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Summarized Guidelines Aid Providers in Caring for Patients with Otitis Media with Effusion

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Summarized Guidelines Aid Providers in Caring for Patients with Otitis Media with Effusion

A Capstone Scholarly Project Presented By:

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Abstract

Otitis media with effusion (OME) is a disorder that can cause hearing loss in children, which can lead to speech and language delay. There are recommendations within the OME guideline and primary care providers are aware of these guidelines but do not follow them. For this project a suburban outpatient pediatric medical practice with 8 providers (4 MD's and 4 NP's) was studied. The 8 providers were educated and presented with an algorithm, designed by the author, organizing the OME recommendations in a flowchart. Over a 2-month period, providers referred to the algorithm and used the recommendations in practice. Then 3 interviews were completed, and providers' answers were analyzed. There was an 87% approval rating by providers using the recommendations in practice and referring to the algorithm. Providers acknowledged that being educated on the OME guideline and using the algorithm in practice improved management of patients with OME. Educating providers on the OME guideline recommendations and supplying them with the recommendations organized in an algorithm maintains consistency and efficiency when treating patients with OME.

Background

The first year of life represents the most crucial time in the growth and development of a child. The first year also represents the time when the child is most susceptible to common illness. Mandel and Casselbrant (2006) reported that otitis media is the most common disorder for which children and their families seek medical attention, next to the common cold. According to the American Academy of Family Physicians (AAFP) (2004), otitis media with effusion (OME) is the most common form of otitis media and is classified as the occurrence of middle ear fluid without any sign of an infection. Otitis media with effusion is the presence of fluid in the middle ear with no sign of infection (AAFP, 2004). Mann and Albenburg (2009) explained that OME will result either from an episode of otitis media (infection), or from poor functioning of the eustachian tube. Otitis media with effusion is an issue in children of all ages.

One of the major issues with treating and diagnosing OME is that it can present with almost no symptoms. Klein and Pelton (2010) reported that a random survey of healthy children found the presence of middle ear effusion in the absence of symptoms in over 50% of patients diagnosed with OME. According to the AAFP (2004), even after 14 days of successful antibiotic treatment of an acute ear infection, 70% of children without active infection still had fluid (effusion) in the middle ear. Fluid lasting more than 3 months is considered chronic. A 1998 multicenter study performed by Marchisio et al. evaluated the frequency and duration of OME in Italian children during a two-winter term. There were 3,413 children between the ages of 5 and 7 years who were examined for middle ear effusion by means of pneumatic otoscopy. Over the designated period, 14% of the children were diagnosed with OME with no difference with regards to sex, age, or geographic area. After a 12-week period, it was determined that over 25% of children with OME still had middle ear fluid. This is a significant statistic showing that

children diagnosed with OME should be closely monitored for the presence of chronic effusion. Chronic middle ear effusion is of clinical significance because it decreases the mobility of the tympanic membrane, which may lead to hearing loss in children (Finitzo, Gunnarson, & Clark, 1990). This hearing deficiency can cause speech, language, and developmental delay, which may place the child at a psychosocial and education disadvantage (Mann & Albenberg, 2009).

Problem Statement

According to the American Academy of Pediatrics (AAP) (2004) there is a high prevalence rate of OME in young children, a 15% to 40% point prevalence of middle-ear effusion in children from birth to 5 years. There are approximately 2 million episodes of OME diagnosed annually in the United States; producing an approximate cost of over \$4 billion (AAFP, 2004). Using Issel's (2004) model for problem definition, the problem is defined as the increased frequency of speech delay and hearing loss in children between 1 and 4 years diagnosed with OME. The high prevalence and cost of treating OME, the difficulty in diagnosing and evaluating the duration of OME, the increased risk of conductive hearing loss, the potential impact on language and cognition from chronic middle ear effusion, and the drastic variation in follow-up and treating the condition makes this an extremely pertinent topic of discussion (AAFP, 2004).

Evidence of Problem Demonstrated in Literature

The first years of life have a direct impact on a child's physical, mental, and emotional growth. Children progress in their development at an amazingly fast pace and show rapid advances in their language development. Thompson (2001) explained that a 3 year old is already putting words together into logical sentences, mastering grammatical rules, and experiencing a significant rate of vocabulary building. By the time a child reaches the age of 6, the child can

have a vocabulary of over 10,000 words. Verbal communication enables children to express their ideas and concepts into words that they can share with others.

Shriberg, Friel-Patti, Flipsen, and Brown (2000) investigated the role of OME in a child's development with a goal of specifically evaluating the risk for lowered speech and language outcomes associated with early recurrent OME, with and without hearing loss. Families from a private pediatric practice in Dallas, Texas who had children meeting the "healthy" child criteria (full term gestation, age > 37 weeks, normal newborn assessment, and no neurological or serious physical defects) were asked to participate in the study at their 3-month well-child visit. All participants who agreed were enrolled before their 6-month well-child evaluation. A total of 256 boys (53%) and 227 girls (47%) were followed from 6 months to 3 years of age. The study consisted of a subsample of 70 children from the 483 participants identified by two inclusionary criteria: all records were available with appropriate compliance, and there was a clear and spontaneous language sample obtained at 3 years. Results indicated that OME and related hearing loss increased risk for lowered speech–language outcomes at 3 years of age.

The early years of a child's life mark an especially critical time when hearing becomes one of the most valuable parts of their social, emotional, and cognitive development. When a child experiences any shortfall in his or her ability to hear, the ability to communicate and comprehend may suffer. A 2006 review by Gravel et al. examined the effect of conductive hearing loss secondary to OME in the first 3 years of life. Participants included 73 children from an elementary school in North Carolina and 59 children from an elementary school in New York. These children had repeated documentation of their middle ear function and their hearing sensitivity beginning in infancy until school age (7-39 months). Middle ear function was determined either by pneumatic otoscopy, tympanometry, or a combination of both, by a

validated pediatric nurse practitioner. Hearing thresholds were measured using either sound field reinforcement audiometry or ear-specific conditioned play audiometry by an experienced audiologist. The number of hearing evaluations was based on the number of times the child changed middle ear status. Composite scores for the tests examining auditory processes completed at the end of the second grade were created, and six different multivariable analyses were conducted. Results of various auditory measures were collected when children were about 8 years of age (end of second grade). The results showed that early hearing loss coupled with the OME history, show reduced hearing sensitivity at school age. This study shows that a complete history and close follow-up will allow providers to identify when a child may need a hearing evaluation. Early detection of hear loss in children with OME will help limit sequelae.

Diagnosing OME

Diagnosing middle ear pathologies and accurately distinguishing between OME and AOM is especially difficult in children. Acute otitis media (AOM) is defined as signs of middle-ear inflammation with associated symptoms, and the presence of middle-ear effusion. However, appropriate training and careful otoscope practice can help make the correct diagnosis and in turn reduce the number of unnecessary antibiotic prescriptions (Jones, Kaleida, & Lopreiato, 2004). Takata et al. (2003) explained that studies have shown that pneumatic otoscopy and professional tympanometry had the highest sensitivity for evaluating the elasticity of the tympanic membrane and appropriately making an OME diagnosis.

According to a paper by Bredfeldt (1991), the *tympanogram* is a purposeful measurement of middle ear fluid or eustachian tube dysfunction. It is an electronic and acoustic measurement practice to assess middle ear status. Tympanometry provides information about the flexibility of the middle ear and tympanic membrane, the pressure within the middle ear, and the capacity of

the external ear canal (Bredfeldt, 1991). *Pneumatic otoscopy* is a clinical assessment accomplished by using a *pneumatic otoscope*, which is an otoscope with a flexible plastic tube and a rubber bulb connected to the otoscope head. Jones and Kaleida (2003) added that for pneumatic otoscopy after the seal is obtained with the otoscope, a small puff of air is inserted into the canal, and the provider can see the response, to determine middle ear status. Pneumatic otoscopy combined with tympanometry is an objective, fast, and highly accurate way to rule out outer and middle ear pathology.

Otolaryngologists, experts in the field of pneumatic otoscopy, have stressed the importance of assessing the mobility of the tympanic membrane (TM) along with the color, translucency, and position (Jones & Kleida, 2003). Even though there is a strong desire by specialists to have providers perform this assessment, there is evidence that many providers who care for children do not perform pneumatic otoscopy, even if a child has a history of middle ear disease (Jones & Kleida, 2003). Takata et al. (2003) performed a meta-analysis on the accuracy of methods available to diagnose middle ear effusion in children. The study reviewed over 400 articles, and concluded that pneumatic otoscopy has nearly a 70% accuracy rating and is a cost-effective method for diagnosing middle ear effusion (MEE) in children. Among the eight diagnostic methods of assessing for MEE, pneumatic otoscopy and professional tympanometry had the highest sensitivity compared among other options, such as acoustic reflectometry and portable tympanometry. The major disadvantage of pneumatic otoscopy is the occasional difficulty of creating a positive seal, which may produce skewed results. Research by Takata et al. (2003) showed that performing tympanograms is as effective as using pneumatic otoscopy in practice and requires less training. Jones and Kleida (2003) also supported the premise in their study that investigated otoscopic accuracy within a group of 40 clinicians. The objective of this

study was to assess whether pneumatic otoscopy actually improved accuracy of diagnosing MEE. The study showed that accurate identification of both the presence and absence of MEE improved after pneumatic assessment of TM mobility.

To diagnose OME, two of the four clinical findings are required: a decreased or absent mobility, yellow or white discoloration of the TM, opacified tympanic membrane, and/or visible air-fluid interfaces. As a result, good visualization of the tympanic membrane through appropriate otoscope practice, and a proper seal with pneumatic otoscopy or tympanograms testing will improve the accuracy of diagnosis of OME (AAP, 2004).

The Clinical Guideline

Otitis media (OM) is an extremely common diagnosis; as a result, the World Health Organization has designated the development of OM management skills a priority for primary care (Lee, Flowerdew, & Delaney, 2009). In 1994, the US Agency for Healthcare Policy and Research developed a clinical practice guideline for management and treatment of OME in young children (Mandel & Casselbrant, 2006). The process of developing the guideline took more than 3 years to accomplish. Callender (1999) explained that the slow progression was because middle ear disease is a multifaceted issue, and designing a document on which practitioners could rely took time and careful planning. This guideline focused on children between 1 and 3 years of age without craniofacial or neurological abnormality. Rosenfeld et al. (2004) clarified that OME and the risk of associated hearing loss was much greater among children with craniofacial or neurologic abnormalities, sensory deficits, or other medical illness; as a result, these children were excluded from the guideline recommendations.

The clinical practice guideline designed by the multidisciplinary team in 2004 provides an evidence-based direction on the diagnosis and management of OME. According to the AAFP

(2004), these criteria included children between 2 months and 12 years of age who may or may not have developmental disabilities or any condition that may predispose the child to OME and its sequelae. The medical interventions in the guidelines included documenting the onset and duration of the effusion, and direct observation; the surgical interventions studied included myringotomy with insertion of tympanostomy tubes, adenoidectomy, and tonsillectomy (AAP, 2004). Rosenfeld et al. (2004) explained that the guideline included both short- and long-term outcomes. The short-term outcomes centered on resolving the effusion and restoring hearing; the long-term outcomes focused on hearing and hearing-related development of speech, language, and cognition. The authors stated that they intended the guidelines for use by providers who care for children; this includes primary care clinicians and specialty care providers in the field.

In 2005 Wollersheim, Burgers, and Grol argued that clinical guidelines may improve patient care by providing easily accessible information regarding optimal care. The research findings in the guidelines help clinicians formulate decisions quickly and consistently. Using the guidelines will increase the efficiency of care, provide high-quality care based on the evidence, and ultimately improve patient outcomes. There are many studies involving the diagnosis, treatment, and prevention of OME but remarkably few focused on management, compliance, and success of treatment.

According to the AAP (2004) guidelines, when OME had been present for 12 weeks, observation is advised in 3-month intervals until resolution of the effusion. During this time, the child's hearing must be evaluated, and if there is a concern of significant structural issues with the tympanic membrane or any significant hearing deficit, a formal hearing assessment and referral to an otolaryngologist is recommended. Families and other caregivers needed current, clear, and concise information in order to make decisions about their child's medical

management. Shriberg et al. (2000) explained that early diagnosis of OME in children who were diagnosed with hearing loss had better outcomes with speech delay than those who were not diagnosed early.

Guideline Adherence

Guidelines are evidence-based recommendations that are not intended to take precedence over professional judgment, but they may be viewed as a limitation on an individual's decision-making freedom (Rosenfeld et al., 2004). The intention is for a provider to follow the strategy based on the provider's knowledge, acceptance, and view of the guidelines. Kalu and Hall (2010) evaluated clinician compliance with the 2004 AAP OME guidelines. This was a retrospective chart review of 363 children between 2 months and 12 years diagnosed with OME. The providers completed an electronic survey to evaluate awareness and knowledge of the guidelines. The results showed that providers had poor knowledge of the guidelines and a majority of the time failed to follow the recommendations. Even with the recommendations in the 2004 OME guidelines, providers were not documenting the laterality of the effusion, duration of effusion, and presence and severity of associated symptoms at each assessment (AAP, 2004).

Guidelines represent the best evidenced-based findings from a team of experts in the field, addressing the scientific support for a specialized topic (Rosenfeld et al., 2004). In a 2009 study, Lee et al. used a prospective cohort design to perform a study measuring the knowledge level of family physicians from Nova Scotia, assessing the awareness of the OME guidelines in respect to risk factors, signs and symptoms, and treatment. In doing so, they discovered that the 25 physicians (convenience sample) showed that their comprehensive knowledge of the guideline was excellent. This supports Mann and Aldenberg's (2009) claim that if provided with

a suitable management plan and appropriate review of the guideline, it can be assumed that the provider knowledge of the evidence would allow for proper guideline adherence.

Deborah Callender (1999) agreed that the literature available over the past decade has proven that there has been far more attention placed on designing the guidelines than there has been on implementing the guidelines into practice. In 1999, Shaneyfelt, Mayo-Smith, and Rothwangl studied whether practice guidelines in peer-review medical literature followed the established standards. A systematic review of 279 clinical practice guidelines, published in the peer-reviewed literature between 1985 and 1997, produced by 69 different developers was completed. The study revealed that only 51% of guidelines adhered to recommendations on development and format methodology, 34% used appropriate identification and summary of evidence, and 46% formulated recommendations appropriately. An additional aspect of the study was that research found that longer guidelines were more likely not to be followed due to time constraints and the complexity of the recommendations, while shorter guidelines had a higher rate of compliance.

Implementation of Guidelines in Practice

Guidelines have been around for 50 years in the field of pediatrics. Callender (1999) stated that practice guidelines must be based on scientific evidence and a rigorous development process. The AAP (2004) explained that careful planning in the development of clinical practice guidelines defines the evidence-based approach to recognize the problem and identify the interventions. The clinical guidelines for OME were designed in 1994 and updated in 2004 by the American Academy of Family Physicians (AAFP), AAP subcommittee on otitis media with effusion, and the American Academy of Otolaryngology-Head and Neck Surgery. This is an efficient tool that can aid in the consistency of diagnosing and managing of children with middle

ear disease. This literature review showed that although the guidelines are extremely well written and supported by the community, they are not being used appropriately.

It is important to remain consistent in the management of children diagnosed with OME. Children may at times see providers other than the provider who originally diagnosed OME. Properly documenting the laterality and duration of the effusion and discussing presence and severity of associated symptoms as well as thoroughly explaining the specific treatment plan is vital to maintaining consistency. Following the OME guidelines gives the provider evidence-based recommendations that are medically effective in reducing morbidity or mortality, and also allows providers to be consistent throughout the duration of management of OME.

Schoem and Choi (2010) explained that the pediatric community applauded the OME guidelines when they were updated in 2004. However, Schoem and Choi also determined that years after the arrival of the guidelines, consistency in diagnosis and management of OME did not exist. Even though there was significant interest in the early stages, OME clinical practice guidelines had a modest effect on changing provider's behaviors in patient care. According to Callender (1999), a majority of healthcare professionals were unaware of the latest evidence-based guidance, and had a difficult time adapting their practice. Providers need to be motivated, and one way to do this is to identify the differences in current practice compared to those of the recommendations in the guidelines. Pediatric health care professionals must be willing to incorporate the guidelines into their everyday practice; the consistency that the guidelines provide will help improve quality patient care. Callender (1999) went on to say that only after the guidelines are accepted can the practical strengths and weaknesses of the implementation be brought to light so that modifications and improvement can take place. Additional research must take place assessing whether strict adherence to the guidelines will help limit poor outcomes in

children diagnosed with OME. There were no studies identified that examined whether implementing the OME guidelines into practice would help improve patient outcomes. Further investigation into whether strict adherence of the OME guideline will help improve patient outcomes and whether providers see the benefits is needed.

The prevalence of OME, the importance of consistency with diagnosis and management of the condition, the significance of closely monitoring children with middle ear effusion, the negative impacts of chronic OME, and the cost of poorly managing OME have made it imperative for the OME guidelines to be implemented into practice (Schoem & Choi, 2010). It is vital for providers to be educated and instructed on how to properly use the guidelines, as well as to convince providers that following the guidelines will help limit poor outcomes in children diagnosed with OME. This performance improvement project examined whether educating, informing, and summarizing guideline recommendations into an algorithm (designed by the DNP candidate), which is then implemented into a pediatric medical practice, will help improve compliance with the OME guideline.

Theoretical Framework to Support Guideline Implementation

Aizen's (2006) theory of planned behavior, which is an extension of the theory of reasoned action, states that an individual will make a decision to perform a behavior based on the individual's intention. The theory examines and clarifies the connection between a person's thoughts, feelings, perceived control, intention, and situational behavior (Allison, 1991). Additionally, this theory indicates that a person's intentions are a strong predictor of his or her behavior; and the stronger the motivation is to accomplish a certain behavior, the higher the probability that the behavior will continue to improve in time (Williamson, 2009). According to the theory, if a person perceives the suggested behavior as positive; there is a higher intention to

complete the behavior (Allison, 2009). Williamson and Allison agreed that the intention to perform the behavior is influenced by the person's culture, beliefs, social pressure, and ability to carry out the action.

According to Aizen's (2006) theory an individual is directed by three considerations in decision making: beliefs about the likely outcomes and evaluations of the behavior, beliefs about the expectations of others to comply with these expectations, and beliefs that there are barriers that will affect the performance of the behavior. The relationship between the intentions of a provider to perform an action and his or her compliance with the guidelines is explained by this theory. In the theory of planned behavior the intention to perform the behavior is influenced by the person's culture, beliefs, social pressure, and the ability to carry out the action (see Figure 1).

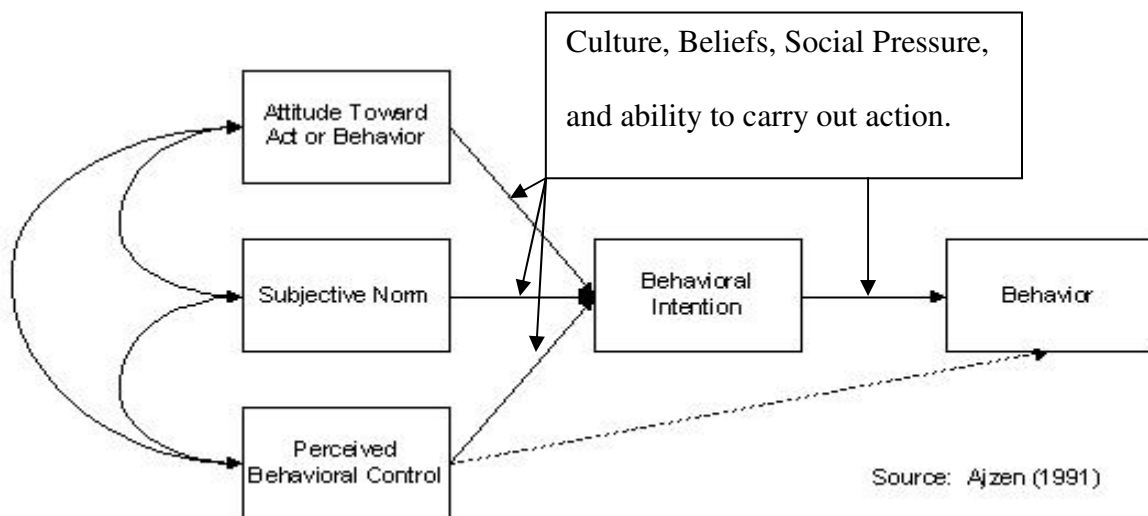


Figure 1. Theory of Planned Behavior. Adapted from "The theory of planned behavior," by Icek Ajzen, 1991, *Organizational Behavior and Human Decision Processes* 50(2), 179-211.

Rosenfeld et al. (2004) added to the theory that making suggestions about health practices involve a value judgment on the popularity of various outcomes associated with management

options. Wollersheim et al. (2005) stated that the intention of clinical guidelines is to advance the quality of care provided by translating new, evidenced-based research findings into practice.

The theory of planned behavior forms the basis of this project. The DNP candidate presented a positive promotional educational description of the OME guidelines. The recommendations were highlighted by focusing on how using these suggestions could positively improve the outcome of patients diagnosed with OME.

Organizational Analysis

Group Description

The clinical setting was chosen based on availability, location, and access. The project took place at a well-established suburban outpatient pediatric medical practice with two locations and 8 providers, 4 medical doctors (MD) and 4 nurse practitioners (NP) who provided care to a diverse population of clientele ages from birth to 21 years. A majority of the patients were from Springfield (inner city), East Longmeadow (suburban), Longmeadow (suburban), and Wilbraham (suburban), Massachusetts. The outpatient practice has over 10,000 active patients and over 30,000 patient encounters annually.

A discussion regarding performance improvement projects took place with providers of the pediatric practice in February 2011. One of the concerns that providers voiced was how practice guidelines could be incorporated into a busy pediatric practice. Providers acknowledged that they were familiar with the OME guidelines but were not using all of the recommendations in practice. A report was produced by the practice management system of the pediatric practice that showed that approximately 300 new patients diagnosed were diagnosed with OME annually. The providers of the pediatric practice agreed to a performance improvement project that would incorporate the OME guideline recommendations into practice.

Evidence of Stakeholders

The primary stakeholders for this evaluation project were based at the outpatient pediatric practice and included the following: patients of the outpatient pediatric practice, patients with middle ear effusion, patients diagnosed with OME, and providers and nurses of the pediatric medical practice. The providers of the pediatric outpatient practice consist of four board certified pediatricians and four nurse practitioners, made up of three pediatric nurse practitioners and one family nurse practitioner. The eight providers' participation in the project was an important measure in the success or failure of this performance improvement project. All eight providers agreed to be a part of this project and understood the importance of the results. (See the Key Stakeholders letter in Appendix A).

Resources, Facilitators, and Barriers

A verbal agreement was made among the practice, the providers, and the DNP candidate to use all resources available, including photocopies for the algorithm and OME guidelines and full access to providers during business hours. Constraints to the project included: the time needed to train the providers on specifics within the OME guidelines; time limits with reviewing the algorithm; providers' lack of awareness; providers' lack of knowledge of the OME guidelines; providers' time constraints; provider resistance to change; providers' culture, beliefs, and ability to carry out the recommendations; and the providers' workload.

Information regarding a provider's knowledge of the guidelines and prior beliefs was assessed to help promote the OME project and strengthen the learning experience. Providers were asked three questions (see Appendix B) to help the DNP candidate design the educational session around the providers' needs and wants, and to focus on the positive outcomes rather than the negative. The other goal of the meeting prior to the educational session was to decrease the

time needed to review the recommendations. The guidelines, due to their length, were summarized into an algorithm that providers can easily refer to throughout their busy workday. The algorithm (Appendix C) consists of a flowchart that specifically addresses the recommendations in the guidelines specific to the management of OME. In the process of formulating recommendations into a workable algorithm, a provider's usual habits and workflow patterns were taken into account. Applying the theory of planned behavior, practitioners will be more likely to follow the guidelines if they believe that the guidelines are likely to produce positive patient outcomes and if they see improvements in their performance.

Protocol and Plan

This performance improvement project used an evaluation design. Eight primary care providers from an outpatient pediatric practice in East Longmeadow were recruited to participate in the project. Four medical doctors and four nurse practitioners who were trained in pediatrics and working at least 20 hours per week in this field at the primary care practice were approached about participation. The DNP candidate conducted an individual educational training for each provider lasting approximately 30 minutes per provider. This method was chosen to allow for proper individualized training and work flow management. During the training, the DNP candidate provided a copy of the complete OME clinical practice guidelines for reference, a summary sheet listing the guideline recommendations in bullet points, a copy of the algorithm, as well as appropriate contact information for quick reference. Prior to the training, the providers were asked three questions (Appendix B) specific to the guidelines to get a baseline of the providers' knowledge of the OME guidelines and a focus for the education required. This allowed the training and presentation to be tailored to their needs. After 1 month, the providers participating were asked five questions to determine their progress and to identify any concerns

or comments that they had during the project (Appendix B). This process was done again at the end of the assessment to acquire the posttest questions, comments, and concerns of the project.

Methods

Eight providers were recruited and educated on the guidelines. Participation was voluntary and demonstrated by attending the education session and participating in the interviews. Each provider was individually educated on the OME clinical practice guidelines. The providers were also introduced to the recommendations and the algorithm, which took approximately 30 minutes per provider; this included discussion, questions, and answers. Descriptive statistics were used to evaluate the results to the yes and no questions of the completed interviews. A one-group pretest/posttest design was used to evaluate the education program and the effectiveness of the algorithm based on providers' use of the recommendations in practice. This design involved a single group that was pretested, exposed to an action, and then tested again. The success of the project was determined by comparing pretest and posttest data. Specifically, the DNP candidate was interested in finding out if exposing the providers to an algorithm summarizing the recommendations in the OME guidelines and educating them on the specifics within the guidelines impacted providers' actions to use the recommendations in practice. A dependent *t*-test statistical test was used to analyze data under this design. A dependent-samples *t*-test assesses whether the mean difference between paired observations are significantly different. That is, the dependent-samples *t*-test evaluated whether there was a difference between the means of the two variables (prior belief and knowledge of the guidelines, and education and use of OME algorithm).

Qualitative data was gathered from questions (Appendix B) asked during the one-on-one interviews. This helped the DNP candidate determine whether educating and summarizing the

guidelines into a workable algorithm was helpful in managing patients with OME, and if this method would be adopted for future use. This method was also helpful to identify obstacles and design a plan so that the obstacles could be overcome. Content analysis involving observational analysis and one-on-one interviews was used to identify common themes and recurrent situations. Post project evaluations identified participation, completion, and satisfaction as well as whether the changes occurred in the targeted behavior, using the algorithm.

Goals

The DNP candidate designed the algorithm (Appendix C). This algorithm consisted of recommendations from the OME guidelines formulated onto a flowchart. The goals of the OME project were to effectively educate on and communicate the OME guideline recommendations to the eight providers at the outpatient practice, and to provide an algorithm (Appendix C) that will allow the providers quick access to a summary of recommendations within the OME guidelines.

Objectives

There were three objectives of the OME project: first, determine the providers' educational needs of the OME guidelines, where their frustrations and concerns were with the OME guidelines, and a discussion specifics of the guidelines in an open forum; second, the successful implementation of an OME algorithm that would provide a summary of the OME guideline recommendations, which would aid providers in properly managing patients diagnosed with OME; and the final objective was to have providers refer to the OME algorithm (Appendix C) when evaluating patients diagnosed with OME to help properly diagnose and manage patients with OME appropriately, and to help improve outcomes in children with chronic MEE. Providers were asked five questions after 1 month and again 2 months after implementation. The questions in Appendix B were used to measure the third objective.

Outcome Expectations

Outcome expectations included the following: There would be 87% (7 out of 8 providers) participation in the study, there would be a 75% (6/8 providers) completion rate, which included 2 months of participation and three complete interviews, and 50% (4/8 providers) satisfaction rate with the implementation of the algorithm into practice (a dependent *t*-test statistical test would be used showing a positive *t*-value). Responses to the one-on-one interview would show that providers found that the use of the algorithm aided their diagnosis of OME and also helped direct care of the patient to decrease poor outcomes. Providers using the algorithm would find that following the guidelines was not time consuming, and they would find comfort in knowing that they were providing the highest quality of patient care possible.

Costs and Plan

Costs involved with this project are detailed below (Figure 2). The practice absorbed the majority of the costs. Those at the practice believed that because this would directly impact the care of patients of the practice that the benefits outweighed the cost. The total cost (absorbed by the practice) was \$74, including paper for printing the guidelines and algorithm and lunch for the providers during their training (Table 1). The DNP candidate absorbed the cost of designing the algorithm, educating the providers on the algorithm, implementing the project, observing providers using the algorithm, and disseminating the results.

Responsible Conduct of Research Translation

This ethical principles presented in the outpatient practice code guided the project. The evaluation design and the fact that this endeavor is a capstone performance improvement project using the standards of care intervention precluded the need to be reviewed by institutional review board (IRB). However, all patient information was protected according to IRB policies as well as

policies surrounding Health Insurance Portability and Accountability Act (HIPPA). Strict patient confidentiality was maintained, and all information gathered was aggregate, which protected the rights of the patients whose medical records were reviewed. The protection of data collected was maintained through a locked area within the practice.

Implementation

This project examined the beliefs about OME guidelines prior to and after providing education to determine the effectiveness, and evaluated the use of the algorithm in helping reduce poor patient outcomes with the OME diagnosis. Once the evaluation period was over, a formal algorithm (Appendix C), breaking down the guideline in a one page synopsis, was introduced to the providers. The algorithm organized the recommendations from the guidelines into a workable flowchart. The algorithm became a reference for providers when they saw patients diagnosed with OME. Using the algorithm was showed to improve continuity of care of patients with OME and helped reduce poor outcomes in these patients.

The AAP, the AAFP, and the American Academy of Otolaryngology-Head and Neck Surgery designed the OME guidelines. The purpose of these guidelines is to inform clinicians of evidence-based methods to identify, monitor, and manage OME in children ages 2 months through 12 years (AAFP, 2004). The algorithm is a synopsis of the management recommendations and includes the following recommendations: (a) documentation of the duration of effusion, and presence and severity of associated symptoms at each visit; (b) after diagnosis, children at risk for speech, language, or learning problems are immediately referred to ear, nose, and throat (ENT); (c) children with persistent OME lasting longer than 3 months are diagnosed as having chronic OME; (d) children who are not at risk are monitored for 3 months at 1-month intervals or are reassessed 3 months from the date of effusion onset; (e) hearing testing

is conducted when OME persists for 3 months or longer, or at any time that language delay, learning problems, or a significant hearing loss is suspected in a child with OME; (f) if a child is diagnosed with chronic OME and has one failed hearing screen or is documented to be at risk for speech, language, or learning problems, the child is referred immediately to ENT; and (g) children with chronic OME who are not at risk and have not had failed a hearing screens are reexamined at 3- to 6-month intervals until the effusion is no longer present, significant hearing loss is identified, or structural abnormalities of the eardrum or middle ear are suspected (AAP, 2004). The guidelines and the algorithm (Appendix C) were introduced to providers, and appropriate education was completed. Circulating the guidelines to the eight providers, including training all providers about how and why to use the guidelines, was essential. The eight providers received education on the OME guidelines privately and were instructed on using the algorithm by February 1, 2012.

The providers were asked a series of five questions at two points, after one month and at the end of the assessment. These questions measured the objectives of the project. The questions allowed the researcher to gain an understanding of what the providers liked and did not about the guidelines and to examine whether implementing the algorithm eliminated some of the obstacles to use of the guidelines and to acknowledge whether the guidelines were actually used in practice. The final questions were designed explain whether the providers used the guidelines as instructed and if there were any unforeseen issues with the implementation.

Timeline

Phase I: Implementation and Evaluation

- 1/31/2012 – Pretest meeting with all participants to complete project specifics and answer any questions. Three questions were asked to determine prior knowledge of guidelines.

- 2/01/2012 – Education to all providers was completed. Algorithm was finalized and approved by Dr. Belemjian and Dr. DeMartinis for implementation into practice.
- 2/03/2012 – Project began.
- 3/03/2012 – Meetings were conducted with each provider for 1-month follow up to evaluate comments and concerns. All participants answered five questions about the algorithm and OME guidelines.
- 4/03/2012 – Final meeting with all providers to evaluate the 2-month study. All participants answered five questions evaluating the process, patient outcomes, and algorithm assessment.
- 05/01/2012 - 5/15/2012 – The written evaluation and findings were submitted to UMASS Amherst and Pediatric Services. Final Capstone Scholarly Project was submitted for final approval and presented to a professional audience.

Phase II: Continuation Determination

- Postdoctoral Period – Program adoption feasibility will be determined by PSS senior management. If adopted, processes will be adjusted as needed and implemented into practice.

Results and Interpretation

Data analysis in mixed methods projects consists of analyzing the qualitative data using qualitative methods and the quantitative data using quantitative methods (Creswell & Plano, 2007). Eight out of eight providers agreed to participate in the 2-month project (100% participation). All eight of the providers completed all three interviews (100% participation), and all eight providers used the algorithm for the full 2 months (100% participation). These results exceeded my outcome expectations of 87% participation in the study, 75% completion rate, and

50% satisfaction rate with the implementation of the algorithm into practice. During the education session, the providers asked appropriate questions on the best way to manage patients with OME. Throughout the education session the providers grasped the material as evidenced by their questions and interview responses, and referred to the information provided and followed along properly. The algorithm was presented to the providers, and each provider was instructed on how to use the algorithm to direct care of their patients diagnosed with OME.

Prior to the training, the providers were asked three pretest questions. Question 1 asked whether the provider was aware of the OME guidelines. Five providers were not completely familiar with the OME guidelines and three were familiar with the OME guidelines. Question 2 asked whether the provider was currently using the guideline recommendations in practice. Of the three providers who indicated that they were aware of the guidelines, all three stated that they used the guidelines in practice. The last question asked whether the provider acknowledged that the guidelines and their recommendations were helpful the way they were presented. Of the three providers who used the guidelines in practice, two indicated that they found the guidelines helpful.

At the end of the study, providers were asked the same three questions. It was determined that all 8 providers gained enough knowledge from training to be comfortable with the guideline recommendations, scoring 100%, which was a 62% improvement from the pretest. All eight providers indicated that they used the guidelines during the 2-month project, which was 100% participation and was a 62% improvement from the pretest. Seven out of eight providers (87%) that stated they stated that they found the guideline recommendations helpful and that they would continue with the recommendations in practice, this was a 75% improvement from pretest answers. Figure 2 shows the pretest versus the posttest results.

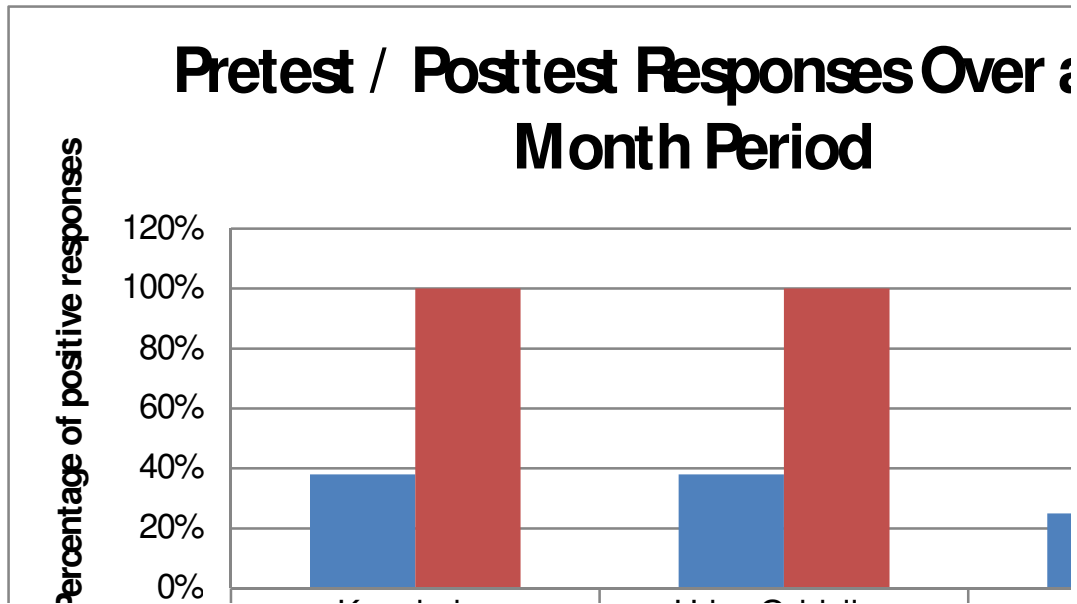


Figure 2. Pretest and posttest responses show improvement over the 2-month test period.

To measure whether this project was successful, the DNP candidate did a pretest and posttest comparison. The three questions that were asked identified whether there was an improvement after educating the providers on the OME guideline and supplying the providers the OME guideline recommendations in an algorithm format. The three questions asked about knowledge, use of recommendations, and satisfaction rate of OME recommendations. Providers improved drastically on all three areas, and explained in the interviews that the training and the algorithm helped them determine proper management of patients diagnosed with OME. A dependent *t*-test was performed on this data. Quantitative data were analyzed through the statistical package for social sciences (SPSS). Qualitative data were analyzed using content analysis. A detailed discussion of each quality measure follows, listing questions asked from the interviews and results and interpretation discussed.

Changes in Knowledge and Comfort Level

Question 1 pre- and post-test

The comparison between the quantitative results from the pretest and the posttest revealed an improvement in the comfort level and knowledge base of providers (63% improvement). The results of the question showed a positive response, and there was also a statistically significant difference documented between the responses of the pretest and the posttest, as measured by the paired samples *t*-test ($P < .01$) (see Appendix D).

The descriptive analysis for this pretest question indicated that of the eight providers who answered the question, five providers (62.5%) gave no answer in the open-ended section of the question related to knowledge of the OME guideline. The responses (Appendix F) indicated that among those providers who gave answers to the pretest questions, the level of understanding of OME guideline recommendations was limited, and they believed that they would need to review the guidelines again to get a better understanding of the recommendations. One provider stated, “I am aware of the guidelines, but I need to review them;” while another stated, “I remember some of the recommendations and think I am using them, but I could use a refresher.”

At the end of the project the providers were asked the same question that they answered prior to the project. Six (75 %) out of the eight providers who answered the open-ended question, gave a detailed positive response, and two (25%) providers gave no response. The qualitative responses (Appendix F) from those who answered the question indicated a significant improvement in the understanding of the OME guideline recommendations. One provider stated, “I feel very comfortable now with the guideline recommendations after the review”; another provider stated, “I believe that I have a much better grasp of the material within the guidelines.” Providers were more comfortable with the recommendations after the education and training. This was evident with one provider’s response: “I am better prepared to care for patients

diagnosed with OME.” The responses indicated an improved understanding of the recommendations after the training and after working with the algorithm for the two months.

Changes in Use of the OME Guideline Recommendations

Question 2 pre- and post-test

The comparison between the quantitative results from the pretest and the posttest revealed an improvement in the use of OME guideline recommendations in practice (63% improvement). The results of the question showed a positive response, and there was also a statistically significant difference documented between the responses of the pre- and post-test, as measured by the paired samples *t*-test ($P < .01$) (see Appendix D).

The descriptive analysis from the pretest question revealed that of the eight providers who answered the question, seven providers (87.5%) gave no answer in the open-ended section of the question related to using the OME guideline recommendations in practice. The only provider to give an answer responded that he was using the guideline recommendations in practice but acknowledged that he was using them “in his own way” (Appendix F). After asking what he meant by this response, it was determined that some of the recommendations in the guideline were not conducive to use in a busy pediatric practice, and he had to modify some of the suggestions.

In the posttest question, of the eight providers who answered, six (75 %) gave a detailed positive response, and two (25%) gave no response. The responses (Appendix F) from those providers who answered the question indicated a significant improvement in adherence to the recommendations in practice. One provider stated, “I now refer to the algorithm often and follow it for every one of my patients that qualify.” The responses also indicated an improved understanding of the recommendations after working with the algorithm. The responses showed

that the consistency among all providers had improved dramatically due to all providers following the same recommendations.

Changes in Attitude towards OME Guideline Recommendations and Algorithm

Question 3 pre- and post-test

The comparison between the answers from the pretest and the posttest questions revealed a 54% improvement in the provider's attitudes towards the OME guideline recommendations. Of the eight providers questioned, seven of the eight acknowledged that guideline recommendations presented as an algorithm were helpful. The results of the question showed a positive response, and there was also a statistically significant difference documented between the responses of the pretest and the posttest as measured by the paired samples *t*-test ($P < .01$) (see Appendix D).

The responses for this pretest question indicated that from the eight providers who answered the question, eight providers gave no answer in the open-ended section of the question related to whether the OME guideline recommendations were helpful.

In the posttest, of the eight providers who answered the open-ended question, eight (100%) gave a detailed positive response (Appendix F). The descriptive analysis from the providers showed that providers found that the use of the algorithm aided their diagnosis of OME and also directed care of the patient to improve patient outcomes. One provider stated, "I believe the algorithm really helped me organize my thinking in determining the care plan for my patients with chronic OME." All providers used the algorithm and found that following the guidelines was not time consuming and found comfort in knowing that they provided the highest quality patient care possible. One provider said, "The algorithm was very helpful, and it was not time consuming as I originally had thought. It was clear and very concise." There was one negative response to this question. This provider stated that he thought that the algorithm was

helpful, it was already what he was doing, so he did not find it helpful. When asked to provide a more detailed response, he said that he understood the guideline specifics and was comfortable with the guideline recommendations. He stated that he always adhered to those recommendations in practice and did not believe that the algorithm was helpful to him.

Providers were asked an additional two questions and to elaborate their answers for the questions during the implementation and after the project was completed. The providers had a range of suggestions and comments (Appendix F). Seven of the eight providers mentioned that they found the algorithm helpful and that it was an organized approach at controlling the care of their patients. One provider stated, “It is a great way to present the recommendations.” They explained that the algorithm helped determine the plan of care for patients who continued with chronic middle ear effusion and that it was also helpful in determining a timeframe for follow-up. One provider stated:

I think the algorithm looks great and clearly presents recommendations in an easy to follow manner. I feel that utilizing these recommendations in practice allows my patients, diagnosed with OME, the best plan of care possible to reduce poor outcomes.

Providers also mentioned that the guideline helped them diagnose chronic effusion because the algorithm clearly states when a patient should be classified with chronic OME. Providers also mentioned that they do not use pneumotoscopy, acknowledging that it was a challenging procedure to incorporate into a busy pediatric practice. They did use tympanograms to back their clinical findings. They also felt more comfortable with knowing when referring to a specialist was indicated. Their recommendations included modifying the algorithm to make it less “busy,” and to include when to perform an otoacoustic emissions hearing test (OAE), a test used to examine the function of the cochlea and other parts of the ear, including the auditory nerve

(Georgalas, Xenellis, Davilis, Tzangaroulakis, & Ferekidis, 2008). The OAE is used in their practice, and the guidelines do not specifically refer to when this test should be performed. The providers also explained that having the algorithm posted in each exam room would be very helpful for quick reference, especially when dealing with an increased workflow. The comments were positive, and the recommendations were used in the postproject implementation.

Discussion

The performance improvement project was successful. The results of the project stressed the importance of educating providers on the use of clinical practice guidelines and also showed the positive impact of summarizing the recommendations into an algorithm that can be used in a busy practice. Providers adhered to the recommendations and used the algorithm. Findings from the qualitative reporting backed up the quantitative data showing a positive correlation between educating providers on the OME guidelines and guideline adherence, which will limit poor outcomes in children diagnosed with OME.

It was also determined that educating each individual provider and having each provider refer to the same algorithm accomplished continuity of care for all children diagnosed with OME. Providers referred to the algorithm knowing that all providers were following the same recommendations, and they were comfortable that each patient was given individualized, high-quality care. It was evident from the interviews that providers enjoyed participating in the project and believed that the algorithm provided them the necessary information to manage their patients troubled with MME.

Conclusion

Otitis media with effusion is condition that needs to be followed closely. Patients with OME may experience serious deficits if care is not managed appropriately. Primary care

providers are familiar with the OME guideline; however a literature review determined that they are not following all the recommendations. Evidence indicates the best results stem from closely following recommendations within the OME guidelines. The performance improvement project used the theory of planned behavior as its basis, and set out to educate providers on the positive aspects of the OME guideline. The DNP candidate explained throughout the instruction how using the recommendations in practice could limit poor outcomes in children diagnosed with OME. Providers were educated on the recommendations of the guidelines and were introduced to an algorithm that summarized the recommendations into a flowchart. Providers were then asked to use the algorithm and adhere to the recommendations in practice for 2 months.

It was determined by this DNP candidate, after completing the project, that there was an 87% positive approval of the use of the guideline recommendations in practice. It was also evident that the algorithm was helpful in determining how to create a plan of care for OME patients, when to follow up, and when to refer patients to a specialist. The success of this project was important because this DNP candidate will eventually be working in the group that has participated in this project, and has also agreed to incorporate the algorithm into practice. The algorithm had a positive impact on the success of this project. The group believed that using the algorithm benefits their patients and improved the care that they provided patients diagnosed with OME.

The results revealed that although the algorithm was a high-quality addition, there are changes that could be made to allow for a full implementation into a busy pediatric practice. Phase II of this project included modifying the algorithm. The DNP candidate redesigned the algorithm and presented the group with the modified algorithm (Appendix G). This project has

laid the foundation for change. It has enabled the providers to manage patients diagnosed with OME in a uniform manner leading to a higher standard of care.

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Appendix A



UNIVERSITY OF MASSACHUSETTS AMHERST
Skinner Hall
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Amherst, MA 01003-9304

School of Nursing

413-545-1302

Fall, 2011

To Whom It May Concern:

I am the Graduate Program Director at the University of Massachusetts, Amherst, School of Nursing. I am writing this letter on behalf of Neil Nordstrom, your student preceptee. Your student is in the final year of the DNP program, is a DNP Candidate, and is planning to complete the final requirement for the Degree, a Capstone Scholarly Project, in your facility. Your student will be designing, implementing, and evaluating the effect of translating a programmatic intervention into your practice or setting. As these projects are considered performance improvement or program evaluation projects and not research studies, the University does not require Institutional Review Board permission for this student to actualize the project as outlined by the student. I am using this letter as a "Key Stakeholder" commitment letter for the student to use in the Capstone Scholarly Project Proposal. A graduate faculty member of the School of Nursing will also be working directly with your student as Chair of the Capstone Scholarly Project.

Thank you in advance for allowing this student to actualize the Capstone Project in your facility. If you have any questions, please call me at 413-545-1343 or email donna@acad.umass.edu

Key Stakeholder Signature: _____

Date: _____

Student Signature: _____

Date: _____

Sincerely,

Donna Zucker

Donna Zucker, RN, MS, PhD, FAAN
Associate Professor
Graduate Program Director

Appendix B

Pretraining questions

- Are you aware of OME guidelines? Explain.
- Are you currently using the OME guideline recommendations in practice? Explain.
- Do you find the recommendations in the guideline helpful in diagnosing and managing OME? Explain.

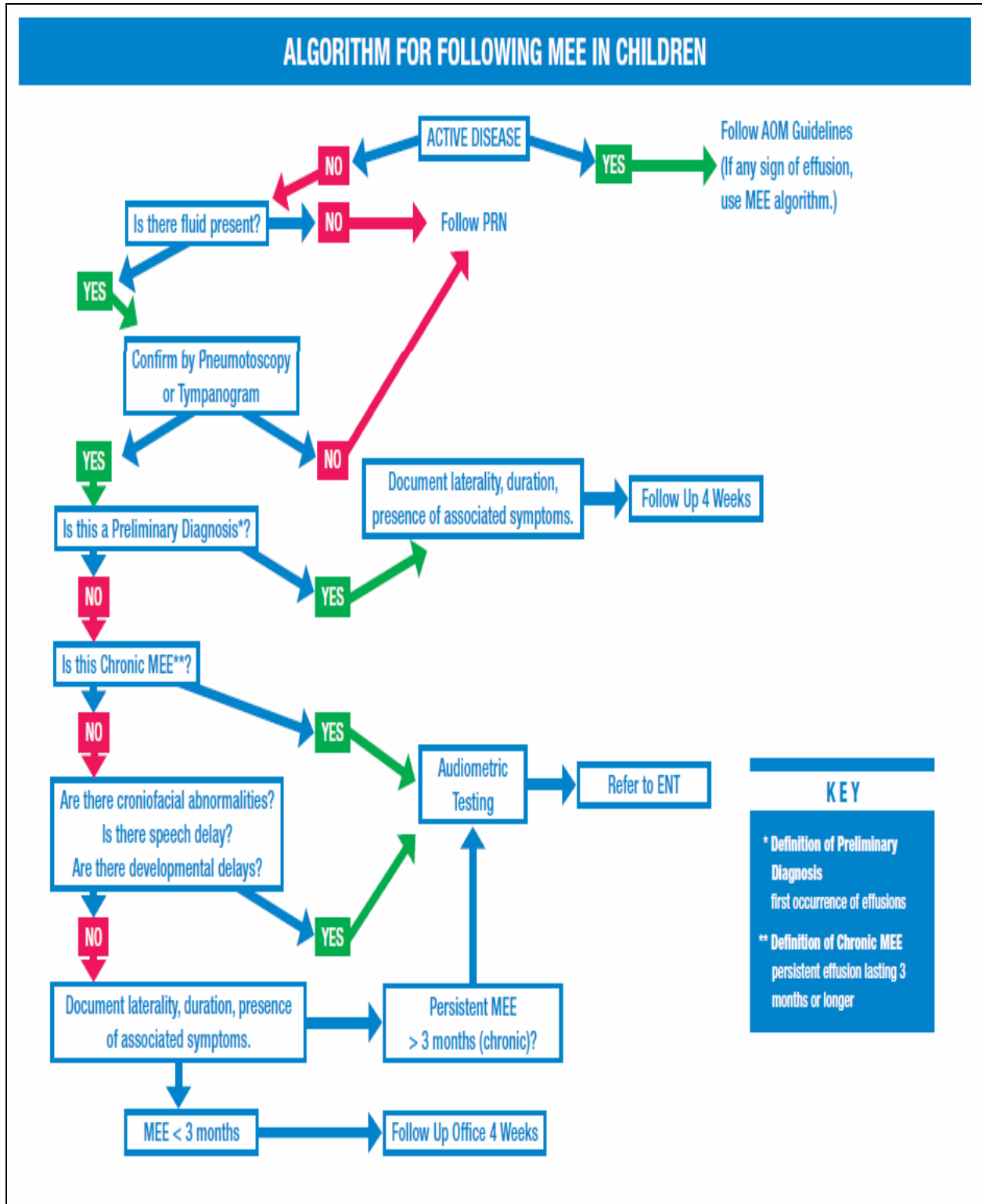
One month after implementation

- Are you comfortable with the OME guidelines and the recommendations within? Explain.
- Are you currently using the OME guideline recommendations in practice? Explain.
- Do you find the recommendations/algorithm helpful? Do you find that using the algorithm has made simplified diagnosis of OME? Explain.
- Do you find that the algorithm has helped with OME management? Explain.
- Will you continue to use the algorithm? Explain.

Postimplementation

- Are you comfortable with the OME guidelines and the recommendations within? Explain.
- Are you currently using the OME guideline recommendations in practice? Explain.
- Do you find the recommendations/algorithm helpful? Do you find that using the algorithm has made simplified diagnosis of OME? Explain.
- Do you find that the algorithm has helped with OME management? Explain.
- Will you continue to use the algorithm? Explain.

Appendix C



Appendix D

	Pretest responses		Posttest responses		Result
	YES	NO	YES	NO	
Knowledge	3	5	8	0	Positive improvement $p < .05$ showing a statistically significant difference
Using in practice	3	5	8	0	Positive improvement $p < .05$ showing a statistically significant difference
Helpful	2	6	7	1	Positive improvement $p < .05$ showing a statistically significant difference

Appendix E

Knowledge and comfort level: Question 1 Pretest

- I am aware of the recommendations but I need to review them.
- I remember some of the guidelines and think I am using them but I could use a refresher.
- I could use a review.

Knowledge and comfort level: Question 1 Posttest

- I feel very comfortable now with the guideline recommendations after the review.
- I feel like I now completely understand the guideline and the recommendations.
- I feel that I have a much better grasp of the material within the guideline.
- It is important and helpful for me to stay current on healthcare guidelines and recommendations. I appreciate it when people can offer this information as a good review.
- I now feel that I am better prepared to care for patients with OME.

Using the OME guideline recommendations in practice: Question 2 Pretest

- I am using the guideline recommendations in my own way.

Using the OME guideline recommendations in practice: Question 2 Posttest

- I am now using the guideline in practice.
- I refer to the algorithm often and follow it for every one of my patients that qualify.
- I now use the guideline and enjoy referring to it.

Appendix F

Satisfaction

- I found the algorithm really helped me organize my thinking in determining the care plan for my patients with chronic OME.
- I thought the algorithm was very well organized and easy to follow. I feel that I am providing high quality care to patients diagnosed with OME.
- The algorithm has aided my diagnosis and care of patients with OME and has made the planning process very easy.
- I found the algorithm very helpful and it was not time consuming as I had originally thought. It was clear and very concise.
- I thought that the recommendations in this format were very easy to follow and felt very comfortable using the algorithm.
- The algorithm is very helpful and keeps things uniform between providers. My patients are now receiving consistent care and I feel that they are really getting the best care that we can provide them.
- The algorithm was well organized and very helpful.
- The algorithm looks fine but it is basically what I do routinely, I did not find it helpful.

Comments about algorithm

- It is a great way to present the recommendations. I wish it could be a little less “busy” because when we are referring to it during the visit I think it should be a little less wordy.
- I think it should be in every exam room. This is an excellent tool and I refer to it regularly.
- We do not use pneumatic otoscopy that often because it is time consuming and we have a hard time incorporating it into our busy day, because children have a hard time sitting still through it. We do however use tympanograms to back up our clinical findings.
- Can you include when we should be doing OAEs? It would be helpful.
- I think that the algorithm looks great I think bolding the box that asks “Are there craniofacial abnormalities/ speech delay/ or developmental delay” would be helpful because that is key to the algorithm.
- I think the algorithm looks great and clearly presents recommendations in an easy to follow manner. I believe that utilizing these recommendations in practice allows my patients, diagnosed with OME, the best plan of care possible to reduce poor outcomes

Appendix G

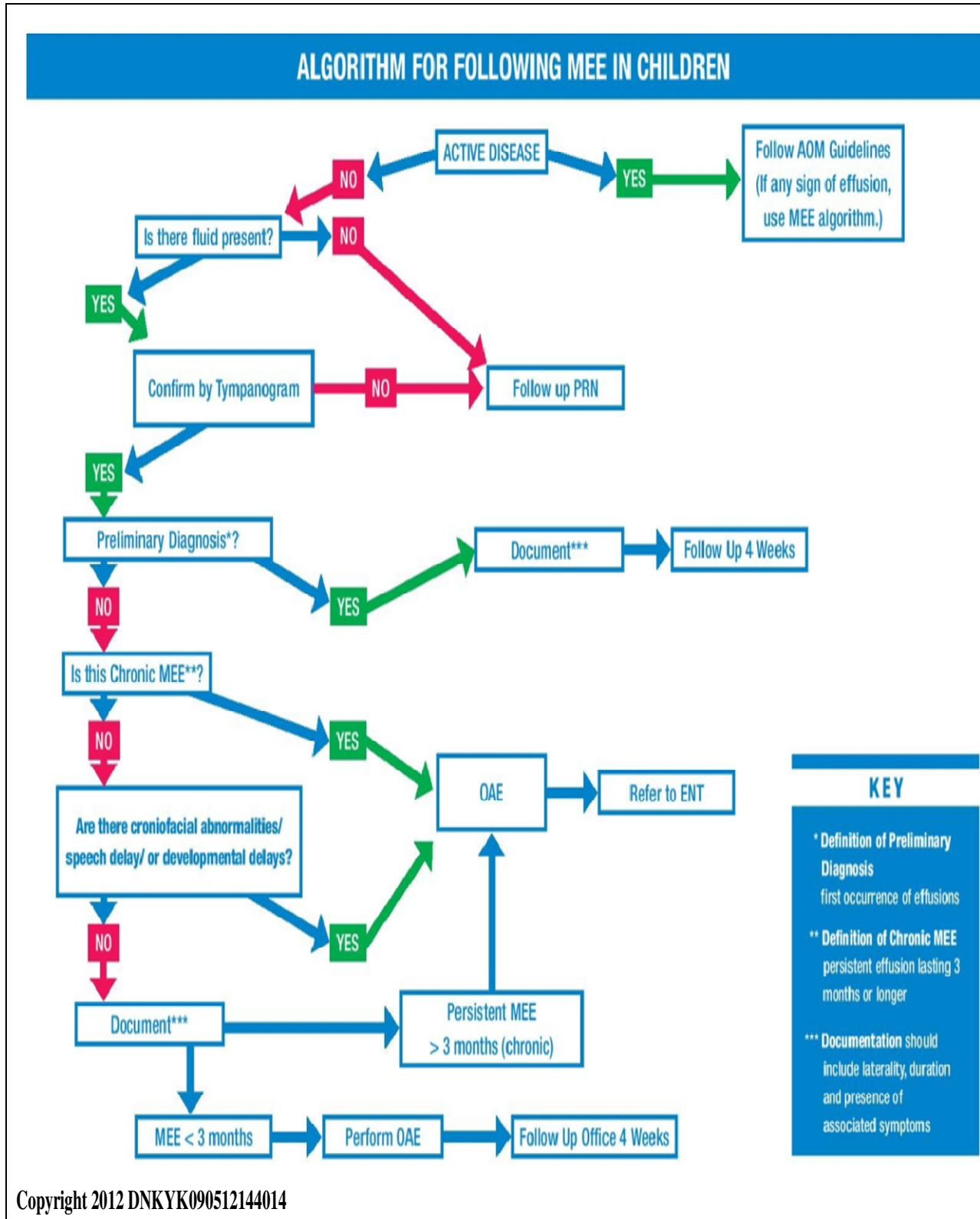


Table 1 Cost Breakdown

Elements	Measure of Input	Measure of Outputs	Cost
Human Resources: Includes personnel costs (Training hours)	1. No new hires required 2. Existing providers participated 3. Training will utilize practice space including provider's offices.	1. No increased work hours	During pilot DNP student volunteered over 150 hours Lunch cost \$64 Use of providers office space cost \$0
Informational Resources: Computer systems (hardware/software); Information Systems (IS), computer generated reports	1. No change in current hardware 2. Printing the algorithm and educational materials for the providers.	1. Number of algorithms and additional educational materials printed.	\$10 for two reams of paper. After Pilot-no change.
Physical Resources: Materials, facilities, equipment	1. No new facility space was needed 2. Existing office space was used 3. Existing clinic laptop computers with the office electronic medical record was used	1. There are no changes in physical resources anticipated for the pilot program interventions to be delivered.	During pilot-\$0.00 Program adoption no additional cost
Managerial Resources: Program Facilitator Collaborative Clinicians	1. Educational level of program leader is a Doctor of Nursing Practice (DNP) candidate, which was suitable for project. 2. Dr. Belemjian - mentor	1. No additional managers were needed.	12-18 hours/week donated by the DNP candidate. Collaborative clinician's time was unchanged with no additional cost.
Time Resources: Personal/timelines/deadlines	1. Timeline developed with a deadline for completion.	1. No delay in meeting all deadlines	During pilot-\$00.00
TOTAL COSTS ANTICIPATED			\$74.00
TOTAL COSTS ANTICIPATED FOR PROGRAM ADOPTION			\$0

Figure 1. A cost breakdown of the project in table form.