Ring! Buzz! Chirp! Part 1: The Basics of Tinnitus

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- Good morning or good afternoon, depending on where you are. It's the top of the hour. My name is Dr. Sejal Kuvadia, I am an audiologist with Starkey in the the Education and Training department. I wanna thank you for coming to today's course, I am very passionate about tinnitus, so I love talking about it, telling other people what I know about it, and hoping that you incorporate this into your practice. So today's course is called "Ring! Buzz! Chirp!", part one, the basics of tinnitus. This is a two-part course, so the next part of the course will be on April 20th live, or it will be recorded at that time. Before I get started and start talking about tinnitus, I wanna go over some basic housekeeping with you.

So just some basics, how do I ask a question? If you look at your tab, there is a spot with Q&A down the middle, go ahead and click on that and ask questions and click on send. I probably won't have time during my talk to answer them but I will answer them towards the end of the hour. If you need the handout, there are a couple of different ways to find it, if you go to the chat box currently, Anna has posted a link to the handout, also it will be available on pending courses from your audiology online count. Now, how do you earn CEU's? If you are looking for CEU's, you have to go to your pending courses on audiology online.

com and pass the multiple choice exam. There's five questions, I'll talk about them and give you the answer today during the session. In order to get CEU's, you also have to have a paid membership with Audiology Online in order to earn that. If you're having any type of technical issues or need assistance, you can call the number seen on the screen. You can also email customer experience @continued.com or use the Q&A if you need assistance right away, and we'll make sure to get you the help that you may need for tech support or any other types of assistance. With today's course, we do have a couple of outcomes, the goal of today's course is by the end of it, you'll be able to identify the signs and symptoms of tinnitus, you'll be able to explain how to evaluate

tinnitus and the handicap caused by the tinnitus a patient might be experiencing and you'll be able to discuss treatment options for tinnitus.

Now that we've gone over that housekeeping, I'm gonna start off with a poll. And I just want you to guess the answer for this, how many people do you think have experienced tinnitus in the US? Do you think it's 10 million, 20 million, 50 million or 300 million? I'll give you about 10 more seconds to answer this question and then we'll close this poll and I'll give you the answer. All right, five more seconds. All right, let's see the answers. Okay. It looks like the majority of you guessed 50 million, and that is actually correct. 50 million people in the US have experienced tinnitus. The study that found this found that 15% of the US adult population have had about of tinnitus at least once in the past five years.

Now there is some talk that this number has gone up since it was last researched in 2017, I wanna break this down even further for you because I find the statistics shocking. One in 12 adolescents have experienced tinnitus, so that's a big chunk of children and teenagers who have had some experience with tinnitus or ringing in their ears. Now we know that about one in six adolescents now have hearing loss due to noise exposure, especially with modern technology, we're also seeing one in 12 adolescents having experienced tinnitus as well. So one in 12 adolescents and one in 10 adults have experienced tinnitus at some point in the last five years. Of the 50 million we talked about earlier, 20 million people have seeked medical attention.

Now this statistic comes about, I would say 15 years ago, this study was done between 1999 and 2004, so in reality, they think that more people have been seeking medical attention especially with the internet, Googling and having access to information and knowing who to go to. And this number keeps rising because of modern technology as does the number of people experiencing tinnitus because of the stresses of daily life, as well as modern technology, more and more people are using

things like iPods, iPhones, smartphones, ear buds, AirPods, so they might be listening at louder volumes, have greater noise exposure than they did before. Now of the 20 million who seeked medical attention, about 2 million will say that they're debilitated by their tinnitus.

2 million people find that their tinnitus is severe and it's impacting their daily life to a point where they're not enjoying themselves. The next slide, and the next statistic I'm going to talk about is very shocking and it's really a sad statistic as well, so be prepared. Of those the 2 million that suffer from debilitating tinnitus, about 10% of women have attempted suicide and 5% of men. So we're talking about one in 10 women who have severe tinnitus attempt suicide and one in 20 men, and that's one statistic, but it's reported that up to 25% of people who have severe tinnitus have contemplated tinnitus, or suicide, I'm sorry. Those are staggering statistics and we need to make sure we get to these patients before they get to that extreme.

We're able to help patients and I wanna make sure we do that. The reason I bring up these statistics is because I want you to keep these in the back of your head when patients come in and report tinnitus, I wanna make sure that you're thinking about those statistics, making sure that they're getting that treatment that they need and you're evaluating them properly. Now that we know a little bit about tinnitus, let's really dive into tinnitus. So what does a tinnitus patient look like or a patient with tinnitus look like? Every single patient is going to be, so if a patient comes in and says they have tinnitus, they may report a unique set of symptoms.

Some common things they may say is they may hear ringing in their ears or a roaring sound, swooshing, sounds like a tea kettle going off, fans, crickets, buzzing, there's so many different perceptions of noise they may experience. And that's okay because they're all considered tinnitus. If you go and look up the definition of tinnitus in a dictionary, it will say tinnitus is the perception of noise such as ringing or roaring that is

typically caused by a bodily condition, maybe it's something with auditory nerve or wax in the ear and is usually subjective and can only be heard by the one affected. There is no external source for the noise. So to break that down basically, tinnitus is the perception of noise when there is no external source for noise.

And when we're talking about tinnitus, we can further break it down. There are two different ways to break it down and classify it, traditionally, we classified it as either objective or subjective. Objective tinnitus is actually really rare, it's about 1% of cases of people who report tinnitus. Objective tinnitus is something that is audible to another person. So if you're standing next to the person experiencing the tinnitus, you should be able to hear it with just your ear, possibly with a stethoscope or a microphone. It is coming from an internal acoustic source, so once again, there's no external source and it could be something like a muscle spasm causing the tinnitus or a vascular tumor. For your objective tinnitus patients, you do want to give them a medical referral to make sure there's nothing else significant going on.

The more common type of tinnitus when we're classifying is subjective tinnitus. Subjective tinnitus is tinnitus that's only heard by the patient, so nobody else around them can hear it and the cause may or may not be known. Sometimes you won't be able to tell what the cause is or it could be caused by various other disorders like cardiovascular issues, head or neck trauma, hearing loss and once again, that's gonna constitute about 99% of all cases. We can classify tinnitus as objective and subjective but we can also classify tinnitus as being primary or secondary. I'm gonna talk about both of these in more detail and I'm gonna start off with secondary 'cause secondary is less common than primary tinnitus.

So let's talk about this. Secondary tinnitus is tinnitus with an underlying cause that is not sensory neural hearing loss. So if somebody has sensory neural hearing loss and secondary tinnitus, the secondary tinnitus is not caused by that sensory neural hearing

loss. It could be related auditorily or non-auditorily. The most common type of secondary tinnitus is gonna be the pulsatile tinnitus. So the patient will report it's very patterned, it sounds like a heartbeat or a pulse in their ears. And secondary tinnitus is gonna be the most treatable type of tinnitus, there's usually an underlying cause and once you treat the underlying cause, the tinnitus goes away. So what are some of these causes of secondary tinnitus?

Let's start off with auditory causes. There are four well-known auditory causes, there's cochlear abnormalities, so if there's a misshapen cochlea that can cause secondary tinnitus, auditory nerve pathology, so your neuromas and tumors on an auditory nerve or in the central nervous system can cause secondary tinnitus, sometimes being able to remove that tumor may result in that timidness going away. Middle ear diseases, also a secondary or a cause of secondary tinnitus, so this would include things like otitis media or your common ear infection, it could be otosclerosis, a conductive hearing loss that is treatable, can cause secondary tinnitus. And then ceruman, so ceruman is one of the more common causes of secondary tinnitus. And matter of fact, I've actually seen patients who've come in and complained about tinnitus and it's been due to the ceruman, and one really sticks out to me about seven years ago, I was in clinic and I had a patient come in, really nice young woman who came in and looked very stressed out.

She had ringing only in one ear and it was debilitating her to the point where her and her boyfriend were on the brink of a breakup, she wasn't able to work cause that ringing was so loud, she couldn't focus on anything else. So we did a thorough case history, she didn't feel like she wasn't hearing well, her main complaint was tinnitus. Started my evaluation, looked in her ears, saw quite a bit of cerumen in her ear wax. Went and did attempt tympanogram and the tympanogram came back flat. So I removed all the wax, we ran the tympanogram which was normal and went through a full evaluation. Her hearing was normal within normal limits, speech and word were

great, and as I'm doing this test, I could see her face relax as we're going through the test.

And as soon as I opened that booth door, she said, whatever you did, the tinnitus is completely gone, even if I try to listen for it, I can't hear it, and she was so happy. And a week later, I called to follow up with her to see how things were going, make sure that tinnitus hadn't come back, wanted to make sure we didn't need to explore other treatment options. And she said, no, but to notice has been gone, I'm much happier, I can sleep again, I'm doing better at work, my relationship is improving, and then she said something that I thought was really important for us, remember she told me she's never using Q-tips again because she figures the reason that swimming was so packed in was she was pushing it in with Q-tips.

So she said, she'd just come in every six months now to have her ears checked and cleaned out if needed be. So secondary tinnitus is very treatable. Some non-monetary causes of secondary tinnitus include vascular anomalies, so if you have malformations of your arteries or veins up there, very narrow, that can cause secondary tinnitus, myoclonus which is the medical term for muscle spasms can cause secondary tinnitus, intercranial hypertension, TMJ disorder, and tonic tensor tympani syndrome which is actually caused by anxiety in most cases and it's where the reflex threshold for the tympani muscle activity is reduced, so it's constantly spasming because of anxiety and that will cause secondary tinnitus. Now that we've talked about secondary tinnitus, let's dive into primary tinnitus, 'cause this is gonna be most of the patients that you see.

Now when we're talking about primary tinnitus, we can break it down into even more characteristics. Primary tinnitus is when tinnitus occurs from an unknown source, so we don't know what the cause for the tinnitus might be, it could be associated with sensory neural hearing loss, it may not be, and we can further characterize it and we

want to further characterize it. So when a patient comes in and we're going through their case history, we wanna classify it as subjective or objective tinnitus and then secondary or primary tenets. When we're looking at the case history, we wanna ask them questions about the temporal characteristics. So the timing of the tinnitus, is it spontaneous where it comes and goes and last less than a minute?

Is it temporary where it's happening a few hours to a few days and then goes away on its own? Is it occasional where it's happening every once in a while? Is it intermittent where it's happening daily or weekly, or is it a constant tinnitus? Are they constantly hearing their tinnitus? And what's the duration, is this something recent? Has this happened within the last 60 days, or has this been going on for awhile? And what's the impact? Is it bothersome or non bothersome? The answers to this, these questions, are going to really form your treatment plan and your referrals. If someone comes in and says, they have spontaneous recent non-bothersome tinnitus, and you hear about them going to a concert three days ago and the ringing in their ears, you might want to play a wait and see because they might very temporary threshold shift on the audiogram.

So you might not go and explore treatment options right away. Or if someone comes in, constant tinnitus started recently and it's bothersome, you might send them on to the ENT to make sure there's nothing going on, like sudden sensory neural hearing loss. Whereas somebody who's not bothered by tinnitus but has had it for a long time, you may not need to necessarily treat it where someone who's complaining and saying that it's bothersome, you may need to treat. Furthermore, we talked about tinnitus, how to classify tinnitus, some questions you should ask during your case history, but we also make sure that we distinguish it from other Phantom auditory perceptions and perceived sound intolerances. So what does that mean?

There are multiple different types of Phantom auditory perceptions. One is gonna be auditory hallucinations which are false perceptions of sounds, it's the experience of hearing internal words or noises that don't have origins in the outside world and are separate from your mental processes. So I know that sounds complicated, but usually auditory hallucinations may be caused by your mental health or it could be caused by infections like encephalitis or meningitis or high fevers, a common one that people experience would be hearing a loved one talk after a recent death. So a loved one died but they can still hear them talking in their head once in a while, that'd be an auditory hallucination. Musical ear syndrome is actually a subset of auditory hallucinations and it has to do with music.

Musical ear syndrome is hearing music when there is no external source of music. So it could be anything from a single instrument to a concert and multiple instruments and it could have someone singing or not singing. So musical ear syndrome would be that patient that comes in and I've had this patient come in before, who comes in and says, you know, I wear earplugs but my neighbors are playing music so loud at 2:00 AM, I can't sleep and when I try to talk to them about it and everyone else in my building, they all say they don't hear it. That's musical ear syndrome is when you're hearing music and there's no external source. Auditory imagination is something we've all experienced, auditory imagination is when you hear or can visualize something that's not there, so it's a form of mental imagery.

So when you get a song stuck in your head, that's an auditory imagination. I'm not going to mention any songs because I don't want them to get stuck in your head but there are a ton of them out there that just gets stuck in your head and then you just hear it, even though there's no external source. Now, and then of course for Phantom monetary perceptions, tinnitus would be included since there is no external source. Now treatment for the auditory perceptions we talked about, it's gonna be different depending on who's treating it. If you're seeing an ear nose and throat doctor or a

hearing care provider for a Phantom auditory perceptions, you're gonna treat it like it's an auditory or hearing problem.

If you're going to a psychologist or neurologist, they're gonna be more likely to treat it with pharmacology. So when they're coming in and they're talking about their Phantom auditory perceptions, make sure that you're making the correct recommendation for them. So now that we've talked a little bit about tinnitus, what patients may experience, let's talk about the tinnitus risk factors, some possible mechanisms of tinnitus, 'cause there's quite a few out there. Known causes of tinnitus, hearing loss, 90% of chronic tinnitus sufferers have some sort of hearing loss, most of them are gonna be sensory neural hearing losses. If they have conductive hearing losses that usually causes secondary tinnitus. Also another known cause of tinnitus is noise exposure. Noise exposure is related to haircel damage, biochemical changes in the cochlea and it can also damage the auditory nerve or central nervous system.

Going to look at a couple of studies that looked at tinnitus and hearing loss. This first one is from 2012 and that was done by Tsai Cheung, and Sweetow and it looked at tinnitus symptom severity and their best hearing threshold. So they have people come in, tested their hearing, chose their best hearing threshold, doesn't matter what frequency and then they have them do a self-assessment called the tinnitus handicap inventory. So this is one of the self-assessments that patients can do that will tell you a little bit more about how much the tinnitus handicaps their everyday life, are they very handicapped, or not handicapped and are able to go on with normal life? Now, what this study found was that it didn't matter what their best hearing threshold was in relation to how handicapped a person felt.

So it didn't matter if you had a severe loss, it didn't mean that you were always going to have severe tinnitus. The severity of tinnitus and hearing thresholds had no correlations. Another study from 2001 by Borchgrevink looked at tinnitus and age and

hearing loss. So it looked at different age groups and it looked at peer torn averages, and this study looks specifically at if you have hearing loss, were you more likely to have tinnitus? And they did find that if you have hearing loss, you are more likely to have tinnitus. So your severity wasn't dependent on your hearing or the severity of your tinnitus isn't depending on your hearing loss but your hearing loss will give you some sort of correlation to whether you have tinnitus or not.

So hearing loss a known risk factor for tinnitus but there are other risk factors as well, and I'm gonna go through these in a little bit of detail. So there are auditory causes like ear infections, neuromas, otosclerosis, drugs and medications can cause it, cardiovascular disease and thyroid issues are known risk factors. So with cardiovascular disease, we're talking about some type of restriction of blood flow in the blood vessels, it could be heart disease, it could be hypertension, it could be coronary artery disease, these all can cause tinnitus. Medications, there are over 500 prescription and over the counter drugs that are associated with tinnitus. Some common ones that you may hear or see on the case history are gonna be your Salycylate and Analgesics, which is aspirin.

It's gonna also be your antibiotics, so your Amoxicillin, azithromycin, all of your -mycins fall under potential causes of tinnitus. Painkillers, so your Oxycodone, your Vicodin, your morphine, those are associated with tinnitus, cancer drugs, so cisplatin, carboplatins, actually all of your platins are associated with tinnitus. Diuretics like Lasix, which is used to treat hypertension and cardiovascular disease, as well as cardiac medications like your Statins, ACE Inhibitors, beta blockers. So it's important to get a list of patient's medications but over the counter and prescription so that you can look them up to see if a potential side effect is tinnitus. If it is, and they're reporting their tinnitus is bothersome, you'll want to refer them back to their prescribing doctor so they can mention the side effects from that medication and the potential cause for tinnitus.

Now, if the prescribing doctor says it's okay for them to stop it, it may stop the tinnitus. It's really dependent, sometimes it's temporary, sometimes it's permanent, sometimes it goes away right away, sometimes it takes a few days or a month. Usually when patients are reporting tinnitus and it may be correlated to medications they're gonna say that the tinnitus is in both ears and it's a high pitched constant tinnitus, but that's not always the case but that might be a good indicator of medication induced associated tinnitus. Another risk factor for tinnitus is head and neck injuries. So this is going to be skull fractures, whiplash blows to the face, IMJ problems and it usually starts right after injury or trauma.

When you're looking at head and neck injuries and their association with tinnitus, these patients actually tend to get treatment for their tinnitus sooner than other patients with tinnitus. And we're looking at these patients will come in to see you within two and a half years, whereas on average patients who are experiencing tinnitus tend to wait up to seven years before coming to get help from anybody. And the reason that this might be is because they can usually, they usually tend to say that their tinnitus is louder and they suffer more daily problems due to their tinnitus, they're also getting medical attention, so they're more aware that there may be treatment options for tinnitus, or it speaks for it a little bit more.

Auditory related causes could be anything from ear infections, noise exposure, Meniere's disease, otosclerosis, sudden hearing loss and acoustic neuromas. So these are all known risk factors for tinnitus but there are also risk factors that are possibly associated with tinnitus. And the research is out there saying that there may be a correlation but more research needs to be done. I don't have time today to go through all of these in more detail, but if you have a question or wanna know more about the research behind any of these, please ask me a question and leave your email address and I'll get back to you afterwards. So some possible risk factors for tinnitus include

alcohol usage. So they're finding that a certain amount of drinks a day can start or is more correlated with tinnitus, for it's possible health status, your weight, your mental health, your geographic region, your socio economic status, all of that could be a possible risk factor for tinnitus.

Now who experiences tinnitus? The correct answer is anyone can experience tinnitus but research shows that some groups are more susceptible than others. Men seem to be more susceptible to tinnitus than women but that could be because they may be in professions that are exposed to noise more than other professions. Senior citizens report tinnitus more often, Caucasians and people with certain health problems tend to report tinnitus more often. Other populations that report tinnitus are gonna be your veterans and military personnel, over 150,000 veterans began receiving compensation benefits for tinnitus in 2015, over a million and a half veterans have an auditory system disability and it is becoming a political issue because it is one of the most frequent health complaints of soldiers returning from war or from the Middle East for the last 20 years.

We're talking $2 billion of US or $2 billion US are used for compensation alone. It's one of the biggest reasons veterans are compensated and given benefits is tinnitus. Other populations to be aware of that might be at risk for tinnitus are gonna be workers in loud environments. So this is gonna be your autoworkers, your firefighters, your police, your EMT, people in manufacturing jobs, musicians, and music lovers because they tend to listen to music. If they're going to concerts, concerts get loud whether it's a rock concert or a classical concert, people wear headphones and ear buds and crank it all the way up. People who like motor sports, so motorcycle drivers or people who ride dirt bikes are at risk for tinnitus, as well as hunting enthusiasts.

So a lot of times these patients aren't aware that they should be wearing hearing protection and that they might have noise exposure that causes hearing loss and

tinnitus later on. And then traumatic brain injury is associated with tinnitus as well, it could be caused by the injury or it could be caused by some of the medications you are using to treat the injuries. That being said, as you can see, there are many causes of tinnitus. We talked about auditory related causes, we talked about cardiovascular disease, fibroid, medications, so many different causes of tinnitus. And that being said, there's probably a lot of different mechanisms of tinnitus, so there might not be just one reason or person or one reason or one theory that explains why someone has tinnitus.

Research is being done, new theories are coming out, but I wanna talk about the top three that are used today. We have theories of causality, the neurophysiological model of tinnitus and the neural synchrony model. Let me talk a little bit about each of these for you. I broke it down into, to make it as easy to understand as possible, Theory of Causality is a theory that says the perception of tinnitus likely involves the auditory pathway and its interaction with other brain systems. So it's looking at the auditory pathway as well as how is that auditory pathway interacting with other parts of the brain. And is that what is causing the tinnitus? Is it that there's too much information being sent to another part of the bain, or brain?

And what it thinks is that all tinnitus originates in the central auditory system. So this could be that, hey, you know, I'm not hearing enough sounds so as I'm not getting signaled to another part of the brain, that part of the brain is making up sound to compensate for the lack of sound. That's a theory of causality. Another model of tinnitus is called the neurophysiological model of tinnitus. And this was just discussed back in 1992 by Jastreboff, and the way this one works is that the tinnitus is resulting from abnormal processing of a signal in the auditory system. So what's happening is there is a signal going up to the brain and something's going on that's causing it to be processed over and over again and creating a feedback loop.

So, okay, you get the first signal, it's causing some type of feedback, and this is creating an annoyance, and then people who have tinnitus and that are hearing the tinnitus get even more annoyed which causes there to be more feedback, so you're going through this vicious cycle, okay, there was an abnormal processing that caused feedback, person notice feedback is annoyed by it so the feedback loop starts again, it's a vicious cycle, it gets stronger and stronger and stronger. And then the final one is the neural synchrony model. And this is where there's irregular neural activity in the primary auditory cortex that have been affected by the hearing loss. Because of the hearing loss, this area is not getting enough activity so it's starting to increase neural firing, and then it's causing the tinnitus, so it's kind of a disconnect of the hearing loss and the brain and the pathways, which is causing tinnitus.

I'm not going into too much detail, but these are great models widely used and highly regarded, you can look more into them, there's a lot of research on these models. As you can see, we have multiple different models because there's different causes of tinnitus. Now that we've said that, we've talked about, okay, these are your risk factors, this might be the cause of your tinnitus, this might be what's going on in your body that's causing the tinnitus. Let's talk about what else we know about tinnitus. So this study is from the 1950s and it's a great study till this day. So how many people suffer from hearing loss? This study had a 100 participants who had normal hearing and no reported tinnitus, they were asked to sit in an anechoic chamber for a period of time.

Of the 100 people, how many do you think suffered or heard tinnitus or had some type of phantom auditory protection? 93%. Most of what they heard was some kind of buzzing, ringing or hissing. So it could be that when there is the absence of noise, their brain is creating noise because it's used to hearing all the time. So just because you have normal hearing doesn't mean you can't experience tinnitus, there's still something going on. Another thing that's also interesting is that with research, they found that

patients who have asymmetrical hearing losses tend to hear their tinnitus more and it tends to be worse, and they're poorer here compared to people or patients who have symmetrical hearing loss, that they're hearing it equally in both ears.

All right. So we talked a lot about the background of tinnitus, so let's talk about your tinnitus patient. What is your tinnitus patient or your patient with tinnitus going to look like? Well, they're gonna come in and they're gonna have a presentation. So they're gonna say something like, I constantly hear ringing in my ears or hissing or a static or a buzzing, waterfall, crickets, lots of different presentations like we've discussed. As we're delving into it, we wanna look at the quality of life impacts. So research shows that balance in emotions, sleep concentration, socialization, physical health, economic wellbeing are all impacted by tinnitus. 18% of patients report tinnitus and come in for treatment report some type of sleep problem.

They have mental health issues like anxiety and ongoing depression. Let's delve into this a little bit more. So once again, some sensitive information coming up, in terms of thoughts and emotions, when a patient comes in with tinnitus, there's a whole spectrum of emotions. They may say they're minimally bothered by their tinnitus and they can go about normally, they may be irritable, they may present nervousness because they don't really know when that tinnitus is gonna come and how it's gonna affect them, so they're nervous and anxious. It might cause them depression, because of that nervousness or anxiety or irritability, they might not wanna be around other people, they might not know what to do, they may have loss of hope, they may have despair and they may be suicidal.

So you really want to get what the patient is thinking as they're going through their tinnitus. Sleep and concentration. A lot of times, patients with severe tinnitus will report that they're unable to sleep. Many patients in general will say that their tinnitus is loudest when they're trying to go to sleep and keeps them awake at night, other

patients may say that they have trouble concentrating due to their tinnitus, they might not be able to focus in school because the ringing is so loud that they can't hear the professor or at work at meetings, they're unable to hear those around them because the tinnitus is bothersome and they're focused on it. In terms of socialization, there are studies showing that tinnitus impact socialization.

Patients may not want to go out, they may want to just stay in, they may not want to socialize because that ringing is bad, and when you look at socialization and the impact of it, you add sufferers and partners, partners notice that there is a higher impact of tinnitus on socialization from the sufferer more than you might realize. So a lot of people will say, oh, it doesn't really impact my socialization, but as you look at two people who are saying, yes, it is impacting my socialization, partners tend to say, yeah, my partner does less than they think they do because of their tinnitus. It can also lead to physical health issues. Patients with tinnitus are at risk for self harm.

There's also health problems that can be exacerbated by the stress of tinnitus, obesity, diabetes, heart disease, GI distress, these are all linked with tinnitus. Patients might overeat because they're upset about their tinnitus, it might cause GI distress, it could cause them to go towards sugary foods as well and cause diabetes. So we wanna keep this in mind when we're talking to our patients and it can also affect their economic wellbeing. Patients with severe tinnitus, it's reported that about their personal economic loss is up to $30,000 annually. And that could be because of lost earnings, meaning to take time off, decreased productivity because their tinnitus, so they're still working but it's taking them longer to get things done because of the ringing in their ears and also their health expenses associated with treatment for tinnitus.

The cost to society is $26 billion annually. So we talked about $2 billion annually in compensation for veterans, but for everybody else, we're spending up to $26 billion

treating them, helping them, lost wages, lost productivity. That's a lot of money. Patients, you also wanna look at their reactions to tinnitus. It can go anywhere from they're able to ignore, it makes them angry, it makes them sad, irritable, overreact, or complete lack of control. So we talked about thoughts and emotions. So that's really what they're feeling. A lot of them keep it inside what they're experiencing. Reactions is going to be how they act towards others, so they may act completely fine, it doesn't bother them that much, or it might make them angry at people, so they get ticked off over something very small that somebody else might not get as mad about or they could lose complete control of themselves or overreact to situations due to their tinnitus.

- So we talked about a tinnitus patient talked about different causes mechanisms, their presentations, we talked about how they're all unique. So why are some more bothered more about it than others? Why do you have patients who have normal hearing sensitivity, reporting severe tinnitus and then profound hearing losses reporting no tinnitus, why is that? Well, research shows that there is no difference in psycho acoustic characterization of tinnitus when comparing groups of people who experienced tinnitus. So psycho-acoustically, they're very similar but it's the reaction they have to the tinnitus that creates their distress, it's not their tinnitus itself. So a good way to think about this is, let's say you live in a big city and you're living in a apartment building and they decide they're gonna be doing roadwork or construction right next to your building for the next three weeks.

All right, two different patients, okay. Day one, let's say it's me. Day one, I wake up, I hear the jackhammer and it's really loud. I hear it, but I just go on with my day. By day five, I'm able to completely ignore it. Oh, it's going on but I don't notice it unless I'm really trying to notice it. By 10, I really don't notice it. So this would be like you're, like people who live near train tracks, where at first they may be bothered by the train, but by day five, day 10, they don't even realize there's trains going by. Their body has, or

their brain has adjusted to ignore it. But now let's say that for example, my husband, we live in the same building same apartment, same construction.

Day one, he hears that. Okay, it's pretty loud, but you know, he goes about his day, but by day five, he's really focused in on this. It's really loud, it's agitating, he's in more distress because that noise is just getting louder and louder and bothering him. And then by day 10, that's all he can focus on. So you can see same situation for two different people but two very different reactions. And so what we're finding in research is that this is a vicious cycle for patients especially those with severe tinnitus. So what's happening is, they're having a negative reaction which is escalating their tinnitus which is causing them to have a higher level of arousal which is causing an even worse reaction, making their tinnitus even more and just going around in the circle over and over again.

That being said, we have to be aware that by the time the patient comes to us, it could be three years out, it could be seven years out, but they've already created their own attitudes and beliefs about their tinnitus, so they may be in that vicious cycle, they may have learned to ignore it, they've Googled. I promise you, they probably Googled tinnitus, they may have tried their own different treatments, they may have seen miracle drugs online that they've tried, they may have read from this person, they may have been on boards where people talk about their tinnitus, they're coming in with their own perception of their tinnitus and we need to make sure that we look at that and ask them about it while we're going through their case history.

So let's move on quickly to what we're going to do. I'm gonna talk about the assessment and treatment of the tinnitus patient right now but I'm really gonna get into this on part two which is gonna be on April 20th, or it will be recorded if you'd like to watch it at a later date. So with the assessment of the tinnitus patient, I'm just gonna talk about this in a very broad term and then go into more detail in part two later on. So

we're gonna break this up into four sections. Self-assessment, case history, audiological assessment, and then counseling and treatment. So self assessment is going to help you understand the patient's perception regarding their tinnitus and hearing problems.

This is a really vital piece because once again, they're coming in with their own preconceived notions on their tinnitus, so you really wanna see where they're at, what they're experiencing, what they know, what they don't know. There's multiple different ways to go about this, there are many different questionnaires and surveys out there that are available. You can look these up, most of these are free, you have the patient fill it out and it gives them a score, some common ones are the tinnitus and hearing survey, the tinnitus functional index, tinnitus handicap inventory, tinnitus reaction questionnaire, tinnitus handicap questionnaire. Tinnitus and hearing survey is a really great one that I like to always highlight because this will let you know what is affected by their tinnitus versus what is affected by their hearing, so it really does a great job of separating those two.

So you always wanna have the patient fill out a self-assessment. Then you wanna take a very thorough case history. So we wanna know whether this is subjective or objective tinnitus. We wanna classify it as primary or secondary, if it's primary, we wanna look at the temporal characteristics, we wanna look at the duration, the onset, all of that. We also wanna know the referral source, so why do they, can't come in today, who referred them to you? Was it a Google search that brought them in? Was it a doctor that brought them in because it's going up, all of this is gonna impact your counseling and your treatment options. You wanna make sure you know their perception their tinnitus, if they're saying that their tinnitus is non bothersome, then maybe you just say like it, if it gets worse, come back in, maybe it's due to hearing loss, or due to the hearing loss and tinnitus doesn't bother them much.

You wanna know their attitudes and beliefs about tinnitus So we wanna know, are they sleeping? Are there concentration issues? What's their reaction to their tinnitus? What are their emotions? You really wanna know all this information because it's gonna help us with our counseling and treatment. It's also gonna let us know if we need to make appropriate referrals. Someone who's angry, despair, has suicidal thoughts, we wanna make sure we're getting them the correct help that they need, we wanna make sure that we're getting them to the psychologist. If they are contemplating suicide, and I say this because I've experienced this where I've had patients come in and make comments like that, I wanna make sure we're calling their primary care physician and getting them the help they need and making sure that we're really managing their tinnitus.

We also wanna know the case history in terms of previous management of tinnitus. So what have they tried? What's worked, what hasn't worked? Because we don't wanna keep going back to something that may have not worked, we wanna know their medical history. So do they have a history of head and neck injury, thyroid issues, cardiovascular injuries, what medications they're on, you saw how that can impact tinnitus. We also wanna know their audiological history, so do you have any auditory issues you've had in the past? Is there a no hearing loss, conductive hearing loss? You know Otitus media, and we also wanna know more about their support system too. So how are they dealing with it? Who knows about it?

Who can they rely on? Because sometimes we wanna make sure that they have people they can talk to at home as well, who are supporting them and are going to encourage them to follow through on treatment. Then we're gonna get into our audio logical assessment. So when we're talking about our audiological assessment, we're gonna look at otoscopy, acoustic reflexes, audiometric thresholds, speech testing, OAE's, tinnitus loudness and pitch matching, masking levels, MCLs, UCLs, once again, I'll go into more detail in part two about all of this. But just some little notes for you, acoustic

reflexes and UCLs should be done only if the patient doesn't have loudness level issues. You don't want to conduct these tests and then have them say that their tinnitus is getting worse because of it.

You don't want it to irritate them, 'cause it's gonna affect the rest of your results, it's gonna affect their perception of the appointment as well as counseling. So only do these if the patient says they don't have loudness level issues. High frequency audiometry and OAEs is really useful for diagnosing those who have normal hearing sensitivity. Sometimes they may have a high frequency hearing loss that you can't see cause it starts after 8,000 Hertz, they may have absent OAEs with normal hearing. So it's really good to be able to do these things for patients, especially if they have normal hearing. Tinnitus loudness and pitch matching, I'll go into more detail about this in the second course but it's just a way to present sounds and pitches similar to their tinnitus to help you identify the patient's specific perception of their tinnitus.

So how loud is it? What pitches it? And minimum masking level is just gonna tell you how loud does a different intensity that's similar need to be in order to totally mask the tinnitus? And this can help with treatment. After you go through the assessment, something I really don't want you to do is tell a patient that nothing can be done to help with their tinnitus, that there's no cure. The moment you say that to a patient, they focus in on those words and everything you say after that goes out the window, they're not hearing any of that and they're gonna be in despair. We wanna change that message to say something like there are options to help you with your tinnitus, let's talk about treatment and then go into that, because yes, there may not be a cure for their tinnitus, well, we can certainly help them decrease the amount of impact it has on their daily life.

We're gonna do that through a couple of different ways. I'm gonna say it one last time, I'm gonna go into more detail about all of these in part two, but counseling and

treatment. Explain what tinnitus is and why it might be happening. The patients coming in with their preconceived notions and they may be completely wrong, so you really wanna tell them the correct way tinnitus or correct tinnitus and why it may be happening. You wanna discuss different options for treatment and you wanna create goals for the treatment. And the biggest goal of treatment and probably your number one goal that I would always use when I tell patients was I wanna lessen the impact of tinnitus on your daily life.

That is the ultimate goal. There are a couple of different ways to do that, we can do that with hearing technology. Hearing technology can reduce the awareness and disturbance, sometimes just treating a hearing loss can make the tinnitus better. Also hearing aids nowadays, or hearing technology also has built-in tinnitus therapy. There's also sound therapy, so white noise maskers, apps, things like that. And you can use tinnitus sound therapy also to habituate the brain to tinnitus. So retrain the way the brain interprets tinnitus. Lifestyle changes can help with tinnitus, so quitting smoking, changing your diet, cut out caffeine, lessen salt intake, lessen alcohol intake, getting more sleep, relaxing, exercise, all of that can help with the patient's tinnitus.

With relaxation and meditation, doing something relaxing, maybe it's watching Bob Ross paint, maybe it's meditating or doing yoga. Also, maybe eating healthier will make it better. If they need more help, there are also well-known protocols like tinnitus retraining therapy, there's also progressive tinnitus management that you can look up on the National Center for Rehabilitative Auditory Research, which is free. And there's also tinnitus activity mistreatment. So lots of well-known protocols that you could utilize and work with the patient in order to help them lessen the impact of tinnitus on their daily life. And then of course you have tinnitus support groups, so these can be in person or virtual. So if someone's rural, they can still go to a virtual support group, and support groups are great because they can talk to other people who may experience

similar symptoms of their tinnitus, the same reactions, hear their stories how they've overcome their tinnitus and the daily life impacts it has.

Also, it's great because support groups usually have guest speakers from all different medical fields come in and talk about tinnitus. Remember that when we're talking about tinnitus, the patient is kind of looking at a candle in the dark room. Those with severe tinnitus, this is especially true where they're so focused on the tinnitus, that it's the only thing they can see, so it's a candle in a dark room, that's where your eyes are going 'cause that's where the light is. But what we wanna do, we wanna open up the light so that the candle is just a small part of their overall daily life. so the impact is lessened, On this slide, I have some tinnitus resources, it's in the handout that you can use that talk about tinnitus and what a patient can do.

These are great resources, lots of information, I actually pulled quite a bit from here when I created this presentation. Also, like I said, we have more courses on tinnitus next week live, we have one on tinnitus management, which is going to be Starkey specific, part two of this course is on April 20th as well. I'm gonna take a second to answer Q&A before the end. And get back to you. So first question is, would tinnitus induced by medication be considered secondary tinnitus? It can be, so this is a complicated question with medication and tinnitus. If discontinuing that medication is appropriate for that patient, they can try to discontinue it and their tinnitus may go away.

In that case, it was considered secondary. If it doesn't go away, there may be another cause of the tinnitus or it may be permanent from the tinnitus and it becomes primary. What percentage of tinnitus sufferers have idiopathic tinnitus? The majority they're saying over 90%, I don't know the specific number, they're saying about 90% because of course there's so many different causes so there's no way to pinpoint one. And then finally, what is the mechanism for cerumen causing tinnitus? Well, it's gonna be

dependent on every patient, I went through the three different models for the cause of tinnitus of what could happen. So when the cerumen is causing tinnitus, usually you would need the cerumen and to be completely impacting so that sound isn't getting through and you're getting a conductive hearing loss due to the cerumen that would cause the tinnitus and then once you remove it.

So it could be due to the lack of sound going up to the brain which could be any of the three models I talked about. Are there any other questions I can answer for you today? If not, I wanna thank you for your time today, I hope you enjoyed this course, I hope I see you next month for part two and thank you for spending time with me. And have a great rest of your day.