

# A multidisciplinary approach to the management of the adult balance - dizzy patient

BY RICHARD GANS AND KIMBERLY RUTHERFORD

**Richard Gans and Kimberly Rutherford**, renowned experts from The American Institute of Balance, give their team’s overview of the stages involved in reaching ‘diagnosis based strategies’. For the dizzy patient, this focuses on patient-centred clinical pathways for individualised therapy with an MDT approach.

According to leading epidemiologists, dizziness ranks as the number one complaint made to physicians by patients 65 years and older. More importantly, perhaps, is that dizziness is the third most common complaint made by all adult patients, preceded only by headache and lower back pain. Clearly, these symptoms are not only common, but account for a significant percentage of physician office visits, as well as considerable laboratory and radiographic imaging costs, and the incalculable cost of human pain and suffering. When balance dysfunction and the consequence of falls in the older population are factored in, it is not surprising that equilibrium disorders were classified as early as 1995 by the National Institutes of Health, as a national healthcare crisis in the USA. This article will present the current evidence-based models and the team approach of physicians, audiologists and physiotherapists, used and taught for over 25 years by the American Institute of Balance.

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## Causes of equilibrium dysfunction and target populations

Equilibrium dysfunction is well documented across the lifespan, from congenital to age-onset. The most common otologic conditions and candidates for evaluation are outlined in Table 1. There are also many non-otologic causes of equilibrium related to numerous comorbidities as shown in Table 2. Therefore, it is critically important for all healthcare practitioners focused on the evaluation and management of individuals with equilibrium dysfunction to also be aware that most are not candidates for pharmacological or surgical intervention. The majority will require management with non-medical treatments such as canalith repositioning, vestibular rehabilitation therapy (VRT), balance retraining therapy (BRT), fall risk management with fall recovery strategies, and activities of daily living, to allow safe ageing in place. For those experiencing a mild traumatic brain injury (mTBI) or concussion, secondary to a head trauma from a fall, sports or other impact trauma, there will need to be clinical decisions on the patient’s ability to return to activities (RTA) and return to play (RTP) post mTBI and concussion. This typically requires a team approach of diagnosticians and rehabilitation specialists.

## Medical triage and evaluation protocols

Once a patient has sought care from their physician, walk-in clinic or hospital emergency department, they are often referred to a ‘balance specialist’. Depending on what the provisional diagnosis may be, the referral could be to any one of those practitioners, who by specialty, reputation,

or success, have become recognised as the ‘expert’ in their community.

The availability of well-trained professionals and the technology to evaluate patients will determine which clinical pathways and testing protocols are engaged. In locales where minimum technology is available, the use of bedside protocols may be the norm. Many facilities around the world do not have access

**Table 1. Common otologic conditions.**

- BPPV
- Vestibular neuritis
- Labyrinthitis
- Meniere’s
- Retro-cochlear
- 500+ Syndromes, non-syndromes and mitochondrial disorders
- Children with delayed motor milestones
- Adults with sudden onset SNHL
- Pre-post Cochlear Implant (CI)

**Table 2. Common non-otologic conditions.**

- Migraine-paediatric-adult
- Head Impact – motor vehicle accidents, sports trauma/mTBI/concussion
- Vestibulotoxicity – chemotherapy, cisplatin etc.
- Medical co-morbidities
  - Diabetes
  - Hypertension
  - Rheumatic disorders
  - Autoimmune
  - Neurological conditions
  - Multifactorial disequilibrium
  - History of Falls

to VNG, vHIT or rotary chair testing, so more modest protocols, which still retain good sensitivity, should be utilised. Often, even these modest protocols will provide excellent information to assist diagnosticians and rehabilitation specialists in the proper triage and treatment. Both bedside and range of technologies and their respective pros and cons are shown in Table 3. The goal is to accurately determine what is the nature of the involvement and best management strategies for the individual patient, once any necessary immediate medical care has been rendered. Most practitioners, regardless of technology limitations, should be able to provide at least some basic screening protocols e.g.

head impulse test, modified Hallpike, or dynamic visual acuity testing, from which patients may then be triaged to those practitioners with speciality qualifications and experience as needed.

Since 1992, the American Institute of Balance (AIB) has evaluated over 150,000 patients and treated over 15,000 BPPV patients with canalith repositioning. An interdisciplinary approach is encouraged and utilised for the majority of patients. The Institute accepts patients only through physician referral. Once a preliminary diagnosis has been established, a comprehensive neuro-diagnostic evaluation is conducted based on the nature of the patient's history and symptoms

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**Table 3. Overview of diagnostic protocols and usefulness in VRT.**

Diagnostic Protocol	Sensitivity	Pros	Cons	Diagnosis Based VRT Strategies	Post VRT Outcome measures
<b>Computerised Dynamic Posturography</b>	Peripheral and Central Vestibular and Neurological	1. Identifies vestibular loss, dysfunction with visual and surface dependence	1. Requires patient to stand independently.	1. Indicates need for Substitution protocols	Recovery of postural stability
		2. Descending Neural pathway	2. May be influenced by neuropathy and other biomechanical comorbidities	2. Fall risk management	
<b>vHIT</b> – Horizontal – Vertical	UVD and BVD	Highest sensitivity indicative of active or uncompensated peripheral vestibular conditions	none	Gaze stabilisation- direction of impairment (horizontal-vertical or both) and whether unilateral or bilateral	Covert corrective saccades disappear after compensation
<b>VEMP</b> – cVEMP – oVEMP	Peripheral Vestibular and Neurological	Documents wide variety of otologic and non-otologic conditions that cannot be assessed by any other tests. Specifically provides information about saccule, utricle and both superior and inferior branch of vestibular nerve and upper and lower brainstem	1. May be difficult with heavy thick necks. 2. Does not show compensation but may show recovery of nerve function following v. neuritis over time.	May show utricular dysfunction and can then initiate utricular VRT protocols	VRT will not demonstrate recovery of VEMP but may occur post neuritis.
<b>Rotation Testing</b> – Passive – Active	Unilateral and bilateral vestibular dysfunction	Provides true physiologic stimulus especially in ac	Passive- only at lower limits of VOR	May require gaze stabilisation, habituation and substitution protocols	Gain recovers (Phase may not) Demonstrates compensation
			Active- requires patient compliance at increased velocities		
<b>Dynamic Visual Acuity Test</b>	Oscillopsia	Only true test to demonstrate the presence of oscillopsia	Based on patient's visual acuity- may be restrictive	Gaze stabilisation in specific plane of head movement and velocity of therapy	Recovery of visual acuity with active head movement
<b>VNG w caloric</b>	Vestibular and Neurological	Only test to isolate each ear's labyrinthine reactivity Identifies presence of nystagmus without concern with visual suppression	Does not use a true physiologic stimulus and calorics test only horizontal canal at ultra-low frequency of .003Hz	Presence of spontaneous or provokable nystagmus indicates need for habituation or canalith repositioning manoeuvres	Treatment efficacy exhibited by extinguishing nystagmus and any correlating vertigo.
<b>ABR/EcochG</b>	Demyelination, neuropathy, lesions greater 1cm, hydrops	Provides an inexpensive non-invasive screening tool for many conditions e.g. tinnitus	Not as efficient as MRI w/contract at identification of space occupying lesions smaller than 1cm.	Use of VRT and balance retraining activities can be better focused on nature of loss or dysfunction	Change in EcochG May be seen during or following medical treatments e.g. hydrops



Figure 1. Basic VRT and balance therapy.



Figure 2. Advanced technology VRT with virtual reality.

which may include all or some of the following: audiologic studies, postural stability testing, computerised dynamic posturography (CDP), vHIT, VEMP, ABR, EChoG, rotary chair, dynamic visual acuity testing. Once the patient has been cleared medically and their functional impairment(s) have been established through the test results, e.g. oscillopsia at 2 cps horizontal head movement, we may proceed with the appropriate non-medical management.

**Diagnosis based strategies: producing and measuring successful outcomes**

The use of ‘diagnosis based strategies’ which focuss on patient-centred clinical pathways, was first recommended by Richard Gans in 1996. The goal is to not use a ‘one-size-fits-all’ approach to therapy, but rather an individualised or prescriptive approach based on the functional impairments from the dysfunction e.g. positional vertigo, oscillopsia, vestibular recruitment or visual/surface dependence. This ensures the shortest course of treatment and successful measurable outcomes in extinguishing the symptoms, as well as enhancing everyday functioning to normal. As examples, shown in Figures 1 and 2, therapy protocols for VRT may range from postural stabilisation on static and dynamic surfaces, to the use of VRT with advanced technology with full immersion virtual reality. The goal is always to produce the most efficacious treatment in the shortest amount of time, allowing

the patient to return to a full, active and safe lifestyle.

**Conclusions**

It is estimated that dizziness, vertigo, falls and/or mTBI effects over 15%, or more than 1.2 billion individuals worldwide every year. Although many individuals will enjoy spontaneous resolution of their symptoms, most will not. This results in untold costs in medical visits, hospitalisations, loss of worker productivity and human suffering. Practitioners in otolaryngology, audiology, neurology and physiotherapy have the opportunity to work collaboratively in the early intervention, evaluation and treatment of this population. Working together as an interdisciplinary team assures patients the best possibility for recovery and return to normal function and an improved quality of life.

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**Declaration of Competing Interests:** Drs Gans and Rutherford are senior staff at The American Institute of Balance, which organises certification workshops for physicians, audiologists, physical and occupational therapists in vestibular and balance science, worldwide.

