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Beltone: It All Starts with a Good Impression

Presenter: Kathleen Liston, MA

- And welcome everyone to today's webinar, Beltone: It All Starts with a Good Impression. We are so pleased to welcome with us Kathleen Liston. If you'd like to learn more about our presenter, please visit the course registration page and you can view her full bio. And with that, Kathy, I'll hand things over to you.

- Okay, thank you, Kimberly. And today I'm gonna be talking about your mold impressions. So whether you are just starting or you need to sharpen your tools a bit, this course is for you. We'll go ahead and get started with today's learning outcomes. So after today we are going to be able to demonstrate the proper impression techniques and procedures for taking an ear mold impression, identify important anatomical landmarks of the ear which are necessary for a good ear mold impression, and evaluate an ear impression for accuracy, fit and retention. I'm gonna go ahead and take myself off camera, but this course is going to be interactive. So when I ask you questions, I would like you to participate.

So let's go ahead and get started. With the popularity of the receiver in the ear, commonly referred to as the RIE or RIC, fewer hearing instruments require ear molds. However, the art of taking a proper ear impression is still important. Some percentage of our patient population will always require a custom mold, either to attach to an RIE or BTE or to use for making a custom hearing instrument. This deck of cards needs a good foundation in order to stand. Without a stable foundation, whatever we are building is not going to be reliable and we need to go back to basics. Why is this important? Well, this can be applied to just about anything. I'm going to apply it to sports.

Both of my kids played lacrosse and I remember when my husband coached and made my daughter use her non-dominant hand. This challenged her and her teammates a lot. It frustrated her, but by learning the basics, it made her a better lacrosse player. It took away a competitor's advantage to capitalize on a weakness

because she could quickly switch hands and go the other way. She could do everything, pass, catch, score with either hand. Those teammates who did not learn those skills with both hands became vulnerable to losing the ball. And this is why it's important to be able to take a good impression. Not only is the impression the foundation of any ear mold or custom hearing instrument, but it gives us an advantage over other hearing care professionals in a very competitive market.

The impression, it is the most important part of any custom order. In order to provide the best fit, a custom hearing aid or ear mold, you need to make a good impression. If the impression is not good, then the manufacturer will either, A, give you that dreaded call where they say, hey, we need a new impression, or B, which is maybe actually worse, they're gonna take that impression, that bad impression that you sent them, and they're going to go ahead and make an impression from that. Now, that could lead to them guessing the ear shape, it could have a poor fit or it could lead to a soreness in the ear. As the hearing care professional, it is important to understand ear anatomy.

We want to make sure to obtain all the ear landmarks, such as the helix, the antihelix, a full concha, tragus, and antitragus. We also need to have a knowledge of possible medical issues that could affect the impression taking process. When taking an impression, the best material to use is silicone, as it gives a more accurate representation of the ear and will not change in the shipping process. Making ear impressions gives you the opportunity to flex your professional skillset and offer your patients what they desire and need for optimal hearing. So here is a picture of an ear mold impression. What is that? It's a physical or virtual cast of the outer ear and ear canal space.

We make it into a 3D image and that is used for custom hearing instruments, custom ear molds, swim molds, hearing protection, musician plugs, you name it. But before we get started, there is some necessary prep work to do before we jump in and take the

impression. So first you're going to want to review the patient's case history. What medications is the patient taking? Are they taking any blood thinners? Do they have any medical conditions that might interfere with the ear mold impression? In particular, diabetes. Have they had a history of ear pain, ear surgery? Do they have any latex allergies? You will need to take extra caution, especially if your patient is on a blood thinner or has diabetes.

And next, it's also important to implement infection control steps. You wanna do this, obviously, before you get the impression materials out, but you are going to wanna wash your hands, you wanna use nitro gloves, which are latex free, nitro gloves and then you wanna disinfect all the non-disposable equipment. Next, I'm gonna select my impression material, my otoblock, impression gun or syringe. And I like to put everything in front of me, within reach. I want the very best conditions so my ear mold impression is successful, and this means adequate lighting, a bright otoscope and a bright otolight. And lastly, before I take in ear impression, I like to sit in a chair or stool so that I'm at eye level with the patient's ear.

I don't wanna be standing over the patient because it might be tricky to get in the best most secure position for the patient. So once you've cleaned your hands and your equipment, you will need to make sure to explain the procedure to the patient. And honestly, this can be the most intimidating part of the appointment for some patients, but just explain that you're gonna put a small piece of cotton or foam in their ear followed by impression material. The material is going to take about five minutes to cure and then you're going to remove it. Next, you're going to do otoscopy again and you wanna ask the patient if they are aware of anything unusual or abnormal before you look in their ears.

The otoscopic exam is going to give you information about the ear canal length, diameter, and direction. This also allows you to reevaluate the amount of wax in the ear

canal. And if you can't visualize all four quadrants of the eardrum, then don't take an impression. Also, you wanna look for any signs of previous surgeries, either behind a pinna or in the ear canal or a sign of a perforated eardrum. When it has been determined, an ear mold impression can proceed, meaning we have no contraindications, then we need to choose the proper otoblock. An otoblock provides a barrier to protect the eardrum and also allows the impression material a stopping point to build up against. It is important to select the best one.

And we have a couple choices to choose from. So we have cotton foam or vented foam or cotton vented otoblocks. The otoblock is going to help replicate the shape of the ear, and we've all heard the horrifying stories where someone has forgotten to use an ear otoblock and inadvertently removed the patient's eardrum along with the impression material. So obviously we don't want this to happen and we want to avoid it at all costs. If we choose an otoblock that is too small, then we could get what's called blow-by. And what happens with this, you can see it with the pink example on the right, is the impression material has actually gone beyond the otoblock into the ear canal.

So we don't want that to happen. If we get an otoblock that is too large, then it could lead to discomfort or stretching of the ear canal. And then our ear canal length will probably be too short when we use an otoblock that is too big. So there is an example of that on the right as well. So getting the just right size is important. We want the otoblock to slightly compress by the ear canal. Also, if someone has a surgically altered ear, they may need several otoblocks. Please refer to a physician if you are uncomfortable in any way, if a patient has a surgically altered ear or something unusual. So there are many different styles of otoblock, and you can see on the top photo, when I had talked about a vented otoblock, the top photo is a photo of foam vented otoblocks.

The vented otoblocks have a pressure, a thin pressure release tube and you can kind of see that almost looks like a tail, that's what you're gonna pull the otoblock out with. And so it comes in many different sizes. Some have a slim series which are half the size of regular ones. Cotton otoblocks also have many different sizes. They also have the ability to have a vented otoblock. So you have a lot of flexibility with the different otoblocks. So my first question is, how many of you have heard of a vented otoblock? So the answers are, yes, I have, no I have not, I'm not sure. And the reason why I ask this question is my colleague in the west, Chris, when I was asking him about kind of consulting him about this, he said he had never heard of a vented otoblock and really doubted if anyone else had as well.

So let's go ahead and look at those results. And actually, you guys, half of you have heard of a vented otoblock and half of you have not. And this tends to be consistent with all of the other classes that we have had up until this class. So my colleague was right. A lot of you have not heard of that. So moving forward, the next thing I would ask you is when would you use a vented foam or cotton otoblock? So here are the answers. An 85 year old male who is getting a custom ear mold for his BTE. A 44 year old female who is getting custom hearing protection. A 65 year old female who is getting a custom CIC, A and B only, or none of the above.

So when do you think that you would use a vented otoblock? And we'll give you just a few minutes here. So very consistent with the results that we have seen. It looks like about, it's split. Half of you think that the 65 year old female getting a custom CIC is when you would use a vented otoblock and that would be correct. And then the other half of you answered correctly. So I guess we need to kind of educate on the vented otoblock a little bit. Now that you guys know what it is, hopefully you'll use it. The vented otoblock is going to provide a deeper ear mold impression with greater comfort and safety, and the hollow tube, that little part that you pull out actually alleviates any pressure vacuum.

So removal was comfortable and it makes it ideal for deeper impressions like CICs. Now let's talk about the different material injection methods. So we have the impression gun and we have the impression syringe. The impression gun uses a cartridge and we mix the material in a cannula, so it's going to be less messy, all of the material is contained in the cannula. A drawback is that you do need greater hand strength to pull the lever. Now the syringe, you have to mix up the material yourself. So you're gonna be mixing two equal parts and it's best to use a spreader with a spatula. You are going to have better control over the impression process. Now I don't think one method is better than the other.

I think that either one is fine. I have been told that if you have large hands, that an impression gun actually may be easier, and if you have smaller hands, then the impression syringe might be easier. So now let's talk about the different material types. Viscosity refers to the consistency before the material hardens. And this is how we classify impression material, based on its viscosity and we classify it by low, medium, and high. And there's no best viscosity. It really just depends on the patient. A low viscosity is going to be soft and runny, it's going to flow easily and sometimes is the default material because it accurately mimics the shape of the ear canal. A lower viscosity is also recommended for deeper canal fittings, whereas a higher viscosity is going to be thicker, firmer and stickier.

We can generally expect a tighter fit. So it's going to be better for patients with large amounts of ear hair, because it's dense and it's going to press down the ear hair and then that's going to make the removal less painful for the patient. A higher viscosity is also going to be appropriate for those patients that we want to have a tighter fit. So particularly those patients that have a severe to profound hearing loss. So according to IHS, the bridge and brace technique is what they recommend for inserting an otoblock. Both hands act as a unit. One hand must be in contact with the patient's head at all

times. One hand holds the instrument and studies its insertion into the ear canal, by placing that same hand in firm contact with the patient's head, then the other hand is free to gently pull back the pinna.

We wanna pull it upward and back. And this helps improve visualization of the ear canal and it also helps with ease and insertion of the instrument. So here are some different methods or techniques of bridging and bracing. One hand is the bridge, both hands are the unit to brace against any sudden head movement. And this safety technique prevents injuries when positioning the otoblock. Once the otoblock is selected, you're ready to insert it into the ear canal, using an otolight with the proper bracing techniques. This is the only time that you should use an otolight and it should never be used in place of an otoscope. So we are going to gently apply several short pushes with the ototip.

And we are going to make sure that it goes into the ear canal about 16 millimeters or just past the second bend. Most adult ears are gonna be about 25 millimeters. So you're not gonna have that otoblock right on the eardrum. It should just go straight into the ear canal without rolling. And then once it is completely inserted, you wanna use the otolight to reinspect the otoblock placement. You wanna make sure that it's compressed by the ear canal. If you can see past the otoblock, you need to either reposition the otoblock or use a larger size. Usually the HCP places both otoblocks and then takes the impression. And occasionally you might evoke a coughing reflex to your patient when you place the otoblock in the ear canal.

This is caused by stimulating the ear canal and activating the auricular branch of the vagus nerve, also called Arnold's reflex. Does it matter how the ear mold impressions are taking? Yes it does. A good best practice is utilizing the 14, I'm sorry, 16 by four rule. We wanna use an otolight, and this particular one has a mark. So we wanna align the mark on the otolight with the aperture and then the impression should be about 16

millimeters from the aperture or about four millimeters beyond the second bend. Now that the otoblock is in place and you have selected your injection method, it's time to take the impression. So the first thing you're going to do is you're going to bleed the impression material or dispense about a half an inch of material into a tissue.

This allows you to do a couple things. First, it's going to verify that the impression material is fully mixed, and then second of all, it is going to remove any air bubbles that might be in the mixture. Then by using proper bracing, we're gonna place the tip of the cannula in the ear canal, between the aperture and the otoblock. And then we are going to slowly withdraw the tip as the material is injected into the ear canal. Now you're going to make sure, when you do this, that it does stay in the material at all time, and once the canal is filled, you wanna move into concha bowl. And then you wanna make sure that you get the tragus, the antitragus and then you wanna move up to the helix area.

And you wanna take your time, don't rush. You wanna make sure to get a full impression with all the ear landmarks. And then you're gonna repeat this process on the other ear. Also, you wanna make sure not to press on the impression material into the ear because it's going to add distortion to the landmarks. So now that both of your patient's ears are full of impression material, you are going to need to wait for the material to cure. And depending on the impression material, it typically takes about five to seven minutes. As the material cures, you want to ask your patient not to move their jaw, 'cause this could change the shape of the canal and possibly cause a fit issue down the road.

And again, the goal is to obtain a good impression on the first time. So many of you use microphone markers, and I, again, there are a lot of you that do not. Why would we use a microphone marker? Well, it helps with the horizontal placement of the microphone, and we want it in the patient's natural position. Microphone placement is

important because we need it for correct directionality. If we have the wrong placement, then it's going to affect the directionality of the hearing aid. We talked about the mic marker. So if you wanna place an order from customer service, here is the part number. And then previously I talked about the otolight with the marking on it, you can order that as well.

And here is an unmarked ear mold impression. So our next poll is going to, we're going to ask you, which is the correct orientation? Is it hearing aid A or hearing aid B? So you wanna look closely at this because if we don't get it in the correct position, then it is going to not only affect the directionality, but it also may affect some of the features of the hearing aid as well. So let's see what we have here with this poll. Okay, so everybody uses the microphone placement and they have chosen B, which is the correct choice. So you guys are pretty smart with this. Okay, once the impression has been fully cured, it is time to remove the impression.

You are going to need to break the seal. So you wanna ask your patient to move their jaw or you can pull back gently and wiggle the pin up. Then you want to slowly move towards the helix portion. You might want to ask the patient to make chewing movements. And then you wanna lift on the pinna and basically move the helix portion, rotating it towards the face while pulling it out of the ear. You're going to turn it clockwise for the right ear and you're going to turn it counterclockwise for the left ear. After the impression has been removed, you must inspect the ear with an otoscope, making sure that there's no debris left behind from the impression process.

If you have a slight redness in the ear canal, that's normal, but you wanna make sure that you document any problems in the patient's file. Remember, if you didn't document it in the chart, it didn't happen according to a court of law. And then if you did have any problems or issues, you might wanna give the patient a call the next day just to make sure that everything is okay. Then we are want to want to look at our

impression with a critical eye. A good ear mold impression should have the concha, and helix, curl completely filled. We should be able to see the tragus, the antitragus, we should have no voids gaps or bubbles and the canal should be about four millimeters past the second bend.

We really wanna take the time here to make sure that you have a good ear mold impression. If you didn't take a good ear mold impression, now is the perfect time to take another ear mold impression while the patient is still there in your office. Just to make sure. Remember, a bad impression will ultimately become a poor fitting and possibly uncomfortable ear mold or custom hearing aid. Generally I'm going to take a closed mouth impression, but sometimes an open mouth impression is indicated. If your impression doesn't pass your self-critique, then, again, you wanna make sure that you take another impression and maybe this time you take an open mouth impression. You've heard about the ear landmarks a lot in this course and in a few minutes we're going to explain why they are so critical and their importance in physical fit of the ear mold or custom hearing aid for your patient.

But first, let's review when an open mouth impression might be required. There was a study that showed a patient's ear canal size and shape can dramatically change by altering jaw position. And actually there was two studies, one done by Oliveira in 1997 and another one done by Darkner, Larson and Paulsen in 2007. So now I'm gonna ask you guys, when do you take an open mouth impression? And I want you to select all that would apply. So the first one that we have is significant jaw placement. So this might mean, you know, if your patient has TMJ or if they, you can actually see their jaw moving when you are looking in the ear canal. Another thing is the patient has feedback issues.

So obviously this wouldn't be a new patient, this would be a previous patient, an ear mold or hearing aid is loose or sliding, and then the patient reports a loss of gain with

jaw movements, so with that, if you have a patient that maybe chews, or when they open their mouth in a different position, maybe they tell you that the volume on their hearing aid decreases. So check all that apply and then we'll see what you have. So you guys, you guys are good. All of these situations are situations where we would recommend an open mouth or maybe doing an open mouth impression. And... So yeah, you guys, you guys did a good job with that.

All right, so the next one... Yes, significant jaw placement. The patient has feedback issues. Ear mold or hearing aid is loose or sliding. And the patient reports loss of gain with jaw movement. So all of these really are when you would take an open mouth impression. An open mouth impression is going to give you the widest canal volume and a tighter fit. So you're going to want to use a bite block to make an open impression. And as you can see with this, you also are going to get a tighter fit. The open mouth impression is going to give you a wider canal diameter, and the closed one is gonna be a little bit more narrow.

Okay. So why is it critical to obtain these landmarks in your impression? Well, we want to ensure your patient has a properly fitted ear mold or custom hearing aid. We need to make sure that the sound reaches the eardrum and does not go into the canal wall, and that we keep the sound in the ear canal. And we wanna make sure that the custom product is comfortable, easy to insert, and that it does have some cosmetic appeal as much as possible. So the first consideration for physical fit is the sound bore direction. It must be directed towards the eardrum. And if your impression is not long enough or just past the second bend, the manufacturer is not going to see how the ear canal bends.

So they might drill a sound bore in a location that leads right into the canal wall and not the eardrum. And as you can see here, with the short canal, the manufacturer guessed the canal shape. And if the HCP had taken a longer canal for a longer impression, then

they would have actually seen that the canal bends to the right and the sound bore would've been drilled in a different location. So obtaining a long enough canal is very important. It's also very important to obtain a full canal cross section or full canal width, especially between the aperture and the first bend for most custom products, this provides an acoustic seal that keeps sound from leaking out and potentially causing feedback issues for your patient.

Here is an underfilled impression with the ear canal overlay, you can clearly see how much of the canal width is missing. All right, the bends in the canal are also retention spots to keep a custom mold from sliding into the ear. The deeper parts of the ear canal, meaning the second bend and beyond, are more sensitive, because they're in the bony portion of the canal. Because of this, it's important to have adequate detailing of this area to ensure the correct taper can be applied for patient comfort and ease of insertion. The next natural retention spot is the antitragus, and this area is the most difficult to sculpt, so the custom mold is comfortable in the ear and cosmetically appealing.

You need to make sure that your impression clearly shows your patient's antitragus. And then lastly, the last retention spot is the helix area. And when looking at patient comfort, this is the area that we don't want completely full. This can make a custom mold difficult for the patient to put in their ear and could possibly lead to feedback or a sore spot. So your impression will need to have a full helix area so the manufacturer can find a balance between retention, comfort, and cosmetics. Now we're going to put this all together with a video by my colleague, Dr. Laura.

- [Laura] Before taking an impression, you need to perform otoscopy following proper bracing techniques. This tells us the size of the impression to be taken, the length, direction and diameter of the ear canal, the shape and contours of the canal, and the presence of any problems such as wax or foreign objects. If during otoscopy you

notice an abnormal canal, do not take the impression, refer out for medical clearance first. Once you have verified the canal is clear to take the impression, you need to place the otoblock. Again, using proper bracing, gently insert the otoblock using our marked otolight. Insert the otoblock using several short pushes to a point where the block is four millimeters past the second bend.

This will give a 16 millimeter length canal, which is a length of the mark on the otolight. This ensures proper canal length. Once the block has been placed, inspect the position using otoscopy. Now it's time to take the impression. To do this, squeeze the trigger of the gun to dispense about half an inch of material into a tissue or paper towel, then discard. This is called bleeding the material. Then using proper bracing, insert the tip of the cannula into the ear canal up to the otoblock. Squeeze the trigger to start the flow of impression material while slowly withdrawing the tip of the cannula. Be sure the tip of the cannula is in contact with the impression material at all times.

Also be sure to fill the concha bowl and helix area fully. Once the material has set for a few seconds, place the microphone marking tool horizontally into the impression while your patient is seated in their natural position. Wait until the impression has fully cured, then remove the microphone marking tool and then remove the impression from your patient's ear. You may need to wiggle your patient's ear to help break the seal, which will aid in removing the impression. Once the impression has been removed, check the patient's ear with an otoscope and make a chart note about the appearance of the ear canal after the impression. Finally check the impression ensuring it is free from voids or layering, that the concha bowl and helix area are completely filled in and all ear landmarks are visible. Also, check that the canal length is at least 16 millimeters long by using the marked otolight. Then fill out the order form for your custom product.

- [Kathy] All right, acoustic couplers transmit the amplified sound from the hearing aid to the eardrum. So examples of this would be custom ear molds and receiver domes.

They must be comfortable to wear, they need to be cosmetically appealing, and they need to maintain or enhance acoustic properties. So I feel like some of you are probably thinking, I don't need to take an ear mold because I fit RIEs all day, every day. And this certainly tends to be the trend with about 70% to 80% of all hearing aid fittings. However, a study by Cubick et al. in "Ear and Hearing" last year found that on average these instant fit tips or domes are actually less effective than custom ear molds.

Now, this is actually desirable for those people that have a mild to moderate hearing loss, but not so much for those patients with a flatter or more severe hearing loss that require more low frequency amplification. And it is very difficult to overcome the Vent Effect. The Vent Effect is the size of the vent influences the effect of the sound leakage both into and out of the ear canal. Let's look at some acoustic properties. The same dome will vary how it affects different ears. And choosing a tip or dome, which is too small, is going to increase leakage and the Vent Effect. If we choose a tip that's too large, it's also going to affect leakage. There are some acoustic alterations that we can do for ear molds.

We can vent, which modifies the low frequencies, damping will smooth out the mid frequencies, and horns will modify the high frequencies. Here is a chart and it is a really nice reference sheet for vent modification and the effect. We want to see when we vent for the occlusion effect. So anytime we have a patient that their own voice sounds hollow or echoey or they can hear themselves too, the size really does matter, the larger vents are going to allow for more low frequencies to kind of go by or not, you're not going to get the low frequencies from about 1000 and below with the larger vents, sometimes you're going to need a deeper canal fitting and that's gonna be more in the bony portion versus the cartilaginous portion.

And a good rule of thumb is if thresholds at 250, 500 and 1,000 hertz are 40 dB loss or better, then you would probably get a medium or larger size vent. If someone had a 40 to 70 dB loss, then we would probably want to use a small vent and 70 dB or greater, we're probably going to want to use a pressure vent or no vent at all. And this needs to be applied to domes as well as ear molds. So to summarize, this course reviewed the proper impressioning techniques and procedures for taking an ear impression. We identified important anatomical landmarks of the ear, which are necessary for a good ear mold impression. And we evaluated an ear impression for accuracy, fit and retention.

So now is the time that we will tackle any questions that came in the Q&A. Of course, if you have any questions that you wanna just reach out to me directly, my email is kliston@beltone.com. I would be happy to answer those or go to the right people to make sure that we get you the answers that you need. So I'm gonna check with Laura to see if we had any questions today?

- [Laura] Hi, everyone. So one kind of clarification question came in, I believe it's on that venting chart you had up, Kathy, someone's just wondering what a D-Vent is.

- [Kathy] Okay, so a D-Vent is the largest vent, it's the most open vent that is available, and the reason why it's called a D-Vent is because it's literally in the shape of the letter D. But that's a great question. That's a great question.

- [Laura] And right now that looks like that was the only question that has come in. So again, as Kathy stated, if you think of anything later on today or this week, few weeks from now, please feel free to reach out to any one of us on the training team and we'll do our best to get you an answer. Or if we don't have the knowledge, we'll consult with our peers to try to get an answer back. But with that, I'll hand it back to you, Kathy.

- [Kathy] All right. So it doesn't look like there's any questions. So we appreciate your time today and we look forward to seeing you on the next webinar.