

# Acute Otitis Media

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## KEYWORDS

• Acute otitis media • Otitis media with effusion • Antibiotics • Tympanostomy tube

## KEY POINTS

- Acute otitis media (AOM) is a common condition seen in primary care offices, as 1 in 4 children will have at least 1 episode of AOM by age 10 years.
- AOM results from infection of fluid that has become trapped in the middle ear.
- The bacteria that most often cause AOM are *Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Moraxella catarrhalis*.
- Differentiating AOM from otitis media with effusion (OME) is a critical skill for physicians, as accurate diagnosis will guide appropriate treatment of these conditions.
- Although fluid is present in the middle ear in both conditions, the fluid is not infected in OME as is seen in AOM patients.

Acute otitis media (AOM) is a common condition seen in primary care offices, as 1 in 4 children will have at least 1 episode of AOM by age 10 years.<sup>1</sup> AOM results from infection of fluid that has become trapped in the middle ear. The bacteria that most often cause AOM are *Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Moraxella catarrhalis*. Differentiating AOM from otitis media with effusion (OME) is a critical skill for physicians, as accurate diagnosis will guide appropriate treatment of these conditions. Although fluid is present in the middle ear in both conditions, the fluid is not infected in OME as is seen in AOM patients.

## EPIDEMIOLOGY

Children from a myriad of diverse demographic categories are commonly affected by AOM, although those of male gender and Native American ethnicity have been shown to be at increased risk of AOM.<sup>2</sup> Children who have other siblings in the home, are of low socioeconomic status, experienced premature birth, were bottle fed, have a family history of recurrent AOM, or attend out-of-home day care are also at increased risk of developing AOM.<sup>2,3</sup> Eliminating exposure to passive tobacco smoke, encouraging breastfeeding, and advocating for reduced pacifier use during months 7 to 12 of life may have some impact on reducing the incidence of AOM.<sup>2</sup> More study is needed

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to clarify the impact of public health programs that optimize maternal health, encourage breastfeeding, and advocate tobacco cessation on rates of AOM.

Although a single episode of AOM may seem trivial, more than 2.2 million episodes occur annually in the United States at a cost of 4 billion dollars.<sup>4-6</sup> Children with recurrent episodes of AOM are most at risk for complications leading to morbidity and mortality. Early onset of a first episode may be an important marker of children most at risk to have recurrent episodes of disease.<sup>3,7</sup>

## PREVENTION

Given the high prevalence of AOM, much research attention has focused on identifying prevention strategies. *S pneumoniae*, *M catarrhalis*, and *H influenzae* continue to cause most cases of AOM. Introduction of the pneumococcal vaccine has resulted in reduction of risk of up to 34% for children to develop AOM.<sup>8,9</sup> The impact of the 13-valent pneumococcal vaccine in current use has not yet been elucidated. Although pneumococcal vaccine certainly does not eliminate the risk of AOM for a given child, even small reductions in risk for an individual has large implications for the community regarding reductions in AOM incidence. Pneumococcal vaccine is beneficial, but children who have been fully vaccinated still contract AOM.

Widespread use of the influenza vaccine has also been shown to be effective in reducing the incidence of AOM.<sup>10</sup> With fewer viral illnesses, children are less likely to have inflammation and swelling of the Eustachian tube and less fluid accumulation in the middle ear. Ultimately, with less fluid accumulation and, subsequently, less bacterial colonization of the fluid, fewer ear infections occur. In one study, children who received seasonal influenza vaccine had fewer episodes of AOM, less need for antibiotics, and a shorter duration of middle-ear effusion.<sup>10</sup>

In addition to vaccines, other interventions designed to reduce viral upper respiratory infection or bacterial colonization of the middle ear have been studied for their ability to decrease AOM rates. Dietary supplementation has been popular, as evidence exists to suggest that deficiencies in zinc, vitamin A, vitamin D, and specific omega-3 fatty acids may result in an increased risk of AOM.<sup>11,12</sup> However, while specific nutritional deficiencies have been linked to increased rates of AOM, studies have demonstrated mixed evidence, at best, that supplementation for deficiencies results in a protective effect. For example, zinc has been shown to prevent AOM in malnourished children younger than 5 years, but benefit in children with normal nutritional status has not been significant enough to warrant recommendations for universal administration.<sup>11,13,14</sup> Moreover, supplementation for hypovitaminosis D, defined as serum levels of (OH)D of less than 30 ng/mL, has been shown to reduce the incidence of uncomplicated AOM.<sup>12</sup>

Probiotics have also been shown to have some benefit in decreasing the rate of AOM. Infant formulas supplemented with lactobacillus rhamnosus GG and bifidobacterium lactis Bb-12 have been shown to reduce incidence of AOM by 22% to 50% in the first 7 months of life.<sup>15</sup> In older children, however, the benefit is less clear. Studies have demonstrated that probiotic administration may decrease days of day care missed, but data regarding reduction in incidence rates is mixed.<sup>11</sup>

Xylitol, a polyol sugar alcohol found in raspberries, has been shown to be effective in preventing AOM, although most physicians who care for children are unaware of its effectiveness as a preventive agent.<sup>16</sup> However, to be effective xylitol must be given 5 times per day, creating a barrier to its widespread use. Beyond dietary interventions, it has been suggested that osteopathic manipulation may lead to reduction in symptoms in children with AOM, although more studies are needed to clarify any possible effect.<sup>17</sup>

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