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Assessment of functional outcomes after rehabilitation

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Abstract

Vestibular disorders cause functional limitations or decreased ability to perform activities of daily living independently. These problems are not necessarily predicted by vertigo scales or physiologic measures. Therefore, the clinician should evaluate functional ability using self-rated scales or direct observation of specific skills of interest. Self-rated scales have the benefit of being relatively quick but may be inaccurate. Direct observation may be time consuming and a thorough evaluation of all skills may not be possible in the context of out-patient or home-based care. This paper reviews the available scales and discusses the major problems in functional assessment of patients with vestibular disorders.

Keywords

Activities of daily living; handicap; disability rating; functional assessment; vestibular impairment

Functional assessment refers to the evaluation of individuals' abilities to perform essential activities of daily living (ADLs) [10], or occupations, i.e. the purposeful tasks and skills that people do every day [2], including personal care tasks that are common to most people, such as getting dressed and brushing one's teeth, mobility skills, home management tasks, and vocational and avocational activities that may be unique to an individual, such as writing a book, examining a patient, or playing golf. Each person's occupations may be uniquely affected by the effects of vestibular disorders. People often seek health care due to bodily discomfort, but patients with chronic vestibular disorders, who have either accepted or become resigned to the discomfort caused by vestibular disorders, such as vertigo, oscillopsia, and disequilibrium, may also seek care because their independence in performing their occupations becomes compromised. Therefore, functional assessment complements but does not replace physical and psychosocial assessment [27]; for adequate treatment planning in rehabilitation functional assessment is an essential component of the initial evaluation. If the outcome of therapy is defined as a result that affects the whole person [27] then functional assessment is an important component of outcomes assessment, too.

The broad-based functional assessments available for use in general rehabilitation, such as the FIM [14] and SF-36 [1], are not appropriate for use with patients who have vestibular

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impairments because the effects of vestibular disorders are subtle and may not be detected by general assessments [9]. Nevertheless patients with vestibular impairments do have significant functional limitations [4]; those problems may be ameliorated with vestibular rehabilitation [4]. The 5-question UCLA Dizziness Questionnaire (UCLA-DQ) includes 1 question about quality of life and 1 question about effect on ADLs, using a 5-point qualitative scale [11]. A heterogeneous group of patients who completed that questionnaire reported moderate to severe impacts on quality of life and ADLs. This paper will discuss functional assessment of patients who have vestibular and balance impairments and related functional limitations.

Using a scale

Normed functional assessment scales are available in many different classification systems [27]. The literature has several self-rating scales for people with vestibular and balance disorders, which may be given to patients before and after therapy. Completing a scale with detailed questions may help the patient to gain some insight into his or her problems as the patient considers each item. Such scales may also be informative as a guide in a structured interview during the initial evaluation. To assess the value of a scale several properties of the scale must be considered. Duracinsky et al. [9] provided a useful list to consider, including several types of validity, test-retest reliability, the population for norming, and the scoring system. These issues are discussed in detail elsewhere [19]. All self-rating scales have significant limitations. The patient's answers may be somewhat unreliable due to a poor understanding of her own level of skill, the patient may not read well due to poor literacy skills, and some questions may not apply to that person's situation.

Duracinsky et al. indentified 4 scales in the literature for assessing handicap or quality of life: the Dizziness Handicap Inventory (DHI) [12], the Vestibular Disorders Activities of Daily Living Scale [5, 6], the Vertigo Handicap Questionnaire (VHQ) [33] and the Activities-Specific Balance Handicap scale (ABC) [23]. They were developed for somewhat different purposes and all of them were criticized by Duracinsky et al. Because the DHQ is not responsive to change after vestibular rehabilitation [32] Yardley and her colleagues developed the Vestibular Rehabilitation Benefit Questionnaire (VRBQ), which they intended to supersede the VHQ [17, 18].

The 25-item DHI, divided into functional, emotional and physical subscales, is the most widely used scale. It has been translated into Chinese, Dutch, German, Portuguese, Spanish and Turkish [3, 13, 15, 22, 28, 29, 31], although the thoroughness of the translations is not clear. A good translation should be forward and backward translated at least twice to insure correct translation. Duracinsky et al. expressed concern about accurate translations into other languages. Intended originally as a tool to assess patients with Meniere's disease the DHI has been used in many other studies. The 3-level scale and simple score obtained by summing the item scores makes it easy to use and it gives a good idea of global level of function but it has a ceiling effect so it may not be useful for teasing apart fine gradations in function [6]. The DHI is not useful for treatment planning because it does not provide detailed information about the patient's actual level of functional limitations in individual

ADLs. Therefore after using the DHI the clinician will still have to perform an ADL evaluation to determine which task and problems should be addressed during therapy.

Similar problems affect the ABC. Furthermore, the ABC is intended only to assess self-perceived balance skill and does not address other areas of daily life. It is, however, a useful guide to a structured interview and may give the patient some insight into her balance problems. It discriminates recent fallers from non-fallers. It has been translated into Turkish [13].

The 28-item VADL is a more focused scale, developed by an occupational therapist in the attempt to remedy the deficits of the other scales, to provide more useful data to therapists when they evaluate patients. It does not address the emotional component in the DHI. Because it was developed to evaluate only ADL function the VADL has more detailed questions than the functional subscale of the DHI. It provides a thorough outline of self-care activities and ambulation skills, but is less thorough in outlining higher level home management tasks and only vaguely indicates work-related and avocational activities. The clinician's structured interview should include questions about those skills since deficits in the ability to perform work and recreational activities often drives some patients to seek health care. The VADL has a 10-level scale that is more reflective of actual patient performance levels and it does not have a ceiling effect. The more detailed 10-level scale also makes it more difficult to use. The overall score is obtained by taking the median or mean. The VADL is sensitive to change after vestibular rehabilitation [6, 7]. It is available in Spanish from the author.

The VRBQ has borrowed components from the other scales in the literature and reworded some questions, for 22 items in three subscales related to symptoms, anxiety and quality of life, so it may be very useful for giving a good overview of the patient's overall level of function. It has the same problem as the DHI, i.e., it may not be useful for detailed treatment planning because it lacks details about performance of many activities of daily living. The reported sensitivity to change after treatment is small in the only reported, uncontrolled study [18]; no controlled studies have used it, yet.

Clinicians should be careful when interpreting information obtained from these scales. Patients' self-ratings may not correlate well with impressions of other people. Using the UCLA-DQ patients' self-reports about quality of life did not correlate well with their physicians' ratings of their quality of life [11]. Physicians reported that quality of life was better for their patients than the patients, themselves, thought. That finding suggests that physicians, at least, do not understand the impact of the symptoms of vestibular disorder on the ability of patients to function well. The opposite is true of patients' significant others. When patients and their significant others were asked to take the VADL patients rated their ability to perform personal self care skills better than did their partners, suggesting that their significant others viewed them as less functional than they really were [6].

Driving

Driving a motor vehicle is a special case of community mobility skills. Driving requires having a state-issued license, and it requires having a motor vehicle. Driving a motor vehicle is potentially hazardous not only to the driver but also to passengers and to anyone else who might be on the road or the adjacent sidewalk. Although driving simulators are available in many rehabilitation facilities they are not usually designed to include the components of vestibular stimulation, i.e. actual forward and backward linear motion of the seat, turns and inevitable slight jostling of the seat that comes from driving over uneven roads. Such motions may elicit vertigo. Also decreased gain of the vestibulo-ocular reflex (VOR) due to vestibular weakness or loss may cause decreased dynamic visual acuity and thus difficulty seeing fine details on the road or the dashboard. The only study that has assessed on-road driving in people with bilateral vestibular loss and normals found no differences between the groups on several measures [16]. They did not, however, test patients with unilateral vestibular impairments and, as the authors noted, unilaterally impaired patients may be more likely to experience driving problems during sudden challenges to the vestibular system, such as a sudden stop or rapid head turn.

The VADL has one question about driving but when problems with driving are suspected more specific driving-related questions may be useful, such as the vestibular-specific questions used by Cohen et al [8], in a survey adapted from work with low vision patients [20]. Cohen et al confirmed the earlier finding that most patients with vestibular disorders have good driving records and their driving skills are not affected by vertigo [26], but patients reported having had particular difficulty driving under conditions of reduced visual cues -- such as dim light or rain (and perhaps also in snow or fog) and on highways when concrete barriers and other visual cues. They also reported having difficulty driving around ramped parking garages, when vertigo might be elicited, and in situations with environmental optokinetic stimuli, such as near a series of evenly spaced columns or trees. Situations with increased motion in the visual environment or extraneous visual stimuli may also be problematic, such as on high traffic roads, or turning left across a busy road. Fortunately, the participants were generally sensible and reported that they do not drive if they feel uncomfortable or unsafe to drive. Their attitude seems to be common among most patients, but many patients have also said that they would ignore their physicians' advice not to drive [26], perhaps due to practical considerations.

Dynamic Visual Acuity

Obtaining the patient's self-report about driving skill should be part of the assessment. Testing dynamic visual acuity (DVA) -- the ability to see clearly while the head is moving -- may also be useful as a measure of how well the patient uses the VOR, although the relationship between scores of current tests and driving skill is unproven. Several DVA tests are described in the literature and other tests are commercially available. Ideally, testing should involve passive movement of the head, to avoid use of predictive saccades [21, 24, 30].

Direct observation

Given the hazardous nature of driving any patient who might be at risk when driving, or who must return to driving a truck or other specialty vehicle, should be referred to a certified driving rehabilitation specialist for direct, on-road evaluation. Most such specialists in the United States and Canada are occupational therapists. A list of them is available from the Association for Driver Rehabilitation Specialists (www.driver-ed.org).

Patients may slightly or vastly underestimate their other skills when describing them. A case in point is the post-operative acoustic neuroma patient who transfered herself out of bed, took a shower, got dressed, prepared and ate breakfast, brushed her teeth, used a telephone to call a taxicab, took her purse and keys, shut the door, walked down a flight of stairs, met the cab, directed the cab to the address of her therapist's clinic, and navigated the complex hallways of that building to arrive at her appointment on time. Then, she told her therapist that she felt helpless and had been unable to do anything for herself in the weeks since her surgery because she had difficulty reading, vertigo still made her feel disoriented, she was off balance, she did not feel able to drive her car safely, she did not know how to use the local bus, and she was not yet ready to return to work. She was surprised when her therapist pointed out how competent she was, having completed such a complex series of tasks that morning prior to the appointment.

By contrast, many elderly people overstate their own competence and report, for example, that they are able to transfer out of a chair, bed, or bathtub safely and without assistance, despite having difficulty performing sit-to-stand transfers from the armchair in the waiting area or from the mat table in the treatment room, in full view of the therapist and significant others. Therefore, whenever possible, direct observation is preferred, as it is usually more reliable than patient report.

Bathtub transfers are particularly unsafe for individuals with poor balance or poor vision without corrective lenses because performing the transfer requires standing on one bare foot, placing the other foot into the slippery bathtub, shifting weight onto the foot in the bathtub, and then moving the other leg into the tub, with minimal room for maneuvering. This situation can be easily mimicked with a pile of Styrofoam blocks or cardboard boxes of the approximate width and height of a standard bathtub. European bathtubs are usually higher than North American bathtubs. The Dynamic Gait Index [25] includes one item that mimics that problem.

Other skills should also be assessed directly whenever possible. For example, he patient can be asked to move small items from a low cabinet, underneath a waist-height countertop, to an overhead cabinet, to model the behavior of emptying a dishwasher, or that task can be modified to mimic putting away groceries or reaching into a cabinet to obtain items to prepare dinner. The facility's stairs can be used to observe stair-climbing skills. The Dynamic Gait Index also has an item about stair climbing. If the patient complains about difficulty performing car transfers, and if she arrived at the visit by car, then accompanying the patient to the vehicle at the end of the visit allows the clinician to observe the patient's car transfers and also allows covert observation of the cognitive skills needed to find the

vehicle. Some patients need the physician's approval to return to duty. For those patients, the clinician should try to determine which work-related tasks are the most problematic and, if possible, should try to set up similar tasks in the clinic, to determine the patient's level of performance and, if necessary, to suggest modifications.

Direct observation may be problematic. The patient must be cooperative and must not have an interest in appearing to be less functional than he or she really is. Therefore, the clinician should already have assessed the patient's psychological state and interest in returning to work. Also, some patients may have unique job requirements, such that direct observation can only be performed at the actual work site. In that kind of situation, the patient may need to work with his or her employer to allow on-site evaluation.

Covert observation

Covert observation is quite useful, as people may perform differently when they are aware of being observed. More than once this author has observed patients who needed assistance to perform sit-to-stand transfers from the armchairs in the waiting room but were able to perform the same transfers without assistance, to the surprise of accompanying family members, in the treatment clinic when the patient knew that the therapist was watching. Similarly, on more than one occasion, a patient who sought to obtain proof of disability has been observed to walk with minimal or no ataxia when unaware of being observed by the therapist but appeared to be ataxic during the formal evaluation.

Bed level skills, such as rolling over, moving from short sitting to long sitting (legs outstretched in front), bridging hips, and sitting up from supine lying may be observed during Dix-Hallpike testing if testing is performed on a bed-sized mat table. If the patient is asked to remove her shoes before Dix-Hallpike testing then donning and doffing shoes can be assessed at that time, too. Since many patients wear jackets or sweaters, asking the patient to remove the garment during the visit, to avoid wrinkling it or because the patient has become warm, provides the opportunity to assess some upper body dressing skills. Particularly problematic tasks for many people are transfer skills, in and out of a seat without or without arms, in and out of the automobile or bus seat, and in and out of a bathtub. The clinician should observe the patient performing sit to stand transfers at the beginning and end of the visit as part of the evaluation.

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