

Otitis Media (Middle Ear Infection)

An infection behind the eardrum in the middle ear that fills the space with infected fluid, blocks sound waves, and causes sharp ear pain.

THE STORY IN ONE SENTENCE

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"A germ invades the space behind the eardrum, trapping pus inside, swelling the drum, and sometimes making it burst."

Normal anatomy — the body's job

The middle ear is a marble-sized air pocket behind the eardrum that holds three tiny bones (the malleus, incus, and stapes—together called the ossicles). When sound waves hit the eardrum, the drum vibrates and rocks these bones, which pass the vibration into the inner ear so you can hear. To keep the air pressure equal on both sides of the drum, a narrow tube called the eustachian tube connects the middle ear to the back of the throat. Every time you swallow or yawn, that tube opens for a split second to let air in and any thin fluid out, keeping the middle ear dry and the drum loose enough to vibrate well.

BODY'S JOB

The middle ear's job is to take sound waves arriving at the eardrum and amplify them (make them stronger) so they can move the fluid in the inner ear and reach the hearing nerve. The three bones act like a lever system that boosts the sound. The eustachian tube's job is to keep the middle ear at the same air pressure as the outside world and to drain away any moisture, so the space stays airy and the drum stays flexible.

1. Sound waves travel down the ear canal and strike the eardrum (tympanic membrane).
2. The eardrum vibrates and moves the malleus (hammer bone), which is attached to the inside of the drum.
3. The malleus rocks the incus (anvil bone), which rocks the stapes (stirrup bone).
4. The stapes footplate pushes on the oval window, a membrane-covered opening into the fluid-filled inner ear.

5. That push creates waves in the inner-ear fluid, bending hair cells that send electrical signals up the hearing nerve to the brain.
6. Meanwhile, the eustachian tube opens briefly with each swallow, letting a puff of air into the middle ear and letting any thin secretions drain down into the throat, keeping the middle-ear space dry.

What breaks

A cold, flu, or allergy makes the lining of the nose and throat swell. That swelling pinches the eustachian tube shut (or mostly shut), so air can't get in and fluid can't drain out of the middle ear. Mucus and watery fluid start to pool in the middle-ear space. Bacteria or viruses that were sitting in the nose or throat climb up through the tube into that trapped fluid and multiply. The infection creates thick, cloudy pus, and white blood cells rush in to fight the germs, making even more fluid. The middle ear fills up like a water balloon, pressing the eardrum outward and stretching it, which hurts. The drum turns red and bulges. Because the space is now full of liquid instead of air, the ossicle bones can't vibrate well, so hearing becomes muffled.

CLINICAL TERM

Acute otitis media (AOM): bacterial or viral infection of the middle ear with pus-filled (purulent) a fluid collection (effusion), inflammation, and increased intratympanic pressure.

How the body compensates

Your body tries to clear the infection by sending white blood cells into the middle ear to kill germs and by increasing blood flow to bring immune proteins. The eustachian tube may briefly pop open during a yawn or swallow and let a little fluid out. If the pressure gets too high, the eardrum perforates (tears), which releases the pus and drops the pressure, often making the pain suddenly better. Most mild infections resolve on their own as the immune system wins and the eustachian tube reopens once the cold improves. Antibiotics help by killing bacteria faster when the body can't clear the infection alone.

1. {'step': 'White blood cells (neutrophils) flood the middle ear to attack bacteria, creating pus.', 'why': 'This immune response fights the infection but also adds to the fluid volume and pressure.'}
2. {'step': 'Blood vessels in the middle-ear lining dilate and leak plasma, trying to wash out germs and deliver antibodies.', 'why': 'More fluid means more swelling and pressure, but it also brings infection-fighting proteins.'}

3. {'step': 'The eustachian tube may briefly open when you swallow hard or yawn, letting a small amount of fluid drain into the throat.', 'why': 'Draining even a little fluid lowers pressure and can start to relieve pain, though the tube usually stays mostly blocked until the upper respiratory infection improves.'}
4. {'step': 'If pressure climbs too high, the eardrum perforates (usually at the thinnest spot), and pus drains out through the ear canal.', 'why': 'This acts like a pressure-relief valve: pain drops immediately, and the hole usually heals on its own within days to weeks once the infection clears.'}
5. {'step': 'Over several days, the immune system kills off the bacteria (or the virus runs its course), inflammation calms down, and fluid is slowly reabsorbed or drains away as the eustachian tube reopens.', 'why': 'The body can often clear the infection without antibiotics if the child is older than two, symptoms are mild, and only one ear is affected; otherwise antibiotics speed recovery and prevent complications.'}

Domino effect

1. A cold, flu, or allergy inflames the nose and throat, swelling the eustachian tube and pinching it shut. — When the tube can't open, air pressure in the middle ear drops and mucus can't drain, creating a stagnant pool where germs thrive.
2. Bacteria or viruses from the nasopharynx (back of the nose and throat) travel up the blocked eustachian tube into the middle ear and multiply in the trapped fluid. — The warm, moist, stagnant environment is perfect for germs; common culprits are *Streptococcus pneumoniae*, nontypeable *Haemophilus influenzae*, and *Moraxella catarrhalis*.
3. The infection triggers inflammation: the middle-ear lining swells, leaks fluid, and white blood cells pour in, turning the fluid cloudy and thick (purulent a fluid collection (effusion)). — Your immune system is fighting the germs, but the battle creates pus and more swelling, which raises pressure inside the sealed middle-ear space.
4. Pressure builds and pushes the eardrum outward, stretching it; the drum turns red and bulges, causing sharp, throbbing ear pain. — The eardrum has pain nerves, so stretching it hurts; the pain is often worse at night when lying flat, because more blood pools in the head and raises middle-ear pressure even more.
5. Fluid filling the middle ear damps the vibrations of the ossicle bones, so sound waves can't pass through well, and hearing becomes muffled (conductive hearing loss of roughly 20–30 decibels). — Sound travels poorly through liquid compared to air; the child may seem inattentive, turn up the TV, or not respond to soft sounds.
6. If untreated or if pressure is very high, the eardrum perforates—a small tear opens and thick yellow or cloudy fluid drains into the ear canal. — The tear relieves pressure instantly, so pain often drops; the hole usually heals on its own in days to weeks, but it can leave a permanent perforation if infections happen over and over.

7. In some children, fluid stays in the middle ear for weeks or months after the infection clears (otitis media with a fluid collection (effusion), or 'glue ear'), keeping hearing muffled. — The eustachian tube is still slow to open, so the thick fluid can't drain; prolonged hearing loss during ages one to three can delay speech and language development.
8. Rarely, infection spreads beyond the middle ear into the mastoid bone behind the ear (mastoiditis), into the inner ear (labyrinthitis, causing dizziness and severe hearing loss), or even into the brain (meningitis or brain abscess). — These serious complications happen when bacteria break through thin bone walls or travel along veins; they require urgent intravenous antibiotics and sometimes surgery.

Symptoms · what the patient feels, and why

- Ear pain (otalgia) that gets worse when lying down: Fluid and pus trapped behind the eardrum press outward on it, stretching it tight like a balloon being blown up. When you lie flat, more blood flows to the head and increases that pressure even more, making the pain sharper.
- Fever (usually 100–104°F): White blood cells (the body's soldiers) flood into the middle ear to fight the bacteria or virus causing the infection. These immune cells release chemicals called pyrogens (fever-makers) that turn up the body's thermostat in the brain, raising temperature to help kill the germs.
- Trouble hearing or feeling like sounds are muffled: The middle ear normally has air in it, which lets the tiny bones (ossicles) inside vibrate freely and carry sound from the eardrum to the inner ear. When thick fluid or pus fills that space instead, it weighs down and dampens those bones so they can't vibrate well—like trying to ring a bell underwater.
- Fluid draining from the ear (otorrhea): Pressure from pus and fluid inside the middle ear can tear a small hole in the eardrum (called a perforation). Once the drum ruptures, the trapped fluid leaks out through the ear canal. Oddly, this often makes the pain suddenly drop because the pressure is released.
- Pulling or tugging at the ear (especially in babies and toddlers): Young children who cannot yet say 'my ear hurts' will pull, rub, or bat at the painful ear because the discomfort is so bothersome. It is their way of showing you where it hurts.
- Fussiness, irritability, or trouble sleeping: Pain from the swollen, infected middle ear keeps the child uncomfortable and unable to settle. Lying down makes the pain worse, so babies wake frequently and cry because they cannot get comfortable.
- Loss of balance or clumsiness: The inner ear (right next door to the middle ear) houses the vestibular system—tiny fluid-filled loops that tell the brain which way is up. If infection or fluid spreads or presses on that area, the balance signals get scrambled, making the person unsteady or dizzy.

- Vomiting or loss of appetite: Severe ear pain and fever can upset the stomach through shared nerve pathways (the vagus nerve connects the ear and the gut). Nausea and vomiting may follow. Also, chewing and swallowing can tug on structures near the infected ear, making eating painful, so children refuse food.
- Bulging, red eardrum seen on exam (hallmark finding): Pus and inflamed tissue behind the eardrum push it outward so it bows like a drum head being hit from behind. Extra blood vessels (redness) rush to the area to fight infection, turning the normally pearly-gray drum bright red or pink.
- Severe headache, stiff neck, or confusion: If bacteria break through the thin bone wall separating the middle ear from the brain, infection can spread to the membranes covering the brain (meningitis) or form a pocket of pus inside the skull (intracranial abscess). This is rare but life-threatening.

Focused exam

- Red, bulging eardrum (tympanic membrane) that doesn't move well when you blow a puff of air at it: A healthy eardrum is see-through and moves like a drum-skin when air pushes on it. When the middle ear fills with infected fluid (pus and mucus), the drum bulges outward and can't bounce back—this tells you infection is trapped behind it.
- Fluid level or air bubbles visible behind the eardrum: Seeing a horizontal line of fluid (like water in a glass tipped sideways) or tiny bubbles means liquid has collected in the space that should be air-filled. This happens when the eustachian tube (the little tunnel from the ear to the back of the throat) gets blocked and fluid can't drain out.
- Ear drainage (otorrhea)—thick yellow, white, or bloody fluid coming out of the ear canal: Drainage means the eardrum has torn (perforated) from pressure, and pus is leaking out. The tear usually heals on its own in a few days, and oddly, once the fluid drains the pain often gets better because pressure drops.
- Swelling, redness, and tenderness of the bone behind the ear (mastoid area): If the infection spreads from the middle ear into the mastoid bone (the hard bump you feel behind your ear), it can cause a serious complication called mastoiditis. This needs urgent treatment because the infection can spread to the brain or blood.
- Child tugging or rubbing the ear, especially in babies and toddlers who can't yet say 'my ear hurts': Young children often can't use words to tell you where it hurts, so they pull at the sore ear or cry more when lying flat (because lying down increases pressure in the middle ear and makes the pain worse).
- Hearing seems muffled or the child doesn't respond to soft sounds: Fluid in the middle ear blocks sound waves from reaching the inner ear, like trying to hear underwater. This temporary hearing loss usually goes away once the fluid clears, but if it lasts weeks or months it can slow speech development in young kids.

Diagnostics · every test answers a question

- Pneumatic otoscopy (looking in the ear with a special light that puffs air) → Is the eardrum red and bulging, and does it move normally when air pressure changes?
- Tympanometry (a quick test that bounces sound off the eardrum to measure how stiff it is) → Is there fluid in the middle ear blocking normal movement of the eardrum?
- Tympanocentesis (using a tiny needle to draw fluid from behind the eardrum) → What exact germ is causing the infection, and will it respond to the antibiotics we're using?
- CT scan of the temporal bone (detailed X-ray slices of the skull around the ear) → Has the infection spread into the mastoid bone or caused an abscess (pocket of pus) near the brain?
- Complete blood count (CBC) → Is the white blood cell count high, suggesting a bacterial infection rather than a virus?
- Hearing test (audiometry) after the infection clears → Did hearing return to normal, or is fluid still sitting in the ear (causing otitis media with a fluid collection (effusion))?

Treatment logic

- High-dose amoxicillin by mouth (80–90 mg per kilogram of body weight per day, split into two doses) for 5–10 days → Amoxicillin kills the most common bacteria that cause ear infections—*Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Moraxella catarrhalis*. The high dose is needed because some pneumococcus strains have built resistance to lower doses. Pain and fever usually drop within 48–72 hours if the drug is working.
- Amoxicillin-clavulanate (Augmentin) if the child was on amoxicillin in the past 30 days, has both eyes infected (conjunctivitis), or isn't better after 48–72 hours → Clavulanate blocks the beta-lactamase enzyme that resistant bacteria use to destroy amoxicillin, so this combination works against strains that regular amoxicillin can't touch. It's the next step when first-line treatment fails.
- Ibuprofen (10 mg/kg every 6–8 hours) or acetaminophen (15 mg/kg every 4–6 hours) for pain and fever → These medicines lower fever by resetting the brain's temperature control and reduce pain by blocking chemicals (prostaglandins) that make nerves more sensitive. Pain relief usually starts within 30–60 minutes and is often the most important treatment for the child's comfort in the first 1–2 days.
- Watchful waiting (no antibiotics right away) for children 6 months to 2 years with ONE ear involved and only mild symptoms, or kids over 2 years with mild symptoms in one or both ears → Many ear infections clear up on their own in 2–3 days as the immune system fights off the germs. Skipping antibiotics when it's safe cuts down on side effects (diarrhea, rash, yeast infections) and slows the spread of resistant bacteria in the community.

- Tympanostomy tubes (tiny plastic or metal tubes surgically placed through the eardrum) for children with recurrent infections (≥ 3 episodes in 6 months or ≥ 4 in 12 months) or fluid that won't clear for 3+ months with hearing loss → The tube creates a permanent air channel through the drum, so the middle ear stays dry and ventilated—like opening a window in a damp basement. This prevents fluid buildup and cuts the number of infections dramatically. Tubes usually fall out on their own after 6–12 months as the eardrum pushes them out while healing.
- Single-dose ceftriaxone injection (50 mg/kg, up to 1 gram) if the child is vomiting and can't keep oral medicine down, or when you're unsure the family can give pills at home → One shot delivers a powerful antibiotic that stays in the body long enough to start killing bacteria, buying time until the child can take pills. It's especially useful in under-resourced settings or when follow-up is uncertain.
- Adenoidectomy (surgical removal of the adenoids, spongy tissue at the back of the nose) in children with recurrent ear infections who also have large adenoids blocking the eustachian tube opening → Big adenoids can sit right over the eustachian tube opening and trap bacteria, making infections come back again and again. Removing them opens the airway and often reduces the number of ear infections, especially in kids who also snore or breathe through their mouth.

Medications

Amoxicillin · Penicillin antibiotic

This antibiotic breaks down the walls that bacteria build around themselves to stay alive. When those walls fall apart, the bacteria die. Amoxicillin targets the most common germs that cause middle ear infections, especially *Streptococcus pneumoniae* (a round ball-shaped germ) and *Haemophilus influenzae* (a rod-shaped germ).

1. You swallow the pill and it dissolves in your stomach, then moves into your intestines where it gets absorbed into your blood
2. The blood carries amoxicillin to the inflamed middle ear, crossing through the small blood vessels in that space
3. Amoxicillin finds bacteria trying to build their protective outer shell (called a cell wall)
4. The drug locks onto special building-block proteins (called penicillin-binding proteins) that bacteria need to finish their walls
5. Without a finished wall, the bacteria burst open from their own internal pressure, like a water balloon with weak spots
6. Your immune system's cleanup crew (white blood cells) comes in to remove the dead bacteria and the infection fades

SAFETY WATCH

Allergic reactions: some people get a rash, itching, or swelling. Very rarely, a severe allergic reaction (anaphylaxis) causes trouble breathing and needs emergency care right away · Diarrhea: amoxicillin kills helpful bacteria in your gut along with the bad ones, so loose stools are common. If diarrhea becomes severe or bloody, call your doctor because a harmful germ called *C. difficile* might be growing · Rash: a pink, flat rash can appear, especially in kids. This is often not a true allergy but tell your doctor so they can decide if it is safe to continue · Finish the full course: even if your child feels better in two or three days, finish all the medicine (usually ten days) so bacteria do not survive and become resistant

Amoxicillin-Clavulanate (Augmentin) · Penicillin antibiotic plus beta-lactamase inhibitor

This combination has two parts. Amoxicillin breaks down bacterial walls (just like plain amoxicillin), and clavulanate blocks a defensive enzyme (called beta-lactamase) that some bacteria make to destroy amoxicillin. Together, they kill bacteria that plain amoxicillin cannot touch, including some strains of *Haemophilus influenzae* and *Moraxella catarrhalis* that have learned to fight back.

1. You swallow the tablet or liquid, and both amoxicillin and clavulanate are absorbed from your intestines into your blood
2. The blood delivers both drugs to the infected middle ear behind the eardrum
3. Some bacteria release beta-lactamase, an enzyme shaped like scissors that normally cuts amoxicillin in half and makes it useless
4. Clavulanate jumps in and ties up (inhibits) the beta-lactamase enzyme so it cannot cut the amoxicillin
5. Now free to work, amoxicillin locks onto the bacteria's wall-building proteins and stops the wall from forming
6. The bacteria burst and die, and your immune system clears away the debris

SAFETY WATCH

Diarrhea: more common with this combination than plain amoxicillin because clavulanate irritates the gut. Giving the medicine with food helps reduce stomach upset · Allergic reactions: same risk as amoxicillin—watch for rash, hives, or swelling. Severe reactions (anaphylaxis) are rare but need emergency help · Liver changes: rarely, clavulanate can raise liver enzyme levels. If your child's skin or eyes turn yellow, stop the medicine and call the doctor · Finish the full course: usually seven to ten days, even when symptoms improve quickly, to prevent resistant bacteria from surviving

Cefdinir · Cephalosporin antibiotic (third generation)

Cefdinir is a backup antibiotic that also breaks bacterial cell walls, but it is built on a slightly different chemical frame than penicillin. This makes it useful when a child is allergic to penicillin or when first-line treatment has not worked. It kills the same common ear-infection bacteria: *Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Moraxella catarrhalis*.

1. You swallow the capsule or liquid and it moves from your stomach into your intestines, where it is absorbed into your blood
2. The blood carries cefdinir to the middle ear, crossing through inflamed blood vessels
3. Cefdinir finds bacteria building their protective cell walls
4. The drug locks onto the bacteria's wall-building enzymes (penicillin-binding proteins) and stops them from finishing the wall
5. Without a strong wall, the bacteria burst open and die
6. Your immune system cleans up the dead bacteria and the infection clears

SAFETY WATCH

Diarrhea: loose stools are common and usually mild. If stools turn red or clay-colored, this is often harmless (caused by cefdinir mixing with iron in the gut), but mention it to your doctor to be sure · Allergic reactions: rare, but possible. If your child has had a severe penicillin allergy (trouble breathing, severe rash), there is a small chance of cross-reaction with cefdinir, so tell your doctor · Rash: a mild rash can appear. If it spreads quickly or blisters, call your doctor right away · Finish the full course: usually five to ten days, even if your child feels better early, to make sure all bacteria are killed

Azithromycin (Zithromax) · Macrolide antibiotic

Azithromycin stops bacteria from making the proteins they need to grow and multiply. It does this by locking onto the bacteria's protein-making factory (the ribosome) so the factory cannot read its instruction manual (messenger RNA). Without new proteins, the bacteria cannot reproduce or repair themselves, and they eventually die. This drug is a second-choice option, used mainly when a child is allergic to penicillin or cephalosporins.

1. You swallow the tablet or liquid and it is absorbed from your intestines into your blood
2. Azithromycin travels through the bloodstream to the infected middle ear
3. The drug enters bacteria and finds the ribosome, the machine that reads genetic instructions to build proteins
4. Azithromycin binds tightly to a spot on the ribosome (the 50S subunit) and blocks the reading process
5. The bacteria cannot make new enzymes, repair their walls, or divide into new bacteria

6. Over time, the bacteria weaken and die, and your immune system finishes clearing the infection

SAFETY WATCH

Stomach upset: nausea, vomiting, and diarrhea can happen. Taking the medicine with food may help · Heart rhythm changes: rarely, azithromycin can cause an irregular heartbeat (prolonged QT interval). Children with known heart problems should use this drug cautiously · Allergic reactions: rash, itching, or swelling can occur. Severe reactions are rare but need immediate medical attention · Resistance concerns: overuse of azithromycin has made some bacteria resistant, so doctors reserve it for cases where penicillins and cephalosporins cannot be used

Acetaminophen (Tylenol) · Analgesic and antipyretic (pain reliever and fever reducer)

Acetaminophen blocks the production of chemicals in the brain (called prostaglandins) that turn up the body's pain and fever signals. It does NOT fight infection or reduce inflammation in the ear itself; it only makes your child more comfortable while the body (or antibiotics) clears the infection.

1. You give your child acetaminophen by mouth (liquid, chewable, or tablet), and it is absorbed quickly from the stomach and intestines into the blood
2. The blood carries acetaminophen to the brain
3. Inside the brain, acetaminophen blocks an enzyme (cyclooxygenase, or COX) that makes prostaglandins
4. With fewer prostaglandins, the brain receives weaker pain signals and the hypothalamus lowers the body's temperature set-point
5. Your child feels less pain and any fever drops toward normal, usually within 30 to 60 minutes

SAFETY WATCH

Liver damage: too much acetaminophen can harm the liver. Always measure doses carefully using the syringe or cup that comes with the medicine, and never give more than the label says for your child's weight · Check other medicines: many cold and flu products also contain acetaminophen, so you can accidentally give a double dose. Read labels carefully · Avoid alcohol: older children and teens should not mix acetaminophen with alcohol because the combination increases liver risk · Call the doctor if fever lasts more than three days or pain does not improve after two days, because this may mean the infection is not getting better

Ibuprofen (Advil, Motrin) · Nonsteroidal anti-inflammatory drug (NSAID)

Ibuprofen blocks an enzyme (cyclooxygenase, or COX) that makes prostaglandins, the chemicals that cause pain, fever, and swelling. By stopping prostaglandin production, ibuprofen reduces all three symptoms at once. It works throughout the body, including in the inflamed tissues of the middle ear, making it slightly more effective than acetaminophen for ear pain because it calms inflammation as well as pain signals.

1. You give your child ibuprofen by mouth (liquid, chewable, or tablet), and it is absorbed from the stomach and intestines into the bloodstream
2. The blood carries ibuprofen to inflamed tissues in the middle ear and to the brain
3. Ibuprofen blocks the COX enzymes (COX-1 and COX-2) that turn a fatty acid (arachidonic acid) into prostaglandins
4. With fewer prostaglandins, blood vessels in the ear constrict slightly, swelling goes down, pain signals weaken, and the hypothalamus lowers the fever set-point
5. Your child feels less pain, has less swelling, and any fever drops, usually within 30 to 60 minutes

SAFETY WATCH

Stomach upset: ibuprofen can irritate the stomach lining. Give it with food or milk to reduce nausea or stomach pain · Kidney stress: long-term or high-dose use can strain the kidneys. Stick to the recommended dose and duration, especially if your child is dehydrated · Bleeding risk: ibuprofen makes blood clot a little more slowly. Avoid it if your child has a bleeding disorder or is taking blood-thinning medicine · Age limit: do NOT give ibuprofen to babies younger than six months unless your doctor says to · Asthma caution: rarely, ibuprofen can trigger wheezing in children with asthma. Watch carefully and stop if breathing worsens · Call the doctor if fever lasts more than three days or ear pain does not improve after two days

Red flags

- Severe headache, stiff neck, or the child cannot touch chin to chest (possible meningitis—infection of the brain's covering)
- Swelling, redness, or tenderness of the bone behind the ear (mastoiditis—infection has spread into the skull bone)
- Facial weakness or drooping on one side (the facial nerve runs through the middle ear; swelling can pinch it)
- Persistent high fever above 102.2°F for more than 48 hours despite antibiotics, or the child looks very ill and listless

- New confusion, extreme drowsiness, seizure, or inability to wake the child fully (signs infection may have reached the brain)

Nursing priorities

1. Assess and manage pain using age-appropriate pain scales, and give pain medicine (like acetaminophen or ibuprofen) as ordered. — Ear pain from middle ear infection can be very sharp and throbbing because the eardrum is stretched tight by fluid pressing against it. Controlling pain helps the person rest, eat, and feel safe. We measure pain with number scales or picture faces so we know if our treatment is working. Pain medicine also brings down fever, which makes the whole body feel better.
2. Check the ear with an otoscope (a lighted tool to look inside the ear canal) and watch for drainage, redness of the eardrum, or bulging. — Looking inside the ear shows us if the eardrum is red, swollen, or pushing outward from fluid behind it. A bulging eardrum confirms fluid is trapped in the middle ear. If we see drainage, we note the color and amount because thick yellow or green pus tells us about bacterial infection. This assessment guides whether antibiotics are needed and tracks if the infection is getting better or worse.
3. Teach the patient or family how to give antibiotics correctly (full course, right dose, right times) if they are prescribed. — Not all ear infections need antibiotics—many are caused by viruses that antibiotics can't kill. But when bacteria are the cause or the infection is severe, finishing the full course (usually 5-10 days) kills all the germs so they don't come back stronger or resistant (able to survive the medicine). Stopping early lets some bacteria survive and multiply again. We explain this clearly so families understand why every dose matters, even when the child feels better after a couple days.
4. Monitor for signs the infection is spreading, like high fever that won't go down, new swelling or redness behind the ear, severe headache, stiff neck, or confusion. — Rarely, a middle ear infection can spread into the mastoid bone (the hard bone just behind the ear), the inner ear (causing dizziness and balance trouble), or even the brain coverings (meningitis, a dangerous infection of the layers around the brain). Catching these early means faster treatment—often IV antibiotics in the hospital or surgery to drain infected bone. We teach families the warning signs so they know when to come back immediately.

5. Educate about measures that help prevent future ear infections, like avoiding smoke exposure, breastfeeding infants when possible, keeping vaccines up to date, and practicing good hand hygiene. — Secondhand smoke irritates the eustachian tube and makes it swell, trapping fluid. Breast milk has antibodies (proteins that fight germs) that protect babies. Vaccines like the pneumococcal and flu shots prevent some of the bacteria and viruses that cause ear infections. Handwashing stops germs from spreading. These steps won't prevent every infection, but they lower the chances, especially for children who get repeated infections.
6. Schedule or remind about follow-up to recheck the ears in 2-4 weeks, especially in young children, to make sure fluid has cleared and hearing is normal. — Even after the infection is gone and pain stops, fluid can stay in the middle ear for weeks (called otitis media with a fluid collection (effusion), a fancy term for fluid without active infection). This leftover fluid is usually thin and not infected, but it muffles hearing. In young children, even temporary hearing loss during this time can affect speech and language learning. A follow-up visit lets the provider look in the ear, do a hearing test if needed, and decide if ear tubes or other treatment is necessary if fluid won't go away.

Sources

- American Academy of Pediatrics (AAP) 2013 Clinical Practice Guideline: Diagnosis and Management of Acute Otitis Media
- American Academy of Family Physicians (AAFP) Otitis Media Guidelines
- CDC - Ear Infection (Otitis Media) Information
- Cochrane Database Systematic Review: Antibiotics for Acute Otitis Media in Children

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