**CHIA MEDICAL TEAM RESOURCES**

OTITIS MEDIA (MIDDLE EAR INFECTION)

 Acute otitis media is an infection of the middle ear. Middle ear infections are very common in children, and most kids will get at least one infection before the age of 3 years. The ear is responsible for hearing and balance and is made up of three parts – the outer ear, the middle ear and the inner ear.

Hearing begins when sound waves that travel through the air reach the outer ear, or pinna, which is the part of the ear that's visible. The sound waves then travel from the pinna through the ear canal to the middle ear, which includes the eardrum (a thin layer of tissue) and three tiny bones called ossicles. When the eardrum vibrates, the ossicles amplify these vibrations and carry them to the inner ear. The inner ear translates the vibrations into electric signals and sends them to the auditory nerve, which connects to the brain. When these nerve impulses reach the brain, they're interpreted as sound.

To function properly, the middle ear must be at the same pressure as the outside world. This is taken care of by the eustachian tube, a small passage that connects the middle ear to the back of the throat behind the nose. By letting air reach the middle ear, the eustachian tube equalizes the air pressure in the middle ear to the outside air pressure. (When your ears "pop" while yawning or swallowing, the eustachian tubes are adjusting the air pressure in your middle ears.) The eustachian tube also allows for drainage of mucus from the middle ear into the throat.

Sometimes, the eustachian tube may malfunction. For example, when someone has a cold or an [allergy](http://kidshealth.org/parent/medical/allergies/allergy.html) affecting the nasal passages, the eustachian tube may become blocked by congestion in its lining or by mucus within the tube. This blockage will allow fluid to build up within the normally air-filled middle ear. Bacteria or viruses that have entered the middle ear through the eustachian tube also can get trapped in this way. These germs can breed in the trapped fluid, eventually leading to an ear infection.

***What is Otitis Media:***

Inflammation and presence of fluid in the middle ear is known as otitis media or a middle ear infection. There are a few different types of otitis media:

1. Acute otitis media – prescence of fluid, typically pus, in the middle ear with symptoms of pain, redness of the eardrum and fever
2. Chronic otitis media – fluid in the middle ear is present for 6 or more weeks
3. Otitis media with effusion – fluid in the middle ear is temporary and not necessarily infected

It is important to know which type of otitis media a child has, because it affects treatment options.

***Who gets otitis media?***

Children are more likely to develop ear infections because their Eustachian tubes are shorter and more horizontal than an adult, which allows bacteria and viruses to get the middle ear more easily. Ear infections occur more commonly in boys than girls, in kids whose families have a history of ear infections and during the winter season when upper respiratory tract infections or colds are more frequent.

***What are the symptoms of otitis media?***

Acute otitis media can cause significant pain and discomfort to children. In most cases, the symptoms last for about 3 days, before the infection starts to go away on its own. The signs and symptoms of acute otitis media may range from very mild to severe:

* The fluid in the middle ear may push on the eardrum, causing ear pain. An older child may complain of an earache, but a younger child may tug at the ear or simply act irritable and cry more than usual.
* Lying down, chewing, and sucking can also cause painful pressure changes in the middle ear, so a child may eat less than normal or have trouble sleeping.
* If the pressure from the fluid buildup is high enough, it can cause the eardrum to rupture, resulting in drainage of fluid from the ear. This releases the pressure behind the eardrum, usually bringing relief from the pain.
* Acute otitis media will can also include:
	+ Fever
	+ Nausea and vomiting
	+ Dizziness
* Otitis media with effusion often has no symptoms. In some kids, the fluid that's in the middle ear may create a sensation of ear fullness or "popping."

In Otitis Media the tympanic membrane (ear drum) will be red and bulging because of fluid buildup and inflammation

***Infection control precautions:***

Otitis Media is not contagious, so no infection control precautions need to be taken.

***Treatment:***

The treatment for Acute Otitis Media is antibiotics and managing symptoms. However middle ear infections often go away on their own within 2 or 3 days, even without any specific treatment. In uncomplicated cases, it is appropriate to wait for a few days to see if the infection goes away on its own.

Antibiotic Treatment:

Most kids will not need to have antibiotics for a mild middle ear infection. However, if a child has any of the following they need to see a doctor and be treated with antibiotics:

1. If they are younger than 6 months old
2. If they get frequent ear infections (more than 2 times in a 12 month period)
3. If they have another condition like cleft palate, Down Syndrome or any other condition that suppresses the immune system
4. If the child’s illness is getting worse, or has not improved after 3 days

Amoxicillin is the most common antibiotic prescribed for otitis media. However, some children might be allergic to amoxicillin. In this case, erythromycin or cotrimoxazole should be prescribed

* 4 weeks to 3 months: 20 to 30 mg/kg/day in divided doses every 12 hours
4 months to 12 years: 20 to 50 mg/kg/day in divided doses every 8 to 12 hours; acute otitis media due to highly resistant strains of Streptococcus pneumonia may require doses of 80 to 90 mg/kg/day orally divided into 2 equal doses 12 hours apart
* erythromycin for a child aged 1 year or older (10 kg) 4 dd 125 mg, for a child aged 4 years or older (20 kg) 4 dd 250 mg, and for a patient aged 12 years or older 4 dd 500 mg
* cotrimoxazole for a child aged 1 year or older (10 kg) 2 dd 180 mg, for a child aged 4 years or older (20 kg) 2 dd 360 mg, and for a patient aged 12 years or older 2 dd 960 mg

If a child’s symptoms have not improved after 24-48 hours, they should go back to the doctor.

Symptomatic treatment:

Middle ear infections can be very uncomfortable for children, and can cause pain and distress. It is important to manage these symptoms.

Paracetamol/Acetaminophen can be given to children to relieve symptoms of pain and fever. The dosage of paracetamol for children is 15mg/kg every 4-6 hours.

For example, a child that weighs 10kg can have 150mg of paracetamol every 4-6 hours.

#### *What are the complications of an otitis media infection?*

#### Sometimes, middle ear infections can cause further complications. Most of the complications are caused by the infection spreading to other parts of the ear. Listed here are some of the most common, and important things to look out for.

#### Burst Eardrum (Ruptured Tympanic Membrane)

#### A burst eardrum is a hole or tear in the eardrum. When someone has otitis media, there is a buildup of fluid behind the eardrum, in the middle ear. This extra fluid causes pressure against the ear drum to increase, and the membrane can burst. Symptoms are a sudden increase in pain, fluid coming from the ear, the child may hear noises or hearing loss. The eardrum will normally heal itself in about 2 months with no treatment. During that time it is very important that the child does not get water in their ear, so they shouldn’t go swimming until it is healed.


#### Hearing Loss:

#### There are 3 very small bones in the middle ear (called the malleus, stapes and incus) that transmit sound vibrations from the ear drum to the inner ear. This is how people can hear.


#### When the middle ear is filled with fluid, as happens in an otitis media infection, then the sound vibrations are not transmitted very well. This can mean that things sound muffled, or different to children. This will normally go away when the infection goes away, though in some children their hearing will be affected for a few weeks after the infection. This is not normally something to be worried about.

#### But children who get ear infections very often are at risk of causing permanent damage to their ear and their hearing. The build up of fluid can cause damage to the ear drum, the bones of the ear or the hearing nerve. Once this happens, damage cannot be repaired and the child will likely have some type of permanent hearing loss in the affected ear. The child will still be able to hear sounds, but it will be different from before, and may cause them problems at school, or problems with their speech development.

#### If a child gets ear infections often, then they need to be treated quickly with antibiotics. Sometimes in these children they will do a surgery to insert drainage tubes that can drain the fluid that occurs during a middle ear infection, reducing the amount of damage. Older children and teenagers are less likely to get ear infections, so it is likely that as the child ages they will get less and less infections. You might not be able to stop them from getting frequent ear infections, but you can limit the long term damage to their ear and hearing.

#### Mastoiditis:


#### This is the most common complication of Otitis Media, but it is still rare for children to get it. Mastoiditis is caused when the infection spreads from the middle ear to the area of bone underneath.

#### Symptoms will include a worsening earache, fluid coming from the ear, high temperature, hearing loss, headache and redness/swelling in or around the ear. Mastoiditis needs to be treated with antibiotics.

### Cholesteatoma:

This is an abnormal pocket of skin (cyst) that can develop as a complication of frequent middle ear infections. Symptoms of cholesteatoma are dizziness, hearing loss and fluid coming from the ear. Cholesteatoma is normally treated through surgery to remove the cyst.

Cholesteatoma

Labyrinthitis:

In this case, the infection spreads from the middle ear to the inner ear and causes inflammation in something called the ‘labyrinth’. The labyrinth is a very delicate part of the inner ear. Symptoms of Labyrinthitis are dizziness, vertigo (the feeling that world is moving or spinning around you), loss of balance and hearing loss. This infection is treated with medication to control the dizziness and an antibiotic to kill the infection.

Meningitis:

In very rare cases, the infection from the middle ear can spread to the meninges, which the protective outer layer of the brain. This is a very serious infection and needs to be treated immediately.

Symptoms of meningitis are severe headache, high temperature, stiff neck, sensitivity to light and a blotchy red rash that does not fade or change colour when you press on it.

Meningitis is treated with intravenous (IV) antibiotics. This means that the antibiotics are delivered straight to the blood stream, rather than oral antibiotics which have to be absorbed into the blood stream through the stomach or intestines. IV antibiotics work faster and are normally stronger doses of medication. Normally meningitis is treated with an antibiotic called Cefotaxime. The child will need at least 48 hours of IV antibiotics. The Cefotaxime dose is:

* Children less than 12 years old or less than 50 kg: 200 mg/kg/day IV divided into 3 doses over 24 hours.
	+ \*for example, a 5 year old child who weights 20 kg should be given 4000mg per day or 1300mg every 8 hours\*
* Children over 12 years old or weighing more than 50kg: 2 grams every 6-8 hours