Practice guidance

Vestibular Rehabilitation

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General foreword

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Contents

Shared Decision-Making

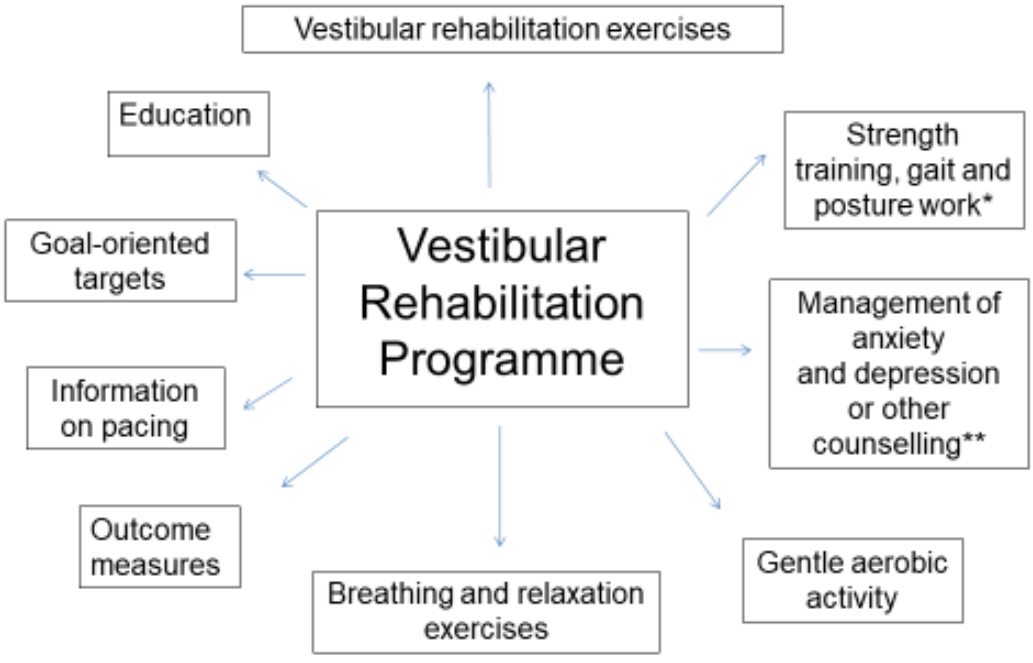
It is implied throughout this document that the service user should be involved in shared decision-making when undertaking audiological intervention, receiving subsequent information and understanding how it will impact on the personalisation of care. Individual preferences should be taken into account and the role of the clinician is to enable a person to make a meaningful and informed choice. Audiological interventions bring a variety of information for both the clinician and the patient which can be used for counselling and decision-making regarding technology and anticipated outcomes.

1. Overview

The purpose of this document is to give an overview of the field of vestibular rehabilitation (VR) for peripheral or central vestibular disorders, and to signpost people working with dizziness and imbalance to evidence and useful resources. It is not meant as a 'how to guide' or protocol, as rehabilitation should be clinically reasoned and individualised. This document will not cover Benign Paroxysmal Positional Vertigo (BPPV). Although this is a key pathology treated under the remit of VR (with particle repositioning manoeuvres), this is covered in detail in the BSA Recommended Procedure for Positioning Tests (2016).

2. What is Vestibular Rehabilitation (VR)?

VR is a programme of rehabilitation which includes the administration of a set of graduated and customised exercises. It may also, where appropriate, include additional components such as education, breathing and relaxation exercises, counselling and gentle aerobic activity (see treatment principles section).



* May require physiotherapy referral
**May require psychology/psychiatry referral

The graded exercise-based approach component of VR is designed to promote central nervous system compensation (via neuroplasticity) to symptoms in a wide range of vestibular conditions. The process occurs via a variety of mechanisms, including adaptation, habituation and substitution (McDonnell and Hillier, 2015). Other factors should also be addressed to optimise rehabilitation, such as management of anxiety and avoidance behaviours (which may require onward referral), with pacing (more details of which are given in section 9) being a key principle.

VR exercises must challenge balance mechanisms holistically and target motor, sensory (vision/vestibular/somatosensory) and cognitive aspects (Shumway-Cook and Woollacott, 2007). It must be goal orientated and context specific (Levack et al, 2006).

3. Aims of VR

The ultimate aim of VR is to (within the context of their diagnosis) help patients to become as fully functional within all aspects of their lives (home, work and leisure) as possible. This aim will include factors such as helping to reduce symptoms of dizziness, enhancing gaze stability, improving balance and gait, improving quality of life, confidence and independence, and reducing falls risk.

Clinicians should also help patients to gain an understanding of triggers, pacing and lifestyle factors that may increase their symptoms, and help patients to make necessary changes in order to manage their condition, potentially long-term.

Goal setting should be individualised, taking into account the diagnosed pathology, co-morbidities that may affect balance and other factors that may impede compensation.

4. Evidence to support VR

There is high-level evidence in a Cochrane review that VR is beneficial for treating dizziness caused by a unilateral vestibular problem (McDonnell and Hillier, 2015). VR is safe, effective and is relatively inexpensive in the treatment of unilateral vestibular dysfunction (McDonnell and Hillier, 2015).

Additionally, a recent synthesis of existing research was undertaken by Hall et al (2016). This multidisciplinary group found strong evidence for the use of VR in the management of unilateral and bilateral vestibular hypofunction and moderate evidence to prescribe exercises to target specific impairments and functional limitations.

It is worth noting that the current research evidence for VR is based on peripheral vestibular hypofunction which is largely involving the semicircular canals. The effect of otolith organ involvement (both with and

without semicircular canal hypofunction) on the symptoms, clinical signs and recovery has not been studied in depth.

5. Who can give VR?

The provision of a safe and effective vestibular rehabilitation programme is a highly skilled role and often relies on an effective team approach in order to address physical, psychological and pharmacological aspects of the conditions (Cohen, 1992).

Vestibular rehabilitation must only be given by appropriately trained health care professionals who may include physiotherapists, clinical scientists, audiologists, hearing therapists, primary care physicians and nurses. Other professionals involved in the team approach to care may include psychologists and those involved in management of falls. Occupational therapists can also be involved and provide advice and therapeutic support for fatigue management, complete home assessments for equipment provision and work within vocational rehabilitation services to help patients remain in work.

It is important that clinicians work within their individual scope of knowledge and skills, seek advice when needed and delegate appropriately to other clinicians.

All clinicians should be registered with their appropriate professional body. As well as requiring clinicians to work within their skill set, these professional bodies require clinicians to maintain and develop knowledge and keep up to date on the latest evidence-based practice. Maintaining and developing new skills can be achieved through effective training, supervision and self-directed learning.

6. Who should receive VR?

VR is beneficial for anyone with a stable peripheral and/or central vestibular problem or anyone with multifactorial causes of dizziness and imbalance, who report repeatable movement-induced or visually-induced symptoms of dizziness or imbalance (Herdman, 2013; McDonnell and Hillier, 2015; Dunlap et al, 2019).

Below is a list of the common diagnoses that will benefit from VR; however it is not an exhaustive list:

- Vestibular neuritis and labyrinthitis
- Ménière's disease (quiescent phase)
- Bilateral vestibular hypofunction
- Vestibular schwannoma
- Vestibular migraine (usually once the migraine headache is controlled)
- Post concussive syndrome
- Traumatic brain injury
- Stroke

- Multiple sclerosis
- Persistent postural perceptual dizziness (PPPD)

VR is most effective when the vestibular condition is stable (i.e. not fluctuating or progressive), whether the diagnosis has a peripheral or central cause. Some patients with a stable central vestibular disorder may improve to a similar extent to those with a peripheral vestibular disorder, but rehabilitation progress may be slower (Brown et al, 2006; Furman & Whitney, 2000).

Rehabilitation outcome will depend on:

- If central structures are affected (Brown et al, 2006; Furman & Whitney, 2000)
- Migraines (Hall et al, 2016)
- Use of vestibular suppressants (Hall et al, 2016)
- Cognition (Hall et al, 2016)
- Supervision and adherence to programme (Hall et al, 2016; Pavlou et al, 2013)
- Anxiety and depression (Herdman, 2013)
- Sleep (Kim et al, 2018)

It is not dependent on:

- Age (Herdman, 2013; Hall et al, 2016; Pavlou et al, 2013)
- Symptom duration (Herdman, 2013; Hall et al, 2016; Pavlou et al, 2013)

7. Assessment

Rehabilitation should be customised to the individual, and thus is not purely dependent on the diagnosis. Therefore, obtaining a detailed history of the patient's symptoms and how they impact on their daily life activities is necessary. It is also important to ask what activities or movements the patients are unable to do, are avoiding or doing differently than before.

Considering the stability of the condition, for example in Ménière's or migraine, will also be important to guide the timing and intensity of treatment.

Along with the history, a range of audiovestibular testing procedures, a thorough oculomotor assessment and bedside tests may have been performed prior to referral. These help with the diagnosis and clinicians should clinically reason which they use to assess the system holistically. More details for VNG, caloric and VEMPs can be found in other BSA procedures online (http://www.thebsa.org.uk/practice/).

Where appropriate, assessment should explore all aspects of the postural control system (motor, sensory, cognitive) and should, (where possible) include testing of muscle strength, sensation, range of joint

motion, coordination and tone. Observation of posture and gait, and assessment of neck range of motion is also suggested.

However, it is acknowledged that this full range of tests is not within the skill set of some clinicians who provide VR. It is important, therefore, for such clinicians to recognise abnormalities in posture, gait, joint range of motion and general physical conditioning, and then request input from a physiotherapist or other suitable clinician as needed.

The assessment process should be underpinned by an understanding of normal balance and the gait cycle as the main vestibular system outputs.

8. Outcome measures

A vast array of validated, sensitive outcome measures are available for use in VR and balance disorders to support this thorough assessment, to monitor patient progress, and for use in clinical audit. These measures assess subjective symptoms, impairment, functional and cognitive difficulties. It is up to the individual clinician to choose measures that he/she feels most appropriate to the patient's needs within the clinical setting, and to fulfil departmental audit criteria. Clinicians are pointed in the direction of a recent review of outcome measures for vestibular disorders (Stewart et al, 2017) and the resources available at http://www.neuropt.org/professional-resources/neurology-section-outcome-measures-recommendations/vestibular-disorders

In cases where an otherwise compliant patient, who is undergoing vestibular rehabilitation, does not show the expected improvement in their symptoms, or where there is an unexpected change/deterioration in reported symptoms during the course of rehabilitation, reassessment should be considered to investigate the possible presence of an alternative diagnosis. Any such reassessment should include consideration of non-vestibular causes of dizziness and, as such, a medical opinion might be beneficial.

9. Treatment principles

Education of the patient is vital and clinicians delivering VR must provide education on:

- Diagnosis and how this caused the patient's symptoms
- How a VR package will help their symptoms and an indication of the expected time course of improvement or recovery
- How to perform the exercises (including level, duration, and frequency of each exercise)
- The importance of exposure versus avoidance
- Pacing (ensuring consistent activity levels each day that are gradually increased over time)

Identifying anxiety, hypervigilance, avoidance behaviours and depression is important and appropriate onward signposting or referrals to medical, psychological or mental health service must be considered.

Clinicians can provide advice on relaxation, breathing control and gentle activity to complement exercise-based rehabilitation.

10. Treatment approaches

Different exercise approaches have been proposed and adopted in the field of VR: habituation, substitution, adaptation and balance and gait. The understanding of the mechanisms underpinning these treatment approaches is not completely understood.

VR was first reported in the 1940s with the oldest format being Cawthorne-Cooksey exercises (Cawthorne 1944; Cooksey 1946). These were originally developed for use in a group setting for patients with unilateral vestibular disorders and post-concussion. They comprised a series of eye, head and body movements, completed with eyes open and then closed and were based on a habituation philosophy.

10.1 Habituation exercises

These exercises are used to desensitise a person to symptoms of dizziness through either self or environment motion (Shepherd & Telian, 1995). Individual triggers should be identified and the patient supported to increase their exposure in a gradual manner over time. Patients should be encouraged not to over- or under-trigger for maximum benefit, with a fairly quick recovery to return to the baseline symptom level. Over time the threshold at which the symptoms are triggered becomes higher and the patient can function with greater ease.

10.2 Substitution exercises

These exercises are designed to use alternative strategies to maintain gaze stability in the absence of normal vestibular function. Many use cervical somatosensory cues and are important in bilateral vestibular hypofunction. As these connections with vision are slower, these exercises should be seen as a second-best option when vestibular function remains for vestibulo-ocular reflex (VOR).

Additionally, substitution by other eye movements for a deficient VOR through saccade modification (see under adaptation exercises) and enhancing the smooth pursuit mechanisms are also important (Han et al,

2011). This approach is especially important in bilateral vestibular hypofunction whereby the capacity of the VOR system to adapt may be lower, and a dual approach including adaptation and substitution is recommended.

10.3 Adaptation exercises

These exercises work to readjust and improve gaze stability through the central nervous system's ability to adapt and compensate (Han et al, 2011). The main current hypothesis to explain this approach is using a retinal slip that induces an error signal and leads to central correction.

However, recent evidence suggests pre-programmed saccades are also involved. Both these mechanisms can lead to an improvement in gaze stability (MacDougall & Curthoys, 2012). It is important that head movement should be included for rehabilitation of unilateral and bilateral vestibular hypofunction, and using saccades alone is not recommended (Hall et al, 2016).

10.4 Balance and falls

Balance relies on the ability to use the three sensory inputs, namely vision, somatosensation and vestibular, in order to remain stable and orientated against gravity to complete everyday activities automatically (Woollacott et al, 1986). Within different conditions, certain sensory cues are more reliable to use for orientation than others (Peterka & Loughlin, 2004). As such, it is important to have flexibility for which sensory cues are used. Treatment should aim to redress any sensory dependency by nurturing, through exposure, the use of natural equilibrium, hip and saving responses.

Following functional gait assessment, physical impairments and abnormalities in gait technique may be noted, for example sensory dependency, strength and challenges in dual tasking. Principles of the assessment can then form part of the treatment plan. It is recognised that detailed assessment may be outside clinicians' training, therefore it may be necessary to request physiotherapy input to assist.

It is also important to ask about falls history and ensure any onward referrals are made to social services for home assessment or care, and to falls prevention services or exercise groups. These typically require a GP referral, but allied health professionals can make referrals and as such it is important to have an awareness of your local services.

11. Formulating a treatment plan

There is little robust evidence on dose and duration of exercises, and this must be customised to the individual based on the assessment findings. Suggestions are given in Hall et al (2016) with a conceptual framework suggested for the progression of balance and dizziness exercises provided by Klatt and

colleagues (2015). Exercises should be given at a level of mild symptom generation and progressed/made more challenging over time.

Vestibular rehabilitation is recommended in patients with migraine, once the migraines are suitably controlled. However, caution must be taken to work at a more gentle level, to avoid provoking more migraines and patients may need more emotional and psychological support (Whitney et al, 2000; Cass et al, 1997; Wrisley et al, 2002).

Vestibular rehabilitation home exercise programmes may be multidimensional and broad. They should be customised to the individual's assessment findings, rather than being diagnosis driven. Early intervention is best and daily practice is recommended (Hall et al, 2016).

It is essential that both short and long term goals are set. As VR will progressively trigger dizziness and imbalance sensations in a controlled, repetitive way over a period of time, being able to demonstrate functional gains will help to maintain focus of the therapy, assist with motivation and compliance and guide when treatment may be no longer indicated (Hall et al, 2016).

Treatment plans can be provided in various formats: written, verbal, or using photo/video on patients' phones/tablets. Regardless of the method, they should be detailed and specific, for example including instruction on: duration to do each exercise, position to do them in, number of sessions per day, how strong symptoms should be triggered to and how quickly they should settle after completing the exercises.

12. Follow up appointments

Little evidence exists to guide the frequency of follow up. This may be influenced by many factors including: symptoms, the ease of the patient attending the service and service structure. Follow-up options can include face-to-face or telemedicine sessions. It is important to use a variety of outcome measures and set goals, to guide the treatment effectiveness and determine when it is appropriate to discharge a patient (Hall et al, 2016).

13. Further considerations

13.1 Visually induced dizziness and sensory reweighting

Over-reliance on vision naturally develops following a vestibular dysfunction and patients commonly report increased fatigue (Bisdorff et al, 2009). A VR plan will therefore encourage sensory reweighting to best use vestibular, visual and proprioceptive inputs to balance (Pavlou et al, 2013).

This problem of sensory reweighting has been expanded in visually-induced dizziness; previously referred to as visual vertigo (Bronstein, 1995). Treatment should resolve inaccurate sensory weighting, VOR impairments and use of appropriate balance strategies. Additionally, patients should be exposed to full visual field moving information (Pavlou et al, 2013). Clear instructions on: duration to perform the exercise, position of the person, what format of visual motion, where the person should look and how to build the exposure up must be provided and tailored to the individual. It is important to stress that this treatment method can be very stimulating and a gentle build up is required.

13.2 Persistent postural perceptual dizziness

Persistent postural perceptual dizziness (PPPD) is a diagnosis to replace chronic subjective dizziness, phobic postural vertigo, space motion discomfort and psychogenic dizziness. The Barany Society has developed a diagnostic framework and outlined the putative pathophysiologic mechanisms (Staab et al, 2017) and ICD-11 (2018). Although there is little robust evidence for the treatment of PPPD, they have also made recommendations for treatment to include: education, habituation exercises, psychological treatments (such as cognitive behaviour therapy) and selective serotonin reuptake inhibitors (for an overview see Dieterich et al, 2017). It is important to note that if such patients are not responding to these rehabilitation techniques, then an onward referral may be necessary (to ensure no new pathologies have developed).

13.3 Functional gait

Patients with vestibular deficits typically present with gait abnormalities, such as veering gait, instability when turning their heads or unsteadiness when dual tasking. It is important that all clinicians providing VR can identify when these gait abnormalities may not be completely explained by the vestibular deficit and request more detailed assessment and treatment by a neurological or vestibular physiotherapist (Nielsen, 2013).

Functional characteristics include (Stone et al, 2005):

- Inconsistent balance/gait
- Gait abnormalities
- Excessive slowness
- Falling to/away from clinician
- Walking on ice pattern
- Uneconomic postures
- Sudden knee buckling
- Pseudoataxia (loss of control over voluntary movements that does not involve an organic cause)

13.4 Alternative methods of VR

Research has shown the importance of supervision in effective rehabilitation programmes and this may explain the dropout rates and lower outcomes seen in booklet-based approaches. Whilst non-customised booklet programmes can help (Yardley et al, 2012), it is important clinicians evaluate the changes made, and, if the person continues to present with symptoms or functional impact, treatment be adjusted and customised.

It is acknowledged, however, that face-to-face consultations are not always possible and therefore booklet-based approaches (an example available from http://www.menieres.org.uk/files/pdfs/balance-retraining-2012.pdf) and other creative approaches can be beneficial. These can include the option of web-based methods such as (https://balanceretraininghs.lifeguidewebsites.org/player/play/balanceretraininghs). If considering online methods, it is important an effective risk assessment for falls is completed, even informally, and the patient knows how to make contact should they encounter problems or require a more individualised approach.

14. Conclusion

A key principle for patients recovering from acute (and other) vestibular deficits is to encourage them to move. VR is a formalised method to structure movement facilitation, to improve balance and gaze stability, manage dizziness and reduce functional limitations. It is iterative and collaborative with the patient.

Whilst not being a competency framework, this document has outlined the main areas involved in devising and delivering such an individualised vestibular rehabilitation plan (citing the evidence base where appropriate).

Individuals must acknowledge their own scope of practice, knowledge and skills, and work collaboratively within a wider multi-disciplinary team. Seeking input of another member of the team may be required, to optimise input or to take over the management as indicated. Outcome measures and goals can help to indicate if treatment is not effective, along with aligning practice to the available evidence base.

This document aims to provide an overview of VR and provide some useful research evidence and resources. Education in VR varies and it is important clinicians undertake continuous professional development through self-directed reading, peer support sessions, networking with experts and attending training.

15. Additional resources

- The Association of Chartered Physiotherapists in Vestibular Rehabilitation (ACPIVR). A professional network for physiotherapists with an interest in vestibular rehabilitation. https://www.acpivr.com/
- The British Society of Audiology. The leading UK organisation for all professionals interested in the latest science and its application in improving people's lives with hearing and balance problems. http://www.thebsa.org.uk/
- The Vestibular Disorders Association (VEDA). The mission is to inform, support and advocate for the vestibular community. https://vestibular.org/
- Ménière's Society. The UK's leading charity for people with dizziness and balance disorders of vestibular (inner ear) origin. https://www.menieres.org.uk/
- The Academy of Neurologic Physical Therapy Vestibular Rehabilitation special interest group. Their mission is to provide a forum for ANPT members who have a common interest in the promotion of health, wellness, optimal function, and quality of life for individuals with vestibular disorders. http://www.neuropt.org/special-interest-groups/vestibular-rehabilitation

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