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Watchful Waiting and Antibiotic Stewardship: A Quality Improvement Project

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A QUALITY IMPROVEMENT PROJECT

by

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DNP Final Scholarly Project Committee

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Submitted in partial fulfillment of the

Requirements for the degree of Doctor of Nursing Practice

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Mary Ellen Roberts — 3/5/19

Dr. Mary Ellen Roberts, Chair — Date

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Dedication

This project is dedicated to my family, especially my wife Dawn for supporting me through this project, to my son Henry for bringing joy to my life, and to my mom Jeannie. My mom has always been a great inspiration to me, always encouraging me to push through and think critically. She is also one of my best proof readers, Thank you.

This project is also dedicated to all the children in my community. These children are the reason for this project, to provide them with the best, safest, and highest quality healthcare available.

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I would like to thank Dr. Patricia Ricci-Allegra for her willingness to review my project and participate in the project committee.

I would also like to thank Dr. Ana Hernandez for her insight into quality improvement projects and supporting this endeavor.

Lastly, I would like to thank Dr. Raphael Paisner, my first pediatric preceptor and mentor. Thank you for instilling in me a love for evidence-based practice and a true appreciation for antibiotic stewardship.

Table of Contents

Abstract

Antibiotic misuse and overuse are major contributors to antibiotic resistance which is responsible for the death of 23,000 American's annually. There is a growing body of evidence that antibiotic stewardship programs are successful in reducing antibiotic prescribing rates while maintaining safe patient care. Research supports a multifaceted approach with an ongoing commitment to antibiotic stewardship. This quality improvement project aimed to reduce the overuse of antibiotics in pediatric acute respiratory tract infections (ARTIs), improve the percentage of children who received laboratory confirmation for the diagnosis and treatment of streptococcal pharyngitis, and to implement and measure the efficacy of watchful waiting for children diagnosed with acute otitis media (AOM) and upper respiratory tract infections (URI). At the start of the project, the quality improvement team implemented on-site educational sessions for 17 pediatric and family practice providers. After 3 months of data collection, there was a 1.8% increase in the percentage of children who were diagnosed with URI and were not dispensed an antibiotic prescription. There was a 10.5% increase in the percentage of children who received proper laboratory confirmation for the diagnosis and treatment of streptococcal pharyngitis. In addition, 70% of watchful waiting protocol patients with AOM improved without the use of antibiotics. Although these improvements were incremental, they demonstrate the success of a single quality improvement cycle and illustrate need for continued improvement efforts in an organization wide outpatient antibiotic stewardship program. Keywords: *antibiotic stewardship, pediatrics, watchful waiting*

Introduction

The overuse and misuse of antibiotics is a major problem in healthcare. When used appropriately, antibiotics can save lives. However, antibiotics also cause side effects such as vomiting, diarrhea, yeast infections and can lead to serious illnesses such as *Clostridium Difficile* or cause severe and life-threatening allergic reactions (Centers for Disease Control and Prevention [CDC], 2014). Antibiotics are the leading cause of adverse drug events leading to emergency department visits in children (CDC, 2014).

Every visit with a healthcare provider is an opportunity to educate the patient and their family about appropriate antibiotic use and the issue of antibiotic resistance. Many parents are unaware of the problem with antibiotic overuse and frequently seek antibiotics for self-limiting viral upper respiratory infections such as the common cold. Sadly, it has become common for healthcare providers to "give in" to the social pressure for antibiotics when they are not needed. Any antibiotic use, even the necessary, contributes to the development of antibiotic resistance (CDC, 2014). As bacteria are exposed to antibiotics, some bacteria develop a resistance to the antibiotic, allowing for the bacteria to continue to grow despite being treated with antibiotics (CDC, 2014).

Antibiotic resistance is a well-documented, ever growing national concern, and is considered one of the most serious public health threats. Antibiotic resistance is associated with infections that cause severe illness, increase mortality rates, increased risk for complications and hospital admissions (CDC, 2014). In the United States, antibiotic-resistant infections affect more than 2 million people annually and are associated with 23,000 deaths (CDC, 2014). Given the scope of the problem it is not surprising that there has been a call to arms at both the national and international levels.

Limiting antibiotic use and ensuring that they are used appropriately are part of antibiotic stewardship programs (ASP). Antibiotic stewardship has been defined in a consensus statement from the Infectious Diseases Society of America (IDSA), the Society for Healthcare Epidemiology of America (SHEA), and the Pediatric Infectious Diseases Society (PIDS) 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" (Barlam et al., 2016, p. e1). The CDC's Core Elements of Outpatient Antibiotic Stewardship (Sanchez, Fleming-Dutra, Roberts, & Hicks, 2016) encourages an ongoing commitment to antibiotic stewardship in all healthcare settings. The CDC outlines four core elements needed for a successful outpatient ASP: Commitment, Action, Tracking/Reporting and Education.

Background

The Problem

Antibiotics are one of the most frequently prescribed medications for children, in fact more than one of five pediatric outpatient visits results in a prescription for antibiotics (Hersh et al., 2011). In the outpatient setting, antibiotics are prescribed at nearly 50 million visits annually in the United States (Hersh et al., 2011). In the outpatient setting, acute respiratory tract infections (sinusitis, AOM and pharyngitis) account for the most antibiotic prescriptions annually, however, only 50% of these prescriptions are estimated to be appropriate (FlemingDutra et al., 2016). The unnecessary use of antibiotics, especially broad-spectrum antibiotics is a major contributor to antibiotic resistance (CDC, 2014). The battle against antimicrobial-resistant organisms must be a multifaceted approach including but not limited to the availability of adequate and appropriate therapeutic agents and antibiotic stewardship

programs (ASP) (Barlam et al., 2016). It is important to bring this problem to the attention of the healthcare providers and to the patients and their families.

Project Description

This quality improvement project aims to reduce the overuse of antibiotics in pediatric patients between two outpatient practices. Existing antibiotic protocols and any antibiotic stewardship programs were reviewed in the development of this project. The project leader collaborated with the leadership team of the outpatient offices to identify the educational needs of providers and staff. Educational "Lunch and Learn" sessions were developed and implemented at the start of the project. These lunch and learn meetings targeted prescribers and office nursing staff (specifically the triage nursing staff/ nurse educators). The focus of these meetings was common childhood illnesses which are often prescribed antibiotics inappropriately, including AOM, bronchitis, the common cold, influenza, pharyngitis, and sinusitis. Watchful waiting (a.k.a. delayed prescribing) was a focus point with educational handouts for patients and their families. Watchful waiting was recommended for children over 2 years of age with mild AOM and for any child whose parent is demanding antibiotics. Those who qualified for watchful waiting received a follow-up call three days post visit to assess if and why the prescription was started.

Objectives

1. Promote provider adherence to appropriate antibiotic prescribing guidelines for AOM, bronchitis, the common cold, influenza, pharyngitis, and sinusitis.
2. Improve the percentage of children between the ages of 3 to 18 years who were diagnosed with pharyngitis, prescribed an antibiotic and received a group A Streptococcus (strep) test for the episode.

3. Provide education about antibiotic use and antibiotic resistance to patients and their families.
4. Provide post visit follow-up call to determine if watchful waiting was followed.

Literature Review

The purpose of this literature review is to identify the most recent evidence supporting outpatient antibiotic stewardship programs and interventions aimed towards appropriate antibiotic prescribing and use in pediatric outpatient settings. This review identified articles in English on antimicrobial stewardship, judicious antibiotic use, appropriate antibiotic use in primary care, from 2003 – 2018 identified by keyword searches of the CINHAL, Cochrane, Google Scholar, and PubMed databases. Studies that provided data from the outpatient population were included in the review with preference for articles which focused on the US pediatric population, however relevant studies and systematic reviews from other countries were not excluded. The author excluded articles focused on in-patient care or the adult only population.

Systematic Reviews of Antibiotic Stewardship Programs

In a systematic review, Arnold and Straus (2005) identified the interventions from 39 studies that were used to reduce antibiotic use in primary care settings. Every community has unique barriers; therefore, no single intervention is best for all populations and communities (Arnold & Straus, 2005). The most effective interventions were found to be multifaceted educational interventions tailored to the communities' need and the barriers to change. Interestingly, printed educational materials about judicious prescribing, lectures, nor providing feedback about personal prescribing practices made a significant effect on antibiotic prescription rates (Arnold & Straus, 2005). Face-to-face meeting with educators and delayed prescribing practices both reduced antibiotic prescription rates (Arnold & Straus, 2005).

Van der Velden et al. (2012) reviewed 58 trials from 1990 to 2009 describing the effectiveness of physician-targeted interventions to improve antibiotic use for respiratory tract infections in primary care. The majority of interventions used in these trials were successful in improving antibiotics prescription rates. Interventions using more than one element (e.g. educational material for the physician, educational meeting, audit and feedback, educational outreach visit, educational material for patients, educational material for general public, communication skills training, etc.) were more successful than interventions using only one (Van der Velden et al., 2012). The combination of educational material for the physician and an educational meeting with the physician showed a significant increase in effectiveness compared to all other combinations. These studies support the use of multiple interventions such as face-to-face education with supportive educational materials and delayed prescribing protocol in an antibiotic stewardship program.

Antibiotic Stewardship Programs with Prescriber Feedback

Over the past decade, researchers have been looking for evidence to support antibiotic stewardship programs (ASP) as a means to improve antibiotic use in the outpatient setting. In a large randomized controlled trial, Gerber et al. (2013) studied the effect of outpatient ASP on the antibiotic prescribing for pediatric patients. This study included 162 prescribers in over 25 pediatrics practices in Pennsylvania and New Jersey (Gerber et al., 2013). The ASP interventions included a one-hour on-site prescriber education session followed by one year of personalized audit and feedback of prescribing for bacterial and viral ARTIs. Gerber et al. (2013) focused on reducing the rates of broad-spectrum (off guideline) antibiotic prescribing for bacterial ARTIs and any antibiotic prescribing for viral ARTIs. Gerber et al. (2013) found significant improvement in the adherence to prescribing guidelines for common bacterial ARTIs.

Gerber et al (2013) identified a 12.5% reduction in broad-spectrum antibiotic prescribing in the intervention group and a 5.8% reduction in the control group; however, the interventions had little improvement on the antibiotic prescribing for viral infections. Gerber et al (2014) continued gathering data for an additional 18 months after the intervention period. Sadly, antibiotic prescribing patterns slowly returned to baseline after completion of the intervention. Gerber et al. (2014) felt that these findings demonstrate the importance of the audit and feedback intervention for continued antibiotic stewardship efforts.

In another cluster randomized clinical trial, Meeker et al. (2016) enrolled 248 prescribers in a behavior modification intervention aimed at improving antibiotic prescribing rates for ARTIs. Meeker and colleagues used non-antibiotic order sets within the electronic medical record (EMR), accountable justification which prompted clinicians to enter free-text explanations/justifications into the patients' EMR, and peer comparison which sent emails with prescriber specific antibiotic prescribing rates compared to those with the best (lowest inappropriate prescribing rates). After randomization, clinicians received one, two, or all three interventions over 18 months. All clinicians received education on antibiotic prescribing guidelines on enrollment. There were 14,753 visits for viral ARTIs during the baseline period and 16,959 visits during the intervention period. Meeker et al. (2016) identified a significant reduction in antibiotic prescribing in the intervention groups compared to the control groups. However, only the decrease in the accountable justification and peer comparison groups were statistically significant. Interestingly, Meeker et al. (2016) also reported on the rate of return visits (within 30 days of the initial visit); only the accountable justification and peer com comparison group had a statistically significant increase in return visits.

Linder et al. (2017) expand on the findings of Meeker et al. (2016). Linder et al. (2017) collected an additional 12 months of data post intervention. During the 12 months after the intervention period, Linder et al. (2017) failed to find a statistically significant difference between control groups and the suggestive alternative or accountable justification groups. The rates of inappropriate antibiotic prescribing for acute respiratory tract infections in the control group declined from 14.2% to 11.8%, whereas it increased from 7.4% to 8.8% in the suggested alternative group, 6.1% to 10.2% in the accountable justification group and 4.8% to 6.3% in the peer comparison group. Interestingly, the peer comparison group continued to have statistically significant improved rates 12 months after the intervention period. Linder et al. (2017) concluded that peer comparison might have led clinicians to make judicial antibiotic prescribing part of their self-image. Linder et al. (2017) suggest that institutions determined to improve antibiotic prescribing rates should consider applying interventions long-term.

In a large cluster-randomized study, Finkelstein et al. (2008) implemented a behavior change intervention in 16 non-overlapping pediatric communities in Massachusetts. The intervention combined guideline dissemination, small-group clinician education, updates and educational materials and limited prescribing feedback (not clinician-specific prescribing rates). Parents received educational materials by mail and in primary care practices, pharmacies, and childcare settings. Finkelstein et al. (2008) measured the change in antibiotics dispensed per year through health-plan data among children who were aged three to < 72 months. The data include 223,135 person-years of observation. During the three-year intervention period, there was a downward trend in antibiotic prescribing in both intervention groups and control groups. Finkelstein et al (2008) saw no statistically significant improvement in children three to < 24

months, but notes a 4.2% decrease among those aged 24 to <48 months and a 6.7% decrease among those aged 48 to <72 months compared to control groups.

Prescriber feedback is an important and essential aspect of antibiotic stewardship programs. However, the discontinuation of audit and feedback corresponds with a return to baseline prescribing patterns. This suggests that organizations dedicated to lasting quality improvement should develop an audit and feedback system.

Improved Provider Communication

In this cross-sectional study, Mangione-Smith et al. (2015) studied the effect of specific communication practices on antibiotic use in pediatric acute respiratory tract infections (ARTI). Mangione-Smith et al. (2015) identified 1,285 pediatric visits motivated by acute respiratory tract infection symptoms. Children were seen by one of 28 pediatric providers representing 10 practices in Seattle, Washington, between December 2007 and April 2009. Providers completed post-visit surveys reporting on children's presenting symptoms, physical examination findings, assigned diagnoses, and treatments prescribed. Parents completed post-visit surveys reporting on provider communication practices and care ratings for the visit. Multivariate analyses identified key predictors of prescribing antibiotics for ARTI and of parent visit ratings. Prescriber suggestions of positive treatment actions (symptomatic care) were associated with a decreased risk of antibiotic prescribing whether done alone or in combination with negative treatment actions such as an explanation as to why antibiotics are inappropriate/ not helpful. In addition, parents reported high satisfaction when they received both positive treatment recommendations and negative treatment actions.

In a systematic review, Coxeter, Del Mar, McGregor, Beller, and Hoffmann (2015) identified nine randomized controlled trials which studied interventions used to facilitate shared decision making to address antibiotic use for acute respiratory infections in primary care. Over 1,100 primary care providers and 492,000 patients where included in this study. Coxeter et al. (2015) found that interventions that aimed to facilitate shared decision-making resulted in a short-term improvement in prescribing rates. Effects on longer-term rates of prescribing are uncertain and needs more evidence to determine how any sustained reduction in antibiotic prescribing affects patient outcomes.

In another large systematic review, Drekonja et al. (2015) identified 50 trials, which used outpatient antibiotic stewardship program (ASP). Drekonja et al. (2015) identified several ASP interventions that decreased antibiotic use for all diagnoses but did not identify a single intervention as being better than another. Drekonja et al. (2015) found medium strength evidence that programs that included communication skills training and laboratory testing were successful in reducing prescription rates.

In this systematic review, O'Sullivan, Harvey, Glasziou, and McCullough (2016) identified two randomized controlled trials that studied the effect of written information for patients to reduce the use of antibiotics for acute upper respiratory tract infections in pediatric primary care. In both studies, clinicians provided written information to parents of child patients during primary care consultations: one trained general practitioners (GPs) to discuss an eight-page booklet with parents; the other conducted a factorial trial with two comparison groups (written information compared to usual care and written information plus prescribing feedback to clinicians compared to prescribing feedback alone) (O'Sullivan et al., 2016). GPs in the written information arms received 25 copies of two-page government-sponsored pamphlets. Compared

to usual care, moderate quality evidence from one study showed that trained GPs providing written information to parents of children with acute URTIs in primary care reduces the number of antibiotics used by patients without any negative impact on return rates or parental satisfaction (O'Sullivan et al., 2016).

These studies highlight the importance of improved communication between the prescriber and the patient. Interventions in an antibiotic stewardship program should include clear communication between healthcare providers and the patient/family, utilization of shared decision making where appropriate, a discussion on symptomatic care, and patient education regarding appropriate antibiotic use. The research does not support a single intervention over another, but interventions should be multifaceted.

Barriers to Judicial Prescribing

In a qualitative study, Dempsey, Businger, Whaley, Gagne, and Linder (2014) identified primary care clinician perceptions about antibiotic prescribing for acute bronchitis through semi structured interviews with 13 primary care providers in Boston, Massachusetts. Dempsey et al. (2014) found that all clinicians agreed that antibiotics are not indicated for acute bronchitis but that they perceive a high patient demand for antibiotics. This patient demand was identified as the primary driver for antibiotic prescriptions in the treatment of acute bronchitis. Clinicians wanted to satisfy patient expectations; however, most clinicians did not feel that their personal antibiotic prescribing patterns were the problem (Dempsey et al., 2014). Many clinicians felt that there was no accountability for antibiotic stewardship (i.e., No audit or feedback). One clinician felt that they would not even notice a difference since they were not receiving feedback on prescribing patterns (Dempsey et al., 2014).

In another qualitative study, Szymczak, Feemster, Zaoutis, and Gerber (2014) studied the perceptions of pediatricians who participated in the Gerber et al. (2013) study. Interestingly, there was deep skepticism regarding the auditing and feedback system. Participants felt that their personal prescribing patterns were not to blame, but that it was non-pediatric physicians, specifically those found in urgent care centers (Szymczak et al., 2014). All participants mentioned parental pressure and expectation for antibiotics as the primary barrier to appropriate antibiotic prescribing. Participants mentioned "a culture of expectation" from the parents for antibiotics (Szymczak et al., 2014). Some prescribers mention "caving" in and prescribing an antibiotic when not necessary due to parental pressure and/or lack of time to educate the family as to why an antibiotic is not necessary (Szymczak et al., 2014).

These studies provide some insight as to the "why" prescribers fail to follow evidence based guidelines for treating acute respiratory tract infections. In both studies, participants mention a pressure to provide patients with antibiotics despite guidelines. Further research is needed on how to address this problem within the community.

Antibiotic Stewardship Programs and Incidence of Infective Complications

Gulliford et al. (2016) reviewed the incidence of infective complications in practices that had lower rates of antibiotic prescribing. Gulliford et al. (2016) pulled data from a robust United Kingdom (UK) database encompassing 7% of UK general practices. Utilizing diagnostic coding, Gulliford et al. (2016) were able to identify the rate of antibiotic prescribing for respiratory tract infections compared with the incidence of infective complications. Gulliford et al. (2016) found that practices who had lower rates of antibiotic prescribing for respiratory tract infections had a slightly higher rate of pneumonia and peritonsillar abscess compared to practices with high rates of antibiotic prescribing. Gulliford et al. (2016) estimated that in the average general practice

(with 7000 patients), a 10% reduction in antibiotic prescriptions for respiratory tract infections will result in one additional case of pneumonia each year and one additional case of peritonsillar abscess each decade. However, low rates of antibiotic prescribing for respiratory tract infections did not increase any other infective complications such as: mastoiditis, empyema, meningitis, intracranial abscess, or Lemierre's syndrome.

Discussion of The Literature

There is a small but growing body of evidence that pediatric outpatient stewardship programs are successful in reducing the overall antibiotic prescribing rates while maintaining safe patient care. There are numerous successful interventions mentioned above, the most frequently successful being a combination of prescriber education and patient or family education. There are many successful outpatient ASPs in the literature which improve antibiotic prescribing rates without increasing the risk for infective complications. Research supports a multifaceted approach, however the benefits are not long lasting (Gerber et al., 2014; Linder et al., 2017). Further research is needed into the drivers of antibiotic overuse and identify methods to address the culture of expectation.

Theoretical Framework

This project utilizes two theoretical frameworks as it both impacts the prescribers and the patient and their families. Kurt Lewin's theory of planned change addresses the theory of change and how it applies to nursing policy (Lewin, 1947). The health promotion model is an excellent theory on how to promote health in an individual (Pender, Murdaugh, & Parsons, 2011). By educating the patient and their family on antibiotic use and antibiotic resistance, the healthcare provider is addressing the culture of expectation and correcting misinformation about antibiotic use and its impact on one's health.

Theory of Planned Change

The aim of this project is to improve the quality of care provided to the outpatient pediatric population by reducing the antibiotic prescribing rates and improving adherence to national guidelines by utilizing Kurt Lewin's theory of planned change (Lewin, 1947). Lewin's theory describes change as a three step process: unfreezing, movement, and refreezing (Lewin, 1947). Shirey (2013) reviewed Lewin's theory as it applies to change in nursing. The first step, unfreezing, begins with the identification of a problem. Lewin recognizes that there must be emotional involvement, as well as a sense of urgency in order for this step to unfold (Lewin, 1947; Shirey, 2013). The strength of the driving forces must exceed the restraining forces (Shirey, 2013). The second step, movement, is the process of change. Active engagement of the participants through a detailed plan of action is vital for successful change (Shirey, 2013). The third step, refreezing, occurs after the desired change becomes embedded into existing systems. In reference to this quality improvement project, unfreezing will occur at the Lunch and Learn session. During this session, the consequences of antibiotic misuse will be reviewed. This may spur an emotional response to promote a change in practice. The evidence-based guidelines, published by the American Academy of Pediatrics (Bradley et al., 2011; Lieberthal et al., 2013; Shulman et al., 2012; Wald et al., 2013), will be reviewed, providing education for movement towards evidence-based practice and adherence to national guidelines. The implementation of this antibiotic stewardship project will the success of utilizing watchful waiting as a tool for quality improvement. Refreezing occurs when the new equilibrium is reached, and adherence to the antibiotic stewardship program is the new standard. Refreezing is crucial to sustainability of change overtime (Shirey, 2013).

This review of the literature shows that there frequently is a quick return to baseline after completion of the antibiotic stewardship intervention (Gerber et al., 2014; Linder et al., 2017). This demonstrates a failure to complete the third stage and have successful change or refreezing. Lewin (1947) states that there needs to be an "emotional stir-up" and that there needs to be a change in the culture for successful refreezing to occur. Accordingly, this quality improvement project needs to inspire the participants to become stewards of antibiotics by adhering to national guidelines, improve communication skills and educate patients and their families about the appropriate use of antibiotics. Only then will this project provide sustainable improvements.

The Health Promotion Model

Secondly, this quality improvement project aims at improving the patient and families' understanding of antibiotic use. As such, Pender's model of health promotion is applicable to these aims. Pender (Pender, Murdaugh, & Parsons, 2011) describes health promotion as "increasing the level of well-being and self-actualization of a given individual or group" (Pender et al., 2011, p. 36). Pender's health promotion model provides the framework for nurses to motivate individuals to engage in behaviors towards enhancing health. Utilizing this model, families should be given health education which discuss the importance of health, the impact that antibiotics have on health (both the good and the bad), and provide alternative care (symptomatic care). The CDC's "Be Antibiotics Aware" campaign has patient centered education which will be used in this project (CDC, 2018).

Methodology

Phase I: Risk Analysis

Strengths. This project is a quality improvement project focused on antibiotic use in the outpatient pediatric population. The participating practices share a common electronic medical

record (EMR). The EMR allows for simple communication between participating prescribers and the project leader as well as for easy chart review. An EMR also allows for tracking and reporting antibiotic prescribing practices which is one of the CDC's core elements for ASPs. The project is supported by leaders who are dedicated to providing high quality patient care. The prescribers in participating offices have expressed a willingness to participate in the project. Prospective participants are eager to learn and improve the quality of care they provide.

Weakness. This project lacks the resources to be truly robust. The healthcare organization in which this project will be taking place has been under financial stress for the last several years resulting in understaffing. Due to understaffing, there is no personnel to provide the audit and feedback which the literature suggests is vital to a successful outpatient ASP. This project is also limited by the EMR. The EMR (Cerner) may have the capability to measure quality indicators; however, this particular version does not. Additionally, the author was unable to attain community data regarding antibiotic use in the pediatric outpatient setting. Lastly, data collection is based on parent-reporting suggesting concerns for accuracy and the potential for missing data and lost to follow-up.

Opportunities. Antibiotic resistance is a major public health threat. In the last several years there has been more literature supporting ASPs and judicial antibiotic use. There is an opportunity to involve prescribers in improvement activities. At every visit where an antibiotic may be prescribed, or where there is a parental expectation for an antibiotic prescription, there is an opportunity to educate the parent on antibiotic use. Moreover, this project also has the opportunity to expand an existing program. There is an existing inpatient ASP within the organization; this project could expand the ASP to the outpatient setting.

Threats. As with any change there are risks. The literature suggests that short term interventions do not leave a lasting impact on the antibiotic prescribing rates (Gerber et al., 2014; Linder et al., 2017). Interestingly the literature also notes that many prescribers do not feel that their personal prescribing rates are the "problem" or contribute to antibiotic resistance (Dempsey et al., 2014; Szymczak et al., 2014). One study even showed that prescribers were very skeptical of their reported personal prescribing patterns (Szymczak et al., 2014). Participant resistance to change is a major threat to this project as is the parental pressures and/or the perceived parental expectation for an antibiotic prescription. This project needs the commitment of organization's leaders and of the prescribers/staff to ongoing antibiotic stewardship.

Needs Assessment

This project began with the identification of an area which needed improvement. There has been a growing concern of inappropriate antibiotic use in the literature and in the practice environment. Professional medical associations such as the American Academy of Pediatrics (AAP) and the Infectious Diseases Society of America (IDSA) as well as federal agencies such as the Centers for Disease Control and Prevention (CDC) have been urging health care providers and healthcare organizations to improve prescribing patterns and take up the mantel of antibiotic stewardship.

Phase II: Obtaining Support

The first step of the project was collaboration with the organization's leadership team, the quality improvement department, educational department and management teams of each individual office. The problem of antibiotic misuse and the current national guidelines for antibiotic use were discussed as well as the CDC and AAP's recommendation for outpatient antibiotic stewardship programs (Sanchez, Fleming-Dutra, Roberts, Hicks, 2016; Zetts, Stoesz, Smith, & Hyun, 2018). Through these discussions, a multidisciplinary team was formed, which

included the Project leader, Chief Medical Officer, Chief Nursing Officer, Director of Pharmacy and Infectious Disease, Director of Provider Services, Managers of Outpatient Pediatric offices, Manager of Convenience Care and the health care providers. This team reviewed and contributed to the development of the aims, measures and interventions.

As this was a quality improvement project regarding best practices there were few expenses. The cost savings associated with outpatient ASPs is yet unknown in the present literature. However, there is a significant cost savings seen in the literature for inpatient ASP's (Beardsley et al., 2012). The research shows little in the way of sustainability, but it is suggested that improvements can be sustainable with long-term dedication to evidence based practice and improved compliance to antibiotic stewardship (Gerber et al., 2014).

Phase III: Implementation

The Project started with a review of the literature, gathering of guidelines, and development of the educational intervention. This was done while forming the quality improvement team. Through correspondence with the quality improvement team, protocols for watchful waiting were formalized, and educational materials for patients were gathered. The educational intervention included a 30-minute Power Point presentation (see Appendix C) on common childhood illnesses which are often prescribed antibiotics inappropriately, including AOM, bronchitis, the common cold, influenza, pharyngitis, and sinusitis. The presentation included the use of watchful waiting as an intervention to support judicial antibiotic use. For this project, watchful waiting was recommended for patients with non-severe AOM who were older than 2 years of age and in any child with an acute respiratory tract infection and whose family was insisting on a prescription despite the recommended guidelines (Bradley et al., 2011; Lieberthal et al., 2013; Shulman et al., 2012; Wald et al., 2013). Attendees were also provided with examples of patient education on AOM and watchful waiting that are available in the public

domain on the CDC's website (Appendix D). These lunch and learn presentations targeted prescribers who work for LRGHealthcare system, offering free lunch and one CME credit. The lunch and learn was advertised via e-mail to all 229 healthcare providers and on the healthcare systems employee website for 1 month prior to the launch date.

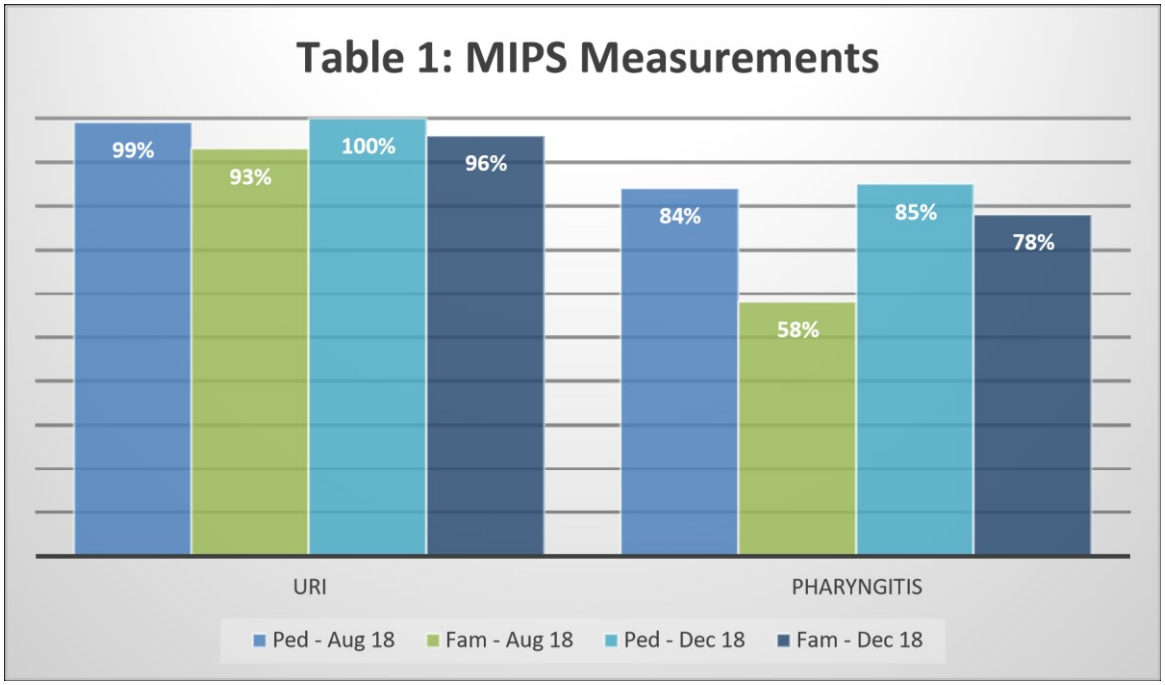
The lunch and learn intervention was launched September, 2018. The project leader presented once at three separate locations over the course of three weeks to a total of 17 healthcare providers, and 4 nurses/clinical support staff. The 17 healthcare providers were comprised of 10 family healthcare providers (MDs and APRNs, which accounts for 34% of the family practice providers), five pediatricians (100% of the pediatricians), and two other healthcare providers (one emergency services MD and one ear, nose and throat, APRN). Watchful waiting data were collected for three months and analyzed in January, 2019.

Phase IV: Evaluation

This quality improvement project aimed to promote provider adherence to appropriate antibiotic prescribing guidelines for AOM, bronchitis, the common cold, influenza, pharyngitis, and sinusitis in children, improve the percentage of children between the ages of 3 to 18 years who were diagnosed with pharyngitis, prescribed an antibiotic and received a group A Streptococcus (strep) test for the episode, provide education for the patient and their family about antibiotic stewardship and provide post visit follow-up call to determine if watchful waiting was followed. This quality improvement project measured provider adherence to prescribing guidelines through chart review and quality metric data regarding antibiotic prescribing rates for URIs and pharyngitis.

The Merit-based Incentive Payment System (MIPS) is Medicare's quality performance incentive program which was utilized to measure two of the above objectives (Centers for

Medicare & Medicaid Services, 2018). MIPS measures the percentage of children 3 months-18 years of age who were diagnosed with upper respiratory infection (URI) and were not dispensed an antibiotic prescription on or three days after the episode. MIPS also measures the percentage of children 3-18 years of age who were diagnosed with pharyngitis, ordered an antibiotic and received a group A streptococcus (strep) test for the episode. The organization's performance scores for these two quality indicators were compared pre and post intervention. The MIPS measurements are discussed below as percentages and are broken down by family practice providers and pediatric practice providers. It is important to note that all the pediatric providers attended the lunch and learn presentation. However, only 5 of the 17 family practice providers attended.

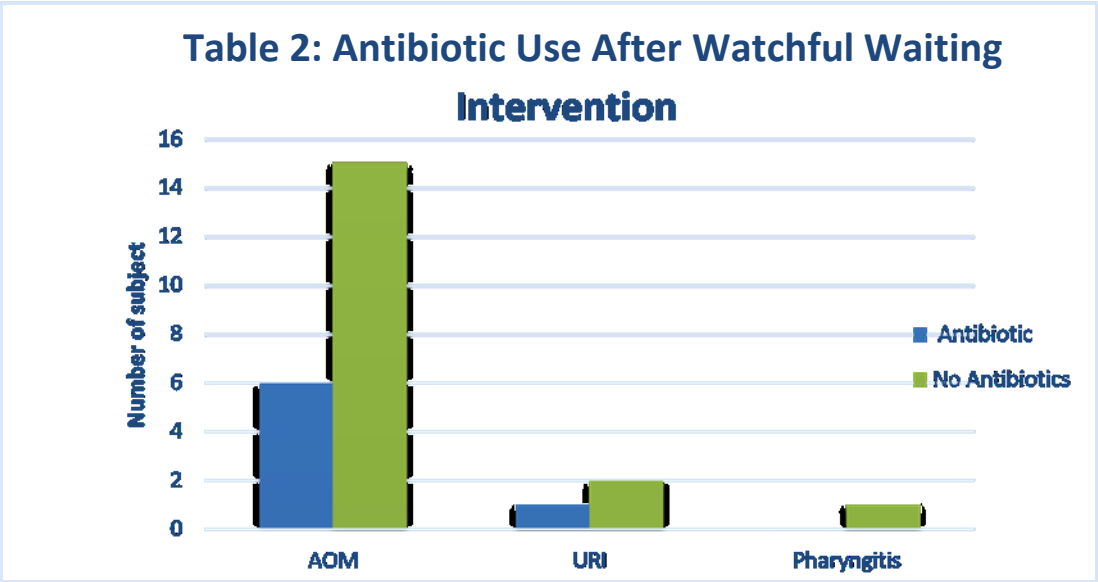


Antibiotics and URI's. As an organization, there was a small improvement noted in the percentage of children 3 months-18 years of age who were diagnosed with upper respiratory infection (URI) and were not dispensed an antibiotic prescription on or three days after the episode. When the data is split between family practice providers and pediatric providers there

was a greater improvement in the family practice providers (see Table 1). However, the rate of adherence to this measurement across the organization was very good at 98%.

Strep Throat. As an organization, there was also a small improvement in the percentage of children 3-18 years of age who were diagnosed with pharyngitis, ordered an antibiotic and received a group A streptococcus (strep) test for the episode. When comparing family and pediatric providers, the pediatric providers followed closer to the guidelines than family practice providers did. However, post intervention there was a drastic improvement in the family practice providers' adherence to the guidelines (See Table 1). There is a need for continued improvement efforts for this quality measure in both pediatric and family practice environments.

Watchful Waiting. As discussed above, watchful waiting is a tool to reduce antibiotic use. The success of this particular intervention was measured through chart review and follow-up calls. Data was gathered manually over three months. There were 27 subjects who were prescribed antibiotics as a part of the watchful waiting protocol, two were lost to follow-up and therefore excluded from this these findings. Twenty-one subjects were diagnosed with AOM, one pharyngitis, and three nonspecific URIs. Of those 25, only 7 started the antibiotics (see Table 2).



When analyzing those who were diagnosed with AOM, over 70% of patients improved without the use of antibiotics. This is consistent with the current research which suggests that roughly 70% of ear infections will improve on their own without antibiotic use (Lieberthal et al., 2013).

This researcher also looked to see if providing educational materials to the family affected the parental decision to start the antibiotics or not. In the watchful waiting group, 66% of parents received educational materials regarding antibiotic stewardship and watchful waiting. Of those parents who received education, only 25% decided to start the antibiotic.

Discussion

Limitations

There were several limitations to this project. Although 17 providers attended the lunch and learn meetings only five of those prescribers reported watchful waiting data. There may have been significantly more opportunities where watchful waiting was used but not captured given data was collected based on prescriber reporting of watchful waiting. Data was primarily gathered from a single outpatient pediatric office. This project did not provide scripting for the prescribers to use when discussing antibiotics or watchful waiting, therefore difference in provider styles may have impacted each individual differently and the parent's decision to start the antibiotic or not. Watchful waiting data was only collected from those patients who were given a prescription, this project excluded those patients who did not receive and antibiotic prescription and were told to follow-up in office if symptoms persisted or worsened. Future quality improvement cycles will include this second type of watchful waiting, which will provide more data. In addition, this project did not continue to follow-up with these patients to see if they returned to office. Lastly, this project did not measure the impact of the patient education

on patients and their families. Further quality improvement projects should address the family's beliefs and attitudes about antibiotics.

Sustainability of Antibiotic Stewardship

Research shows that improvement in prescribing patterns after antibiotic stewardship interventions generally declines overtime. As this project is the first cycle of quality improvement, there is the ability to build on this intervention to promote continued antibiotic stewardship. The long term goal of this project is to inspire the development of an organization wide outpatient antibiotic stewardship program. The first step in developing such a program is raising awareness of antibiotic overuse and misuse. Followed by establishing prescriber accountability for prescribing through an audit feedback system.

Conclusion

This quality improvement project is the first step towards a system wide outpatient pediatric antibiotic stewardship program. Watchful waiting proved to be a successful tool in reducing the use of antibiotics. The educational intervention aimed at the prescribers was also a successful tool in improving the health care provider adherence to evidence based guidelines. Further quality improvement cycles should include provider specific audit and feedback, expand the definition of watchful waiting to include those patient who did not receive a prescription, and include additional follow-up data.

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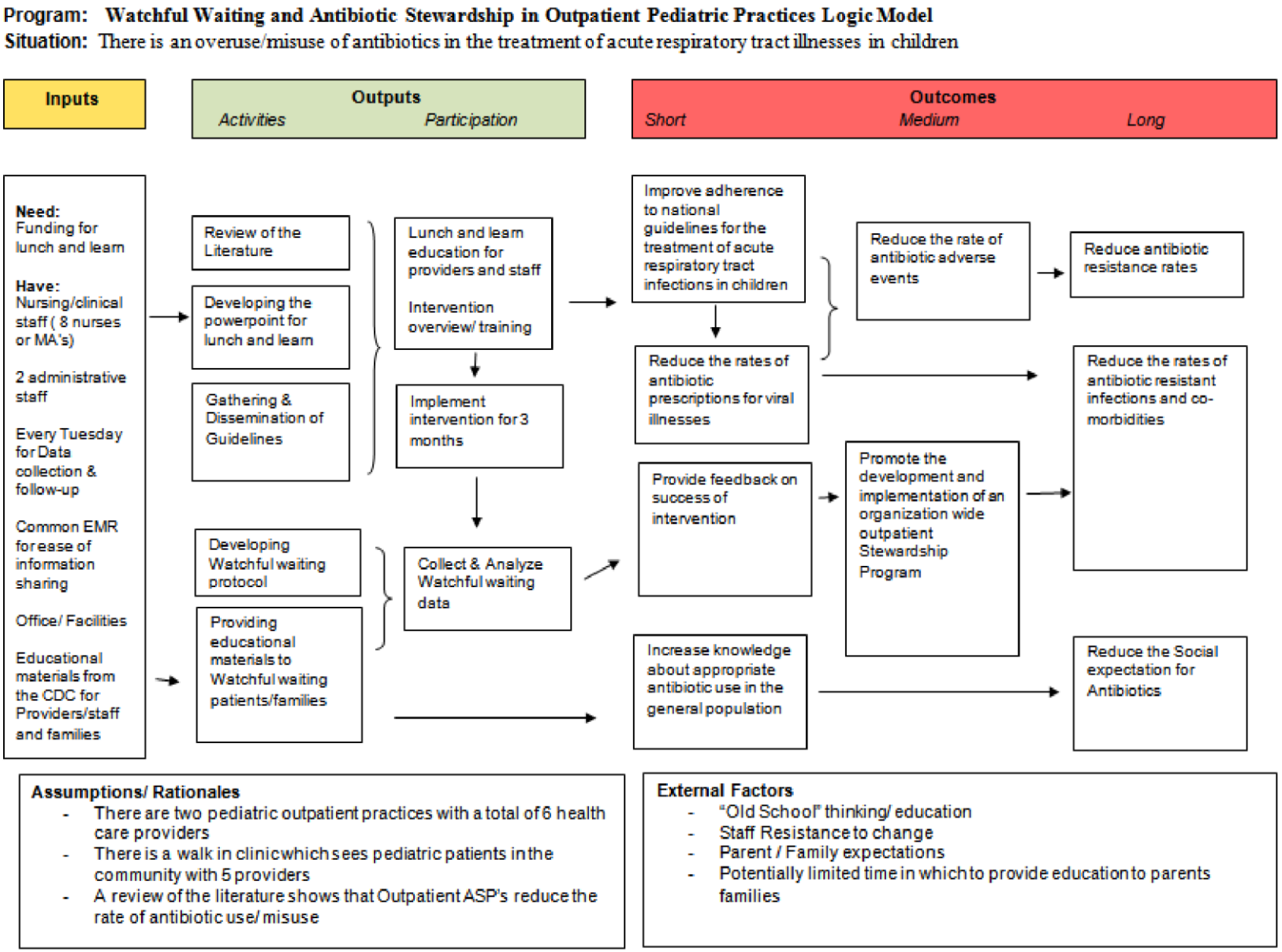
Appendix A: Logic Model



Appendix B: Budget

One-Time Costs	
Staff Training – Lunch and Learn	
Lunch	$300.00
Other – use of CDC educational materials	(no cost, public)
Total One-Time Costs	$300.00
Capital Cost	
Equipment- conference room, utilities and video	(cost absorbed by organization)
Total Capital Costs	$0
Ongoing Costs	
Staff time for follow-up calls -	Staff time already allocated to follow-up, costs absorbed by the organization
Software License fees –absorbed by organization	$0
Total Cost	$300.00

Appendix C: PowerPoint Presentation (abridged)

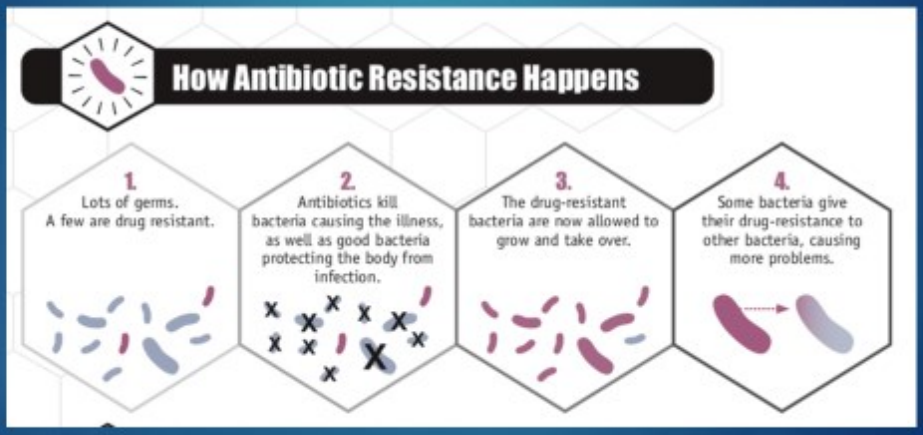
Watchful Waiting and Pediatric Outpatient Antibiotic Stewardship:

A Quality Improvement Project

BECCA COUPER, MSN, RN, CPNP
SETON HALL UNIVERSITY

Introduction

- Too much of a good thing?



(CDC, 2014)

Antibiotic Stewardship

- Antibiotic stewardship is the effort to measure antibiotic prescribing
- Aims to improve antibiotic prescribing and use, so that antibiotics are only prescribed and used when needed
- Ensures that the right drug, dose, and duration are selected when an antibiotic is needed

The Problem

- In the United States, antibiotic-resistant infections affect more than 2 million people annually and are associated with 23,000 deaths (CDC, 2016).
- It is estimated that more than 30% of outpatient antibiotic prescriptions are inappropriate (Fleming-Dutra et al., 2016)

What we see…

- Children with viral URI's being prescribed broad-spectrum antibiotics (Azithromycin).
- Lack of judicial antibiotic use.
- Prescribing habits which contribute to the culture of antibiotic expectation.
- Children receiving antibiotics for pharyngitis which "looks like strep" but no Rapid strep test or culture done.

Acute Otitis Media:

Antibiotics vs. Watchful Waiting

Lieberthal et al., 2013

Age	Otorrhea With AOM	Unilateral or Bilateral AOM With Severe Symptoms	Bilateral AOM Without Otorrhea	Unilateral AOM Without Otorrhea
6 mo to 2 y	Antibiotic therapy	Antibiotic therapy	Antibiotic therapy	Antibiotic therapy or **watchful waiting**
≥2 y	Antibiotic therapy	Antibiotic therapy	Antibiotic therapy or **watchful waiting**	Antibiotic therapy or **watchful waiting**

Acute Otitis Media (Cont.)

First line antibiotic:

Amoxicillin 80-90mg/kg/day in 2 doses.

Alternatives: cefdinir (14 mg/kg per day in 1 or 2 doses)
cefuroxime (30 mg/kg per day in 2 divided doses)
cefpodoxime (10 mg/kg per day in 2 divided doses)
or ceftriaxone (50 mg/kg, administered intramuscularly).

Duration: Age and severity dependent

<2 yr or for severe AOM = 10 days
2-5 yr or mild/moderate = 7 days
6+ yr = 5-7 days

(Lieberthal et al., 2013)

Bacterial Sinusitis

- Diagnosis:
  1. URI symptoms lasting more than 10 days without improvement
  2. Worsening course: worsening or new onset of nasal discharge, daytime cough, or fever after initial improvement
  3. Severe onset: Fever >102F and purulent nasal discharge for at least 3 consecutive days.

(Wald et. al., 2013)

Sinusitis: Treatment

- First line treatment:

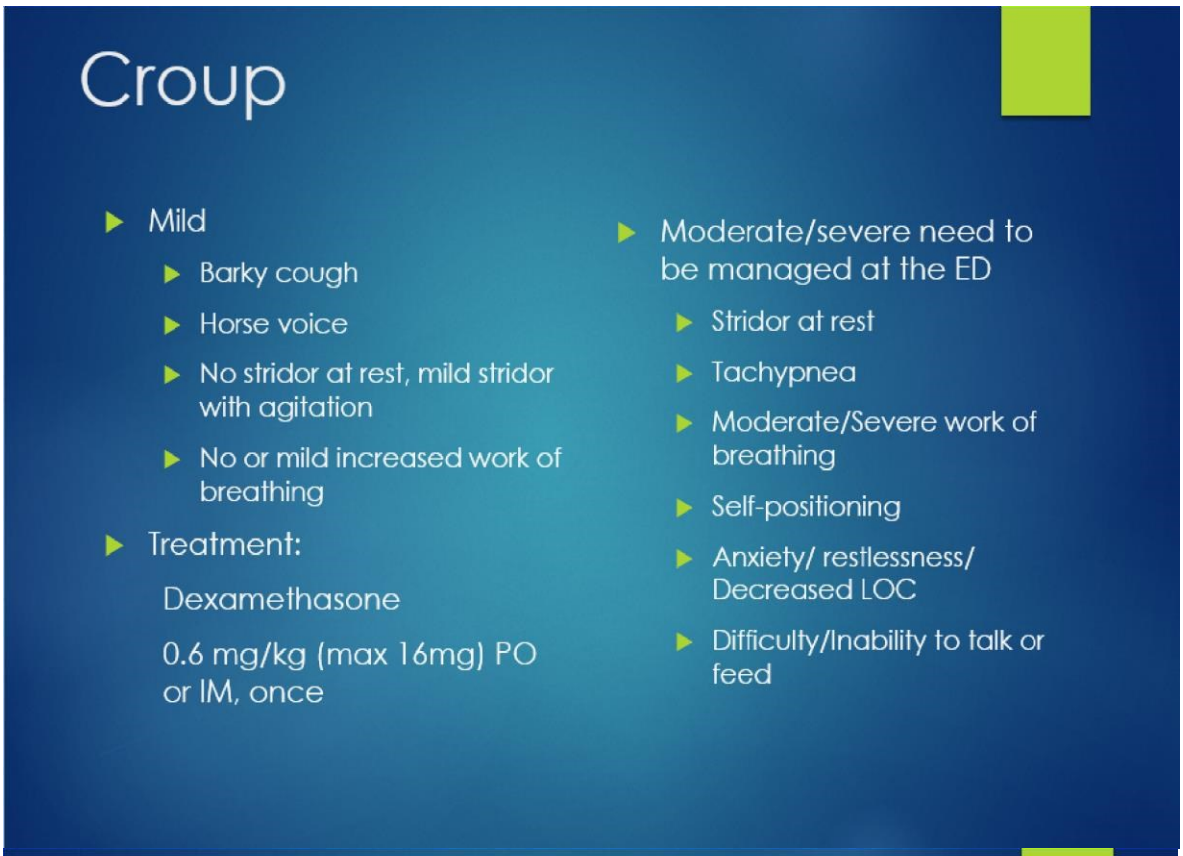
  Amoxicillin 80-90mg/kg/day in 2 divided doses for 10 days (max dose 2g).

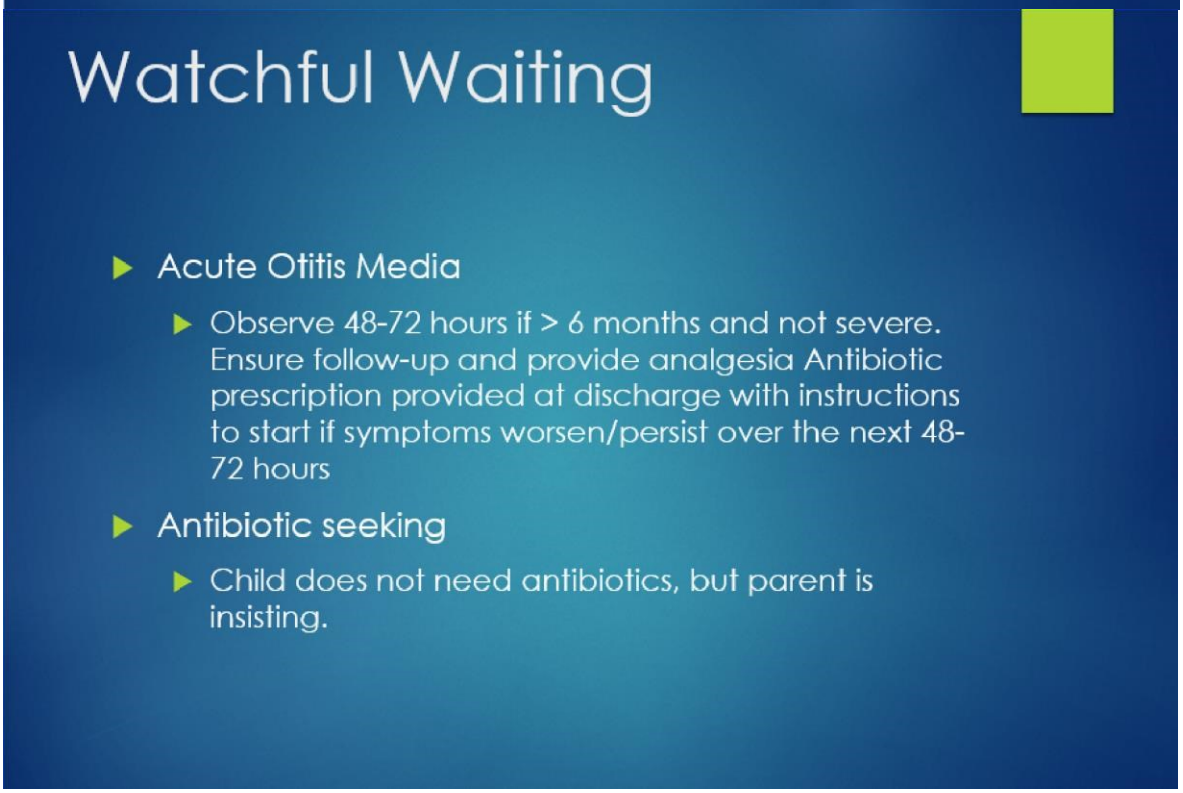
  - Use Amoxicillin-clavulanate if child is <2 yrs, in childcare or has had an antibiotic in the last 30 days.
    - 80–90 mg/kg per day of the amoxicillin component with 6.4 mg/kg per day of clavulanate in 2 divided doses with a maximum of 2 g per dose).
  - Alternatives:
    - Single IM dose of ceftriaxone (50-mg/kg dose)
    - Cefdinir Oral: 14 mg/kg/day in divided doses every 12 to 24 hours for 10 days; maximum daily dose: 600 mg/**day**

(Wald et. al., 2013)

Pharyngitis

- Henry is a 5 year old here today for fever, sore throat, and headache. On exam he has an erythematous pharynx, Tonsils +1 without exudate and shotty anterior lymph nodes.
- Would you test?
- Would you treat?


Croup
Mild
Barky cough
Horse voice
No stridor at rest, mild stridor with agitation
No or mild increased work of breathing
Treatment:
Dexamethasone
0.6 mg/kg (max 16mg) PO or IM, once
Moderate/severe need to be managed at the ED
Stridor at rest
Tachypnea
Moderate/Severe work of breathing
Self-positioning
Anxiety/ restlessness/ Decreased LOC
Difficulty/Inability to talk or feed


Watchful Waiting
Acute Otitis Media
Observe 48-72 hours if > 6 months and not severe. Ensure follow-up and provide analgesia Antibiotic prescription provided at discharge with instructions to start if symptoms worsen/persist over the next 48-72 hours
Antibiotic seeking
Child does not need antibiotics, but parent is insisting.

Appendix D: Patient Education

Preventing and Treating Ear Infections

What is an ear infection?

Ear infections can affect the ear canal or the middle ear.

Acute otitis externa (AOE) is the scientific name for an infection of the ear canal, which is also called swimmer's ear.

Middle ear infections are called *Otitis Media*, and there are two types of middle ear infections:

- **Otitis Media with Effusion (OME)** occurs when fluid builds up in the middle ear without pain, pus, fever, or other signs and symptoms of infection.
- **Acute Otitis Media (AOM)** occurs when fluid builds up in the middle ear and is often caused by bacteria, but can also be caused by viruses.

How are ear infections caused and how can they be prevented?

Bacteria

AOM is often caused by bacteria, and *Streptococcus pneumoniae* is a common bacterial cause of AOM.

➔ Ensure your child is up to date on vaccinations, including the pneumococcal vaccination which protects against *Streptococcus pneumoniae*. Breast feeding exclusively until your baby is 6 months old and continuing to breastfeed for at least 12 months can protect your baby from infections, including AOM.

Cold and Flu Season

AOM often occurs after a cold. Viruses cause OME (fluid in the middle ear), and then bacteria can grow in the fluid leading to AOM.

➔ Ensure your child is up to date on vaccinations and gets a flu vaccine every year.

Injury to the Ear

Foreign objects, like cotton swabs and bobby pins, can cause cuts and bruises in the ear canal that can get infected, causing acute otitis external AOE.

➔ Avoid putting foreign objects in the ear.

National Center for Emerging and Zoonotic Infectious Diseases
Division of Healthcare Quality Promotion

CS281332A

(CDC, 2017)

Cigarette Smoke

Exposure to cigarette smoke can lead to more colds and more AOM.

➔ Avoid smoking and exposure to secondhand smoke.

Family History

The tendency to develop AOM can run in families.

➔ Family history is not preventable. Instead, focus on other prevention methods, like staying up to date on vaccinations, breast feeding, and avoiding smoke.

How are ear infections treated?

- **AOE** is usually treated with antibiotic ear drops.
- **OME** usually goes away on its own and does not benefit from antibiotics.
- **AOM** may not need antibiotics in many cases because the body's immune system can fight off the infection without help from antibiotics, but sometimes antibiotics are needed.

Watchful Waiting

- Mild AOM often will get better on its own without antibiotic treatment, so your healthcare professional may recommend *watchful waiting* before prescribing antibiotics to you or your loved one. This means that your provider may wait a few days before deciding whether to prescribe antibiotics, while treating the symptoms of AOM. Watchful waiting gives your or your child's own immune system time to fight off the infection first before starting antibiotics. If you or your child don't get better in 2–3 days or get worse, your healthcare professional can recommend starting antibiotics.
- Another form of watchful waiting is *delayed prescribing*. This means that your healthcare professional may give you an antibiotic prescription, but ask you to wait 2–3 days to see if you or your child are still sick with fever, ear pain, or other symptoms before filling the prescription.

Symptom Relief

There are ways to relieve symptoms associated with ear infections – like ear pain – whether or not antibiotics are needed. Consider using acetaminophen or ibuprofen to relieve pain or fever. Ask your healthcare professional or pharmacist what medications are safe for you or your loved one to take.

Antibiotics, such as amoxicillin, are used to treat severe ear infections or ear infections that last longer than 2–3 days.

If your child has a fever of 102.2°F (39°C) or higher, discharge or fluid coming from the ear, symptoms are much worse, or symptoms last for more than two or three days for AOM, you should contact your healthcare professional. If your child has symptoms of OME for more than one month or hearing loss, contact your healthcare professional.

Page 2 of 2

(CDC, 2017)