

# *The Burden of Otitis Media*

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## **Introduction**

Otitis media (OM) is one of the most common childhood infections, the leading cause of doctors' consultations, and the most frequent reason children take antibiotics.<sup>1</sup> OM refers to an inflammation of the middle ear and has two entities, i.e. acute otitis media (AOM) and otitis media with effusion (OME). AOM is defined as the presence of middle ear effusion in conjunction with the rapid onset of one or more signs or symptoms of inflammation in the middle ear such as otalgia, otorrhea, fever, or irritability.<sup>2</sup> OME is defined as fluid in the middle ear without signs or symptoms of an ear infection.<sup>2</sup>

## **Epidemiology**

At least 80% of children will have experienced one or more episodes of OM by the age of three years.<sup>3</sup> The peak incidence of AOM occurs during the second half of the first year. There is clearly a degree of clinical overlap between children with OME and children with AOM. Children with OME suffer from up to five times more episodes of AOM than those without OME, and in 50% of cases the middle ear effusion directly follows an episode of acute infection.<sup>4</sup>

The natural course of both AOM and OME shows a high rate of spontaneous recovery. It has been estimated that without treatment about 80% of children with AOM experience relief of pain and fever within 2-3 days, while complete clinical resolution of AOM has been observed in 73% of children within 1 to 2 weeks.<sup>5</sup> Children with OME show a constant improvement rate of about 50% every month.<sup>5</sup>

OM is also characterised by a high rate of recurrences; a recurrence rate of three or more episodes of AOM have been documented in 50 and 65% of children aged 3 and 5 years, respectively. In children with OME a recurrence rate of 50% was found within 24 months.<sup>3</sup>

## **Risk factors**

OM is a multifactorial disease, resulting from an interplay between microbial load (viral and bacterial) and immune response. All factors known to cause OM relate to these two core elements: host factors such as age, genetic predisposition, and atopy relate to the impaired immune system, whereas environmental factors such as siblings, day care, and season relate to microbial load. The Eustachian tube plays a central role as it is the port of entry to the middle ear for pathogens from the nasopharynx.<sup>6</sup>

**Antibiotics & mastoiditis**

OM is the most frequent reason children consume antibiotics.<sup>1</sup> Evidence from an individual patient data meta-analysis suggest that antibiotics are more likely to be beneficial in children aged less than 2 years with bilateral AOM, and in children with AOM and otorrhea. For most other children an observational policy seems justified.<sup>7</sup> Furthermore, prescribing antibiotics is known to encourage attendance in future episodes, increase pressure on clinicians to prescribe, increase antibiotic use, and increase antibiotic resistance. On the other hand, it has been suggested that withholding antibiotics increases the risk for suppurative complications, such as mastoiditis. Van Zuijlen et al.<sup>8</sup> have indeed shown a slightly higher incidence rate of acute mastoiditis, i.e. about 4 per 100,000 person years, in the Netherlands, where only 31% of patients with AOM receive antibiotics, as compared to 2 per 100,000 person years in the United States where almost all cases of AOM were treated with antibiotics. However, in view of the low estimated incidence of acute mastoiditis in AOM of 0.4 per 1000 AOM episodes, the number of antibiotic prescriptions for AOM that would be needed to prevent one episode of acute mastoiditis is extremely high: at least 2500.<sup>8</sup> Moreover, not all cases of acute mastoiditis can be prevented by antibiotics. Retrospective studies have shown that 36-87% of patients with acute mastoiditis have been treated with antibiotics for AOM prior to developing this complication.

**Sequelae**

It has been hypothesised that OM related hearing loss due to the effusion can delay language acquisition, alter behaviour and influence quality of life. The degree of conductive hearing loss associated with OM is 10-40 dB. However, conclusive evidence that hearing loss associated with OM indeed influences language development, behaviour and quality of life, is absent. A meta-analysis using different types of studies showed small adverse effects of OM on language development, which may be unimportant for most otherwise healthy children. The effect may, however, be disproportionate on children with developmental delays.<sup>9</sup> Brouwer et al.<sup>10</sup> found that a reduction in the number of AOM episodes was associated with an increased health-related quality of life. Other studies, however, did not find such effects. The conflicting findings might be due to methodological shortcomings. Some studies failed to confirm the duration and severity of the OM, or did not measure hearing levels. In other studies, potential confounders that also contribute to a child's communicative skills, such as the intelligence quotient of the child or the educational level of the parent, have not been taken into account.

**Costs**

Annual costs for OM have been estimated at \$ 3 – 5 billion for the USA, whereas estimated costs per AOM episode vary from \$103 to \$1,330. The true impact is probably even underestimated because indirect costs might be substantially higher.<sup>11</sup>

**Epilogue**

The ideal intervention, either preventive or curative, for OM would be non-toxic and rapidly effective at clearing the effusion, and would sustain more than a few months. Such an intervention does not yet exist, so there is an urgent need for

creativity as to design and testing other/new directions for treatment corresponding to modern insights into the pathophysiology of OM. Most success is expected if this search focus on interactions between pathogenic factors. More insight into the pathogenesis is required for answering the question why part of the children recover from OM spontaneously while others need specific interventions.

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