

How to evaluate and treat the dizzy patient: non-medical diagnosis-based strategies

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It is estimated that dizziness, vertigo and falls are the third most common complaints heard by physicians from all age groups, only preceded by headache and lower back pain [1]. These symptoms, however, are the number one complaint of patients aged 65 years and older [2]. Given the exponential growth of this older cohort group worldwide, this is a significant and growing segment of the population. This older population is also confronted with numerous medical comorbidities complicating their management with the increased prevalence of falls, which represent considerable morbidities and mortality, with balance-related falls being the number one cause of accidental death for this population [3].

Function-function-function

Today's modern vestibular assessment protocols are most valuable when focused on identifying the functional impairments the patient is experiencing and then creating diagnosis-based strategies to produce the best treatment and therapy outcomes. This will require selecting those tests which have the greatest sensitivity correlating those systems most often attributable to

acquired unilateral or bilateral vestibular dysfunction, as shown in Table 1.

Although the caloric portion of the VNG test has historically been used as the standard in determining peripheral end-organ dysfunction, it actually has rather poor sensitivity and specificity. For example, there are no universal standardised norms for caloric results as with other neurodiagnostic tests including: brainstem evoked potentials, electrocochleography, vestibular evoked myogenic potentials, rotary chair or video head impulse testing. Furthermore, a caloric weakness does not mean that the individual is experiencing an uncompensated condition. Often patients are no longer symptomatic and have normal gain on rotary chair testing and vHIT. Conversely, a patient without a caloric weakness may still have an uncompensated vestibulopathy in the higher frequencies of head movement, which is often 1-3Hz during normal activities. The stimulation of .003HZ of the caloric test is well below the range of the vestibular ocular reflex (VOR) of .5-6HZ. Also, the caloric test is a non-physiologic stimulus solely based on a thermal convection, making those tests with passive and active head rotation

Table 1: Symptoms and best tests for sensitivity and corresponding conditions.

Common patient symptoms post acute event	Test	Condition
Unsteadiness	Postural stability	UVD BVD
Hypersensitivity to motion	vHIT Rotary chair	Uncompensated UVD and / or 3PD
Blurred vision with head movement	Dynamic Visual Acuity (DVA) vHIT	Uncompensated UVD or BVD
Positional vertigo	Hallpike and Positional	BPPV-
Persistent sense of motion w/wo precedent event	Full testing	3PD, MdDS

Abbreviation	Glossary
BPPV	Benign Paroxysmal Positional Vertigo
BVD	Bilateral Vestibular Dysfunction
CDP	Computerized Dynamic Posturography
DVA	Dynamic Visual Acuity
SOP	Sensory Organization Performance
UVD	Unilateral Vestibular Dysfunction
VEMP	Vestibular Myogenic Evoked Potential
vHIT	Video Head Impulse Test
VNG	VideoNystagmography
VOR	Vestibular Ocular Reflex
VRT	Vestibular Rehabilitation Therapy

Table 2: Tests with sensitivity for abnormalities and corresponding treatment and therapy.

Test	Abnormalities	Function	Treatment/therapy protocol
Postural stability (mCTSIB, Gans SOT or CDP)	Sway or fall with dynamic surfaces and no vision	Visual and surface dependent	Substitution
Video-oculography (VOG)	Nystagmus Direction-fixed horizontal (non-CNS patterns)	Active-acute stage of unilateral vestibular	Adaptation and habituation
Positioning/Hallpike & Positional Tests	Nystagmus patterns consistent with canal(s) involved and/or w or w/o vertigo	BPPV-PC, HC,AC or MPV or CNS patterns	Canalith repositioning, canal specific or medical referral
Video Head Impulse Test (vHIT)	Abnormal gain consistent with corrective saccades	Uncompensated UVD in direction of impulse	Adaptation & habituation
Dynamic Visual Acuity Test (DVA)	Degraded vision with horizontal and or vertical head movement	Oscillopsia	Gaze stabilization in specific planes of head movement and frequencies
Rotary Chair	Low gain, high phase UVD or low gain and abnormal phase bi-directional with bilateral vestibulopathy	Unilateral (UVD) or bilateral (BVD) hypofunction or loss	Vestibular rehabilitation with specific activities or balance retraining with BVD

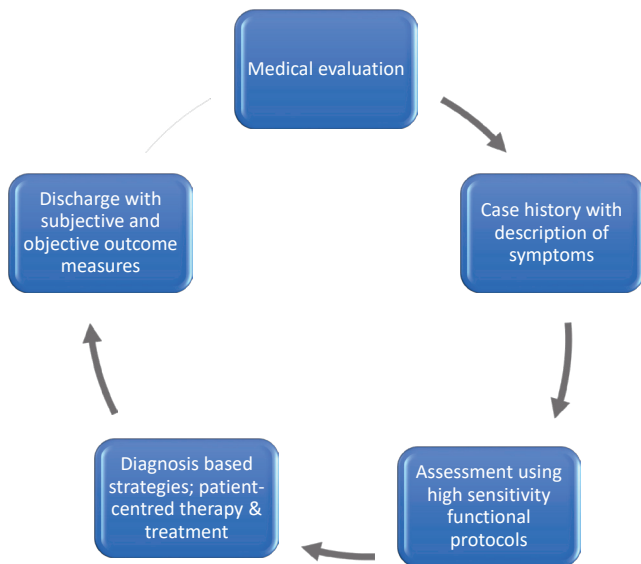


Figure 1: Process from medical evaluation to patient discharge.

potentially better measures of peripheral vestibular function. The use of the caloric test in isolation of better tuned tests of functional impairment will cause patients to be erroneously sent to therapy or miss those who continue to go undiagnosed and without remediation. However, it still has its place in assessment and the advantage that it can diagnose a peripheral deficit long after vestibular adaptation has occurred.

It is estimated that no more than 15% of patients seeking care for equilibrium conditions will require medical or surgical interventions, leaving 85% who will be candidates for non-medical management. The objective, therefore, is to find the most efficient and efficacious non-medical management interventions for patients who are experiencing limiting or disabling vestibular and equilibrium conditions, whilst ensuring underlying medical diagnoses are not missed. The use of those diagnostic protocols most sensitive for functional impairments may then be correlated with the patient's subjective complaints and targeted by specific treatment and therapies, as shown in Table 2.

Clinical pathway: from assessment to treatment

The majority of patients reporting symptoms to ENT or audiology services, other than those seen in an emergency department, are typically out of the acute stage or reporting a chronic condition lasting weeks, months or even years. Finding and implementing the most appropriate patient-centred specific interventions should be the overriding objective. Regardless of accessibility to higher-level diagnostic technologies, even the more basic and low-cost protocols – e.g. Gans, SOP, DVA or simple monocular video-goggle – can provide guidance in developing the best treatment for a patient well beyond the capabilities of a caloric test alone. Figure 1 demonstrates the process from medical evaluation through patient discharge. The objective is to make the patient's journey to wellness as easy and seamless as possible. Using an integrated clinical pathway with physician, audiologist and physiotherapist all communicating and using the same diagnosis-based strategy will ensure successful outcomes.

Therapy may include vestibular rehabilitation (VRT) for those with an acquired vestibular hypofunction or loss, usually in one ear. Balance retraining therapy may be best suited for a bilateral vestibular loss, either acquired post chemotherapy or associated with other chronic systemic conditions such as diabetes or cardiovascular conditions. This may be further complicated by other disease-associated comorbidities such as peripheral



Figure 2: Therapy setup may range from basic to advanced technologies.

neuropathy of the lower extremities and low vision secondary to retinopathy. As shown in Figure 2, a therapy setup may include everything from homemade basic activities to advanced computerised technologies. The goal is to address the functional impairments using the appropriate diagnosis-based strategies of adaptation, habituation, and substitution either in isolation or, most likely, in a synergistic hybrid model that incorporates all activities to resolve the patient's symptoms or reduce the likelihood of falls as needed.

Conclusions

Individuals suffering from acute or chronic equilibrium dysfunction are a substantial population within ENT and audiology departments. Patients may be missed entirely or over-referred for non-beneficial therapy without the use of basic to advanced diagnostic protocols that have high sensitivity for functional impairments, typically those involving a range of activities with head movement and dynamic surfaces with and without vision. Practitioners are encouraged to select protocols for testing and therapy which are best suited to the nature of the patient's complaints and provoking activities in order to produce the best treatment outcomes.

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Declaration of competing interests: None declared