

# Diagnostic Imaging Pathways - Vertigo

## Population Covered By The Guidance

This pathway provides guidance on the imaging of adult patients with recent onset of vertigo.

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**Date of next review: 2017/2018**

**Published: December 2014**

## Quick User Guide

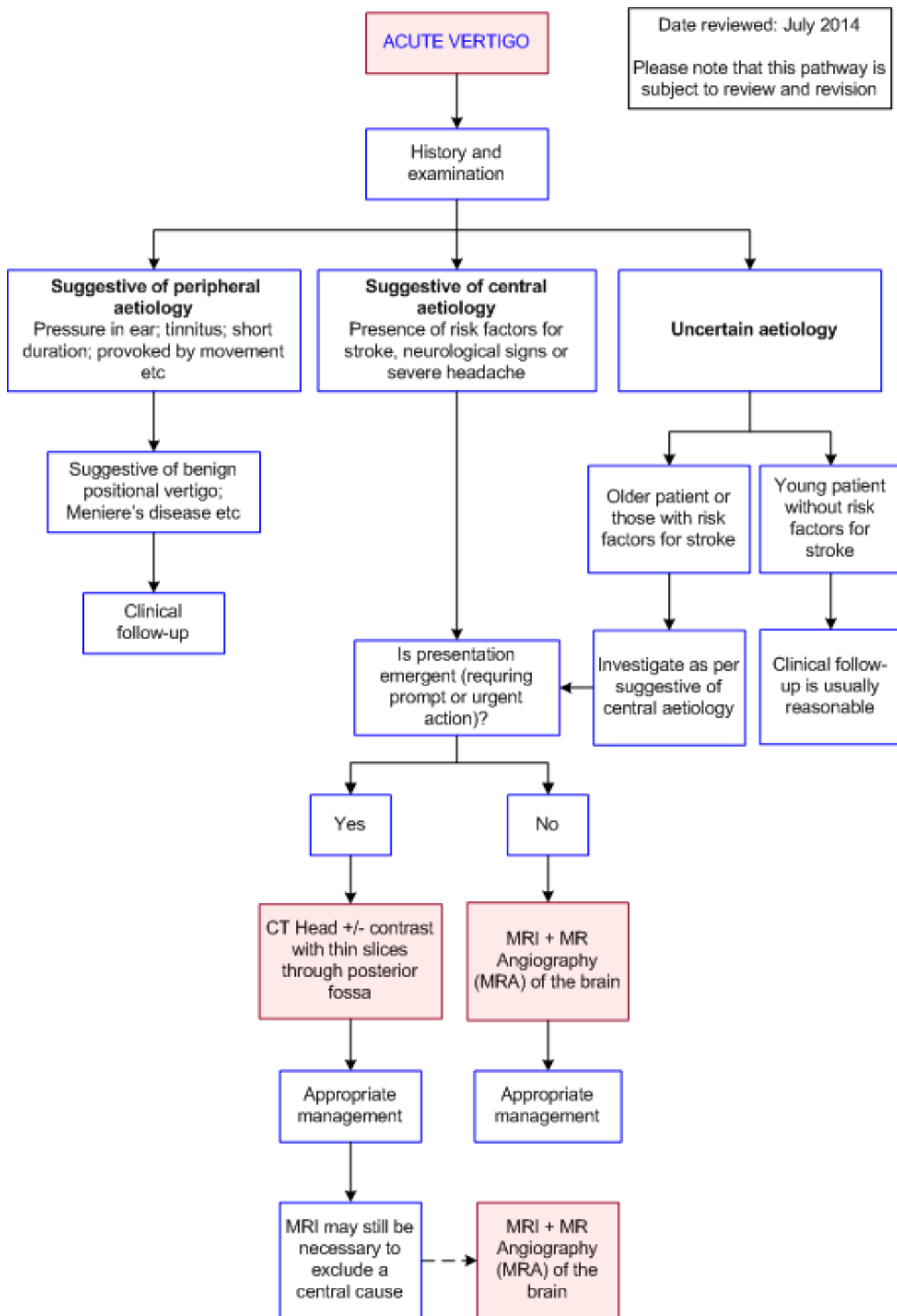
Move the mouse cursor over the **PINK** text boxes inside the flow chart to bring up a pop up box with salient points.

Clicking on the **PINK** text box will bring up the full text.

The relative radiation level (RRL) of each imaging investigation is displayed in the pop up box.

| SYMBOL   | RRL     | EFFECTIVE DOSE RANGE |
|--|---------|----------------------|
|   | None    | 0                    |
|  | Minimal | < 1 millisieverts    |
|  | Low     | 1-5 mSv              |
|  | Medium  | 5-10 mSv             |
|  | High    | >10 mSv              |

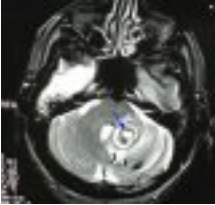
## Pathway Diagram



## Image Gallery

*Note: These images open in a new page*

1a



### Cavernous Haemangioma

Image 1a and 1b (Magnetic Resonance Imaging): Axial and sagittal images demonstrating a cavernous haemangioma in the left cerebellar hemisphere extending towards the vermis. Surrounding high signal intensity indicates oedema.

1b



## Teaching Points

- Vertigo is a symptom of illusory movement arising from damage or dysfunction of the vestibular system
- A history and detailed neurological examination is important to determine whether the symptoms and signs are suggestive of a peripheral or central cause of vertigo. This will dictate the need for and timing of the imaging
- MRI +/- MRA is generally indicated if a central cause of vertigo is suspected
- If MRI is unavailable or likely to be delayed, a CT scan with fine images of the posterior fossa is a suitable substitute

## Magnetic Resonance Imaging (MRI) and Magnetic Resonance Angiography (MRA)

- Investigation of choice after clinical examination if [11](#)
  - A central cause for vertigo is suspected (e.g. vertebrobasilar system infarction, intracranial haemorrhage, neoplasm, multiple sclerosis or infection)
  - A central/peripheral distinction cannot be made and there are risk factors for stroke (e.g. hypertension, diabetes, smoking, atrial fibrillation, valvular heart disease) or a severe headache accompanying the vertigo [12](#)
- MRI has a higher diagnostic yield than CT in detecting central causes of vertigo
- MRI has a high sensitivity for the detection of cerebellar infarction, even early in the course of symptoms but may be less sensitive for the detection of a cerebellar haemorrhage. The conversion of oxyhaemoglobin to deoxyhaemoglobin, which may take 12-24 hours, also allows the more ready detection of haemorrhage [13](#)
- One study showed MRA to have a sensitivity of 97% and specificity of 98.9% for the diagnosis of occlusions and stenoses of the posterior circulation when compared to the reference standard of

intra-arterial angiography [14](#)

- The use of diffusion weighted imaging (DWI) is particularly useful for the detection of ischaemia. Two studies have shown DWI to have a sensitivity of 88-100% and specificity of 95-100% for the detection of ischaemia within 6 hours of stroke [15,16](#)
- Caution should be taken in patients with acute vestibular syndrome and suspected ischemic stroke and early negative MRI-DWIs within the first 48 hours when there is a higher false negative rate. [2, 6](#) A delayed MRI-DWI may be necessary
- Follow-up MRI can identify stroke missed on CT and in one study changed diagnosis 16% of the time [17](#)
- In a 2009 systematic review, Acoustic neuroma [18](#) was recommended to be imaged with MRI as the initial investigation of choice

## Vertigo

- Vertigo and dizziness are a common emergent presentation and mostly related to peripheral (end organ vestibular) causes which are generally benign. A small proportion are due to central causes (e.g. posterior fossa haemorrhage of infarction) which if missed could lead to significant morbidity and mortality. [1](#)
- History and detailed neurological examination is important in distinguishing between central and peripheral aetiology and will inform subsequent diagnostic evaluation and treatment.
- The clinical decision rule (3 component bedside oculomotor examination), HINTS (horizontal head impulse test, nystagmus type and test of skew) and the risk stratification tool, ABCD2 risk score (age, blood pressure, clinical features, diabetes) are useful in determining the risk of stroke. [2-5](#)
- On systematic review HINTS was highly sensitive and specific in identifying stroke in patients with acute vestibular system and in the first 48hours was more effective in ruling out stroke than early MRI-DWI [6](#)
- Patients with vertigo have a 3 fold higher risk of stroke than the normal population; when they have at least 3 risk factors this increases to 5 fold. [7,8](#)
- Focal neurological deficit, age  $\geq 60$  or a chief complaint of imbalance have been associated with a serious underlying neurologic diagnosis. [9,10](#)
- Vertigo associated with ischaemia is typically of abrupt onset and occurs in patients with risk factors for stroke such as hypertension, diabetes, smoking or those with cardiac abnormalities such as atrial fibrillation or valvular heart disease. [21-25](#)

## Computed Tomography (CT) of the Head

- Head CT is frequently used in emergent presentations where timely MRI is not available, impractical or contraindicated to exclude posterior fossa haemorrhage or a large mass as a cause for vertigo [17](#)
- It is less sensitive in detecting posterior fossa pathology and an ischemic stroke compared to MRI-DWI, has a lower diagnostic yield, and is associated with ionising radiation [10,15,17,19,20](#)
- CT is less sensitive for posterior fossa pathology and ischemic strokes (26% compared to 83% for MRI), a common cause of central vertigo. MRI is more appropriate but expensive and not readily available
- Fine cuts through the cerebellum should be used to assist with diagnosis. If immediate brain imaging is indicated and a normal CT is obtained on the first day subsequent MRI and MRA are generally recommended. In the meantime the patient's neurological status should be closely monitored [11](#)

- Imaging may not be necessary if the patient has isolated vertigo, no other neurological signs and no risk factors for stroke [11](#)

## References

Date of literature search: June 2014

The search methodology is available on request. [Email](#)

References are graded from Level I to V according to the Oxford Centre for Evidence-Based Medicine, Levels of Evidence. [Download the document](#)

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