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## **An Interdisciplinary Approach to Persistent Postural Perceptual Dizziness (PPPD) and Functional Gait Disorders (FGD), presented in partnership with AVAA**

Presenter: Patricia Elie, AuD

Thank you everyone for joining us today on today's webinar, an interdisciplinary approach to persistent postural perceptual dizziness and functional gait disorders. Presented in partnership with AVA. Our guest speaker today is Doctor Patricia Ellie. If you'd like to learn more about our guest speaker, additional information can be found on the course registration page. And with that, welcome Doctor Ellie.

We're so happy to have you on today, and at this time I'm going to hand over the mic to you. Thank you so much. I'm happy to be joining you all again today. So these are my disclosures. Please note that the views expressed in this presentation are those of the authors and do not necessarily reflect the official policy or position of the us government.

So, here are the learning objectives. To first define functional neurological disorders, or FND identify patients presenting with persistent postural perceptual dizziness or triple PD and functional gait disorders, or FGD, and discuss how to treat and manage patients with triple PD and FGD. Explain the importance of interdisciplinary management for patients with FND.

To better understand functional neurological disorders, or FND, is to better understand the former and current terminology. The disorder was previously referred to as dissociative by the international Classification of Diseases, 10th revision. However, this implies that there's a sense of detachment or compartmentalizing of neurological functioning from normal awareness. The DSM five recognized the term conversion disorder as an alternative term. However, this terminology implies there's a psychological stressor as the source of the disorder.

However, the psychological stressor may not always be present or easily identifiable, which poses challenges when making the final diagnosis. So thus, the term functional is more neutral in regards to the cause and also recognized by the DSM five and is now the preferred terminology. To better understand functional neurological disorders is to understand what we call the three p's or

predisposing. Precipitating and perpetuating factors. Predisposing factors are all the factors that you are born and raised with.

So examples of predisposing factors are genetics, early life eVRT or traumas such as childhood abuse, family neglect, family dysfunction, or your overall disposition, such as vulnerability traits or avoidance tendencies. Precipitating factors are the catalyst or the item that ignites the FND. Precipitating factors can be adverse later life experiences such as bereavement, health problems, interpersonal difficulties, work related problems, and it should be noted that adverse later life experiences can be an example of not only precipitating factors, but can also be examples of predisposing factors. Just as neuromedical conditions such as epilepsy or mild TBIs or headaches, and psychiatric comorbidities such as anxiety or depression can act as both precipitating right what ignites the FND and perpetuating factors or items that maintain the FND? So examples of perpetuating factors are your family and friends behavior, the patient's family or friends behavior, the patient's behavior, their cognition, or the chronic stress and sick role in this illness behavior.

Functional neurological disorders have an incidence of four to twelve per 100,000 population per year. You're looking at four to five per 100,000 population per year for motor FND and functional gait. FND occurs in about six to 8.5% of the population. Persistent postural perceptual dizziness is the most common chronic vestibular disorder in people 30 to 50 years of age, and females are affected more often than men, with a ratio as high as four to one. Seeing as discussed earlier, the terminology has transitioned from conversion disorder to functional there's no longer a precipitating factor needed to make the final diagnosis for all FND disorders, with the exception of persistent postural perceptual dizziness.

This again has made it easier to make the final diagnosis. Seeing as precipitating factors, as we mentioned before, can be challenging to identify, and sometimes it's not identifiable. And so FND is not

a diagnosis of exclusion. There are positive signs that can be utilized to make the final diagnosis, and we'll discuss these signs shortly. Also of notice that FND is not malingering, seeing as there's no monetary goal or gain.

It's not a factitious disorder, meaning there's no internal gain. This is not something that the patient is consciously controlling. There are so many types of clinical features or types of FND, right? There's limb weakness, tremors, seizures, muscle spasms, gait disorders, facial spasms, tics, jerks and twitches, drop attachments. So the patient might suddenly fall to the floor without losing consciousness.

Functional sensory symptoms such as numbness, pins or needles or feeling a limb is not a part of their body. Or functional cognitive symptoms, functional speech and swallowing difficulties, and persistent postural perceptual dizziness. Or triple PD. For the sake of time and relevance, we'll focus primarily on gait disorders and persistent postural perceptual dizziness. These are both two conditions that I found and you may find as well amongst patients presenting to your vestibular clinic.

So the FND division was established by neurology at the Miami VA in 2022. And per neurologist, it's the first known FND division in the VA. This team has proved to provide critical supplemental neuropsychiatric psychiatric workup services for triple PD patients and is comprised of neurology, audiology, speech pathology, psychology, psychiatry, physical therapy, primary care, and we even have whole health and ENT as well on board.

The establishment of the FND team is a perfect illustration of how one could go about establishing an interdisciplinary team at your facility. After neurology first recruited the various disciplines. To join the team, we reviewed massive amounts of literature regarding the various FND disorders, and then neurology invited an expert who had experienced leading an FND team to speak with us. Now we meet monthly to review our cases. Our neurologists had invited doctor LaFrance, who said something that has always seemed to stick with me when working with this population.

As you begin to find yourself working among this population, you may notice as well. You may notice what he said as well, right. And he said, do not work harder than the patient. You'll find that the no show rate, the no show and cancellation rates among this population is high. Don't be discouraged.

However, don't burn out either. And so that's what he meant by that statement. All right, so we're going to shift gears and talk about functional gait disorders. So, two to 20% of patients referred to movement disorders outpatient clinics have a functional movement disorder. 40% have a gait abnormalities without structural damage.

Then it gets even more complicated, seeing as it can co occur with organic gait disorders. There are seven signs of gait abnormalities. Right? So there's a toxic gait or an inability to walk in a straight line without excessive arm movements. Bastard gait or scissoring, which involves the legs crossing over each other when the patient's walking.

Weak gait, which can result in knees giving way or limping. Parkinsonian gait that can result in excessive slowness and start hesitancy. Hemiparetic gait that can result in dragging or weakness in one limb. Dystonic gait, which can present as abnormal posturing of the leg or trunk due to muscles contracting involuntarily, will be focusing primarily on ataxic gait and parkinsonian gait, seeing as some of the tests used to evaluate these signs are some of which we may encounter or have already been using with our patient population. For a toxic gait, providers can utilize the Romberg and tandem walking test.

So for those of you familiar with the Gans sensory organization performance test, you may find that some of these some of these tests to be very familiar. While the Gans SOP does not, well, the Gans SOP does tandem Romberg. And the assessment calls for tandem walking. It's still very similar. Right.

And for the Romberg test, you would look for exaggerated truncal sway without falling. In functional gait patients, however, in a vestibular pathology, you would see them veer to the site of lesion. For the tandem walking, you would see that no sidestep, right and or prolonged standing on one leg without falling would occur in functional gait disorders. However, in a person with organic disorder, you would see that they would be unable to perform the test without making that corrective side step. There's also a test called the retropulsion test, or a pull test.

It's a test of postural stability. This test evaluates the ability of patients to recover from a backward pull on the shoulder. So for parkinsonian gait, this would lead to excessive truncal sway without falling or falling backwards. But balance is otherwise good, except on this particular test. However, in patients with an organic disorder, they may take balanced corrective steps, and in severe cases, they may actually fall.

Okay, so for those of you not familiar with the gans sop, there's an illustration, a video to the right there illustrating it. So, for condition one, the feet's together, eyes open. Condition two, the feet together, eyes close. Condition three, tandem, eyes open. And in our clinic, we look at both right and left foot forward for discrepancies.

Condition four, tandem, eyes closed. Condition 5ft together, eyes open on foam, and then feet together, eyes closed on foam, and then stepping through the could, marching with eyes closed. I'm going to go ahead and play the video again, so you can kind of see that because it went pretty fast.

And so you're seeing the tandem now. Eyes closed, eyes open, eyes closed on foam. Eyes open, eyes closed, stepping Fukuda. Okay, so nanieks and his colleagues mentioned that tasking, such as engaging in conversation similar to how we would do for caloric from performing balance testing, can help identify patients with functional gait disorders. So, while tasking, you can look for inconsistencies, such as improvement or worsening of their performance on these tests.

So you may also see exaggerated truncal sway without falling. So when diagnosing functional gait disorder, the provider will want to look for inconsistencies in organic gait disorders.

The diagnosis at our facility, at least, is given by neurology. If you're suspecting functional gait, these are things you may want to consider right. Does a family member or a significant other remark on how the patient walks differently at home than when they're in the clinic with you? Does their gait improve when they're distracted? Is there visible gait impairments that affect the activity of their activity of daily life?

Is there mild gait impairment? Right. But then they say they can't do any of their activities of daily living. Some patients may even complain that their symptoms are worsening, but there's no identifiable structural damage.

To go back to that. So what I mean by that with the visible gait impairments. So maybe there might be a lot of visible gait impairments, but they're saying they're able to do all their activities of daily living. It's not interfering with it. Right.

Or the contrary that we mentioned earlier. So you'll want to look for incongruities that would not be present with an organic disorder. So are their symptoms delayed, but they only have a very minor injury. So a good example of incongruency are patients presenting with buckling gait but normal quadriceps strength. Right.

Or patients presenting with improvement in gait when performing cognitive tasks while walking. Also patients that fall slowly without injuring themselves.

Okay, so Ross presented to my clinic. Here's our first case study with reports of dizziness that started in 2018 that occurs every time he would stand up or get out of bed. He stated that at the time, his dizziness was mild, but has been getting more severe and accompanied by a panic attack. He reported that he lost his sister and later his mother in April of 2023. Unfortunately, he couldn't tolerate vehicles.

He requested that caloric testing be discontinued after irrigation response was measured on the right side. However, we were unable to rule out a peripheral involvement, seeing as results were inconclusive. He presented with abnormal gain during tracking, but also had a panic attack during testing. During the test and could not really repeat any of the testing. And, you know, he had post head shake, nystagmus, three degrees per second.

Right. B but it wasn't accompanied by dizziness. And he had. And he had panic attacks throughout the testing. And then for the sensory performance test or the SOP test, it resulted in a sway throughout most of the conditions and a fall on condition six.

Unfortunately, I completed this prior to reading Nanique's and colleagues articles, so I didn't task, which would been great to see. Right. However, the patient sways were exaggerating during or exaggerated during SoP. I couldn't help but to wonder whether I was looking at a functional gait disorder, whether or where the precipitating factor is the loss of his sister and his mother. So I referred him to neurology and mental health.

He also needs physical therapy services. However, we'll discuss soon why it's crucial, crucial for, and really critical for these patients to have the appropriate diagnosis prior to enrolling in physical therapy. So they saw neurology, who looked at the three p's, right? So for the predisposing factors that were identified by neurology, they said his parents separated when he was in third grade. He had seven siblings and a history of physical abuse by his dad.

His mother was always working and his caregiver was his sister, who passed away in 2023. And when asked about sexual trauma, he got tearful and shut down and preferred not to talk about it. The precipitating condition identified, my neurology was the loss of his mother and his sister, as we had suspected. Right. And perpetuating factors identified were depression and anxiety and panic disorders.

Those are the items of maintaining his functional gait disorder.

Went a little advanced a little too far. And so it's a good thing we're going to talk a little bit about why shortly, why it was so important to get that final diagnosis. But before we do something that I wanted to mention, there are as far as there's this video here. So there's international functional Neurological Disorders Awareness Day. It's April 13 and the goal is to raise awareness of FND support people affected by FND and advanced into FND prevention, treatment or recovery.

So I encourage you to visit this YouTube link that highlights two FND cases and then also Nanique's and colleagues 2020 article that's in your handout has a comprehensive list of videos illustrating FND that I would highly encourage you to visit. They have so many examples of videos of patients presenting with various forms and signs that we mentioned, but for time purposes, I couldn't really include it. So I apologize. Okay, so treatment options for functional gait disorders how do we treat for this? Right.

Physical therapies is how you can treat for functional gait disorder, but in order to treat for it, you need to make sure the patient receives the diagnosis by a physician, but most importantly, accepts the diagnosis. If the patient does not accept the diagnosis, they may not want to help and therefore their physical therapist will not be able to identify treatment goals. Education is the key with this particular population. Making sure you're using the appropriate terminology so you're using functional acknowledging that their symptoms are real and the disorder is common, acknowledging that it's a problem with the functioning of the nervous system that is not permanent and can be retrieved to get

control over movements. Factors that may be contributing to symptoms such as physical illness or injury, or psychological factors such as anxiety, depression, or any trauma.

All right, so treatment for functional gait disorders with physical therapy involves showing the patient that normal movements are possible, right. Or that their abnormal movements can stop. So this can be done by using mirrors or recording videos to provide feedback to patients regarding their movement or posture. So the physical therapist will focus on retraining movement by distracting the patient from cognitively controlling the movement. Examples of how they can do this is having them perform fast, unfamiliar, unpredictable movements.

What is an example of? Maybe it may not be fast, but an unfamiliar, unpredictable movement. Yoga, tai chi. Right. Those are unfamiliar and unpredictable movements.

Right. And then also things that they do is introduce music, having them perform.

Having them perform cognitive tasks such as math while they're doing the movements. Right. Or engaging them in conversations, similar to how we would do in caloric testing. Right. And then you can.

They'll have them stimulate automatically generated movements, such as having them sit on a therapy ball or sitting on an unstable surface.

Okay, so treatment for functional gait disorder patients can include also visualization exercises, also having them maintain a therapy diary to keep track of their goals and achievements. Okay. And so for this next item, it highlights why Ross, when Ross came to my clinic, I didn't immediately send them to physical therapy. When suspecting a functional gait disorder with this population, you want to avoid issuing them an assistive device such as a cane or a walker, if you can. So the use of an assistive device can prevent them from returning to normal movement.

Or even worse, it can cause new issues such as weakness or pain. If they need to have them use an assistive. If they, you know, if they need to have them use an assistive device due to a history of injuries, the goal is to try to wean them off of it. All right, so also a form of treatment is cognitive behavioral. Well, neurobehavioral therapy, right, which is a form of cognitive behavioral therapy.

So cognitive behavioral therapy for your not familiar with it. It involves having patients understand that their beliefs and thoughts instructs and leads their mood and behavior. It also helps patients notice irrational, destructive thoughts and replace them with healthier, realistic thoughts. It's this idea that the patient is an active participant in therapy. The patient is expected to practice techniques at home, learned in therapy, and given at home assignments to complete.

And so neurobehavioral therapy is neurology's version of this, cognitive, cognitive behavioral therapy for this particular patient population.

Last year, we teamed up with physical therapy, whole health and psychology to launch our interdisciplinary fall prevention program as a part of our FND team, our functional neurological divisions team. Something that we decided to implement for our functional gait disorder patients is to enroll them in this.

And so it is a, you know, as far as the components of this program, there's a one time virtual educational group component that's co taught with physical therapy and audiology, and it reviews home modifications and fall risk, which can. Can include, but it's not limited to vestibular disorders. Right. And enrollment in individualized. It also includes enrollment in individual lies physical therapy, a six week, 90 minutes mindfulness group, and both virtual and in person tai chi sessions.

So the virtual tai chi sessions are completed, seating, seated, and then the in person tai chi sessions are completed while standing. And I just had somebody finish up recently the program, and I was, you know, they really took to the tai chi somebody that was diagnosed with functional gait disorder. So I really excited that we have this program for this, our patients, not just in general, but also for this population as well. All right, so we're going to shift gears and talk about persistent postural perceptual dizziness. So when we think of vestibular disorders, we typically think of vertigo.

Right. However, persistent postural perceptual dizziness or triple PD, is this non vertical sensation that can be described as a feeling of unsteady or like they're unstable when walking or standing, they may also describe the sensation of feeling like they're swaying, rocking, bobbing, or bouncing. They may feel like they're moving, or they may feel like their environment's moving. And so, in order to make the final diagnosis of triple PD, the patient has to meet the following criteria in addition to having this non vertigo sensation. Right.

So their dizziness must increase with all the following moving or complex visual patterns. Sitting or standing upright, active or passive movement. So passive movement, being riding in a car or elevator, being moved around in a crowd. It's not really direction or position specific. Right.

And so, symptoms also must cause considerable distress and functional impairment. How can we quantitatively measure considerable distress or functional impairment? How about utilizing the dizziness handicapped inventory? So this is an item we are utilizing regularly, regularly throughout our vestibular clinic. Right.

And that can help capture this information. And so another thing is that symptoms must last most days. So most days, meaning 15 of every 30 days for three months or more, because this idea that it's a chronic functional vestibular disorder. Right. And there has to be an identifiable precipitating factor.

Remember that catalyst that kind of ignites the disorder. So the conditions that cause vert, it could be conditions that cause vertigo and steadiness, dizziness or problems with balance, including acute episodic or chronic vestibular syndromes, other neurological or medical illnesses or psychological distress. And then another key factor is symptoms cannot be better explained by another disease or disorder.

All right, so patients with triple PD would find that all the items to the right here. I'll get my pointer out here. So all the items to the right here causes their dizziness to intensify, seeing as this is a part of the diagnostic criteria. However, some. Some patients may find that some of these items may cause their dizziness to intensify.

May cause their to intensify more than others. And that has led to the development of these subtypes that you see to the left here. Right over here. Okay. And so visual.

The visual dominant subtype is where patients feel like moving or complex visual patterns cause their dizziness to intensify more than other items. This is the most common subtype. And the active motion dominant subtype is where patients find that the active movement triggers their dizziness more than all the other items. And then the mixed subtype notes that the triple PD symptoms to the right equally exacerbates the patient's symptoms. All right, so there is this author questionnaire.

It's called the Nagata triple PD questionnaire for, or the MPQ. And it's a questionnaire for diagnosing and assessing triple PD severity. So the MPQ does not consist of questions regarding dizziness, unsteady, non spinning vertigo, the time from onset, which must, you know, which we said it has to be greater than three months. And so these are all items that must be assessed to diagnose triple PD. Right.

It doesn't say it doesn't have. Look at how many times within the month they have it. Right. So these items must be assessed to diagnose triple PD. And so you have to make sure that these.

They meet that criteria before administering the questionnaire, just in order for the questionnaire to really be valid. Right. So this questionnaire should be, you know, it can be used in addition to the case history, but should not really replace the case history. Right. It's a good supplement.

And so the MPQ has three subscales. It has the upright posture, walking movement, visual stimulation. And there are certain questions on the MPQ that captures each of these subscales. Each subscale totals to 24 and all subscales combined totals to 72. Yagi et Al found that a visual stimulation score of at least nine out of the 24 was one of the best measures of distinguishing between triple PD participants from non triple PD participants, and a total MPQ score of 27 yielded the best sensitivity, and a total MPQ score of 29 yielded the best specificity.

So our service is currently using a total score of 27 or greater and or a total visual stimulation score of nine or greater to help identify these triple PD patients. All right, so triple PD can often occur following other non related conditions such as the following peripheral or central vestibular disorders 15% to 20% of the time. Vestibular migraines you're looking at 15% to 20%. You can expect to see triple PD following a panic attack or anxiety 15% of the time concussions and neck injuries ten to 15% autonomic disorder 7%, irregular heartbeat or adverse reactions to drugs 3%. And then it gets even more complicated, right?

Because it can, seeing as it can also occur simultaneously with another disorder. There are many theories as to the cause of triple PD. Is it a vestibular problem? Is the psychiatric problem? Some theorize that it may be due to the change in functioning of an organ unrelated to structural or cellular deficits, another due to a change in neurological networks, and another states that it's not psychiatric conditions.

So a lot of different theories there. So what should you expect to see on your vestibular test for this particular population? Some theorize that there may be clinical indicators on the vestibular test to suggest triple PD. So some say there may be positional nystagmus and small caloric asymmetry post acute vestibular neuritis. They also may say that you may see low VRR gain with overt saccades on VRT and less covert saccades post vestibular neuritis.

Another suggests that you may also see absent cervical VRT post acute vestibulopathy. However, there are a series of literature stating that there are no observed association between vestibular tests and triple PD, and I'd have to agree with the latter, seeing as I I can't help but to feel like the vestibular findings noted depend heavily on the precipitating condition. If the precipitating condition is vestibular neuritis, then perhaps you may see the findings mentioned earlier. However, the precipitate differs. You may not see any of the items mentioned earlier.

Thus, I'd have to agree with the theory that there is no specific vestibular test findings for this particular population.

Let's take a look at treatment options for triple PD.

Specifically, there's this really great article that's entitled vestibular rehabilitation therapy outcomes in patients with persistent postural perceptual dizziness. What we know is that medications, specifically serotonin reuptake inhibitors, have been a successful treatment for triple PD patients, but it has side effects such as nausea, physical fatigue, and that lead to patients discontinuing the use of these medications. Right. So we know the vestibular rehabilitation therapy, or VRT, helps recover balance, minimize falls in dizziness by reducing hypersensitivity to motion cues, and increasing patients reliance on their natural balance reflexes. Exercises include patient movement and movement of stimuli.

However, there's limited research evaluating VRT of effect on triple PD, so this article looks at that. The study included 60 patients between 18 and 45 years of age with triple PD. They omitted patients with conditions that could increase fall risk, arthritis, foot, visual, cardiovascular, and or neurological disorders, which sounds like my entire patient population. However, this is one of the few articles that explores vestibular rehabilitation therapy with this particular population. It actually shares the exercises.

Let's continue to explore its methods and findings. Despite this, dizziness. Provoking sources were categorized as visual, head related, or body related factors, depending on patients subjective sensitivity to movement or visual objects, head movements, or body movements. They completed v and g bedside assessment, CVM testing, diagnosis, having triple PD based on the diagnostic criteria we outlined earlier. However, vestibular testing was completed to ensure that those with organic vestibular lesions were excluded.

Unfortunately, they did not list their precipitating conditions. Right. So there's. It's unclear what the precipitating conditions were for this particular population. They completed the dizziness handicap inventory, or the DHI, at the start of the study, and the DHI six weeks post VRT, and then follow up was done via WhatsApp daily and clinic visits every two weeks.

All right, so there were two groups of 30 patients. Group one received self guided VRT, meaning that the patients completed exercises at home and were initially instructed on how to perform the exercises correctly. Exercises were tailored to the patient's complaints and functional limitations. Right. And then group two received the VRT and then a placebo where ore really, which was a vitamin that patients were told would minimize their dizziness.

Right. All right, so one form of vestibular exercises that the participants completed was gait stabilization exercises. So where the goal is postural stability, both when standing still or moving. What is great about this? Like, I said about this particular article is they actually included a comprehensive list of the

exercises.

I'm just going to highlight a few here. Right. So you can look at that, look at the rest later, but just a few.

So examples of gait stabilization exercises are walking, right? Or walking exercises where the patient walks for ten minutes, twice per day, 5 meters back and fourth.

And so you may need to gradually increase the distance to 5 meters based on the patient's ability.

Right. And then also you can gradually increase the intensity of the exercises by modifying the following. So maybe you start them with a flat surface and later move to an uneven surface, and then maybe have the patient move first without head movements and then later incorporating head movements. You may also have the patient walk backwards or walk around obstacles, such as a table illustrated here.

Another exercise where they had the patient step up on a stool and climb down to stimulate climbing. Sears sitting, having patients move from a standing to a sitting position and from a sitting to a standing position. All right, so some more gait stabilization exercises include standing sway exercises, which is where the patient, having the patients move their torso to the right and the left as the head is fixed. Or they can, they also varied it by having the torso move horizontally, horizontally. As a head move horizontally, they gradually increase the intensity of the exercise by modifying the following.

So maybe starting with a wide movement, then increasing to narrow movements, increasing the rate of the movements, increasing the complexity of the background. And then they had the handball toss as another exercise, which involves this eye and hand coordination center of, you know, and center of gravity training. So your center of gravity is the point between the upper and lower body. Therefore, you want to strengthen the upper and lower body. And then it involves visual tracking.

And they gradually increase the intensity of exercises by having additional people join into the handball toss. Okay. All right, so another exercise is gaze stability exercises that they had the participants complete. So where the goal for gaze stabilization exercise is to improve dizziness by working on gaze instability via habituation. Right.

So an example of that included emptying and refilling a cupboard that is at the level of the patient's head. This exercise required vertical head movements along with vertical eye movements, and then head movements in general, head movements exercises, as well as something that they incorporated. Right? So initially, twice daily, 1 minute per session, gradually increasing to five times daily, two minutes per session. And so this also depends on what the patient can handle.

Right? So as far as head rotations, some of it while fixating on a target can involve the following various exercises. So, vestibular ocular reflex or VRR times one and VRR times two exercises, which we'll review shortly. Linear head movements. Right?

So, which can be completed by having the patient sitting on a bouncing ball. Right. And they can gradually increase the exercises by modifying the following, maybe having them change from a simple or blank background to a common complex background.

So here's an illustration of VRR times one, the first one. So notice that the target is fixed while the head moves, which is depicted, what is depicted as the head moving horizontally. However, you can have the patients move the head vertically as well. We have also illustrated how we vary the exercises in our clinic and how you can too. You can have the patient complete exercises while seated, standing on a firm surface, as we highlighted here, and then on a dynamic surface, and later walking.

Okay. And so the same can be done with VRR times two exercises where the target and the patient's head move in opposite directions. And then you can also introduce complex backgrounds, right, as

depicted in the third illustration here.

So you can, you can do it for VR times one and VRR times two. The video to the right is just an illustration of how it can be done for VR times one exercises. All right. So when comparing pre and post DHI scores for both, group one, which encompassed the participants that completed VRT only, and group two, which those that completed VRT, in addition to taking a placebo, both groups had improvement in total post DHI scores and functional and physical subscales of the DHI, but not on the emotional subscale of the DHI.

So no improvement on the emotional subscale of DHI demonstrated how important addressing the emotional component is. In addition to VRT, seeing as performance between both groups on the DHI was about the same, it showed no effect of placebo. And among patients that did not benefit from VRT, the duration of the dizziness and severity of aggregating factors were significantly greater. These subjects required significantly higher level of combined VRT exercises, gazing gait stabilization exercises, and had significantly higher total DHI score than the group that benefited. And so it suggests that early intervention is more effective than delayed treatment.

Patients that benefit from VRT required more customized gaze stabilization exercises. So, food for thought, this article highlights the importance of pre and post issuance of DHI when completing VRT. Right? And so, limitations is they excluded all my patients, or really, you know, excluded patients with comorbidities, which are almost all my patients, or maybe patients, you see, that's something to keep in mind as well. But they also use DHI skills that assess the functional, emotional, and physical difficulties so perhaps it's worth making this distinction as well when we're utilizing the DHI and something we've implemented throughout our clinic as well.

Now. All right, something of note that we've decided to implement and would encourage those of you currently administering VRT who plan to incorporate VRT as a part of your vestibular program is a VRT

contract that highlights what to expect and what is expected of the patient throughout VRT. Something else we added, due to the suggestion of our neurologist, is a section that allows them to identify their motivating factors and obstacles for enrolling in VRT that you can revisit throughout therapy. All right, so we're going to shift gears. How can we add back that emotional component?

Right? And here's how we can do it. We're going to shift gears and talk about this fantastic article by Axe and his colleagues. That talk on their colleagues. I'm sorry.

That talk about multimodal treatment of persistent postural perceptual dizziness. Right. And so we know that cognitive behavioral therapy is this idea that highlights of this need to address assumptions throughout our assumptions, thoughts or moods regarding dizziness in order for behavioral changes to be made, seeing as it revolves around the theory that our mind commands our behaviors and this form of treatment can be effective with this particular population. As we explored earlier, we know that vestibular rehabilitation therapy, when used to work on compensation, which focuses on brain learning and changing the function of neural networks, has been shown to be successful in this particular population. We saw that recently.

Right. We just reviewed that this can be done via adaptation or habituation exercises. In some cases where adaptation and habituation exercises are not successful, substitution exercises, where we stimulate functional symptoms, can prove to be helpful. We also know that medical management, specifically the use of serotonin reuptake inhibitors, have proved to be successful with this particular population. What we don't know yet is the effect of the combination of all three of these items.

Right. So let's take a look at that.

This particular longitudinal study had a total of 657 patients that attended therapy for one week for 7 hours per day. There are about eight to ten people in each therapy session. Throughout the week, they

were seeing the interdisciplinary team that consisted of a nurse, neurologist, psychologists, physical therapists. The participants were given follow up questionnaires six months post treatment. The outcome measures they utilized were the vertigo severity scale, which also has a vestibular balance subscale and autonomic anxiety subscale, and they also utilize a hospital and anxiety and depression scale or the had, and a visual analog scale ranging from zero to.

So sorry. The visual analog scale ranging from zero to ten to quantify intensity and distress due to dizziness. And so highlighted above is an illustration as to what their weekly therapy sessions look like. In an ideal world where our clinic access could accommodate this, daily scheduling of patients would be fantastic. But you can see kind of how they broke it down per day for the week.

The mean age of the total 657 patients was 57.5 years old, 60% were female, 40% were male, and for the non triple PD patients, most of them presented with a multisensory deficit. The second highest disorder seen in this population was vestibular neuritis, which comprised of 18% and then 14% vermineers disease. And then for the triple PD participants, mean age was 50 years old with 61% female, 39% male. 305 of the total 657 participants, or 46.4%, met the criteria for triple PD. The triggering or, you know, the coexisting disorders or the precipitant, if you would, found in one third of the triple PD patients was BPP and vestibular neuritis.

And triple PD patients, compared to non triple PD patients were younger, had more distress due to dizziness, had higher scores on the VSS, the VSS anxiety subscale, and the DHI anxiety. Right. And so 418 of the 657 cases, or 63.6%, completed a follow up questionnaire six months after attendance of therapy. So 183 of those patients were triple PD patients and 235 were patients with other somatic diagnosis. And so both triple PD and non triple PD group had a significant change pre and post therapy on the vss and had anxiety intensity and distress, which suggests that even if we are on the fence regarding the triple PD diagnosis, this interdisciplinary or multidisciplinary approach can benefit both

triple PD and non triple PD or the rest of our patients in our vestibular clinics.

It's not like functional gait disorder, where some treatment approaches can have adverse effects like we discussed earlier. And so also, both groups benefited from this multidisciplinary approach. There was a trend noted where, you know, even though both groups benefited, there was a trend noted where triple PD patients showed more improvement than non triple PD patients, but only significant change were noted in the VSS anxiety subscale.

All right, so this article highlights the importance of an interdisciplinary approach to managing triple PD patients. This is how we can finally address the emotional component on the DHI with a VRT alone as an intervention, we were unable to see improvement in this area. Addressing this emotional component is essential in this population, seeing as avoidance behavior, unfavorable thoughts, fears, and anxious self inspection are processes that may further sustain symptoms and lead to significant distress and functional impairment.

So, as I was preparing for this presentation, I reached out to our neurologist for additional insight. To ensure that I'm providing you all with a comprehensive overview regarding this population, he shared with me this article by Erin et al on gamma core as a form of treatment for triple PD patients. Gamma core is currently FDA approved for use for patients with migraines, but not yet with patients with triple PD. We have been discussing, among our functional neurological division, the feasible ability of exploring this as a treatment option for our particular population. Your vagus nerves are the longest cranial nerve running from your brain to your large intestines, and the vagus nerve is a part of the parasympathetic nervous system, which calms your body after you've been in a stressful situation.

The thought is that triple PD patients have hyperactive autonomic nervous system, resulting in nausea, vomiting, increased heart rate and sweating. And so a study was conducted looking at outcome measures after gamma core use. And after four weeks of treatment, there was improvement in quality

of life measures reduction on the hospital on the hospital anxiety and depression scale, specifically the depression score and improvements imbalance, specifically post geography condition that involves standing on foam with eyes open. Open. Okay, so I had a patient come into my office about one or two years ago, and for the sake of keeping with our friends references, we'll name her Phoebe.

Our last case study. So she told me that she is here only for treatment for BPPV. And if I was playing when she came into my office, she said, I'm only here for BPPV, and if you're planning to do. And she described what sounds like caloric testing that she had about 14 years ago, she would cancel her appointment. And she stated that she has a history of Meniere's disease and that she has seen ENT before and it's currently.

She said, listen, I know my meniere's disease. It's currently under control. And she stated that she's not had a meniere's disease episode in years and is only here for BPPV. So I performed the Canalith repositioning maneuver and the BPPV resolved. However, you know, the patient lives in constant fear that her BPPV was going to return.

She reported sleeping upright and avoiding all head and body movements out of fear that it would cause her BPPV to reoccur. She returned to the clinics a few months later, stating that she had a severe Meniere's disease episode last year and has not noted that since then. She has been having a new dizziness sensation. You know, she said, I know what my meniere's feels like. I know it.

The fullness, the unilateral tinnitus. The change is fluctuating. Hearing. She's like, I know what that feels like. And this is completely different.

It's this. She had a hard time describing it. She described it as this off kiltered, unsteady sensation that has been constant and has occurred daily since last year. She emphasized that the meniere's disease symptoms and the off kilter sensation are very different, but she just knew they were somehow related.

Right.

Because they would kind of co occur at times. Right. And so the disease. The meniere's disease episodes have become more frequent since the onset of BPPV and off kilter and off kilter dizziness. And she finds that she's very anxious because she's constantly concerned that the disease is going to occur.

So Phoebe reported she doesn't really leave her house and has hired a cleaning person because of her dizziness. She stated that all she. She also recently lost her job. She's been working there ten plus years, but had to take a lot of time off due to her dizziness. And she said she was terminated as a result.

And she said that this new dizziness sensation increases with complex visual patterns moving from sitting to standing, and horizontal and vertical head and body movement. So, you know, patient. The patient's known to ent and neurology. How did she describe her dizziness? It's that non vertigo.

Right. She couldn't really put it into words, but she knew it wasn't vertigo. Right. It's this off kilter unsteady sensation. And so it increases with the complex visual patterns moving from sitting to standing, horizontal, vertical and head and body movements.

What's the precipitating factor? The meniere's disease. Right. And comorbidities. Anxiety.

A lot of it. And we'll explore that. And then the onset was last year. And the amount of dizziness. I'm sorry, the amount of episodes in one month was every day.

So really chronic, this idea of the chronic nature of it. And so Phoebe presented. So we administered the MPQ. Right. And she presented with the following 60.

A total score is 61. Right. Well over what we were looking at. Right. Our cutoff values.

Subcategory scores. So you see a 14 for the upright posture, walking movement scores 13. Visual stimulation score 24. Really high. Right.

Arguably, we could probably say she's in that visual dominant category that we were talking about earlier. And then the DHI, 92 out of 100. Right. So severe handicap is causing her considerable distress. So I will say, unfortunately, the DHI was completed before we started using the subscales, but it would have been great to see the subscales break down for that.

Okay. And then we also administered the hospital anxiety and depression scale. Right. So anxiety score 17, depression score 18. So, really abnormal for suggesting that veteran may be presenting with both anxiety and depression.

So really want to make sure mental health is also involved and on board. And then we administered the dizziness symptom profile. So the results of the dizziness symptom profile was positive for unsteady, persistent postural perceptual dizziness, and vestibular migraines. Right. Which I thought was interesting.

The latter was really interesting because she never reported migraines. So it's really unclear what it was picking up there. The fact that she presented with BPPV on DSP highlights the fact that sometimes patients will complete questionnaires based on previous symptoms rather than current symptoms. And we often will see that with DHI. And it's picked up on unsteady.

But it did pick up on the unsteady in a triple PD patient. Triple PD as well. And so with this particular patient, our neurotologist was considering maybe gentamicin injection or vestibular nerve ablation. And

I think the one thing is getting her back. He convinced her to come back and do.

Do a repeat vestibular testing, comprehensive vestibular testing. But I will say she has since no showed and or canceled about three or four times. I don't think she's ready to. Again, we go back to kind of what he said, what doctor Lafrance said, and I'm going to leave you with as well. Full circle is you can't work.

Don't work harder than the patient. But she's here. We're here if she needs us. Just keeping in mind that, you know, it's good to have these services, and when we have seen so much improvement, especially with. Through.

Through all the services we offer VRT, the interdisciplinary fall prevention program. But it's when the patients are ready. Right. And so all that to say, thank you so much, and here is my contact information. If you guys need it or feel free, don't hesitate to reach out.

All right, well, thank you so much, Doctor Ellie. We've now reached the end of our presentation, I like to open up the floor for questions and comments from our attendees, and we'll give it a few seconds here for questions to come in. In the meantime, I want to extend a sincere thank you to Doctor Ellie for sharing her expertise and valuable insight. And thanks to everyone who participated in today's course.

So I'll read this. So not a question for you, Doctor Ellie, but I'll read a comment out to you. A lot of thank you. Really informative.

Oh, thank you. I'm so glad to hear that. You know, know, it's always a pleasure and I love, this is one of my favorite topics and one of my favorite interdisciplinary teams to be a part of. So again, don't hesitate to reach out. If you guys have, if anything comes up or you have a question or anything like that, you have my information there.

All right, so we'll give you a couple more seconds, but I think we may have a quiet group today, and I love how you have your contact information, information there. So for those of us that are listening right now, if you do have any follow up questions as you're listening to the recording and reviewing the handout, feel free to reach out to our presenter directly. Her email is there on that last thank you slide. And then what we'll do now is we'll move on to the final slide and I'll just go over a few of our, a couple of important reminders and then we will wrap up. All right, so just a couple of reminders here.

A post exam will be available in your account within the next ten to 15 minutes and please feel free to complete it within the next seven days. To access the exam, log into your account, go to pending courses and select take exam. You'll need to score a 80% or higher to achieve a four course credit. And then also exam question hints are noted on the relevant slides from today's presentation. And then if you have any questions about continuing education credits, you can always reach us.

Reach out to [us@customerservicecontinue.com](mailto:us@customerservicecontinue.com) or if you have any specific questions for Doctor Ellie, please feel free to reach out to her directly on that thank you slide where her email is. And with that, we'll go ahead and wrap up. Thanks everyone for participating today. We look forward to your evaluations and we will see you next time on audiology online.