Parents worry a lot about their children having ear infections; they think such infections are very dangerous. Accordingly, they often bring their children in to see the family doctor.

In the middle of a typical Wednesday morning clinic, Mrs Green, a white, 31-year-old, married mother, brings her 3-year-old daughter, Amy, to see you. Mom says that Amy has been complaining about a pain in her left ear, and pulling at that ear, for 2 days. She has not had a cough or a runny nose, but she might have had a slight fever.

Amy was born by normal vaginal delivery and has been a healthy child. Her record shows that she has been seen only twice in your clinic, once for otitis media (treated with an antibiotic) and once for abdominal pain. There is no record of hospitalization or serious illness.

Epidemiology and population at risk

Acute otitis media (AOM) is predominantly a disease of children; you will rarely see an adult with it. After the common cold, it is the second most common reason why children are brought to their FPs. 1 About 30% of children younger than 3 years of age visit their FPs with AOM each year, and by their third birthdays 80% to 90% of children have experienced AOM. 2 The peak incidence is between 6 and 15 months; after 5 years of age, the incidence rate drops rapidly. Attendance at a day-care centre or nursery school greatly increases the risk of AOM; other risk factors are white ethnic origin, male sex, enlarged tonsils and adenoids, a previous history of AOM, bottle feeding, use of a dummy or soother, parental smoking, a family history of AOM, 3 and the presence of anatomic disorders of the nasopharynx such as cleft palate 4 and Down syndrome. 5

As Amy is in the age group most likely to experience AOM, and she has a documented previous attack of AOM. Amy is white, but has no predisposing abnormal anatomical features. You do not know whether her mother smokes, whether Amy goes to day care, or whether the family is prone to ear infections.

What else could it be?

Acute otitis media is far and away the most common cause of earache in children, but you stop to consider other possibilities—mostly mild but some potentially serious: foreign body, coryza causing eustachian tube blockage, mumps, otitis externa, tender cervical nodes, temporo-mandibular joint pain, cervical spine pain, pharyngeal tumours, mastoiditis, meningitis, dental pain, and sinus pain.

Figure 1 shows that otitis media, otitis externa, and the common cold cause most earaches in children. In primary care, other causes are rare.

Alarm symptoms. Amy is not known to have been in contact with any serious infectious diseases; she does not attend day care. Mom cannot think of any toy or small item that is missing, and the pain did not come on suddenly. Amy has not been unusually drowsy or had a high fever. The pain is restricted to her ear on one side.
**Alarm signs.** Amy has no rash, neck stiffness, or unusual drowsiness; she seems alert. Her ear is not running, and she does not look particularly ill.

*You ask more questions—the mother is a non-smoker, the family is not prone to ear infections. Mrs Green says her daughter has not complained of neck, sinus, or throat pain. Amy has not vomited.*

**Clinical examination.** Amy is quiet but is alert and looks quite well to you. Her temperature is 37.8°C; she has a runny nose; her throat looks normal, and there are no swollen neck glands. Your otoscopic examination reveals that her left tympanic membrane looks redder and less reflective than her right one, but you do not see bulging, retraction, or fluid behind the eardrum. There is no perforation or discharge. Her face, mouth, and throat look normal. Your examination reveals no foreign body. There is no swelling in front of her ears; the mastoids, temporomandibular joints, and maxillary sinuses are not tender. Her cervical glands are normal in size and are not tender. Her teeth and mouth look normal, and you notice that during the examination Amy moves her neck freely.

*You are now fairly confident that no serious cause of the earache is present (or at least not detectable at this stage). You are beginning to think AOM is likely.*

**How sure of your diagnosis are you?** It is difficult to confidently diagnose AOM; there is no criterion standard for diagnosis in primary care. Most studies have used a combination of symptoms and signs to diagnose AOM.6-9 As Table 1 shows, some features make AOM more or less likely.

Your patient has an earache, a cloudy tympanic membrane, and a history of previous AOM, all of which increase the chances of AOM being present. On the other hand, her slightly raised body temperature, the presence of a cold, and the slight redness of her eardrum do not increase the chances.

*You decide that your young patient probably does have AOM. Now you have to think about management.*

**Is it likely to get worse?** The natural history of AOM has been elucidated by the experiences of thousands of placebo-group subjects in the trials of antibiotic treatment.10,11 It has been estimated that in around 80% to 85% of children with AOM, the fever and pain resolve within 2 to 3 days; after 7 days, the absence of all symptoms and signs (except for middle ear effusion) can be expected. These trials for children with AOM showed that very few treated children developed complications, but neither did those children who were given placebo.10,12 Very few suppurative complications occurred either in the placebo or intervention groups.11 Complications of AOM, such as mastoiditis and meningitis, once moderately common, are now extremely rare in developed countries. Administration of antibiotics does not prevent these complications.

Because of the high spontaneous cure rate, there is controversy about the need for antibiotic treatment of AOM. Since a landmark trial done in the Netherlands, which found that only 2.7% of children who were treated with symptomatic relief therapy rather than antibiotics got worse rather than better,13 many reviews of the antibiotic trials for AOM have been done. Typical of these is the Cochrane review that concluded that there is only weak evidence that routine antibiotic treatment improves the clinical course and outcomes of AOM.10 If antibiotics are given to all children as soon as possible after AOM appears, less than 15% of them (who cannot be identified by clinical features) will experience any noticeable benefit, and the benefit will be modest and short-term.10

**Deciding on the best treatment**

**How many children do I have to treat for one to benefit?** To achieve the absence of all signs and symptoms at 7 days, the number needed to treat (NNT) with antibiotics is about 8.11 This means that 7 out of 8 children with AOM either do not need antibiotics or will not respond to them. The NNT to reduce fever and pain at 2 days is about 21. The NNT to avoid contralateral AOM is 17. The NNT to reduce fever and pain using ibuprofen or acetaminophen is about 5.11

<table>
<thead>
<tr>
<th>Table 1. Likelihood ratios for signs and symptoms of AOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEATURE</td>
</tr>
<tr>
<td>-----------------------</td>
</tr>
<tr>
<td>Symptoms</td>
</tr>
<tr>
<td>• Earache</td>
</tr>
<tr>
<td>• Cough</td>
</tr>
<tr>
<td>• Rhinitis</td>
</tr>
<tr>
<td>• Fever</td>
</tr>
<tr>
<td>• Diarrhea or vomiting</td>
</tr>
<tr>
<td>Signs</td>
</tr>
<tr>
<td>• Red TM</td>
</tr>
<tr>
<td>• Very red TM</td>
</tr>
<tr>
<td>• Cloudy TM</td>
</tr>
<tr>
<td>• Bulging TM</td>
</tr>
<tr>
<td>• Retracted TM</td>
</tr>
<tr>
<td>• Reduced TM mobility</td>
</tr>
</tbody>
</table>

AOM—acute otitis media, TM—tympanic membrane.

Data from Hayden and Schwartz,6 Kontiokari et al,7 Heikkinen and Ruuskonen,8 and Uhari et al.9
Trials have shown that ibuprofen and acetaminophen are equally effective in relieving pain and fever.14

**How many children do I have to treat to harm one?** With oral antibiotics, the number needed to produce diarrhea, vomiting, abdominal pain, or rash is about 11.15

**Which is the best antibiotic to use?** If you decide to use an antibiotic for the treatment of AOM, amoxicillin remains the best first-line choice, because it gives adequate coverage of all the bacterial organisms that commonly cause AOM and has relatively few side effects. If amoxicillin is contraindicated or fails, the choice of agent remains unclear—there is no clear contender for second-best agent.14,15 A Cochrane review found that although treatment failure was more likely to occur when an antibiotic course of fewer than 7 days was used, compared with a longer course, at least 17 children would have to be given a longer course to avoid 1 treatment failure.16

**Is it safe to wait and see what happens?** Most children with acute AOM will recover spontaneously. For those who do not, there seems to be no harm in delaying antibiotic treatment for a short time while providing symptomatic relief. There are several good-quality trials that show that if parents are given delayed prescriptions for antibiotics, which they are advised to use only if their children do not improve after a few days, far fewer children will take antibiotics.17

You advise the mother that her daughter has AOM. You tell her that it will most likely improve by itself in a day or so. You suggest that she give Amy ibuprofen to relieve the earache and return to see you in 2 days. The mother says that they will be away from town for 2 days. You provide her with a delayed prescription for amoxicillin, which she can use if required. If, despite antibiotic therapy, Amy still does not improve, Mrs Green should seek further medical advice.

Dr Worrall is Honorary Research Professor in the Department of Family Medicine at Memorial University of Newfoundland in St John’s.

Competing interests
None declared

**Correspondence**
Dr Graham Worrall, Dr W.H. Newhook Memorial Clinic, Family Medicine, Box 449, Whitbourne, NF A0B 3K0, e-mail gworrall@mun.ca

**References**