3-2012

Acute Otitis Media

Tonia A. G. Poirier

ACUTE OTITIS MEDIA

By

Tonia A. G. Poirier

Master of Science in Nursing, University of North Dakota, 2012

An Independent Study

Submitted to the Graduate Faculty

of the

University of North Dakota

in partial fulfillment of these requirements

for the degree of

Master of Science

Grand Forks, North Dakota

March

2012

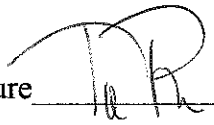
PERMISSION

Title Acute Otitis Media

Department Nursing

Degree Master of Science

In presenting this independent study in partial fulfillment of the requirements for a graduate degree from the University of North Dakota, I agree that the College of Nursing of this University shall make it freely available for inspection. I further agree that permission for extensive copying or electronic access for scholarly purposes may be granted by the professor who supervised my independent study or, in her absence, by the chairperson of the department or the dean of the Graduate School. It is understood that any copying or publication or other use of this independent study or part thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to the University of North Dakota in any scholarly use which may be made of any material in my independent study.

Signature 

Date 3/29/12

Abstract

Acute otitis media (AOM) is a common childhood illness that almost every child experiences by the time that they are five years of age. AOM is a self-limiting condition in which analgesics are thought to be efficient in treating the pain in these children. Literature was reviewed and the information that was compiled was presented as a PowerPoint presentation to a local group of mothers with children under the age of 6 years. This information explained the anatomy of the ear, the risk factors for AOM, treatment options, and preventative measures for AOM. As a future Nurse Practitioner, it is imperative that we understand what the needs of the parents are for the children that we are evaluating. It is our duty to provide the education needed and to share in the informed decision making process with the parents when a child is faced with an illness. We need to empower parents and providers to take a stand in a time where overprescribing is a global issue and leading us down a pathway of drug resistance. This is a multifactoral condition where guidelines are in place, but now must be revisited to ensure parents are aware of the treatment plans used to effectively manage AOM.

Introduction

Two thirds of all children will have their first case of Acute Otitis Media (AOM) by the time they turn one year of age. Furthermore, by the age of three, four out of five children are affected and by five years of age nearly every child would have had at least one case of AOM. In the United States (US) alone, AOM is responsible for 25 million office visits annually with treatment costs estimated at $3 billion (American Academy of Otolaryngology-Head and Neck Surgery, 2012).

Most recent research has demonstrated that AOM is prevalent in pre-school age children, is self limiting, and pain being the most prevalent symptom can be relieved with analgesics. So why do we, as healthcare providers, continue to treat almost every child with an ear infection with antibiotics, especially since research says that uncomplicated AOM has a documented spontaneous resolution rate of 78% or better (Montgomery, 2005)? The question explored in this paper is, is "watchful waiting" with the use of analgesics in children under six years of age just as effective as antibiotics in the resolution of AOM symptoms?

Investigation on when to treat or not treat AOM will lead us to current findings in research, the ability to review provider practices and current guidelines, and to understand parental expectations and attitudes. It will also assist us in understanding provider or parental healthcare beliefs, and the barriers needing to be overcome to change the future practice of treating AOM in children.

experiences, will help them resolve most AOM symptoms in the future at home, which will in turn give them a sense of empowerment and be cost effective.

Significance

Overprescribing is a global problem and is certainly not a new topic in healthcare especially when it comes to children with ear infections. It has led to an increase in adverse side effects from the antibiotics, increase in drug resistance, and an increase in parental expectations that may be inappropriate. We need to go back to the basics and start with the least invasive type of treatment whenever possible and then expand beyond that, if it is not effective in managing uncomplicated AOM.

However, because of the inconveniences associated with having an ill child and linking AOM with antibiotics for a ready solution, some parents have expectations for wanting their children to be treated when they feel that the child is exhibiting symptoms for an ear infection. Many parents may not have the time to take off of work or they do not want their child to miss a day of daycare for financial reasons, so antibiotic treatment is the only answer they are looking for at that time.

Another problem is that antibiotics are not always necessary as first line treatment for AOM. When they are routinely prescribed as such, it demonstrates that some providers do not always follow the guidelines that have been implemented to assist them with diagnosing and treating AOM. Some providers prescribed antibiotics inappropriately because of parental pressure or because they want the parent to have a favorable opinion of themselves. Every visit is different, but if one were to take both of those factors out of the equation when diagnosing AOM, we would definitely see a decrease in the number of prescriptions written annually. It

brings us back to how important it is to accurately diagnose and treat AOM according to the history given by the parent, the findings from the physical exam, and using guidelines to effectively manage AOM. During the visit, it is imperative that the providers involve the parents throughout the process, which will increase parental respect for the provider and compliance with the final treatment plan.

Findings from this study will help influence parents to be confident that their child's provider is successfully managing AOM according to their findings. The provider can effectively manage AOM according to the history and physical findings if the parents are educated by the provider about the condition. Parents will be able to utilize the knowledge gained to limit the amount of social pressure put on the provider to prescribe antibiotics inappropriately. It will provide the tools needed to educate the parent on the course of the illness along with the treatment plan. This is a timely subject to be assessed and further analyzed to see how we can effectively manage AOM without using antibiotics as our first choice when warranted. Change takes time and effort, so it is pertinent for providers to continue their practice and educate parents to start changing beliefs.

Theoretical Framework

Basic knowledge of the anatomy of the ear can be crucial for parents so that they can understand the mechanism of action as to why young children get frequent ear infections. When children are young, the Eustachian tube is floppy, horizontal, and short, which can lead to more infections whether it is viral or bacterial because of the difficulty to drain. Then, as the child grows, the maturation of the ear develops more of a slope to the Eustachian tube which allows for better drainage. Other factors that can compromise drainage of the Eustachian tube would be

swelling or secretions from allergies or viral respiratory infections, which many children experience due to increase exposure at daycare centers (Porth & Matfin, 2009).

There are different types of ear conditions and each one is treated differently according to the history of present illness, symptoms, and the physical exam. Acute otitis media (AOM) is a sudden, onset of symptoms with the presence of a middle ear effusion and signs of inflammation. The effusion is noted by the bulging of the tympanic membrane, limited or absent mobility of the tympanic membrane, air-fluid level behind the TM, and otorrhea. Signs of inflammation would be redness of the TM and otalgia. Other generalized symptoms sometimes exhibited by the child are fever, diarrhea, vomiting, irritability, anorexia, rhinitis, and conjunctivitis (Montgomery, 2005).

Acute otitis media can be a challenging condition for providers and parents. Some of the challenges that the parents should be made aware of that can arise for the providers during the exam are if the child is uncooperative or scared, if their ear canals are narrow or obstructed, or trying to decipher if the erythema in the tympanic membrane is caused from the child crying, an infection, or a viral myringitis (Varrasso, 2006). The provider must take all of these things into account along with the history and symptoms provided by the parent. Research has demonstrated that when providers are even only about 50% certain about the diagnosis, they will still prescribe antibiotics (Varrasso, 2006).

Treatment of Acute Otitis Media has evolved throughout the years and now more than ever it is so important to treat with antibiotics only when confident with the diagnosis, or when the child is under six months of age to prevent complications, to limit overprescribing. The research is supporting "watchful waiting" where a decision is made by the parents and provider

to wait and see if the symptoms progress or resolve on their own. This practice saves children from taking unnecessary antibiotics when the ear was able to heal itself without any complications. The other treatment option is the practice of giving the patient a safety net prescription that the parent can fill, not immediately, but in a couple of days if the symptoms were to worsen (Siegel et al., 2003). This approach empowers the parents to make decisions according to the way their child is responding to the illness. Many times, it is these parents who do not even fill the prescription because they had a backup plan if needed, which gave them more piece of mind with this option. Lastly, it is recommended to use antibiotics when warranted to treat severe cases of AOM or when unsure of diagnosis in children under the age of six months.

Definitions

Acute Otitis Media (AOM) is defined as an abrupt, onset of symptoms of middle-ear inflammation or middle ear effusion. Symptoms of middle-ear inflammation include bulging of the tympanic membrane (TM), limited or absent mobility of the TM, air-fluid level behind the TM, or otorrhea while symptoms of middle ear effusion are erythema of the TM or otalgia (Lieberthal et al., 2004).

Otitis Media with effusion is presence of fluid behind the tympanic membrane but no signs of infection.

Recurrent Acute Otitis Media is 3 or more episodes within 6 months or 4 or more episodes within a year (Wilson & Mayo, 2003).

Otalgia is pain experienced in the ear (Shah & Blevins, 2003).

Otorrhea is discharge from the inside of the ear.

to wait and see if the symptoms progress or resolve on their own. This practice saves children from taking unnecessary antibiotics when the ear was able to heal itself without any complications. The other treatment option is the practice of giving the patient a safety net prescription that the parent can fill, not immediately, but in a couple of days if the symptoms were to worsen (Siegel et al., 2003). This approach empowers the parents to make decisions according to the way their child is responding to the illness. Many times, it is these parents who do not even fill the prescription because they had a backup plan if needed, which gave them more piece of mind with this option. Lastly, it is recommended to use antibiotics when warranted to treat severe cases of AOM or when unsure of diagnosis in children under the age of six months.

Definitions

Acute Otitis Media (AOM) is defined as an abrupt, onset of symptoms of middle-ear inflammation or middle ear effusion. Symptoms of middle-ear inflammation include bulging of the tympanic membrane (TM), limited or absent mobility of the TM, air-fluid level behind the TM, or otorrhea while symptoms of middle ear effusion are erythema of the TM or otalgia (Lieberthal et al., 2004).

Otitis Media with effusion is presence of fluid behind the tympanic membrane but no signs of infection.

Recurrent Acute Otitis Media is 3 or more episodes within 6 months or 4 or more episodes within a year (Wilson & Mayo, 2003).

Otalgia is pain experienced in the ear (Shah & Blevins, 2003).

Otorrhea is discharge from the inside of the ear.

"Watchful waiting" is described as the time frame, usually 72 hours, in which the parent is monitoring the child for resolution of AOM symptoms without the treatment of antibiotics.

Process

According to Mateo and Kirchhoff (2009), a systematic review is a type of literature review that focuses on a specific clinical topic and appraises individual studies on that topic. The Cochrane Reviews are recognized internationally as the highest standard in evidence-based health care. The author conducted an electronic search in the Cochrane Database for systematic reviews which investigates the effects of interventions for the prevention and treatment of conditions (The Cochrane Collaboration, 2010).

The author used the key words "Acute Otitis Media" which produced 22 articles, of which the author found that none of them were relevant to the author's question, is "watchful waiting" with the use of analgesics in children under six years of age just as effective as antibiotics in the resolution of AOM symptoms? Another search was conducted using "Acute Otitis Media" and "wait". From that search, the "clinical trials" link and resulted in 13 articles, 4 of which had relevant data and were within the last 10 years. The reference list from one of the articles was reviewed and 4 more articles were found to be pertinent to the author's question.

A search was conducted in the Cumulative Index to Nursing and Allied Health Literature (CINAHL). The terms "acute otitis media" and "treatment" were used initially and further refined by limiting: the source type to only on periodicals and academic journals; the age to only contain infant, preschool child, and child; and the publication dates to range from 2000-2011. That search granted the author over 144 articles with many different variables. The author was

attempting to find more case study information that provided information about the different perspectives that follow the author's question in hopes that it would provide valuable insight to the future of this approach. The search was then limited to "Acute Otitis Media" and "watchful". This search produced 11 articles of which were narrowed down to one by the author due to factors indicated in the study that were not pertinent to the question. The search using "acute otitis media" and "wait-and-see" produced close to the same results. Of the articles obtained through these two searches, the author then reviewed the reference lists and found a pattern in which many of the authors were noted in the other articles and so forth. At that point, the author felt that a sufficient number of articles were obtained and the search stopped. A total of five articles were reviewed for this paper.

Information abstracted from research was compiled and formatted into a PowerPoint presentation and presented in a community board room, located where the author is from, to a group of mothers with children under the age of six. After the presentation, I made myself available for any questions, comments, or concerns about the presentation. My project was evaluated both by a Physician's Assistant that works in the Urgent Care setting and by the mothers at the presentation. Many positive comments were made by the mothers in regards to educating them on the anatomy of the ear and how infections and fluid behind the ear occurs. They felt that now that they understand what is happening and what their choices are, they can make a more informed decision when it comes to treating their children for AOM.

Review of Literature

Current Guidelines for AOM

The clinical practice guidelines by the American Academy of Pediatricians (AAP) and American Academy of Family Physicians (AAFP) (2004) provide recommendations for the providers for the management of AOM in children from 2 months through 12 years of age. The five recommendations pertinent to this paper are: 1) To effectively diagnose AOM, the provider should confirm an acute history of onset, identify fluid in the middle ear, and evaluate for signs of infection; 2) To include assessing for pain in the child and give treatment options; 3) To utilize "watchful waiting" without antibiotics for uncomplicated AOM cases in children 6 months or older or if child needs to be treated due to exam and history, then Amoxicillin is the gold standard for antibiotics; 4) To reassess patients if treatment failure occurs within 48-72 hours and to exclude other reasons for illness. If the patient was originally managed with "watchful waiting", then antibiotic therapy needs to be started. However, if the patient was treated initially with antibiotics, then the provider needs to change the medication; 5) to encourage AOM prevention by educating parents on risk factors. These guidelines are for children over two months of age taking into consideration that 7-20 aged children must be treated with antibiotics for just 1 child to receive any benefit (AAP &AAFP, 2004).

Managing Pain with AOM Guidelines

Pain is subjective and in children, they can't always tell us if something hurts or where it hurts. Shah and Blevins (2003) explicated what otalgia is, the cause of otalgia, and how to manage it. They define otalgia as pain in the ear but that the pain can be primary or referred. This is something that health care providers need to consider. The authors discussed the most

common etiologies of otalgia three of which are common and pertain to children; otitis media, Eustachian tube dysfunction, and gastroesophageal reflux. The pain in otitis media is primary pain. It is due to an inflamed mucosa mediated by the glossopharyngeal nerve. Also, they go on to say how pain can be due to the tympanic membrane bulging. This opens the door that just because the tympanic membrane isn't bulging doesn't mean that the child does not have ear pain. So therefore, we would want to treat the pain with an analgesic as we would an adult. Eustachian tube dysfunction is also noted as primary pain and can occur without an infection. This type of ear pain happens when the middle ear can't equalize the pressure between itself and the atmosphere. Many children experience this with upper respiratory symptoms where it then does not allow the fluid to drain in the middle ear (Shah & Blevins, 2003).

Gastroesophageal reflux is the third cause for otalgia and is noted as referred otalgia. The authors state "gastroesophageal reflux disease can cause otalgia by irritation of the upper aerodigestive tract in the sensory distribution of the glossopharyngeal and vagus nerves" (Shah & Blevins, 2003, 1148). These are the same nerves that innervate the ear, which demonstrates how the irritating and damaging effects from gastric acid secretions can cause otalgia. This should be considered when parents complain that their child has pain upon lying down versus being upright. Gastric reflux is common among children as noted with parents talking about how their children "spit up" during or after feedings.

Providing analgesic relief to children experiencing AOM symptoms can be crucial in managing this self-limited condition, which has been gaining more attention since the 2004 clinical practice guidelines. A randomized control trial was conducted over a one year time frame and included 238 children from the ages of 6 months to 12 years of age whom were seen

in a pediatric emergency setting for ear symptoms. The children were divided into two groups; one that received antibiotics and one that did not. However, every participant received analgesics for pain control during the study. The purpose of the study was to determine whether the treatment of AOM using a wait-and-see approach significantly reduces the use of antibiotics (Spiro et al., 2006).

Positive aspects of this study were that education was presented about antibiotic resistance and adverse side effects of antibiotics. The impediment to conducting a study within an emergency type of setting is that parents usually expect some sort of prescription because it doesn't feel justified that they waited in the ER and it was more of an effort to bring their child there versus the clinic. What resulted out of this study was that after 4-6 days, ear pain and fever had a lower incidence in the wait-and-see group versus the group on antibiotics. In the 11-14 day follow-up, ear pain was slightly less than the antibiotics group but fever was about the same in both groups. So in comparison, it showed that there really was not advantage to taking the antibiotics and that the use of analgesics proved to be a far better option in managing the otalgia which becomes a common theme throughout this paper and a main reason for all of the research that has been placed into this paper (Spiro et al., 2006). Tylenol and Ibuprofen are effective orally for pain and topically Auralgan ear drops can be utilized. Multiple findings have demonstrated that antihistamines and decongestants are not recommended and do not offer any benefit in resolving AOM symptoms.

Antibiotic Use with Guidelines

There are some variations noted in the duration of treatment, as the most recent research on other countries' guidelines in treating AOM demonstrate. According to Marchisio et al.

(2010), Italy's guideline is to treat with Amoxicillin for 10 days however, it can be lessened to five days in children over the age of two. They go on to elaborate that in Finland, Sweden, Germany, Scotland, and Australia the recommended duration is ten days while The Netherlands and South Africa advise medicating for five days. The standard treatment in the United States, France, Canada, and Luxembourg is that it can be based on the age of the patient and chronicity of the condition. If the child is under two years of age, then it is advised to treat for ten days while over two years of age can be anywhere from five to ten days depending on the situation.

"Watchful Waiting" from AOM Guidelines

A study was conducted because of the 2004 clinical guidelines for AOM, which was to compare the management of AOM before and after the guidelines. The study was conducted 30 months before and after the guideline was published. The sample was 1114 children across the U.S. ranging in ages from 6 months to 12 years old and inclusions were that it was a newly diagnosed case of AOM with ear pain and fever. The data for this particular quantitative study was retrieved from the National Ambulatory Medical Care Survey (NAMSC) (Coco, Vernacchio, & Anderson, 2010).

Interestingly enough, what this study found was that most of the physicians agreed with the new guideline of using an observation window, but did not implement it themselves in their practice. One would ask why that is? The study did not elaborate on the reason why, which would have been very beneficial to be able to understand the barriers that prevented that from happening. Even though there was little movement towards the use of the observation period, there was a decreased use of broad spectrum and an increase in narrow spectrum antibiotics to

treat AOM. Also, treating pain in these children soared to 71% after the release of the guidelines, which is one of the main reasons that parents bring their children into the doctors' office (Coco, Vernacchio, & Anderson, 2010).

Preverbal Children

Shaikh et al. (2010) conducted a community level randomized trial study to investigate how parents of preverbal children determine whether their child is having ear pain or not. It was a very small sample size consisting of only 59 parents who had children between the ages of 3 months-2 years. Over 75% of the parents in this study were African American, had public insurance, and were not college graduates. When this study was conducted, there were no other studies that looked at how parents of preverbal children determine how much pain the child is in, so this adds importance because this is the main population that is targeted. This study consisted of eight case studies presented to the parents to review and then according to the symptoms given. Each case study was different, some had certain symptoms and some symptoms were absent. The main symptoms of an ear infection that were used were fussiness, trouble sleeping, playing less, fever, tugging at ears, and eating less. The results showed that the cases studies with the most symptoms were rated the highest for causing pain in children and the cases with the least symptoms were rated the lowest on the pain scale. The two most important factors that parents felt were symptoms of pain consistently were ear tugging and fussiness (Shaikh et al., 2010).

Shaikh et al. (2010) had limits to their study such as a small, homogenous sample. It was looking for more subjective information from parents versus objective measures. Even though this was a very small study, it demonstrates how important education on the nature of a disease

is. Here the parents felt that if the child had a lot of symptoms, they must be in pain, the number of symptoms is not necessarily an indicator of pain. The child could have one symptom with positive findings on exam to be diagnosed as AOM. If the parents were educated on ear infections, they would have known what symptoms to expect and how those symptoms correlate with a true diagnosis of AOM.

Laine, Tahtinen, Ruuskanen, Huovinen, and Ruohola (2010) studied parent reported symptoms in their children when they suspected AOM and whether severity, occurrence and duration could predict AOM. In this study, parents who brought their children in for suspected AOM were given a survey to fill out on the symptoms that the child was exhibiting for AOM. Then, the otoscopic exam was conducted to see if the answers from the questionnaire correlated to the findings. There were 469 children total enrolled over a two year period from the ages of 6 to 35 months of age, which appeared to be limited, but they were focusing on the age group of children who are not able verbalize pain or other symptoms. Some of the symptoms that the survey focused on were: ear pain, ear rubbing, irritability, excessive crying, restless sleep, poor appetite, rhinitis, conjunctivitis, vomiting, and diarrhea. Next, the provider would examine the tympanic membrane by using pneumatic otoscopy. In order to diagnose AOM, there were three main criteria that they sought. First, there should be middle ear fluid along with two of the following symptoms: bulging, opacity or abnormal color, and decreased mobility. Next, there should be inflammatory signs noted on the tympanic membrane, and lastly symptoms should be acute in nature (Laine, Tahtinen, Ruuskanen, Huovinen, & Ruohola, 2010).

The results were that only 51% of the parents were correct in their suspicions of AOM. It also demonstrated that the most common reason that parents felt that their child had an ear

infection was because of restless sleep (29%). Other symptoms for suspicion were rubbing ears (14%), and ear pain, fever, and cough which where the lowest of the list of AOM symptoms. Of all of these symptoms, Laine et al. (2010) concluded that none of them were good predictors alone for AOM. They actually found that rubbing of the ears was more profound in children who did not have AOM. The first interesting finding was that the main symptom that was reported, children not sleeping well, is one which affects parents the most. They can tolerate most other symptoms, but when they are up at night with this, they tend to be less tolerant of the condition compared to fever or rubbing of ears. Another factor was the difference in reported symptoms and actually having AOM. It demonstrates how important it is to not treat AOM by symptoms reported because this may lead to an accurate diagnosis half of the time (Laine et al., 2010).

"Wait and See"

Stveanovic, Komazec, Lemajic-Komazec, and Jovic (2010) conducted a prospective study in Serbia over a year and a half time period with 314 children between 2 months-6 years old to evaluate the efficacy of wait-and-see approach in children diagnosed with AOM until resolution is complete. The group of symptoms that were utilized to diagnose and treat AOM with antibiotics was: purulent drainage, tense tympanic membrane, fever >38.5C, and pain. Nonsevere symptoms for the wait-and-see category were: erythema in the malleolar folds, tympanic membrane without strain, and a fever up to 38.5C. Symptoms in this study were a little different than mentioned in the first study.

Depending on the children's symptoms, they were placed into two groups and treated according to those groups. Out of the 314 children, 237 were observed without antibiotics for

three days while the other 77 children were treated with antibiotics. Out of the 237 children that did not receive an initial prescription for antibiotics, 191 (81%) of them had spontaneous resolution of symptoms while the other 46 (19%) needed antibiotics for a total of 123 children total that received antibiotics. Out of the 123 children, 77 (63%) had complete resolution while the other 46 (37%) had a relapse of AOM symptoms (Stveanovic, Komazec, Lemajic-Komazec, & Jovic, 2010).

Stveanovic et al. (2010) came to the conclusion that in almost two-thirds of the children, watchful waiting with a follow-up in three days would be appropriate and would reduce the antibiotic use greatly. However, they believe that this would only work if there is confidence between the provider and the parents and if the parents knew that the provider was available if the child were to become more ill. The outcome of this study, meaning more children did not require antibiotics, could be due to the fact that there was education provided upfront to the parents on when the correct time to use antibiotics is and what the side effects of antibiotic use are.

In the U.S., Finkelstein, Stile, Rifas-Shiman, and Goldman (2005) conducted a randomized study within 16 diverse communities in Massachusetts over a one month time period. The goal was to assess the physician's the use of "watchful waiting" and to determine if this was an acceptable option to the parents of young children. The study included 2054 parents and 160 physicians. The control group of parents and physicians did not receive educational interventions. The intervention group of parents and physicians received educational materials, attended community wide meetings with other physicians, and were offered feedback on current prescribing practices. The results demonstrated that the higher level of satisfaction with watchful

waiting was reported amongst the parents who had a higher level of education, more knowledge about antibiotics, and felt included in the medical decisions with their child. The providers with the higher level of satisfaction were the younger physicians who used this model more, physicians in the intervention group, and Family Practice physicians over Pediatricians.

Finkelstein et al. (2005) demonstrated in their study how individuals want to be included in the decision making process and to get them on board, it is critical to educate them on the subject at hand. It demonstrates the needs of parents and us as healthcare providers to understand this and try to empower them to be active in their family's health care needs. One disadvantage was that there was no follow up given to providers or parents within the study; this could have been an excellent time to take the opportunity to educate the parents and providers that did not receive all of the educational materials.

Optional Prescription

Siegel et al. (2003) conducted a random controlled study to determine whether parents in the US find safety-net antibiotic prescriptions (SNAP) along with analgesics for AOM acceptable and whether the use of antimicrobials could be decreased by its use. The sample consisted of 175 children with ages ranging from 1-12 years who lived in Kentucky, Indiana, or Ohio. Inclusions for the study were bulging TM on otoscopic exam and red TM with decreased mobility. Interestingly, they excluded any child with a fever. Parents were given educational material on AOM and a SNAP to use if the child's symptoms worsened or showed no improvement in 48 hours for the clinic visit.

Siegel et al. (2003) demonstrated in their results that the parents were very accepting of this type of option for their child. There were 120 parents out of 175 (69%) that did not fill the prescription at all and the other 55 parents filled the prescription within 48 hours because of unresolved fever or pain. The most significant finding was that 117 parents out of 120 (97.4%) stated that they would use analgesics only for the next AOM.

This was a small sample size for a study and a time frame in which it was conducted was not mentioned. Time frame could give a more favorable result because it would introduce more control in the study. The other factor to consider is that they excluded all children with a fever. Because fever may or may not be associated with AOM, by excluding it, the author is setting the study up for more favorable results. Children are more symptomatic with fevers, and so the sample may not be an ill group in which the symptoms may have resolved anyways (Siegel et. al, 2003).

Pshetizky, Naimer, and Shvartzman (2003) conducted a very small study but one that gives hope to providers that education could play a key role in the reduction of antibiotic use for AOM. The goal of their study was to assess see if providing education about the course of illness and antibiotic resistance to parents helped to persuade their ideas on antibiotic use. This study was conducted in Israel over a one year time frame and included 81 parents of children between the ages of 3 months to 4 years. The location of the study could be an arguable factor when trying to compare it to the US, however, their inclusions and exclusions were very similar to the studies in the US.

Pshetizky et al. (2003) noted two groups in this study. Both groups received a prescription for antibiotics however, one group received additional education as noted above and

the other group did not. The results demonstrated that in the group that was informed on the nature of the illness, only 37% of them filled the prescription. In comparison, the group that did not receive any education, 63% of them filled the prescription and over 77% of those actually started the antibiotic that day.

The authors continue to make observations throughout the article. When anyone is informed and can make a good decision based on education, they tend to be more conservative with treatments. If a person is not informed of the course of the illness, they tend to fear the worst and seek treatment to prevent what is statistically rare in findings (Pshetizky, Naimer, & Shvartzman, 2003).

Little et al. (2001) conducted an open random control trial (RCT) with 315 children ages 6 months-10 years living in England. The purpose of the study was to compare immediate to delayed prescribing of antibiotics for AOM. AOM inclusions were defined as having otalgia and acute inflammation of the tympanic membrane, which was characterized by bulging, perforation, or dull or cloudiness and erythema. One group was given the antibiotic to start immediately while the other group was instructed to give the symptoms a few more days, and if there was not improvement, then to start the antibiotics. Intervention for follow up for these patients was three days. On average, children that were not treated with antibiotics had symptoms that resolved on their own within the three days. The children that received the immediate treatment of antibiotics had their symptoms dissipated within two days of treatment however benefit came after 24 hours. Many times symptoms usually start to resolve anyways after that first day, therefore it opens up the thought that those children could have forgone the antibiotic and given it more time.

An interesting concept was demonstrated with this study in that the researchers thought that when children are always treated with antibiotics for AOM, it introduces what they call "cyclic behavior" by parents. This behavior has been noted in many other research articles but having a name attached to it has not been noted (Little et al., 2001).

Provider Challenges

Even though we are attempting to reduce the use of antibiotics through education, we also need to direct our attention to the provider side of this issue. Among the challenges of accurately diagnosing AOM or any other ear condition comes the skill set that is needed. Providers' assessments differ throughout the medical field and this can be confusing to the patient and/or parents if information is not always consistent. The amount of otoscopic training offered to the providers during their schooling is minimal, which can cause overprescribing due to uncertainty. Between the years of 2004-2005, Kaleida et al. (2009) conducted a study where the authors developed a program in which an online training module (Enhanced Proficiency in Otitis Media (ePROM), and test (Diagnostic Ear Assessment Resource) were created that included otoscopic images, mnemonic guides, and sessions for feedback once the session was completed by the participant.

These tests were given to 109 second year postgraduate residents (PGY2) and 102 first year postgraduate students (PGY1) from six U.S. residency programs. The PGY2 students were only given the test without any instruction. The PGY1 students were given the test, informed of their scores, given access to the Enhanced Proficiency in Otitis Media (ePROM) module to work on their skills, and then offered the test again at the end of the year. The PGY1 group that had access to the ePROM diagnosed more cases of AOM correctly (67%) than did the PGY2 group

(62%). It also showed that initially the PGY1 students scored 55% in correct diagnoses but after reviewing the module and taking the test again, their scores increased to 67% (Kaleida et al., 2009).

This study was limited by the small number of participants. Another limitation that they noted in the study was that "demonstration of the ability to identify findings correctly on the Internet-based test does not guarantee that that ability will be transferred to the clinical setting" (Kaleida et al., 2009, e719).

The link to the ePROM was provided and I signed up and was able to review the training module and test. The first time I took the skills test to diagnose otoscopic images as either being AOM, OME, or no effusion, I scored 43%. I completed the training module and came back to the test and my scores came up to 71% because I was given the educational tools to work through the cases that I did not have prior (Kaleida et al., 2009).

Steinmann and Babl (2006) audited medical records of 306 children diagnosed with AOM in which 14% were less than one year of age, 23% were 1-2 years of age, and 63% were over two years old. Of the 306 children, 169 were male and 137 were female. The retrospective study took place in Australia in the Emergency Department (ED) of a large urban pediatric hospital and was researched to determine the prescribing rates for antibiotics in the pediatric ED. The study divided the physicians into three groups; senior physicians, middle grade physicians, and junior physicians and it was not specified what symptoms quantified as AOM but results demonstrated that the senior physicians (77%) were more likely to prescribe antibiotics over middle grade physicians (68%) and over junior physicians (62%). The difference in prescribing behaviors may go back to when the senior physician was trained or that he evaluates more of the

sicker children and hence prescribes more antibiotics. On the other hand, the junior physicians could have adapted more easily to the new guidelines since being so fresh in the profession. The overall conclusion of this study found that the rate is higher for prescribing antibiotics to children with AOM in the ED department however it is felt that more research should be conducted on the way the physicians prescribe in that setting.

Risk versus Benefit

Treatment for AOM needs to be investigated economically also. Not only do we want children to feel better sooner, we also want to make sure that how we are treating them is cost effective. CoCo (2007) studied the cost effectiveness to multiple pathways of treating AOM and also presented data demonstrating the differences in treatment within the Netherlands and the United States. His study consisted of strategies to manage AOM which are watchful waiting, delayed prescription, treating immediately with Amoxicillin. In his study, watchful waiting and delayed prescription both involved a period of 72 hours in which one waited to see if symptoms would spontaneously resolve before considering antibiotic therapy. He also looked further into the societal costs incurred during a possible episode of AOM. These costs were from the time that parents missed work or what was spent on transportation or OTC medications.

CoCo (2007) conducted a study within a very short time frame of 30 days but it gave new information. The children were from 6 months to 12 years of age and the specific outcomes evaluated were resolution of ear pain and fever, along with clinical failure by means of the child still exhibiting AOM symptoms within the 72 hour time frame or while receiving antibiotics such as Amoxicillin. Interesting to note, watchful waiting and delayed prescription are common in the

Netherlands whereas in the US antibiotics are the norm for treating AOM. This study pointed out some very intriguing numbers to keep ones eye on.

CoCo (2007) found that in the first category of watchful waiting in the Netherlands, over 20% of parents did not seek medical treatment for their child, which had a clinical failure rate of 7%. The clinical failure rate is defined as the three day window used to observe if symptoms resolve on own and if it doesn't, then treatment will be started. The other 80% of parents did seek treatment for their child where at the time they were instructed to return to the clinic if symptoms did not resolve within three day; the clinical failure rate was 17% and those children were then treated with 7-10 days of amoxicillin for complete resolution of symptoms.

CoCo (2007) found that in the second category of delayed prescription still in the Netherlands, 37% of parents did not seek medical treatment for their child where again a clinical failure rate of 7% was noted. The other 63% of parents sought medical treatment and were told to come back to the clinic in three days and a prescription would be waiting for them if the symptoms had not resolved. The clinical failure rate for this was 24% and all symptoms were resolved with the 7-10 days of amoxicillin.

Third, in the United States where antibiotics are routine, only 6% of parents did not seek medical treatment with a 7% clinical failure rate in which symptoms resolved after 7-10 days of amoxicillin. Alternatively, 94% of parents sought medical treatment and received amoxicillin for 7-10 days. This came with a 6% clinical failure rate and therefore these children were then given Augmentin to take for 10 days for resolution of symptoms (Coco, 2007).

The end result found that treating a child with 7-10 days of Amoxicillin was the most effective way to manage AOM but, delayed prescription cost the least. However, the author further states that there is a considerable cost attached to routinely treating these patients with Amoxicillin, which actually only reduces symptoms by a few hours. Coco estimates that each prescription costs around $23.00 and last year there were over 25 million cases of AOM that would increase health care expenditures a whopping $575 million annually when compared to utilizing the concept of delayed prescriptions. He also pointed out additional figures that talk about non-medical costs associated with AOM such as how families lose about 5.6 hours of work and spend an additional $13.00 on non-medical costs per one episode of AOM (Coco, 2007).

This study clearly showed us how we differ in the United States versus other countries when it comes to simple illnesses. It has almost become so second nature for us that we need to stop and realize the benefits versus the risks to having our children treated every time they appear to have pain or be fussy. There are risks involved to these decisions, not to mention that the child has almost a 10% chance of experiencing gastrointestinal adverse effects that come with taking antibiotics (Coco, 2007). One common theme in all of the literature is the worst case scenario of mastoiditis if AOM is left untreated. However, that condition was much more prevalent over 10 years ago, and currently the percentage of children getting mastoiditis by not treating in ear infection is 0.004%.

Long Term Effects

A prospective three year follow-up study was done in The Netherlands from 1996-1998 however results were reported in 2000 and 2006. This was also a double blinded, randomized, and placebo controlled trial study that consisted of 168 parents of children ages 6 months to two

years (Bezakova, Damoiseaux, Hoes, Schilder, & Rovers, 2009). The objective of this study was to determine if there were any long term effects of treating AOM with antibiotics.

There were two groups involved in the study; an amoxicillin group and a placebo group. These children were followed extensively for six months and throughout the process, the parents were aware of the fact that they would be blinded until the end. Then in 2000, three and a half years later, a survey was sent to those parents to evaluate their children for recurrence of AOM symptoms and any referrals to ears, nose, and throat surgery. The results of this study were impressive. It was concluded that AOM reoccurred in 63% of the children that were in the amoxicillin group compared to 43% in the placebo group. It also showed that 21% of the amoxicillin group and 30% of the placebo group were referred to ENT (Bezakova et al., 2009).

What this study adds to the current literature on AOM is that by over treating this condition, we can increase the episodes of attack. There may be some resistance developing and because the study did not have confirmation of resolution of symptoms in these children, maybe the ear infection didn't resolve after the first course of antibiotics.

Discussion

There were common themes throughout the literature that was reviewed to complete this project. First, it was advised that all children under six months of age and those between 6 months to two years of age who are ill-appearing and the exam is uncertain, should be treated with antibiotics to prevent complications. The main complication spoken of was mastoiditis. Mastoiditis was once noted to be a cause of mortality in children until antibiotics were developed. Now, it is extremely rare to see an untreated AOM become mastoiditis. In all other

children who do not appear ill, unless it is a classic case of a bulging, opaque, erythematous tympanic membrane then there are options outside of antibiotics.

Next, the process of 'watchful waiting' was introduced in the new guidelines put forth from the American Academy of Pediatrics. This is an option for those grey areas in medicine. It lets the parent know that the provider is not confident in their findings, but now can turn the control over to the parent to have them continue to observe the child for the next 48-72 hours since they know them best. Parents should be part of the shared decision making process compared to an active listener. When they are educated, they feel more confident in knowing what to do. However, if they are not sure, they may prematurely fill the prescription for the antibiotic and start it even though it was not warranted.

Using the SNAP is also a method to reduce the use of inappropriate antibiotics for conditions that will potentially resolve on their own. Many times the child is brought to the clinic on day one of the illness; most of the time this is too early and the infection process has not even started yet for symptoms to show. Frustration may occur because the parent expects an antibiotic but the provider believes what they are seeing in the visit could be a multitude of illnesses starting and does not want to treat anything blindly. Therefore, the provider writes a prescription to fill if the symptoms do not get better or worse in the next 48-72 hours. Parents are in control of the situation and can decide how the child's course of illness is going and will have a back-up plan which will prevent another visit for the same condition. Many parents are happy with this option because they can monitor the child without the frustration of taking another day off from work to bring the child back into the clinic.

Intervention

A PowerPoint was created and presented to a group of mothers with young children under the age of 12 years. In the presentation, my main goal was to educate mothers on ear infections to help with the frustration that this can cause in the parents and children. The presentation covered ear anatomy, risk factors for ear infections, diagnosing challenges, prevention, and treatment. After the presentation, many parents were grateful to have gained more knowledge on ear infections, the anatomy of the ear, and what their part is in getting the child through this illness.

The PowerPoint was very general but with enough information to not overwhelm parents. However, I found that once the parents understood the general message, they recognized familiar situations. There were more requests for me to talk through an ear exam so that the parents felt knowledgeable and could understand what the provider was seeing and then what was being conveyed to them. I did walk through an ear exam along with other questions that I might ask as a future provider to parents of a child with questionable AOM. The parents were also intrigued on how questions meshed and could finally understand the reasoning behind the questions and answers.

The topic of AOM can be used to identify nursing implications for practice. As a future Family Nurse Practitioner, it is important to establish a way of practice. A question to ask is "Am I going to follow evidence based research or practice from what I have seen and learned in your training?" Those can be two separate ways to practice. I lean more towards following the evidence but also utilizing my clinical experience to reinforce what the evidence is saying. In this topic of study, I would follow these recommendations. They are safe, will reduce

overprescribing, and will be playing a key role in drug resistance. The challenge will be if other providers in your office practice differently and have a common belief that every possible ear infection needs to be treated.

Education is a key component, for practitioners and for the parents. It is our obligation as providers to stay up on the latest literature review to be able to diagnose and manage conditions such as AOM. This can be accomplished by reading the current literature, attending conferences, or by round table meetings with other providers to see how they are practicing. Providers should also encourage their patients/parents to review information on conditions from reliable sources. This will provide a general base of knowledge in which they can build on if and when they or their children are ill.

Policies in health care are written for a reason, to keep patients safe. Nurse practitioners need to be aware of the variety of policies for a multitude of reasons. We need to know the policies within the health care system that we work in and the policies that the Board of Nursing has. Policies can also encompass guidelines that we must follow in treating our patients no matter what the condition is. There are many reputable sites on the internet that have guidelines such as the American Academy of Pediatrics, American Academy of Family Physicians, and even the National Guideline Clearinghouse. The guidelines are not exactly the same, but have common themes within themselves.

Further research is always indicated in health care because it is constantly evolving. The ears themselves, were first noted in 460-375BC by Hippocrates and infections back then were noted to 'be hot'. Now we call it AOM. In the ancient times, they also had the philosophy to treat often where we are getting away from that concept and going to a more conservative

approach (Pahor, 1992). As we can see with AOM, things can change and things can stay relatively the same throughout time but no matter what, it is important to stay current on research. Research will assist in continuing to provide the best care possible to our patients.

Summary/Conclusion

Effectively managing AOM can be a difficult process sometimes because of the circumstances that are in front of you in the clinic. I think that it is important as a nurse practitioner to have strong, evidence based background and strong clinical experience, which will help you to think through scenarios such as ear infections. I am also a firm believer in working with your patients, or parents in the matter of AOM. View parents as a partner during this time; they are the eyes and ears to the history that is given because we know that children are not always exhibiting the symptoms once they get into the clinic. Parents should be an active participant in the shared decision making for treating AOM. They should work together with the provider to ensure that the child is treated accurately and appropriately according to the illness.

I have found though that if there is ever a question in the diagnosis, talk things through with the parents. Open communication can build confidence and trust between the parents and the providers. Let the parents know of the uncertainty and together, develop a plan for the course of the illness that can be agreed upon. Providers will not know everything, but they are crucial resources for the parents in trying to get their child through another ear infection.

When evaluating everything that was detailed in this paper, the greatest learning experience for me was to come across the ePROM training module that I could access as a nurse practitioner student. This was a very valuable learning experience, one which other students would benefit greatly from it. I have forwarded the information onto other colleagues of mine

because that is what education is about; teaching what you know, being a resource for others, and sharing knowledge and experiences so that other can learn.

References

American Academy of Otolaryngology-Head and Neck Surgery. (2010). *Fact sheet: Ear infections and vaccines.* Retrieved from http://www.entnet.org/HealthInformation/earInfectionVaccines.cfm

American Academy of Pediatrics and American Academy of Family Physicians. (2004). Diagnosis and management of acute otitis media. *Pediatrics, 13*(5), 1451-1465.

Bezakova, N., Damoiseaux, R. A. M. J., Hoes, A. W., Schilder, A. G. M., & Rovers, M. M. (2009). Recurrence up to 3.5 years after antibiotic treatment of acute otitis media in very young Dutch children: Survey of trial participants. *British Medical Journal, 339*(7712), b2525.

Chikotas, N. E. (2008). Theoretical links: Supporting the use of problem-based learning in the education of Nurse Practitioners. *Nursing Education Prospectives, 29*(6), 359-362.

Coco, Andrew. (2007). Cost-effectiveness analysis of treatment options for acute otitis media. *Annals of Family Medicine, 5*(1), 29-37.

Coco, A., Vernacchio, L., & Anderson, A. (2010). Management of acute otitis media after publication of the 2004 AAP and AAFP clinical practice guideline. *Pediatrics, 125*(2), 214-220. doi: 10.1054/peds.2009-1115

Finkelstein, J. A., Stille, C. J., Rifas-Shiman, S. L., & Goldmann, D. (2005). Watchful waiting for acute otitis media: Are parents and physicians ready? *Pediatrics, 115*(6), 1466-1473. doi: 10.1542/peds.2004-1473

Kaleida, P. H., Ploof, D. L., Kurs-Lasky, M., Shaikh, N., Colborn, D. K., Haralam, M. A., Ray, S., Kearney, D., Paradise, J. L., & Hoberman, A. (2009). Mastering diagnostic skills: Enhancing proficiency in otitis media, a model for diagnostic skills training. *Pediatrics 124*(4), e714-e720. doi:10.1054/peds.2008-2838

Laine, M. K., Tahtinen, P.A., Ruuskanen, O., Huovinen, P., & Ruohola, A. (2010). Symptoms or symptom based scores cannot predict acute otitis media at otitis-prone age. *Pediatrics, 125*(5), e1154-e1161.

Lieberthal, A. S., Ganiats, T. G., Cox, E. O., Culpepper, L., Mahoney, M., Miller, D., Runyan, D. K., . . .Wald, E. (2004). Diagnosis and management of acute otitis media. *Pediatrics,113*(5 part 1), 1451-1465.

Little, P., Gould, C., Williamson, I., Moore, M., Warner, G., & Dunleavey. (2001). Pragmatic randomized controlled trial of two prescribing strategies for childhood acute otitis media. *British Medical Journal, 322*, 336-342.

Marchisio, P., Bellussi, L., Di Maura, G., Doria, M., Felisati, G., Longhi, R., . . . Principi, N. (2010). Acute otitis media: From diagnosis to prevention. Summary of the Italian guideline. *International Journal of Pediatric Otorhinolaryngology, 74*, 1209-1216. doi: 10.1016/j.ijporl.2010.08.016

Mateo, M. A., & Kirchhoff, K. T. (2009). *Research for advanced practice nurses: From evidence to practice.* New York, NY: Springer Publishing Company.

Montgomery, D. (2005). A new approach to treating acute otitis media. *Journal of Pediatric Health Care, 19*, 50-52. doi: 10.1016/j.pedhc.2004.10.005

Pahor, A. L. (1992). Ear, nose and throat in ancient Egypt. *The Journal of Laryngology and Otology, 106*, 677-687.

Porth, C. M. & Matfin, G. (2009). Disorders of hearing and vestibular function. In H. Surrena, H. Kogut, & D. Schiff (Eds.), *Pathophysiology: Concepts of altered health states* (pp. 1427-1448). Philadelphia, PA: Lippincott Williams & Wilkins.

Pshetiky, Y., Naimer, S., & Shvartzman, P. (2003). Acute otitis media-A brief explanation to parents and antibiotic use. *Family Practice, 20*(4), 417-419.

Shah, R. K., & Blevins, N. H. (2003). Otalgia. *Otolarynologic Clinics of North America, 36*(6), 1137-1151.

Shaikh, N., Kearney, D. H., Colborn, D. K., Balantine, T., Feng, W., Lin, Y., & Hoberman, A. (2010). How do parents of preverbal children with acute otitis media determine how much ear pain their child is having? *The Journal of Pain, 11*(12), 1291-1294. doi:10.1016/j.jpain.2010.03.017

Siegel, R. M., Kiely, M., Bien, J. P., Joseph, E. C., Davis, J. B., Mendel, S. G., . . . DeWitt, T. G. (2003). Treatment of otitis media with observation and a safety-net antibiotic prescription. *Pediatrics, 112*(3), 527-531.

Spiro, D. M., Tay, K. Y., Arnold, D. H., Dziura, J. D., Baker, M. D., & Shapiro, E. D. (2006). Wait-and-see prescription for the treatment of acute otitis media. *Journal of American Medical Association, 296(*10), 1235-1241.

Steinmann, K. & Babl, F. E. (2006). Antibiotic prescribing rates for acute otitis media in a pediatric emergency department. *Journal of Paediatrics and Child Health, 42*, 204-205.

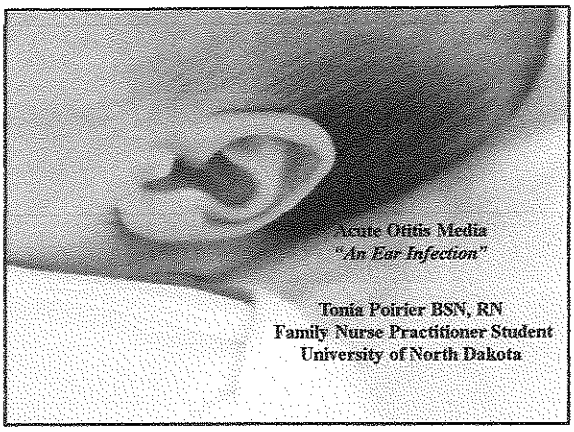
Stveanovic, T., Komazec, Z., Lemajic-Komazec, S., & Jovic, R. (2010). Acute otitis media: To follow-up or treat? *International Journal of Pediatric Otorhinolaryngology, 74*, 930-993. doi: 10.1016/j.ijporl.2010.05.017

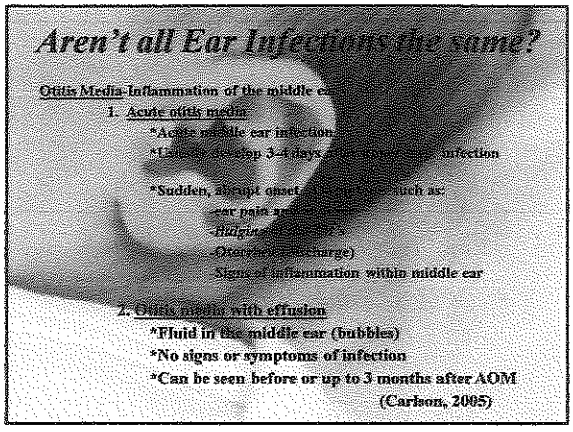
The Cochrane Collaboration. (2010). *Cochrane Reviews.* Retrieved from http://www.cochrane.org.ezproxy.undmedlibrary.org/cochrane-reviews

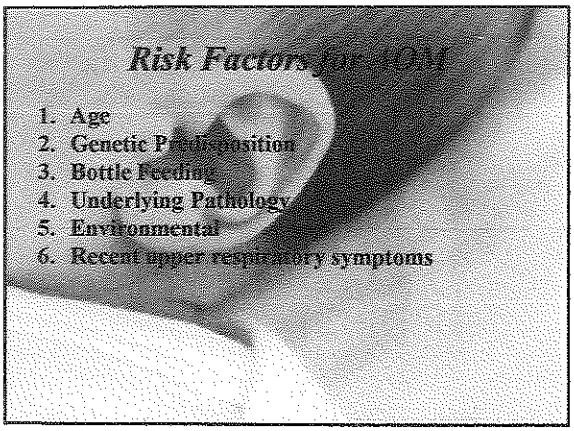
Varrasso, D. A. (2006). Otitis media: The need for a new paradigm in medical education. *Pediatrics, 118*(4), 1731-1733. doi: 10.1542/peds.2005-2794

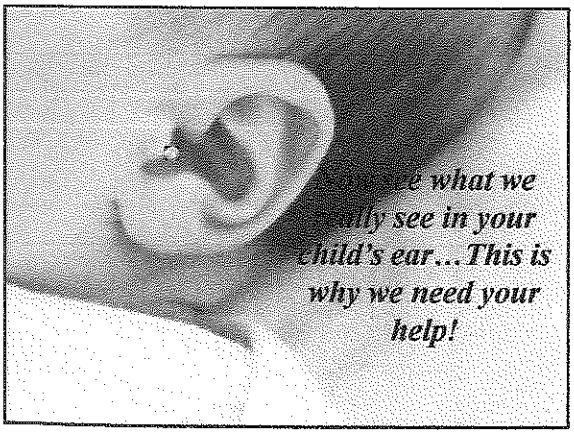
Wilson, S. A. & Mayo, H. (2003). Are tympanostomy tubes indicated for recurrent acute otitis media? *Journal of Family Practice, 52*(5), 403-406.

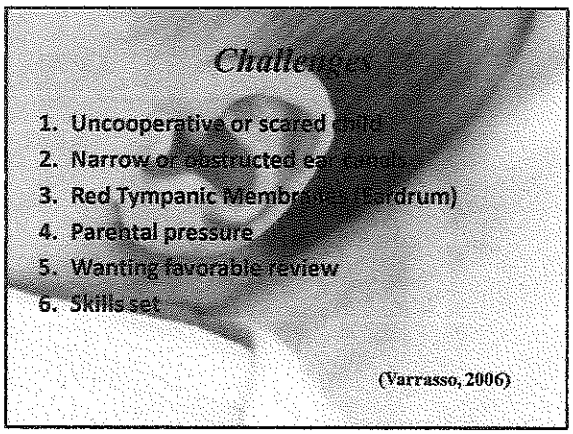
Appendices: PowerPoint Presentation











Appendices: PowerPoint Presentation