

Earache Scenario:

A 7-year-old female child is being seen in urgent care for pain in her right ear. She is accompanied by her mother, who states that the pain started 2 days ago, and is accompanied by fever, and that the child has not been able to sleep well.

Using the Epi-logical approach, what should be the probable diagnoses?

The clinician should consider all differentials listed on the mind map except temporomandibular joints (TMJ) dysfunction and trigeminal neuralgia. The clinician should also acknowledge that the most common causes of earache in this age group are otitis media (OM) and upper respiratory infection (URI), both of which are inflammatory or infectious causes of pain. The fact that the patient's mother gave additional information as a part of the chief complaint (fever, duration of illness, and inability to sleep), can help further narrow the probable diagnoses.

How should a clinician address urgent/emergent situations?

Applying general principles of the Epi-logical approach, the clinician should review a patient's vital signs and appearance. A child's appearance is often termed as the sixth vital sign. A happy-looking, playful child is usually not very ill, at least for the period of time that the clinician is evaluating the child. On the other hand, even with normal vital signs, a withdrawn, lethargic-looking child should be promptly evaluated for urgent/emergent situations. The 7-year-old child appears to be in no distress and, although not very cheerful, does not look lethargic, and is able to give non-verbal cues of alertness. Her vital signs are normal, except for her temperature of 100.8 F. The differentials which correlate with acutely urgent/emergent situations in this clinical mind map are basilar skull fracture, severe trauma, and mastoiditis. All of these can cause patients to appear distressed to some degree. Although the clinician cannot rule them out, so far, the evaluation does not point to these diagnoses.

Weighing and Remove Anchor Bias:

The clinician already has some information that can help with the weighing process and can continue with rest of the questions. Usually, patients (relatively older children and adults) can feel pain specifically over the area that directly correlates with the anatomical location of the pathology. Therefore, to arrive at a narrower differential diagnosis list, the clinician should ask about the location of the pain as the first high yield question when weighing. Below is a list of these questions, the patient's answers, and the weighing process.

The Clinician's Questions	The Patient's Responses	How does this information help with the weighing process?
Where exactly does it hurt the most?	My ears.	Her mom said one ear, but the child stated ears (The <i>child might not realize that describing ears as plural does not mean pain is only in one ear, or she may actually have pain in both ears</i>). Therefore, more clarifying information is needed at this point. Otherwise, the differential will shift from

		OM more likely than URI to URI more likely than OM
Can you put your hand or both hands where the pain is?	The child puts one hand over her entire right ear.	Causes of unilateral earache are likely. This includes otitis externa, media, foreign body, mastoiditis and perichondritis/cellulitis. Among these, foreign body and otitis externa are not highly likely because of the presence of a fever. Causes of bilateral earache, most common of which is URI are less likely. The rest of the diagnoses are not under consideration yet. A patient with a skull fracture will most likely list trauma as the chief complaint instead of an earache. Ramsay hunt and TMJ are very rare in this age group.
At this point, the clinician can ask specific questions or medium yield questions about diagnoses that are being considered with a high index of suspicion		
Does it hurt if you or mom pull your ear?	Yes	Otitis Media is likely
(To mom) Did you notice any drainage and was she swimming in the past few days?	Not really	Otitis externa is unlikely
(To mom) Did she have another ear infection in the last few days or weeks?	Yes. If she has an infection today, this would be her second infection in the last 3 weeks	Mastoiditis is possible and therefore needs to be ruled out
At this point, it is important to ask further questions about mastoiditis and perform a physical exam because the clinician is possibly dealing with an urgent/emergent situation. Mastoiditis, if left untreated, can lead to intracranial infection, which can be fatal.		
Let me see if there is any swelling or tenderness behind your ear. <i>Start the exam</i>	There is redness, protrusion of the auricle, and swelling behind her right ear, and this area is quite tender to touch	Mastoiditis is highly likely unless proven otherwise
The evaluation process has mixed components of history and physical exam findings at this time. The clinician may not need to remove the anchor bias in this situation due to two reasons, 1) an urgent/emergent situation is being considered and 2) this urgent/emergent situation corresponds to a life-threatening diagnosis for which the index of suspicion is high. The clinician has at least four positive findings (fever, pain and tenderness over her entire right		

ear, a recent ear infection, and swelling and tenderness behind the ear) for mastoiditis. Does it make sense to ask additional questions to remove anchor bias or ask pain related questions, such as severity, radiation, and alleviating or relieving factors? Probably not, unless the clinician is waiting to arrange for the management intervention. If the index of suspicion was low or the clinician had determined that an urgent/emergent situation is not present, the clinician could move forward with the following additional questions to remove anchor bias.		
Did you recently travel by air?	No	Barotrauma is not a contributing factor to pain
(To mom) Did she get hurt or fall by chance?	No	Trauma/Fracture is unlikely
(To mom) Did she accidentally push something in her ear?	I don't think so	Foreign body unlikely

Additional diagnostic tests include complete blood count (looking for white count elevation), C-reactive protein, X-Ray of skull, and CT scan of mastoid. Patients with mastoiditis need to be hospitalized and treated with antibiotics. In some cases, surgical debridement and additional interventions, such as hyperbaric oxygen therapy, are necessary.