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## PRACTICE POINTER

### Acute vertigo: getting the diagnosis right

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#### What you need to know

- All patients presenting with brief episodic acute vertigo or unsteadiness should undergo a Dix-Hallpike manoeuvre
- Consider stroke in patients with new onset acute unilateral hearing loss and vertigo
- Urgent brain imaging is always indicated when acute vertigo is accompanied by other central neurological signs (such as dysphagia, dysarthria, diplopia)
- Severe acute gait ataxia (patient unable to stand without support) is most common with central causes of vertigo (such as cerebellar lesions) rather than inner ear causes

Dizziness is a common presentation to emergency departments and primary care.<sup>1,2</sup> It is defined as the sensation of disturbed or impaired spatial orientation without a false or distorted sense of motion.<sup>3</sup> The estimated prevalence of dizziness in a general practice community sample varies across studies<sup>4</sup> but is approximately 20%.<sup>5,6</sup> Its prevalence increases with age.

While patients often use the word “dizziness” to describe their symptoms, this encapsulates a variety of distinct symptom clusters, including vertigo (box 1). Vertigo is a specific type of dizziness defined as the sensation of self motion when no self motion is occurring or the sensation of distorted self motion during an otherwise normal head movement.<sup>3</sup> Acute vertigo represents up to 5% of all admissions to the emergency department.<sup>7</sup>

#### Box 1: Specific definitions that are often included under the term “dizziness”

- *Dizziness*—The sensation of disturbed or impaired spatial orientation without a false or distorted sense of motion
- *Vertigo*—The sensation of self motion when no self motion is occurring or the sensation of distorted self motion during an otherwise normal head movement
- *Light-headedness*—A feeling you are “going to faint”
- *Imbalance*—A state of being out of equilibrium, or with loss of balance
- *Gait disorder*—A problem or difficulty with walking
- *Acute vestibular syndrome*—Sudden onset of vertigo, nausea, postural instability, and nystagmus lasting for  $\geq 24$  hours
- *Transient vestibular syndrome*—Sudden onset of vertigo, dizziness, or unsteadiness lasting  $< 24$  hours

This article discusses the approach to patients presenting acutely to urgent care settings with dizziness: When to refer, when to image and when

patients can safely be discharged with primary care follow up.

#### What not to miss:

The most common cause of acute vertigo is benign paroxysmal positional vertigo (BPPV),<sup>8</sup> but in younger individuals vestibular migraine may be more common.<sup>9</sup> However, 3% of patients presenting with vertigo will have had a stroke,<sup>10</sup> and 35% of these strokes are missed.<sup>11</sup> Patients discharged from emergency departments with “benign” dizziness are at a 50-fold increased risk of being hospitalised for stroke in the seven days following discharge compared with controls.<sup>12</sup> Patients presenting with vertigo may be misdiagnosed with benign inner ear disorders such as labyrinthitis or Ménière’s disease over far more common conditions such as BPPV and vestibular migraine. Good history and examination are crucial to reach the correct diagnosis and ensure that stroke or other sinister pathology is not missed (see infographic).

Central (brain) causes of acute vertigo are more likely than peripheral (inner ear) aetiologies to require urgent triage and management. Most patients with acute vertigo will have a non-life-threatening cause, but patients with “red flags” (box 2), including vascular risk factors or associated neurological symptoms and signs, should be prioritised for triage.

#### Box 2: Red flags for a patient presenting with acute vertigo

##### Mandatory brain imaging

- Isolated, persistent ( $> 24$  hours) vertigo of hyperacute (seconds) onset
- Normal head impulse test
- New onset headache
- New onset unilateral deafness
- Cranial nerve weakness or sensory loss (diplopia, dysphagia, dysarthria, facial weakness) or limb weakness or sensory loss
- Severe (grade 3) ataxia<sup>13</sup>

##### Acute brain imaging not required

- Subacute onset vertigo (several minutes or hours)
- No other associated neurological symptoms
- No central neurological signs
- An abnormal head impulse test
- Unilateral hearing loss with typical history of Ménière’s disease (recurrent episodes of aural fullness, tinnitus, hearing loss, vertigo and nausea or vomiting lasting  $> 30$  minutes)

Acute vertigo is the most common symptom of posterior circulation stroke (47%), and isolated

vertigo, nausea, and unsteadiness can be the sole presenting symptoms, making it hard to differentiate from a benign inner ear disorder: one of the reasons that these strokes are often missed.<sup>14</sup> In many posterior circulation strokes there will be associated neurological signs, such as an occipital headache (28%), dysarthria (31%), or unilateral limb weakness (41%).<sup>15</sup> Patients may not always volunteer these symptoms, so good history taking is paramount.

Other disorders not to miss that may present acutely with vertigo include infective causes (such as cerebral abscess, where the patient is typically systemically unwell) and inflammatory neurological disorders (such as multiple sclerosis, where the vertigo is usually accompanied by other central neurological signs). Brain tumours, whether primary or metastatic, are part of the differential diagnosis, although these are less likely to present with acute vertigo, and more commonly present with focal signs (such as limb weakness) or progressive unsteadiness, headache, or vomiting (as signs of raised intracranial pressure).<sup>16</sup>

### What specific questions should you ask patients presenting with “dizziness”?

Most patients with acute vertigo will describe “dizziness”.<sup>17</sup> Ask the patient what they mean by “dizziness” to identify whether this is vertigo or an alternative symptom such as light-headedness or non-vestibular symptoms (such as headache). Identifying whether the patient is describing spinning vertigo (where they see the world move around them) or an internal sensation of movement (spinning or swaying “inside the head”) does not help differentiate between the different causes of acute vertigo. Equally, vomiting is not a useful discriminating symptom for peripheral versus central causes, as it can occur in both.

Box 3 details the differential diagnoses for acute vertigo, following recent published diagnostic algorithms that focus on history and examination findings in patients with acute vertigo (such as TiTrATE<sup>18</sup> and STANDING<sup>19</sup>).

#### Box 3: Differential diagnosis in patients with dizziness

##### General medical

- *Haematological*—Anaemia, hyperviscosity syndromes
- *Cardiovascular*—Postural hypotension, dysrhythmia, carotid sinus syndrome, valvular dysfunction
- *Metabolic*—Hypoglycaemia, hypercalcaemia
- *Infectious*—Sepsis, meningitis
- *Malignancy*—Posterior fossa or brainstem tumours, paraneoplastic (cerebellar) syndromes

##### Neurological

- Stroke
- Multiple sclerosis
- Malignant
- Neuro-infectious
- Neurodegenerative
- Psychogenic
- Migraine
- Epilepsy
- Microvascular compression (vestibular paroxysmia)

##### Otological

- Ménière’s disease
- Benign paroxysmal positional vertigo
- Post-traumatic syndrome

- Perilymphatic fistula
- Vestibular neuritis and labyrinthitis
- Paget’s disease
- Tumours
- Autoimmune disorders

The focus of the history should be on associated symptoms, timing of symptoms (whether episodic, acute, or chronic), and triggering events<sup>18</sup>:

- *Timing: onset and duration*
  - How quickly did the symptoms start? Acute onset of persistent vertigo (within seconds) is most common with stroke, whereas in vestibular neuritis or vestibular migraine onset is over several seconds or minutes. In BPPV the onset will be acute (over seconds) but will not be persistent (typically lasting only a few seconds).
- *Has this happened before?*
  - Recurrent episodic vertigo is seen in BPPV, vestibular migraine, Ménière’s disease, and vestibular paroxysmia (<1 in 2000 people).
- *Associated symptoms*
  - Ask about new onset headache, new onset unilateral hearing loss (acute vertigo and hearing loss in a young adult (<40 years) without vascular risk factors may be more suggestive of viral labyrinthitis), loss of sensation over the face or limbs, marked gait unsteadiness, speech disturbance, diplopia, or dysphagia,<sup>20</sup> all of which point to a central (brain or brainstem) cause.
  - Ask about chest pain, palpitations, and breathlessness, which may indicate a cardiac cause such as arrhythmia (see box 3 for differential diagnoses of dizziness). Associated facial pallor, visual blurring, and muffling of sound can occur with orthostatic hypotension, and confusion can occur with hypoglycaemia.
  - Ask about vascular risk factors (age >65 years, existing ischaemic heart disease, diabetes, hypertension, previous stroke or transient ischaemic attack<sup>14</sup>) as their presence will increase the suspicion of stroke in a patient with acute vertigo.
- *Triggers*
  - Were there any triggers to the event? Dizziness triggered by turning over in bed or looking up are suggestive of BPPV; dizziness (particularly “light-headedness”) on standing from sitting or lying is suggestive of orthostatic hypotension; trauma to the neck before onset of vertigo should raise suspicion for vertebral artery dissection. Ask about changes to medications or recent introduction of new ones (especially potentially vestibulo-toxic ones such as gentamicin).

### What are the key clinical signs that will help with diagnosis?

Clinical examination of a patient presenting with acute vertigo can help in differentiating central from peripheral disorders. All patients should have a neurological examination, including assessment of

cranial nerves and hearing. They should also have their gait examined.

Assess gait by asking the patient to walk a few steps (if they are able to) and to tandem walk (heel to toe). Most patients with dizziness (of any cause) will report unsteadiness, but in the context of a posterior circulation stroke this is typically severe: defined as an inability to maintain upright in a sitting or standing posture even with the feet apart.<sup>21</sup> Patients with central causes of acute vertigo are often unable to walk without falling, whereas patients with a peripheral vestibular lesion will be uncomfortable and reluctant to move but are still able to walk with minimal assistance.<sup>22</sup>

A “bedside” assessment of hearing is of particular importance because patients with vertigo may not notice a loss of hearing (given the severity of the vertigo sensation). This can be done simply by rubbing your thumb and index finger over one ear, and then the other and asking about symmetry. Patients with anterior inferior cerebellar artery infarction may have isolated recurrent vertigo, fluctuating hearing loss, and/or tinnitus (similar to Ménière's disease) as the initial symptoms for one to 10 days before the permanent infarction.<sup>23</sup>

All patients presenting with brief episodic acute vertigo or unsteadiness should undergo a Dix-Hallpike manoeuvre (see video at <https://www.bmj.com/content/366/bmj.l521524>),<sup>25</sup> particularly when the standard neurological examination is otherwise normal. This is because benign paroxysmal positional vertigo—the commonest cause of episodic vertigo worldwide—can only be diagnosed with a positional manoeuvre. In BPPV there will be torsional (and up-beating) positional nystagmus on the affected side only<sup>25</sup> during a Dix-Hallpike manoeuvre. The presence of vertical positional nystagmus (such as downbeat nystagmus) or prominent vomiting suggests a central cause (such as stroke or space occupying lesion).<sup>26</sup>

In patients with acute and persistent vertigo (for >24 hours) and nystagmus (of any kind), a normal head impulse test (a measure of peripheral vestibular function), presence of direction-changing nystagmus (suggestive of a cerebellar pathology), skew deviation (vertical misalignment of the eyes), and abnormal bedside test of hearing (so called HINTS plus assessment), has a sensitivity of 99% and specificity of 97% for stroke.<sup>27</sup>

### Imaging and further investigations (if appropriate before referral)

Routine serological investigations are rarely of diagnostic yield in patients with acute vertigo. However, finger prick glucose levels can help to rule out hypoglycaemia, calcium levels for hypocalcaemia or hypercalcaemia, and inflammatory markers (C reactive protein and erythrocyte sedimentation rate); urine dipstick may help identify infectious causes; and lying/standing blood pressure should be measured to explore the possibility of postural hypotension.

Urgent brain imaging is always indicated where acute vertigo is accompanied by other central neurological signs, such as cranial nerve signs, limb weakness, or severe acute occipital headache. Computed tomography (CT) is highly sensitive for haemorrhage but has little value in detecting the small posterior circulation infarctions that present with isolated acute vestibular syndrome (sudden onset of vertigo/dizziness or unsteadiness lasting for ≥24 hours). Where magnetic resonance imaging is less readily accessible, it should be prioritised for patients with acute vertigo and vascular risk factors.

Patients without cranial nerve or neurological limb (weakness or sensory loss) signs, normal ocular alignment (no skew deviation),

normal hearing, and healthy-looking eardrums can be safely discharged. However, they should be advised to seek urgent medical advice if new neurological symptoms develop within the next 24 hours, and if vertigo symptoms persist beyond three days they should be referred to neurology for a further opinion (box 4).

#### Box 4: When and why to refer

The key features of a patient's history and examination that warrant acute referral for neurology review include:

- Presence of any CNS signs—Gaze-evoked direction changing nystagmus (for example, nystagmus beats to the left when patient looks left and beats to the right when patient looks right); nystagmus on upwards or downwards gaze; marked gait ataxia; broken smooth pursuit; new onset unilateral hearing loss; loss of sensation over the face or limbs; speech disturbance
- Prolonged continuous and severe vertigo for >24 hours with no improvement and at least one vascular risk factor (age >60 years, hypertension, diabetes, smoking, obesity)
- Severe nausea and vomiting accompanied by acute vertigo, unable to tolerate oral fluids
- First attack or newly suspected diagnosis of vestibular migraine

#### How this article was created

We discussed with our GP co-author and her practice colleagues about the common problems GPs face when assessing patients with acute vertigo and what information would be most beneficial to include in the article. We performed a literature search on 31 August 2021 with the search terms “acute vertigo,” “acute dizziness,” “vascular vertigo,” and “diagnosis of vertigo.” We used these sources to explore the condition in depth, looking at epidemiology, diagnosis, and management to compile a comprehensive approach for the diagnosis and management of acute vertigo to help guide non-specialist physicians.

#### How patients were involved in the creation of this article

We discussed this article with a patient who had recently experienced acute vertigo and had been assessed in both general practice and an emergency department. He highlighted the need for correct diagnosis and prompt treatment to avoid prolonged complications.

#### Education into practice

- Do you check hearing (finger rub) in patients with acute vertigo?
- Do you carry out a Dix-Hallpike manoeuvre in patients with brief episodes of acute vertigo or imbalance?

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