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The Use of Shared Decision Making and its Effect on Antibiotic Prescriptions

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Use of Shared Decision Making and its Effect on Antibiotic Prescribing

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Dedication

This doctoral project is dedicated to my family for their unwavering support and faith in my abilities. I am so grateful for all of you.

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Abstract

The overuse and misuse of antibiotics for acute respiratory tract infections contribute to antimicrobial resistance and potential patient harm. The use of shared decision-making is an evidence-based practice tool shown to decrease unnecessary antibiotic prescriptions while promoting antibiotic stewardship. This quality improvement project implemented an evidence- based shared decision-making model, along with the use of an evidence-based decision tool for the treatment of acute respiratory infections in a rural college health center over a 4- month period. The results of this project were commensurate with the historical and current evidence found, adding to the body of knowledge and research supporting shared decision- making in the outpatient setting for the reduction in antibiotic use.

Keywords: shared decision making, antibiotic stewardship, acute respiratory tract infections, antibiotics, young adult.

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Chapter 1

Introduction and Background

Antibiotic prescriptions for acute respiratory tract infections (ARI) in the outpatient setting are all too common. An estimated 44% of antibiotic prescriptions prescribed in the outpatient setting are for the treatment of acute respiratory tract infections including the common cold. Thirty percent of these are not necessary because the majority of ARIs are viral in nature (Pew Charitable Trust, 2016). Despite this consensus, greater than half of inappropriate antibiotic use is found to be in the outpatient setting (CDC, 2020).

Background

The inappropriate use of antibiotics is a leading contributor to antimicrobial resistance worldwide and is the root cause of numerous infections becoming resistant to current antimicrobial treatment, higher medical expenditures annually, and increased morbidity and mortality globally (WHO, 2012). Over two million Americans are diagnosed with an antimicrobial resistant infection annually. Clostridioides difficile is among the most common, leading to nearly 20, 000 deaths and healthcare expenses of over four billion dollars annually (CDC, 2015; The Whitehouse, 2014).

The Problem

In the United States, outpatient oral antibiotic prescriptions totaled nearly 259 million in 2018. Primary care physicians are among the heaviest prescribers accounting for over half of all outpatient antibiotic prescriptions (CDC, 2020). It has been identified that General Practitioners all too often succumb to prescribing antibiotics due to perceived patient expectations an inadequate knowledge, while patients often are unaware of the deleterious effects of unwarranted antibiotic use (Altiner et al., 2007; Bakhit, Del Mar, Gibson & Hoffmann, 2018; Hruza et al., 2020; O'Connor, O'Doherty, O'Regan & Dunne, 2017).

Antibiotic prescribing trends for acute respiratory infections in rural private residential college health center in Pennsylvania average was 28% per provider (See Table 1). Albeit there is no specific consensus on what percent of respiratory infections warrant antibiotics, it is understood that most of these infections are viral in nature, as previously stated. Based on the incidence of morbidity and mortality from antibiotic overuse and misuse, experts recommend a 50% reduction in prescriptions for ARIs by the year 2020 (Pew Charitable Trust, 2016).

Population Affected

Overuse of antibiotics affects millions of Americans worldwide annually. Over 60% of antibiotic prescriptions for viral infections are unnecessary, contributing to antibiotic resistance, and beckons for antibiotic stewardship (Hruza et al., 2020; Legare et al., 2010). The outpatient setting alone has been identified as promulgating antibiotic resistance through unnecessary antibiotic prescriptions (AHRQ, 2014). The mere use of antibiotics in one person potentiates antimicrobial resistance in the host that then may spread to family, friends, and community members (CDC, 2017).

Epidemiology

Antibiotic prescriptions in the United States are triple to that of European countries (Pew Charitable Trust, 2016). This is equivocal to approximately 838 prescriptions per 1000 persons (CDC, 2015). Rates of secondary diarrheal infections, Clostridioides difficile, due to antibiotic use have increased among younger persons, once thought to be less susceptible. A majority of the data is from inpatient sources, which undoubtedly is missing a large proportion of unreported cases (DePestel & Aronoff, 2013). Clostridioides difficile infections annually are over 220,000 and of those infected nearly 13, 000 die. Antibiotic use is the number one risk factor for acquiring this diarrheal infection (CDC, 2017).

Antibiotic prescribing trends for acute respiratory infections in a small rural private residential college in Pennsylvania averaged 28% per provider (see Table 1). Over 50% of these prescriptions were not indicated at the time of diagnosis according to evidence-based practice guidelines. There was one incidence of Clostridioides difficile infection reported in 2018, by a student with a recent diagnosis of Crohn's disease and history of three antibiotic prescriptions in a 12-month timeframe.

What We Know

The Whitehouse National Action Plan, pursuant to the Executive Order 13676, to reduce antibiotic resistance focuses in part on the adoption of evidence-based antibiotic stewardship strategies (The Whitehouse, 2014). Shared decision making (SDM) is one such strategy. Shared decision making is a process of communication between the provider and patient that encourages patient participation in decision making related to their care, with emphasis on their preferences (AHRQ, 2014). The use of shared decision making for the treatment of ARIs has been shown to reduce overall antibiotic prescriptions in the outpatient setting (Durante, McBride, Miklo, Killeen, & Creech, 2017; Sharp et al., 2017). Young adult patients prefer this decision-making model (Alden, Mers, & Akashi, 2012).

Shared decision making has been an accepted and effective tool for the treatment of chronic conditions including heart failure and Type II Diabetes. In recent years, research on the use of shared decision making in the outpatient setting for the treatment of ARIs has garnered focus to promote antibiotic stewardship.

More research is needed using various methods of shared decision making to evaluate its effect it has on antibiotic stewardship as well as other outcomes (Pew Charitable Trust, 2016). Specifically, research is needed in the college population as very few studies have been done, as evidenced by the lack of extensive data found for this project. College and university campuses provide a communal living setting, increasing the risk for infection(s) due to close quarters, shared living spaces, and shared common facilities. Similar to the outpatient setting, college health centers experience similar rates of ARI visit reasons. Therefore, promoting antibiotic stewardship by reducing the number of antibiotic prescriptions is indicated. Shared decision making is ideal for procuring this aim while teaching self-care and advocacy, a cornerstone of health promotion in higher education (ACHA, 2014).

Purpose Statement

This quality improvement project asks whether the use of shared decision making in the treatment of acute respiratory tract infections in young adults age 18-24 reduces the number of antibiotic prescriptions.

Clinical Questions

- Will SDM be used for each ARI visit?
- Will there be fewer antibiotic prescriptions for ARIs than pre-intervention?
- Will the provided EBP guidelines be utilized for decision making

DNP Project Objectives

- To have at least 30 patients participate in SDM for the treatment of ARIs as evidenced by signed consent and documentation of SDM in the EHR.

- To have both providers use EBP guidelines as a decision aid in the treatment of ARIs for each visit as documented in the EHR.
- To promote antibiotic stewardship by using SDM and thus decrease the number of antibiotic prescriptions for ARIs by at least 20% from January 4, 2021-April 15, 2021, compared to January 4, 2019-April 15, 2019

Assumptions and Limitations

- This project assumes that the patients will consent to participation in the use of SDM for treatment of ARIs.
- There is the possibility that patients will prefer the provider to decide treatment for ARIs.
- There is the possibility that there will be a limited number of visits for ARIs due to the current pandemic and limited time frame of 16 weeks

Chapter 2

Literature Review

Chapter Two includes a description of the theoretical framework and review of literature on shared decision making (SDM) in the treatment of acute respiratory tract infections (ARIs) in the outpatient setting. For the purpose of this project, acute respiratory tract infections include any infection lasting more than 2 days but less than 10, involving the upper airway, mouth, sinuses, ears, and throat (See Table 2). The Agency for Healthcare Research and Quality (AHRQ) SHARE Approach model for SDM will be employed during these visits (See Figure 1). The outpatient setting will be in a small rural private residential college health center in Pennsylvania, with a population of young adults ages 18-24.

The literature search included English language original studies on shared decision making and acute respiratory infections in the outpatient setting. Databases included CINAHL, PubMed, Medline, and Google Scholar for original studies using the keywords “shared decision making”, “acute respiratory infections”, “outpatient”, and “antibiotic stewardship”. Date delimitations were January 2009 to October 2020, as antibiotic stewardship did not garner much attention until the mid-2000s with the advent of the Affordable Care Act. The initial search yielded 199 studies. After applying inclusion criteria of adults age 18-40, peer reviewed, and antimicrobial resistance prevention, the list was narrowed to 28 studies. A major limitation is the lack of studies on this topic in the outpatient setting, which begs for future research.

Theoretical Framework

The Theory of Planned Behavior (TPB), originally the Theory of Reasoned Action in in health care for the promotion of healthy habits, chronic care treatment adherence, and in palliative care

(Coronado-Vazquez et al., 2020). Although there are not many studies, a compelling systematic review of 20 studies based on TPB and intention to use SDM in general practice found providers preferred the use of SDM and intention to engage in the use of SDM was based most consistently on subjective norms, one of the three fundamental constructs of TPB. The three constructs are (a) attitudes- the degree to which a person has a negative or positive concept of an action/behavior; (b) subjective norm- beliefs about what peers approve/disapprove; (c) perceived behavioral control- a person's perception or belief of ability and ease to perform an action/behavior, (Thompson-Leduc, Clayman, Turcotte, & Legare, 2014). The TPB theoretical framework will guide this quality improvement project providing the connection between how subjective norms, including patient preference, are most strongly correlated with providers' intention to use SDM (Thompson-Leduc et al., 2014; Hruza et al., 2020; see figure 1). This socio-cognitive theory (TPB) supports the patient-centered construct of SDM as the influence of patient preferences in the decision- making process is a leading predictor of adoption and use of SDM, (Thompson-Leduc et al., 2014).

Antibiotic Resistance

The rate of antibiotic prescribing in the United States continues to remain constant. Inappropriate prescribing of antibiotics is the largest threat to antimicrobial resistance and development of resistant infections (Olesen, Barnett, MacFadden, Lipstich, & Grad, 2018; CDC, 2015). Not only is overuse of antibiotics a known threat to antimicrobial resistance, lack of observation of EBP guidelines is an additional threat (Olesen et al., 2018).

The incidence of antimicrobial resistance and superinfections due to inappropriate antibiotic use is daunting (CDC, 2020; The Whitehouse, 2014; WHO, 2012). Antibiotic associated diarrheal illness, Clostridioides difficile, is on the rise not only in hospital settings, but now more commonly in the community at large. Anyone taking an antibiotic is 7-10 times more likely to have Clostridioides difficile (CDC, 2017). The healthcare costs associated with Clostridioides difficile is in the billions annually (DePestel & Aronoff, 2013). With >80% of ARIs being viral in nature at the onset of presentation, the indication for antibiotic treatment is not present. Despite consensus, >60% of ARIs are treated with antibiotics initially (Hruza et al., 2020; Legare et al., 2010). Levofloxacin and azithromycin are two of the most prescribed antibiotics for ARIs at onset despite viral etiology (Olesen et al, 2018).

Treatment of ARIs

Evidence-based guidelines have been established for the treatment of ARIs. From specialty societies to the CDC, consensus has been formulated and readily available (See Table 3). Despite their availability, inappropriate prescribing patterns continue (CDC, 2015; Olesen et al., 2018). Some of the mainstay treatments for ARIs are symptom management using over-the- counter analgesics, decongestants, and mucolytics. Antibiotics are not considered one of these mainstay treatments.

Antibiotic stewardship. Antibiotic stewardship was formalized in 2007 by the Infectious Disease Society of America (ISDA) and Society for Healthcare Epidemiology of America. It is comprised of a multidisciplinary team charged with formulating prescribing guidelines, monitoring prescribing patterns, and educating providers about appropriate antimicrobial use, among other things, to reduce the amount of antibiotics used and to foster appropriate use (Goff et al., 2017). The ISDA provides clinical guidelines for the treatment of a plethora of conditions, including ARIs. Despite these guidelines, antimicrobial resistance is on the rise (CDC, 2015; Goff et al, 2017). In response, the federal government appropriated monies to antibiotic resistance research in 2016. This led to the development of provider tools to promote antibiotic stewardship. Among them is SDM.

Shared decision making. Patient-centered care is a core element in SDM, with emphasis on patient values and preferences while working together to come to a treatment decision (AHRQ, 2014). Studies show patients under age 40, specifically young, educated adults, prefer the use of SDM in the treatment of ARIs (Blyer & Hulton, 2015; Briel et al., 2007). Evidence indicates active engagement in the treatment plan, along with a concise understanding of why the mutually determined treatment is appropriate, is appreciated by adult patients leading to greater satisfaction (Blyer & Hulton, 2015; Alden et al., 2012). Patient satisfaction is valuable, so much so that Medicare has established pay for performance incentives based on patient satisfaction scores.

Primary care providers are integral in promoting judicious use of antibiotics. The evidence indicates providers that are trained in the use of SDM prescribe fewer antibiotics with reductions of up to 39% (Durante, Miklo, Killeen, & Creech, 2017; Legare et al., 2010; Little et al., 2019; Trivedi, 2016). Initiation of a SDM approach to treatment affords opportunity to employ safe prescribing practices based on evidence, while considering patient preferences (Legare & Witteman, 2013). Its use has been shown to foster collaboration between provider and patient enhancing patient compliance to treatment, improved outcomes, and patient satisfaction (Legare & Witteman, 2013).

Adoption. There are several factors contributing to the adoption of SDM. The influence of peers and their support for antibiotic stewardship in the form of SDM is fundamental.

Providers were more likely to use SDM if peers were doing the same; it is the perception of intention of peers that was the common denominator across studies (Thompson-Leduc et al., 2014). Other key factors lending to adoption of SDM are training of healthcare providers in the use of SDM and the use of decision aids to help guide collaboration between provider and patient (Legare & Witteman, 2013).

The utilization of both, together, was consistent across studies evaluating successful implementation of SDM (Durante, et al., 2017; Legare et al., 2010; Little et al., 2019; Trivedi, 2016).

Training formats were varied including chart reviews of historical prescribing patterns, internet- based education on communication skills to the use of leaflets, pamphlets, and decision aids. Overwhelmingly, the use of decision-aids was reported to enhance provider comfort in making treatment plans by decreasing indecisiveness, while increasing patient awareness of treatment options and appropriateness of treatment options. These findings were consistent across studies in varying age groups, mostly adults, some children. (Coronado-Vazquez et al., 2020; Sharp et al., 2017). Most decision aids were formulated based upon evidence-based practice guidelines.

Barriers. Barriers identified were provider attitudes related to time, lack of knowledge of SDM, and diagnostic uncertainty (Coronado-Vazquez et al., 2020; Durante et al., 2017; Hruza et al., 2020; Legare & Witteman, 2013; O'Connor et al., 2018).

Provider attitudes reflected the belief time was insufficient to support SDM, a primary barrier identified (Coronado-Vazquez et al., 2020; Durante et al., 2017; Hruza et al., 2020).

Since the initiation of pay-for-performance, a term used to include initiatives aiming at health care quality improvement and value, providers are under pressure to meet quality measures during each patient care visit. Measures are comprehensive and can be time consuming, adding minutes to a typical 15-to-20-minute appointment, compounding any preconceived beliefs that patient visits are already too short. Provider education in SDM, predominantly by peers, improved the perception that it takes too much time and increased utilization of SDM across studies (Coronado-Vazquez et al., 2020; Hruza et al., 2020; Sharp et al., 2017). Specifically, training in communication with patients in pursuit of successfully engaging them in the SDM process was paramount (Legare & Witteman, 2013).

Another common barrier was concern for poor patient outcomes should an antibiotic not be prescribed at the initial visit, the proverbial "what if…". To address these barriers, studies were conducted to ascertain what interventions would help mitigate this issue. Findings were peer to peer education in the use of SDM, with emphasis on communication skills, most beneficial. Educating the patient when to follow up if their symptom does not resolve, or worsens, fostered confidence in quality outcomes. Thusly, patient self-advocacy and participation in care decisions enhanced provider confidence in SDM process. The addition of a decision aid led to improved provider comfort with fewer antibiotics prescribed, and greater patient understanding related to treatment plans. Decision aids are viewed as integral to the SDM process (Coronado-Vazquez et al., 2020; Hruza et al., 2020; Legare & Witteman, 2013; Sharp et al., 2017).

Opportunity. The use of SDM has been an effective tool for chronic conditions such as heart failure and diabetes insofar as patient adherence to plan of care through education (AHRQ, 2014). Patient compliance taking antibiotics as directed can be tenuous at best, especially in the young adult population. Incorrect dosing in the form of not completing treatment as prescribed is contributory to antibiotic resistance (Olesen et al., 2018). Opportunity exists for the education of young adults about antibiotic stewardship for the treatment of ARIs using SDM and is preferred by most (Blyer & Hulton, 2016). Engaging young adults in risk/benefit conversation pertaining to their treatment cultivates self-advocacy skills and increased health literacy, which are fundamental to SDM.

Literature Gaps

Although there are few studies utilizing SDM in the outpatient setting for the treatment of ARIs, as evidenced by the literature, its value is no less as it has been shown to decrease antibiotic prescriptions. That said, the duration of its effectiveness and utilization is brief in some studies and calls for duplicate studies for further validation (Briel et al., 2007; Durante et al., 2017; Hruza et al., 2020; Legare et al., 2010; Sharp et al., 2017).

Studies focusing on the young adult, particularly those 18-24, are lacking (Alden et al., 2012; Blyer & Hulton, 2016). Considering the importance of antibiotic stewardship, the need for future studies including this age group is warranted. Opportunity to educate young adults, particularly in the college setting, are abundant. We know SDM works for the adult outpatient population, but not enough research has been done on the young adult.

Despite the evidence that use of decision aids along with SDM leads to decreased antibiotic treatment for ARIs, the effects have not been long term in some studies and little research has looked at its effect on the young adult patient (Alden et al., 2012; Briel et al., 2007; Durante et al., 2017; Legare et al., 2010).

Therefore, a quality improvement project was conducted using AHRQ's SDM model and CDC evidence-based guidelines as a decision tool for ARI visits in a small rural liberal arts private college health center.

Chapter 3

Methods

This evidenced-based practice QI project implemented AHRQ's SHARE Approach SDM model for the treatment of ARIs in a college health care setting. The need for this project was determined by the historical antibiotic prescribing rates for ARIs per provider in a small private rural college from January of 2019 to April of 2019. Out of 199 ARI visits, 61 received antibiotics, which is approximately 31% (see Table 1). Benchmark data aims for less than 20% of ARIs be treated with antibiotics (The Whitehouse, 2014). An evidence-based treatment decision aid for ARIs from the CDC was readily available in paper format for each provider (see Table 3). This QI project observed whether the use of SDM for the treatment of ARIs decreased the number of antibiotic prescriptions over a 15-week timeframe. In this project, additional time was added to each patient visit from 15 minutes to 30 minutes per visit to afford adequate time engage patients in the use of SDM.

Project Design

This QI project design was chosen as it bridges the gap between identifying change needed on the patient level and procuring that change on a system-wide level (Toulany, McQuillan, Thull-Freedman, & Margolis, 2013). It was a pre and post study design.

Project Population

The project implemented purposeful sampling including English-speaking college students ages 18-23 attending a small private rural college. There were two Health Services providers, both were Certified Registered Nurse Practitioners (CRNP), and they gave verbal agreement to participate in the project. Only students scheduled for acute visits for respiratory tract infections lasting less than 10 days were included. Exclusion criteria were students with a respiratory illness lasting greater than or equal to 10 days, follow-up appointments for an ARI, or a visit for reasons other than ARI symptoms. Purposeful sampling was utilized.

Protection of Human Subjects

All study participants read and signed an informed consent furnished by the Medical Assistant prior to the provider entering the visit (see Appendix A). IRB approval was received from Gettysburg College and exempt from West Chester University (see Appendix B).

Setting

The setting for this QI project was Health Services in a small private rural college in Pennsylvania. This health center is with a total of seven full-time employees, including two providers. Hours of operation are Monday through Friday from 8:00am to 5:00pm.

Timeline

This QI project commenced February 4, 2021 and ended May 15, 2021. Please see table 4 for timeline details.

Education and Data Collection

After IRB approval beginning January 15, 2021, both CRNP providers completed the AHRQ SHARE Approach SDM 3-hour online webinar. There was no fee for this webinar and completion occurred during Winter break when students were not on campus. A meeting with the IT Administrator occurred prior to the January 15th date to imbed the SDM model and CDC EBP guidelines into the EHR (See Table 4).

Data Analysis

Upon completion of the project, the data was shared with a statistician for description and inferential statistical analysis. Data was collected through chart review for specific ARI diagnosis codes in the EHR. The use of SDM and EBP for each ARI visit were documented by marking a specific cell in the objective portion of the visit note and were captured through reports generated by the IT Administrator. Lastly, each ARI visit plan was reviewed for identification of antibiotic prescription or not. Data analysis was conducted using SPSS odds ratio to compare preintervention and postintervention prescribing rates. As the average prescribing rate preintervention was not as high as National average reported, the overall goal of the project was to not exceed previous trends with end-goal of reducing antibiotic prescription numbers postintervention.

Barriers

The main barrier was mainly related to the de-densification of the campus population due to the COVID-19 pandemic. The total campus population was decreased in the Spring 2021 semester from 2, 600 students to 1,500. Thus, fewer patient care visits for ARIs were likely.

Another barrier identified was consent forms were forgotten by the support staff. The forms were originally kept at the front desk where students check-in. To overcome this, forms were placed in each patient care room door pocket where they were readily accessible and visible.

Chapter 4

Results

Data collection commenced in September 2020 for historical antibiotic prescribing rates for ARIs. Timeframe of this data was August 2018 to May 2019. Data collection for current ARI visits and antibiotic prescribing rates commenced February 4, 2021. This data includes the use of AHRQs SHARE Approach model and CDC EBP guidelines for ARI treatment. Final data collection ended April 15, 2021.

Patient Demographics

There was a total of 246 patients seen during the preintervention and postintervention period combined. Of the 246, 148 were female and 88 were male. During the intervention period, 31 were female and 16 were male.

Response Rate

Of the 49 students asked to participate in this QI project, 47 agreed to sign the consent. This was determined by the number of ARI diagnosis codes during the project period, including additional diagnoses were added to compensate for decreased visits due to the de-densified campus second to Covid pandemic, and number of signed consents received. One of the consents not signed was missed by the support staff unbeknownst to the provider, and the other patient did not agree to sign. Data from both visits was left out of results. The data was retrieved from the EHR, and then physically reviewed in the EHR manually to match with printed data to ensure rigor. Thus, the total sample size in the project was 47.

Data Analysis

The latest version of SPSS (SPSS 27.0) was used for statistical analysis. The data analysis plan was conducted in three phases. First, all study variables were presented using descriptive statistics. Second, bivariate analysis, specifically single predictor binary logistic regression analysis was used to identify which explanatory variables (timepoint, provider, acute respiratory infection diagnosis) were related to the dependent variables at a statistically significant level ($p<.05$). Explanatory variables that evidenced a significant relationship with a dependent variable, rates of *Antibiotic Prescribed (Yes/No)*, were included in the third phase of analysis, multivariate analysis. Third, a multivariate model, specifically a binary logistic regression model was used to model changes in rates of *Antibiotic Prescribed (Yes/No)* from pretest to posttest. Due to conceptual considerations, the explanatory variable respiratory infection diagnosis was controlled for in the final regression model even if there was not a significant bivariate relationship between these variables.

Checks of test assumptions for the binary logistic regression model indicated that multicollinearity was not a problem between the 2 explanatory variables (VIF=1.16). In terms of statistical power, the *Power and Precision* software program indicated that a binary logistic regression model (estimating experiencing the dependent variable at approximately half at pretest and one-quarter at posttest), a medium effect size (OR= 3.34) would be detected with 100 study participants. Thus, the current sample of 246 study participants provides sufficient statistical power for the current analysis.

Research question. In college-age students, does the use of shared decision-making for the treatment of acute respiratory infections (ARIs) reduce antibiotic prescriptions?

Table 3 presents a binary logistic regression analysis that indicates that pretest and posttest timepoints were significantly related to the *Antibiotic Prescription* rate, B=-1.01, SE=.50, Wald X^2=4.79, $p<.05$, where study participants at posttest were 3.0 (1/.33=3.0) times less likely to evidence an *Antibiotic Prescription* relative to those at pretest.

Descriptive analysis. Table 5 presents a descriptive analysis of study variables. There were 246 study participants involved in the current study. Data regarding the variable timepoint, pretest included 80.9% (*n*=199) of the sample, while posttest included 19.1% (*n*=47) of the sample. Among providers, CD addressed 19.5% (*n*=48) of cases, while JF addressed 80.5% (*n*=198) of cases. Lastly, only 3.3% (*n*=8) did not have a diagnosis of an acute respiratory infection diagnosis.

Bivariate analysis. Table 6 presents a single predictor binary logistic regression analysis examining *Antibiotic Prescribed (Yes/No)* by pretest/posttest timepoint, provider, and severe respiratory diagnosis. Analysis indicated that the dependent variables were not significantly related to the variables provider, B=.61, SE=.40, Wald X^2=2.31, OR=1.84, 95% CI=.84-4.04, p=.13, and acute respiratory infection diagnosis, B=-.14, SE=.83, Wald X^2=.03, OR=.87, 95% CI=.17-4.41. The dependent variable was significantly related to the variable timepoint, B=-.93, SE=.44, Wald X^2=4.48, OR=.40, 95% CI=.17-.93, $p<.05$, where study participants at posttest (14.9% received prescriptions) were 2.5 (1/.40=2.5) times less likely to evidence an *Antibiotic Prescription* relative to those at pretest (30.7% received prescriptions).

Multivariate analysis. Table 7 presents a binary logistic regression analysis examining *Antibiotic Prescribed (Yes/No)* by pretest/posttest timepoint while controlling for acute respiratory infection diagnosis. Data indicated that the overall model was statistically significant,

$X^2(2)=5.90$, $p<.05$, and classified 72.4% of cases correctly. Within the model, timepoint was significantly related to the dependent variable, B=-1.01, SE=.50, Wald $X^2=4.79$, $p<.05$, where study participants at posttest were 3.0 (1/.33=3.0) times less likely to evidence an *Antibiotic Prescription* relative to those at pretest.

Chapter 5

Discussion

This quality improvement project sought to find if the use of SDM for the treatment of ARIs would in fact decrease the number of antibiotic prescriptions. This was achieved by comparing preintervention ARI visits in a college health center to postintervention ARI visits in the same health center, for the same two Nurse Practitioner providers. The findings support the use of SDM for the treatment of ARIs to promote antibiotic stewardship and indicate antibiotic prescriptions were three times less likely to be given compared to historical data provided.

Sample

One surprising finding was the proportion of female patients versus male patients. In both the preintervention and postintervention data sets, females outnumbered males by approximately 50%. One factor that may have influenced this is the proportion of female students at the college compared to male students. Another factor may be the de-densification of the campus resulting in more female students.

Results

The findings in this project support the evidence that the use of shared decision making for the treatment of ARIs has been shown to reduce overall antibiotic prescriptions in the outpatient setting (Durante et al., 2017; Sharp et al., 2017). Engaging the patient in discussion about their preferences for treatment fosters patient education about treatment options while supporting their self-advocacy. One objective of this study was to engage in open discussion with patients using SDM and was successfully done for each ARI visit.

Another objective was to decrease the number of antibiotics prescribed for ARI visits by 50%, a national benchmark. This goal was met as evidenced by the pre and post data results, 30.7% and 14.9% respectively, a 50% decrease achieved. Interestingly, these findings were more robust than that of some of the previous studies where reductions in antibiotic prescribing were as high as 39% (Durante et al., 2017; Legare et al., 2010; Little et al., 2019; Trivedi, 2016). This may be due to the size of this project being on a smaller scale.

It is important to note that in the post intervention analysis, there were seven antibiotics prescribed out of 47 visits. Of the seven prescribed, two were for non-ARI visit reasons. The use of SDM was used in all visits. Of the seven prescriptions, six met EBP guidelines for use. This finding is commensurate with studies indicating the use of a decision aid enhances the use of SDM in providing reassurance (Legare & Witteman, 2013).

Theoretical Framework

The findings fit the Theory of Planned Behavior model. The use of SDM was 100% in the project. Providers were trained in its use and shared a positive attitude toward its use. The intention to use SDM for each visit was influenced by the subjective norm, or perceived approval, which is the most critical construct of TPB. Adequate training of key stakeholders was fundamental in influencing both attitudes and subjective norm. The providers also used EBP guidelines consistently, which provided enhanced control over the decision making for both patient and provider (Thompson-Leduc et al, 2014).

Implications and Limitations

The implications for practice for providers are that SDM can be used consistently for ARI visit reasons to support antibiotic stewardship and avoid undue potential harm. Every time an antibiotic is prescribed, antimicrobial resistance is triggered. Consistent support for SDM will encourage adoption by peers and provide patients opportunity to be educated about treatment options while self-advocating.

Future implications for this project are to incorporate the use of SDM for additional diagnoses. Opportunities to include the patient in their care and treatment plans fosters greater satisfaction and adherence to the plan of care (Legare & Witteman, 2013).

Limitations in this study include the missed opportunity to use SDM due to decreased visits second to the pandemic. The project itself was small and included only two providers. Another limitation was the missed opportunity due to staff forgetting to have consent signed. This was surmounted by placing consents in the patient room door pocket, along with a written reminder sign on the door. Although not necessarily a limitation, the fact that far more female patients presented for ARI visits than males, begs for further investigation.

In conclusion, the outcomes of this project indicate that SDM is an effective intervention that reduces the use of antibiotics for ARIs. After education in AHRQ's SHARE Approach Model for SDM, the providers adopted its use for every ARI visit, as well as seven other visit- types. Patients generally were agreeable to participate, almost 100%. At the end of each visit, their preferences were heard, treatment education was provided in the form of EBP, and 50% fewer antibiotics were prescribed.

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Table 1. Acute respiratory infection diagnosis prescribing rates by provider

Provider-CRNP	Number of ARI visits from 01/21/19-04/15/19
Provider CD	(12 hours per week) total- 48
Provider JF	(40 hours per week) total- 151

Total ARI visit	Total antibiotic Rxs
199	61 Rx, 31% of ARI visits

Note: Antibiotic prescribing rates from January 2019-April 2019.

Table 2. ICD-10 acute respiratory diagnoses codes

ICD-10 Code	Description
J20.9	Acute bronchitis
J02.9	Acute pharyngitis
J01.90	Acute sinusitis
H66.90	Otitis media
H65.90	Unspecified nonsuppurative otitis media
H60.90	Otitis Externa
J00	Acute nasopharyngitis
J03.90	Tonsillitis
J22	Lower respiratory tract infection

Note: ARI ICD-10 diagnosis codes.

Table 3. Evidence-based guidelines from CDC for acute respiratory infections

Condition	Epidemiology	Diagnosis	Management
Acute rhinosinusitis[1,2]	• About 1 out of 8 adults (12%) in 2012 reported receiving a diagnosis of rhinosinusitis in the previous 12 months, resulting in more than 30 million diagnoses • Ninety–98% of rhinosinusitis cases are viral, and antibiotics are not guaranteed to help even if the causative agent is bacterial.	• Diagnose acute <u>bacterial</u> rhinosinusitis based on symptoms that are: ○ **Severe (>3-4 days),** such as a fever ≥39°C (102°F) and purulent nasal discharge or facial pain; ○ **Persistent (>10 days) without improvement**, such as nasal discharge or daytime cough; or ○ **Worsening (3-4 days)** such as worsening or new onset fever, daytime cough, or nasal discharge after initial improvement of a viral upper respiratory infections (URI) lasting 5-6 days. • Sinus radiographs are not routinely recommended.	If a bacterial infection is established: • Watchful waiting is encouraged for uncomplicated cases for which reliable follow-up is available. • Amoxicillin or amoxicillin/clavulanate is the recommended first-line therapy. • Macrolides such as azithromycin are not recommended due to high levels of *Streptococcus pneumoniae* antibiotic resistance (~40%). • For penicillin-allergic patients, doxycycline or a respiratory fluoroquinolone (levofloxacin or moxifloxacin) are recommended as alternative agents.
Acute uncomplicated bronchitis[3–5]	• Cough is the most common symptom for which adult patients visit their primary care provider, and acute	• Evaluation should focus on ruling out pneumonia, which is rare among otherwise healthy adults in the absence of abnormal vital signs (heart rate ≥ 100 beats/min,	Routine treatment of uncomplicated acute bronchitis with antibiotics is not recommended, regardless of cough duration.

	bronchitis is the most common diagnosis in these patients.	respiratory rate ≥ 24 breaths/min, or oral temperature≥ 38 °C) and abnormal lung examination findings (focal consolidation, egophony, fremitus). • Colored sputum does not indicate bacterial infection. • For most cases, chest radiography is not indicated.	Options for symptomatic therapy include: • Cough suppressants (codeine, dextromethorphan); • First-generation antihistamines (diphenhydramine); • Decongestants (phenylephrine). Evidence supporting specific symptomatic therapies is limited.
Common cold or non-specific upper respiratory tract infection (URI)[6,7]	• The common cold is the third most frequent diagnosis in office visits, and most adults experience two to four colds annually. • At least 200 viruses can cause the common cold.	• Prominent cold symptoms include fever, cough, rhinorrhea, nasal congestion, postnasal drip, sore throat, headache, and myalgias.	• Decongestants (pseudoephedrine and phenylephrine) combined with a first-generation antihistamine may provide short-term symptom relief of nasal symptoms and cough. • Non-steroidal anti-inflammatory drugs can be given to relieve symptoms. • Evidence is lacking to support antihistamines (as monotherapy), opioids, intranasal corticosteroids, and nasal saline irrigation as effective treatments for cold symptom relief.

Providers and patients must weigh the benefits and harms of symptomatic therapy.

Note: retrieved from https://www.cdc.gov/antibiotic-use/community/for-hcp/outpatient-hcp/adult- treatment-r

Table 4. Timeline

Completion Date	Planning	Pre-implementation	Implementation	Evaluation
10/01/2020	Meet with key stakeholders to individually obtain their support			
11/08/20		Submit IRB applications		
01/20/21		Education session for AHRQ SHARE Approach for shared decision making		
01/27/21		Meet with IT to add SDM & EBP check boxes to “objective” in SOAP note in EHR; provide NPs with CDC EBP guidelines for treatment of ARIs		
01/28/21		Pilot test documentation of use of SDM/EBP in EHR		
01/29/21			Begin tracking ARI visits, use of SDM and EBP guidelines	
04/15/21				Meet with statistician; evaluate data and write analysis
05/10/21				Present study result

Table 5. Descriptive Analysis of Study Variables (n=246)

Variable	**n**	**%**
Timepoint		
Pretest	199	80.9
Posttest	47	19.1
Provider		
CD	48	19.5
JF	198	80.5
Acute Respiratory Infection Diagnosis		
Yes	238	96.7
No	8	3.3

Table 6. Single Predictor Binary Logistic Regression Analysis Examining Antibiotic Prescribed (Yes/No) By Pretest/Posttest Timepoint, Provider, and Acute Respiratory Diagnosis (n=246)

	Antibiotic Prescribed					
	No	**Yes**				
Variable	**n (%)**	**n (%)**	**B (SE)**	**Wald X^2**	**OR (95% CI)**	**p**
Timepoint			**-.93 (.44)**	**4.48**	**.40[1] (.17-.93)**	**.03**
Pretest	138 (69.3)	61 (30.7)				
Posttest	40 (85.1)	7 (14.9)				
Provider			**.61 (.40)**	**2.31**	**1.84 (.84-4.04)**	**.13**
CD	39 (81.3)	9 (18.8)				
JF	139 (70.2)	59 (29.8)				
Acute Respiratory Infection Diagnosis			**-.14 (.83)**	**.03**	**.87 (.17-4.41)**	**.87**
Yes	172 (72.3)	66 (27.7)				
No	6 (75.0)	2 (25.0)				

[1]The inverted odds ratio reflects a value of 2.5 (1/.40=2.5) times less likely to evidence an Antibiotic Prescription at Posttest relative to Pretest.

Table 7. Binary Logistic Regression Analysis Examining Antibiotic Prescribed (Yes/No) By Pretest/Posttest Timepoint While Controlling for Acute Respiratory Infection Diagnosis (n=246)

Variable	B (SE)	Wald X^2	OR (95% CI)	p
Acute Respiratory Infection Diagnosis	**-.82 (.95)**	**.75**	**.44 (.07-2.82)**	**.39**
Timepoint	**-1.01 (.50)**	**4.79**	**.33[1] (.12-.89)**	**.03**

Model: $X^2(2)=5.90$, $p<.05$, 72.4% of Cases Were Classified Correctly

[1]The inverted odds ratio reflects a value of 3.0 (1/.33=3.0) times less likely to evidence an Antibiotic Prescription at Posttest relative to Pretest.

Figure 1. AHRQ SHARE Approach Shared Decision Making Model

Figure 1. The SHARE Approach a communication tool that guides providers and patients through exploration of risk and benefits for healthcare treatments with focus on patient preferences. Retrieved from: https://www.ahrq.gov/sites/default/files/publications/files/share-approach_factsheet.pdf

Figure 2. Theory of Planned Behavior Model Incorporating SDM

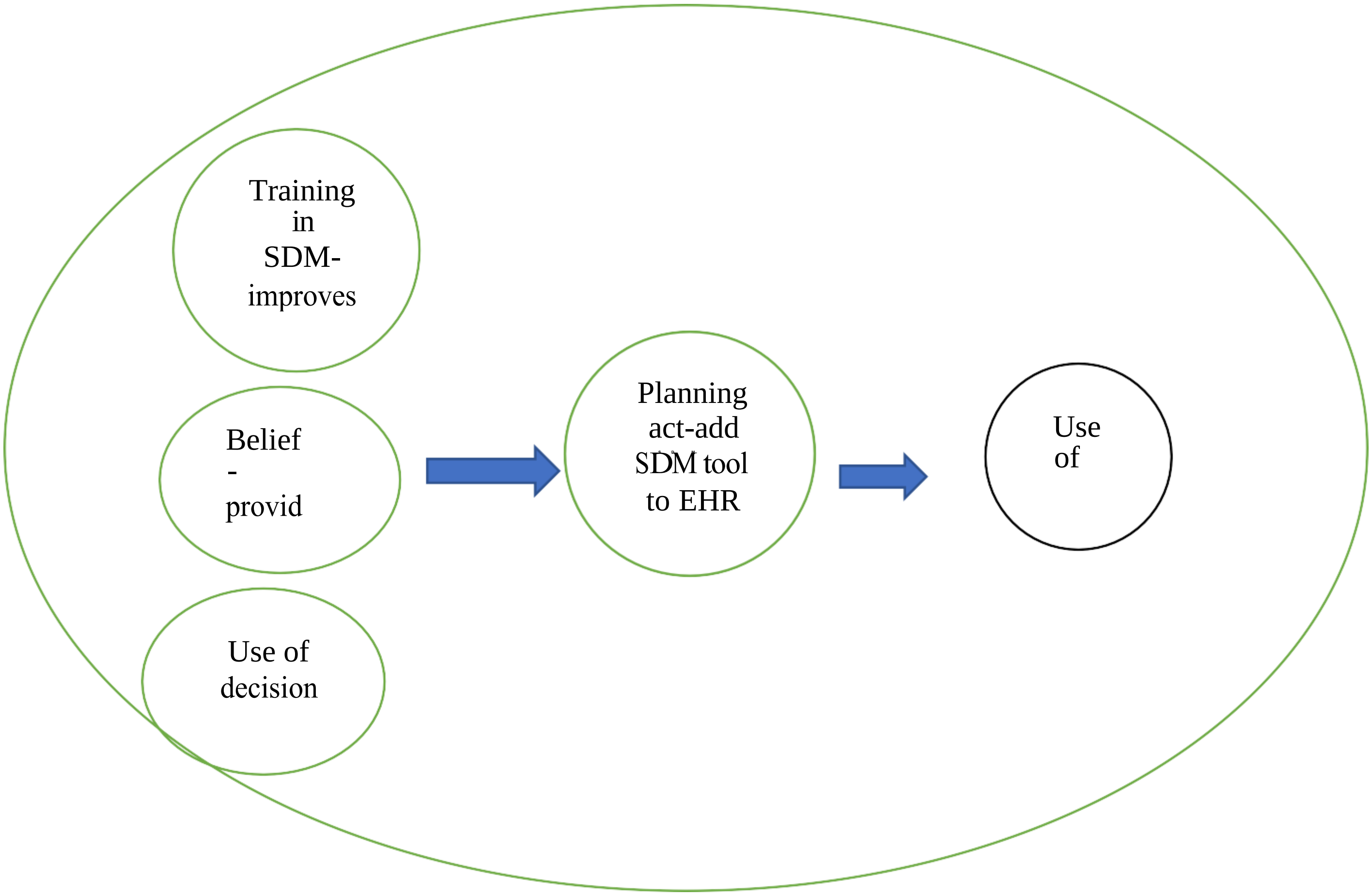

Figure 2. The Theory of Planned Behavior Incorporating SDM. Retrieved from:https://www.en.wikipedia.org/wiki/Theory_of_planned_behavior

Appendix A

Participant Consent

Consent to Participate in the Project of the Use of Shared Decision Making for the Treatment of Acute Respiratory Tract Infections

Identification of Study Investigator and Purpose of Project

You are being asked to participate in a project conducted by Jennifer M. Fernandes, MSN, FNP, from West Chester University. The purpose of this project is to assess the use of shared decision making in the treatment of acute respiratory tract infections and its effect on antibiotic prescribing rates.

Project Procedures

Should you decide to participate in the project you will be asked to sign this consent form prior to answering any questions. You may opt out of the project at any time without affecting your care/treatment. The project consists of the provider using the AHRQ SHARE Approach shared decision making 5-step model during your acute care visit. You will be asked to engage in the shared decision making for the treatment of your acute respiratory symptom(s). Visits are 30 minutes in length and will not go over this time, in most cases. You may request for the provider to make all decisions regarding your treatment if you are not comfortable with the shared decision-making process. Your treatment will be guided by the Centers for Disease Control and Prevention evidence-based guidelines for the treatment of acute respiratory tract infections.

Confidentiality

Participation in the project is confidential. No personal identifiers will be used; gender and age will be tracked. Your patient visit is protected under the Health Insurance Portability and Accountability Act (HIPAA).

Risks

The investigator does not perceive any more than minimal risk by participating in this project (no more risk than one may experience in daily life).

Benefits

There are no perceived benefits from participation in this project other than it might provide increased understanding of appropriate use of antibiotics for acute respiratory tract infections and may help others with similar symptoms in the future.

Contact Information for IRB Regarding Your Rights

Jennifer Fernandes, MSN-FNP, Health Services:

jfernand@getttsburg.edu

Salma Monani- Associate Professor and interim Chair of IRB Environmental Studies Department
smonani@gettysburg.edu

https://www.gettysburg.edu/offices/provost/irb/

Appendix B

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December 2, 2020
Jennifer Fernandes MSN-FPN
Health Services
Gettysburg College

Dear Jennifer Fernandes,

The Institutional Review Board (IRB) has reviewed your application for the project titled, "The Use of Shared Decision Making for the Treatment of Acute Respiratory Tract Infections." It was determined that the project is exempt from IRB review under §46.104 (d)(2)(ii and iii) of the revised Common Rule: "Research that only includes interactions involving . . . survey procedures, interview procedures, or observation of public behavior . . ." in which "Any disclosure of the human subjects' responses outside the research would not reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, educational advancement, or reputation," and "The information obtained is recorded by the investigator in such a manner that the identity of the human subjects can readily be ascertained, directly or through identifiers linked to the subjects, but an IRB conducts a limited IRB review to make sure that the researcher implements a plan to protect subjects' privacy and maintain confidentiality."

This letter signifies that you are free to commence your research. Under the revised Common Rule implemented in January 2019, you may continue this project for however long is necessary without applying for continuation. Please note that even though your research is "Exempt," you are still expected to get informed consent from research subjects, make all efforts to mitigate risk, and adhere to the ethical standards of your discipline. Thank you for your attention to ethical protocol, and please contact me if you have any questions or concerns. Our committee wishes you the very best on you project.

Sincerely,

Salma Monani

Salma Monani
Interim Chair, IRB
Associate Professor and Chair
Environmental Studies
Gettysburg College

cc: Dean Jennifer Bloomquist, Ph.D., Provost's Representative