



# NEW PARADIGMS IN THE MANAGEMENT OF ACUTE OTITIS MEDIA

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## Abstract

Acute otitis media (AOM) is an infection of the middle ear and is the second most common pediatric diagnosis following upper respiratory infections. This article provides a review of the latest evidence on risk factors, diagnosis, management, and prevention of acute otitis media. Acute otitis media is a symptomatic disease with natural healing. Antibiotics should only be given in selective conditions. Myringotomy with the placement of ventilation tubes is the most common first-line surgical option for a child with recurrent or persistent AOM.

Keyword : Management, Acute, Otitis, Media, AOM

## Introduction

Acute otitis media (AOM), a common middle ear infection, ranks as the second most prevalent pediatric diagnosis, surpassed only by upper respiratory infections. In addition to AOM, the spectrum of middle ear inflammations encompasses recurrent otitis media (ROM), chronic suppurative otitis media (CSOM), and otitis media with effusion (OME). While AOM can occur at any age, it is most frequently diagnosed between 6 and 24 months, with the prevalence gradually diminishing after age 5. However, it reaches its peak incidence between the ages of six and fifteen months. Notably, boys are slightly more susceptible to developing AOM than girls.

Statistics indicate that approximately 50% to 85% of children will experience at least one episode of AOM by the time they reach three years old, highlighting the significant impact of this condition on pediatric health. The causes of middle ear infections can be attributed to various factors, including viral, bacterial, or coinfections. Among the bacterial species responsible for otitis media, *Streptococcus pneumoniae*, non-typable *Haemophilus influenzae* (NTHi), and *Moraxella catarrhalis* are the three most frequently encountered.

This literature review aims to comprehensively explore the risk factors associated with AOM, the methods used for diagnosis, the available treatment options, and preventive measures. By gaining a deeper understanding of these aspects, healthcare professionals can improve their ability to identify, manage, and prevent AOM effectively.

Examining the risk factors linked to AOM is crucial in order to identify individuals who are more susceptible to developing the condition. Factors such as exposure to second-hand smoke, attending daycare or crowded environments, lack of breastfeeding, and a family history of recurrent ear infections may increase the likelihood of AOM occurrence. By recognizing these risk factors, healthcare providers can implement preventive measures and tailor treatment plans to address specific needs.

Accurate and timely diagnosis is essential for effective management of AOM. This review will delve into the various diagnostic techniques available, such as otoscopy, pneumatic otoscopy, and tympanometry, shedding light on their benefits and limitations. Additionally, the article will explore the importance of differentiating between viral and bacterial etiologies, as this

knowledge can guide treatment decisions and the appropriate use of antibiotics.

In terms of treatment, a comprehensive approach is necessary to address AOM effectively. While antibiotics are sometimes prescribed, it is important to note that their use should be selective and reserved for cases that meet specific criteria. This approach aims to minimize the overuse of antibiotics and reduce the risk of antibiotic resistance. Non-pharmacological interventions, such as pain management techniques and the use of warm compresses, can also play a significant role in alleviating symptoms and promoting healing.

Prevention is a key component in reducing the incidence and severity of AOM. Vaccination against bacterial pathogens, such as pneumococcus and *Haemophilus influenzae*, has shown promising results in decreasing the risk of AOM. Furthermore, implementing good hygiene practices, including regular handwashing and proper bottle and pacifier hygiene, can contribute to preventing the spread of infections. Environmental modifications, such as reducing exposure to second-hand smoke and promoting breastfeeding, also play a vital role in preventing AOM.

In conclusion, this comprehensive literature review aims to provide an in-depth analysis of the risk factors, diagnosis, treatment, and prevention of acute otitis media. By exploring these facets, healthcare professionals can enhance their understanding and approach to managing this common pediatric condition. Through the adoption of evidence-based practices and guidelines, tailored treatment plans can be developed to optimize patient care and improve health outcomes for children affected by AOM.<sup>1-4</sup>

## Risk Factors

Risk factors for AOM are shown in Table 1.<sup>1</sup> One of the risk factors for OM is paternal smoking. This increases mucus production, goblet hyperplasia, and mucosal inflammation, which lowers mucosal immunity and promotes bacterial colonization by improving bacterial adhesion to respiratory epithelium. AOM is more common in children whose mothers smoked during pregnancy. Another well-known risk factor for kids is bottle feeding, which is associated with higher non-typeable

Haemophilus influenzae prevalence and lower levels of immunoglobulin G antibodies in addition to providing some passive immunity through breast milk. Some studies have linked the condition to GERD. GERD patients may exhibit the presence of pepsin/pepsinogen in the middle ear in approximately 85.3% of cases associated with otitis media (OM). However, it is important to note that establishing a direct cause-and-effect relationship between GERD and OM remains challenging.

Various risk factors contribute to the development of AOM. Early age, attending daycare centers, preterm birth, having a greater number of siblings, the use of pacifiers or dummies, exposure to cold weather, and the presence of craniofacial anomalies are among the factors associated with an increased likelihood of experiencing AOM.

The association between GERD and OM underscores the complexity of factors influencing the occurrence of middle ear infections. The presence of pepsin/pepsinogen in the middle ear among a significant percentage of OM patients with GERD suggests a potential connection, although it is essential to conduct further research to establish a definitive cause-and-effect relationship. Understanding the interplay between GERD and OM can help healthcare professionals develop more targeted management strategies for patients with these conditions.

Moreover, nutritional deficiencies have been observed in individuals with AOM and rOM. Deficits in key nutrients, including vitamin A, zinc, EPA, selenium, and other vitamins, can impact immune function and increase susceptibility to infections. Addressing these deficiencies through appropriate dietary interventions or nutritional supplementation may play a crucial role in the prevention and management of middle ear infections.

In addition to GERD and nutritional deficiencies, a range of other risk factors contribute to the development of AOM. Younger age, particularly in infants and toddlers, is associated with a higher incidence of AOM. This vulnerability may be attributed to the immaturity of the immune system and structural characteristics of the Eustachian tube in younger children. Attending daycare centers, which are known for their close contact and increased exposure to pathogens, also increases the risk of AOM. Preterm birth, having a greater number of siblings, the use of pacifiers or dummies, exposure to cold weather, and the presence of craniofacial anomalies are additional factors that have been linked to an elevated risk of developing AOM.

Understanding these risk factors allows healthcare providers to identify individuals who may be more susceptible to AOM. By recognizing these factors, appropriate preventive measures can be implemented to reduce the incidence and severity of middle ear infections. For instance, implementing strict hygiene practices in daycare centers, educating parents on pacifier use and proper bottle hygiene, and promoting breastfeeding can all contribute to reducing the risk of AOM.

In summary, the presence of pepsin/pepsinogen in the middle ear among GERD patients with OM, although lacking a definitive cause-and-effect relationship, highlights the potential interplay between these conditions. Additionally, deficiencies in essential nutrients have been observed in individuals with AOM and rOM, emphasizing the importance of addressing nutritional needs for optimal immune function. Furthermore, early age, daycare center attendance, preterm birth, having more siblings, pacifier use, exposure to cold weather, and craniofacial anomalies are all recognized risk factors for AOM. Recognizing and addressing these risk factors can aid in the prevention and management of

middle ear infections, ultimately improving the health outcomes of affected individuals.<sup>1, 5</sup>

**Table 1.** Risk factors for AOM

Non-Modifiable Risk Factors
< 5 years old
Craniofacial abnormalities
Family history of ear infections
Low birth weight
Male sex
Premature birth (< 37 weeks of gestation)
Prior ear infections
Recent viral upper respiratory infection
White ethnicity
Potentially modifiable risk factors
Exposure to tobacco smoke or environmental air pollution
Factors increasing crowded living conditions (cold seasons, low socioeconomic status, school/day-care)
Gastroesophageal reflux
Lack of breastfeeding
Pacifier use after 6 months
Supine bottle feeding (bottle popping)

**Pathophysiology**

AOM has complicated and diverse pathogenesis. The causes of OM are multifactor and include anatomical abnormalities, pathophysiology, such as the interplay of microbial pathogens and host immune response, and cell biology of the middle ear cleft (mastoid, middle ear cavity, eustachian tube), as well as the nasopharynx.<sup>6</sup> AOM episodes are frequently accompanied by or preceded by viral upper respiratory tract infections

Similar bacteria have also been cultured from the fluid of otitis media with effusion (OME), although the outcomes of various studies conducted under different conditions in different countries may yield divergent results. The identification of similar bacterial species in OME fluid further supports the notion of a link between these bacterial pathogens and the development of middle ear infections. However, further research is necessary to obtain a comprehensive understanding of the bacterial profiles associated with OME, taking into account various factors such as geographical location and local epidemiological factors.

These findings underscore the complex interplay between viral and bacterial pathogens in the pathogenesis of otitis media. While viral infections create an environment that facilitates bacterial invasion, it is important to note that the presence of bacteria alone is insufficient to cause AOM. Viral-bacterial interactions and other contributing factors, such as impaired immune response and structural abnormalities of the Eustachian tube, also play significant roles in the development of middle ear infections.

The recognition of specific bacteria, such as *S. pneumoniae* and *H. influenzae*, as predominant culprits in AOM and OME provides valuable insights for clinical management. Targeted interventions aimed at preventing and treating infections caused by these bacterial pathogens can help improve outcomes for individuals affected by otitis media.

In conclusion, recent advances in research have revealed the value of antiviral treatment in managing AOM, highlighting the role of viral infections in its development. Furthermore, the presence of bacteria commonly associated with upper respiratory tract

infections in middle ear effusions supports the notion of a bacterial contribution to AOM. *Streptococcus pneumoniae* and *Haemophilus influenzae* have been consistently detected in recent studies, emphasizing their significance in the pathogenesis of AOM. Similarly, bacterial profiles in OME fluid demonstrate similarities to those found in AOM, although further research is needed to establish comprehensive understandings. Recognizing the interplay between viral and bacterial pathogens and their association with otitis media can guide clinicians in implementing targeted interventions for improved patient outcomes. The bacteria in OME are generally comparable to those found in recurrent AOM (rAOM).<sup>4</sup> The eustachian tube and nasopharynx may become congested due to upper respiratory tract illnesses. The middle ear's ability to regulate pressure is affected by the congestion that follows, which precludes proper eustachian tube activity. Nasopharyngeal bacteria may aspirate into the middle ear if they are sustained.

While these pathogens are present, they cause inflammation and pus to develop in the middle ear, which leads to the clinical signs and symptoms of AOM. The middle ear ossicles are less movable and may be prone to resorption during this inflammatory period, which could possibly result in irreversible conductive hearing loss. Smaller mastoid cavities have been linked to a higher incidence of chronic middle ear illness in studies, but it is debatable whether this effect is causal. Due to ototoxicity, patients with chronic infections may also experience sensorineural hearing loss.<sup>4</sup>

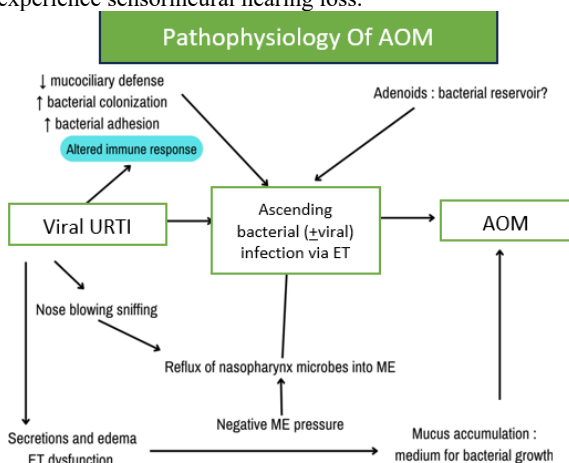


Figure 1. Pathophysiology of AOM<sup>4</sup>

**Diagnosis**

- Acute otitis media (AOM) typically presents with a constellation of common symptoms, including ear pain accompanied by fever. Children affected by AOM may also display signs of irritability, otorrhea (discharge from the ear), anorexia (loss of appetite), and, in some cases, vomiting or lethargy. One of the hallmark symptoms of AOM is ear pain, which can be quite distressing for children. This pain is often exacerbated by movement or pressure changes, such as during swallowing or lying down. The presence of fever is another characteristic feature of AOM, indicating an inflammatory response within the middle ear. In addition to ear pain and fever, children with AOM may exhibit irritability. The discomfort caused by the infection can lead to changes in behavior, with affected individuals becoming more fussy and difficult to

soothe. Otorrhea, or discharge from the ear, may also be observed in some cases of AOM. The discharge can vary in consistency and color, ranging from clear fluid to a thick, purulent discharge. Furthermore, AOM can affect a child's appetite, resulting in anorexia or decreased interest in eating. The combination of ear pain, discomfort, and systemic inflammation can lead to a loss of appetite, which may further contribute to feelings of malaise and lethargy in affected children. In certain instances, vomiting or lethargy may occur as additional symptoms of AOM. Vomiting can be a result of the pain and discomfort associated with the infection, while lethargy can stem from the systemic response to inflammation and the overall feeling of unwellness. Recognizing these typical symptoms is crucial for early identification and prompt management of AOM. Timely diagnosis allows for appropriate treatment interventions, which may include pain management, antibiotics if necessary, and supportive care to alleviate symptoms and promote healing. It is important to note that while the aforementioned symptoms are commonly associated with AOM, the presentation of the condition can vary among individuals. Some children may experience a milder form of the infection with fewer or less pronounced symptoms, while others may have more severe symptoms requiring immediate medical attention. In summary, acute otitis media is characterized by several typical symptoms, including ear pain, fever, irritability, otorrhea, anorexia, and occasionally vomiting or lethargy. Recognizing and understanding these symptoms can aid healthcare providers and caregivers in identifying AOM and initiating appropriate management strategies to alleviate discomfort and promote recovery.<sup>1</sup>

- Hearing loss is the most significant side effect of ear disease. The "whisper test" serves as a valuable tool in identifying children who are at a higher risk of experiencing significant hearing loss. It involves the examiner whispering 2-3 syllable words or numbers from a distance of approximately 2 feet (0.6 meters) to the child being assessed. The results of this test provide insights into the child's ability to perceive and understand auditory stimuli, particularly at specific sound intensity levels. The positive likelihood ratio, a statistical measure that indicates the likelihood of a specific condition based on the test results, for thresholds ranging from 25 to 35 decibels (dB) has been found to exceed 9 in studies evaluating the effectiveness of the whisper test. This high positive likelihood ratio suggests that a positive result on the whisper test is strongly associated with the presence of significant hearing loss within this intensity range. Identifying children at risk of serious hearing loss through the whisper test is crucial for early intervention and appropriate management. Detecting hearing loss early allows healthcare professionals to implement targeted interventions, such as hearing aids, assistive devices, or therapeutic interventions, to mitigate the impact of hearing loss on the child's development and overall well-being. It is important to note that while the whisper test can provide valuable information regarding the likelihood of serious hearing loss, it may

not be suitable for all age groups or individuals. Administering the whisper test to young children, for example, might present challenges due to their limited ability to understand and respond to verbal instructions. In such cases, alternative assessments, such as visual reinforcement audiometry or play audiometry, may be utilized to evaluate the child's hearing abilities accurately. In summary, the whisper test is an effective screening tool used to identify children who are at a higher risk of experiencing significant hearing loss. By whispering 2-3 syllable words or numbers from a distance of 2 feet (0.6 meters), healthcare professionals can assess the child's ability to perceive and understand auditory stimuli. The positive likelihood ratio associated with thresholds ranging from 25 to 35 dB demonstrates the test's ability to identify children at risk of serious hearing loss. However, it is important to consider alternative assessment methods for younger children who may have difficulty participating in the whisper test. Early identification and intervention based on the results of the whisper test are crucial for optimizing the child's hearing health and overall development. However, giving this exam to young children might be challenging. The pure tone average hearing loss in cooperative children will be determined via play audiometry in order to obtain an accurate threshold across several frequencies (from around three years of age).<sup>10</sup>

- Common symptoms and a tympanic membrane examination are used to make the clinical diagnosis. The diagnosis can be approached in Figure 2.
- In children, acute otitis media (AOM) can also be diagnosed based on specific clinical findings. When assessing young children who may not be able to communicate their symptoms verbally, the presence of ear pain can often be inferred from their behavior. Fussy and nonverbal children may exhibit certain actions that suggest discomfort in the ear. These actions can include holding, tugging, or rubbing the affected ear. Recognizing these behaviors can aid healthcare providers in identifying potential cases of AOM in children who may not be able to articulate their pain verbally. It is important to consider these clinical indicators in the diagnosis of AOM, as they provide valuable information about the child's condition and guide appropriate treatment decisions. Early identification and intervention for AOM can help alleviate pain, prevent complications, and promote recovery. In addition to the aforementioned clinical findings, healthcare providers may also consider other symptoms and signs when diagnosing AOM in children. These may include fever, irritability, otorrhea (discharge from the ear), anorexia (loss of appetite), and, in some cases, vomiting or lethargy. While these symptoms can vary in severity and presentation, their presence in combination with the clinical indicators mentioned earlier can support the diagnosis of AOM.<sup>1</sup>

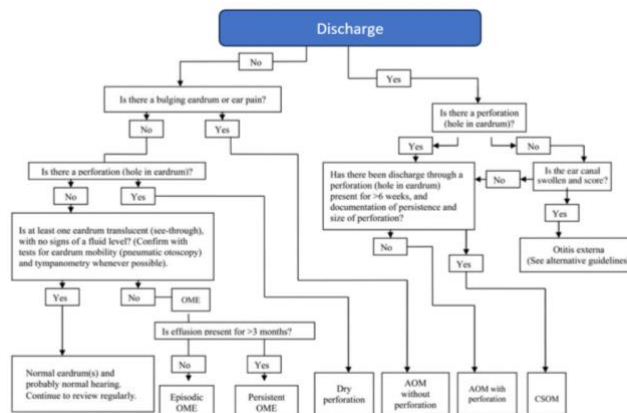


Figure 2. Diagnosis algorithm of AOM<sup>10</sup>

- Otitis media with effusion is often misdiagnosed as AOM<sup>1</sup>, both condition have an effusion in middle ear cavity, but in OME there is no sign of acute inflammation.<sup>1</sup>
- When conducting a physical examination, otitis media with effusion (OME) can be identified by certain characteristic findings. The tympanic membrane, for instance, may appear neutral or retracted and exhibit an amber or blue color, as opposed to the usual white or pale yellow appearance. It is important to note that the presence of air-fluid levels can be observed in either circumstance, highlighting the variability in presentation.
- To assess the status of the tympanic membrane and identify middle ear effusion, pneumatic otoscopy is a valuable tool. This technique involves applying gentle

pressure changes to the ear canal and observing the resulting movement of the tympanic membrane. Pneumatic otoscopy has been found to be highly effective, with a sensitivity of up to 94% and specificity of 90% in identifying middle ear effusion.

- In addition to pneumatic otoscopy, tympanometry can be used as a supplementary diagnostic tool. Tympanometry measures the compliance or stiffness of the tympanic membrane in response to changes in air pressure. It has shown a sensitivity ranging from 70% to 94% and a specificity of 90% in detecting middle ear effusion. By combining pneumatic otoscopy and tympanometry, healthcare professionals can obtain a more comprehensive assessment of the middle ear status.
- While tympanocentesis serves as the gold standard for identifying the specific microorganisms causing middle

ear infections, its use in routine primary care settings is impractical. This invasive procedure involves obtaining a sample of the middle ear fluid for culture and antibiotic susceptibility testing. Due to the predictability of the major bacterial pathogens involved in otitis media, tympanocentesis is rarely necessary for initial management in primary care clinics.

- However, in certain cases, tympanocentesis may be considered to guide treatment decisions in children who have received multiple rounds of antibiotics or when there is a need for precise identification of the causative pathogen and its antibiotic susceptibility. This approach ensures a targeted and effective treatment regimen.
- In summary, a combination of pneumatic otoscopy and tympanometry can aid in the diagnosis of middle ear

### Management

Treatment strategies for acute otitis media (AOM) can vary based on factors such as age, symptoms, and physical examination findings.

When weighing the benefits and potential risks of antibiotic treatment for AOM, it is noteworthy that the resolution rate of AOM in children without antibiotic treatment is approximately 81%, while it increases to around 93% with antibiotic treatment. This indicates that antibiotics offer modest benefits in terms of improving the resolution of AOM compared to supportive care alone. However, it is essential to consider the potential adverse effects associated with antibiotic use, including the risk of developing rash, vomiting, or diarrhea.

These findings highlight the limited impact of antibiotics on these specific outcomes and emphasize the need for a careful assessment of the overall risks and benefits when deciding whether to initiate antibiotic therapy for AOM.

In addition to antibiotic treatment, other interventions may be considered to manage AOM symptoms and promote healing. These interventions can include pain management strategies, such as the use of over-the-counter pain relievers or warm compresses, as well as non-pharmacological approaches like encouraging rest and adequate hydration. These measures can provide relief from pain and discomfort while allowing the body's natural healing processes to take place.

In summary, treatment strategies for AOM should be tailored based on various factors, including age, symptoms, and physical examination findings. While antibiotic treatment can modestly improve the resolution rate of AOM, it is crucial to weigh the potential benefits against the risks of adverse effects. Antibiotics have limited impact on early pain, hearing loss at three months, and recurrence within 30 days. Therefore, a comprehensive approach that includes supportive care, pain management, and close monitoring may be appropriate in many cases of AOM. Healthcare providers should consider individual patient characteristics and preferences when making treatment decisions for AOM.<sup>12</sup>

Amoxicillin remains to be the first-line antibiotic of choice when contemplating antibiotics because the majority of *S. pneumoniae* and *H. influenzae* still have susceptibility. Macrolides can also be applied to allergic conditions. Second-generation antibiotics should be changed to amoxicillin-clavulanate, second-generation cephalosporin, or third-generation cephalosporin if severe symptoms continued for longer than 2-3 days. If the patient is more than 2 years old, the course of antibiotics lasts 5-7 days

effusion. Pneumatic otoscopy allows for the assessment of the tympanic membrane, while tympanometry provides additional information about middle ear compliance. While tympanocentesis remains the gold standard for identifying causative microorganisms, its use is limited in primary care settings. However, in select cases, tympanocentesis may be considered to guide treatment decisions in children who have received multiple antibiotics. These diagnostic techniques contribute to the accurate diagnosis and appropriate management of middle ear infections.<sup>1</sup>

instead of 10 days. Giving decongestants and antihistamines is not advised.<sup>13</sup>

When it comes to patients with recurrent otitis media (rOM), the use of prophylactic antibiotics is not recommended due to the lack of substantial evidence supporting their effectiveness. The decision regarding grommet insertion, a surgical procedure involving the placement of ventilation tubes in the eardrums, remains a topic of controversy in the management of rOM. However, studies have indicated that grommet insertion can significantly reduce the recurrence rates of otitis media, leading to improved outcomes in terms of hearing and speech for affected children.

In addition to grommet insertion, addressing gastroesophageal reflux disease (GERD) through the use of anti-reflux medication has shown promising results in reducing the occurrence of rOM. Controlling GERD can have a positive impact on the overall management of rOM and contribute to decreased recurrence rates. By targeting the underlying cause of GERD, healthcare providers can potentially mitigate the risk factors associated with rOM and improve the outcomes for affected individuals.

Moreover, beyond the medical interventions mentioned above, it is important to consider the broader approach to managing rOM. This may include optimizing the child's immune system through proper nutrition, ensuring adequate vaccination, and promoting healthy habits, such as regular handwashing and avoiding exposure to environmental allergens. These measures can contribute to reducing the frequency and severity of rOM episodes and enhance the overall well-being of affected children.

Furthermore, the impact of rOM extends beyond the physical symptoms experienced by the child. It can significantly affect their quality of life, particularly in terms of hearing and speech development. Addressing the recurrent episodes of otitis media through interventions like grommet insertion and managing underlying conditions like GERD can play a crucial role in improving the child's overall quality of life by minimizing the impact of rOM on their hearing abilities and speech development.

In summary, the management of recurrent otitis media involves a multidimensional approach. While prophylactic antibiotics are not recommended, grommet insertion has demonstrated benefits in reducing recurrence rates and improving hearing and speech outcomes. Additionally, addressing GERD through anti-reflux medication can be effective in decreasing the occurrence of rOM. Taking a holistic approach that includes

optimizing the child's immune system, promoting healthy habits, and considering the broader impact on quality of life can further enhance the management of rOM. Healthcare providers should tailor the management approach to each individual case, considering the specific needs and circumstances of the patient.<sup>13</sup>

Children with AOM should receive pain medication as necessary. For a brief period of time (less than 48 hours), oral ibuprofen or acetaminophen monotherapy relieves ear pain. These drugs being better than the other or for combined therapy being more effective in relieving pain is not supported by sufficient evidence. Parents should receive advice on how to use these painkillers properly.<sup>14</sup>

Follow-up care is essential for cases of acute otitis media (AOM) to ensure appropriate management and monitor the resolution of the condition. In simple instances of AOM, follow-up visits are recommended after 4 to 8 weeks. This timeframe is crucial because even after 2 weeks, middle ear effusion may still be visible in 60-70% of cases. The visibility of effusion decreases to 40% after 4 weeks and 25% after 3 months, emphasizing the importance of continued monitoring and assessment.

In cases of recurrent or persistent AOM, surgical intervention may be considered as an option. However, the decision to proceed with surgery in these cases is more controversial compared to cases of otitis media with effusion (OME). The most common first-line surgical option is myringotomy with the placement of tympanostomy tubes. However, the efficacy of these tubes in preventing the recurrence of AOM is not fully established, as systematic reviews have indicated insufficient evidence with only small short-term benefits.

Exceptions to the decision-making process for tube placement may be made in favor of children at high risk of complications. This includes children who are syndromic, have developmental delays and sensory deficits. These considerations highlight the importance of individualized care and tailored decision-making based on specific patient characteristics.

In conclusion, follow-up care is crucial for monitoring the resolution of AOM, considering surgical interventions for recurrent or persistent cases, and making informed decisions based on individual patient characteristics. Continued research and evidence-based guidelines contribute to the advancement of effective management strategies for various forms of otitis media, ultimately improving outcomes for affected children.<sup>15-20</sup>

### Prevention

Three or more episodes of acute otitis media (AOM) in the previous six months, or four or more in the previous year, are considered recurrent AOM (rAOM). When it is feasible, risk factors should be avoided. In the first six months at least, and preferably for the first year, breastfeeding has a protective impact. It has been proven that pacifier avoidance and smoking cessation strategies can lower the risk of AOM recurrence.<sup>5</sup>

Vaccinations are other preventive measures. Vaccinations are a well-established part of the effective care of children. In high-risk children, the prior heptavalent pneumococcal vaccine lowered the relative risk of AOM by 5% to 6%, while in low-risk children, it decreased the risk by up to 6%. The relative risk reduction for pneumococcus-specific AOM ranged from 20% to 25%. It is challenging to evaluate the effectiveness of the 13-valent pneumococcal conjugate vaccine (Prevnar 13) in preventing AOM, but a recent study found that, compared to the heptavalent vaccine, the additional six serotypes result in an 86% risk reduction of pneumococcal-specific AOM

in middle ear fluid. The Advisory Committee on Immunization Practices recommends that all children receive the pneumococcal vaccine.<sup>1</sup>

A viral upper respiratory tract infection frequently comes after AOM. AOM episodes are reduced by 4% overall by influenza immunization and by 30% to 55% during the respiratory illness season. Annual influenza vaccinations should be given to children older than six months.<sup>21</sup>

### Conclusion

AOM is the second most common health problem in children. AOM is a symptomatic disease with natural healing. There is a strong recommendation to give medicine to relief symptoms and antibiotics should be given in selective cases.

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