5-10-2019

# A Multifaceted Approach to Antibiotic Stewardship in the Outpatient Clinical Setting for Bronchitis

Elizabeth A. Weaver
*Valparaiso University*


# A MULTIFACETED APPROACH TO ANTIBIOTIC STEWARDSHIP IN THE OUTPATIENT CLINICAL SETTING FOR BRONCHITIS

by

**ELIZABETH A. WEAVER**

**EVIDENCE-BASED PRACTICE PROJECT REPORT**

Submitted to the College of Nursing and Health Professions

of Valparaiso University,

Valparaiso, Indiana

in partial fulfillment of the requirements

For the degree of

**DOCTOR OF NURSING PRACTICE**

2019

Elizabeth Weaver 5-10-19 Theresa Kessler 5-10-19

Student Date Advisor Date

## DEDICATION

For Keith, my husband and Jacob & Joshua, my sons without whom this journey would not have been possible.

For Bob & Linda, my parents and for Vivian (GG) my grandmother.

## ACKNOWLEDGMENTS

I wish to thank Dr. Theresa Kessler for her guidance, encouragement and respected critiques of this EBP project, and for her remarkable ability to construct a valuable timeline for completion in the way-back, which was firm, but I managed well enough. I would also like to thank the providers, staff and patients of the healthcare corporation where the project was implemented, especially Rachel Mullins and Alaina Reynolds.

I would also like to thank my family for their patience and support during this process.

**TABLE OF CONTENTS**

**Chapter Page**

## LIST OF FIGURES

**Figure Page**

## ABSTRACT

Antimicrobial resistance is a world-wide health crisis (Infectious Disease Society of America [IDSA], 2016; World Health Organization [WHO], 2017) expedited by the overuse/inappropriate use of antibiotics. In the outpatient setting it has been determined that approximately 60% of antibiotic therapies are prescribed (Centers for Disease Control and Prevention [CDC], 2016). Antibiotic stewardship is the coordinated effort to improve the use of antibiotic therapies, minimize misdiagnosis and delayed diagnosis and select appropriate antibiotic drug regimens (IDSA, 2016). The purpose of this evidence-based practice project was to evaluate the effects of an antibiotic stewardship program (presentation, survey collection, bimonthly e-mail reminders, patient education) for providers to determine prescribing practices for bronchitis. Pre-intervention, and post intervention chart audit for data collection was conducted based on the diagnosis code for bronchitis J20.9. Extensive literature review clearly supports bronchitis as the primary diagnosis which typically does not require antibiotic therapies (Schmidt et al., 2018). Outcomes measured included number of antibiotic prescriptions written for bronchitis before the antibiotic stewardship intervention and following the intervention. Also, the difference in prescribing rates for physicians and advanced practice registered nurses, also, provider attitudes towards antibiotic stewardship, and delayed prescribing. Chi-square test of independence was calculated comparing prescribing rates which remained consistent post intervention, ($X^2$ (1) = 0.622, $p$ >.05) indicating no statistical significance. An independent-samples $t$ test was calculated comparing the mean scores of nurse practitioners and physicians. No significant statistical difference was found ($t$ (2) = 0.283, $p$ > .05). However, survey results yielded positive responses congruent with attendance at the intervention presentation. Influenced by the antibiotic stewardship program nurse practitioners prescribing of antibiotics decreased from 85% pre intervention to 82.5% post-intervention. Providers agreed the overuse of antibiotics has contributed to the problem of drug resistance and that antibiotic education for

the public is important. The implementation of an antibiotic stewardship program presents an inexpensive intervention for the annual reintroduction of the detrimental effects of the mis/overuse use of antibiotics for providers and patients.

# CHAPTER 1

# INTRODUCTION

## Background

Antimicrobial resistance is a multifaceted public health crisis, increasing the risk to the effective treatment of an escalating range of infections caused by bacteria, parasites, viruses, and fungi (Infectious Disease Society of America [IDSA], 2016; Dobson et al., 2017). Antimicrobial resistance may lead to serious health crises that may have far-reaching and lasting effects on society. It has been documented that in the United States 2 million infections and 23,000 deaths will occur per year due to antibiotic resistance (Centers for Disease Control and Prevention [CDC], 2016; Fleming-Dutra et al., 2016; Klepser et al., 2017; Richards, 2018) at a cost of over $20 billion (IDSA, 2017).

Antimicrobial resistance threatens the actual treatment and prevention of infectious diseases caused by certain microorganisms. When exposed to antimicrobial drugs the alteration of the microorganisms of bacteria, fungi, viruses, and parasites begins (World Health Organization [WHO], 2017). These altered microorganisms render the medications given to patients useless on the illnesses and infections manifesting. Antimicrobial resistant infections then will cause death, contagion, and the potential for enormous costs (WHO, 2017). “Superbugs” are microorganisms that have developed resistance to many/most antimicrobials (WHO, 2017).

Antimicrobial resistance is the term that covers the extensive spectrum of microorganisms and their resistance to antibiotics, antivirals, antifungals and antiparasitic medications (WHO, 2017). Antimicrobial resistance does occur over time, but it is expedited by the overuse/inappropriate use of antibiotics, such as a viral illness being treated with antibiotic therapy or the wrong medication for a bacterial infection being prescribed. There may also be a lack of infection control protocols and prevention measures in the clinic setting, as well as a decreased quality of prescription drugs available (WHO, 2017). Of greatest concern is that

common illnesses and infections that were once easily treatable are now resistant and this situation will increase morbidity and mortality within society (CDC, 2016). Without action, there will be a post-antibiotic era where once curable common infections and injuries will kill people yet again (WHO, 2017).

## Statement of the Problem

To fight antibiotic resistant bacteria, it is crucial to improve antibiotic prescribing practices in the outpatient clinic setting. Many antibiotic therapies, approximately 60% are prescribed in the outpatient setting with overuse of antibiotic therapy being common (CDC, 2016; Drekonja, Filice, Greer, Olson, MacDonald, Rutks, Wilt, 2015). Within the adult population up to 50% of the antibiotic prescriptions may be inappropriate due to antibiotic selection, dosage, route, or duration of treatment, as well as unnecessary antibiotic treatment (IDSA, 2016; CDC, 2016). Increased rates of prescribing also have the contributing factors of patient expectation, patient and provider unawareness of antibiotic resistance, and a lack of knowledge of the serious consequences of antimicrobial resistance. Obstacles to correct antibiotic prescribing may further be lack of clinical guideline and best practice knowledge, a high volume of patients with increased pressure for expedited visits, and unsatisfied patients if antibiotic prescriptions are not given (CDC, 2016; Drekonja et al., 2015)

According to the CDC (2016) for the year 2013, 269 million antibiotic prescriptions were dispensed from outpatient pharmacies. For pediatric visits, 20% resulted in an antibiotic prescription, and 10% of adults received prescriptions in the outpatient setting. Consequences from antibiotic use may be self-limiting such as diarrhea or rash which are the most common, to respiratory airway edema that is classified as a severe adverse event, which is much less common. Severe adverse events account for approximately 140,000 emergency department visits per year (CDC, 2013). These visits are a contributing factor for excessive use of, at times, limited health care resources (CDC, 2016).

The most important risk factor for contracting a *Clostridium difficile* infection is antibiotic therapy (CDC, 2016; Drekonja et al., 2015; IDSA, 2016). Previously, *C. Difficile* infection (CDI) was considered a nosocomial pathogen, but it is increasing within the community (Klepser et al., 2017). Zetts et al. (2018) references that if there is judicious use of antibiotic therapies this will have an impact on community acquired *C. Difficile* (CA-CDI) infections. Further, many studies have discovered that most patients with CA-CDI were treated with antibiotics in the weeks leading up to the infections (Richards, 2018; Zetts et al., 2018). If there is a 10% decrease in outpatient antibiotic prescriptions, it is estimated that there would be a 17% decrease in community associated *C. difficile* infections (CDC, 2016).

Antibiotic stewardship in the outpatient setting will improve prescribing rates by clinicians, increase knowledge of use by patients for specifically only when needed, and help to ensure that when an antibiotic is prescribed it will be the right drug, dose, and duration of treatment. A program promoting antibiotic stewardship in the outpatient setting will improve patients' outcomes, decrease adverse events, allow for patient and provider satisfaction, and may help to decrease the effects of antimicrobial resistance.

**Data from the Literature Supporting Need for the Project**

The development of antimicrobial resistance has been several decades in the making. In 1943, Penicillin was the first commercially available antibiotic. During the 1950's through the 1970's, the introduction of 20 new classes of antibiotics deemed this period the "Golden Age of Antibiotics" (IDSA, 2016). Alexander Fleming, who discovered Penicillin, in his Nobel Prize speech from 1945 cautioned that "the public will demand these" and "bacteria could become resistant to these extraordinary drugs" (Ventola, 2015, p.278).

For more than 60 years, antibacterial drugs have been regarded as the remedy to cure infections, whether their use is appropriate, and whether the infection was community or hospital acquired (IDSA, 2016). Within the microorganism, the development of resistance is a normal evolutionary process. But this process has been enhanced by the discerning pressure

applied by widespread use of antibacterial drugs (IDSA, 2016). Antibacterial drugs have been misused in humans and the animals we use for food, this misuse benefits the survival and spread of resistant bacteria (IDSA, 2016). This misuse has led to antibacterial drugs being less effective, or worse, ineffective which is a public health threat and an emergency presenting limited treatment options. The efficacy of existing antibiotic therapies should be maintained through processes that lessen the development and spread of resistance to these therapies (IDSA, 2016). Antibiotics save patients' lives and have helped with numerous advances within modern medicine and surgery. Antibiotics have helped to extend expected lifespans by eradicating bacterial infections (Ventola, 2015).

Antibiotic stewardship is defined by multiple experts as "coordinated interventions designed to improve and measure the appropriate use of antibiotic agents by promoting the selection of the optimal antibiotic drug regimen including dosing, duration of therapy, and route of administration" (IDSA, 2016, p. 51). Defined by the CDC, antibiotic stewardship "is the effort to measure antibiotic prescribing; to improve antibiotic prescribing by clinicians and use by patients so that antibiotics are only prescribed and used when needed; to minimize misdiagnoses or delayed diagnoses leading to under use of antibiotics; and to ensure that the right drug, does, and duration are selected when and antibiotic is needed" (Sanchez, Dutra-Fleming, Roberts, & Hicks, 2016, p. 1)

In 2015, the Joint Commission established antimicrobial stewardship criterion for hospitals, long term care centers and ambulatory care among others following a White House Forum on antibiotic stewardship (Joint Commission Perspectives, 2016). The White House Forum along with the Joint Commission gathered several stakeholders from professional and governmental organizations including the Centers for Medicare and Medicaid Services (CMS), the Society for Healthcare Epidemiology of America (SHEA) and the Centers for Disease Control and Prevention (CDC) (Joint Commission, Perspectives, 2016). These agencies agreed that there is an urgent need for an antimicrobial stewardship standard among all providers of

healthcare services in all settings. The main goals for antimicrobial stewardship are for strong leadership within the organizational setting to promote use of best scientific based guidelines and protocols, to promote staff and provider education along with monitoring regarding antimicrobial resistance and stewardship, and to promote a multidisciplinary team approach to assist with the organizational education of patients and families regarding antimicrobials. The Joint Commission endorses the core elements of leadership commitment, accountability, drug proficiency, action, tracking, reporting, and education (CDC, 2016; Joint Commission Perspectives, 2016).

Currently, there is no cost incentive to implement an antibiotic stewardship program in the outpatient clinic setting. Outpatient clinics and community pharmacies unlike hospitals and long-term care facilities have no opportunity to rationalize funding based on reductions in antibiotic expenses or decreased duration of stay (Klepser, Dobson, Pogue, Labreche, Adams, Gauthier, Brigg Turner, Su, Jacobs, Suda, 2017). Expert opinion is that funding for outpatient antibiotic stewardship should control incentives for provider participation (Klepser et al., 2017). An example of this would be preferred provider status within the clinic for antibiotic prescribing by meeting quality measures. Also, an explanation for funding aimed at compliance supporting documented scientific guidelines and standards may provide incentives for participation with the avoidance of fiscal consequences (Klepser et al., 2017).

For the formation of an outpatient antibiotic stewardship program to be successful, the identification of the practice community and the stakeholders must be determined. For successful implementation of the program, goals and outcomes must be identified. Following team member acquisition, data analysis collection to define the focus of the antibiotic stewardship program will create the purpose of the program. The program outcomes must be concise and clear to avoid the creation of unmanageable expectations (Klepser et al., 2017). Outcomes to be measured within the antibiotic stewardship program may be, for example, clinical cures, treatment failures, antibiotic susceptibility patterns, guideline adherence, and

prescription data to highlight a few (Klepser et al., 2017). Since antibiotic resistant bacteria are not limited to the inpatient hospital setting with 66% of antibiotic use in the outpatient setting, there is an urgent need for antibiotic stewardship programs to be implemented the outpatient clinical setting.

**Data from the Clinical Agency Supporting Need for the Project**

In the community ambulatory clinic setting the reduction of inappropriate use of antibiotic therapies will help with the reduction of infections due to antimicrobial resistant microorganisms. This reduction of prescribing practices will require the identification of barriers of prescriber behavior to promote change (Arnold & Straus, 2009). Organization leaders and stakeholders should commit to antibiotic stewardship. Clinic leaders need to be willing to help with the identification of obstacles that lead to divergence of best practice guidelines (CDC, 2016).

In this evidence-based practice (EBP) project, one of the obstacles explored was the provider patient experience where pressure from patients for an antibiotic prescription is put upon the provider. This situation offered the opportunity to introduce the concept of a WASP (wait and see) prescription from providers. The basis of the WASP concept is that patients who are insistent, will be relieved to leave with the prescription, satisfied with the care received from the provider, and that the illness most likely will resolve and the prescription will not be filled (Arnold & Straus, 2009). Multifaceted interventions appear to be the most beneficial according to the literature sources. A step-by-step approach to interventions included evidence-based guidelines for providers, education for providers and patients, audit and feedback and WASP. Patients received educational brochures along with communication from their provider about antimicrobial therapies, risks, and benefits along with symptomatic treatment therapies to manage and alleviate symptoms (Arnold & Straus, 2009; CDC, 2016)

A large community health care system with six locations and 45 providers was the optimal place to implement this EBP project. Currently, there is no formal program focused on antibiotic stewardship for providers and patients. The Director of Practice Improvement as well

as the Director of Quality Improvement anticipate a protocol for yearly review of antibiotic stewardship in the outpatient clinical setting from this initial implementation of the intervention.

## Purpose of the Evidence-Based Practice Project

The purpose of this EBP project was to evaluate the intervention and implementation of an antibiotic stewardship program in the outpatient clinical setting for providers prescribing practices for bronchitis which typically does not require antibiotic therapies for treatment. Based on conversation with the Director of Practice Improvement, there currently is no formal antibiotic stewardship program in place. That said, according to the Director of Quality Improvement there does not appear to be a high number of providers inappropriately prescribing antibiotics for upper respiratory infections specifically bronchitis, but there has been no formal data analysis to determine so. But now these data will be determined following the pre-intervention chart audit. The project also impacts the patient experience with an increase in knowledge concerning antimicrobial resistance and antibiotic therapies. Antibiotic stewardship has the goal to maximize antibiotic treatment and minimize harm to the individual as well as communities (CDC, 2016).

### Compelling Clinical Question

The compelling question was: Will an outpatient antibiotic stewardship program increase provider awareness of inappropriate antibiotic prescribing for upper respiratory conditions specifically bronchitis, thereby decreasing the number of inappropriate prescriptions written while encouraging patient awareness of the detrimental effects of the use of antibiotic therapy when not required? The implementation of this multifaceted antibiotic stewardship program in the outpatient clinical setting will answer this question with data analysis and interpretation of results.

**PICOT Question**

In the outpatient setting will an antibiotic stewardship program directed by national clinical guidelines and best practice vs. no program decrease the number of unnecessary prescriptions for bronchitis in a three-month period?

## Significance of the EBP Project

The significance of this EBP project is binary. Antibiotics are prescribed too often for upper respiratory infections due to 90%-98% of the conditions being of a viral source and viral conditions will not improve with antibiotic therapies (IDSA, 2016). The CDC, WHO, and National Physician Alliance acknowledge that in clinical practice being a good steward is the ability/opportunity to decrease the prescription use of antibiotics for bronchitis, which also happens to be one of the top five applications of antibiotic stewardship (Holmes, Struwe, Waltman, 2018).

Antimicrobial resistance is directly attributed to the overuse and inappropriate prescribing of antimicrobial therapies (CDC, 2016). Although the development of antimicrobial resistance does occur naturally, the overuse of antibiotics in the outpatient setting has increased and accelerated the rate of antimicrobial resistant microorganisms (WHO, 2017). The unnecessary use of antibiotics in the outpatient setting promotes antibiotic resistance, which leads to increased healthcare costs; and has the potential to expose patients to adverse events (Weddle, Holmes, Goldman, Myers, Newland, 2016). To combat antibiotic resistant microorganisms, antimicrobial prescribing must be better (CDC, 2016).

Organizations must commit to antibiotic stewardship for the optimization of antimicrobial prescribing along with patient safety. As well as the commitment, there must be actions which may include a policy or procedure to improve the prescribing of antimicrobials, tracking and reporting of provider prescribing habits, and education for providers and patients about antibiotic stewardship (CDC, 2016). The antibiotic stewardship program will identify barriers, establish

standards, and identify high-priority conditions that require intervention such as antibiotic therapy for sinusitis (CDC, 2016).

Patients and families were provided education to evaluate perceptions of antibiotic use and to increase health literacy (CDC, 2016). Patients were informed that for viral infections antibiotics will not work, and that some bacterial infections may/will resolve on their own. Symptom management recommendations along with antibiotic therapy information is associated with an increase in patient satisfaction (CDC, 2016). Patient education included when to follow up or when to return if symptoms do not improve or if they get worse (CDC, 2016). Along with the enormous benefit that antibiotics have provided over the years there also is a possible harm associated with antibiotic use. Patients were made aware of possible side effects such as diarrhea, nausea, vomiting along with risk of adverse event such as airway restriction and *C. difficile* infections (CDC, 2016). Educational materials provided to patients about antibiotic use and when this use is needed and appropriate are a valuable tool and an offered an opening for providers to start the conversation of the risks, benefits, and possible harms associated with antibiotic use (CDC, 2016).

# CHAPTER 2

# THEORETICAL FRAMEWORK, EBP MODEL, AND REVIEW OF LITERATURE

This chapter provides a synopsis of the theoretical framework and EBP model guiding this project to include its applicability, strengths, and weaknesses. An overview of the synthesis and appraisal of the literature, the best practice recommendation, and how the best practice can answer the clinical question will be addressed.

## Theoretical Framework

### Overview of Theoretical Framework

For successful implementation, of this EBP project, the theoretical framework chosen was Lewin's Theory of Planned Change. According to the Lewin theory, when observing a situation, we must understand that there will be a "series of forces working in different directions" (Lewin, 1947, p. 341). Within the organizational setting, there will be forces eager to change and forces determined to maintain the current situation. Lewin's method hypothesizes that behavior is a role of the group environment or field (Lewin, 1947; Borkowski, 2016)

To implement the proposed change (goal), the forces eager and willing to change must be increased; these are the driving forces (Lewin, 1947; Borkowski, 2016). The restraining forces, those who wish to maintain status quo must be decreased or cleared away. With the acknowledgment and understanding of each force, it was then possible to differentiate between the two, and to determine issues that may be changed and those issues that will remain unchangeable. A goal is that the new behavior will be continuous, current, and normal behavior.

The stages of Lewin's Change model are unfreezing, change, and refreeze. Briefly, unfreezing involves getting ready for the change (Lewin, 1947). This stage involves the identification of the need to change, a change agent, and the identification of change champions, those willing to be involved with the change process. Within the unfreezing stage the identification of factors for and against change was determined. For the change to be successful the strengthening of forces for change and lessening of forces against change was

required. The change stage involved the intervention plan being implemented in the clinical setting. Also, the involvement of the change agents for coaching and reassurance that the change is relevant and valuable (Borkowski, 2016; Lewin, 1947; Shirey, 2013). The change agent is a cheerleader or champion. The requirement of the change agent is to promote the change. The change agent was available when questions or concerns arose and would help to propel the change forward. The final stage is refreezing. This stage encompasses the monitoring and evaluation of the new change for successful continuation and sustainability. This is the stage of the new normal. The change has been embedded in the facility and may remain permanent.

**Application of Theoretical Framework to EBP Project**

For the application of this framework, to the evidence-based practice project, the first step was to determine whether an antibiotic stewardship program was in place. Following consultation with the Director of Practice Improvement of the health care system it was determined that there was no requirement for providers and staff for a yearly program regarding antibiotic stewardship. Antibiotic stewardship programs are currently required for hospital and long-term care facilities that receive funds from the Centers for Medicare and Medicaid (CMS) Department of Health and Human Services (Joint Commission Perspectives, 2016). The outpatient clinic administration team has not been made aware of this requirement, but from our discussions, it was decided that an antibiotic stewardship program may, soon, be a requirement for federally funded clinics.

After an extensive review of the literature the *Core Elements of Antibiotic Stewardship* from the Health and Human Services Centers for Disease Control and Prevention was chosen to guide the elements of the antibiotic program to be implemented (UNFREEZING). For this program to be successful the identification of stakeholders and key members was necessary. Along with the Director of Practice Improvement, the Director of Quality Improvement was recruited as well and promoted the program as a change champion as I did, the project leader,

as well. A chart audit prior to the intervention was conducted to determine prescriber rates and appropriate therapies for upper respiratory illnesses specifically bronchitis.

For the implementation of the antibiotic stewardship program and the promotion of best practice, the literature supports the use of provider commitment, along with education, and audit with feedback will promote a successful outcome. Also, referenced within the literature is the recommendation of the appropriate actions for outpatient clinics to take as well as the incorporation of buy-in from major stakeholders within the organization (CHANGE).

Strategies utilized to encourage the permanent change are the incorporation of EBP guidelines for the treatment of upper respiratory conditions including bronchitis, pharyngitis, and sinusitis which are the diagnoses supported within the literature. Based on data collection from the health care system and to further support the intervention, the diagnosis to target for inappropriate prescribing of antibiotic therapies was specifically bronchitis. Promotion of the antibiotic stewardship program via e-mail, as well as, onsite was implemented as a “nudge” for providers to remain committed to correct prescribing habits (REFREEZE).

After a comprehensive review of the literature, it was determined that for antibiotic prescribers, the most frequent diagnosis of which inappropriate antibiotics were prescribed, is the category of upper respiratory infections, which include bronchitis, pharyngitis, and sinusitis. Providers received a training session about antibiotic stewardship, with feedback, as well as printed evidence-based guidelines for best practice for upper airway infections including upper respiratory infections and sinusitis. Providers also received tips and techniques for managing patients and parents of patients that demand an antibiotic for which there is no need (Rosenfeld et al., 2015, Wong et al., 2012; Zoorob et al., 2012).

**Strengths and Limitations of Theoretical Framework for EBP Project**

The strengths of the Lewin Change model are that it is easy to use, simple to understand, realistic and adaptable. Lewin’s Change model has been in existence for many, many years and thus there is a plethora of literature testifying to the usefulness, ease of use,

and relevance of the stages of the model. This model is most effective when used in a top-down approach for the implementation of a change (Shirey, 2013). For this project, formal leaders were very supportive and helped to promote the change. According to the research, change is successful when champions are in place to be the driving forces to propel the change forward (Borkowski, 2016; Lewin, 1947; Shirey, 2013). Further, according to the theory, change will be successful if there is buy in from stakeholders. The directors were willing and excited to be change agents for the promotion of the intervention.

Limitations of the model also affect the EBP project. The model appears to be too simplistic. This model uses a three-step approach to change which was not realistic nor generalizable. This three-step approach to change followed a linear path with no exception for circumstance. Change is multifaceted and unpredictable; therefore, in the clinical setting it was not be possible to frame the project in a three-step scenario.

## Evidence-based Practice Model

### Overview of EBP Model

The EBP model chosen for use with this project was the ARCC Model. ARCC stands for Advancing Research and Clinical Practice through Close Collaboration (Melnyk & Fineout-Overholt, 2015). This model strictly focuses on the implementation of best evidence-based practice along with promotion of sustainability system wide. This model has five steps. Step one was the assessment of the organization, the culture, and readiness for clinic wide change implementation. Step two was the recognition of strengths and limitations of evidence-based practice within the organization. Step three was the identification of evidence-based practice advisors and guides. Step four was the implementation of evidence into practice, and step five was the evaluation of determined outcomes that have resulted from the practice change (Melnyk & Fineout-Overholt, 2015; Schaffer, Sandau & Lee, 2012)

This model has been used within the community clinic setting as well as hospitals and has been established as a plan for the improvement of practice outcomes. The ARCC model

highlights the organizational culture and the circumstances that support evidence-based practice. The authors also clearly note that this model stresses organizational procedures to strengthen evidence-based practice within direct patient care, but that the decision-making process at the point of care must include provider expertise along with patient preference (Melnyk & Fineout-Overholt, 2015).

**Application of EBP Model to EBP Project**

The emphasis of the ARCC model is on organizational usage. For this project and step one of the model, the identification of organizational culture was determined as well as the readiness for change implementation. The large health care system with six offices and a total of 45 providers appeared to be the optimal setting for implementation of an outpatient antibiotic stewardship program. There currently is no program. The strengths of the organization are the administrative characteristics of an inviting and approachable attitude, as well as, progressive thinking with patient best interest at the forefront. The health care system also presents with a willingness to serve as a clinical cite for project implementation, with the future benefit of a sustainable organizational change which will then benefit the providers, patients, and community. This health care system serves a large, diverse population. The organization utilizes electronic health records (EHR) which support ease of data collection. Members of the implementation team included the project leader, director of practice improvement, and director of quality improvement. For implementation of evidence into practice, providers and patients were given information on antibiotic stewardship and best practice guidelines for upper respiratory illnesses.

Step two of the model, the identification of potential strengths and barriers of EBP, was determined. Strengths identified are administrative support with a knowledge of EBP. Barriers identified are a lack of a formal program and no determined champions. Future barriers to EBP may be individual providers unwilling to change or possibly providers having the attitude that antibiotic stewardship is someone else's problem. Step three of the model, the use of EBP

mentors were identified. The project leader, director of practice improvement as well as director of quality improvement were recruited to serve as mentors. Step four of the model, the implementation of evidence into practice based on clinical guidelines, was the promotion of the antibiotic stewardship program in the outpatient setting. Finally, step five is the evaluation of the predetermined, chosen outcomes.

**Strengths and Limitations of EBP Model for EBP Project**

The ARCC model also has the goal of promoting the EBP team. The aim is to provide healthcare systems with an organized conceptual framework to guide system wide implementation and sustain evidence-based practice. The use of the ARCC model for promotion of an antibiotic stewardship program will improve quality of care and patient outcomes. The ARCC model also can be used to achieve high reliability organizational status. These characteristics include the ability to deliver safe and high-quality care, decrease costs, and improve providers' job satisfaction (Melnyk, Fineout-Overholt, Gallagher-Ford, & Stillwell, 2011).

A strength of the ARCC model included clearly identified steps for the implementation of EBP into the practice setting and the identification of champions to facilitate the EBP change. Also, the ARCC model is a tested method for improving practice outcomes with a reputation of proven experience in the community practice setting. The focus of the ARCC model is the promotion of sustainability system wide for EBP implementation.

A barrier of the model may be provider knowledge deficit and use of EBP. Providers may see no value in EBP, this may lead to an unwillingness to acknowledge EBP and incorporate it into their practice. Another possible barrier may be a decrease in the buy-in from stakeholders to sustain and continue the project. Following implementation, the program may be allowed to fade away if champions and stakeholders see no real benefit.

## Literature Search

Research for relevant evidence was identified by searching multiple databases within the Christopher Center library system at Valparaiso University (see Appendix A). The search for evidence included the Cochrane Database of Systematic Reviews, The Cumulative Index to Nursing and Allied Health Literature, (CINAHL), Joanna Briggs Institute, MEDLINE, ProQuest, and PubMed, as well as National Guidelines Clearinghouse, Agency for Healthcare Research and Quality (AHRQ), and United States Health and Human Services Department Centers for Disease Control and Prevention. Key terms for the search included antibiotic, antimicrobial, stewardship, sinusitis, upper respiratory, systematic review, guidelines, prescribe, prescriber, therapeutic, use, pattern, outpatient, and ambulatory. Boolean operators and mesh terms were applied to the search as well. Limiters for the search were English language, scholarly and peer reviewed, and the years between 2014 and 2018. Additional studies were obtained by citation chasing from literature appearing with the qualifying criteria.

Relevant literature abstracts were read for qualifying criteria for possible inclusion. Inclusion criteria included the years 2014-present and English language as well as evidence of documented guidelines from professional organizations supported by experts in the field.

### Sources Examined for Relevant Evidence

The results from the CINAHL search were 17. All abstracts were read for content and qualifying criteria with three being chosen to include in the literature review. The results for MEDLINE were 40. After reading all abstracts one was selected based on qualifying criteria. For the Cochrane Database, nine sources were identified, with abstracts read for content. One Cochrane review was chosen following abstract evaluation, then ultimately dismissed due to current research presenting with increased comprehensive content. Joanna Briggs Institute resulted in a very large number of sources, 110. Abstracts of most closely related criteria were read; none were chosen for review. The National Guideline Clearinghouse presented evidence-based practice guidelines that were further searched to include one, the original guideline by the

American Academy of Otolaryngology through MEDLINE. The PubMed search resulted in 31 sources of those, all abstracts were read for content with one selected for review. ProQuest presented the largest quantity of sources, 147, with all abstracts read for content with most closely qualifying criteria resulting in one chosen for review. The search of AHRQ and CDC resulted in several sources with relevant content aimed at antibiotic stewardship programs in the outpatient setting. Skimmed for content, the interventions most closely aligned with qualifying criteria for providers and patients resulted with one being selected for review.

**Levels of Evidence**

From this extensive literature search, many sources were identified for content that met inclusion criteria. Eight sources were chosen for the review and appraisal. All sources of evidence were ranked according to the Melnyk and Fineout-Overholt hierarchy of evidence (Melnyk & Fineout-Overholt, 2015). This appraisal methods ranks evidence in a top down approach with those sources at the top of the pyramid, the highest level of evidence, being a level one. Level one evidence includes clinical practice guidelines, and systematic reviews. Level one evidence has been shown to have a lower risk of bias and is generalizable to the population Level two evidence includes randomized control trials (RCT's). These trials randomly assign participants to control or experimental group, and variables are the same for each group. Level three evidence includes controlled cohort studies. These studies follow participants over a period and the outcomes are measured and reported. Level four evidence includes uncontrolled cohort studies. These studies are of an observational method and no control was used to determine or maintain the participants or treatments. Level five evidence includes case studies and case series, qualitative and descriptive studies, EBP implementation and quality improvement projects. Level six evidence includes expert opinion. Once leveled, all sources of evidence were evaluated according to the Melnyk and Fineout-Overholt Rapid Critical Appraisal of Evidence, specifically, the Rapid Critical Appraisal of Guidelines and the Rapid Critical

Appraisal of Systematic Reviews and Randomized Control Trials (Melnyk & Fineout-Overholt, 2015).

A total of eight sources were selected. For the determination of best evidence-based practice, four clinical guidelines were ultimately chosen for inclusion. Clinical guidelines are a level one for strength of evidence according to Melnyk and Fineout-Overholt (2015) with high quality due to experts in the field being the researchers and creators of the guidelines. Also included are two systematic reviews that also are a level one for strength of evidence on the hierarchy by Melnyk and Fineout-Overholt (2015) with the quality being good due to the exhaustive search and inclusion criteria. Included as well are one randomized clinical trial and one retrospective cohort study. These studies are a level two and level four based on evidence respectively and were included based on the interventions presented within the literature, for example, provider commitment, that were ultimately implemented during the EBP project at the clinical site.

Guidelines according to the hierarchy by Melnyk and Fineout-Overholt (2015) are a level one. The level one status is achieved when experts in the field develop the guidelines, direct the guidelines to additional experts, then interpret and challenge the results of the feedback to determine best practice. Review and feedback are the basis for the guideline that presents best evidence-based practice. Systematic Reviews conduct exhaustive research to determine eligible studies to be included within the data set. These reviews include tables with relevant information such as outcomes, interventions, prescribing rates/use, and summary. Also, an overview of strength of evidence is contained within several articles and deemed appropriate with confirmation of good, satisfactory, or poor. Following the appraisal and leveling of the evidence eight sources are included for review. Six level one, one level two and one level four. The overall quality of evidence based on the leveling system is good.

**Appraisal of Relevant Evidence**

The appraisal of relevant evidence as shown in Appendix B was conducted according to the tools provided by Melnyk and Fineout-Overholt (2015). The Rapid Critical Appraisal of Systematic Reviews as well as Rapid Critical Appraisal of Guidelines were utilized. The appraisal of systematic reviews, as well as EBP guidelines, look to establish the credibility, transferability, applicability and generalizability that the chosen reviews and guidelines are presenting (Melnyk & Fineout-Overholt, 2015). Credibility has been determined due to the guideline developers being experts as well as major stakeholders in the field being represented (IDSA, 2016). The developmental strategy included an extensive, comprehensive review of literature that is easily reproducible (IDSA, 2016). Transferability is determined by the experts presenting explanations for diagnosis and treatment of common upper respiratory illness that may be utilized by family practice as well as other specialties (IDSA, 216). Within the guideline, recommendations for treatment are ranked with strength of evidence for use in practice as a strong recommendation, recommendation, or option (IDSA, 2016). Applicability and generalizability have been determined by the publication of the clinical guideline in the national practice journal as well as the presentation of standardization of clinical diagnosis and treatment (IDSA, 2016). These recommendations are clinically relevant and help in the care of patients (Melnyk & Fineout-Overholt, 2015). Further, these recommendations are practical, easy to implement, and are a reintroduction of best practice. With the administration of EBP standard of care these outcomes will be analyzed and measured for this EBP project.

**Level I**

The guideline provided by the CDC for review is based loosely on the previous versions of the guideline meant specifically for hospitals and long-term care facilities (CDC, 2016). This guideline is high quality due to adaptation and building on of best practice for antibiotic stewardship by systematic review which was researched and published in 2015 and 2016 respectively. Further identified were subject matter experts in outpatient antibiotic stewardship,

best practice, implementation, and policy. Experts on subject matter provided feedback and suggestions for improvement prior to the final draft. This guideline outlines core elements for outpatient clinics to implement for best evidence-based practice (CDC, 2016).

The Infectious Disease Society of America (IDSA) presents a guideline for implementation of an antibiotic stewardship program that has involved a rigorous process which applied the GRADE system for evaluation of the strength of recommendation and quality of evidence (IDSA, 2016). The GRADE system briefly involves the confidence level of the evidence as well as the determination of strength involving balance of benefits and harms, patient preferences, resources, and cost, as well as an implication for the population, the policy maker, and the healthcare worker. To be labeled as a strong recommendation, most people would want the recommendation, most people should receive it, and the recommendation is adaptable as a policy (IDSA, 2016).

For intervention and implementation of the best practice antibiotic stewardship program, one of the required steps is EBP for upper respiratory conditions, including sinusitis. This clinical practice guideline is presented by The American Academy of Otolaryngology which is an updated (2015) clinical practice guideline for diagnosis and treatment of adult sinusitis. This guideline is intended for use by providers who are likely to see adults in the clinical setting. Included within the guideline is a summary of EBP statements with strength of evidence for use. Also included for clinic use by providers is a defined algorithm for adults with possible sinusitis. This guideline will help providers in caring for their patients as well as present a standard of care to measure outcomes related to the diagnosis and treatment of sinusitis (Rosenfeld et al., 2015).

An additional guideline from Zoorob et al. (2012) and the American Academy of Family Physicians includes the diagnosis and treatment of upper respiratory conditions including bronchitis, pharyngitis, rhinosinusitis, as well as the common cold and influenza. Within this guideline, providers found key recommendations for practice with the stated evidence rating and

references. Also provided within the reading is a table with diagnostic findings along with appropriate treatment for common upper respiratory conditions.

Presented guidelines from the CDC (2015) and IDSA (2016) helped to serve as a guide within the interventions for implementation of an antibiotic stewardship program in the outpatient clinical setting. Guidelines recognized from the American Academy of Otolaryngology and the American Academy of Family Practice were presented to providers as a component of the multifaceted antibiotic stewardship program (CDC, 2015).

A systematic review by Drekonja et al. (2015) provides an evidence table on antibiotic stewardship interventions in the outpatient clinical setting. This review supplements and reinforces the CDC guideline for interventions which will be successful in decreasing the number of inappropriate prescriptions for upper respiratory conditions. For example, provider and patient education, communication skills training, and feedback for providers is included (Drekonja et al., 2015).

Finally, the systematic review by Keller et al. (2018) details the multiple interventions available for the provider in the clinical setting. Topics presented are provider education, audit and feedback, and communication techniques. Keller (2018) further presents information on interventions for the immediate clinic environment. These results are reproducible in the clinic setting with clinic outcomes that are relevant and important to best care.

**Level II**

A randomized control trial (RTC) by Meeker et al. (2015) presented the benefits of a “nudge” in the form of a public display for the judicious use of antibiotic therapy in the outpatient clinical setting. This RTC demonstrated that the consistent use of a public display (poster and provider picture) was successful in changing prescribing behavior as well as influencing patient behavior for requesting antibiotic therapies. This intervention was low cost and easily implemented in the outpatient clinical setting. This intervention was also shown to decrease inappropriate antibiotic prescribing.

### Level IV

A level four retrospective cohort study by Schmidt et al. (2018) demonstrated that provider and patient characteristics which may influence the inappropriate prescribing of antibiotic therapies for common upper respiratory conditions. Characteristics such as provider age and patient gender. Data extraction allowed for multiple factors to be analyzed. Specifically, provider prescribing rates as well as patient characteristics were presented in table form for ease of use. These interesting results further reinforced the need for an antibiotic stewardship program in the outpatient setting to be multifaceted with provider, patient and clinic interventions directed from within the organization.

## Construction of Evidence-based Practice

### Synthesis of Critically Appraised Literature

Ultimately, from the literature review, it was determined that the first step for recognizing how to decrease inappropriate outpatient antibiotic prescribing is to assess diagnoses for which antibiotics are hardly ever, indicated (Schmidt et al., 2018). Further to ascertain provider commitment to antibiotic stewardship practices, incorporate best evidence-based practice guidelines from nationally recognized professional organizations, evaluate interventions based on provider, patient, and facility specifics, and then finally implement a program founded on evidence based best practice guidelines is needed (CDC, 2016; Drekonja et al., 2015; Dobson et al., 2017; IDSA, 2016; Schmidt et al., 2018).

### Provider Perceptions and Knowledge of Antimicrobial Stewardship/Resistance

Within the literature it is noted that providers acknowledge the threat of antimicrobial resistance, disregard in some cases the seriousness of that threat (antimicrobial resistant microorganisms), and providers believe that antibiotic stewardship is a concern for every specialty setting (Drekonja et al., 2015; CDC, 2016; Arnold & Straus, 2009; Schmidt, Spencer, & Davidson, 2018; Zetts et al., 2018). All authors present the opinion that there is an agreement that the over use of antibiotic therapy is a chief reason for the emergence of antimicrobial

resistant microorganisms (Arnold & Straus, 2009; CDC, 2016; Drekonja et al., 2015; Schmidt, Spencer, & Davidson, 2018; IDSA, 2016; Rosenfeld et al., 2015; Zetts et al., 2018).

Combating antimicrobial resistance with a defined and focused antimicrobial stewardship program is a priority most providers agree with (IDSA, 2016; Drekonja et al., 2015; Keller et al., 2017; Meeker et al., 2015; Schmidt, Spencer, & Davidson, 2018; CDC, 2016; Arnold & Straus, 2009). Zetts et al. (2018) and Fiore et al. (2017) described providers as being aware of inappropriate prescribing and overuse of anitbiotics, but deem the problem due to other providers practices mainly, not themselves.

**Provider Prescribing Practices and Patient Characteristics**

Higher rates of antibiotic prescriptions from providers were associated with patient expectations and patient satisfaction, along with patient and provider knowledge deficits of antibiotic resistance (Drekonja et al., 2015; Keller et al., 2018; Meeker et al., 2015). Increased workload and decreased patient visit time are factors for an increase in providers prescribing practices (Zetts et al., 2018). Provider age was also determiners of prescribing rates (IDSA, 2016). Provider age does appear to play a role in antibiotic prescribing practices (Meeker et al., 2017). From the literature, it was noted that older providers were more likely to prescribe antibiotics inappropriately for upper respiratory conditions than their younger counterparts. Patient characteristics such as age and ethnicity, as well as insurance coverage effected the number of prescriptions written as well (Drekonja et al., 2015; Schmidt, Spencer, & Davidson, 2018). As provider age increased, the likelihood of receiving an antibiotic prescription also increased up to the provider age of 61 years. For providers in the 51-60-year age group, the patient was four times more likely to receive the antibiotic as for prescribers younger than 30 years of age (Schmidt et al., 2018).

Patient characteristics of age, ethnicity, and insurance status also played a role in provider antibiotic prescription receipt (Meeker et al., 2017). For patient age 20-39 years, they were 4% less likely to receive an antibiotic than the patients who fell between 40-64 years of

age. For age, it was determined that older age increased the likelihood a prescription was provided possibly due to family responsibilities or return to work status (Schmidt et al., 2018). White patients were more likely to receive an antibiotic prescription than those of Asian or African American descent (Schmidt et al., 2018).

Commercial insurance patients were 10% more likely to receive an antibiotic prescription than patients with managed care plans. Patients with other forms of insurance such as no insurance, worker's compensation, and self-pay were less likely to receive an antibiotic prescription (Schmidt el at., 2018). Patients with Medicare and Medicaid were less likely to receive an antibiotic compared to patients with commercial plans (Schmidt et al., 2018).

Additional reasons for inappropriate prescribing were found in the literature and included defensive prescribing (departure from standard practice to prevent complaints), being unaware of current practice guidelines, patient demand, and clinic philosophy (IDSA, 2016; Meeker et al., 2015).

Providers consider patient demand a substantial factor when prescribing antibiotics and some providers believed patients expect actions (antibiotic prescription) that are substantial to address their illnesses (IDSA, 2016; Keller, Tamma, Cosgrove, Miller, Sateia, Szymczak, Gurses, Linder, 2018; Meeker et al., 2015; Zetts, Stoesz, Smith, & Hyun, 2018). Fiore et al. (2017) found mixed results with patient satisfaction when providers prescribe antibiotics in the outpatient setting. According to Fiore et al. (2017), it appears that when providers explain why antibiotic therapy is not needed versus a provider who just writes the script, a higher level of satisfaction from patients is reported (Fiore et al., 2017). Zetts et al. (2018) and Meeker et al. (2017) also described a concern for the provider with experience of the threatened (possible) loss of patients, if the antibiotic prescription is denied. Further, Zetts et al. (2018) and Meeker et al. (2015) have revealed that providers may be seeing a decrease in this demand by patients due to increased media attention surrounding antimicrobial resistance.

**Education & Feedback for Providers**

Provider education will be multifaceted and include current best practice guidelines, audit and feedback, and communication skills exercises. Clinical practice guidelines adhering to best practice published from national professional societies and organizations such as the Infectious Disease Society and the American Academy of Otolaryngology-Head and Neck Surgery should be utilized. This education will be in the form of a policy implementing the use of national guidelines for evidence-based treatment recommendations and diagnostic criteria (CDC, 2016 Drekonja et al., 2015; IDSA, 2016; Keller et al., 2018; Meeker et al., 2015; Schmidt et al., 2018; Zetts et al., 2018). Drekonja et al. (2015) references that within published studies concerned with antibiotic use, there was a significant decrease in prescribing following implementation of best practice guidelines. Keller et al. (2018) and IDSA (2016) described providers who attended evidence-based education for antibiotic stewardship focused on upper respiratory conditions showed a decrease in antibiotic prescribing over a 30-month period. And for providers attending education as well as feedback with peer review sessions, the reduction in prescribing inappropriately decreased from 54% to 27% which was sustainable for 2-3 years (Keller et al., 2018)

**Commitment from Providers**

Provider commitment to antibiotic stewardship as presented within the literature is the implementation of an intervention for antibiotic stewardship. A provider signed poster in the waiting area committed to appropriate antibiotic prescribing, as well as posters in exam rooms stating appropriate use of antibiotics will be verification of provider commitment (Meeker et al., 2015; Zetts et al., 2018). Commitment letters signed by providers posted in examination rooms may lead to a decrease in inappropriate antibiotic prescriptions (Meeker et al., 2015; Zetts et al., 2018). Along with the commitment letter, a picture of the provider as well as a signature from that provider on the letter stating a commitment to avoid inappropriate antibiotic prescribing led to a decrease in the number of inappropriate antibiotic prescriptions by providers and requested

by patients (Zetts et al. 2018). This intervention was prescriber specific in that providers had their own exam rooms and there was no movement of patients within the different provider exam rooms. This low-cost intervention of the posted letter committing to avoiding inappropriate antibiotic prescriptions if implemented across the United States "could eliminate 2.6 million unnecessary antibiotic prescriptions and save 70.4 million annually on drug costs alone" (Meeker et al., 2015, p. 8). According to Meeker et al. (2015), public commitments such as the signed poster in the waiting area indicate suggested intervention follow through is successful with decreasing inappropriate antibiotic prescriptions.

**Action to be Taken by Providers**

Communications skills training for providers improved patient and provider experience which addressed patient concerns and questions regarding treatment options for illness and diseases (CDC, 2016). Strategies to inform patients of the harms and benefits of antibiotic therapy and the symptomatic management of illness will increase patient awareness (CDC, 2016). Providers also must have the tools needed to manage patient expectations and the disappointment certain patients will feel with not receiving an antibiotic during an outpatient visit (Keller et al., 2018; Meeker et al., 2015). Provider decision support through the EHR showing diagnosis and treatment in print form for patients to have and take with them at the end of the visit decreased inappropriate antibiotic prescriptions (CDC; Sanchez, Guillermo V; Dutra-Fleming, Katherine E; Roberts, Rebecca M; Hicks, Lauri A, 2016; Keller et al., 2018).

**Tracking and Reporting**

Tracking and reporting of antibiotic prescribing practices, also referred to as audit and feedback, were used to encourage practice change and to assess antibiotic prescribing practices, and to determine whether an increase or decrease in prescribing is noted. The approach to track and report on identified conditions such as upper respiratory infections can be implemented to assess antibiotic therapy appropriateness, correct diagnosis and antibiotics given, and if dose and duration were correct according to best evidence-based practice (IDSA,

2016; Meeker et al., 2015;). Keller et al. (2018) IDSA, (2016) and Zetts et al. (2018) agreed that interventions which incorporate audit and feedback have been successful. While Zetts et al. (2018) and the CDC (2016) described the audit of providers who were made aware of their own personal prescribing practices "significantly improved prescribing habits for common acute respiratory tract infections" (p.6). However, Keller et al. (2018) found that for providers with high prescribing rates and who received data about their habits "did not impact antibiotic prescribing over 2 years" (p.424). This negative effect was possibly due to providers receiving written communication about prescribing habits, which then required the provider to follow-up electronically. Related to a substantial decrease in inappropriate antibiotic prescribing was individualized feedback for providers regarding their individual antibiotic prescribing rates (CDC, 2016; IDSA, 2016; Drekonja et al., 2015; Keller et al., 2018; Schmidt et al., 2018)

**Delayed Prescribing**

Delayed prescribing, the WASP (wait and see prescription), and watchful waiting all have been described in the literature as useful techniques for promotion of antibiotic stewardship and best practice (CDC, 2016; Drekonja et al., 2015; Keller et al., 2018). For this prescribing technique, the patient is given a prescription with explicit instructions for when to have it filled. Drekonja et al. (2015) summarized that along with patient education or no education from provider, the delayed prescribing technique resulted in a significant reduction in prescription use. Further, the recommendation states for providers to inform patients to call if a condition does not improve or gets worse and at that time providers may give the prescription for antibiotic therapies if warranted. Best EBP promotes symptomatic treatment with watchful waiting and delayed prescribing for illnesses to safely decrease overuse antibiotic therapies (CDC, 2016).

**Best Practice Model Recommendation**

Inappropriate use of antibiotics contributes to the development of antibiotic resistant microorganisms. Antibiotic stewardship programs in the outpatient clinical setting are designed

to lessen this risk by confirming that these antibiotics are prescribed only when required and if prescribed, prescribed appropriately. Providers must adhere to EBP guidelines to ensure that patients receiving antibiotics for a bacterial infection are prescribed the correct drug, dose, and duration of treatment (CDC, 2016; IDSA, 2016; Rosenfeld, 2016; Wong, 2006; Zoorab, 2012).

Meeker et al. (2015) and Richards (2018) acknowledged that commitment from providers for appropriate antibiotic prescribing within the antibiotic stewardship program may include posters and commitment letters located within the clinic and individual patient rooms. Further, education for providers must be a multifaceted approach. This education must include distribution of guidelines, hard copy or electronically, committed to best practice. Audit and feedback as well as training to improve the patient provider communication experience is noted. Patient questions and concerns addressed in a courteous, professional, and informative manner from the provider will increase patient satisfaction and decrease the number of inappropriate antibiotic prescriptions given.

Tracking prescribing rates while utilizing audit and feedback allowed for identification of “top performers”, those providers who adhere to best practice guidelines and have low antibiotic prescribing rates. As noted within the literature, this intervention “significantly reduced inappropriate prescribing” (Zetts, Stoesz, Smith, & Hyun, 2018, p. 6). According to IDSA (2016), a fundamental element of any antibiotic stewardship program should include audit and feedback to determine prescribing rates. Once rates are determined, this information should be made available to the individual prescribers with status noted as well as ways to improve prescribing habits. Providers must further be given education regarding patient characteristics and preferences for antibiotic therapies. Education must extend to patients in the form of explanations mainly from providers with support of clinic staff concerning the inappropriate use of antibiotics and that this may lead to adverse events and possible serious infection with *C. difficile* (CDC, 2016; Drekonja et al., 2015; Fiore et al., 2017; IDSA, 2016; Zetts et al., 2018)

**Model Elements**

Antibiotic stewardship programs in the outpatient clinical setting (see Figure 1) will be beneficial to patients as well as providers to help to decrease the number of inappropriate antibiotic prescriptions requested by patients and written by providers.

**1. Evidence Based Guidelines** The utilization of best practice guidelines will help providers determine appropriate antibiotic therapy based on clinical presenting illness and present a plan for treatment which will include best drug, dose, and duration of therapy.

**2. Commitment and Education** Written education for providers combined with educational material was given to patients. Antibiotic stewardship, guidelines, symptomatic treatment, and EHR or CDC information will open the dialogue to increase patient and community knowledge of the detrimental effects of using antibiotic therapy when not required. Delayed prescribing of antibiotic therapies with symptomatic treatment has been shown to decrease inappropriate antibiotic use. Communication skills exercises for providers to increase their confidence level when patients demand antibiotic therapies which are not warranted were included.

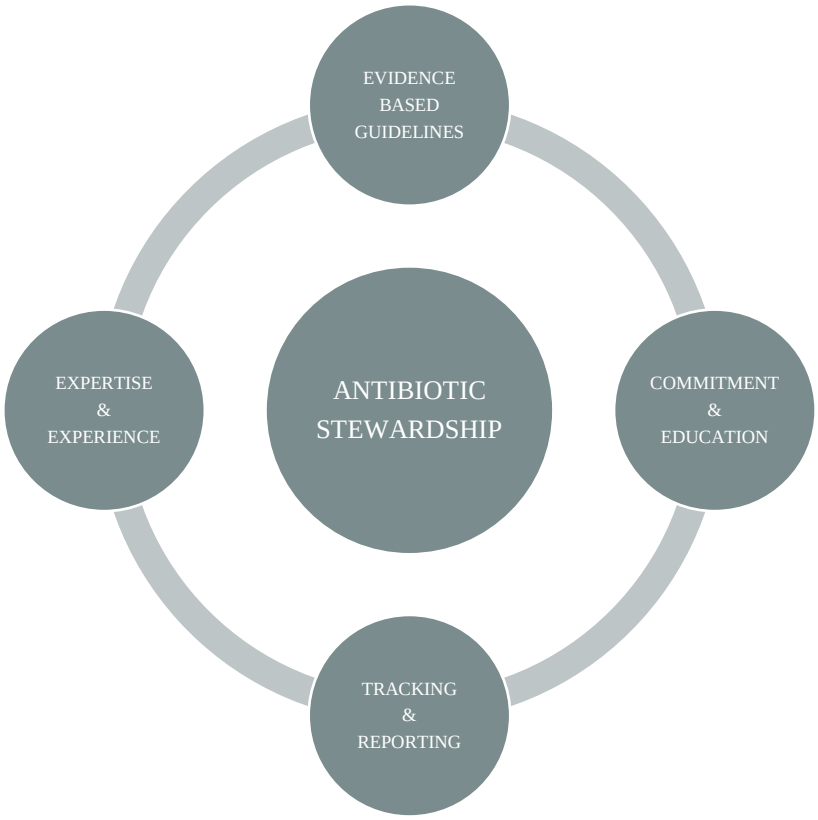
**3. Tracking and Reporting** As previously stated, audit and feedback of individual prescribing rates offered providers the opportunity, without any requirement from the provider, to obtain “top performer” status. Top performers may be defined by predetermined outcomes such as quality measures checked, individual prescribing rates for conditions not routinely requiring antibiotic therapies, and patient feedback.

**4. Experience and Expertise** Provider expertise and experience included communication for patients concerning the detrimental effects of using antibiotic therapies when not warranted. Providers can use the techniques provided to manage patients who demand treatment with antibiotics. This dialogue will hopefully become routine, not a point of contention or challenge, to incorporate into practice. Visual prompts in the form of commitment letters and posters are reminders for providers and possible conversation starters for patients of the consequences of inappropriate antibiotic therapies. Providers are encouraged to speak with an expert that may

assist with improving prescribing rates, such as a pharmacist. Finally, clinic leaders were mentors for promotion of best evidence-based practice for antibiotic stewardship programs which will lead to overall decreased health care costs and most importantly better outcomes for patients their families, and communities.

**Figure 2.1**

**Best Practice Model Presentation**



**How the Best Practice Model Will Answer the Clinical Question**

The best practice model answered the clinical question of: Within the outpatient clinical setting will an antibiotic stewardship program directed by national clinical guidelines and best practice decrease unnecessary prescriptions for upper respiratory illnesses specifically bronchitis, while increasing provider knowledge as well as increasing patient and community knowledge regarding the detrimental effects of using antibiotic therapy when not required?

The implementation of an antibiotic stewardship program (see Figure 2.1) directed by national clinical guidelines and best practice in the outpatient clinic setting did not decrease unnecessary antibiotic prescribing by providers. Providers were made aware of their prescribing practices and were then encouraged to earn “top performer” status. Also, an increase in the knowledge base of patients, families, and communities of the detrimental effects of using antibiotic therapies when not warranted which may lead to adverse events as well as *C. difficile* infections is essential to best practice. Comprehensive multifaceted antibiotic stewardship programs recognize and support initiatives that are being taken and recommendations being made to minimize harm, diminish unnecessary and inappropriate antibiotic therapy, and reduce the unnecessary use of systemic antibiotics which is a major contributing factor in the development of antimicrobial resistant organisms (CDC, 2016; Rosenfield et al., 2015).

# CHAPTER 3

## IMPLEMENTATION OF PRACTICE CHANGE

Successful implementation of an antibiotic stewardship program in the outpatient clinical setting is efficacious following extensive, exhaustive literature review with synthesis to determine best practice and best approach. Lewin's Theory of Change model and the ARCC model were used as frameworks for implementation of the program. Antibiotic stewardship is the most important way to decrease inappropriate use of antibiotic therapies, thereby decreasing the number of antibiotic resistant organisms (CDC, 2016; WHO 2017). Within this process, the protection of providers and patients who participated in the implementation of this project was maintained.

During the planning for this EBP project, the steps for Internal Review Board expedited review process were followed to ensure ethical treatment of all participants. Further, the project leader successfully completed The National Institutes of Health (NIH) Office of Extramural Research course "Protecting Human Research Participants". The implementation phase involved assessing the environment where the intervention was needed, planning the antibiotic stewardship program, and the protection of the confidential materials collected. Institutional Review Board (IRB) proposal was approved (see Appendix D). Permission was granted to the project leader from the health care center to commence with the project during the pre-stated times (see Appendix E).

Antibiotic stewardship in the outpatient setting is a multifaceted approach for providers, staff, and patients. Briefly, the implementation of this program was directed to providers with a planned approach at the monthly staff meeting which all providers were required to attend. This method presented a survey, PowerPoint® presentation, question and answer session, and finally distribution of hard copies of EBP for antibiotic therapy for the most commonly diagnosed upper airway conditions that normally do not require antibiotic therapy. Also, included within the

printed material was the article by Fiore (2015) which summarized techniques for providers when confronted by a patient demanding antibiotic therapy when not required.

The patient portion of the outpatient antibiotic stewardship program included printed material in the form of a trifold from the Centers for Disease Control and Intervention (2018) “Be Antibiotics Aware” with the harms associated with using antibiotic therapy when not needed and the explanation of antibiotic resistance. This form is available in English and Spanish in the clinic. Posters in the clinic included: An Antibiotic is the Wrong Tool to Treat a Virus; Do you need antibiotics? and a chart, Viruses or Bacteria What’s Got You Sick? (CDC, 2018). These materials are written in basic language for reading at the 8th grade level. Posted areas included any/all reception areas where patients were waiting for individual scheduled appointments for the delivery of visual confirmation.

## Participants and Setting

Participants for this EBP project, a multifaceted antibiotic stewardship program, were the providers, staff, administrators, ancillary staff, and patients of a large multi-site northwest Indiana health care agency. The clinical site agency is a non-profit federally qualified community health care system with multiple clinic locations. The clinical site agency provides care to patients regardless of ability to pay. These health care centers provide high quality, affordable health care to all patients, the uninsured, underinsured, and insured. Clinic sites accept Medicare and Medicaid, Hoosier Healthwise, as well as private insurance. Coordinators also will help with the navigation process of applying for Medicare and Medicaid for those patients that require assistance. Clinic sites also offer a sliding scale based on income for those with no medical insurance who qualify. Clinic providers offer the spectrum of healthcare from pregnancy, pediatrics, adult care, urgent care, chronic diseases as well address issues of homelessness and other obstacles related to the inability with no opportunity to prioritize health care. This multi-site organization receives Health and Human Services funding and has Federal

Public Health Services (PHS) status for certain health or health related claims in the outpatient clinic for covered patients.

## Outcomes

Outcomes measured included the number of inappropriate antibiotic prescriptions written for common upper airway conditions that normally do not require antibiotic therapies. Included unanimously and consistently is the condition of bronchitis based directly on literature review. The ICD-10 code was utilized to determine qualifying patient visits for this diagnosis. Patient characteristics were age, gender, comorbidities, and medical record number (MRN) number. Prescribing provider information was also included. Also, a secondary outcome that was determined included if there was a difference in prescribing practices for physicians and advanced practice nurses. A retrospective random chart audit was conducted to retrieve patients for the months of November 2017-January 2018 that met the qualifying criteria compared to those during the intervention period of November 2018-January 2019. A third outcome that was measured was the applicability of the WASP or delayed prescribing technique in the outpatient clinic setting.

## Intervention

A multifaceted-antibiotic stewardship intervention program involved the presentation introduced at the mandatory provider meeting. Providers were encouraged to complete a 10-question survey concerning their opinions of antibiotic stewardship and their own prescribing practices as well as their opinion of overall practice promotion of antibiotic stewardship (see Appendix F). A PowerPoint® presentation based directly on the *CDC's Core Elements of Outpatient Antibiotic Stewardship* was offered. Following the PowerPoint® presentation, the floor was open for questions of which there were none. To conclude, printed materials were provided in the form of best evidence for treatment of common upper respiratory conditions based on current clinical guidelines from the American Academy of Otolaryngology (CDC, 2016; IDSA, 2016). Providers were offered the opportunity sign posters to be displayed in the waiting

areas promoting antibiotic stewardship. These posters served as the visual commitment from providers for antibiotic stewardship. Lastly, providers received printed copies of techniques for individual provider use to deter the patient or family requesting antibiotic therapy when not warranted.

Patient intervention included posters within waiting areas describing antibiotic therapies, viral and bacterial symptoms, and the detrimental effects of using antibiotic therapies when not required. A tri-fold pamphlet was available for patients to identify when it is appropriate to use antibiotics and the explanation of antibiotic resistance.

## Planning

For the planning of this multifaceted antibiotic stewardship program in the outpatient setting, the utilization of the CDC's Core Elements of Antibiotic Stewardship was applied (CDC, 2016). The practice change timeframe was three months. Phase one included the introduction of the multifaceted antibiotic stewardship program to the providers at the monthly mandatory staff meeting held in September. Phase two included the promotion of the program with the displaying of the provider signed posters in waiting areas of all clinics. Clinical champions promoted the intervention. Also, there was distribution of educational materials for patients divided among the clinics for use and circulation by providers and staff. Phase three was the continued promotion of the antibiotic stewardship program through bimonthly email reminders to providers. Following the closure of the predetermined time frame, the project leader conducted a post intervention chart audit of the predetermined outcomes to determine the effectiveness of the program.

Antibiotic resistant microorganisms are one of the greatest threats to humans now and into the future as evidenced by the approximately 2 million infections and 23,000 deaths per year (CDC, 2016). An increase in morbidity and mortality with the increase of antimicrobial resistant microorganisms is expected (CDC, 2016; WHO, 2017). Increased health care costs will be directly related to antimicrobial resistant infections (CDC, 2016). Antibiotic stewardship

programs can determine the degree of antibiotic prescribing and to improve antibiotic prescribing by providers and use by patients so that antibiotics are only prescribed and used when needed. Additionally, these practices will minimize misdiagnoses or delayed diagnoses leading to underutilization of antibiotics and make certain that the right drug, dose, and duration are selected when an antibiotic is warranted (CDC, 2016). The project plan was directed by the project leader with support from the Director of Practice Improvement and the Director of Quality Improvement.

## Data

### Measures

Providers completed a 10-question survey (see Appendix F) to determine their beliefs and attitudes about antibiotic stewardship, along with information about their own personal prescribing practices in the clinical setting. The survey was developed by the project leader and included five knowledge-based questions and five questions concerned with prescribing practices. These questions were extracted from the literature to support their validity. A five-point Likert Scale, ranging from one extremely likely, two likely, three neutral, four unlikely, and five extremely unlikely were used for the determination of prescribing practices. Providers were encouraged to complete the survey honestly and without fear of retribution or disclosure of content to others. Chart audit parameters included patient characteristics, provider type, and antibiotic therapy. All data collected were reviewed and verified for accuracy.

### Collection

Survey collection from providers was conducted through an online survey service. These data were analyzed for presenting themes. Data collection was conducted through a retrospective chart audit with the parameters of diagnosis, patient characteristics, MRN, and provider for the dates of November 2017 through January 2018. Although the literature supports a slightly longer time period, most upper respiratory infections are in fact diagnosed in the Winter (CDC, 2015). The data set and time frame allowed the project leader to determine

outcomes in a timely manner. These data were analyzed to determine additional themes presenting along with determined outcomes of number of inappropriate prescriptions and provider type. Following antibiotic stewardship program implementation in September 2018, a chart audit was completed for the date range of November 2018-January 2019. Data was analyzed using the exact parameters as the retrospective chart audit with the expectation that the outcomes measured would be apparent, and relevant to the project. Patients receiving a WASP were contacted by the project leader to determine if the prescription was not filled, which was the aim of the WASP, delayed prescribing technique.

**Management and Analysis**

Data management was maintained through passwords protected accounts. Provider surveys were kept separately, and data securely destroyed following coding and inclusion for data analysis. This intervention was aimed at providers with no patient requirement nor involvement. Spread sheet analysis of the predetermined parameters was conducted by the project leader. Data collected from pre-intervention and post-intervention chart audits was anonymous for patient identifiers. Statistical analysis and testing were performed using the IBM SPSS statistics 25 software. Chi square was used to determine any differences between the two groups of nominal data for pre-intervention and post intervention data for physicians vs. nurse practitioners (Cronk, 2017). An independent *t*- test was used to determine the results of the outcomes of the intervention on pre-data and post data (Cronk, 2017).

**Outcomes**

The primary outcome and initial goal, following implementation of the program, was to report a decrease in the number of unnecessary prescriptions being given for upper respiratory illnesses specifically bronchitis which does not usually require antibiotic therapies. The illness for inclusion is bronchitis, based on the literature review. To determine the initial prescribing characteristics, a retrospective chart audit was conducted using the parameters of age, gender, ethnicity, date of service, comorbidities, smoking status, diagnosis code, physician or nurse

practitioner (NP), antibiotic prescribed, and antibiotic name if prescribed. Encounter number was also included for use by the project leader if warranted or questions arose. Following implementation of the program, with bimonthly reminders, a chart audit was conducted using the same parameters to determine prescribing rates post intervention.

The second outcome measured was if there was a difference in the prescribing rates between physicians and NP's. Holmes et al. (2018) found that in the months following an antibiotic stewardship program, providers wrote fewer prescriptions for antibiotics, and providers were more likely to limit the number of antibiotic prescriptions given. According to Weddle et al. (2017), antibiotic stewardship programs can be successful for decreasing unnecessary antibiotic prescribing. Zetts et al. (2018) concludes that while primary care providers account for the largest number of outpatient antibiotic prescriptions, NP's play an important part in the promotion of antibiotic stewardship and should be involved in the future efforts of the program.

The third outcome measured was the effect of the WASP or delayed prescribing technique and efforts by the provider. Delayed prescribing, as noted within the literature, has shown to decrease the number of prescriptions being filled by patients (CDC, 2016; Drekonja et al., 2015; Keller et al., 2018). Further, delayed prescribing has a positive effect on the patient experience, patients are satisfied with the care received if they obtain a prescription (Arnold & Straus, 2009). Patients receiving the WASP were contacted by the project leader to determine if the symptoms subsided and if the prescription was filled or not, which is the aim of this technique.

## Protection of Human Subjects

### Ethical Standards

Protection of human subjects was maintained through anonymous data collection for pre-intervention and post-intervention chart audits. Data collected from the EHR for patient characteristics included, age, gender, ethnicity, smoking status, and comorbidities. These data sets were password protected and did not contain specific patient identifiers. Data collected for provider characteristics were anonymous for inclusion within project data. As a component of the antibiotic stewardship program the tracking and reporting of antibiotic prescribing habits of providers was reported only to stakeholders, director of practice improvement and director of quality improvement, within the healthcare system for the determination of top performer status. Upon the completion of data analysis and reporting of the results all project data was securely shredded and destroyed.

# CHAPTER 4

## FINDINGS

This EBP project was designed to determine the effect of a multi-faceted intervention for antibiotic stewardship for providers in the outpatient clinical setting to determine prescribing practices for antibiotic therapies for bronchitis. The compelling clinical question was: Will an outpatient antibiotic stewardship program increase provider awareness of inappropriate antibiotic prescribing for upper respiratory conditions specifically bronchitis thereby decreasing the number of inappropriate prescriptions written while encouraging patient awareness of the detrimental effects of the use of antibiotic therapy when not required?

The project was conducted at a large network of community clinics in Northwest Indiana. Each individual facility has a varying number of providers, nurse practitioners and physicians. These providers offer services that cover care across the lifespan, urgent care services are also available. Implementation of this program was directed to providers with a planned approach at the monthly mandatory staff meeting at which all providers were required to attend. This approach included a PowerPoint® presentation, question and answer session, survey, and finally distribution of hard copies of EBP for antibiotic therapy for the most commonly diagnosed upper airway conditions that normally do not require antibiotic therapy. The patient portion of the outpatient antibiotic stewardship program included printed material in the form of a trifold from the Centers for Disease Control and Intervention (2018) “Be Antibiotics Aware” with the harms associated with using antibiotic therapy when not needed and the explanation of antibiotic resistance. These handouts for patients were distributed to clinic sites by the project leader for display in high patient traffic areas, exam rooms and lobby. Finally, bimonthly e-mail reminders, promoting antibiotic stewardship were sent to providers by the director of practice improvement.

## Participants

### Size and Characteristics

Participants for this EBP project, a multifaceted antibiotic stewardship program, were the providers, staff, administrators, ancillary staff, and patients of a large multi-site northwest Indiana health care agency. A total of 25 (*N* = 25) providers participated in the monthly mandatory staff meeting: 10 physicians, 11 nurse practitioners, and 4 licensed clinical social workers who provide behavioral health services for patients (see Figure 4.1) The ages ranged from 30-70 years (*M* = 46.9, *SD* =9.14). Within the group, 24% (*n* = 6) were men and 76% (*n* = 19) were women. All providers were documented to have at least three years of clinical experience. A total of 11 providers, 5 physicians and 6 nurse practitioners, completed the antibiotic stewardship survey. A total of five patients were offered the wait and see prescription (WASP). All WASP recipient patients were female, and ages ranged from 26 to 54 years (*M* = 39.8, *SD* = 11.14).

A retrospective chart audit was conducted for the dates of November 1, 2017-January 31, 2018 and included the diagnosis code J20.9, bronchitis. Patient characteristics included gender, ethnicity, age, date of service (DOS), chronic conditions, smoking status, provider seen, and antibiotic prescription given. The post intervention chart audit included the exact same parameters with the date range of November 1, 2018-January 31, 2019. Data collection pre and post-intervention was obtained with a random query of the EHR for the predetermined parameters and differing timeframes. Data collection revealed the age range for patients was 18 -64 years, (*M* = 42.8, *SD* = 12.6) pre-intervention, and post intervention the age range of 19 - 64 years (*M* = 42.7, *SD* = 12.4). Data collection further revealed that pre intervention, 64.4% of the patients seen were women and 35.6% were men (*M* = 1.35, *SD* = .479). Post intervention data showed that 62.8% of patients seen were women and 37.2% were men (*M* = 1.37, *SD* = .484). Ethnicity data collection revealed pre intervention that 0.4% of patients identified as American Indian, 0.4% of patients identified as Asian, 17.6% of patients identified as Black/African

American, 0.4% identified as Hispanic, 0.2% identified as Hispanic or Latino, 0.6% identified as more than one race, 0.2% identified as Pacific Islander, 0.2% identified as Other Race, 14.6% Refused to Report/Unreported, and 69% identified as White/Caucasian. Post intervention results included American Indian, 0.3% identified as, 0.4% of patients identified as Asian, 18.7% identified as Black/African American, 0.8% identified as Hispanic, 0.04% identified as Hispanic or Latino, 0.4% identified as more than once race, 0.1% identified as Pacific Islander, 0.2% identified as Other Race, 12.4% Refused to Report/Unreported, and 71% identified as White/Caucasian. Based on independent samples *t* tests, ages of the two groups were not significantly different ($t$ (2) = .561, $p$ > .05). Based on chi square test of independence, the two groups were not significantly different for the characteristics of gender and ethnicity $p$ >.05.

## Changes in Outcomes

### Statistical Testing

Data analysis was completed using SPSS Version 25. Parametric tests were used to determine the difference in prescribing rates for diagnosis code J20.9, bronchitis. Statistical significance was established for all data at $p$ <.05. Chi-square test of independence was calculated comparing prescribing rates. Descriptive statistics and frequencies were completed according to the predetermined parameters of demographic data for all patients ($N$ = 500) included pre-intervention ($n$ = 250) and post intervention ($n$ = 250). Following data analysis, it was determined that two providers be removed from the sample due to not attending the intervention. This resulted in a new set of demographic data for all patients ($N$ = 282), pre-intervention ($n$ = 130) and post intervention ($n$ = 152). Independent sample *t*-tests and Chi square were used to determine pre and post-intervention patient characteristics, and physician and nurse practitioner antibiotic prescribing rates (Cronk, 2017). Pre-intervention and post intervention patients were included via random chart audit with the only determiner being a diagnosis of bronchitis J20.9. The chi-square test of independence is used to determine if two

variables are independent of each other (Cronk, 2017). Independent sample *t*-test utilizes the mean of two independent samples to determine if a relationship exists (Cronk, 2017).

An independent-samples *t*-test was calculated comparing the mean score of patients who received an antibiotic and the mean score of patients who did not receive an antibiotic. No statistical difference was found ($t$ (2) = .872, $p$ <.05). The mean of the patients who received antibiotics ($M$ = 1.50, $SD$ = .501) was not significantly different from the mean of patients not receiving antibiotics ($M$ = 1.47, $SD$ = .503) An independent-samples *t*-test was calculated comparing the mean score of nurse practitioners ($M$ = 1.16, $SD$ = .372) prescribing antibiotics to the mean score of physicians prescribing ($M$ = 1.15, $SD$ = .362) antibiotics. No significant statistical difference was found ($t$ (2) = 0.283, $p$ < .05). An independent-samples *t*-test was calculated comparing the mean score of pre-intervention antibiotic prescribing ($M$ =1.63, $SD$ = .484) to post intervention antibiotic prescribing ($M$ =1.59, $SD$ = .493). No statistical difference was found ($t$ (2) = 0.72, $p$ <.05). Analysis of the patients who received the WASP showed 20% lost to attrition, 60% did not fill the prescription (felt better), and 20% did fill the prescription (felt worse).

**Significance**

No statistical significance was evident following Chi square test of independence for pre and post-intervention data comparing antibiotic prescribing rates. No significant relationship was found ($X^2$ (1) = .647, $p$ <.05). The intervention does not appear to have had an impact on prescribers' habits of whether to provide an antibiotic prescription for bronchitis. Pre-intervention analysis revealed 83.6% of patients received antibiotics with post intervention analysis revealing 85.2% receiving antibiotics. No antibiotics were given to 16.4% of the pre-intervention patients and 14.8% of the patients' post-intervention did not receive an antibiotic. A Chi square test of independence was calculated comparing smoking status and receiving an antibiotic prescription. A significant interaction was found ($X^2$ (1) = 3.201, $p$ < .05). Smokers were more likely to receive a prescription for antibiotics than non-smokers. A chi square test of

independence was calculated to determine a relationship between gender and antibiotic prescribing. No significant relationship was found between gender and receiving an antibiotic prescription ($X^2$ (1) = .540, $p$ < .05). Gender and antibiotic prescribing appeared to be independent of one another. A chi square test of independence was calculated comparing ethnicity and antibiotic prescription relationship. No significant relationship was found ($X^2$ (1) =.320, p < .05). Ethnicity and receiving an antibiotic prescription appear to be unrelated. A chi square test of independence was calculated comparing comorbidities and antibiotic prescribing. No significant relationship was found ($X^2$ (1) =.669, $p$ < .05). Comorbid conditions and receiving an antibiotic prescription appear to be unassociated.

Proportionally, more patients were seen during the identified timeframes, November-January 2018-2019, by physicians' pre-intervention at 62% and post intervention at 58.8% than nurse practitioners who were at 37% pre-intervention and at 41% post intervention respectively. Influenced by the antibiotic stewardship program nurse practitioners prescribing antibiotics decreased from 85% pre intervention to 82.5% post-intervention. An increase in antibiotic prescribing was shown for physicians from pre intervention 82% to post intervention 87%. Individual provider prescribing results pre and post-intervention were made available to the stakeholders, directors of practice improvement and quality improvement, for their dissemination and conclusion within the community health care organization.

Survey results yielded positive responses congruent with attendance at the antibiotic stewardship intervention presentation. For the question of has antibiotic overuse contributed to the problem of increased drug resistance, 100% of respondents replied true. For the question of for acute cough lasting for 1 week, antibiotics are indicated 80% of respondents replied false with 20% replying true. For the question of to decrease antibiotic use, delayed prescribing is an appropriate technique for providers to utilize 90% of respondents replied true with 10% replying false. For the question of bronchitis or acute cough may last up to three weeks 100% of respondents replied true (see Figure 4.2). For the question of how often your patients request

antibiotics unnecessarily 90.9% of respondents replied frequently, to somewhat frequently with 9.1% replying neutral (see Figure 4.3). For the question of how likely are you to incorporate antibiotic education into your clinic visits with patients 72.73% of respondents replied extremely likely with 18.18% responding likely and 9.09% as neutral (see Figure 4.4). For the question of how helpful is an antibiotic stewardship program promoting best practice, 90.91% of respondents replied extremely helpful to helpful with 9.09% as neutral. For the question of how likely you are to incorporate delayed prescribing (WASP) into your practice, respondents replied extremely likely to likely 81.82% with 9.09% as neutral (see Figure 4.5). For the question of how important you would say antibiotic education is for the public, all respondents 100% replied extremely to very to somewhat important (see Figure 4.6).

Figure 4.1

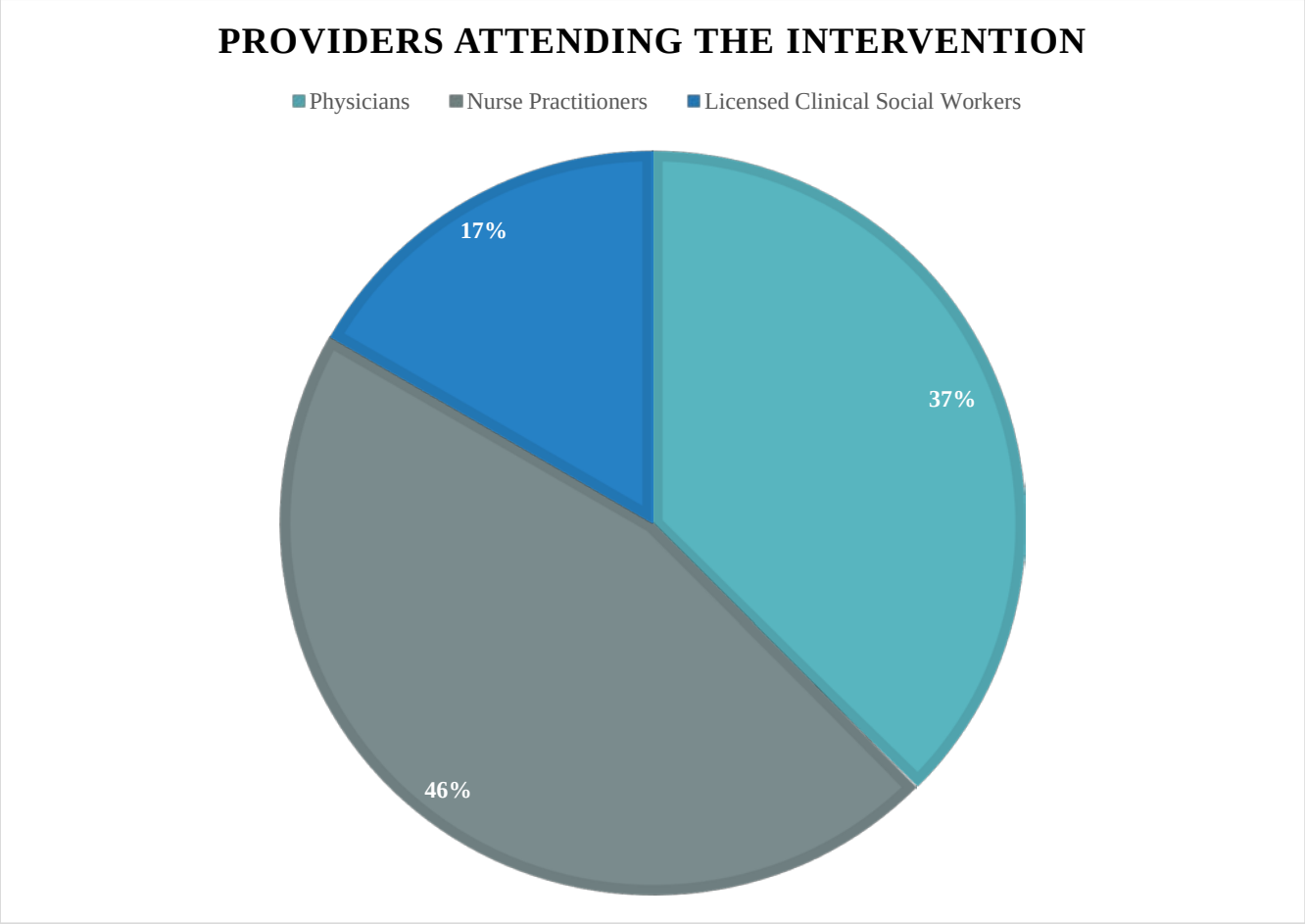
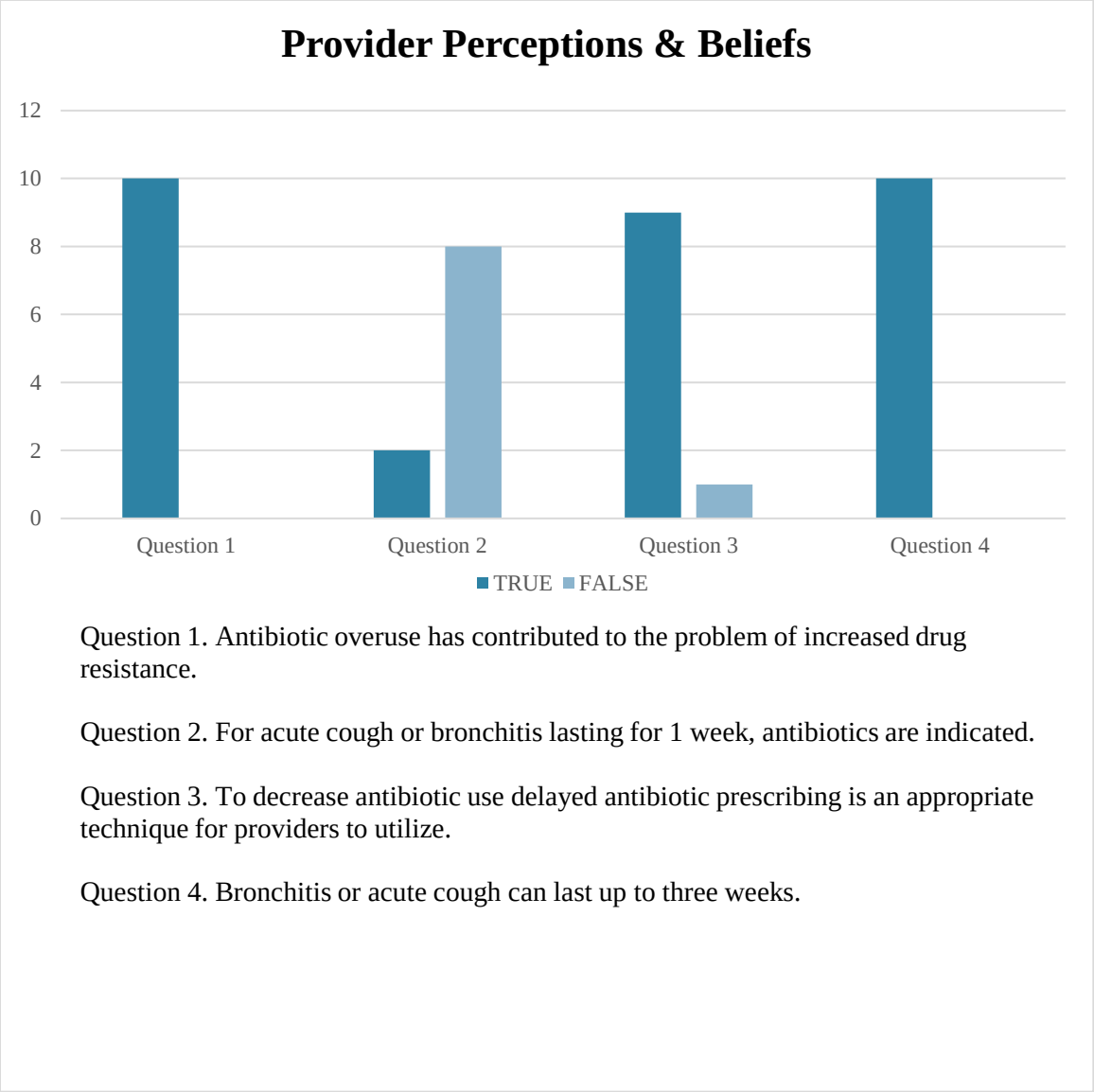


Figure 4.2




Question 1. Antibiotic overuse has contributed to the problem of increased drug resistance.

Question 2. For acute cough or bronchitis lasting for 1 week, antibiotics are indicated.

Question 3. To decrease antibiotic use delayed antibiotic prescribing is an appropriate technique for providers to utilize.

Question 4. Bronchitis or acute cough can last up to three weeks.

Figure 4.3

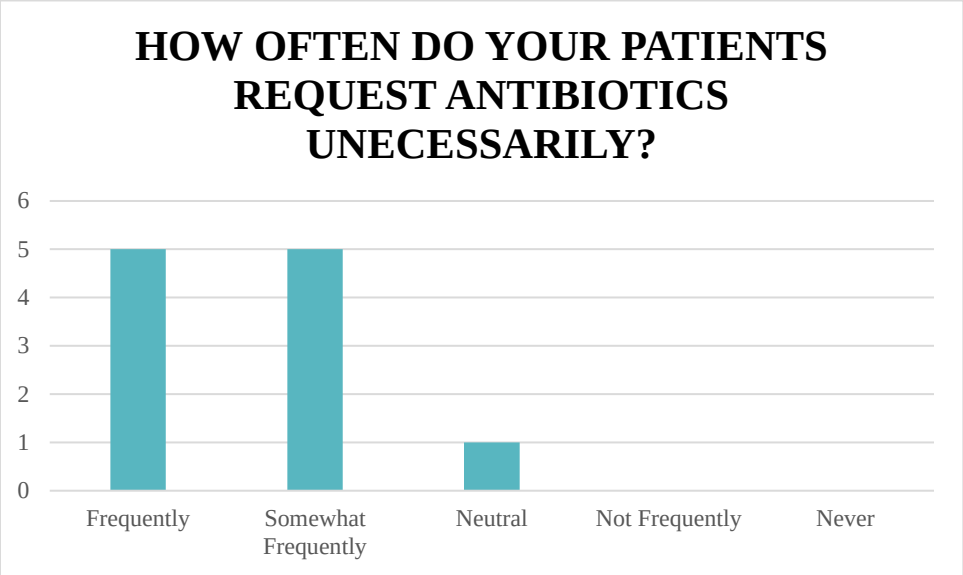



Figure 4.4

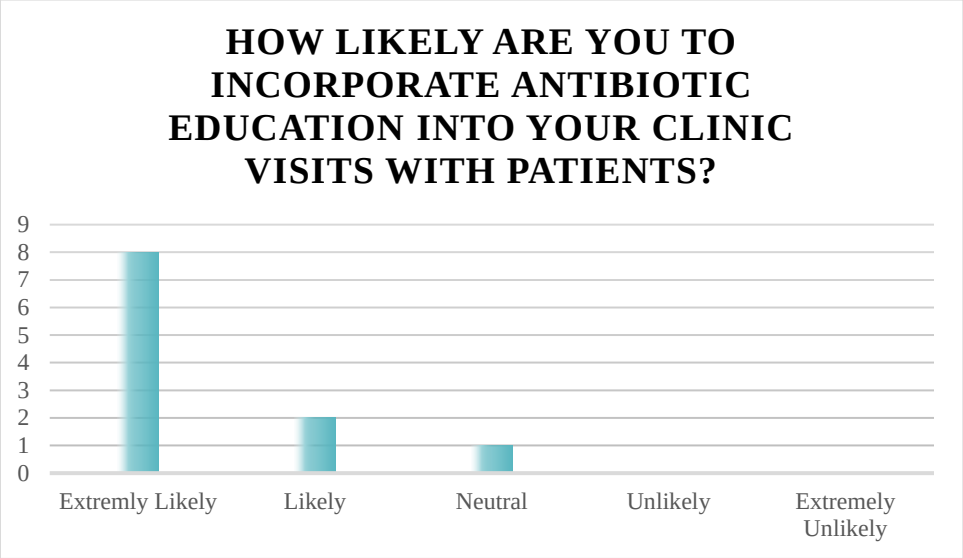


Figure 4.5

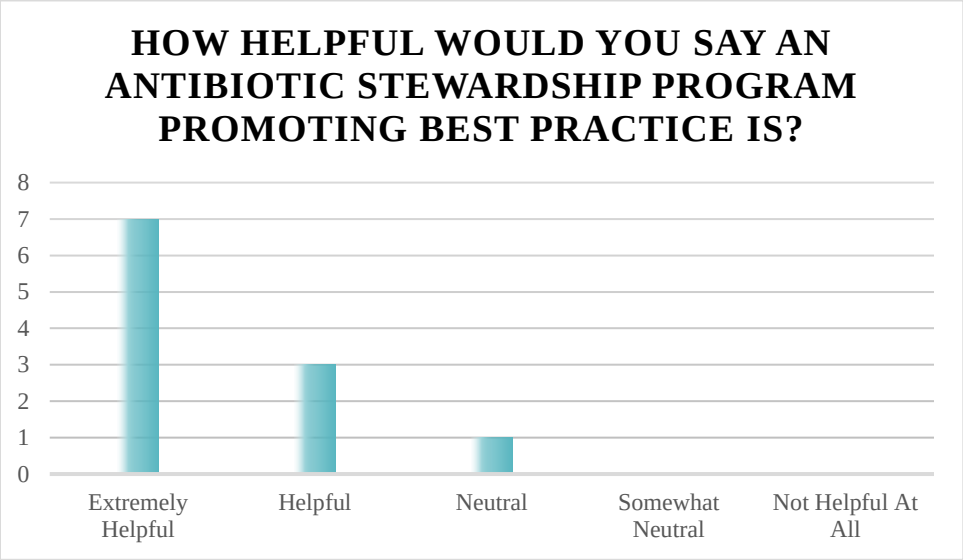
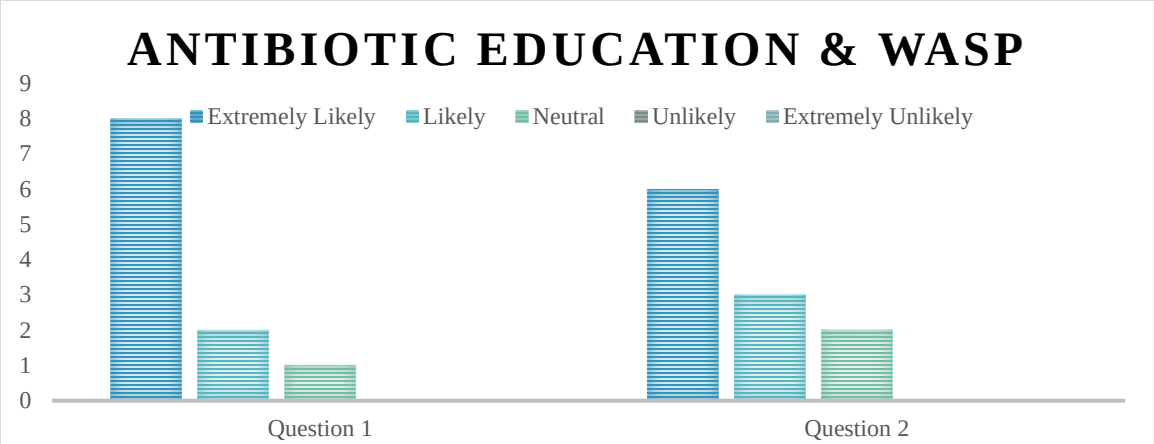



Figure 4.6




Question 1. How likely are you to incorporate antibiotic education into your clinic visits with patients?

Question 2. How likely are you to incorporate delayed prescribing (WASP) into your

# CHAPTER 5

# DISCUSSION

This evidence-based practice project was designed to answer the compelling clinical question of: “will an outpatient antibiotic stewardship program increase provider awareness of inappropriate antibiotic prescribing for upper respiratory conditions specifically bronchitis, thereby decreasing the number of inappropriate prescriptions written while encouraging patient awareness of the detrimental effects of the use of antibiotic therapy when not required?” This project, which was implemented at a large multi-site community health care organization in Northwest Indiana. The focus was on the determination of a multifaceted intervention, which included provider information session, visual reminders, utilization of change champions and survey results which would influence providers to decrease the number of unnecessary prescriptions for bronchitis. Project findings, including limitations and successes will be disseminated in this chapter. Theoretical and EBP frameworks utilized for this project as well as implications for future projects similar to this project will also be discussed.

## Explanation of Findings

Initial project evaluation for this EBP project, with documented findings, was designed to answer the primary clinical question concerned with prescribing for bronchitis. Data for secondary outcomes to determine if there was a difference between prescribing rates for nurse practitioners and physicians as well as results from the distribution of the wait and see prescription (WASP) were explored.

Prior to the intervention for providers, the organization had a policy change. Previously, providers were required to meet every month for a staff meeting. All staff members would convene at a predetermined location for approximately one hour. The provider’s clinic schedules were adjusted to meet this demand. For the month of the EBP implementation September 2018, administrators required providers to attend the monthly mandatory staff meeting via teleconference. This scenario removed the initial one-to-one contact between providers and the

project leader. For the teleconference 10 physicians, 11 nurse practitioners, and four licensed clinical social workers attended the antibiotic stewardship intervention presentation. The teleconference included the PowerPoint® presentation which was emailed to all providers prior to the appointed day in September. This allowed providers to follow along while the intervention was introduced and explained. One week following the presentation, the project leader and director of practice improvement travelled to all locations. Instructions with explanations of the antibiotic stewardship program were made by the director of practice improvement. The project leader reintroduced the implementation requirements, as well as distributed guidelines, posters, patient information brochures, and paper surveys. Approximately two weeks following this step, one survey was returned.

Another change that took place at the organization was the acquisition of a new medical director. During this phase, the project leader updated the provider survey to an electronic version for distribution to all providers within the healthcare organization. The medical director was briefed on the project, supported the project, and became a champion by distributing the new electronic version of the survey to all providers within the healthcare organization via e-mail. The project leader determined a one-month timeline for survey completion. The project leader also offered the incentive of a chance to win one of four gift cards. Following the predetermined timeframe for survey completion and closure of the electronic source, providers who completed the survey were randomly drawn by the director of quality improvement. Surveys were completed by 11 providers within the healthcare organization. Gift card distribution was completed by project leader and director of quality improvement for the incentive.

For the primary clinical question: Is there a difference in the prescribing rate for providers for bronchitis pre-intervention and post intervention? The main outcome for this project was examined in detail with a focused approach. Ideally, there should be no prescriptions given for bronchitis according to CDC guidelines (CDC, 2016). Pre-intervention data were obtained with a

retrospective chart audit for the months of November 2017 to January 2018. The criterion for inclusion was the diagnosis of bronchitis which is the ICD-10 code of J20.9. Post intervention chart audit was conducted in February of 2019 for the corresponding dates of November 2018 to January 2019. No statistical significance was determined following chi square data analysis. Rates of prescribing for all providers remained consistent post intervention, ($X^2(1) =. 647$, $p <.05$).

When examined separately by provider, findings indicated that nurse practitioners prescribing rates showed an improvement in not prescribing an antibiotic prescription for bronchitis: 85% pre-intervention and 82.3% post-intervention. Physicians, on the other hand, showed an increase in the number of prescribing antibiotics, with 82% pre-intervention to 87% post intervention.

Additional outcomes evaluated were based on pre and post-intervention data to determine if there was a significant difference in providers prescribing habits among nurse practitioners and physicians. An independent-samples *t*-test was calculated comparing the mean score of nurse practitioners to the mean score of physicians. No significant statistical difference was found ($t$ (2) = 0.283, $p > .05$). Ultimately from the analysis, it was determined that physicians treated more patients during the required timeframes than nurse practitioners. Patients treated by physician's were 62% at pre-intervention and 58.8 % post intervention with nurse practitioners treating patients 37% at pre-intervention and 41% at post intervention respectively. Due the increase in number of patients being treated by physicians the data analysis reports increased findings for the physician group. If, perhaps, more patients were treated by nurse practitioners, the data analysis result may have shown an even greater statistical significance in the decrease in prescribing of antibiotic therapies. From the data analysis this could be expected. Data analysis of the results of the wait-and-see-prescription (WASP) for patients demonstrated 20% were lost to attrition; 60% did not fill the prescription (felt better) which was the aim of this method; and 20% did fill the prescription (felt worse).

Provider perception of patient demand and expectations may be further explored with future projects. This future project might involve provider and patient surveys concerning antibiotic prescribing and satisfaction with the outcomes of the visit. Expectations for patients and providers should be explored. (IDSA, 2016; Keller, Tamma, Cosgrove, Miller, Sateia, Szymczak, Gurses, Linder, 2018; Meeker et al., 2015; Zetts, Stoesz, Smith, & Hyun, 2018). The CDC (2016) reports that ongoing communication skills training for providers will improve the patient provider experience. Patient expectation my further be improved by the addition of symptomatic treatment regimens, from providers, such as cough suppressants to help with sleep, and decongestants to decrease congestion, as well as chicken soup and warm liquids. These treatments may help to manage patient expectations and avoid disappointment with the visit (Keller et al., 2018; Meeker et al., 2015).

Provider survey results concerning knowledge about antibiotic stewardship yielded responses congruent with the intervention presentation. The responses related to antibiotic overuse, delayed prescribing, and antibiotic education for the public were correct and corresponded with best practice (CDC, 2016; Drekonja et al., 2015). Providers agreed that overuse of antibiotics has led to an increase in drug resistance. Providers also agreed that delayed prescribing is an appropriate technique to use in the clinical setting, and antibiotic education is extremely important for patients. However, while the physicians and nurse practitioners at this community health organization were knowledgeable about correct prescribing guidelines for bronchitis, the results showed providers did, in fact, prescribe antibiotics for bronchitis. Keller et al. (2018) and IDSA (2016) described providers who attended evidence-based education for antibiotic stewardship focused on upper respiratory conditions showed a decrease in antibiotic prescribing over a 30-month period. The promotion of the antibiotic stewardship program annually may show a decrease in prescribing in the upcoming years. The three-month time frame may have not been a long enough amount of time to determine accurate provider prescribing practices and support a significant decrease and

change in antibiotic prescribing. We cannot determine if providers disregarded the seriousness of the threat of antimicrobial resistance nor disregarded the promotion of judicious antibiotic prescribing. (Drekonja et al., 2015; CDC, 2016; Arnold & Straus, 2009; Schmidt, Spencer, & Davidson, 2018; Zetts et al., 2018). Further, we do not know if providers related the problem of over prescribing to other provider practices not their own (Zetts, et al., 2018; Fiore, et al., 2017).

The yearly antibiotic stewardship program for providers attending the education sessions, as well as feedback, may further increase the reduction in prescribing antibiotics for bronchitis, which was sustainable for two to three years (Keller et al., 2018). Provider commitment in the form of posters, letters, and pictures will benefit from being updated annually to provide visual confirmation for patients of the commitment from providers for responsible prescribing. Literature supports the use of these techniques to decrease inappropriate prescribing for bronchitis (Meeker et al., 2015; Zetts et al., 2018). EMR support should be included for providers in the form of a prompt (clinical decision support) when initiating the diagnosis code for bronchitis, J20.9, for visual reminder of no antibiotic required to decrease inappropriate prescribing (CDC; Sanchez, Guillermo V; Dutra-Fleming, Katherine E; Roberts, Rebecca M; Hicks, Lauri A, 2016; Keller et al., 2018).

Provider prescribing was disseminated by the stakeholders within the community healthcare setting with individual provider results reported by the quality improvement department. As reported to the project leader, providers receipt of results was uneventful with no response currently. This may be possibly due to results being shared with individual providers via e-mail, as well as the short timeframe for initiation of the program. Keller et al. (2018) found that for providers with high prescribing rates and who received data about their habits, this information “did not impact antibiotic prescribing over 2 years” (p.424). CDC (2016), IDSA (2016), Drekonja et al. (2015), Keller et al. (2018), Schmidt et al. (2018) agree that this undesirable effect was possibly due to providers receiving written communication about prescribing habits; however, these providers have currently received results of prescribing via

electronic communication only. Upcoming results related to a substantial decrease in inappropriate antibiotic prescribing was individualized feedback for providers regarding their individual antibiotic prescribing rates which may show a decrease in the future for this community healthcare facility.

## Evaluation of Applicability of Theoretical and EBP Frameworks

For the application of the theoretical and EBP frameworks to the evidence-based practice project, the first step was the determination of whether an antibiotic stewardship program was in place. This EBP project utilized Lewin's Planned Theory of Change (Lewin, 1947) for the theoretical framework and the Advancing Research and Clinical Practice through Close Collaboration (ARCC) model (Melnyk & Fineout-Overholt, 2015) for the evidence-based practice framework. These theories will be discussed in relation to the EBP project.

### Theoretical Framework

The theoretical framework chosen was Lewin's Theory of Planned Change. According to the Lewin theory, when observing a situation, leaders must understand that there will be a "series of forces working in different directions" (Lewin, 1947, p. 341). Within the organizational setting, there will be forces eager to change and forces determined to maintain the current situation. Lewin's method hypothesizes that behavior is a role of the group environment or field (Lewin, 1947; Borkowski, 2016). Individual provider characteristics determine obstacles to the success of the project. Guidelines are intended to supplement providers experience and knowledge. Guidelines are diagnosis specific, but not necessarily patient specific. Literature is clearly supported by CDC, WHO, and National Physician Alliance who acknowledge that in clinical practice being a good steward is the ability/opportunity to decrease the prescription use of antibiotics for bronchitis, which also happens to be one of the top five applications of antibiotic stewardship (Holmes, Struwe, & Waltman, 2018). As evidenced by the data analysis, the diagnosis of bronchitis may have warranted a prescription from providers based on individual patient presentations. A female patient 28 years, with a BMI of 25 with no chronic conditions will

be treated differently than a female 63 years with a BMI of 58 with historical diagnosis of COPD. As will there be a difference of antibiotic treatment regimen between smokers and non-smokers (Steinberg, Akincigil, Jung Kim, Shallis, Delnevo, 2016). Providers replied consistently with best practice to survey responses but ultimately survey responses may not be applicable in the clinical setting due to individual patient characteristics and circumstances.

Freeze, change, unfreeze is a compelling concept for completion of this intervention. This intervention led to a new yearly policy/protocol (see Appendix E) for providers which will involve an education module with the PowerPoint® presentation provided by the project leader. The presentation incorporates the survey questions to keep current with CDC recommendations and possible requirement from the Centers for Medicare and Medicaid (CMS).

The freeze involved a new situation, the implementation of an antibiotic stewardship program new to the agency. The change involved provider participation in the teleconference meeting as well as survey completion and refreeze was the new normal of a yearly antibiotic stewardship requirement for providers to complete. Providers, staff, and administrators were eager and willing to participate in the intervention and were willing to comment in positive language to the project leader. Comments received included, “great information”, “good presentation”, “helpful”, and “the paperwork is colorful”. But even though they responded as anticipated about antibiotic stewardship, the providers did not decrease the amount of antibiotics they prescribed for the diagnosis of bronchitis. However, from the data analysis, smoking status resulted in an increase in prescribing antibiotics, which from the literature basis, is an expected finding (Steinberg et al., 2016)

To implement the proposed change (goal), the forces eager and willing to change must be increased; these are the driving forces (Lewin, 1947; Borkowski, 2016). Following dissemination of the project, recruitment of more champions may have been beneficial to the success of the project. Individual clinic access was maintained by the project leader; however, during the process, it was difficult to reinforce and promote the project to providers within the

demanding clinical setting. Providers were extremely busy, ancillary staff were extremely busy, and patients were waiting to be seen. There were no restraining forces identified, but for the status quo to be decreased, an individual champion at each facility may have contributed to an increased success of the project. A goal that was achieved is the accomplishment of a yearly antibiotic stewardship policy/protocol for this healthcare facility. Antibiotic stewardship programs are currently required for hospital and long-term care facilities that receive funds from the Centers for Medicare and Medicaid (CMS). This project led to a sustainable change with the introduction of a yearly antibiotic stewardship intervention for providers at the organization which is sustainable by the facility and is the new normal.

Strengths of the Lewin theory included ease of use, realistic, and provided a straight-forward plan of three steps for change. The three steps provided a basic strategy of unfreeze, change, refreeze to implement the change. These steps provided guidance with this EBP project acknowledging forces for and against the change while allowing the project leader to identify issues acting for or against change. This theory is time-tested and applicable to the outpatient clinical setting. The top-down approach was effective for the implementation of this EBP project which included strong support from stakeholders.

Outwardly there appeared to be no obstacles to change, but from the data analysis, it is evident this theory may have been too simplistic. The three-step approach was not realistic nor generalizable. Providers with years of knowledge and experience did make the final determination of whether their patients required antibiotic therapies for bronchitis. EBP guidelines are intended to guide practice not replace clinical judgment. Change is multifaceted and unpredictable; therefore, in the clinical setting it was not possible to frame the project in a three-step scenario. Ultimately it was difficult to enact a change during a three-month timeframe for such an extensively constructed, provider and patient specific scenario.

**EBP Framework**

The EBP model chosen for use with this project was the ARCC Model. ARCC stands for Advancing Research and Clinical Practice through Close Collaboration (Melnyk & Fineout-Overholt, 2015). This model strictly focuses on the implementation of best evidence-based practice along with promotion of sustainability system wide. This model has five steps. Step one is the assessment of the organization, the culture, and readiness for clinic wide change implementation. Step two is the recognition of strengths and limitations of evidence-based practice within the organization. Step three is the identification of evidence-based practice advisors and guides. Step four is the implementation of evidence into practice, and step five is the evaluation of determined outcomes that have resulted from the practice change (Melnyk & Fineout-Overholt, 2015; Schaffer, Sandau & Lee, 2012). Step five included project evaluation with outcomes disseminated.

The ARCC model strictly focused on the implementation of best evidence-based practice along with promotion of sustainability system wide. Consistent with the model, EBP guidelines were distributed following the formal intervention meeting with providers. As the ARCC model highlights, organizational culture and the circumstances that support EBP were utilized in the form of monthly e-mail reminders to providers promoting the antibiotic stewardship intervention. Although this model clearly stresses organizational procedures to strengthen EBP within direct patient care, ultimately the decision-making process at the point of care must include provider expertise along with patient preference (Melnyk & Fineout-Overholt, 2015). From the extensive data analysis, it was concluded that individual provider judgement and knowledge determined whether antibiotic stewardship clinical guidelines were followed.

The emphasis of the ARCC model is on organizational usage. For this project and step one of the model, the identification of organizational culture was determined by the project leader. There was no formal antibiotic stewardship program in place, now the organization has an antibiotic stewardship protocol based directly on current CDC guidelines. The strengths of

the organization are the administrative characteristics of an inviting and approachable attitude, as well as, progressive, forward thinking. This thinking acknowledges provider, patient, and community interests. This healthcare facility presented with a willingness to serve as a clinical site for project implementation, with the benefit of a sustainable organizational change in the form of a protocol for the yearly management of an antibiotic stewardship program. Administrative support was crucial for clinic wide implementation and a positive response was received from all stakeholders.

During step two, the strengths and limitations of the application of evidence-based practice was examined. EBP is intended to be a guide for providers, EBP is intended to complement provider experience and knowledge base concerning individual patient population and characteristics, not supersede it. Guidelines are intended to supplement not replace provider knowledge and experience. During step three of the model, EBP mentors were identified, including project leader, and directors of practice improvement and quality improvement. As determined by the project leader, an increase in champions/mentors was needed for successful implementation outcomes. The project leader determined that the project would have benefited from recruiting an individual from each site to increase facilitation of the EBP project. Step four of the model, implementation of EBP guidelines was established by the participation of providers in the antibiotic stewardship intervention program, with distribution of current CDC guidelines to all providers, along with bi-monthly reminders for the promotion of antibiotic stewardship. Step five, the evaluation of the project was completed by the project leader with strengths and limitations discussed.

## Strengths and Limitations of the EBP Project

### Strengths

Strengths for the EBP project include the applicability of the ARCC model and Lewin's Theory of planned change to the implementation of this project. These frameworks provided a comprehensive, thorough guide to the determination of characteristics required for the

successful intervention and implementation of the EBP project. This EBP project was based on the extensive literature review with implementation of the intervention taken from current disseminated research. Currently, the healthcare facility with multiple locations and multiple providers will now have access to, and the opportunity intended for, a yearly roll-out of antibiotic stewardship activities and literature. This yearly intervention will include provider and patient information. Also included with the intervention, from the data analysis, the opportunity for facility directors to statistically determine and visually understand “top provider” status with the reporting of individual provider prescribing habits for bronchitis.

**Limitations**

Limitations of this EBP project were the simplistic approach to antibiotic prescribing adopted by the project leader. Guidelines are diagnosis specific, but not necessarily patient specific. For example, a female patient 28 years, with a BMI of 25 with no chronic conditions will be treated differently than a female 63 years with a BMI of 58 with historical diagnosis of COPD. As will a 35-year-old male with current diagnosis of HIV, these individual patients will be treated appropriately by providers due to comorbid or chronic conditions (CDC, 2016). Antibiotic prescribing is based on several factors, chronic health conditions, smoking status, and BMI for example, not only diagnosis (CDC, 2016; Steinberg et al., 2016). EBP includes utilization of guidelines from nationally recognized professional organizations, with interventions based on provider, patient and facility specifics. This EBP project intervention included the PowerPoint® presentation, survey, and bimonthly e-mail reminders. This process was applicable, however, the extensive approach to the project may have required a more focused intent and method. The environment for this EBP project was applicable to the intervention, however, a more intensive and concentrated intervention may have yielded statistically significant results. A future project recommendation could include a “one clinic, one provider or one group of providers” focus with the intervention presented in a face-to-face format. Also, for future projects it is recommended that a focused intervention promoting the WASP be undertaken. Additionally,

a time-frame determiner of Winter only months (January-March) may also have yielded statistically insignificant results. An increase in the timeframe from three months to six months or greater may have yielded statistically significant results (Keller et al. 2018; IDSA 2016).

## Implications for the Future

### Practice

Although the data analysis yielded no statistical significance within the project sample, it was determined that nurse practitioners remained consistent and showed an improvement for not prescribing antibiotics pre intervention through post-intervention. The data analysis determined that the use of an antibiotic stewardship intervention did not decrease the number of prescriptions written for bronchitis for physicians. These outcome findings conclude that the implementation of the intervention had no effect on providers prescribing rates for bronchitis. It is not known why the providers did not change their prescribing practices. Increased rates of prescribing may be due to the contributing factors of patient expectation, patient and provider unawareness of antibiotic resistance, and an increased number of patients who smoke, and a lack of knowledge of the serious consequences of antimicrobial resistant microorganisms (CDC, 2016; Steinberg et al., 2016). Obstacles to correct antibiotic prescribing may have been a high volume of patients with increased pressure for expedited visits, and unsatisfied patients if antibiotic prescriptions are not given (CDC, 2016; Drekonja et al., 2015).

The significant practice findings of this EBP project include the development of a sustainable facility-wide protocol for antibiotic stewardship to meet the future possibly likely requirement by CMS. This yearly intervention for providers will reintroduce the topic annually, as well as offer opportunities for providers to earn “top performer” status. Stakeholders and facility directors will have ease of use with the implementation of the intervention from materials provided by the project leader. This intervention is based on current literature, CDC guidelines, and may not require a revision for quite some time. Antibiotic stewardship will remain at the

forefront of patient care due to the increasing number of antimicrobial resistant microorganisms. Sharing the results of this project with the providers may provide them with a view of their practice. While all providers agreed that antibiotic stewardship was needed, the providers did not follow clinical guidelines for practice for bronchitis treatment. Seeing these individual provider results may impact their future practice as they are able to reflect on their own EBP care. For future project use, the focused approach would include a sustained facility wide education session with implementation of the wait and see prescription.

**Theory**

The results of this EBP project were not consistent with past results from the literature and successes with implementation. Although literature support for the project was strong, results were fewer than expected. Lewin's Theory of planned change provided an exceptional initial framework for the determination of inclusion for the project intervention. The ease of use and minimal steps offer an applicable way to determine inclusion criteria for the intervention. Lewin's Theory did not address the fluidity of change, and the results of provider knowledge and experience. Lewin's Theory also emphasizes the forces for and against change. With this EBP project the determination was made that individual patient characteristics and provider decisions guided antibiotic prescribing, not the change of promoting EBP guidelines.

Of the providers surveyed, all agreed with all components of the antibiotic stewardship intervention, however guidelines did not replace clinical judgements. The ARCC model provided a valuable tool for the applicability of EBP and the promotion of a sustainable facility wide initiative. This model allowed for the assessment of the organization and culture. While readiness to change may not have been appropriate, due to individual provider characteristics, the top down approach provided a sustainable facility protocol for antibiotic stewardship intervention. The recognition of strengths and limitations of EBP was evident with the development of this project. Although the intervention is supported by the literature, an increase

in number of champions may have been beneficial. This model is well-suited to this project, but it has been determined the project focus was ultimately to extensive.

**Research**

Implications for future research based on the results of this EBP project include a comprehensive approach to antibiotic stewardship with a determined focus on provider, patient and community perceptions. Additional research should be conducted to focus on the WASP wait and see prescription. Current literature supported recommendations include the implementation of the antibiotic stewardship program, however, research must include the provision for individual provider clinical judgement and experience. An additional component may be the determination of time of day and day of week that the providers distributed the prescriptions for antibiotics. The project leader was witness to clinical judgement that included a late Friday appointment where the patient did not fit the criteria of requiring an antibiotic but was prescribed one based on, it being the beginning of the weekend. The rationale from the provider was that of, “this patient will go to urgent care or the emergency department for the prescription if I do not provide it, and that is a waste of resources and dollars”.

**Education**

The intervention presented to providers was based on the CDC guidelines for antibiotic stewardship. This PowerPoint® presentation was completed within the required meeting timeframe, 20 minutes, and the providers were offered the opportunity to comment. Ideally, if the survey had been distributed immediately following the presentation in a face-to-face format, more providers may have participated. Future implications for this project would preferably include a “lunch and learn” for providers within the clinic setting to increase participation with survey completion and reporting of results.

Antibiotic stewardship education must be on-going. Facilities, providers, and patients must accept responsibility for promoting efficacious use of antibiotics. The world-wide crisis of antimicrobial resistance will not go away and may increase. Although this EBP project

promoting best practice did not yield results consistent with the literature, this facility that serves a large diverse population will have the opportunity to promote antibiotic stewardship yearly.

## Conclusion

Conclusions of this EBP project though varied, do support an antibiotic stewardship policy/protocol for providers in the outpatient setting. While the predetermined outcomes of this EBP project did not provide statistical significance to support the evidence that an antibiotic stewardship intervention will decrease the number of prescriptions given for bronchitis, the project did, however, support the use of the intervention for the promotion of education for providers concerning antibiotic mis/overuse with positive survey results and encouraged providers to offer the wait and see prescription if the individual patient situation warrants. Future projects will benefit from the analysis of data for this individual project by offering results consistent with an extensive and conceivably too simplistic approach to antibiotic prescribing for bronchitis in the outpatient clinical setting. Literature results show that a much longer timeframe be measured for successes with a decrease in prescribing of antibiotics for bronchitis. The reported timeframe appears to have been too brief. Future projects may also attempt to determine if time of day or day of week have an impact on prescribing antibiotics for bronchitis.

## REFERENCES

Aminov, R. I. (2010, December 8). A brief history of antibiotic era: lessons learned and challenges for the future. *Frontiers in Microbiology, 1*, 1-7. doi:10.3389/fmicb.2010.00134

Arnold, S., & Straus, S. (2009). *Inteventions to improve antibiotic prescribing practice in ambulatory care (Review).* The Cochrane Collection. John Wiley & Sons, Ltd.

Borkowski, N. (2016). *Organizational Behavior, Theory, and Design in Health Care.* Burlington, MA: Jones & Bartlett.

CDC. (2018, May 26). *U.S. Centers for Disease Control and Prevention.* Retrieved from Antibiotic Resistance Threats in the United States, 2013: https://www.cdc.gov/drugresistance/threat-report-2013/

Cronk, B. (2017). *How To Use SPSS A Step-by-Step Guide to Analysis and Interpretation* (9th ed.). New York, NY: Routledge.

Dobson, E. L., Klepser, M. E., Pogue, J. M., Labreche, M. J., Adams, A. J., Gauthier, T. P., . . . Suda, K. J. (2017). Outpatient antibiotic stewardship: Interventions and opportunities. *Journal of the American Pharmacists Association, 57*, 464-473. doi:10.1016/j.japh2017.03.014

Dobson, E. L., Klepser, M. E., Pogue, J. M., Labreche, M. J., Adams, A. J., Gauthier, T. P., . . . Suda, K. J. (2017). Outpatient antibiotic stewardship: Interventions and opportunities. *Journal of the American Pharmacists Association, 57*, 464-473. doi:10.1016/j.japh2017.03.014

Drekonja, D. M., Filice, G. A., Greer, N., Olson, A., MacDonald, R., Rutks, I., & Wilt, T. J. (2015). Antimicrobial Stewardship in Outpatient Settings: A Systematic Review. *Infection Control & Hospital Epidemiology, 36*, 141-152. doi:10.1017/ice.2014.41

Dutra-Fleming, K. E., Hersh, A. L., Shapiro, D. J., Bartoces, M., Enns, E. A., File, T. M., . . . Sanchez. (2016). Prevalence of Inappropriate Antibiotic Prescriptions among US Ambulatory Care Visits, 2010-2011. *Journal of the American Medical Association, 315*(17), 1864-1873. doi:10.1001/jama.2016.4151

Fiore, D. C., Fettic, L. P., WRight, S. D., & Ferrara, B. R. (2017). Antibiotic overprescribing: Still a Major Concern. *The Journal of Family Practice, 66*(12), 730-736.

Holmes, L., Struwe, L., & Waltman, N. (2018). Evaluation of an Antibiotic Stewardship Program in a University Health Center. *The Journal for Nurse Practitioners, 14*(3), e57-e61. doi:10.1016/j.nurpra.2017.11.025

ISDA; Barlam, Tamar F; Cosgrove, Sara E; Abbo, Lilian M; MacDougall, Conan; Schuetz, Audrey N; Septimus, Edward J; Srinivasan, Arjun; Dellit, Timothy H; Falch-Yetter, Yngve T; Fishman, Neil O; Hamilton, Cindy W; Jenkins, Timothy C; Lipsett, Pamela A; Malani, Preeti N; May, Larissa S; Moran, Gregory J; Neuhauser, Melinda M; Newland, Jason G; Ohl, Christopher A; Samore, Matthew H; Seo, Susan K; Trivedi, Kavita K. (2016). *Implementing an Antibiotic Stewardship Program: Guidelines by the Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America.* Boston, Massachusetts: Oxford University Press. doi:10.1093/cid/ciw118

ISDA; Barlam, Tamar F; Cosgrove, Sara E; Abbo, Lilian M; MacDougall, Conan; Schuetz, Audrey N; Septimus, Edward J; Srinivasan, Arjun; Dellit, Timothy H; Falch-Yetter, Yngve T; Fishman, Neil O; Hamilton, Cindy W; Jenkins, Timothy C; Lipsett, Pamela A; Malani, Preeti N; May, Larissa S; Moran, Gregory J; Neuhauser, Melinda M; Newland, Jason G; Ohl, Christopher A; Samore, Matthew H; Seo, Susan K; Trivedi, Kavita K. (2016). *Implementing an Antibiotic Stewardship Program: Guidelines by the Infectious*

*Diseases Society of America and the Society for Healthcare Epidemiology of America.* Boston: Oxford University Press. doi:10.1093/cid/ciw118

Joint Commission. (2016). New Antimicrobial Stewardship Standard. *Joint Commission Perspectives, 36*(7), 1-8. Retrieved 2018, from https://www.jcrinc.com/the-joint-commission-perspectives/

Keller, S. C., Tamma, P. D., Cosgrove, S. E., Miller, M. A., Sateia, H., Szymczak, J., . . . Linder, J. A. (2018). Ambulatory Antibiotic Stewardship through a Human Factors Engineering Approach: A Systematic Review. *Journal of the American Board of Family Medicine, 31*(3), 417-430. doi:10.3122/jabfm.2018.03.170225

Klepser, M. E., Dobson, E. L., Pogue, J. M., Labreche, M. J., Adams, A. J., Gauthier, T. P., . . . Suda, K. J. (2017). A call to action for outpatient antibiotic stewardship. *Journal of the American Pharmacists Association, 57*, 457-463. doi:10.1016/j.japh.2017.03.013

Lewin, K. (1947). Quasi-Stationary Social Equilibria and the Problem of Permanent Change. In K. Lewin, *Group Decision and Social Change* (pp. 39-44). New York, NY: Henry Holt & Co.

Meeker, D., Knight, T. K., Friedberg, M. W., Londer, J. A., Goldstein, N. J., Fox, C. R., . . . Doctor, J. N. (2015). Nudging Guideline-Concordant Antibiotic Prescribing: A Randomized Clinical Trial. *JAMA Internal Medicine, 174*(3), 1-15. doi:10.1001/jamainternmed.2013.14191

Melnyk, M. B., & Fineout-Overholt, E. (2015). *Evidence-Based Practice in Nursing & Healthcare: A Guide to Best Practice* (3rd ed.). Philadelphia, PA: Wolters Kluwer Health/Lippincot Williams & Wilkins.

Melnyk, M. B., Fineout-Overholt, E., Gallagher-Ford, L., & Stillwell, S. B. (2011). Sustaining Evidence-Based Practice Through Organizational Policies and an Innovative Model. *American Journal of Nursing*, 57-60.

Richards, D. (2018). *Antibiotic Stewardship in the Outpatient Setting.* Centers for Medicare and Medicaid Services, U.S. Department of Health and Human Services. Lake Superior Quality Innovation Network. Retrieved 2018

Rosenfeld, R. M., Piccirillo, J. F., Chandrassekhar, S. S., Brook, I., Kumar, K. A., Kramper, M., . . . Corrigan, M. D. (2015). Clinical Practice Guideline (Update): Adult Sinusitis. *Otolaryngology-Head and Neck Surgery*, *I52*(2S), S1-S39. doi:10.1177/0194599815572097

Sanchez, G. V., Dutra-Fleming, K. E., Roberts, R. M., & Hicks, L. A. (2016). *Core Elements of Outpatient Antibiotic Stewardship.* Division of Healthcare Quality Promotion, CDC, U. S. Department of Health and Human Services. Atlanta: Center for Surveillance, Epidemiology, and Laboratory Services, Centers for Disease Control and Prevention (CDC). Retrieved 2018

Schaffer, M. A., Sandau, K. E., & Lee, D. (2012). Evidence-based practice models for organizational change: overview and practical applications. *Journal of Advanced Nursing*, 1197-1210.

Schmidt, M. L., Spencer, M. D., & Davidson, L. E. (2018). Patient, Provider, and Practice Characteristics Associated with inapproproate Antimicrobial Prescribing in Ambulatory Practices. *Infection Control and Hospital Epidemiology, 39*(3), 307-316. doi:10.1017/ice.2107.263

Shirey, M. R. (2013). Lewin's Theory of Planned Change as a Strategic Resource. *Journal of Nursing Administration, 43*(2), 69-72.

Steinberg, M. B., Akincigil, A., Jung Kim, E., Shallis, R., & Dedlnevo, C. D. (2016). Tobacco Smoking as a Risk Factor for Increased Antibiotic Prescription. *American Journal of Preventive Medicine, 50*(6), 692-698. doi:10.1016/j.amepre.2015.11.009

The Joint Commission. (2016). New Antimicrobial Stewardship Standard. *Joint Commission Perspectives, 36*(7), 1-8. Retrieved 2018

Ventola, C. L. (2015). The Antibiotic Resistance Crisis. *Pharmacy & Therapeutics, 40*(4), 277-283.

Weddle, G., Goldman, J., Myers, A., & Newland, J. (2017). Impact of Educational Interventions to Improve Antibiotic Prescribing for Nurse Practitioners in a Pediatric Urgent Care Center. *Journal of Pediatric Health, 31*(2), 184-188. doi:10.1016/j.pedhc.2016.07.005

WHO, W. O. (2014). *Antimicrobial Resistance Global Report of Surveillance.* Geneva: WHO Press.

Wong, D. M., Blumberg, D. A., & Lowe, L. G. (2006). Guidelines for the Use of Antibiotics in Acute Respiratory Infections. *American Family Physician, 74*(6), 956-966.

Zetts, R. M., Stoesz, A., Smith, B. A., & Hyun, D. Y. (2018). Outpatient Antibiotic Use and the Need for Increaed Antibiotic Stewarship Efforts. *Pediatrics, 141*(6), 1-10. doi:10.1542/peds.2017-4124

Zoorob, R., Sisani, M. A., Fremont, R. D., & Kihlberg, C. (2012). Antibiotic Use in Acute Respiratory Tract Infections. *American Family Physician, 86*(9), 817-822.

Appendix A

Literature Search Results

| Database | Key Terms | Limiters | Date Range | Results | Reviewed/Accepted |
|---|---|---|---|---|---|
| CINAHL | Antibiotic, antimicrobial, stewardship, sinusitis, upper respiratory, systematic review, guidelines, prescribe, prescriber, therapeutic, use, pattern, outpatient, ambulatory | English Language Scholarly-Peer Reviewed | 2014-Present | 17 | 12/3 |
| Cochrane | Antibiotic, antimicrobial, stewardship, sinusitis, upper respiratory, systematic review, guidelines, prescribe, prescriber, therapeutic, use, pattern, outpatient, ambulatory | English Language Scholarly-Peer Reviewed | 2014-Present | 1 | 1/0 |
| Johanna Briggs Institute | Antibiotic, antimicrobial, stewardship, sinusitis, upper respiratory, systematic review, guidelines, prescribe, prescriber, therapeutic, | English Language Scholarly-Peer Reviewed | 2014-Present | 110 | 15/0 |

| Database | Key Terms | Limiters | Date Range | Results | Reviewed/Accepted |
|---|---|---|---|---|---|
| | use, pattern, outpatient, ambulatory | | | | |
| MEDLINE | Antibiotic, antimicrobial, stewardship, sinusitis, upper respiratory, systematic review, guidelines, prescribe, prescriber, therapeutic, use, pattern, outpatient, ambulatory | English Language Scholarly-Peer Reviewed | 2014-Present | 40 | 25/2 |
| National Guideline Clearinghouse | Antibiotic, antimicrobial, stewardship, sinusitis, upper respiratory, systematic review, guidelines, prescribe, prescriber, therapeutic, use, pattern, outpatient, ambulatory | English Language Scholarly-Peer Reviewed | 2014-Present | 1 | 1/0 |
| AHRQ/CDC | Antibiotic, antimicrobial, stewardship, | NA | 2014-Present | 2 | 1/1 |
| ProQuest | Antibiotic, antimicrobial, stewardship, sinusitis, upper respiratory, systematic review, guidelines, prescribe, prescriber, therapeutic, | English Language Scholarly-Peer Reviewed | 2014-Present | 147 | 30/1 |

| Database | Key Terms | Limiters | Date Range | Results | Reviewed/Accepted |
|---|---|---|---|---|---|
| | use, pattern, outpatient, ambulatory | | | | |
| PubMed | Antibiotic, antimicrobial, stewardship, sinusitis, upper respiratory, systematic review, guidelines, prescribe, prescriber, therapeutic, use, pattern, outpatient, ambulatory | English Language Scholarly-Peer Reviewed | 2014-Present | 31 | 15/1 |
| Hand Search | Citation Chase | | 2014-Present | 2 | 2/0 |

Appendix B

Literature Synthesis
Antibiotic Stewardship in the Outpatient Setting

| Citation (APA) | Purpose | Intervention | Design | Outcome | LOE Quality |
|---|---|---|---|---|---|
| Barlam, Tamar F; Cosgrove, Sara E; Abbo, Lilian M; MacDougall, Conan; Schuetz, Audrey N; Septimus, Edward J; Srinivasan, Arjun; Dellit, Timothy H; Falch-Yetter, Yngve T; Fishman, Neil O; Hamilton, Cindy W; Jenkins, Timothy C; Lipsett, Pamela A. (2016). *Implementing an Antibiotic Stewardship Program: Guidelines by the Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America.* Boston: Oxford University Press. | Clinical guideline for the implementation of an antibiotic stewardship program. | Expert panel developed the guideline by including a systematic review of the strength of recommendation and quality of evidence via the GRADE system. | Guideline | The use of evidence based best practice guidelines for the treatment of illness will lead to best outcomes and help to decrease antimicrobial resistance. Each clinical site must determine what approach is best for the implementation of an antibiotic stewardship program. Interventions must be multifaceted, communication, audit & feedback, and EHR support at time of prescribing. Recommendation of drug, dose and duration of treatment be standardized to shortest amount of time, and specific to patient. | Level I Good |
| CDC; Sanchez, Guillermo V; Dutra- | Clinical guideline for the | Consolidation of evidence-based antibiotic | Guideline | Provides a framework for best evidence for practice for improving antibiotic | Level I Good |

| Citation (APA) | Purpose | Intervention | Design | Outcome | LOE Quality |
|---|---|---|---|---|---|
| Fleming, Katherine E; Roberts, Rebecca M; Hicks, Lauri A. (2016). *Core Elements of Outpatient Antibiotic Stewardship.* Division of Healthcare Quality Promotion, CDC, U. S. Department of Health and Human Services. Atlanta: Center for Surveillance, Epidemiology, and Laboratory Services, Centers for Disease Control and Prevention (CDC). Retrieved 2018 | implementation of an antibiotic stewardship program in the outpatient setting. | stewardship programs and to expand on best practices for antibiotic stewardship for hospitals and long-term care facilities. Narrative review including 5 systematic reviews from 2015-2016. Subject matter experts were identified for their expertise. These experts provided specific feedback on the feasibility, acceptability, recommended supplementary material and the potential to promote antibiotic stewardship that is effective for improving antibiotic prescribing. | | prescribing in the outpatient setting. Consistent effort on the part of the health care system is needed to achieve best outcomes. The outpatient clinic setting must develop an antibiotic stewardship program that is provider, patient, and clinic specific. | |
| Drekonja, D. M., Filice, G. A., Greer, N., Olson, A., MacDonald, R., Rutks, I., & Wilt, T. J. (2015). Antimicrobial Stewardship in Outpatient Settings: A Systematic Review. *Infection Control & Hospital* | Evaluation of the effect of an antibiotic stewardship program in the outpatient setting. | Identified studies with evidence that antibiotic stewardship programs that incorporate communications and PCT are medium strength. For antibiotic stewardship programs to be effective the approach must be multifaceted. | Systematic review. | A multifaceted approach (provider & patient education, audit & feedback, clinical guidelines, delayed prescribing, communication training and EHR prompts) to antibiotic stewardship programs was associated with decreased inappropriate antibiotic prescribing. No evidence of harm or high cost were shown, but they were not collectively assessed. | Level I Good |

| Citation (APA) | Purpose | Intervention | Design | Outcome | LOE Quality |
|---|---|---|---|---|---|
| *Epidemiology*, 141-152. | | | | | |
| Keller, S. C., Tamma, P. D., Cosgrove, S. E., Miller, M. A., Sateia, H., Szymczak, J., . . . Linder, J. A. (2018). Ambulatory Antibiotic Stewardship through a Human Factors Engineering Approach: A Systematic Review. *Journal of the American Board of Family Medicine, 31*(3), 417-430. doi:10.3122/jabfm.2018.03.170225 | The identification of interventions and studies of antibiotic stewardship. | Interventions focuses on clinical decision support & PCT, provider education, audit & feedback, delayed prescribing, and commitment posters. | Systematic Review | A positive impact on antibiotic stewardship were provider communications training, education for providers and patients, audit and feedback, and signed clinic posters advocating antibiotic stewardship. Engagement of all clinic staff as an intervention had a positive impact but this was not routinely done. | Level I Good |
| Meeker, D., Knight, T. K., Friedberg, M. W., Londer, J. A., Goldstein, N. J., Fox, C. R., . . . Doctor, J. N. (2015). Nudging Guideline-Concordant Antibiotic Prescribing: A Randomized Clinical Trial. *JAMA Internal Medicine*, 1-15. | Evaluated a behavioral technique which was a “nudge” based on provider commitment for the judicious use of antibiotic therapy for upper respiratory conditions. | Antibiotic prescribing rates for acute respiratory infections that were inappropriate at baseline and intervention. | Randomized Control Trial. Poster sized commitment letters in exam rooms with provider photo and signature stating commitment to avoiding inappropriate | Baseline rate for no poster 43.5% and for poster 42.8% at intervention. No poster increased to 52.7% while poster decreased to 33.7%. Poster resulted in a 19.7 absolute percentage decrease in inappropriate antibiotic prescribing for acute respiratory infections. This intervention was low-cost and simple to implement with positive results. | Level II Good |

| Citation (APA) | Purpose | Intervention | Design | Outcome | LOE Quality |
|---|---|---|---|---|---|
| | | | antibiotic prescribing. | | |
| Rosenfeld, R. M., Piccirillo, J. F., Chandrassekhar, S. S., Brook, I., Kumar, K. A., Kramper, M., . . . Corrigan, M. D. (2015). Clinical Practice Guideline (Update): Adult Sinusitis. *Otolaryngology-Head and Neck Surgery, I52*(2S), S1-S39. doi:10.1177/0194599815572097 | Clinical Practice Guideline (Update) Adult Sinusitis | Evidence-based recommendation to manage adult rhinosinusitis. Systematic review of 42 articles. Expert opinion. Information for patient education, creation of a new algorithm, delayed prescribing indications. | Update of the 2007 guideline. | Improve diagnostic accuracy for adult rhinosinusitis, promote appropriate use of PCT for diagnosis confirmation and management and promote judicious use of systematic and topical therapies. Opportunities for quality improvement and the creation of explicit recommendations for implementation into clinical practice. | Level I Good |
| Schmidt, M. L., Spencer, M. D., & Davidson, L. E. (2018). Patient, Provider, and Practice Characteristics Associated with inappropriate Antimicrobial Prescribing in Ambulatory Practices. *Infection Control and Hospital Epidemiology, 39*(3), 307-316. | Explained factors associated with inappropriate antibiotic prescribing. Evaluation included 448,990 outpatient visits for common respiratory conditions that should not require antibiotic therapy. | Data extraction to include diagnosis for which antibiotic prescribing was not appropriate. | Retrospective cohort study. Outcome of interest was antibiotic prescribing at the visit. | Individual provider characteristics as well as individual patient characteristics were associated with increased rates of inappropriate antibiotic therapies. Antibiotic stewardship programs in the outpatient setting must have a multifaceted approach to interventions for successful outcomes and best patient care. | Level IV Good |

| Citation (APA) | Purpose | Intervention | Design | Outcome | LOE Quality |
|---|---|---|---|---|---|
| doi:10.1017/ice.2107.263 | | | | | |
| Zoorob, R., Sisani, M. A., Fremont, R. D., & Kihlberg, C. (2012). Antibiotic Use in Acute Respiratory Tract Infections. *American Family Physician, 86*(9), 817-822. | Clinical Guidelines for appropriate antibiotic use for common upper respiratory conditions | Evidence-based recommendation for the management and treatment of common cold, influenza, rhinosinusitis, otitis media, pharyngitis & tonsillitis, laryngitis, epiglottitis, and bronchitis & tracheitis. Systematic review of current research. | Guideline | Indications for appropriate antibiotic therapies for common upper respiratory infections frequently seen in family practice. The use of antibiotics based on best evidence-based guidelines will help prevent adverse events and drug resistance. | Level I Good |

Appendix C

Valparaiso University

phone: 219.464.5798
fax: 219.464.5511
www.valpoirb.edu

Institutional Review Board
212 Arts & Sciences Building
1400 Chapel Drive
Valparaiso, Indiana 46383-4520

To: Elizabeth A. Weaver

From: Rasha Abed
Associate Director of Sponsored Research

RE: Antibiotic Stewardship in the Outpatient Clinical Setting (#19-005)

Date: September 21, 2018

The IRB has approved the above study on September 20, 2018. The project was reviewed in accordance with all research statues and regulations pursuant to Federal regulations, 45 CFR 46.101(b).

The researcher has approval of this project until one year from the identified date.

If additional protocol changes are needed, approval must be sought from the IRB prior to implementing those changes. Please submit a new expedited request to the IRB for consideration.

When the project is completed, notify the IRB. If the research protocol needs to extend beyond one year, written approval must be sought from the IRB.

Good luck with your work. Please retain a copy of this letter for your records.

Appendix D

September 17, 2018

To Whom It May Concern,

Based on my review of the proposed research by Elizabeth A. Weaver, it has been approved for her to conduct DNP project focused on antibiotic stewardship. We understand that her project will include research along with education for our staff.

I confirm that I am authorized to approve this project.

Sincerely,

Rachel Mullins

Rachel Mullins, MHA, PCMH CCE

Director of Practice Improvements

Appendix E

## POLICY: Antimicrobial Stewardship

| | | | |
|---|---|---|---|
| **Effective Date** | 04/01/2019 | **Policy Number** | IC 2.1 |
| **Revision Dates** | | **Department/Operations Areas** | Clinical, Administration |
| **Approval Dates** | 04/01/2019 | **Approved By** | |

### POLICY STATEMENT

The purpose of this policy is to ensure the proper and safe use of antimicrobials throughout the healthcare facilities.

### POLICY PURPOSE

The purpose of antimicrobial stewardship is to promote the appropriate use of antimicrobials by selecting the appropriate agent, dose, duration and route of administration to improve patient outcomes, while minimizing the emergence of antimicrobial resistance. The purpose of the antimicrobial stewardship program is to improve antimicrobial stewardship practices at the facilities of NorthShore Health Centers and to monitor outcomes and antimicrobial use (consumption).

### POLICY DEFINITIONS

*Antimicrobial Stewardship* is a coordinated program that ensures the optimal selection, dose, and duration of an antimicrobial therapy that leads to the best clinical outcome for the treatment or prevention of and infection while producing the fewest toxic effect and the lowest risk for subsequent resistance.

The *Antimicrobial Stewardship Program* is coordinated through a multi-disciplinary team that reports to the director of practice improvement and the director of quality improvement and is charged with the responsibility of promoting optimal antimicrobial utilization.

*Reservations* are specific indications/reasons for the use assigned to the medication. Reservations are in place as a means of defining the appropriate situations when a designated antimicrobial would be acceptable for prescribing (clinical practice guideline). While the guidelines are not technically required for the medication to be dispensed, a periodic review process will be put in place to access compliance with clinical practice guidelines.

### POLICY GOAL

The goal of Antimicrobial Stewardship is to improve appropriate antimicrobial utilization to improve patient outcomes, minimize the emergence of antimicrobial resistance and toxicity. The goal of the Antimicrobial Stewardship Program is to promote the optimal antimicrobial utilization at the health centers of NorthShore Healthcare Centers.

To assure appropriate and quality utilization of antimicrobial agents, Antimicrobial Stewardship Committees have been developed to include the following:

- Physicians, Dentists, Advanced Practice Registered Nurses
- Pharmacists
- Quality Improvement, Practice Improvement
- Information Technology

The objective of the Antimicrobial Stewardship Program will be to improve patient outcomes through optimization of antimicrobial therapy by selection of appropriate antibiotic dose, route and duration of treatment. Potential benefits may include the following:

- Improve patient safety by decreasing side effects and toxicity
- Support the education of all healthcare providers, patients and families about antimicrobial stewardship, including resistance and appropriate use.
- Minimize the development of antimicrobial resistance by appropriately selecting antibiotics.
- Reduction in pharmacy expenditures on antimicrobials
- Potential decrease the number of community acquired *Clostridium difficile* infections and the emergence of multidrug-resistant organisms.

## PROCEDURE

Antimicrobial stewardship will be performed as an ongoing practice involving several disciplines throughout the health care system. The antimicrobial stewardship Committee will develop strategies and initiatives to promote appropriate antimicrobial use.

A. The antimicrobial stewardship committees will be responsible for the following:

1. Development or revision of policies, procedures, protocols and guidelines related to antimicrobials.
2. Development and distribution of an antimicrobial program at least annually and assessing trends of antimicrobial resistance within the community.
3. Providing recommendations about antimicrobial selection, dose, and duration of therapy.
4. Providing ongoing healthcare practitioner education (in-service, newsletters, one-on-one interaction) regarding antimicrobial stewardship initiatives.
5. Collection tracking and analysis of antimicrobial prescribing on an as needed basis.
6. Collection, tracking, and analysis of resistance patterns.
7. Regularly reporting antimicrobial stewardship measures relevant to healthcare providers and administration.

B. Policies and procedures related to the Antimicrobial Stewardship Committee will be reviewed and the committee will be responsible for any/all approval of any revisions, including additions or deletions to the antimicrobial reservation lists.

C. Roles and responsibilities

1. Provide oversight to team functions
2. Provide clinical guidance and support
3. Share responsibility for program outcomes
4. Assist with auditing, analyzing and reporting data as related to Antimicrobial Stewardship initiatives.
5. Assist with integrating stewardship protocols into existing workflow.

## RESTRICTIONS

Retrospective medication utilization reviews shall be conducted periodically to assess the overall compliance with the established protocol/policy. The frequency of the review shall be determined by Quality Improvement and Practice Improvement.

APPROVED:

4/1/19

Date

Appendix F

ANTIBIOTIC STEWARDSHIP PROGRAM

Thank you for completing the following survey, your help is greatly appreciated.

1. True or False: Antibiotic overuse has contributed to the problem of increased drug resistance. (TRUE)
2. True or False: For acute cough or bronchitis lasting for 1 week, antibiotics are indicated. (FALSE)
3. True or False: All patients with a fever require antibiotics. (FALSE)
4. True or False: To decrease antibiotic use delayed antibiotic prescribing is an appropriate technique for providers to utilize. (TRUE)
5. True or False: Bronchitis or acute cough can last up to three weeks. (TRUE)
6. On a scale of 1 to 5, how often do your patients **request** antibiotics unnecessarily?
    1. very often
    2. often
    3. neutral
    4. not often
    5. never

7. On a scale of 1 to 5, how likely are you to incorporate antibiotic education into your clinic visits with patients?
    1. extremely likely
    2. likely
    3. neutral
    4. unlikely
    5. extremely unlikely

8. On a scale of 1 to 5, how helpful would you say an antibiotic stewardship program promoting best practice is?
    1. extremely helpful
    2. helpful
    3. neutral
    4. not helpful
    5. extremely not helpful

9. On a scale of 1 to 5 how likely are you to incorporate delayed prescribing (WASP) into your practice?

1. extremely likely
2. likely
3. neutral
4. unlikely
5. extremely unlikely

10. On a scale of 1 to 5 how important would you say antibiotic education is for the **public**?

1. extremely important
2. important
3. neutral
4. somewhat important
5. extremely not important

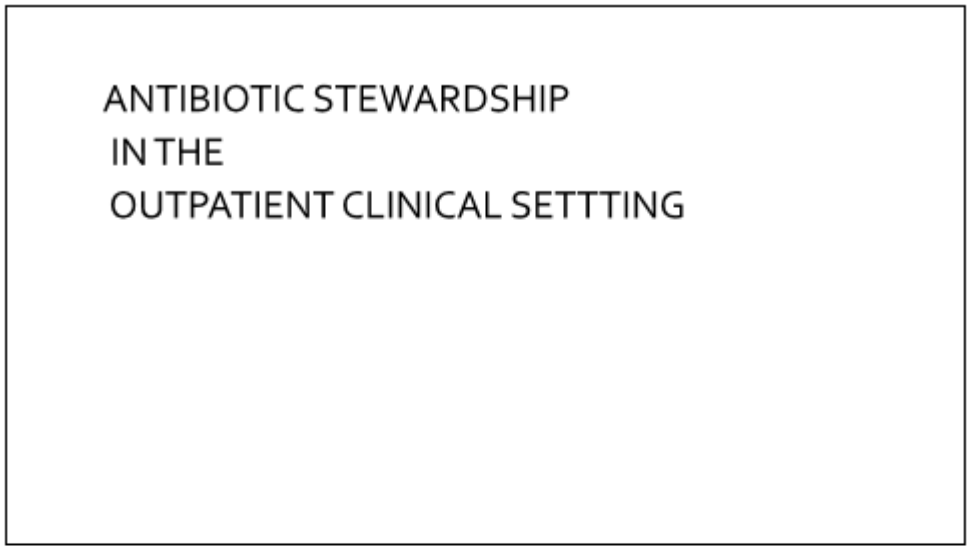
Would you be willing to provide the following information? Please mark the appropriate answer.

MD_____ NP_____

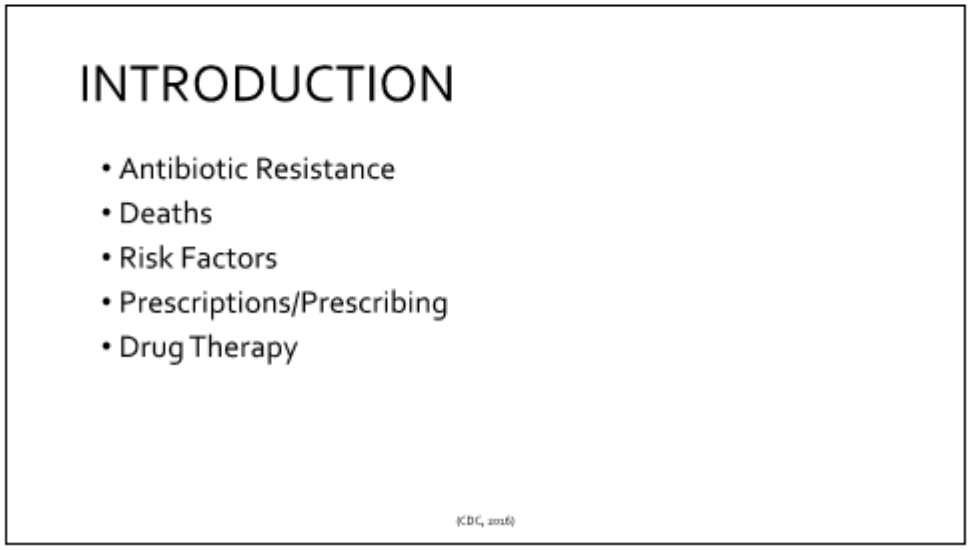
Age_____ Gender_____

Years of Practice_____

Appendix G



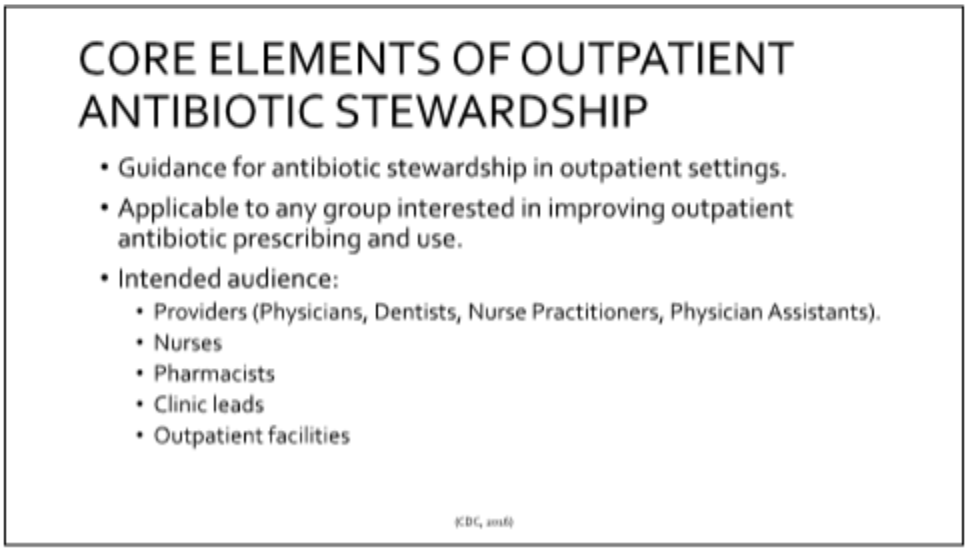

1



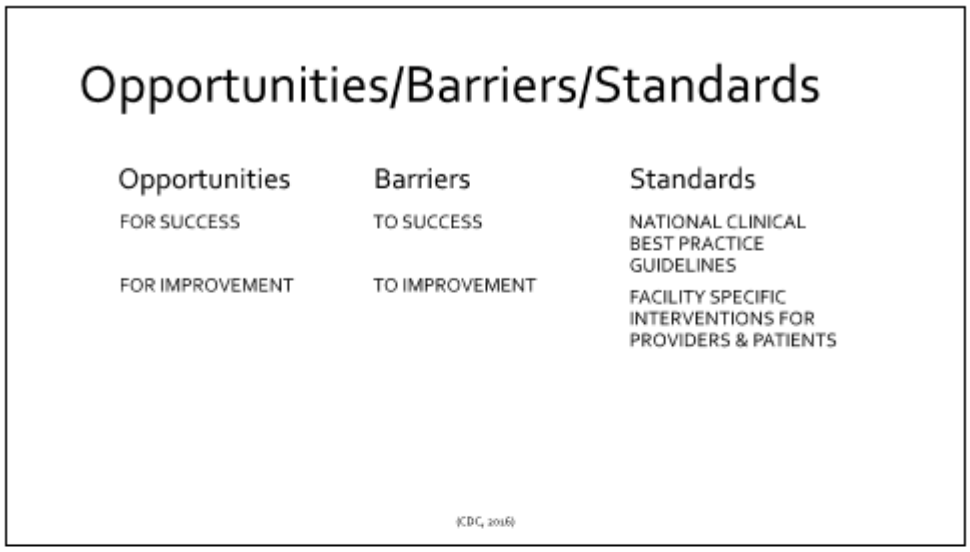

2


BACKGROUND
• Expenditures
• Outpatient Pharmacies
• Complications
• Healthcare Resources
(CDC, 2016)

3


CORE ELEMENTS OF OUTPATIENT ANTIBIOTIC STEWARDSHIP
• Guidance for antibiotic stewardship in outpatient settings.
• Applicable to any group interested in improving outpatient antibiotic prescribing and use.
• Intended audience:
• Providers (Physicians, Dentists, Nurse Practitioners, Physician Assistants).
• Nurses
• Pharmacists
• Clinic leads
• Outpatient facilities
(CDC, 2016)

4


Opportunities/Barriers/Standards
Opportunities
FOR SUCCESS
FOR IMPROVEMENT
Barriers
TO SUCCESS
TO IMPROVEMENT
Standards
NATIONAL CLINICAL BEST PRACTICE GUIDELINES
FACILITY SPECIFIC INTERVENTIONS FOR PROVIDERS & PATIENTS
(CDC, 2016)

5


CORE ELEMENTS
• COMMMITMENT
• ACTION FOR POLICY AND PRACTICE
• TRACKING AND REPORTING
• EDUCATION AND EXPERTISE
(CDC, 2016)

6

## COMMITMENT

- Display public commitments in support of antibiotic stewardship.
- Identification of a leader to direct antibiotic stewardship activities.
- Inclusion of antibiotic stewardship-related duties in job descriptions or evaluation criteria.
- Communicate with all clinic staff members to set patient expectations.

(CDC, 2016)

7

## ACTION FOR POLICY AND PRACTICE

- Evidence-based clinical practice guidelines.
- Delayed prescribing & watchful waiting.
- Communication skills training.
- Written justification for non recommended antibiotic prescribing.
- Clinical decisions support

(CDC, 2016)

8

## TRACKING AND REPORTING

- Self-evaluation
- Participation
- Tracking for "TOP PERFORMER" status
- Quality Measures

(CDC, 2016)

9

## EDUCATION & EXPERTISE

- Communication strategies
- Antibiotic therapies potential harms
- Patient education materials
- For providers
  - Educational training.
  - Continuing education.
  - Access to experts

(CDC, 2016)

10

# CONCLUSION

- FRAMEWORK
- SUSTAINABILITY
- Establishing an effective antibiotic stewardship program can protect patients & providers while also optimizing best clinical outcomes within the outpatient health care settings.

(CDC, 2016)

11

REFERENCES

CDC. (2018, May 24). ***U.S. Centers for Disease Control and Prevention***. Retrieved from Antibiotic Resistance Threats in the United States, 2013: https://www.cdc.gov/drugresistance/threat-report-2013/

CDC, Sanchez, Guillermo V; Dantes-Fleming, Katherine E; Roberts, Rebecca M; Hicks, Lauri A. (2016). ***Core Elements of Outpatient Antibiotic Stewardship***. Division of Healthcare Quality Promotion, CDC, U. S. Department of Health and Human Services. Atlanta: Center for Surveillance, Epidemiology, and Laboratory Services, Centers for Disease Control and Prevention (CDC). Retrieved 2018

(CDC, 2016)

12

## BIOGRAPHICAL MATERIAL

Elizabeth A. Weaver

Elizabeth graduated from Indiana University with an associate degree in the science of nursing 2004. She worked as a surgical nurse as well as a school nurse for eight years prior to returning to Indiana University to earn a bachelor's degree in the science of nursing in 2015. After obtaining her BSN, Elizabeth returned to surgical nursing where she became a member of the open-heart team as well as coordinator for the plastic surgery team. In addition to providing patient care, she is a preceptor for new hires, nurses and surgical technologists. She is currently attending Valparaiso University to earn a Doctor of Nursing Practice (DNP) degree with anticipated graduation, May of 2019. In 2015, Elizabeth was inducted as a member of Sigma Theta Tau International-Alpha chapter. She is a member of the Indiana State Nurse Association as well as a student member of the American Association of Nurse Practitioners, and the Coalition of Advanced Practice Nurses of Indiana. Elizabeth presented her evidence-based practice (EBP) project at the Northwest Indiana Research Consortium in 2018. The project emphasis included antibiotic stewardship in the outpatient clinical setting with a focused, multifaceted approach regarding appropriate antibiotic use for providers and patients. Elizabeth plans to practice in an underserved rural community following graduation and board certification.

## ACRONYM LIST

AHRQ: Agency for Healthcare Research and Quality

ARCC: Advancing Research and Clinical Practice through Close Collaboration

CDC: Centers for Disease Control and Prevention

CINAHL: Cumulative Index to Nursing and Allied Health

CMS: Centers for Medicare and Medicaid

EBP: Evidence Based Practice

EHR: Electronic Health Record

IDSA: Infectious Disease Society of America

MRN: Medical Record Number

NP: Nurse Practitioner

RCT: Randomized Control Trial

SHEA: Society for Healthcare Epidemiology of America

WASP: Wait and See Prescription

WHO: World Health Organization