Providing Humanitarian Vestibular Care, presented in partnership with Vanderbilt University

Presenter: Daniel Romero, AuD, PhD

- [Christy Huynh] It's my pleasure to welcome back Dr. Daniel Romero. He's gonna be presenting for us today a course in partnership with Vanderbilt University, Providing Humanitarian Vestibular Care. If you'd like to learn more about Dr. Romero and his background, you can read about his bio on the course registration page, but at this time I'll hand the mic over to you, Dr. Romero.

- Thank you, Christy. My name is Daniel Romero. I am a assistant professor here at Vanderbilt University Medical Center. Half of my time is in the clinic, half of my time is research and teaching, so quite a bit of a variety. And I'm especially excited to talk about a very unique thing that happened this year with regard to some humanitarian efforts that we were a part of and we collaborated with other universities on. And so this is essentially what the course will be about. So, excited to get into it. And these are just some of my disclosures. And so I just wanna be upfront and let you know that the trip or the humanitarian effort was sponsored by Interacoustics and the William Demant Foundation.

And so just wanted to lay that out there. We're gonna have a few different learning outcomes today. The first is going to be, describe an example of vestibular protocol when testing out in the community when you have limited access to equipment. Second is gonna be identify adaptations to typical vestibular exams when testing in a foreign country. And third is going to be discuss basic vestibular rehabilitation exercises provided to patients out in the field. And so I have a lot of pictures that I will be showing from two different trips that we took this year. So I hope you enjoy the pictures as much as I do, 'cause it really speaks to the work we did out there.

And so we're gonna just start with a little bit of background, what am I actually talking about when I'm talking about vestibular humanitarian stuff? Some of the preparation that went into these two trips, the protocol that we went over to Poland, and did, and executed actually. And then we're gonna talk a little bit about the initial trip, we'll have a

little case study, as well as some follow-up that we actually just returned from. So we spent our second trip over the Thanksgiving holiday, and so I'm excited to share some preliminary stuff about that. The case studies is gonna be intertwined with the June and November trip. And then we'll just talk about some overall findings, and what this all means, and some of the next steps.

So what is it? So this originally started as Northern Illinois University has a Heart of Hearing humanitarian program led by Dr. King Chung, she's been doing this for over 10 years. She was actually my former professor, I am an NIU alum, and I was fortunate enough to go on one of these hearing missions as an AUD student. And so again, Dr. King Chung's been doing this for quite some time, providing hearing services around the world to several different countries. And really the goal is to facilitate academic and clinical exchanges in different countries and deliver hearing services to underserved communities around the world. And a couple years ago they embarked on their first trip to Poland, and last year they published some of their findings.

And what they ended up finding was there was a significant prevalence of hearing loss found in the Ukrainian refugee population. The hearing team that went out there conducted otoscopy, tympanometry, DPOEs, and pure-tone audiometry, and actually estimated that out of the 150 refugees tested, approximately 70 of them were in need of hearing aids. And after testing, the JCC, which is the Jewish Community Center, provided translations to be able to facilitate some communication between the hearing team and the refugees, and let them know not only did they have hearing loss, but they were actually in need of some hearing aids. And so I'm gonna take a little step back and just talk a little bit about the crisis that's going on over there right now.

So it essentially quantifies some of the impact of the current war that is going on. And as you can see, I mean, this is a very fluid situation, an active situation, and so there's been quite a bit of Ukrainian, both military and civilian, casualties. Millions of Ukrainians

have been displaced into other countries. Poland has taken a lot of this Ukrainian refugee population. And so the impact on the Ukrainian quality of life has been pretty severe. And it has impacted not only their personal lives, but also their access to healthcare and everything that they know or knew of Ukraine, which is their home. So certainly a lot of these statistics will have increased since this was made, which was just a few months ago.

And knowing this, so after the Heart of Hearing team found out that many of these Ukrainian refugees needed hearing services there, they started visiting Krakow, Poland, and not only wanted to continue providing these hearing services, but also wanted to be able to fit hearing aids on these refugees. And so this trip that I'm talking about, this mission to Poland did not first happen this year. I sort of joined in as they were already undergoing two trips prior to my joining the team. And so there's been a few different trips, one in November, which is where they found that initial figure of refugees having some hearing loss. In March, they returned with some students from Northern Illinois University, as well as some different students and audiologists from the University of Brazil.

And were able to fit 44 Ukrainian refugees with hearing aids donated actually from ReSound. And prior to this March trip, Dr. Chung sent out an email to all NIU alum asking anyone who was interested in going for a trip that was planned in June. Well, I don't necessarily focus on hearing aids, and so I was wondering, well, certainly some of this population may be suffering from dizziness and imbalance. So during the March trip, I had translated a dizziness and balance case history form and found some startling results. After the March trip I had obtained some of the results of the case history, and found that a lot of these refugees were complaining of symptoms of dizziness, vertigo, balance, history of falls.

And so I certainly knew after this that there could have been a need for vestibular assessment, possibly some exercises. And so that sort of kicked off these two trips that we embarked on, the first being in June and the second being in November. And so prior to actually going on this June trip, I knew that there were a lot of different pieces that had to come together. I didn't necessarily want to go out there and provide testing without some type of treatment or rehabilitation. And so there were several steps in preparation of this trip, one, we had to get university approvals to go. Second, we had to secure some equipment and set up protocols, what were we actually gonna do out there with them out in the field where we have limited access to equipment?

What types of meetings were we gonna have with the other audiologists from other universities? That sort of thing. We had to create and translate case history forms, protocol sheets, assessment sheets to be able to track data in real time to ultimately determine what was actually going on by the time we finished our assessment. The second part of this is we had to really create and translate vestibular rehab exercises so patients can go home and do exercises in case we did find any vestibular involvement. And to do this, we didn't necessarily do this in isolation, we met with Dr. Holly Cauthen, who's a physical therapist here at Vanderbilt, as part of the Pi Beta Phi Institute, and she's an expert vestibular physical therapist, and she was so gracious in providing us with some handouts that we could then get translated and be able to take with us.

And then before the trip, of course, practicing the protocol to ensure that everyone involved in these vestibular assessments were competent, we didn't want anybody practicing while we were over there. And so there were several sessions where myself and my students, of course, were were going through the protocol to make sure that we can really hit the ground running when we got there. The protocol was essentially split into three main sections. The first, we wanted to get an overall gross assessment of their balance. Second, we wanted to do some type of ocular motility screening. And then third, of course, to do the vestibular screening. And so anyone working with dizzy

patients or balanced patients should be pretty familiar with these three different things that we assess during a regular appointment.

In order to measure the vestibular system and to determine if anything vestibular is going on, we really have to rule out any ocular motor issues, and then of course put that together with the entire balanced system. And so to do this, we secured some video goggles from Interacoustics, and we're able to, I guess, I call it the enhanced bedside exam. And so I will get into the protocol a little bit down the road, but it was essentially an enhanced bedside exam that was complete with ocular motors, positionals, spontaneous head shake, and again, we'll get a little bit more detail, but I call it enhanced because we actually use the video goggles to look at the eyes.

So some of the equipment that we took on the initial June trip were some VNG goggles and a tumbling E eye chart. And I'll kind of explain why we did that. That was very strategic and a diagram of ear anatomy as well as all of our handouts. We wanted to be able to provide some, whether it was VRT handouts, whether it was other types of counseling handouts, like BPPV, that sort of thing. We wanted to make sure we could provide the patient with something after we saw them. And so when we got there, the Jewish Community Center was able to set us up with a small space that we were able to test the refugees throughout the week.

And we sort of had to make do with what we had, but essentially it was three main rooms. One was a hearing evaluation room that also served as a makeshift waiting room. The second room had our sort of stations. We had a balanced screening station, ocular motor station, and a vestibular station. On the other side of that same room, we had a hearing aid station where we were providing some ear molds and doing some counseling. And then lastly, we had a final room where the hearing team was actually going, we're fitting the actual hearing aids, doing real ear, that sort of thing. And this is just some pictures of our first room where we did some hearing evaluations.

So we did some pure tone audios prior to anyone getting fit with hearing aids, got a complete audiogram, and it was also nice too, because even for our vestibular assessment, we had some hearing data as well. This is a overview of our main room, so this was the biggest room, and as you can see on the far end of that table where there was a hearing side, so that was all the hearing aid team. And then this closest to us is the balance team. So on this initial trip, it was myself and three of my AUD students in Vanderbilt's AUD program. And so they were able to come on this trip with me and provide some pretty intensive, similar exams throughout the week.

And so we had sort of a waiting area on the side there, we had our balance screening against that wall. The patient would come right here and sit and do an ocular motor exam. And then we would switch right into our vestibular exam using that table, and again, using our video goggles. Here are some more images of showing the hearing aid station, making some instant molds to be able to at least temporarily provides some custom-fit ear molds for the refugees. This was not a one-and-done trip. So essentially we would provide the instant molds and then about four to five months later on the trip back, we would then have their actual molds for them and then switch them out at that time.

And here are some images showing the balance stations within that main room. So we first took the patient's case history, we had a translated case history form, and we also had three interpreters with us. So we weren't necessarily just handing them the form and then having them fill that out. An interpreter, who's a Ukrainian native, was able to kind of sit with them and walk them through each question. We then did an a balance screening, followed again by our ocular motor vestibular exam. And then we finished up with dynamic visual acuity. And again, I'll sort of get into some of the rationale behind all of the tests that we picked to go over there. Again, here's finally just some

images of the hearing aid room where they fit hearing aids and were able to do some real ear using the Verifit.

So again, our first step is that balance screening, or what we call the pre-screening, where we explain the purpose of the testing, we explained ear anatomy, and then kind of went through their case history. The first June trip, most of the patients there were coming in solely for their hearing aids. And so we wanted to first explain to them why we were actually interested in testing. And given that most of them had hearing loss, we know that the prevalence of vestibular loss is also prevalent as well. So we had patients fill out their case histories and if they had any dizziness, imbalance, we would then tested them. Here's an example of our case history sheet that we developed.

It essentially has some standard basic balance questions that you would ask during most clinical appointments. Some examples, you know, do you have dizziness? You know, what does that dizziness feel like? How long does it last? The frequency of those episodes? Balance issues, history of falls, you know, what are some triggers for those? History of migraines, headaches, and then any associated ear symptoms. So we had an English side and then on the back we had our translated side or Ukrainian side. We also had here an instruction sheet. And so the reason why we had this was the interpreters that were provided, they were excellent, they also were being pulled in many different directions, as you can imagine, especially during counseling, during hearing aid, real ear, anytime that an audiologist needed to communicate with the patient, we essentially needed an interpreter.

And so there would be moments during our assessment that we may not have had access to an interpreter. And so we also created an instruction sheet for every single test that we were doing and translated that into Ukrainian, that way we could essentially point to the number to give them instructions on what we were going to do next. And so just ocular motors, you know, please follow my finger, vestibular

screening, I'm going to be placing these visors. And of course, all of the typical instructions that we would give dizzy patients during our appointments. This is an example of our assessment sheets, these were essentially for our use only. So prior to our departure, we wanted to create these assessment sheets to be able to document our test results.

We then took these sheets home and inputted all of the data to sort of complete our kind of data analysis. And then we went in and added some of their hearing results here. So it was really a way for us to keep track of what was going on and what we were going to counsel the patient on. And so to kind of get deeper into the initial balance screening, we first brought, or we wanted to do a modified CTSIB. It's a very well-established assessment, consists of four conditions where you're keeping the eyes apart on firm ground, or the feet apart on firm ground with the eyes open, feet together, eyes closed, and then essentially repeating that on foam.

As you can imagine, we didn't necessarily have foam. So on our way off of the plane, a couple of us snuck onto the first-class areas and grabbed a one of the pillows that were on there as soon as we got off the plane in Poland. And so we often joke that this trip was also sponsored by Lufthansa Airlines. And it served quite well, it was a great way for us to distort proprioceptive information. And our second one, it was a test called five times sit to stand. It's a test that can measure if somebody is at an increased risk of falling. And you essentially have the patient sit on the edge of a chair and you have them just go up and down, sit to stand five times.

And if they do that within 14 and a half seconds, it's good. Anything above that could be an indicator that someone is at a risk for fall. Our ocular motor exam, again, I call this the enhanced ocular motor exam. 'cause we were looking at the eyes under video goggles, except for the examiner, the examiner was sort of doing that at bedside already. So all tests were completed under the video goggles. We did some gaze, left,

right, up, down, we did some saccades, we did some smooth pursuit, and then some VOR suppression. In gaze, of course, we're looking for some of these, you know, gross abnormalities in the eye movement. So gaze, we're looking for gaze of open nystagmus.

Saccades, we're looking for obvious overshoots, or undershoots, or slowing of that saccade. Smooth pursuit, we're looking for large degrees of saccadic intrusions. And VOR suppression, and I'll talk a little bit about how we actually tested that a little later on. And our vestibular screening. So after we completed our ocular motor exam, we then put on the visors and did some spontaneous. We looked at the eyes to determine if there was any nystagmus of any kind and whether it fixated. We then did a head shake to look for any obvious or see if we could exacerbate any nystagmus that we may or may not have seen under spontaneous. We then completed a bedside head impulse. So if any of you are familiar with the video head impulse test, the bedside head impulse is the original one.

And it is essentially you have the patient look at your nose and you're doing head thrusts, and you're looking for corrective saccades. After that we did a BPPV screening where we did a left and right Dix-Hallpike, followed by a deep head hang, where we were looking for anterior canal BPPV. Then we put the patient in supine, and as you can see on that top right and those right figures there, we used our table, right, and our pillow to be able to do this. And so we put the patient in supine, we did a couple left/right head rolls to look for horizontal BPPV, and then we finished with dynamic visual acuity. Now, dynamic visual acuity is essentially a test where we have the patient look at an eye chart, and we have them, using their corrected vision, if they had glasses or contacts, we wanted them to wear that, and we're essentially wanna find the lowest line that they could read with their head still.

That is gonna be the static condition. And then what we do is we move the head about one to two Hertz or one to two times per second. And we're essentially having them read that same line. And that is the dynamic position. And so if the vestibular ocular reflex is working well and functioning, we would expect a very small, if not no deviation, between the line that they can read when their head is still and the line that they can read when their head is moving. And if there is a greater than two line deviation that could indicate that there may be some retinal slip, there may be an abnormal VOR there. So that was essentially one of our ways to determine if there was some underlying vestibular damage and/or if it was compensated or uncompensated.

And so we used a tumbling E chart, because obviously this is a population that doesn't speak English. And so we wanted to make sure that we were using something that was as universal as we possibly could make it. And so instead of letters or the alphabet on that eye chart, it was an E that was in different directions. And we essentially had the patient point to which direction that E was facing, which worked really well. So that is the tumbling E chart, and you'll see a couple pictures of it as we move forward. So I want to give some background on the head impulse test or the head thrust test. It is a bedside test used to identify peripheral vestibular impairment.

This is what the video head impulse test or the vHIT is based upon, as many as you know. So it takes advantage of the lateral VOR, it's very easy to perform, so we could do it out in the field. It's very sensitive to complete vestibular damage. If there's 100% impairment there, the head impulse test will pick it up, but it's not very sensitive to more of those mild to moderate impairments, which I would argue we see more of, right? So it has its advantages, but also it is not the end all be all. We know that the gold standard for identifying a peripheral impairment is the caloric exam. And so with using just the head impulse, we know we're gonna miss some things.

And then after we finished our exam, when counseling, we would sit down with the patients, explain the results, what it means, and any treatment plans if indicated. If patients had normal findings, this was easier of course. But when there was a peripheral impairment or if anything was central, if there was any type of finding in any way, you know, we had to make sure that we had an interpreter with us to be able to explain what was going on. And it's just some considerations that we came across, especially my students is, you know, we had to make sure that we were being culturally competent, this was a different culture, different mentality. And so we had to make sure that we were sensitive to those things.

We had to also make sure that we were clear and concise in our messaging, because there was a language barrier, and you know, we wanted to make sure that everything we were saying was as clear as we possibly could make it. We have essentially four different handouts that we took with us to aid in our counseling. All the handouts were pre-translated in Ukrainian on the front end, and we brought them with us to Poland. So initially for the June trip we had a VRT handout. And we had a VRT handout, which we also laminated some small Xs because as you'll learn, you know, we have to be able to have the patient focus on something, on a target while they move their head from side to side or up and down, and that is known as VOR x1.

And so we laminated some Xs, you can sort of see them on the table there in that photo. And then anyone that we handed these VOR x1 exercises out to, we also gave them an X so they could use it at home. We had two different balance handouts, one with and without head turns. And I'll explain the line of thinking as we go forward. We also had a BPPV treatment handout. So anybody that we treated BPPV on, we also gave them instructions for post-repositioning care. And we also gave them instructions on what BPPV is, just more of an informational type thing. So this is the VOR x1 handout. And so we would check off what we wanted each patient to do on the sheet, and then do it with them to ensure that they knew how to do the task.

So demonstration was key. And these are all tips that we learned from our physical therapist colleague, Holly. And she was certainly fundamental to this part of the trip. And so this handout was given to dizzy patients with peripheral impairments, or anybody, essentially, reporting that they had dizziness. And so essentially patients were instructed to hold the target at arm's length or on the wall, you know, they could do that sitting or standing, and in couple different feet positions. And essentially for one to two minutes, three times a day, they are moving their head side to side, at least 70 degrees per second. So that's about one full head turn per second, side to side and up and down three times a day.

And as you can see, it was all both in English and in Ukrainian. We also provided some balance handouts with head turns if we wanted to challenge the vestibular system a little more. These were provided to the patients, you know, with unsteadiness, with balance issues. And exercises could be given to anybody with any otolith impairments. But of course we didn't do any VEMP testing while we were out there, so we wouldn't necessarily know. But anyone that was suffering from imbalance, we would give these types of head turns or these types of balance exercises to be able to challenge the vestibular system a little bit, maybe drive up those vestibular cues to help them with their balance a little more.

And again, we would make sure that they can demonstrate this to the patient and so they can show us that they understood what we're asking of them. And then, of course, that they could demonstrate it. We did give a similar handout, but without head turns. This was really given to patients with more limited balance. This was the handout that we gave to patients that may have been at more at risk for falling or, you know, we didn't wanna necessarily challenge as much, just given their limitations. Which handout we gave out to who really depended on each individual patient. This was our BPPV

handout. So it just essentially goes over what is BPPV, what does the treatment look like?

You know, what did we find today? Did we find BPPV in the left ear, right ear? And how were we going to treat it and what did the treatment look like? As well as some things to expect after the treatment. Now I wanna just bring up a certain case, because this was a very unique trip, and among kind of the first humanitarian trip focused on providing vestibular services. And so, I think I was a little nervous going out there because I didn't know the results those case history forms that I had sent out in March. But I was cautiously optimistic, I guess you can say. So this was actually our first patient, and I think it just kind of validated what we were doing.

And so the first patient that we saw out in June was about a 57-year-old female. She reported some head swimming symptoms lasting seconds, occurring with changes in position, trouble walking in a straight line, so there was some veering there, stumbling, some double vision, also a history of migraines, as well as sensitivity to sound and motion. The audiogram showed a bilateral asymmetric hearing loss with no response in the right ear from 250-8,000. And when we saw her for our vestibular exam, we saw a small left beat nystagmus that was present during positionals as well. Just for your reference, you can see the tumbling E chart right there on the top. During head shake there was a positive head shake, we saw a seven degree left beat nystagmus post head shake.

During our bedside head impulse, we saw some clear right overt saccades. And then when we did our dynamic visual acuity, so if you remember, with her head still, she was able to read at a line nine. So that's among the lowest, smallest lines there. And when we started moving her head, the lowest line that she can read was line four. So that was a five line deviation. And if you remember, anything above a two line deviation was considered abnormal. And so that day I came together with the students to figure out,

okay, what's actually going on here? And we all decided that there was a right uncompensated vestibular impairment, and it was also interesting that it was on the same side as the profound hearing loss as well.

And so we gave some VRT handouts as well as some balance exercises to this patient. And just to kind of place a little bit of videos here, I'm gonna first play what we saw under spontaneous. Yeah, so you can see that it wasn't obvious, is essentially the moral of the story here. It was there, but it was very, very, very small left beat. And it got even larger after we did the head shake. So you'll see right now we're just moving her head from side to side, so that's why her eyes are closed. After the 20 seconds we tapped her on the shoulder, we had her open up her eyes. So we're still moving her head here.

And that spontaneous really comes out and you can see it. There it is. So you can see that fast phase moving to the left. And so we know, of course, that something is obviously going on on the right side. And this was video of me doing the bedside head impulse. Just so you're aware, rightward direction is here on the left side and leftward direction is here on the right side, or leftward direction is on the left side there of your screen. Rightward direction or right impulse is on the right side of your screen. So we were already suspecting that there was something going on on that right side. And what we ended up drawing conclusions for was a corrective saccade that we were consistently seeing on any time that we did a hit to the right.

And you sort of see it there, it's not obvious, it was right there, it's really quick, and that one's pretty clean, clean, and you can see it really clear here. There it is, you can see that. If you saw that extra jerk, that's gonna be the corrective saccade. And it becomes really obvious when we slow it down. So lemme see if I can zoom in here or, oh, yeah, so you can see a couple of those corrective saccades if we slow down that video. But that's what we were going off of initially. And then we did a follow-up trip in November.

And there were two main things that changed. One was we wanted to assess patients with dizziness and imbalance as the primary complaints.

We also made some modifications to the assessment sheet as well as the balance protocol. And this was through our conversations with Holly, our PT colleague, because what we had initially found during the initial trip was it may have been a little bit too confusing, I think, all of the different options when, essentially, we wanted everyone to sort of drive up those vestibular cues as much as we could in a safe and capable way. And so we made a few different changes, which I'll talk about here. And the big thing that we'll talk about, I think, that changed is we sort of dropped the bedside head impulse. So we wanted to try to drive up and collect as much objective information as we possibly could.

And so we swapped the bedside head impulse for the video head impulse. So I was able to secure some equipment for the week to be able to bring vHIT out there. And that added a whole other layer of objectivity and confidence to what we were doing. And so the vestibular testing, again, everything else essentially looked the same, except this time every patient that was coming in reported active symptoms of dizziness and imbalance. And just to kind of give you an idea of how much dizziness was out there, we had made the call for anyone suffering with dizziness to come, we're gonna be here on these dates over the Thanksgiving holiday, and we had over 20 people sign up in like seven or eight days.

And so there was certainly a need when we got there. And just so everyone knows, and we know that that vHIT covers that high frequency range, it's not the end all be all test. But it did add a layer of objectivity to our evaluation, and it's extremely portable, it's just plug and play. And so it does allow us to identify some high frequency VOR impairments. It's again, very portable, could easily be used out in the field. It also allows us to evaluate the vertical canals. And before we weren't necessarily doing that.

So we're able to evaluate the vertical semicircular canals, and we're evaluating these canals at frequencies more consistent with everyday head movements. It does not require tasking.

And so there's a lot of advantages to using vHIT, as well as some given indications or indicators of central compensation. Of course there are some disadvantages here. We know that it's not necessarily a controlled stimulus, it's based on the examiner again. And here's a lot of sources of noise that can be introduced into the recording and further complicate the interpretation. But we were certainly excited to be able to use this to be able to, again, add that layer of confidence and hopefully be able to help some of these patients. So again, we swapped out the head impulse test on our initial sheet and we were able to kind of add the vHIT variables. So our gain and if there were any corrective saccades.

The second change was to our balance handout. Now if you remember, we had two separate handouts, the first one, one with and without head turns. And again, our PT colleague, Holly, really guided us to be able to kind of simplify it as much as we possibly could while still challenging the vestibular system. And so we sort of got rid of a lot of different things. But it sort of came down to this, we always wanted somebody, essentially on cushion, with feet positions, depending on how much sway we observed. So we would always start with feet apart or that top illustration. If that was too easy, we move down. So it goes from the top is the easiest, the bottom is the hardest.

So we always started with the easiest to see how well they could handle that task with their eyes closed while shaking their head up and down, side to side. It's harder than it looks. So if somebody can do side to side head movements with their eyes closed really easily with feet apart, we then had them put feet together. And then we did that until we saw a good amount of sway. And Holly mentioned, that as PT's, she

mentioned that PT's love sway, they love to see patients sway, because that is the sweet spot, that is the spot where we know that it's going to be challenging. Obviously not to the point where they're falling, but we don't want to see them standing still either.

And then we had a picture diagram that we essentially circled, and it gave the patient a visual depiction of how we wanted them to do these exercises. So again, this is the second time around. I had three new students join me, and essentially our case history looked the same, our ocular motors looked the same. Our counseling VOR x1 exercises looked the same, except with these different slight modifications. And again, we demonstrated these exercises to ensure that patients understood and we provided a goal-oriented therapy the entire time. So we always had patients demonstrate these exercises before we sent them home with them. And we again circled which ones we wanted to do. Some patients, we kind of gave them a little plan of action.

So we said, okay, start here, do these, when this becomes too easy, move on to this next harder condition. So we felt a little bit more structured and a little bit more goal-oriented when working with these patients. So overall in June, and again, we had five days of testing in June, Monday through Friday. And we had four days of testing in November just last week. And when I talk about just got back, we just got back or just got back on Sunday. So we tested 50 patients in June over the course of five days and around 35 patients last week. And the mean age was about 50. The majority of patients were female. And these were essentially our overall findings.

Now of course we cannot say for certain what was going on here, but these were our suspected cases for both June on the left and November on the right. Now one thing that you'll immediately notice is that there are a lot of percentages of a lot of different things in November's trip. I think there's probably a couple of different reasons for that. One, we had vHIT, we were able to catch a couple of more things. We also sent out the

call to patients specifically with dizziness and balance symptoms. So those patients were coming in specifically for that and not necessarily specifically for hearing aids. So those two reasons are probably gonna be the main reasons why that we found so much more this second time around.

So peripheral vestibular stuff, about 8% of everyone we tested in June we found to have a vestibular problem, a peripheral problem. 8% of BPPV, a couple of cases of vestibular migraine. And as opposed to November where that peripheral number jumps up to 29%. Handful of cases of BPPV, a lot of vestibular migraine, and a lot of central cases. I was honestly surprised by the number of central cases. But if I take a step back and I think about it, it actually does make sense because I guess more of those patients that are dealing with these types of things chronically are more likely to be more motivated to seek help for it. And if they heard about a call for dizziness and balance testing, they're probably more motivated to come in.

And so I wanna follow up on that first patient that we saw in June. So we asked this patient to come back in November. I wanted to see how she was doing with the VRT exercises and if she was still feeling some dizziness. And so five months later she did report that she was subjectively feeling better, that there was a "little dizziness" left. So initially that was really encouraging, I think. And so we retested her, we redid some of the vestibular tests, we still saw that small left beat. We didn't necessarily see no change to it. We saw the head shake nystagmus was about the same, there was no significant change, so clearly still uncompensated. We did do vHIT on her, and just like we found in June with the bedside head impulse, we saw some low gain with the right lateral canal, with some clear disorganized overt saccades.

So certainly gave us some validation in what we were doing the first time around. And so overall with this time around, we saw, again, right peripheral impairment, same side as our hearing loss, and still uncompensated. And so we didn't necessarily leave it

there, we provided more challenging VRT exercises for her. So hopefully we can provide some relief and get her to the point of compensation. But my hope is to make some more connections out there, especially with a physical therapist that she can then go to. So overall adaptations that we made in the field, we learned how to give instructions non-verbally without the use of an interpreter. That was big. We used Google Translate for patients with normal findings, which worked out really well.

We changed up our order of the ocular motility exam throughout, just changed it just depending on the flow. Like it helped the flow of the assessment a little more. Now again, I haven't necessarily said how we tested VOR suppression, and I'm gonna say this now. So what we ended up doing was we put the visors on the patient and we had them turn their head from side to side, very slow, didn't have to go fast. And we looked for nystagmus on the raw tracing and then while they were turning their head, we turned on the fixation light in the goggles and had them stare at it. And we essentially just looked for a gross suppression of that nystagmus.

And if we saw that gross suppression of the nystagmus, we were satisfied at that point. And so that's like an adaptation that we made to VOR suppression out in the field to be able to test it, at least grossly at bedside. Secondly, counseling, we expanded our counseling to overcome the language barrier to really ensure that patients understood what we were saying. Again, it really ignited our creativity to be able to make sure that we were explaining things very clearly and very simply in very simple ways, so that way the patient could understand and there was little lost in translation hopefully with that. Modifications for future trips, we want to include more objective and portable equipment. Hopefully we can get to the point where we can include VEMPs, perhaps active head rotation, which is sort of the cheap way of doing rotary chair.

But again, that has to be validated, of course, first. More privacy for testing. I think, you know, patients sometimes felt because the waiting area was pretty close to the testing

site, some patients requested more privacy. But oftentimes space is limited on these types of trips. Secondly, definitely wanna establish more local connections with primary care, ENT, neurology, physical therapy to be able to guide patients to. All of the refugees have same health insurance as Polish citizens, and so we were essentially directing them back to their primary care or family doctors. But it would be nice to have some ENT, neurology, PT contacts that we can get in touch and send patients to. Definitely want to create some future handouts.

One of course being, since we had a lot of central cases, you know, a central vertigo handout to be able to just add to some of that counseling, vestibular migraine, that sort of thing. Now I do want to say that this current protocol is an incomplete vestibular evaluation, so it's not a complete test. It is missing some things for sure. We are likely missing compensated impairments as well as impairments at other frequency ranges. However, there is strong evidence that there is a need for this type of testing for those who currently do not have access to it. There aren't any necessarily current guidelines regarding vestibular testing out in the community. But I think this trip helps support that field testing is possible and feasible.

And this protocol could be used to identify some uncompensated peripheral vestibular impairments. I want to choose those words carefully because of course this is an incomplete evaluation at the moment. And I think it also raises an interesting discussion about the audiologist's role in managing peripheral vestibular disorders. You know, certainly this was a unique part in us providing some of these VRT exercises with the help of our PT friends. So that was really wonderful for me as well the students. Some of the next steps, we want to continue to follow up with these patients, ensure that they're doing well. We want to assess the international need in other countries. We wanna also assess the need domestically here in the United States and in low-income communities, patients without health insurance, and for patients that actually cannot go to a large medical center for some of these vestibular evaluations.

So if you wanna learn more, there's a few articles, and just if you wanna learn more about our trip and just some of the experiences of the students, and you can catch them in a few different areas through Interacoustics' website, podcast that I host called "A Dose of Dizzy", just different avenues of just learning more about everything that went on. And of course, I wanna acknowledge so many different people. This was not in isolation in any way, this was not any one person. The hearing team that has been going since last year, the ones that went in June and here last week in November, the vestibular team, my students, they're wonderful. And Interacoustics and William Demant And then a special thanks to Dr.

King Chung, who's been leading these types of trips all over the world. Dr. Fuemmeler, who helped us secure equipment and some funding. And Dr. Cauthen who was the physical therapist that helped us with setting up all of the PT or VRT side of it. And again, just want to thank you to our sponsors and take any questions. Okay, so someone asked how did patients find out about the program? So the Jewish Community Center in Poland helps set up these shops for some of the refugees where they're able to secure food, clothing, more of the essential needs. And so we had a contact with an organizer from the JCC who was able to make some of these announcements and post some of these flyers that we were coming on these specific dates to be able to make patients aware.

- [Christy Huynh] Dr. Romero, I don't see any other questions in the queue, but we can leave it open just for a few more seconds while you leave any closing comments, and then we can go ahead and end the classroom.

- Yeah, so again, I just want to thank everyone for sitting or being with me today. This was a great thing that I was very much happy to share all our experiences with everyone, and so we really appreciate. And yeah, if anybody has any questions, after the webinar feel free to reach out to me, I'm happy to take any questions after this webinar or at any point in time. Thank you.