

Life Care Planning for Vestibular Disorders

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Abstract

Vestibular disorders can follow injury or illness and they impact crucial aspects of a person's daily functioning. The aim of this article is to review case studies and treatment guidelines to both improve life care planners' knowledge of this set of disorders and better understand typically related treatment guidelines. This article will review the diagnoses of vestibular disorders, etiology, symptoms, and typical treatment guidelines along with three case studies demonstrating the implications for life care planning.

Life Care Planning for Vestibular Disorders

Vestibular disorders describe symptoms of varying diseases of differing etiologies (Strupp et. al., 2020). Individuals with vestibular disorders report symptoms of vertigo, dizziness, visual disturbance and/or imbalance (Farrell, 2015). These symptoms can significantly impact an individual's cognition, emotional state and daily functioning.

Merriam-Webster defines "vestibular" as relating to or affecting the perception of body position and movement. Life care planners often work with evaluatees who have been diagnosed with a vestibular disorder following injuries such as whiplash and mild traumatic brain injury (Kolev, 2016). The diagnoses that a life care planner is most likely to come across in a medical review that may indicate vestibular symptoms include: Benign Paroxysmal Positional Vertigo (BPPV); Vestibular Hypofunction; otolithic deficits, vertigo and photophobia; mild traumatic brain injury or concussion; post-traumatic brain injury syndrome; post-traumatic headaches; balance system deficit from the inner ear; inner ear vestibular pathology; vestibular migraines; vestibular hypofunction; persistent postural-perceptual dizziness (PPPD); and multiple sclerosis (MS). Some of the causes of vestibular disorders may include medications, infections, inner ear problems, calcium debris in the ear canals, whiplash injury, and traumatic brain injuries (Vestibular Disorders Association [VEDA], 2021; Kolev & Sergeeva, 2016).

Individuals with vestibular disorders typically complain of dizziness. Dizziness is a subjective and often vague symptom and understanding the type of sensation being experienced can be helpful in understanding its impact on daily activities. Dizziness can be described in terms of

- vertigo, a strong sense of motion or spinning;
- disequilibrium, feeling off-balance, unsteady, or wobbly;
- light-headedness, feeling woozy or disconnected from the environment;
- oscillopsia (vestibulovisual), the illusion that the world is jiggling whenever the individual moves; or
- presyncope, a feeling of losing consciousness or feeling about to faint (Post & Dickerson, 2010; Military Health System, 2020).

Other symptoms of vestibular disorders include balance issues, blurred vision, falls, confusion or disorientation, headaches, nausea, vomiting, diarrhea, and anxiety or fear of movement. These symptoms typically impact one's ability to engage in daily life tasks in activities at home, at work, and in the

community. Individuals may avoid leaving the house and restrict participation in community activities (such as shopping, socializing, attending worship, playing sports, and/or working). Changes in head orientation, rapid changes in visual movement, bright lights, and/or loud noises can trigger symptoms.

Individuals with vestibular disorders are often at risk of falling, and this may increase their fear of movement (Agrawal et al., 2009). These individuals will generally benefit from environmental modifications such as proper lighting, grab bars, clear pathways, modifying living environments to minimize reaching overhead or bending, using equipment such as a reacher to retrieve objects, using laundry baskets on wheels, or adaptation of activities.

Benign Paroxysmal Positional Vertigo (BPPV)

Benign Paroxysmal Positional Vertigo (BPPV) is the most commonly occurring vestibular disorder and is diagnosed by a trained healthcare provider (typically a physician, physiotherapist, or audiologist) using the Dix-Hallpike maneuver (Dunlap, Holmberg & Whitney, 2019). Individuals with BPPV experience brief periods of mild to intense vertigo triggered by head movement, nausea, and vomiting. There is no known cause, but it can be associated with a blow to the head or damage to the inner ear (Strupp et al., 2020). For billing purposes, the Dix-Hallpike maneuver is typically billed using CPT code 92542. This code is bundled within 92540, but when performed in isolation, it is billed with the modifier 59.

Treatments include Canalith Repositioning Treatment (CRT), the Modified Epley Maneuver, or the Semont (Liberatory) maneuver and can be performed by a vestibular trained physiotherapist (Dunlap, Holmberg & Whitney, 2019). For billing purposes, these maneuvers are typically billed with CPT code 95992, with a modifier of 59 if billed with other codes.

Peripheral Vestibular Hypofunction

Peripheral vestibular hypofunction, a condition where the balance of the inner ear is not working properly either bilaterally or unilaterally, is usually caused by inner ear issues, most commonly due to toxicity to the ear, meningitis, labyrinthitis, progressive disorders, congenital loss, or neurofibromatosis. It can also be due to head trauma, or as a side effect of medication prescribed after head trauma (Kolev & Sergeeva, 2016).

In most cases however, etiology cannot be identified. Typically, vestibular hypofunction results in difficulty in maintaining balance, oscillopsia, disequilibrium, and becoming physically deconditioned due to inactivity (Vestibular Disorders Association [VEDA], 2021).

The American Physical Therapy Association published clinical practice guidelines for vestibular rehabilitation for patients with peripheral vestibular hypofunction in 2016. These are the first clinical practice guidelines for this population.

Vestibular rehabilitation can improve subjective symptom report, perceived handicap, gait performance, balance, and activities of daily living for persons with peripheral vestibular disorders (Dunlap, Holmberg & Whitney, 2019). As a general guide, The American Physiotherapy Association recommends supervised vestibular rehabilitation sessions ranging from once a week for two to three weeks for acute to subacute unilateral vestibular hypofunction; once a week for four to six weeks for individuals with chronic unilateral vestibular hypofunction; and weekly sessions for eight to twelve weeks for individuals with bilateral vestibular hypofunction (Hall et al., 2016). For billing purposes, the CPT code associated with a basic vestibular evaluation is 92540, which is a bundled code consisting of four procedures: 92541, 92542, 92544 and 92545. If all four procedures are not performed, then a modifier 59 would be applied.

In addition to supervised sessions, patients are prescribed a daily home exercise program. Education is provided to the patient to help them understand the program goals and how to progress their program independently (Hall et al., 2016). Targeted exercise in treatment may include gaze stabilization exercises to improve vestibulo-ocular reflex (VOR) gain, habituation to improve sensitivity to body movements, or optokinetic exercises to improve visual motion sensitivity (Dunlap, Holmberg & Whitney, 2019). For billing purposes, the CPT codes associated with vestibular rehabilitation include: 97110 for therapeutic exercise and/or 97112 for neuromuscular re-education of movement. These codes are timed codes of 15-minute intervals.

Concussion/Mild Traumatic Brain Injury (MTBI)

Head trauma can cause the brain to communicate abnormal signaling about position and movement of the head in space, resulting in abnormal vestibular functioning. Inaccurate vestibular information results in visual-vestibular issues that coincide with concussion symptoms, as there can be damage to the areas of the brain that are involved in visual and vestibular function (Wallace & Lifshitz, 2016). Vestibular dysfunction after labyrinthine concussion (damage to the inner ear caused by head trauma causing microscopic hemorrhages in the labyrinth) is often manifested by vertigo, nausea and/or vomiting (Kolev & Sorgeeva, 2016). Individuals who have sustained head trauma or TBI may also experience balance-related symptoms; such as, dizziness, unsteadiness, or imbalance (Row et al., 2019).

Vestibular symptoms for concussions are often assessed using the Vestibular Ocular Motor Screening (VOMS) assessment, as the VOMS tool was developed to screen vestibular and/or ocular disorders in individuals, post-concussion (Dunlap, Holmberg & Whitney, 2019).

Treatments can include the use of coloured lenses to relieve photophobia, prism lenses to relieve double vision, vestibular rehabilitation, and gaze stabilization. In order to have one's eyes fixed on a particular target during head movement, we rely on the vestibular ocular reflex (VOR). The VOR ensures gaze stability with head movement. Gaze stabilization exercises are prescribed in an attempt to adapt the VOR and reduce visual blurring with head movement. Vestibular rehabilitation can include balance and ocular exercises. Ocular exercises can be done with checkered walls, Magic Eye 3-D pictures, walking in crowded areas or on patterned carpets, viewing optokinetic videos, or balance training. Often a 20-minute brisk-walking program, preferably outdoors and including uneven terrain, is generally recommended as part of the vestibular rehabilitation program for those with vestibular dysfunction in order to improve conditioning and provide realistic balance challenges to the central nervous system (Wallace & Lifshitz, 2016).

Persistent Postural-Perceptual Dizziness (PPPD)

Persistent Postural-Perceptual Dizziness (PPPD) is a chronic vestibular disorder characterized by symptoms of dizziness, unsteadiness, or non-spinning vertigo that last for over three months with unknown etiology, but are worsened by upright posture, active or passive motion, and exposure to moving visual stimuli or complex visual patterns (Staab et al., 2017).

Treatment for PPPD may involve education on nutrition, medication, vestibular rehabilitation, and psychotherapy (Bittar & Lins, 2015). Vestibular rehabilitation that may be beneficial includes education, threat reduction, integrated relaxation/mindfulness practice, graded habituation, balance retraining, and visual/optokinetic motion desensitization (Dunlap, Holmberg, & Whitney, 2019). Psychotherapy was not indicated for longstanding PPPD; however, cognitive behavioral therapy (CBT) was shown to be effective

within eight weeks after initial onset (Vestibular Disorders Association, 2021).

Vestibular Migraines

Vestibular migraines, considered the most common cause of vertigo, are characterized by spontaneous rotational or positional vertigo and balance problems that precede or occur during or after a migraine headache and may be accompanied by sensitivity to light, intolerance to noise or smell, and tinnitus (Dieterich, Obermann & Celebisoy, 2016).

There is no evidence yet to support any specific treatment for vestibular migraines (Strupp et al., 2020). However, studies show that patients who were treated with lifestyle adjustments and migraine prophylaxis medication outperformed those treated with vestibular rehabilitation; although, vestibular rehabilitation is also a consideration in conjunction with lifestyle adjustments and medication (Dunlap, Holmberg & Whitney, 2019).

Multiple Sclerosis (MS)

For about 20% of people with MS, the vestibular system is affected, causing symptoms like dizziness, the sensation of spinning, and feeling off-balance. There are limited studies on vestibular rehabilitation for use with MS; however, one study by Hebert et al. suggests that vestibular rehabilitation may improve balance, dizziness, fatigue, and health-related quality of life in ambulatory individuals with MS (Hebert et al., 2018).

The Role of the Life Care Planner in Vestibular Disorders

The standard methodology for life care planning involves conducting a medical review, interviewing the evaluatee, performing an assessment within the life care planner's scope of practice and seeking relevant professional consultations to form the medical foundation for the recommendations within the life care plan. The medical review will provide information on the evaluatee's functional difficulties, gratuitous or paid assistance provided, potential safety concerns, whether the typical course of rehabilitation has been received, and the response to treatments to date. Conducting a formal vestibular evaluation is not typically within the scope of practice of the majority of life care planners; therefore, it is important to rely on the appropriate medical diagnoses and prognosis provided to establish the medical foundation. If specific recommendations to address vestibular impairment(s) are not made within the medical information reviewed, it is recommended that consultation is attempted with the treating vestibular rehabilitation provider(s) or relevant physicians. If vestibular evaluation and rehabilitation is within the scope of practice of the life care planner, then the life care planner would be able to make recommendations for future vestibular treatments, aids and supports following their evaluation in accordance with their professional standards of practice.

Review of Case Studies

Case Study One

This evaluatee was a 40-year-old female who was involved in a motor vehicle accident (MVA) five years prior and had sustained a mild traumatic brain injury and soft tissue injuries. She complained of daily headaches or migraines (weekly to monthly), dizziness (vertigo) and nausea from brisk head movement or bending down, and deficits in concentration, memory, and word recall. Otolaryngology reports ruled out BPPV and she was diagnosed with an otolithic deficit. Prognosis was guarded with a high likelihood that

she would need ongoing support for activities of daily living and a low likelihood that she would return to work.

Social/Environmental/Vocational Situation

Prior to the injury, the evaluatee was living in a rented two-story 2200 square foot, three-bedroom home with her two children, and working part-time as a server. She was the primary caregiver at home, and primarily responsible for all housekeeping, childcare, and meal preparation. She socialized with friends regularly and had a “tight-knit” social group.

At the time of the assessment, she was living in the same rented two-story home with her boyfriend and her two children, ages 10 and 16. Her boyfriend and children were helping out with the housekeeping, meal preparation, and grocery shopping. She had attempted a gradual return to work but was unsuccessful.

Activities of Daily Living

The evaluatee reported only being able to walk short distances when dizzy. Head position changes, particularly when transferring from lying to standing, triggered a sensation of vertigo. Head position changes in the shower triggered dizziness, and she relied on a shower bench, a handheld showerhead, and grab bars for modified independence.

Looking down to cook and prepare meals triggered symptoms of vertigo and nausea and she relied on her boyfriend for daily assistance with meal preparation. She also relied on her boyfriend for grocery shopping, as crowded, busy, or open spaces triggered her vertigo and nausea.

Housekeeping tasks that required looking down or bending over, such as vacuuming or washing floors, cleaning tubs and toilets, and unloading the bottom shelf of the dishwasher triggered vertigo. Migraines also impeded participation in housekeeping tasks.

Responsibility for childcare was shared with her live-in boyfriend, but she avoided driving her children to school and extracurricular activities due to migraines and vertigo symptoms.

The evaluatee was instructed by her family physician to drive only on asymptomatic days and only for short distances, with no driving on days with vertigo symptoms. She was medically restricted from working due to her vestibular symptoms.

She reported socializing less due to her low mood and vestibular symptoms; not wanting to be a burden, she no longer saw her friends and would just talk to them on the phone from time to time.

Implications for Life Care Planning

- The Otolaryngologist recommended “vigorous” vestibular physiotherapy, a neuro-ophthalmology evaluation to determine the need for vision therapy, and that she avoid any activity that put her at risk for falls.
- Neurology evaluation was indicated by the physiatrist for management of migraine symptoms.
- The life care planner recommended psychological assessment and counseling; housekeeping assistance, weekly; a taxi account to attend medical appointments and taking children to and from school; aids for independent function (shower bench, reacher, and cane) replaced every three to four years; and grab bar replacement with every future move.

Case Study Two

This 29-year-old male evaluatee was involved in an MVA about two years prior to the care assessment

and diagnosed with concussion, post-concussion syndrome, vestibular migraines, and soft tissue injuries. He complained of daily headaches and weekly migraines, vertigo, and nausea caused by moving his head quickly, screen time (working on computer, scrolling on phone, or fast paced movies), bright lights, and busy environments. If his migraines and vertigo were too intense, he would vomit. He had many visits to the emergency department due to the intense pain from his migraines. He also complained of lower back pain impacted by sitting and lifting and carrying; shoulder pain impacted by lifting and reaching up; neck pain impacted by looking down; and severe symptoms of depression and anxiety. Prognosis indicated that if he responded well to treatment with recommended medications, migraines and vestibular symptoms would resolve, but neck and back pain would likely be ongoing.

Social/Environmental/Vocational Situation

Prior to the injury, he was living with his wife in a rented two-bedroom 700 square foot apartment and was responsible for 20–30% of housework, and 100% of indoor home maintenance (such as minor repairs or changing lightbulbs). He was working full-time as an accountant. He participated in outdoor sports, such as jogging and soccer, and socialized with friends.

At the time of the assessment, this evaluatee was living with his wife and child (age 2) in the same two-bedroom apartment. He and his wife were expecting a second child. He worked as an accountant part-time and was doing a gradual return to work with modified duties but had not managed to increase back to full-time.

Activities of Daily Living

The evaluatee was medically restricted from working full-time with full duties. He was working five days a week for five hours a day. His family physician recommended that he could increase to six hours a day within the month. He has a limited sitting tolerance of between 30 to 40 minutes and needed to take microbreaks throughout his day to manage his pain. He was also provided an ergonomic workstation by his workplace and would alternate from sitting to standing throughout his day.

The evaluatee did not participate in housework duties due to fatigue and migraines. Housekeeping tasks that required looking down, such as washing dishes, vacuuming and mopping, and cleaning the washrooms triggered neck pain and dizziness. His wife had taken over responsibility for all housework and meal planning.

He no longer participated in any indoor home maintenance due to fatigue and migraines. Indoor home maintenance responsibilities were taken over by his wife, or his brother would come by to help.

He experienced pain and fatigue when caring for his child but reported doing it despite the pain. He reported limiting the frequency and duration he would take his child on outings due to fear of symptom exacerbation when he was away from home. He has difficulty falling asleep and staying asleep due to pain symptoms. He reported a reduced frequency in socializing with friends and family due to mood and pain.

Medical and Rehabilitation Program

At the time of the assessment, the evaluatee was engaging in a rehabilitation program consisting of weekly physiotherapy, chiropractor, kinesiology and massage therapy, and counselling every two weeks. He had also received occupational therapy for case management, education on pain management strategies, and ergonomic assessment. For workplace equipment, he has a sit-to-stand desk, ergonomic chair, and footrest.

He was also attending neurology appointments every three months. He was receiving BOTOX injections

for migraines every three months, and Emgality (120ml self-injectable) monthly.

Implications for Life Care Planning

- The neurologist recommended ongoing BOTOX every three months and Emgality (120ml monthly) to manage migraines.
- The physiatrist recommended ongoing chiropractic care, physiotherapy and massage therapy to manage neck and back pain.
- The psychiatrist recommended psychology for CBT and a trial of nortriptyline.
- The life care planner recommended home support services, housekeeping and handyman services, to prevent the evaluatee from regularly triggering his vestibular symptoms while restoring household roles.

Case Study Three

Case study three is a 34-year-old woman who was involved in an MVA three years prior to the care assessment. She was diagnosed with a mild traumatic brain injury (mTBI), post-concussion symptom disorder, soft-tissue injuries, post-traumatic stress disorder (PTSD), and depression. She complained of symptoms of vertigo, disequilibrium, and lightheadedness; nausea, vomiting, and nosebleeds that accompanied the vomiting (one to five times weekly); difficulty with memory, concentration, and attention; and fatigue and pain related to soft tissue injuries. During balance testing, she was observed to lose her balance and fall over spontaneously; thus, safety was a concern. Prognosis for mTBI was guarded. Prognosis for PTSD indicated possibility for improvement; however, may worsen if a future MVA occurred. Prognosis for depression indicated that symptoms may improve with treatment.

Social/Vocational/Environmental Situation

Prior to the MVA, the evaluatee lived alone in an owned, 400 square foot studio apartment. She worked full-time at an architectural firm as a project manager (40–60 hours a week). Prior to the injury, she was responsible for all housekeeping, meal preparation, grocery shopping, laundry, and indoor home maintenance. She had an active lifestyle and enjoyed hiking, travelling, and socializing with friends.

At the time of the assessment, the evaluatee was living in an owned, 600 square foot one-bedroom apartment and working from home in her previous full-time job. She was relying on friends for support with some housekeeping. In order to manage her workload, she spread her eight-hour workday over a 14 hour day, seven days a week, with breaks for naps, walks, and rehabilitation appointments. She was receiving assistance with meal preparation and housekeeping for four hours weekly, and ordering her groceries online.

Activities of Daily Living

The evaluatee was limited with walking and standing, especially after symptoms of vertigo were triggered. She was limited to a sitting tolerance of about 30 minutes at a time.

She was restricted with work due to cognitive issues (memory, concentration, attention), headaches, fatigue, and vestibular symptoms. She reported making errors and using adaptive strategies to manage her limitations (using technology and taking notes).

Her ability to drive was reduced to driving no more than 10 to 20 minutes at a time due to vestibular and pain symptoms which restricted her ability to travel (driving on road trips).

She was limited with housekeeping, meal preparation, grocery shopping, and home maintenance. She

reported forgetting to turn off household appliances used for cooking, ironing, etc. She demonstrated the ability to do simple household tasks such as heat up a prepared meal, wipe counters and put away groceries. She required weekly assistance for meal preparation, housekeeping and used an online grocery service.

She no longer hiked and reduced her participation in travel and socializing due to mood, vestibular and pain symptoms.

Implications for Life Care Planning

- The physiatrist recommended ongoing therapies including physiotherapy, chiropractor, massage therapy, and active rehabilitation programming with a kinesiologist to work on strength and endurance for pain symptoms, and balance exercises to manage poor balance issues.
- The neurologist recommended continuing vestibular rehabilitation for one more year.
- The life care planner recommended housekeeping and meal preparation weekly for one year then to be reduced by 25% after a course of OT; occupational therapy for education on pain management, cognitive adaptive strategies, cognitive remediation, and assistance with obtaining ergonomic equipment; and an ergonomic workstation, including a sit to stand desk, ergonomic chair, blue light filter for her screen, and footrest was recommended.

Conclusion

Vestibular disorders are commonly diagnosed after injuries affecting the neck and head. Treatment and management of vestibular disorders is typically a multidisciplinary effort that involves a combination of medical services, medications, therapies, aids for independent living, ergonomic equipment, and home support services for optimal functional outcomes. This article can assist life care planners, without direct clinical experience working with individuals with vestibular disorders, to understand the basics of the diagnoses, treatment, and functional impairments that often arise in the context of vestibular disorders as well as relevant implications for life care planning.

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References

- Agrawal, Y., Carey, J. P., Della Santina, C. C., Schubert, M. C., & Minor, L. B. (2009). Disorders of balance and vestibular function in US adults: data from the national health and nutrition examination survey, 2001-2004. *Archives of Internal Medicine*, 169(10), 938. <https://doi.org/10.1001/archinternmed.2009.66>
- Agrawal, Y., Ward, B. K., & Minor, L. B. (2013). Vestibular dysfunction: prevalence, impact and need for targeted treatment. *Journal of vestibular research: equilibrium & orientation*, 23(3), 113–117. <https://doi.org/10.3233/VES-130498>
- American Medical Association (AMA). (2020). AMA CPT Professional Edition 2021 Standard Edition. AMA.
- United States. (2019). American time use survey. *Washington, DC: U.S. Bureau of Labor Statistics*.
- Bittar, R. S. M., & Lins, E. M. D. (2015). Clinical characteristics of patients with persistent postural-perceptual dizziness. *Brazilian Journal of Otorhinolaryngology*, 81(3), 276-282. <https://dx.doi.org/10.1016/j.bjorl.2014.08.012>
- Brukes, E., Manchaiah, V., Allen P., Baguley, D., & Andersson G. (2019). Internet-Based Interventions for adults with hearing loss, tinnitus, and vestibular disorders: a systemic review and meta-analysis. *Trends in Hearing*, 23: 1-22. <http://doi.org/10.1177/2331216519851749>
- Burzynski, J., Sulway, S., & Rutka, J. A. Vestibular rehabilitation: review of indications, treatments, advances, and limitations. *Current Otorhinolaryngol Reports* 5, 160–166 (2017). <https://doi.org/10.1007/s40136-017-0157-1>
- Cohen, H. (2019). A review on screening tests for vestibular disorders. *Journal of Neurophysiology*, 122: 81-92. DOI: <https://doi.org/10.1152/jn.00819.2018>
- Dieterich, M., Obermann, M., & Celebisoy, N. (2016). Vestibular migraine: the most frequent entity of episodic vertigo. *Journal of Neurology*, 263 Suppl 1, S82–S89. <https://doi.org/10.1007/s00415-015-7905-2>
- Dunlap, P. M., Holmberg, J. M., & Whitney, S. L. (2019). Vestibular rehabilitation: advances in peripheral and central vestibular disorders. *Current Opinion in Neurology*, 32(1):137–144. <https://doi.org/10.1097/WCO.0000000000000632>
- Farrell, L. (2015). Vestibular rehabilitation therapy (VRT condensed). Vestibular Disorders Association. www.vestibular.org
- Gronksi, M., & Neville, M. (2017) Vestibular impairment, vestibular rehabilitation, and occupational performance. *The American Journal of Occupational Therapy*, 71, 1–3. <https://doi.org/10.5014/ajot.2017.716S09>
- Hall, C. D., Herdman, S. J., Whitney, S. L., Cass, S. P., Clendaniel, R. A., Fife, T. D., Furman, J. M., Getchuis, T. S. D., Goebel, J. A., Shepard, N. T., & Woodhouse, S. N. (2016). Vestibular rehabilitation for peripheral vestibular hypofunction: An evidence-based clinical practice guideline: from the American physical therapy association of neurology section. *Journal of Neurologic Physical Therapy: JNPT*, 40(2), 124–155. <https://doi.org/10.1097/NPT.0000000000000120>
- Hebert, J. R., Corboy, J. R., Vollmer, T., Forster, J. E., & Schenkman, M. (2018). Efficacy of balance and eye-movement exercises for persons with multiple sclerosis (BEEMS). *Neurology*, 90,e797–e807. <https://doi.org/10.1212/WNL.00000000000005013>
- Kolev, O. I., & Sergeeva, M. (2016). Vestibular disorders following different types of head and neck trauma. *Functional Neurology*, 31(2), 75–80. <https://doi.org/10.11138/fneur/2016.31.2.075>
- Merriam Webster Dictionary (March 4, 2021). Vestibular. Retrieved from: <https://www.merriam-webster.com/dictionary/vestibular>

- Military Health System. (2020). Coding guidance for diagnosing the vestibular disorders in the MHS: recommendations from the department of defence hearing centre of excellence. <https://Hearing.health.mil>
- Needleman, A. (2017). Billing and coding the vestibular evaluation. *Audiology Today*, 29(6), 47-49.
- Post, R.E., & Dickerson, L.M. (2010). Dizziness: a diagnostic approach. *American Family Physician*, 15;82(4):361-8, 369. <https://doi.org/10.1212/WNL.00000000000005013>
- Row, J., Chan, L., Damiano, D., Shenouda, C., Collins, J., & Zampieri, C. (2019). Balance assessment in traumatic brain injury: a comparison of the sensory organization and limits of stability tests. *Journal of Neurotrauma*, 36(16), 2435–2442. <https://doi.org/10.1089/neu.2018.5755>
- Smółka, W., Smółka, K., Markowski, J., Pilch, J., Piotrowska-Seweryn, A., & Zwierzchowska, A. (2020). The efficacy of vestibular rehabilitation in patients with chronic unilateral vestibular dysfunction. *International Journal of Occupational Medicine Environmental Health*, 33(3), 273-282. <https://doi.org/10.13075/ijomeh.1896.01330>
- Staab, Jeffrey P., Eckhardt-Henn, A., Horii, A., Jacob, R., Strupp, M., Brandt, T., & Bronstein, A., (2017). Diagnostic criteria for persistent postural-perceptual dizziness (PPPD): consensus document of the committee for the classification of vestibular disorders of the Bárány Society. *Journal of Vestibular Research*, 27(4), 191–208. <https://doi.org/10.3233/VES-170622>
- Strupp M., Długaiczek, J., Ertl-Wagner, B. B., Rujescu, D., Westhofen, M., & Dieterich, M. (2020). Vestibular disorders: diagnosis, new classification and treatment. *Deutsches Ärzteblatt International*, 117, 300–10. <https://doi.org/10.3238/arztebl.2020.0300>
- Vestibular Disorders Association (VEDA) (2021, February 19). <https://vestibular.org/>
- Wallace, B., & Lifshitz, J. (2016). Traumatic brain injury and vestibulo-ocular function: current challenges and future prospects. *Eye and Brain*, 8, 153–164. <https://doi.org/10.2147/EB.S82670>
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