Step by Step: The Audiologist's Guide to Fitting the Inductive Earlens Contact Hearing Solution

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- [Pragati] Welcome and thank you for joining me today. As part of this course, I will be talking about fitting the Inductive Earlens Contact Hearing Solution. This paradigm-shifting technology truly has the ability to differentiate your practice and give your patients an unparalleled sound experience. So a little bit about me. I'm Dr. Pragati Mandikal Vasuki. I'm a Senior Research Audiologist and Hearing Scientist at Earlens Corporation in Menlo park, California. I've been working with this revolutionary technology for almost two years now. I'm an audiologist by training and have a PhD from Macquarie University in Sydney, Australia. As a Hearing Scientist, I work closely with R & D to continue to enhance this revolutionary technology. And then as a Research Audiologist, I have the opportunity to evaluate the benefits of this groundbreaking technology with patients.

So let's take a look into what you'll be learning today as part of this course. After this course, you will be able to describe the clinical flow for placement and fitting of the Earlens device. Describe steps for fitting and programming the Earlens device. Describe the basis for fitting prescription or gain prescription in the Earlens Fitting Software. And then list three common fine tuning steps performed by audiologists while fitting and programming an Earlens device. Now, before I go into my talk today, I'd like to draw your attention to two other courses on audiology online that will help you learn more about this unique technology. The first course, 34073 goes into the details of candidacy for Earlens devices. While the second course, 34075 describes details of clinical flow for fitting the Earlens device. The links to these courses are available in the slide. With that said, let's briefly go into who is a candidate for the Earlens device. In a sense, there are three factors to consider: Hearing profile, anatomy and patient related factors. Most commonly, patients who have experienced conventional hearing aids and who make use of the device while desiring a boost in sound quality are those who are likely to be interested in Earlens. These are patients with mild to severe sensorineural hearing loss, where audibility is the primary concern and these would be patients who wear the hearing aids daily. From an anatomical standpoint, it would be good if the physician can obtain a good visibility of the tympanic membrane and the ear is relatively easy to access. Very tight ear canals can make it difficult to obtain a good impression and to place the lens. Also, when it comes to patient related factors, this would be a patient who can tolerate ear cleaning, follows directions and is accepting of new technology. Going into more details of the fitting range, the graph on the left shows an audiogram with the Earlens fitting range, superimposed in gray here. Earlens is approved for use in adults over 18 years of age and those who have a mild to severe sensorineural hearing loss. These would be patients who have high word recognition scores, indicating that audibility is needed to improve speech performance. Those are generally patients who would be good candidates for the Earlens device. Some more details on candidacy: In the graph that I showed to you earlier, no more than two primary audiometric frequencies should be outside that gray shaded area or the Earlens fitting range. And the patient should have an unaided word recognition score of greater than, equal to 50% at most comfortable level. The patient should have a Type A tympanogram, indicating that there is no significant conductive component to the hearing loss. Recall that Earlens is indicated for only sensorineural hearing loss. And the patient should be compliant and be able to learn new technology.

So what are some contraindications to fitting the Earlens device? Earlens is not indicated for those patients who have a rapidly progressive hearing loss or a fluctuating hearing loss. Also patients with any kind of outer ear or middle ear anatomical restrictions or any type of conductive components are not candidates for Earlens device. So when it comes to outer ear restrictions, anyone with a restrictive ear canal anatomy or a compromised immune system that affects the tissue of pinna or ear canal is not a candidate. When it comes to the middle ear, if a patient has more than 10 dB of air bone gap on the audiogram or any anomaly related to the tympanic membranes, such as abnormal tympanic membrane, perforated tympanic membrane, or has abnormal middle ear, frequent history of ear infections or history of middle ear surgery will not be a candidate for the Earlens device. You can find more details about candidacy at the link that is available at the bottom of the slide. Now let's go into the details about the parts of the Earlens Contact Hearing Solution. When you order an Earlens for your patient, these are the parts that come with the Earlens devices. The first one is the tympanic lens that is shown on the left, the top left here. This lens is custom made for the patient and is placed on the tympanic membrane by a trained ENT physician. The next part, as we move to top, the right image is the processor and Ear Tip, the Ear Tip is also custom made and the processor is similar to any behind-the-ear device that you see with other manufacturers. With the new patient kit, you get a charger that is used to recharge the batteries on that processor. And the Earlens device is compatible with iPhone, so the Earlens Control App allows the iPhone to control settings on the processor. The Earlens devices are fit using the Earlens Fitting Software, which prescribes gains and allows the audiologist to fine tune settings on the Earlens processor. The Earlens clinical flow involves a synergistic partnership between two professionals; an audiologist and an ENT physician. Both partners are involved in determining if the patient is a candidate.

So the audiologist will measure the hearing thresholds and see if the audiogram is in the fitting range that I showed you earlier. At the same time, the ENT physician will look into the ear and see if the ear anatomy is suitable for impressions and lens placement. Because the Earlens device is a custom device, as part of pre-fitting, the audiologist measures the cable length, so this part here for the device and the patient chooses the processor color that they like. The ENT physician at this stage, will take an impression of the ear canal and the ear drum and then based on this impression, the Earlens device will be manufactured. During the fitting stage, first, the MD places the lens on the tympanic membrane and after that the device is fit and programmed by an audiologist. Both professionals are involved in follow-up visits. The ENT checks if the lens is on ear and in position, while the audiologist checks the programing and can perform any fine tuning as needed. Now let's go into some more details of this process. The impression of the ear is obtained by a trained ENT physician under a microscope. During this process, impression of the tympanic membrane and the ear canal is obtained. A low viscosity material that flows easily over the tympanic membrane and anterior sulcus anatomy is used to capture that part of the anatomy, while a high viscosity material captures the lateral ear canal and the concha bowl. These materials fuse together during the maturation phase and can be taken out as a single impression as shown on the left. So the blue part that you see here is the low viscosity material and this captures the tympanic membrane and the medial portion of the ear canal. While the high viscosity material that's in pink color captures the lateral part of the ear canal and the concha bowl. This impression is then digitally modeled and a lens and Ear Tip is manufactured using this impression. The figure here shows the digital modeling as you can see within this anatomy. This is how the lens would sit on ear for this anatomy and this is being modeled to here. I'm going to show you a brief video of the impression process. These are the materials needed for the impression process. The impression is taken in an office and no anesthesia is required. The patient is comfortably positioned on a chair that's widely available in ENT practices. And the impression kit is provided by Earlens. This cotton wisp is dipped in mineral oil and then excess oil is tapped off. Then the cotton wisp is used to clean the ear thoroughly of any cerumen or epithelial debris as you can see here. If there's any excess oil, that can be removed with a dry cotton wisp.

Now the physician uses the blue impression material to take the impression of the tympanic membrane and the medial portion of the ear canal. This is a low viscosity material. And as you can see in the video, it flows really easily over the tympanic membrane. This material takes about eight minutes to cure and the patient must remain in supine position while the material is curing. After eight minutes, you can sit the patient up and now lateral part of the ear canal and the concha bowl impression will be taken with the high viscosity material. This material is similar to what you would use to get an impression for a custom ear mold. The physician uses this material to get impression of the lateral portion of the ear canal and parts of the concha bowl, concha cymba and around the tragus. You can then use this impression to order custom swim plugs for your patient if needed. This material takes about three minutes to cure. And after curing, you'll see that the two impressions fuse together and actually come out as a single impression. And there it is, impression of the tympanic membrane and the entire ear canal and parts of concha bowl. When a new Earlens kit arrives for a patient the first step is placement of the lens on the tympanic membrane. This is an in-office procedure and no anesthesia is required. I'll play a short video to demonstrate this. The first step is assessment of ear canal and tympanic membrane. Any cerumen present in the ear canal or tympanic membrane is thoroughly cleaned. The physician places drop of mineral oil on the tympanic membrane and ear canal. This allows the lens to slide in easily. Drop of oil is placed at the umbo. Now this is what a lens looks in the shipper mold. The lens is carefully advanced into the ear canal under microscope. And then it's carefully advanced into the sulcus. Lens functioning is checked using an inductive pen. Then placement of the lens is confirmed. Once the lens is placed on the ear, the audiologist takes over fitting the Earlens device. The Earlens device is fit using the Earlens Fitting Software or ELF.

The figure on the left that you see is the tuning screen in ELF. ELF is integrated in Noah and programming can be completed using the wired mode or the wireless mode. If you're using the wired mode, you'd need a HI-PRO2 to complete programming. If you're programming wirelessly, you'd need the Noahlink programmer to complete programming. Now these are the steps to fit an Earlens device and we'll go into the detail of each of these during the course of this presentation. The first step is entering audiogram in Noah. The second step's an optional step, which is entering 10 kilohertz hearing threshold in ELF Fitting Software. Third step is a unique step to Earlens which is calibration. The fourth one, running feedback canceler. And the fifth one, performing any fine tuning as needed per the patient's preference. So now let's go into the details of each step. The first step is creating a new patient file in the Noah software. ELF is integrated within Noah and it does not have a standalone version, so you'd create a new patient file, open the audiogram module and then enter hearing thresholds from 250 hertz to 8,000 hertz. Now, Earlens is the only device that's capable of delivering audible amplification in low frequencies up to 100 hertz, despite a widely vented fitting. So if you've measured hearing thresholds for 125 Hertz, you can enter that here. And this would ensure that a more accurate fitting is generated in the low frequencies. Moving on to the second step, when you open the ELF software, the figure on the left is the first screen that you would see. What you see here is the audiogram that you entered in Noah with the Earlens fitting range superimposed in gray. As you can see this patient's audiogram is well within the Earlens fitting range. In this step, what you can do is enter the 10 kilohertz hearing threshold if you've measured it using a high frequency headphone. Earlens is capable of delivering audible amplification up to 10,000 hertz. And if you've measured the 10 kilohertz hearing threshold, you can enter the value here in the blue boxes shown. This would generate an accurate gain prescription at 10,000 hertz. But not to worry, if you've not measured the 10 kilohertz hearing threshold, you could leave these boxes blank and the software will extrapolate hearing thresholds up to 10 kilohertz and generate a fitting. The next step is a truly unique step to fitting that Earlens system that is calibration. This is an in-situ procedure that uses the processor to generate tones and then thresholds are measured at various frequencies. Thresholds are measured up to seven frequencies per ear and this process takes about three minutes per ear.

So this figure on the right shows the calibration screen. As you can see, you have at the bottom, the seven frequencies listed, which is 250 to 10 kilohertz. And you have 22 steps for presenting sounds at various levels. If you're presenting sounds at this level, very soft sound will be presented in the patient's ear. And if you're presenting sounds at this level, a loud tone will be generated in the patient's ear. An experienced audiologist may be able to complete calibration for both ears within three minutes. Now you may be wondering why is calibration needed? I'm going to start this with a simple analogy. Let's assume that you have an audiometer, your tried and tested audiometer and you know that your air conduction hearing threshold using this audiometer is 30 dB HL at 1000 hertz. Now, your friend asks you to check out a smartphone audiometer and says, tell me how that works. The first step you would do would be to find out 30 dB HL of hearing loss with your tried and tested audiometer equates to how many dB HL in the new audiometer. In other words, you want to find out the correction factor needed to operate the new audiometer. Now you could do this by adjusting the volume in the smartphone audiometer so that it produces output as the same level as your tried and tested audiometer. In other words, you would have found out the correction factor needed to operate the smartphone audiometer. That is exactly what Earlens calibration achieves. Earlens uses the in-situ calibration audiogram to adjust the output level of the Earlens device so that it matches the air conduction audiogram. This is similar to manipulating the volume control of the smartphone audiometer until you can hear sound at your hearing threshold level. Now, putting this analogy aside, you must remember that Earlens does not produce any sound. Instead Earlens produces low power radio signals, which the lens then converts to mechanical vibrations to move the tympanic membrane. So movement as small as 0.0005 microns, which is equal to a diameter of the hydrogen atom produces a sound level of about 20 dB SPL in a patient's ear. A movement as large as one micron, which is about 1/70th of the diameter of human hair produces a sound level that's as loud as 114 dB SPL. So calibration is needed so that the Earlens system knows how much signal is needed to produce a given amount of sound. In other words, all we're doing is finding out the correction factor needed to operate the Earlens system. An accurate audiogram and calibration are necessary, because they reflect the actual expected on-ear performance of the device.

So on the right here, you will see the tuning screen in the ELF Fitting Software. The red lines show the output curves for soft, medium and loud speech. Whereas the black line at the bottom shows the air conduction hearing threshold in SPL. When calibration is accurate, the output that you see on the screen in dB SPL is exactly that much, because you have already verified this using the in-situ calibration. The graph here shows an output of 40 dB at 125 hertz. And this is exactly produced in the ear because of calibration. In other words, calibration is equivalent to real ear measurement that you would do with an acoustic hearing aid. Calibration actually verifies the output produced in the ear, so that when we're saying that we're producing 40 dB SPL at 125 hertz, we really are and it's verified. So the next question that may come into your head is: Do I need to perform calibration on everyone? Yes, calibration needs to be performed on everyone at every visit. There are several factors that can affect calibration. First one is hearing thresholds. So if a patient has more severe degree of hearing loss, more energy is needed to produce sound at threshold for this patient and this patient would have higher calibration values. Middle ear variability also impacts calibration. So if two patients have the exact same amount of hearing loss, because of middle ear variability they can have different calibrations. And finally calibration reflects the Earlens system performance; so how well the lens sits on ear and the physical coupling of the lens onto the umbo also impacts calibration. So calibration must be run at every visit as it confirms the status and functioning of the Earlens system. It must be run whenever a new component is fit such as an Ear Tip or a lens. And calibration is the first step in troubleshooting, as it checks the overall integrity of the system.

Moving on to the next step in fitting the Earlens device, this would be feedback measurement. Now feedback can occur with the Earlens device. When enough gain is applied, for example, if a patient has a lot of hearing loss like a severe hearing loss in the high frequencies, then more gain is needed and the lens vibrates a lot more because a lot of gain is needed to make the sound audible for this patient. And this would result in the tympanic membrane vibrating a lot more. The tympanic membrane then by itself acts like a drum and produces tiny amounts of sound. Sometimes this sound can actually be picked up by microphones and cause feedback, but not to worry, ELF automatically prompts you to run the feedback canceler every time calibration is run. And once you run feedback canceler, gains are automatically adjusted to mitigate feedback in future. The next step is programing and fine tuning the Earlens per the patient's preference. The default gain prescription in ELF is called ELF Rx. In ELF Rx, gain targets are generated using the CAM2 fitting formula that was proposed by Professor Brian Moore and his colleagues at Cambridge University. This is the only fitting formula that prescribes gain up to 10,000 hertz. Now one important thing to remember is that ELF Rx prescribes gain just based on the patient's acoustic hearing thresholds. This is similar to any other fitting formula out there. When you plug in the hearing loss or the acoustic hearing thresholds, gains are prescribed per that hearing loss. So calibration has no impact on ELF Rx or the way gains are prescribed. Gains are purely determined based on the patient's hearing loss and not calibration. Now before I go into the details of CAM2 fitting formula, I'd just like to quickly take you through different fitting formula approaches that are out there. The one that is most common is NAL-NL2. This fitting formula is based on maximizing speech intelligibility index while normalizing overall loudness for average speech and because of this, high frequencies are emphasized a lot more in NAL-NL2. Sometimes after first fit is done with NAL-NL2 patients can report tinniness or unnatural sound quality. But despite that this is widely used, as the insertion gains can be implemented in conventional hearing devices. The next fitting formula is DSL-5. This one takes into account hearing thresholds and LDLs and attempts to restore audibility for 50 dB SPL speech while keeping the 80 dB SPL speech within the patient's dynamic range. It's widely used for pediatric fittings and it's slowly becoming popular for adult fittings as well. Now there are a number of proprietary fitting algorithms that are out there. Most of them are variations of the NAL-NL2 fitting formula.

But if you look at the gains that are prescribed in these proprietary fitting formulae and you compare them with NL2, you may notice that less gain is prescribed in some of these algorithms and this may result in the patients asking for more gains. In that case, REM measurements are necessary, but it's not always run by audiologists, because it's a laborious process to enter targets for proprietary algorithms as they're not readily available within the REM devices. And finally, the CAM2 fitting formula, which is based on the principles of loudness, equalization and normalization. And because of these two unique principles, CAM2 does not compromise on sound quality to maximize speech intelligibility. So let's take more detail look into these two principles of loudness equalization and loudness normalization. As part of loudness equalization CAM2 equalizes specific loudness across the critical bands. What it does to achieve this is it applies different gains to the various critical bands to equalize loudness. Once loudness equalization is achieved, CAM2 would then apply loudness normalization and here it normalizes the overall loudness for soft and loud speech. What it does is that the overall loudness level is adjusted so that it's at the same level as a normal hearing person, which means that soft speech would sound soft for the hearing impaired patient and it would be at the same level, like would continue to sound soft just as it would for a normal hearing person. Similarly, the same thing would be done for loud speech so that the loudness difference between soft and loud is maintained for the hearing impaired patient. And because of this unique principle, sound quality is maintained in CAM2 and very few patients request fine tuning after the first fit with CAM2 fitting formula. If any fine tuning is required, ELF has nine bands which can be used for fine tuning gains per patient's preference and these bands in turn controls, 20 sub bands, which are hidden. So after first fit, as you can see in this tuning screen here, you can change the gains per the patient's preference. If the patient requires more base, you can turn up gain in the low frequencies. Or if the patient requires more crisper sounds, you have the ability to manipulate gains all the way up to 10,000 hertz. Now let's take a look into the other features that are available that audiologists can change within the Earlens Fitting Software.

The first one is background noise reduction that would reduce the noise levels for stationary, as well as non-stationary noise sources. You can customize the strength of noise reduction from any of these four options here. You can turn it completely off or set it to mild, moderate, or strong. You can also change impulse noise reduction settings in this feature screen in ELF. This algorithm will manage transient loud sounds such as dishware clanging. You can either turn the feature on, or turn it off. The next one is wind noise reduction. So if a patient likes to go outside and cycle, you can change to the strength of this algorithm. You can turn it to mild, moderate, or strong, or you can turn it totally off if it's not needed. The next one is changing the directional mode on the processors. You can change the microphone setting. You can change it to omni or fixed directional, or you can let the algorithm figure out directionality in automatic adaptive and automatic fixed. In these last two options, it's the null that steered to achieve directionality. And the last feature that can be adjusted on the screen is feedback canceler. Feedback canceler can be changed to be slow, fast or can be turned completely off if the patient does not get any feedback and there are wide gain margins. When you change a feedback canceler to slow or fast, it's actually the speed with which the system reacts to feedback that is managed here in this option. Now, along with the features that can be adjusted, you can add up to four programs for a patient within the Earlens device. The first program is the main program and for the rest of the three you can choose from any of these eight options here. These options include; music, restaurant, car, quiet, noise, party, outside and TV. What changes in these settings are the gain profiles and the feature settings. For example, in restaurant, gains are shaved as well as noise reduction settings are changed. In music, again, there'll be a little bit of bass boost and automatic signal processing features will be turned off.

So this, along with enabling features, you can independently go into each program and change the features per the patient's request. Another feature within the Earlens system is the acclimatization module. Now all Earlens patients are new to hearing the wide bandwidth and especially the high frequencies. So in this screen, you have the option to turn down the gains either manually or through automatic acclimatization. When you choose automatic acclimatization, it adjusts the percent of gain to target over a period of time. So let's say you've adjusted it to 80% over a two week period. This means that over the course of these two weeks, gains are slowly going to increase from 80% and at the end of two week period gains will be at 100% of the target. So the screen here shows you acclimatization. The dotted lines show the actual gains, the targets for this patient. And because acclimatization has been turned on, the current gains are turned down for high frequencies in both ears. Again, this can be enabled for high frequencies only, or for all frequencies. But one of the things we've noticed is that because of the unique approach of CAM2 towards fitting, the principles that I talked to you about earlier; loudness, equalization, and loudness normalization, very few patients actually require the acclimatization to be turned on. Patients like the sound quality, the balance of lows and highs and very few of them actually requests that any accommodation be turned on or fine tuning be performed. The next screen that you see in the ELF Fitting Software is the user controlled screen. And on the screen, you can customize the buttons, what each of the buttons on the processors do. You can choose the level of alerts, the voice prompts. You can choose if the patient should hear melody-based alerts or voice prompts for alerts. You can enable or disable low battery warning alerts. For example, the first warning can go out at 60 minutes before the battery was discharged completely. And the second warning can be played at 15 minutes before the battery's set to discharge completely. In this screen, you can also adjust the volume control range and the volume control step size. So you can make all these adjustments in the user control screen. The Earlens device is MFi compatible and to manipulate settings on the Earlens device you can use the Earlens Control App that is available to download in the iTunes store. The Earlens Control App allows the patient to change programs and volumes.

So for example, here you see that this patient has four programs; main, music, restaurant and car and you can adjust volume for left and right device independently, or you can fuse these controls so that you have a single slider and you can adjust volume for both devices at the same time. The app also has an equalizer function where you can adjust bass and treble. So let's say a patient is a music aficionado and wants to give himself a little bit more of bass sounds, that setting can be changed here. You have the live mic and locate my Earlens features. The live mic is where the phone is used as a remote microphone and any input to the phone microphone directly streams to the Earlens devices. And the locate my Earlens feature plots the last known location of the Earlens device, the last known location when the device was connected to the phone on a map and this can be used by the patients to locate their devices in case they're lost. And finally, you can set up reminders for oiling in the Earlens Control App. Each Earlens patient must oil and oiling frequency depends on what the physician prescribes, typically it's once a day and those reminders can be set up through the app here. Once the device is fit, we move to the next step, which is counseling about the use and care of the device. As part of the counseling, the first step is reminding the patients about oiling. Each Earlens patient must oil, because it's the oil that keeps the lens in place via hydrostatic tension. The oil also creates a buffer area for epithelial migration. So at this point of the fitting, you can review patients oiling regimen, typically it's one squirt of oil every night, or whatever the physician has recommended to them. With Earlens devices you cannot use any Q-tips or wax removal kits, because these will damage the lens on ear. At the stage, during counseling, you can review charging. So the Earlens processors have rechargeable batteries. They're charged through wireless inductive charging. The batteries take up to four hours to fully charge. The charger has charge status indicators here. And once charged, the batteries can last minimum of 16 hours and sometimes up to 24 hours depending on how the patient uses the devices.

At this stage, you can also install and explain the use of the Earlens Control App to the patient if the patient requests MFi. With the lens in place the patients can take shower, they can swim, they can take a bath. We recommend that they wear ear plugs during swimming if they're frequent swimmers. But then again, this is something that the patient and the audiologist and the physician can discuss during the office visit. With the lens in place, the patients can also use earphones and custom earplugs. As long as the device is not over inserted and it does not protrude deeply into the ear canal these can be used safely. The next step is to introduce to the patient the Earlens Concierge Program, which is truly a unique program to the Earlens devices. Earlens Concierge, our Customer Service Associates, who are proactively engaged in supporting your patients through their Earlens journey. This remote professional will free up your time by reducing the number of office visits so that you can use your time to focus on high value activities. Patients who interact with Earlens Concierge report increased success with their Earlens device, because a lot of times minor issues can be resolved almost immediately by the Earlens Concierge. Also, patients who use the Concierge Service have increased satisfaction because of this remote troubleshooting capability. Here is the number of the Earlens Concierge, it's: 844-234-5367. And this is something that truly highlights the premiere device and service that's provided by Earlens. Once the patient has been fit, follow-up visits can be scheduled per the audiologist and the physician's recommendation. We typically recommend that a follow-up visit is scheduled during the fitting optimization period and this is typically done one to two week post-placement and fitting. During this visit it's recommended that the lens is viewed through otoscopy to confirm that the lens is in position, The audiologist will evaluate Ear Tip stability, consistency and comfort, so if you need to reinstruct your patient on how to put in the Ear Tip, or just adjusting your Tip, you can do that at the session. At the follow-up fitting session, we recommend that calibration is run to confirm that the system is working as expected. And if the patient has any specific asks, you can perform fine tuning if needed. It's also a good idea to check up on the patient's oiling regimen and to just reiterate oiling regimen and confirm with the patient that they are oiling regularly. During the session, some additional measures, some optional measures can also be recorded. For example, you can obtain damped unaided thresholds. This would be measuring hearing thresholds with headphones, with the lens still on ear.

So the patient would just remove the processor and Ear Tip and you would place the headphone on ear and measure an audiogram. This audiogram, the damped audiogram can be then used as a baseline for annual exams. So the next time you need an annual hearing check for this patient you can just use this baseline and measure hearing again. Also, you can complete aided thresholds that are measured using sound field and these will help to demonstrate the benefit of the Earlens device to the patient. So on the right here, you see an audiogram screen. You'll see the left ear hearing thresholds in this graph. And with E here, you see the aided thresholds that have been plotted on top of the audiogram here. So the screen can be used to counsel the patients about the benefit that they're getting with their Earlens device. Now that we've learned about how to fit the Earlens device and we've gone into the details of first fit and counseling, let us look into the commonly performed fine tunings that are needed for Earlens fittings. One common complaint that you may hear is related to hissiness, sharpness or tinniness, especially patients may say that the S sounds are a little too sharp. Now, remember that every new Earlens user is new to the extended high-frequency amplification above six kilohertz. They've probably not heard sounds from six kilohertz to 10 kilohertz in a long, long time. And as a result of that, they may say that when you say some S's like, Sally sells seashells by the seashore, those S's are a little too sharp. If that happens, you can use the automatic acclimatization feature and that's going to take off the edge and make S's a little more pleasant. So the graph on the right shows, automatic acclimatization that's been turned on. The dotted lines show the actual targets. And the solid line shows the new curves with the reduced gains. Slowly over the course of two weeks, these gains will be turned up and it'll finally reach the target at the end of two weeks. If you've made any other fine tuning adjustments, then you can look at the gains above six kilohertz and also make fine tuning adjustments for those gains. You can turn down some of the gains from six kilohertz and above and that can reduce the hissiness in S sounds. While you're making these gain adjustments always keep audibility in mind. Another thing that you may hear patients say is that their own voice sounds too loud, or sounds like it's in a barrel. The presence of lens and oil on ear can increase perception of own voice loudness, especially after initial placement.

So during that first placement, if you recall from the video, oil is placed on the ear canal and the ear drum and the patient may feel that their own voice is a little too loud. At the first phase you can counsel the patient that this is going to go away as the oil is absorbed and that sensation is going to reduce over the next two days. You can also make some programming adjustments that can alleviate this concern. So first thing that you can do is decrease gains for loud speech in the low frequencies, from 125 to 500 hertz, or you can consider increasing the gains for high frequencies and make it sound a little crisper. Typically these are gains changes from three to six dB and that should take care of the patient's concerns. And finally, let's look into how to optimize music sound quality with Earlens. You will find that a lot of Earlens patients are music aficionados, because they love hearing music through that wide audible bandwidth. No other device out there provides audible amplification from 100 hertz to 10,000 hertz. So a lot of Earlens patients are those who love listening to music and enjoy music. They can come back to you and ask for some fine tunings to their music program. So as part of fine tuning, what you could do to optimize music is increase a little bit of bass and that can give back music its richness and improve the tambour of music. You can also turn off any automatic features, such as noise cancellation, impulse noise reduction, wind noise reduction and that will improve the quality of music. You could also turn off the feedback canceler. The feedback canceler is set to slow by default in the music program. If you recall, that with Earlens there is limited chance of feedback. So if the patient has large margins, for example, more than 20 dB of margin between the feedback measurement curve or the maximum stable gain curve and the soft speech gain curve, what you could do is turn off the feedback canceler completely and that can result in an improved sound quality from music. Now that we've gone into a lot of details about first fits for Earlens device and how to fine tune Earlens device, let's summarize what we've learned today.

The Earlens placement and fitting is a synergistic partnership between the ENT physician and an audiologist. Both professionals are involved in candidacy, in pre fitting, in fitting and followup visits. After the lens has been placed on ear by a trained ENT physician, the audiologist takes over the fitting of the Earlens device. this is done through the Earlens Fitting Software, which is integrated in Noah. As first step, you would enter the hearing thresholds. You would run calibration which is a truly unique step to fitting the Earlens device. This step verifies that what you see on the screen, the gains and the outputs that you see on the screen are actually presented in the ear. The audiologists can perform fine tuning as needed. So the first fit would be CAM2 gains and then you can perform any fine tuning per the patient's preference. And then you can adjust features, suggest microphones, noise reduction settings, or button settings as needed. The Earlens is truly a unique addition to your practice, providing a noticeably and meaningfully superior listening experience to your patients. We look forward to working with you and your practice as you embark on this Earlens journey. If you'd like to learn more about Earlens, please visit the link here on this slide. I wanna take this time to thank each and every one of you for joining this course and learning more about the Earlens device. Thank you.