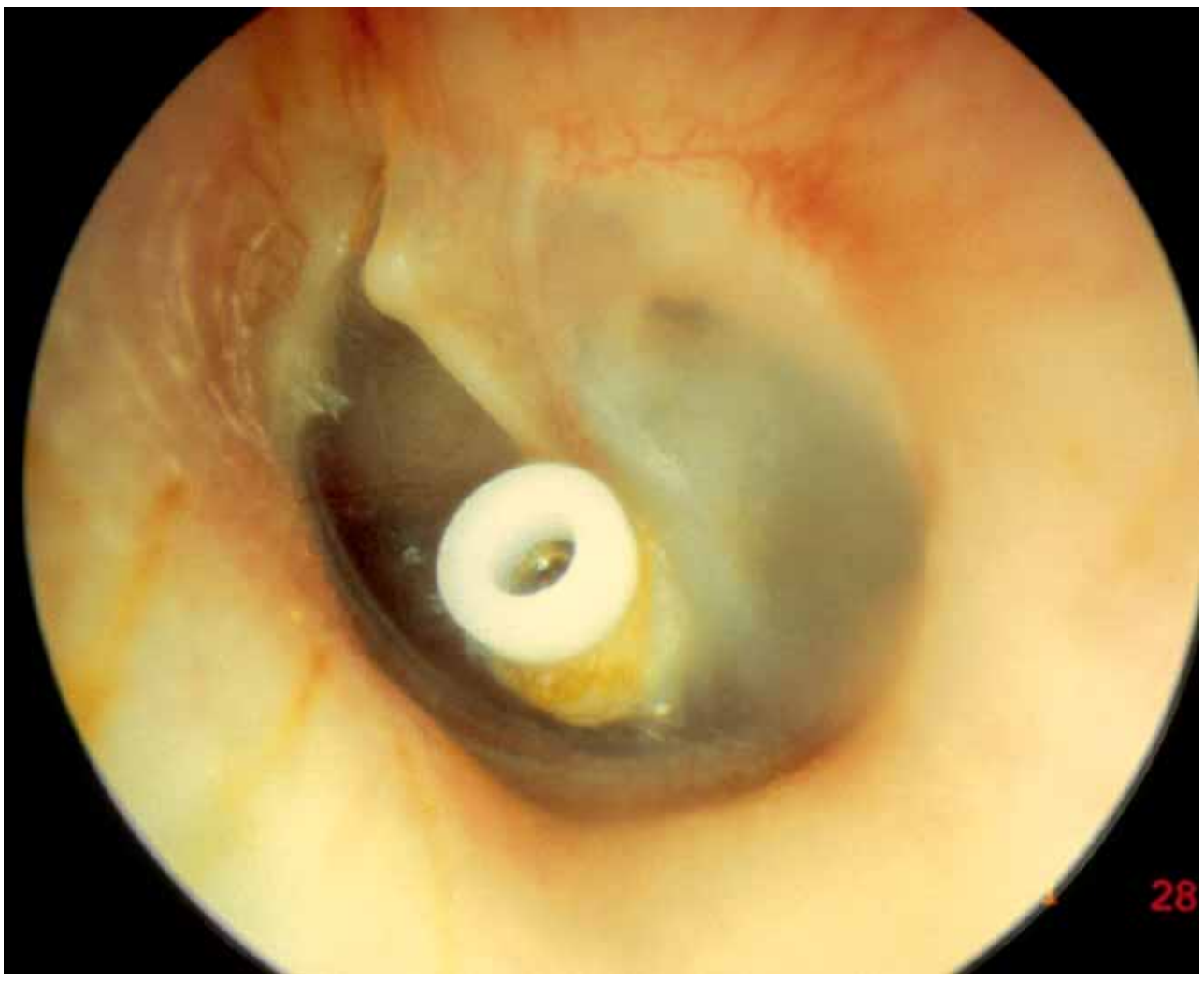

UPDATING OTITIS MEDIA MANAGEMENT

Experts DR PHIL SALE and DR NIRMAL PATEL advise on recent changes and controversies in managing otitis media.

MEASURES to manage and prevent otitis media — such as antibiotics and vaccines — may, in themselves, be driving the need to change the approach to managing this condition. In this article, we examine the evolving role of antibiotics, the impact of vaccines, the changing complications of acute otitis media and we review the indications for grommets.

What role for antibiotics?

The use of antibiotics in acute otitis media in children over two years of age is controversial due to the high rate of spontaneous symptom resolution.

Only modest benefits have been demonstrated for antibiotic treatment of acute episodes in children aged over two, with estimates of a 5% improvement in symptom resolution at day 2-3.[1]

Data published last year in the *New England Journal of Medicine* suggests a slightly greater benefit in those aged 6-23 months, but the study methodology has been criticised by many.[2]

Children treated with antibiotics also have higher rates of carriage of resistant pneumococcus in their nasopharynx — a change evident across whole populations, with significantly fewer cases of resistant pneumococcus in populations where routine antibiotic treatment of acute otitis media is discouraged.

Guidelines produced by the American Academy of Pediatrics (AAP) and the American Academy of Family Physicians (AAFP) in 2004 recommend a period of watchful waiting in selected children with otitis media (table 1).

Antibiotic treatment is generally reserved for the very young (younger than two years of age) and especially when these children display more severe symptoms and signs of infection.

However, follow-up studies in the US and Scandinavia have demonstrated very poor adherence to these guidelines, usually attributed to perceived parental pressure.

In children with recurrent acute otitis media (rAOM), the evidence for prophylactic low-dose antibiotics is poor.

Initial estimates of the efficacy of antibiotic prophylaxis suggested a 1.5 episode, per person, per year reduction in episodes of rAOM, while some later work has suggested no significant difference at all.

Further, this minimal effect is in the context of the potential for side effects of medications and the development of resistant organisms.

In fact, more recent studies have suggested that the development of antimicrobial resistance in the three most common bacterial species that contribute to rAOM — pneumococcus, haemophilus and moraxella species — may account for the reduced efficacy of prophylactic antibiotics.[4-6]

What impact have vaccines had?

The introduction of pneumococcal conjugate vaccines has changed the flora involved in otitis media.

Prior to the introduction of pneumococcal vaccination in infants, it was recognised that pneumococcus species played a role in 30-50% of cases of acute otitis media.

The introduction of pneumococcal conjugate vaccines has changed the flora involved in otitis media.

It was also known that a small number of the known pneumococcal serotypes accounted not only for most cases of acute otitis media but also invasive pneumococcal infections.

Early attempts at vaccination in infants and children using polysaccharide vaccines demonstrated a moderate, temporary efficacy.

The long-term nasopharyngeal carriage of vaccine serotypes was not prevented and the approximately 50% reduction in cases of acute otitis media only lasted for six months after vaccination.

Protein conjugate vaccines had a greater potential immunogenicity in infants, but the number of serotypes that could be covered within a single vaccine was fewer than for a polysaccharide vaccine.

Within these constraints, the heptavalent pneumococcal conjugate vaccine (7-PCV — Prevenar, Wyeth) was developed.

The serotypes included in the vaccine accounted for up to 70% of cases of acute otitis media in the US at the time of development.

Infant vaccination programs became common in the US in the early 2000s, with the vaccine added to the Australian childhood immunisation schedule in 2005.

The overall burden of acute otitis media was thought to decrease by 6-7% after introduction of 7-PCV vaccination programs in study communities in California and Finland — a much smaller effect than the observed reduction in invasive pneumococcal disease.

Vaccine serotypes were often eliminated from vaccinated children, but other serotypes and other organisms largely filled the void left by the absence of 7-PCV serotypes.

For several years, nontypeable *Haemophilus influenzae* (NTHi — distinct from *Haemophilus influenza* type B – Hib) became the most commonly identified causative organism in acute otitis media, with *Moraxella catarrhalis* the second most common.

More recently, however, pneumococcus has caught up to NTHi in causation of acute otitis media due to increased rates of infection due to non-vaccine serotypes such as 6A, 6C and 19A.

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One worrying trend is high levels of antibiotic resistance, particularly in serotype 19A, which has also been causing a large proportion of invasive pneumococcal disease in the Australian population recently.[7]

Further pneumococcal conjugate vaccines have been developed — 10-PCV (Synflorix, GlaxoSmithKline) and then 13-PCV (Prevnar 13, Pfizer) — each with additional serotypes added after their emergence as pathogens.

Prevenar 13 has recently superseded Prevenar in the Australian Childhood Immunisation Schedule and, importantly, includes serotype 19A.

Table 3. Current indications for insertion of a middle ear ventilation tube*

Chronic otitis media with effusion (OME)	OME — Unilateral middle ear effusion persisting for six months, or bilateral effusion persisting for three months.
Recurrent acute otitis media (rAOM)	Three or more episodes in six months or four or more episodes in 12 months.
Recurrent OME	Cases where effusions do not persist long enough to be considered chronic, but the recurrent nature means that the cumulative period with effusion is greater than six months in 12.
Complicated AOM	Placement of a ventilating tube in AOM with suppurative complications allows longer-term drainage as well as facilitating delivery of ototopical medications.
Eustachian tube dysfunction	Placement of ventilating tubes to relieve symptoms of eustachian tube dysfunction remains a controversial topic. However, placement of a ventilating tube as, or to facilitate, surgical treatment of middle-ear disease caused by eustachian tube dysfunction is well accepted.
Barotrauma	Prevention of recurrent barotrauma, during activities such as hyperbaric treatment, diving, or flying in patients unable to equalise via their eustachian tube.

*Adapted from reference 13.

Have complications changed?

Some authors have reported an increase in cases of acute mastoiditis complicating acute otitis media in the years following adoption of watchful waiting protocols advised by the AAP/AAFP in 2004.[8,9]

However, more recently, multicentre reviews by Swedish hospitals — where similar watchful waiting practices have been in place since 2000 — demonstrated no increase in the incidence of mastoiditis or other suppurative complications of acute otitis media since the introduction of those practices.[10]

Nevertheless, primary care providers need to be aware of the spectrum of potential complications of severe and partially treated acute otitis media, particularly given that their symptomatology may be altered in the setting of contemporary medical care and widespread antibiotic use (table 2).

Masked mastoiditis is now the precursor to a large percentage of suppurative complications of otitis media (including subperiosteal infection, dural sinus thrombosis, otitis hydrocephalus and intracranial abscess). In such cases, the original otitic symptoms may have been the only clue to an otogenic origin of infection.

Antibiotic treatment can eliminate most classical otitic symptoms (such as otorrhoea, otalgia, fever), meaning that a problem is not identified until the onset of neurologic symptoms and signs including facial nerve paralysis, mental state change, seizure activity, nausea and vomiting.

Masked mastoiditis is now the precursor to a large percentage of suppurative complications of otitis media.

When are grommets indicated?

Although formal recommendations for the use of middle ear ventilating tubes (grommets) remain unaltered since 2004 (table 3), recent work on the long-term outcomes of patients with ventilation tubes inserted for chronic otitis media with effusion (OME) has the potential to alter clinical practice.

In 2007, research published in the *NEJM* suggested that in otherwise healthy children younger than three, the period of watchful waiting prior to insertion of ventilating tubes for OME can be extended from the typical three months to nine months without any measurable detrimental effect on cognitive, psychosocial, auditory processing or speech measures.[12]

However, as the period of watchful waiting is extended, recognising children at higher risk of developing speech and language disorders is important to avoid delay in ventilation tube insertion.

The research group's interpretation of their data caused some concern, with others pointing out that the rigorous selection criteria in the study meant that only children who were already at a very low risk of developmental sequelae (otherwise healthy children, most of them with only unilateral effusions and thus

Table 1. American Academy of Pediatrics recommendations for antibiotic treatment of acute otitis media in children.[6]

AGE	Certainty of AOM Diagnosis			
	CERTAIN		UNCERTAIN	
	Severe otalgia or T≥ 39°C	*Mild otalgia and T<39°C*	*Severe otalgia or T≥ 39°C*	*Mild otalgia and T<39°C*
Less than 6 months	Antibiotics	Antibiotics	Antibiotics	Antibiotics
6 months — 2 years	Antibiotics	Antibiotics	Antibiotics	Watchful waiting
More than 2 years	Antibiotics	Watchful waiting	Watchful waiting	Watchful waiting

Table 2. Intracranial and extracranial complications of acute otitis media

- **Meningitis**
- **Bezold abscess***
- **Facial nerve paralysis**
- **Suppurative labyrinthitis**
- **Mastoiditis**
- **Masked mastoiditis**
- **Subperiosteal abscess**
- **Dural sinus thrombosis**
- **Otitic hydrocephalus**
- **Intracranial abscess**

* Erosion through the bone of the mastoid tip causing suppuration within the superior portion of the sternocleidomastoid muscle

normal hearing in their unaffected ear) were included.

These low-risk children are generally in the minority of children considered for surgical management of their ear disease.

Also, OME does not generally exist on its own, and most children being considered for insertion of ventilating tubes for OME already qualify for ventilating tubes on other criteria, generally recurrent acute otitis media.

Overall, when indicated, the evidence for using ventilating tubes for either recurrent acute otitis media or OME in children, all indicate significant improvements in disease-specific quality of life.[13]

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