

## **Ear infections (otitis media) in children**

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**INTRODUCTION** — Ear infections, also called otitis media, are a common problem in children. About 50 percent of infants have at least one ear infection by their first birthday. Ear infections can cause pain in the ear, fever, and temporary hearing loss and general signs such as loss of appetite and irritability. Some children get better without specific antibiotic treatment but most young infants benefit from use of an antimicrobial agent.

This topic will review the definition, causes, symptoms, diagnosis, treatment, and potential complications of ear infections in infants and children.

More detailed information about ear infections is available by subscription. (See "[Acute otitis media in children: Treatment](#)".)

**WHAT IS AN EAR INFECTION?** — Ear infection is also known as acute otitis media (otitis = ear, media = middle). Otitis media is an infection of the middle section of the ear.

Ear infections most often develop after a viral respiratory tract infection, such as a cold or the flu. These infections can cause swelling of the mucous membranes of the nose and throat, and diminish normal host defenses such as clearance of bacteria from the nose, increasing the amount of bacteria in the nose. Viral respiratory tract infections also can impair Eustachian tube function. Normal Eustachian tube function is important for maintaining normal pressure in the ear. Impaired Eustachian tube function changes the pressure in the middle ear (like when you are flying in an airplane). Fluid (called an effusion) may form in the middle ear and bacteria and viruses follow, resulting in inflammation in the middle ear ([figure 1](#)). The increased pressure causes the eardrum to bulge, leading to the typical symptoms of pain and fussiness in young children. (See '[Ear infection symptoms](#)' below.)

**EAR INFECTION SYMPTOMS** — Symptoms of an ear infection in adolescents and older children include ear aching or pain and temporary hearing loss. These symptoms usually come on suddenly.

In infants and young children, symptoms of an ear infection can include:

- Fever (temperature higher than 100.4°F or 38°C, see the Table for how to measure a child's temperature) ([table 1](#))
- Pulling on the ear
- Fussiness or irritability
- Decreased activity
- Lack of appetite or difficulty eating
- Vomiting or diarrhea

**EAR INFECTION DIAGNOSIS** — If you suspect that your child has an ear infection, call your doctor or nurse to see if and when the child should be examined.

Although the exam is not painful, most infants and children do not like having their ears examined. To make the process easier, hold your child in your lap and hug your child's arms and body while the doctor or nurse uses an instrument (otoscope) to look inside the child's ear ([picture 1](#)).

It can be hard to tell for sure if a child has an ear infection. When the clinician is able to see clearly inside the ear and sees all of the typical features of ear infection, the diagnosis is certain. When all of the typical features are not present, the diagnosis is less certain. In this case, the doctor/nurse will work with you to decide what treatment is best. Often cerumen (ear wax) will need to be removed so your doctor or nurse can get a good view of the ear drum.

**EAR INFECTION TREATMENT** — Treatment of an ear infection may include:

- Antibiotics
- Medicines to treat pain and fever
- Observation
- A combination of the above

The "best" treatment depends on the child's age, history of previous infections, and any underlying medical problems.

**Antibiotics** — Antibiotics may be of value for children in whom the diagnosis of ear infection is certain and/or children who have severe symptoms. Antibiotics are of benefit for infants under two years of age in whom the diagnosis of ear infection is certain. Children two years of age and older with mild symptoms may be observed initially and most will heal without antibiotics.

- Antibiotics are usually given to infants who are younger than 24 months or who have high fever or infection in both ears
- Children who are older than 24 months may be treated with an antibiotic or may be able to be observed to see if they improve without antibiotics (see ['Observation'](#) below)

Antibiotics are not given to every child with an ear infection because studies show that many older children with ear infections improve without using antibiotics. Antibiotics can have side effects such as diarrhea and rash, and overusing antibiotics can lead to more difficult to treat (resistant) bacteria. Resistance means that a particular antibiotic no longer works or that higher doses are needed next time.

**Observation** — In some cases, your child's doctor or nurse will recommend that you watch your child at home before starting antibiotics; this is called observation. Observation can help to determine whether antibiotics are needed.

Observation may be recommended in these situations:

- If it is not clear whether the child has an ear infection, based upon the exam
- If the child is older than 24 months
- If ear pain and fever are not severe
- If the child is otherwise healthy

You can give pain-relieving medicines during observation to ease pain. (See ['Pain management'](#) below.)

If your child is being observed rather than treated with antibiotics, you will need to call or go back to the doctor or nurse's office after 24 hours for follow-up. If your child's pain or fever continues or worsens, antibiotics are usually recommended; observation may continue if the child is improving.

**Pain management** — Pain-relieving medicines, including [ibuprofen](#) (Motrin®), [acetaminophen](#) (Tylenol®), or ear drops, such as Auralgan®, which contain a numbing medicine, may be used to reduce discomfort.

**Complementary and alternative medical treatments** — There are a wide variety of complementary and alternative medical (CAM) treatments advertised to treat ear infections. These may include homeopathic, naturopathic, chiropractic, and acupuncture treatments.

There are few scientific studies of CAM treatments for ear infection, and even fewer studies that show CAM treatments to be effective. As a result, these treatments are not recommended for ear infections in children.

**Decongestants and antihistamines** — Cough and cold medicines (which usually include a decongestant or antihistamine) have not been proven to speed healing or reduce complications of ear infections in children. In addition, these treatments have side effects that can be dangerous. Neither decongestants nor antihistamines are recommended for children with ear infections.

**Follow-up** — Your child's symptoms should improve within 24 to 48 hours whether or not antibiotics were prescribed. If your child does not improve after 48 hours or gets worse, call your doctor or nurse for advice. Although fever and discomfort may continue even after starting antibiotics, the child should get a little better every day. If your child appears more ill than when seen by his or her health care provider, contact the provider as soon as possible.

Children who are younger than two years and those who have language or learning problems should have a follow-up ear exam two to three months after being treated for an ear infection. These children are at risk for delays in learning to speak. This follow-up helps to ensure that the fluid collection (which can affect hearing) has resolved. (See '[Ear infection complications](#)' below.)

## **EAR INFECTION COMPLICATIONS**

**Tympanic membrane rupture** — One of the common complications of an ear infection is rupture of the ear drum, also known as the tympanic membrane. The tympanic membrane can rupture when fluid presses on the membrane, reducing blood flow and causing the tissue to weaken. It does not hurt when the membrane ruptures, and many people actually feel better because pressure is released. Fortunately, the tympanic membrane usually heals quickly after rupturing, within hours to days. Rupture of the ear drum is an indication for antibiotic treatment of an ear infection.

**Hearing loss** — The fluid that collects behind the eardrum (called an effusion) can persist for weeks to months after the pain of an ear infection resolves. An effusion causes trouble hearing, which is usually temporary. If the fluid persists, however, it can interfere with the process of learning to speak. (See '[Otitis media with effusion \(serous otitis media\) in children](#)'.)

Effusions usually resolve without any treatment. However, if the effusion persists, the child may need treatment. The decision to treat is based upon how much the effusion affects the child's hearing and the child's risk of speech problems.

Children who are not treated for an effusion should be monitored over time. This includes an ear exam and hearing testing every three to six months until the effusion goes away.

**Treatment** — The best treatment for an effusion that does not resolve is a surgical procedure. During the procedure, fluid is drained from the middle ear by making a small opening in the tympanic membrane (called myringotomy) and placing a tube to maintain the opening (called a tympanostomy tube) ([figure 2](#)). This procedure usually is performed by an ear, nose, and throat surgeon in a hospital while the child is under general anesthesia.

The benefit of surgery is improved hearing. The risks of surgery include a small chance of damage to the tympanic membrane.

**EAR INFECTION PREVENTION** — Some children develop ear infections frequently. Recurrent ear infections are defined as three or more infections in six months, or four or more infections within 12 months. Several treatments can help reduce the risk of recurrent infections, including continuous low dose antibiotics and/or surgical placement of tubes in the ears. (See "[Acute otitis media in children: Prevention of recurrence](#)".)

Some of the vaccines included in the routine childhood vaccine schedule (such as the pneumococcal conjugate vaccine and influenza vaccine) may help to reduce the frequency of ear infections. (See "[Patient information: Vaccines for infants and children age 0 to 6 years](#)".)

**Preventive antibiotics** — Children who have recurrent ear infections are sometimes treated with a preventive regimen of a daily antibiotic during the fall, winter, and early spring months. Although preventive antibiotics might help reduce the number of ear infections, it is still possible for the child to get an infection. There is also a risk that taking antibiotics for a long period of time can lead to bacteria that are resistant to standard antibiotics. Talk to your child's doctor or nurse about the potential benefits and risks of this approach.

**Surgery** — Some studies show that having surgery to place tympanostomy tubes in the ears helps to prevent recurrent ear infections. Other studies show no benefit of tympanostomy tubes for prevention of recurrences ([figure 2](#)) [1]. Talk to your child's doctor about the risks and benefits of surgery.

**WHERE TO GET MORE INFORMATION** — Your child's healthcare provider is the best source of information for questions and concerns related to your child's medical problem.

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