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DEMYSTIFYING ALDs

Presenter: ALICE PAKHTIGIAN

ALICE PAKHTIGIAN: They said I was born with hearing, but shortly thereafter I lost some, and then it just got worse, plateaued, and worse. So, basically, I'm severely to profoundly hard of hearing and I have a cochlear implant, as well as a hearing aid. The Hearing Discovery Center, where I worked before I came to WROCC, is a lending library of assistive listening devices. I was based in the senior center, and we outreached to the senior community. It was very exciting, and I hope we reached a lot of people.

Where I work for now is the Western Region Outreach Center and Consortia (WROCC) at Western Oregon University. We are under the umbrella of PEPNET, which is Post Secondary Education Program Network. We are a nationwide, federally funded program. We're broken down into four different regions. In my region, in Oregon, we outreach to Alaska, Washington, Oregon, and Idaho. We provide services to the service provider for deaf and hard of hearing. For example, the VR disability offices and employers. We don't necessarily work directly with the consumers per se, but we work with the service providers.

The web site for PEPNET is www.pepnet.org . So, if you're not in the WROCC region, and if you have questions to ask me, I could help you or I can direct you to the coordinator in your state. It's online, so I didn't bring the little booklet. I have an entire suitcase of all this stuff. So we're discussing the demystifying assistive listening devices, the devil is in the details. Let me describe the agenda. We will be discussing the benefits of assistive listening devices, the components of assistive listening devices, the wireless systems themselves, and due to the limited amount of time we're not going to really be able to cover troubleshooting and keys to success.

Why do we use assistive listening devices? In order to answer that question, are hearing aids and cochlear implants effective by themselves? They could be, in certain situations. In a quiet environment, one on one conversation, or in your living room, dining room. In an atmosphere that you can control. It's effective to a certain degree. But not always. So why use assistive listening devices? For example, if you're at a

party or if you're at a meeting such as this, if you're at a lecture, assistive listening devices help the hearing aid amplify the sound you receive.

We're going to be talking about the different components that will help for a better listening situation. We're going to be discussing the individual, sound, the environment, the sound source, microphones, telecoils, coupling devices, transmitter and receiver systems.

The first one we will be discussing is the individual. Now, as many of you know, everybody has a different story concerning his or her hearing loss. Some people have their hearing loss from when they were born, others at late age. Some people have one ear they have no hearing in, or it's bi-neural, where it's in both ears. Everyone has different severities in frequency losses. It could be conductive or sensory neural. It just may plateau at a certain point and stay that way or could just get worse. Everybody has different speechreading ability. So everybody has a different story to tell and it helps them with the devices, it helps them work with the devices. I'll explain that more later.

Another component is sound. There are different dimensions of sound. There's frequency and loudness. Let me show you, this is not quite an audiogram. It looks like an audiogram but your audiogram does not have pictures. Frequency is the pitch, the soft, high pitches and the low, loud pitches. For example, the f, the s, the th, those are high pitches. The low pitches are the o, the r, the u. Those are like deeper sounds. The loudness is the volume; when you lose your hearing it's common that the more hearing loss you have, the more you lose the high frequency pitches. And then as your hearing loss gets more severe you start losing the low-pitch sounds too. So for example, if you're in the severe, you may lose the sounds, the vowels and the consonants, that's speech discrimination sound.

You're going to be able to hear the dog barking, it's in the same room as you. But you're not going to be able to hear leaves falling. You may lose conversation; you'll have trouble conversing. This is what the frequency and loudness is. I'm going back to the impact on speech intelligibility. Sound. As you know, if you're in the first row you can be able to hear the sound better than if you were in the fourth row, because the further the sound goes, the softer it gets. It loses its intensity, it loses the volume. The closer you are to the person it's easier. The signal to noise ratio, for example, a person with hearing, they want to hear a particular sound, that sound needs to be 6 decibels above the environmental sounds, the surroundings, for the hearing person.

For the person with the hearing loss, for a particular sound they want to hear, like a conversation, that sound needs to be 15 to 25 decibels louder than the surrounding environment. It just makes it a little bit harder, less signal to noise ratio. The reverberation is echo. And I’m sure some of you experience this: when you're in a building and you're getting tired of waiting for the elevator you want to take the stairs. The stairs are cement, there's no softening, you just go up the stairs, and you're with someone, you're going up the stairs with someone, and they're talking to you, and you

can't understand a word they're saying. It's because of all the echo. There's no place for the echo to be absorbed.

If you're in a carpeted room, like your living room, the echo that comes out gets absorbed. The sound comes out, the echo comes out. It gets absorbed by the furniture and the carpeting and the tapestries, so it's just easier. The impact depends on what assistive listening devices have to do with speech intelligibility, the distance, signal to noise, and reverberation. The assistive listening devices, or ALDs, as I call them, help overcome this. For example, this FM system is a transmitter and a receiver. I'm wearing a microphone and this is hooked up into the sound system. This is like an individualized sound system. This is the microphone, which I could be wearing, and this is the receiver. This is just one example of the many components I'm going to be showing you. But, with the receiver and head phones, you could be sitting in the back of the room and using this, and you could be hearing as well as the person sitting in the front row, because the distance is not going to matter. The signal-to-noise ratio is cut out because the environment is cut out. The echo is not going to matter because this is going directly from here into the receiver. So there's not going to be reverberation. So this is what fm systems do, or listening devices do.

As a lot of you already know, you want to consider whether it's a dark room or a light room, or whether somebody's standing in front of the window. Because the light is going to bother you, it's going to obstruct your view of the person, because their face is in shadow. You're going to have a hard time lipreading them. That's one situation to consider in the environment.

Another situation is somebody calling you from another room. That's harder. Obviously, you want them to come in so you they can call you from there. They'll say, "Hey Alice, I need to talk to you," rather than calling from the kitchen. The room acoustics. You want carpeting; you want to be in that type of room, rather than going up the stairwell, or in a very unfurnished room. You're going to have a hard time, even with wood floors. This is another factor you need to deal with when you want a better listening situation.

When you're dealing with and buying FM systems, you want to be able to modify it. For example, I'm giving you a lecture right now. It's going to get interactive later, but right now, I'm the only one with the microphone, so you're hearing just me. You're not hearing the other people in the audience yet. I'm wearing the microphone; you're wearing the receiver. So, you're hearing just from me. Now if I bring in a panel of speakers, that's a different story, because I'm going to be passing the microphone around. I mean there are five different speakers here. It's hard; it's a hard situation for everyone to remember the microphone.

There are different types of listening devices. There's something called the Mendoza system. This actually comes with six microphones, an output, and you put it with a transmitter. The transmitter will help you use six microphones, so you can spread that

out among the six speakers. And you'll be wearing the receiver. Everybody gets his or her own receiver. This is with an FM system you'd want to use it.

Now video or audio recording, there's the infrared system where you can put the transmitter on top of the TV. It has a microphone, and you have the receiver. There are different ways of working around this type of situation. I just wanted to let you know that you want to be aware of that when you walk into a room.

I know I jumped ahead on microphones. There's the omnidirectional microphone, which is the type of microphone where you hear within a certain range. I could put this in the middle of a table, like a table top microphone, and you will be able to catch what's around the table. This has the transmitter. You would be wearing the receiver. If someone is talking to you from the door, you're not going to get that because it stops at the end of the table.

Another table microphone is unidirectional, where the sound source comes very close to the microphone. A lapel mike can be omnidirectional, or it can be unidirectional. When you get an FM system, you can order microphones separately as another component. There are catalogs and websites out there. You can order an omnidirectional mike, or unidirectional mike separate. Usually it comes with an omnidirectional mike. Unidirectional a little more expensive, maybe about $50 more.

Placement of the microphone is very important. Obviously, it would not work as well if it was on my waist. It would not work well if the microphone was far away from the speaker. If I left this here and walked over there, you guys would not understand me. Just remember the effect of distance on sound. You know if you're up front you can hear better without the system, but with the system you can hear well from a distance.

Another component is telecoils. Some people know about it, some people don't. Telecoils are electromagnetic induction wires in your hearing aid or cochlear implant. There's a coil wrapped around a porcelain rod. The thing about it is not all hearing aids have them, not all cochlear implants have them. The hearing aids that most commonly have them are behind the ears and in the ears, not in the canals because they're very small. I'm going to advocate here. Telecoils are very important. All hearing aids should have them. All cochlear implants should have them. If you don't have one, get one. Talk to your audiologist or hearing aid specialist, and see if they could add it in there. They may need to ship it away to get it in there. It's not too much more expensive, depending on the hearing aid, but it's very important for you to be able to use FM systems, or for you to be able to use the telephone.

Telecoils are also known as t-switches, telephone switches, and t-coils. So if one of those four things, they all mean the same thing. Telecoils, or t-coils, they're not as sensitive as microphones. They're different. Microphone you hear in the environment. When you switch to the t-coil, you have to amp up the volume a little bit more. If you

have a weak t-coil you need to turn the sound up full volume. If you have a strong one, you just need to turn it up a couple of notches.

The proximity of the telecoil is important. If you're not close to the induction coil, you're not going to be able to get the sound. Telecoils are also found in hearing aid compatible telephones. You may see the box, HAC--that's hearing aid compatible. Not all phones are hearing aid compatible.

Okay there's an electromagnetic induction field around the phone, the speakers. For the hearing aid compatible phones, that field is open for you to use. They are susceptible to electromagnetic interference. If you're near a computer, if you're near a speaker, if you're near anything electronic, and you have it on the t-switch, and you hear humming or buzzing, that's electromagnetic interference. If you're working with devices you don't want to be too close to that. You don't want to be too close to the speaker. You don't want to be too close to the computer because that's going to interfere with your system.

Another component is coupling devices. If you don't have a hearing aid, if you don't have a cochlear implant, or you don't have a t-coil, then what do you use? You're a person with hearing, you've got head phones. I mean if you want to listen to the radio you plug it in, this is what you use. Or you use ear buds. You can just put that on your ear. That's for people with hearing, no hearing aids, no cochlear implants. But if you have a hearing aid, if you have a cochlear implant with a t coil, there are other things that you can use. You can use silhouette.

Silhouette, you can plug this in your receiver, the person is wearing a transmitter, you're wearing the receiver, and you put this by your hearing aid or your cochlear implant you put it on the side of it. This is electromagnetic. So you're getting the sound from the transmitter, it's going to your receiver in different ways, and then it goes from the receiver to your silhouette, and electromagnetically, and it goes to your cochlear implant or your hearing aid and it converts in the hearing aid to your ear. It converts acoustically. I know there are different ways of converting. This is one example: a silhouette. Many people do like this because it's close to your t-coil so therefore it's stronger. The other example is a neck loop. Many people also like neck loops. These are also pretty strong. But as you can tell, it's not as close to your t-coil. It's not as strong. But it is strong, don't get me wrong. It works. This brings the electromagnetic current up to your t-coil, and then converts t-coil to your hearing aid acoustically.

AUDIENCE MEMBER: I just want to say what I like about a neck loop. Sometimes I don't want it to be obvious that I'm using assistive listening. So I put it under my blouse and take it to my belt under my blouse and no one else sees that I'm using it. But I still get the sound that I need.

ALICE PAKHTIGIAN: That's very true. You can cover it up and it won't really block it.

Other methods are direct audio input. It's in the newer hearing aids. It has three different copper buttons on the bottom of your hearing aid. And it's a feature that allows you to get sound with, say, an FM boot.

AUDIENCE MEMBER: Does the FM boot work with different frequencies, or is it preset with one frequency, or are different ones set up different ways? I'm just wondering if the FM system comes with the transmitter, so that's already set with one frequency. I have students at my high school that use the boot, and it's a kit together. They'll give it to the person who's talking. So, the teacher would wear it and the kid just has the boot. And it has a really far range. So there's been teachers who have forgotten and they've gone to the bathroom and they forget to turn it off, or you know they're still talking and they can hear their teacher. You have to be careful.

ALICE PAKHTIGIAN: I've experienced that myself. So, for example, if you had the FM boot and the teacher has a microphone that's from another system, or another student had another FM boot with their microphone, it's not going to necessarily work. You need to have your own little kit. You need to have the same channel. That's very important.

There are differences in components. This is an FM system. There are different brands out there: Williams sound, Compact, Listen. FM uses radio wave frequency--it's just like a radio station, there's a big radio station out there, and then you're listening on the radio. That's the transmitter, and the radio that you are listening on is the receiver. There's many different channels. The channels, 72 to 76, is the older frequencies. The newer one is the 16 to 217. The one with the less interference, 72 to 76, is the one that works with the walkie-talkies, the police radio, and with pagers. There's a lot of interference that way. But an example of the FM other than the radio, is a crib monitor. You would have the transmitter in the baby's room, it could look like a walkie-talkie, and the transmitter's there and you can go out into the yard or in the living room, and you have the receiver. So you have it on a particular channel, you can hear the baby. The advantages of it are that they're very portable, they're very easy to set up, and you can carry one around.

AUDIENCE MEMBER: How far is the range?

ALICE PAKHTIGIAN : That's a good question. I've experienced it where I can walk a couple hundred feet, and I can still hear it. A distance of a street. I know there's many different lengths here, but I can still hear the person at the end of the street with the FM. I'm not exactly sure where's the cutoff.

An advantage is how you can cover your system up. You can hide it. You can put a coat on top, and it still won't matter because you can still be able to hear what's going on. There's no fluctuation in strength. You go further down the road, you go down the

stairs, you're still going to be able to hear the same strength as if you were sitting in the front row. It's still very strong.

The disadvantage is that there's one transmitter. There are systems out there where you can have five receivers for one transmitter. They all have to be on the same channel. But every person needs to have a receiver. Another disadvantage is that the receivers vary in quality and durability. Some brands they can last a lot longer. It just depends on the quality.

If you're in the newer systems, if they're between it 200016 and 217 megahertz, you get less interference. It's nice to know so you won't be hearing the construction workers outside. The receiver and transmitter must be on the same channel. It needs to be in a kit. If there's two kids with an FM boot, they could be on two different channels. If one person gives the microphone, the other kid's not going to be able to hear it because it's a different channel. They would need to give their microphone, too.

There must be one free channel between each system. So, there could be a little situation between those two kids. If they're both wearing the FM boot and the teacher's wearing two microphones, if the channels are 72.1 and 72.2, there's going to be interference. Let me describe that a little differently. If someone is in the next room wearing a microphone and transmitter, and in an adjacent room another person is wearing the system, they're going to each be hearing what's going on in the other room. There's interference. So there needs to be a channel in between that's empty so it doesn't interfere. That's the FM system.

The other systems I'm going to be talking about is the infrared system. This is just a smaller version, but this is the transmitter-emitter panel. You also need a transmitter and a receiver. A good example of this would be your TV remote. On your TV remote you have this little red light that is the diode. It works the same way as this does. You know you have to point it directly to the TV, and that's because there's an infrared light you can't see. It helps change the channel. This is a smaller version. A bigger version would be in the movies, also there is a huge version at Disney World called the text in giant.

The advantages of the infrared is the compatibility, it's 95 kilo hertz, and 250 kilo hertz. It's industry standard. It's very high and very strong. No spillover means security. This is good for when you're in court. When you're in a jury and you're going off to another room, and you're wearing one of these, you walk out of the room; you're not going to hear what's going on. This is secure. It won't go into another room. As I was describing earlier with the FM system, you could be able to hear what's going on in another room because of the channels. With the infrared you can't, because it's all through light. Therefore, it could be used in three rooms adjacent to each other, because, again, there's no spillover.

It has the widest bandwidth and the best sound reproduction. It's appropriate for mild to moderate to severe hearing loss and it's not affected by radio transmission because it's just by light.

The disadvantage is that receivers are required for everyone, for the transmitter. You can't use this without the receiver. You can't cover this, because once you cover it you're not going to get the light. It can be used for indoor and evening use only, although at Disney World, they do have it outside. It's very powerful, though. That's why it's called the text in giant. They have four emitter panels in a shaded area. If you're just wearing this, you could hear the announcements. But the sun and high fluorescent lighting affects it. It causes a lot of interference. So, if this were a brighter room, fluorescent lighting, it wouldn't work as well. Large area requires multiple emitter panels.

An induction loop is an electromagnetic field of energy with a telecoil. The receiver is your t-coil. You don't need a receiver, and you don't need a box. You just need your t-coil to switch it on. The induction loop is in some speakers. The more expensive speakers have it so that the electromagnetic field is off. It's easier for people who have hearing aids. Not all speakers are like that, though.

The advantages of this are that it’s low cost. The system can be anywhere up to $800 for the FM system. Bigger ones are more expensive. Once it's installed, it's easy to operate. Just turn the switch on. It lasts forever. The induction receiver is compatible with all receivers.

The disadvantages are that installation costs may be high. For example, in a historic building, they may not be able to put it in there, because the ideal thing to do is to put it in a wall. If it's in a building that they're starting to build, they can easily put it in. They could just wire it in, the system, in the wall. But if it's in an existing building, they may have to tear the wall out, and that's a little more expensive. It's susceptible to electrical interference and spillover. It needs to be not very close to electrical outlets. It's susceptible to the interference. You must sit in that looped area. If you're in that room, great, you're hearing what's going on. If you're outside that room, you're not going to hear it.

There may be dead areas within the loop. If that happens and you can't hear from there, just move to another seat. Just move around until you can hear what's going on. These are the different components I was discussing, and these all factor in for a better effective listening environment.

So, if something goes wrong, you want to do a little trouble shooting. It could be the batteries of the system, it could be the t-coil that's not working, it could be different couplers. If your FM system's not working, you might want to think if it’s the microphone. Is it the placement of the microphone? Is it your neck loop? Is it the

silhouette? You want to try different ways. Also, another consideration is the ultra sonic sensors.

Ultra sonic sensors is like a motion detector. You walk into a room and the light goes on--that's an ultra sonic sensor. If you have questions about your system, ask a local ALDA chapter. Try to talk to an expert. Try to cultivate an expert within your chapter. Get them to know about systems. Send them off to assistive technology training or call the company you bought the device from and ask them. That's what they're there for.

Alice Pakhtgian obtained her masters in Library and Information Service from Drexel University. As a program coordinator in the Hearing Discovery Center she presented on Assistive Listening Devices in the community, focusing on senior citizens. An active Hard of Hearing Member of Self Help for Hard of Hearing Inc, she used her connections to educate as many individuals as possible to technology. Alice now works at the WROCC, Outreach Site at Western Oregon University.