Weeks	Increase or at least unchange satisfaction rate (not decreased satisfaction rate from baseline)

effective communication		antibiotic is not an appropriate treatment or not indicated in viral or ARTIs cases and what to expect in terms of symptoms management.		after a decreased rate of antibiotic prescribing rate.