

Dr. Alyssa Smith:

Hello, everyone. Welcome to another episode of ENT in a nutshell, my name is Alyssa Smith and today we're joined by pediatric otolaryngologist, Dr. Sarah Bowe. Today we will be discussing otitis media in pediatric patients. Thanks for being here, Dr. Bowe.

Dr. Sarah Bowe:

Thank you for having me. I'm excited.

Dr. Alyssa Smith:

All right, so let's start with presentation. How does a patient with otitis media typically present?

Dr. Sarah Bowe:

Sure. So obviously as a pediatric otolaryngologist, a large portion of my practice is dealing with different varieties of otitis media, whether that's recurrent acute otitis media or otitis media with effusion. And so some of the differences in terms of that is recurrent acute otitis media are kids that have had lots of ear infections. And usually I tend to see those as referrals from pediatrics around when they've had maybe three or so, maybe four or so infections over the past kind of six to 12 months. And it varies a little bit on the frequency in terms of what I see for referrals. And then sometimes we get referrals where somebody has had an ear infection and that fluid is just continuing to linger around. And so really the definition of otitis media with effusion is when that fluid has continued to be there for over three months straight.

Dr. Alyssa Smith:

And what age are these children typically presenting at?

Dr. Sarah Bowe:

There certainly can be a wide spectrum, but most of the time, these kids we're usually seeing as it gets close to about a year of age and then in, through kind of the kind of early elementary school age. And then it tends to basically kind of follow that natural curve off after that. But I certainly sometimes see kids that are coming in that are nine years old and they're just having their first series of infections. And sometimes that may be due to allergies or other problems.

Dr. Alyssa Smith:

And do we have any idea how common this actually is?

Dr. Sarah Bowe:

It is very common. I believe that somebody actually says it's basically just a hazard of childhood at one point because kids are generally just set up to have these issues. And so most of the time we say usually about 90% of kids are going to have at some point in time fluid or an ear infection.

Dr. Alyssa Smith:

So thinking about the pathogenesis of otitis media, we know that it's inflammation in the middle ear space, but what actually happens in the middle ear that causes this to occur?

Dr. Sarah Bowe:

Yeah. So, as I just touched upon kids in many ways are very much prone to this and that's because when they're born, the eustachian tube length is very short compared to adults. And also the angle is very flat, meaning that it's basically kind of going almost across from the back of the nasal pharynx. And then over time that eustachian tube elongates and reaches up at a higher angle as the angle changes from the back of the nasal pharynx up to the middle ear space. And so that short tract, as well as the fact that the angle is pretty flat, allows inflammation to be more prominent in kids that then have very frequent upper respiratory infections. And all of those really just set kids up to have that fluid. The middle ear space naturally because of the flow of the blood and the various gases that are in that space will naturally become negative pressure without opening of the eustachian tube. There was actually a funny paper. That's one of those random isolated papers that you find of a couple of otolaryngologists set actually tried to not swallow it and see who could not swallow for the longest period of time. And they looked at the pressures in the middle ear over that time, and you could see them dropping as they tried to not swallow and not open their eustachian tubes.

Dr. Alyssa Smith:

Oh my God. As you were talking about that, I was trying not to swallow and it's nearly impossible.

Dr. Sarah Bowe:

Yeah, yeah. It really is. Which is fortunate. That's a great thing about the functional setup of the eustachian tube is that it naturally opens with our swallowing mechanisms and helps equalize that pressure that would become negative otherwise.

Dr. Alyssa Smith:

So when we're thinking about when this buildup of fluid becomes infected, what are the most common pathogens that we should be thinking about?

Dr. Sarah Bowe:

Sure. So there's kind of the top three that we always tend to learn about and always ask about one of those is strep pneumoniae. Another is Haemophilus influenza, and the third is moraxella catarrhalis. And as you know, at least kind of from the first two, we have immunizations against those. And those have really helped kind of over time in terms of decreasing some of the incidents of acute otitis media, because there is protection against those.

Dr. Alyssa Smith:

So when a child presents to your clinic and you're evaluating them, what are some important questions that you ask either the parent or the child?

Dr. Sarah Bowe:

Sure. So certainly there's kind of in many ways a different avenue that you might go down in terms of questions a little bit, whether it's recurrent acute otitis media or otitis media with effusion. And so with recurrent acute otitis media, there are some times where I get referrals in where a kid has maybe only had two infections spaced out by a few months. And so certainly we expect that, especially depending on the age of the kid. And so kind of going through a good history in terms of when this started, how often it's happening, what are the exact symptoms that happen? Again, kids are very commonly get upper respiratory infections. And so they can have little fevers here and there and some of those complaints, but those can often resolve in 48 hours to 72 hours time. And so really determining how

severe the symptoms are when they happen and what the exact symptoms are can really help. In terms of otitis media with effusion, sometimes that's different. It may be in the setting of recurrent acute otitis media as well. And so teasing that out helps. And then certainly with that, we tend to also think about potential impacts on hearing and that comes up with the recurrent acute otitis media too.

Dr. Alyssa Smith:

And then when you're doing your physical exam, what are some specific findings that you're looking for?

Dr. Sarah Bowe:

Sure. So certainly looking through the ear canal and making sure that well that there isn't ear wax in there. Sometimes we'll get referrals for failed hearing screens and the kids just have a whole lot of ear wax. So that can definitely be a confounding problem for hearing loss. Then if you're looking at the ear, depends on kind of the acuteness most of the time, it's pretty rare for me to truly see acute otitis media in the clinic. One of the things that you're looking at is taking a look at the eardrum is it bulging at all? Or is it more of that kind of yellowish opaque color? That's more a sign of acute otitis media with kids with a history of recurrent acute otitis media. Most of the time we're looking just for the presence of fluid. And so that could be more serious fluid, which really is a bright yellow amber color, or it could actually look just like a really dark gray eardrum.

And one thing that I always say is an eardrum that has more of that mucoid fluid versus just a normal eardrum. Sometimes they both can kind of look gray and the difference between translucent and maybe a little bit of fluid is sometimes hard to tease out. And that's really where a pneumatic otoscopy is a very, very important skill. And no matter whether somebody goes into ENT or is going into general pediatrics pneumatic otoscopy is fantastic for assessing the mobility of the eardrum and what that gives us a lot of information as to whether or not fluid is in there.

Dr. Alyssa Smith:

And so thinking about some of these common presenting symptoms, whether it be otalgia or a child that is constantly pulling on their ears, what should be on our differential diagnosis?

Dr. Sarah Bowe:

Yeah. So, I think obviously the most important thing when it comes to acute otitis media really is, is it a complicated acute otitis media? And so certainly again, it's rare for us to see these as referrals in clinic per se, but we will see these as referrals in the emergency room. And so having that on our differential terms of, is there mastoiditis, is there some other kind of deeper or more concerning problem going on? Usually those kids are going to have high fevers, they're really going to be sick of hearing. And so it's pretty rare to see those in clinic.

Dr. Alyssa Smith:

And then thinking further about our workup, who should get an audiogram or even tympanometry?

Dr. Sarah Bowe:

Sure. So I will say sometimes it depends on your local system that you're working in. A lot of the kids that I see have actually already had hearing tests that have been ordered and may have already had them before they come to see me. And some of that is in association with concerns that arise because many times these kids, the way they start presenting is that they have a little bit of speech delay. And so

their pediatrician in the setting of ear infections, or just generally concerned for speech delay, one of the first steps that they usually take will be to get an audiogram. And then based on that audiogram, then they'll often get referred into the ear nose and throat doctor.

And so in terms of the audiogram, if I'm seeing a child that has had recurrent acute otitis media, I don't always get an audiogram, but I get a history in terms of, did they pass their newborn hearing screen? Have there been any concerns with hearing loss or speech delay or anything that might question a change from the newborn hearing screen, whether it's normal, but certainly if there's fluid on exam and the kid is younger, all of those things are probably going to have us find an abnormal audiogram. And so many times if the history is really pointing to the fact that they're hearing it was normal and there were no concerns, then I may defer the audiogram at that point until after we do some treatment for the fluid that's there.

Dr. Alyssa Smith:

And then can you walk us through an audio gram and a tympanogram and what you're looking for on those things?

Dr. Sarah Bowe:

Sure. So, I think one of the biggest kind of things that stands out usually, and that both, kind of myself that I look at, but also that I noticed residents tend to look at is certainly that tympanogram. And so there's kind of three usual types of tympanograms that we see big picture. Type A is normal. And so that's going to peak at zero atmospheres. And so that's kind of the nice normal peak that you see. A type C is that same kind of peak, but it happens at a negative pressure that usually indicates some eustachian tube dysfunction, meaning that, that eustachian tube is an opening to regulate that pressure and bring it back toward more normal. And then the final one is a flat tymp, which is a type B tymp. And basically that line just goes straight across the bottom.

And again, that's essentially kind of mimicking what you're doing with pneumatic otoscopy, you're trying to move the eardrum, but because there's fluid, which is stiffer than air, that eardrum does not move much and really just stays stationary. And then in terms of the actual hearing test itself, certainly you can gauge the levels of potential hearing loss that are being impacted by the fluid that's there sometimes you'll see kids where their hearing is still pretty normal, despite the fact that they have the fluid. And then other times you may actually even see, a 30 or 40 decibel loss from that fluid. So there can be a little bit of variety in terms of the actual hearing loss that happens.

Dr. Alyssa Smith:

And so what are some risk factors for developing otitis media?

Dr. Sarah Bowe:

Sure. So first of all, is just kids in general and younger aged kids. We know that most kids, they may get up to eight to 12 upper respiratory infections in a year. And so certainly that younger age, as we talked about in terms of the size or the size and the angle of the eustachian tube really predisposes them to have problems. And then there can be other things that factor in just like environmental factors. So one of the things that I always ask about is are kids in daycare that gives them more exposures to other kids to get more infections. And so certainly we know that kids in daycare have higher rates, also tobacco exposure, whether in the home or around them. And so that's another thing that I ask about in the history. And then there can be certain craniofacial disorders that can predispose to this. So we know that cleft palate, because of the architecture of the palate and the muscles in the palate that then

influence the eustachian tube, they can have more problems. In addition, allergy and immune issues can also present this way because of dysregulation of that kind of inflammation pathway around the eustachian tube.

Dr. Alyssa Smith:

So let's move on to treatment of this. What are the goals of treatment?

Dr. Sarah Bowe:

Sure. So really, the goals in both of these cases are essentially to buy time. We know that over time that you eustachian tube will change and many kids will outgrow their risks, unless they have some of those additional risk factors that we just talked about. And so what the tympanostomy tube does is basically creates a space holder in the eardrum, so that pressure can equalize across the eardrum instead of requiring or relying on the eustachian tube to do that. And so most of those tubes will last, maybe around on average we say kind of nine to 12 months, depending on the type of tube. And so really you're just buying time until ideally that patient outgrows the risk that's just inherently there.

Dr. Alyssa Smith:

And so you mentioned tubes, but what are some other treatment options that are available for children that are struggling with this?

Dr. Sarah Bowe:

Sure. So, as we talked about in terms of indications, medical management, in terms of antibiotic use for those acute infections is completely reasonable. And so, especially in patients that maybe haven't quite reached that point or in patients and families where you have a discussion with them, you offer them the options of, we could just watch and see how this is. We could continue to do antibiotics as needed. We could consider putting in a tube, really having that full discussion and allowing the most of the time the families, as opposed to the patients, cause they're quite young to decide. And, I think that that's important, as we have realized over time, the impact and potential impact that we're still trying to understand in terms of anesthesia risks, it's really about weighing kind of the risks and benefits of proceeding under anesthesia with a surgery that potentially can have some complications. Another thing that I often weigh in a little bit with my patients is their age and the time of year. So sometimes, maybe a kid has had three infections throughout the winter time, but it's now March or April and they're a little bit older, they're more school age. And, they may have just had a bad winter. And so that discussion with the family can vary a little bit, depending on a lot of different factors.

Dr. Alyssa Smith:

And so thinking about the clinical practice guidelines that are available, who meets criteria for tube placement?

Dr. Sarah Bowe:

Sure. So we've touched on this a little bit per the clinical practice guidelines for recurrent acute otitis media. It is three infections in a six month period or four infections over a year's time, but at least one of those infections has to be also within the past six months. And then in terms of otitis media with effusion, again, that fluid needs to be around for three months time. And generally also has to have an impact on the hearing. Now there are caveats to both of these kind of scenarios in terms of the recurrent acute otitis media in the more recent guideline, it came out that unless fluid was seen on

exam, when you were seeing them, then it was not indicated to consider tube placement. Now, in some cases I've found that to be helpful, to be in the guideline and then practically speaking, in other cases, depending on the nature of your practice, sometimes it's difficult in the sense that I've seen a good number of kids that when they come in for that referral for recurrent acute otitis media, they don't have any fluid and it looks fantastic in their ears.

And generally at that point, the discussion I have with the family is, everything looks good. We can kind of see how this goes. Sometimes it's hard to try to get them in to then see us, but sometimes I make that effort to try to say, next time they have the same symptoms. Let's try to take a look at the ear and see if the fluid's there and what it looks like. And it's really always kind of striking a balance between the pediatricians that are, that you work with and that are referring to you and the exam that you're seeing in front of you. And so sometimes I now find that that discussion is also kind of weighing the balance of has this kid had seven rounds of antibiotics, eight rounds of antibiotics, and the ears still look good, and the parents are frustrated.

And so there's a lot of pieces that can also come into play in terms of your practice setting and kind of social aspects of the encounter. And then in terms of the otitis media with a fusion, well, there is the requirement for having hearing loss and having the fluid and having it be there for a certain period of time. Again, there are other scenarios where you might consider that even if the hearing loss may not seem quite as bad, and that may be well, are they having fluid? They're having like one infection, but it's also impacting them in school. And maybe they're having issues with school and focusing because of hearing concerns or are there other risk factors that might prompt you to think about it?

Dr. Alyssa Smith:

And so in surgery, I can imagine that there is a lot of different tubes available and techniques available. Can you walk us through PE tube placement and the types of tubes?

Dr. Sarah Bowe:

Sure. So in terms of the PE tubes there, yes, there is a very, very wide variety, but there's generally two categories. There is more short term tubes, which are basically kind of a little bit of a barrel essentially that have flanges just on each side. And those usually last, maybe around like a year or so is what I tend to tell parents. And then there's what we say a little bit more like long-term tubes or T tubes they're often called. And those are much longer in terms of the external barrel that sits outside the eardrum. And then they have longer flanges that kind of snap underneath the eardrum. And because of that, they're a little bit harder to extrude. And so they last longer. And so those, some people say, "Oh, these are like permanent tubes." They're not really permanent tubes, but sometimes they can stay around for a really long time.

Usually I tell parents, those are probably more on the order of kind of two to three year tubes when I make that distinction between kind of short-term and long-term tubes. And then in terms of the decision for using those the first time around, I pretty much am always putting in the short-term tubes. And even now, because there's a very different rate in terms of complications between those in terms of perforations that happen after the tubes of extruded, I tend to actually go more towards maybe a second and third set of the short-term tubes. And then it's at that third kind of fourth set that I talk with families usually about more of the long-term tubes. And that's just a personal decision that everyone will come to deciding on when they want to kind of make that difference. And again, it will vary sometimes depending on the patient because of other risk factors that they have. And then in terms of the placement itself, basically we're aiming for that anterior inferior quadrant, which is usually the quadrant that kind of has that cone of light that's often talked about. And so it's a small little incision

just wide enough to be able to slip the tube in, and then it just rests kind of suspended there on either side of the eardrum.

Dr. Alyssa Smith:

And then can you speak to the role of adenoidectomy for some of these patients?

Dr. Sarah Bowe:

Sure. So, adenoidectomy can definitely play in with these patients when I was training, it was before some of the newer guidelines had come out and generally speaking, there may have been certain symptoms in a patient such as chronic runny nose or chronic sinusitis, chronic infections that may have prompted adenoidectomy really soon. But generally speaking with the first set of tubes, we didn't do an adenoidectomy, but fairly routinely with the second set of tubes, that was almost just a given that we would proceed with adenoidectomy. And then more recently the newer guidelines said, unless there's some other indication such as I just mentioned, whether it be chronic rhinitis, chronic adenoiditis symptoms. So just chronic runny nose, congestion, nasal obstruction, and breathing, or recurrent sinusitis issues, unless those were present then in a child under four years old, you shouldn't just do adenoidectomy with that second set of tubes, for instance. So there has been a little bit of a change over in terms of adenoidectomy.

Dr. Alyssa Smith:

And then you mentioned the risk of perforation with the different types of tubes. How frequently does that happen and what are some other complications that we should be thinking about or counseling parents about?

Dr. Sarah Bowe:

Sure. So, certainly it'd be great if ear tubes went in and were there and fell out and there were no problems. And fortunately, most, I wouldn't say most, but yeah, most of the time that is true, which is great. And I usually tell parents that, most of the time, this is exactly how this course goes, but that's not to say that a good chunk of time. We don't see some of the complications or sequelae that you would talk about. So tube otorrhea is actually pretty common. You can basically about 25% of kids at some point in time are going to have drainage from the ear tubes. Now, I usually tell parents it's possible that that may happen here and there when they get a cold, if it starts becoming really thick or profuse or smelly, then those are times where we might need to intervene being concerned that there is an actual infection that we need to treat.

And the great part about the ear tubes is that we can then do topical treatment. We can do ear drops in the ear canal that work right onsite. And so it essentially removes some of the need for the oral antibiotics. And that's another thing that I talk about as a benefit with parents. And then in terms of perforation, with the more short term tubes, it's on the more rare side, I usually say kind of one to 2% of times, there could be a perforation that we have to watch it's possible that may still heal on its own, or we might need to do a small patch procedure later on down the road. With the long-term tubes it's, conceivably upwards of about 15% of the time that you actually may have a perforation that needs to be managed now, not all of those are going to need a formal tympanoplasty, but there are some of those that will as well.

Dr. Alyssa Smith:



And then thinking about how you counsel parents, what do you tell them about the chance of success with surgery and the length of time that the child might need tubes?

Dr. Sarah Bowe:

Yeah, so generally speaking, I tell parents that ear tubes are very common. Most of the time I actually even ask families, is there another sibling or, a relative or friend that's had them. And most of the time they have. And I think that that helps because sometimes you can then gauge how much information they already know before you go with your whole entire discussion. And three of their other kids have already had ear tubes. And so in terms of success, generally speaking, what I tell families is that, the majority of kids actually will only need one set of tubes. Maybe about 20% of kids will need a second set of tubes. And then there are others that need even further sets of tubes, but that's something that we have to, just see over time.

So, I bring up the fact that we're going to put these tubes in, we'll do an initial check. Usually I do that in about six weeks, and then we'll keep following every six months to check on the status of the tubes, see how the eardrum's doing, see whether they've fallen out and they've healed and then kind of go from there in terms of more of that long-term followup. But generally speaking, a lot of it is reassurance that this really is, a normal process that we expect that most kids are going to outgrow, but unfortunately we don't have any, magic eight ball to tell us which kids are going to do fine, and which kids aren't, especially if there's no other risk factors.

Dr. Alyssa Smith:

So you mentioned follow-up and seeing them back in clinic, but do you ever get any repeat testing such as an audiogram?

Dr. Sarah Bowe:

Yeah, so, again, it varies a little bit, if they've had a normal hearing test before there is no concerns in terms of speech or language delay, and, everything, depending on the age of the kid, if we might've been able to actually get phone lines beforehand to determine that their sensorineural hearing was fine. I don't always get a repeat audiogram right after putting in ear tubes either. And so I have that discussion with the family and, and many times it may be, "Okay, things are doing better, let's wait." And at some point once you know the ear tubes are out, the eardrum's healed, they're not having their problems. Then I may get a repeat audiogram at that point.

Dr. Alyssa Smith:

And then thinking about the natural history of this disease, what could we expect to happen if there was no treatment that was pursued?

Dr. Sarah Bowe:

Yeah. And so, certainly part of the reason why we started recognizing the biggest concerns about this is as it relates to hearing and language development. And so, if that fluid were to remain in there, certainly it doesn't mean that kids aren't hearing, most of the time in terms of the normal volume that the average person speaks at kids are hearing the sounds, but it certainly does impact their ability to distinguish the subtle details, which then allow them to form language in the way that they're supposed to. And so, as I mentioned, many times that's how kids are getting referred to me in, in the first place is that we know that there's so much language development that happens in those first few years of life.



And so because of that, by taking that fluid out and relieving that space so that they can hear those subtle differences, many times I have parents that come in and at that six week appointment, they're like, they're a different person. I didn't know that they could make this many sounds. It's just like a different world. And so some of those are how we know that we're, really making a difference by putting those in. And then on the other side, too, certainly in terms of the antibiotic usage and overuse and antibiotic stewardship, I definitely think that if we can give kids some relief from that constant prescription of antibiotics, then that also can help that subset of kids too.

Dr. Alyssa Smith:

And then finally thinking specifically about the acute otitis media, what are those like scary complications that we should have in the back of our head?

Dr. Sarah Bowe:

Yeah. So, certainly mastoiditis in some respects can be a little bit scary, that may require surgical drainage and addressing that. And then also, because of the nature of where that is in the temporal bone, you can get intercranial complications as well. Usually, as I kind of mentioned towards the beginning, most of the time, those kids are going to really appear very ill because we're talking about meningitis, we're talking about intercranial abscesses. And so those kids oftentimes will have high temperatures. They'll be lethargic and they'll have much more concerning presenting symptoms, but those should kind of always be in the back of your mind, depending on if you see that acute otitis media on exam and these kids are coming in in that fashion. Most of the time, that's already going to be delineated a little bit by the emergency department in their initial workups of kids that have kind of fever presentations. Oftentimes they are thinking about things like meningitis, but certainly it helps to know the origin of that. And if it's relating to the acute otitis media, then urgent tube placement will help treat those conditions.

Dr. Alyssa Smith:

In summary, when thinking about pediatric otitis media, it can be broken down into two categories. Recurrent acute otitis media and otitis media with effusion where fluid has been present in the middle ear space for at least three months. Patients can present with otalgia, hearing loss, speech delay, or even after a failed hearing test. Kids are prone to developing fluid in their middle ear space due to the relatively short and flat eustachian tubes. Other risk factors for developing otitis media include attendance at daycare, tobacco smoke exposure, allergies, and craniofacial abnormalities. Evaluation includes in addition to a complete physical exam, an otoscopic exam with, or without pneumatic otoscopy and sometimes an audiogram and tympanometry as well. Patients meet criteria for PE tube placement with recurrent acute otitis media or otitis media with effusion based on certain criteria.

With recurrent acute otitis media, they meet criteria if they've had three episodes of acute otitis media in six months or four within the past 12 months with at least one being in the past six months. For otitis media with effusion, they meet criteria for tube placement if fluid has been present for at least three months, and there's also been an impact on hearing. Some complications of PE tubes include tube otorrhea and persistent perforation in the tympanic membrane. Some sequelae associated with acute otitis media include both intercranial and extracranial complications, intercranial complications include meningitis, epidural abscess, subdural empyema, and lateral sinus thrombosis. Intratemporal complications include mastoiditis, acute perforation of the tympanic membrane, labyrinthitis, and facial paralysis. There can also be a Bezold's abscess, which is an abscess deep to the sternocleidomastoid

muscle, where purulence from mastoiditis has eroded through the cortex of the mastoid bone. Dr. Bowe, thanks again for joining us. Is there anything else you'd like to add?

Dr. Sarah Bowe:

No, I mean the thing that I always say is that the Academy does do a wonderful job putting in so much time and effort to compile the extraordinary amount of literature that's out there and create the guidelines for us. The guidelines are guidelines they're made to help give you information that you can use to treat your patients and work with your families, but they aren't, the absolute end all be all, they are made to be guidelines, but there's a lot of wonderful information in them that can really help. And so utilizing those as opposed to, sometimes it's easy to treat the anecdotes of patients that impact us in our own practices. And so having the bigger picture, I think really helps.

Dr. Alyssa Smith:

Awesome. Thanks again for joining.

Dr. Sarah Bowe:

Thanks.

Dr. Alyssa Smith:

I'll now move on to the question portion of this podcast. As a reminder, I will ask a question, pause for a few seconds and then give the answer. The first question is what are the three most common pathogens that cause acute otitis media? The three most common pathogens responsible for acute otitis media include Haemophilus influenza, strep pneumoniae, and moraxella catarrhalis.

The second question is what are the three patterns that we can see on a tympanogram? The first pattern that we can see is called a type A tympanogram, which has a peak at zero atmospheres. In general this represents a normal tympanogram with normal tympanic membrane motion. The second type is type B, which is a flat tracing and represents no movement of the tympanic membrane. This can indicate fluid in the middle ear space as seen in acute otitis media and otitis media with effusion. Type C has a peak at less than zero atmospheres and represents negative pressure in the middle ear space and eustachian tube dysfunction.

The third question is according to clinical practice guidelines, who is a candidate for PE tube placement? According to clinical practice guidelines, patients with either recurrent, acute otitis media or otitis media with effusion can meet criteria for PE tube placement. With recurrent acute otitis media they meet criteria if they've had three episodes of acute otitis media in six months or four within the past 12 months with the caveat that one episode has to have been within the past six months. Additionally, there should be documentation of the presence of fluid in the middle ear space at the time of patient evaluation. For otitis media with effusion, they meet criteria for PE tube placement if fluid has been present in the middle ear space for at least three months, and there's also a documentation that there's been an impact on hearing. Thanks for joining. And we'll see you next time.