VERTIGO

CHI Formulary Indication Review

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Council of Health Insurance

INDICATION UPDATE

ADDENDUM- October 2023

To the CHI Original Vertigo Clinical Guidance- Issued April 2020

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Related Documents

Related SOPs

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Abbreviations

AC	Anterior Canal
BPPV	Benign Paroxysmal Positional Vertigo
CHI	Council of Health Insurance
CP	Canal Paresis
CPG	Clinical Practice Guideline
EMA	European Medicines Agency
FDA	Food and Drug Administration
HC-BPPV	Horizontal Canal Benign Paroxysmal Positional Vertigo
IDF	CHI Drug Formulary
IT	Intratympanic
MD	Meniere's Disease
MRI	Magnetic resonance imaging
PC	Posterior Canal
PSC-BPPV	Posterior Semicircular Canal Benign Paroxysmal Positional Vertigo
SFDA	Saudi Food and Drug Authority
VAS	Visual Analog Scale
VM	Vestibular Migraine

Executive Summary

Dizziness and vertigo rank among the most prevalent symptoms that lead patients to seek medical attention, with a frequency comparable to that of back pain and headaches. The collective occurrence of dizziness, vertigo, and unsteadiness stands at 5-10%, and this figure escalates to 40% among individuals aged over 40. Meanwhile, the likelihood of experiencing falls rises to 25% in those aged over 65 years[1].

A comprehensive epidemiological study was undertaken to investigate the frequency and factors associated with dizziness within a sizable sample of the Saudi population. In this cross-sectional investigation, we employed an electronic questionnaire that garnered responses from 1,478 participants, achieving an 84% response rate across five different regions of Saudi Arabia. Of the participants, 42.97% reported having dizziness at the time of taking the survey. Women were less likely than men to report dizziness (OR = 0.65; CI, 0.49, 0.87; p = 0.003). A description of the type of dizziness by age revealed that vertigo slightly decreased with age[2].

The most common causes of peripheral vertigo include BPPV, vestibular neuronitis, Meniere's disease, and immune-mediated inner-ear disease. In individuals experiencing dizziness, the overall physical examination should prioritize the evaluation of vital signs, including supine and standing blood pressure readings, along with an assessment of both the cardiovascular and neurological systems. Specific diagnostic tests include positioning examination (Dix-Hallpike test), caloric testing, posture, and gait assessment (Romberg, tandem gait, and Fukuda stepping tests), vestibular stress testing (Hamid vestibular stress), and hyperventilation examination[1].

The objectives of pharmacological treatment are to alleviate vertigo, minimize health-related issues, and prevent potential complications. Medications employed for these purposes encompass antihistamines, benzodiazepines, phenothiazines, monoaminergic drugs, and anticholinergic agents. Steroids may be beneficial for specific patients. It's advisable to use vestibular suppressants for a limited duration, typically no more than a few days, as they can impede the natural compensatory process for peripheral vertigo within the brain. Vestibular rehabilitation proves highly effective in enhancing central vestibular compensation[1].

CHI issued new guidelines related to the management of Vertigo. Updating clinical practice guidelines (CPGs) is a crucial process for maintaining the validity of recommendations. Below is a description of sections that need updates. Below is a description of sections that need updates.

CHI issued Vertigo guidance after thorough review of renowned international and national clinical guidelines in April 2020. Updating clinical practice guidelines (CPGs) is a crucial process for maintaining the validity of recommendations.

This report functions as an addendum to the prior CHI Vertigo **clinical guidance** and seeks to offer guidance for the effective management of **Vertigo**. It provides an **update on the Vertigo Guidelines** for CHI Formulary with the ultimate objective of updating the IDF (CHI Drug Formulary) while addressing **the most updated best available clinical and economic evidence related to drug therapies.**

Main triggers for the update are summarized being **the addition of new guidelines and review articles to the report** such as Practice Guidelines for the Diagnosis and Management of Benign Paroxysmal Positional Vertigo Otoneurology Committee of **Spanish Otorhinolaryngology and Head and Neck Surgery** Consensus Document **(2017)**, Diagnostic and therapeutic strategies for vestibular neuritis of the **Japan society for equilibrium research (2022)**, the American Academy of Family Physicians (**AAFP**) Approach to Evaluation and Management of Dizziness (**2017**) and **a Systematic Review and Meta-analysis** on the Efficacy of Benzodiazepines or Antihistamines for Patients With Acute Vertigo **(2022).**

After carefully examining clinical guidelines and reviewing the SFDA drug list, it is recommended to remove Acetazolamide from the CHI formulary since it is no longer registered in the SFDA Drug List of September 2023. There have been no changes or updates made to any of the previously listed drugs in terms of drug information and prescribing edits since April 2020 as well as no newly registered medications since then.

All recommendations are well supported by reference guidelines, Grade of Recommendation (GoR), Level of Evidence (LoE) and Strength of Agreement (SoA) in all tables reflecting specific drug classes' role in Vertigo management.

Below is a table summarizing the major changes based on the vertigo guidelines used to issue this report:

Table 1. General Recommendations for the Management of Vertigo

Management of Vertigo		
General Recommendations	**Level of Evidence/Grade of Recommendation**	**Reference**
When dealing with Benign Paroxysmal Positional Vertigo that involves the Posterior Semicircular	Not graded	The Spanish Otorhinolaryngology and Head and Neck

Canal (PSC-BPPV), the primary strategy involves conducting maneuvers to reposition particles. Medications are generally not effective in managing this condition.		Surgery Consensus Document (2017)[3]
After exhausting all available treatment options and when a patient's quality of life is significantly impaired by symptoms, surgical interventions such as singular nerve section or occlusion of the posterior semicircular canal may be considered. However, these surgical procedures are typically reserved for individuals who show no response to treatment or have exceptionally debilitating symptoms.	Not graded	The Spanish Otorhinolaryngology and Head and Neck Surgery Consensus Document (2017)[3]
The effectiveness of anti-vertigo medications for the management of acute vestibular neuritis is not firmly established due to limited evidence. However, betahistine, which has shown potential in alleviating peripheral vertigo, might be a consideration.	Grade of Recommendation: C1	Japan society for equilibrium research (2023)[4]
Steroid therapy for vestibular neuritis has the potential to assist in the process of vestibular compensation.	Grade of Recommendation: C1	Japan society for equilibrium research (2023)[4]
There is limited evidence supporting the effectiveness of antiviral medications in managing vestibular neuritis, and their use for treating this condition is not recommended.	Grade of Recommendation: D	Japan society for equilibrium research (2023)[4]
Vestibular rehabilitation has been proven to be successful in treating prolonged cases of vestibular neuritis.	Grade of Recommendation: A	Japan society for equilibrium research (2023)[4]

Diuretics and/or betahistine may be considered as options for continuous treatment aimed at reducing or preventing Meniere's disease (MD) symptoms. It's important to note that this maintenance therapy is not intended to eliminate symptoms during an acute MD episode but rather to manage chronic and persistent symptoms in individuals with the condition.	Not graded	American Academy of Otolaryngology – Head and Neck Surgery Foundation (2020)[5]
When noninvasive treatments prove ineffective, contemplate the use of intratympanic (IT) steroids such as methylprednisolone and dexamethasone. These steroids are commonly used and are associated with minimal side effects and complications.	Not graded	American Academy of Otolaryngology – Head and Neck Surgery Foundation (2020)[5]
If noninvasive treatments do not yield results, consider intratympanic (IT) gentamicin therapy when administered by an experienced healthcare provider.	Not graded	American Academy of Otolaryngology – Head and Neck Surgery Foundation (2020)[5]
Surgical ablative therapy is recommended for individuals with active Meniere's disease, nonfunctional hearing, and unsuccessful prior treatments. This procedure, known as labyrinthectomy, should be performed by a qualified medical practitioner.	Not graded	American Academy of Otolaryngology – Head and Neck Surgery Foundation (2020)[5]

While the most recent guidelines developed in 2020 by the American Academy of Otolaryngology–Head and Neck Surgery Foundation on Meniere's disease[5] recommend the use of intratympanic steroids as well as intratympanic gentamicin in patients that were not responsive to nonablative therapy, two Cochrane reviews published in February 2023 remain more skeptical regarding the benefit of intratympanic therapy for Meniere's disease. For intratympanic corticosteroids, the

evidence for use remains uncertain as there are few published RCTs, leading to data results or low- or very low-certainty[6]. A similar conclusion was reached for intratympanic gentamicin, with a very uncertain role in therapy due to the limited number of published trials, and the need for a consensus on the appropriate outcomes to measure in studies of Meniere's disease[7].

Section 1.0 Summary of Reviewed Clinical Guidelines and Evidence

This section is divided into two parts: the first includes recommendations from **updated versions of guidelines** mentioned in the previous CHI vertigo report, and the second includes **newly added guidelines** that have helped generate this report.

1.1 Revised Guidelines

This part contains the updated versions of the guidelines mentioned in the 2020 CHI vertigo report and the corresponding recommendations.

There are no guidelines that have been updated since April 2020.

Table 2. Guidelines Requiring Revision

Guidelines Requiring Revision	
Old Version	**Updated Versions**
American Academy of Otolaryngology – Head and Neck Surgery Foundation Clinical Practice Guideline: Meniere's Disease Executive Summary (**2020**)	N/A*
International Consensus (**ICON**) on Treatment of Ménière's Disease (**2018**)	N/A*
The **European Academy of Otology and Neurotology and The Politzer Society** European Position Statement on Diagnosis, and Treatment of Meniere's Disease (**2018**)	N/A*
Danish Health Authority National Clinical Guideline for the Treatment of Ménière's Disease (**2018**)	N/A*
American Academy of Otolaryngology – Head and Neck Surgery Foundation Clinical Practice Guideline: Benign Paroxysmal Positional Vertigo (BPPV) (Update, **2017**)	N/A*

** No updated versions available*

1.2 Additional Guidelines

This part includes the added guidelines to the previous CHI Vertigo report, along with their recommendations.

Table 3. List of Additional Guidelines

Additional Guidelines
Practice Guidelines for the Diagnosis and Management of Benign Paroxysmal Positional Vertigo Otoneurology Committee of **Spanish Otorhinolaryngology and Head and Neck Surgery Consensus Document (2017)**
Diagnostic and therapeutic strategies for vestibular neuritis of the **Japan society for equilibrium research (2023)**
American Academy of Family Physicians (**AAFP**) Approach to Evaluation and Management of Dizziness (**2017**)
Efficacy of Benzodiazepines or Antihistamines for Patients with Acute Vertigo: A Systematic Review and Meta-analysis (Hunter et al. *JAMA Neurol.* **2022**)

1.2.1 Practice Guidelines for the Diagnosis and Management of Benign Paroxysmal Positional Vertigo Otoneurology Committee of Spanish Otorhinolaryngology and Head and Neck Surgery Consensus Document (2017)

Benign Paroxysmal Positional Vertigo (BPPV) is the most frequent episodic vestibular disorder. The purpose of this guide is to supply a consensus document providing practical guidance for the management of BPPV. It is based on the Barany Society criteria for the diagnosis of BPPV, and provides recommendations on each variant of BPPV, with a description of the different diagnostic tests and the therapeutic maneuvers. A chapter on differential diagnosis and a section relating to general aspects in the management of BPPV was also included[8].

I. Canalithiasis of the posterior semi-circular canal

Diagnosis

- Symptoms consist of vertigo, typically characterized by a spinning sensation (in older individuals, this symptom may manifest as unsteadiness). These symptoms occur suddenly and are brief, often triggered by movements involving the vertical positioning of the head, such as lying down, standing up, or tilting the head upward.

- The Dix-Hallpike test is the gold standard: the patient sits on the bed, they turn their head 45° towards the side that is to be tested and then they are put into the supine position, extending their head preferably about 15-20° below horizontal; this produces movement on the plane of the corresponding posterior canal (PC) which enables ampullofugal displacement of the canalith.

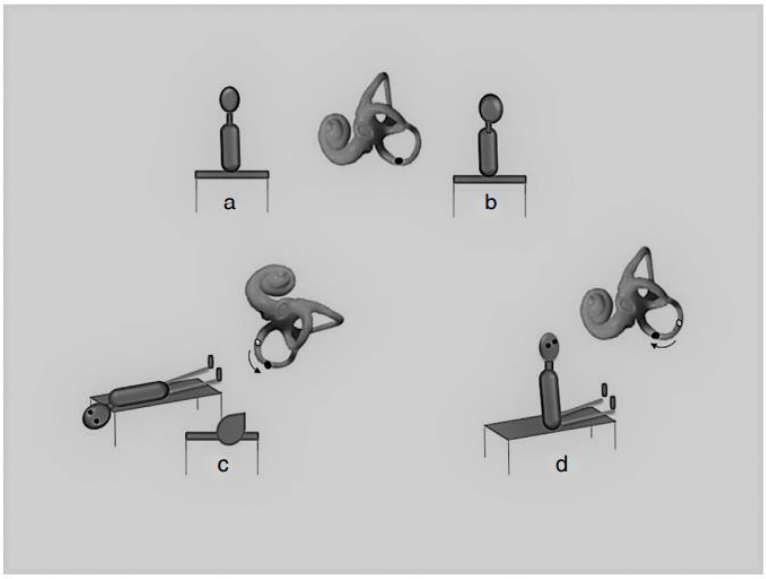


Figure 1. *Dix-Hallpike test for canalithiasis of the posterior canal (right).*

(a) patient seated on the bed, with their head facing forwards; (b) we turn their head approximately 45° towards one of the 2 sides (in this case to the right); (c) maintaining this head position in relation to the trunk, we lie the patient down, so that their head is approximately 20° below the horizontal; we maintain this position for at least 30 s (maximum latency until onset of nystagmus); (d) we sit the patient upright.

Retrieved from Practice Guidelines for the Diagnosis and Management of Benign Paroxysmal Positional Vertigo Otoneurology Committee of Spanish Otorhinolaryngology and Head and Neck Surgery Consensus Document[8].

- The nystagmus displays a lack of coordination between the eyes (as it is related to the stimulation of the vertical canals). The eye on the same side as the stimulus exhibits the torsional component more prominently, while the eye on the opposite side displays the vertical component more prominently.

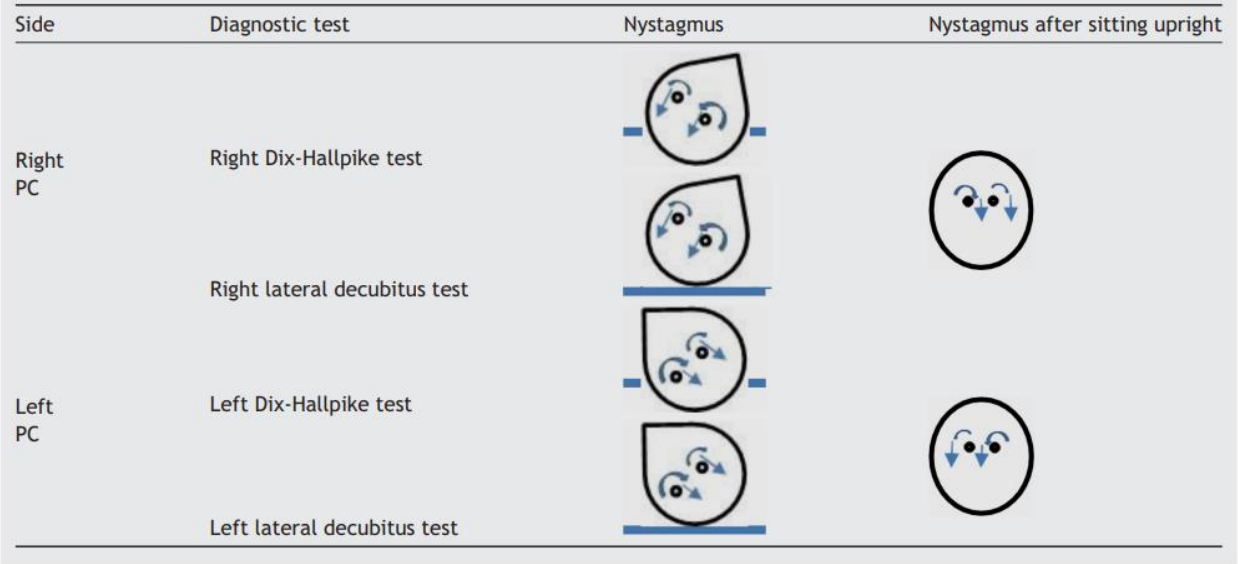


Figure 2. *Diagnosis of canalithiasis of the posterior canal.*

Retrieved from Practice Guidelines for the Diagnosis and Management of Benign Paroxysmal Positional Vertigo Otoneurology Committee of Spanish Otorhinolaryngology and Head and Neck Surgery Consensus Document[8].

Treatment

- The management of Posterior Semicircular Canal Benign Paroxysmal Positional Vertigo (PSC-BPPV) primarily involves performing particle relocation maneuvers. Generally, pharmaceutical interventions are not effective in treating Benign Paroxysmal Positional Vertigo.
- The two most employed maneuvers, which have garnered significant consensus in literature and are supported by a sufficient number of class A studies, are the Epley and Semont maneuvers.
- The Epley maneuver aims to reposition the otoconia from the posterior semicircular canal into the vestibule by utilizing a sequence of positions that facilitate their movement with the assistance of gravity. The steps to perform the maneuver are detailed in Figure 3.

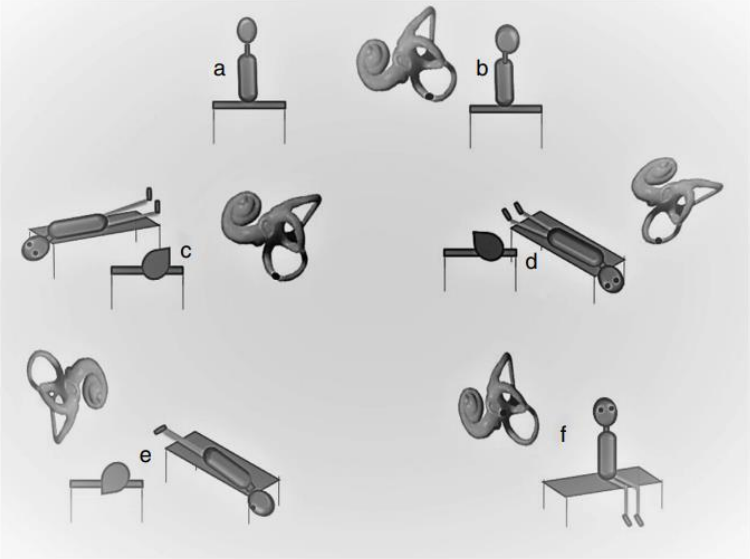


Figure 3. *Epley maneuver for canalithiasis of the posterior canal (right side).*

(a) the patient is seated on the bed, with their head facing forwards; (b) we turn their head approximately 45° to the right; (c) maintaining this head position in relation to the trunk, we lie the patient down, so that their head is approximately 20° below the horizontal; we maintain this position until the nystagmus disappears or for at least 30 s; (d) we turn the patient's head 90° to the left, so that it is rotated 45° to the left in relation to the supine decubitus position; we maintain this position until the nystagmus ceases (if it appears) or at least 30 s; (e) we turn the patient's head and trunk, en bloc, another 90° to the left, so that the head is rotated 135° to the left in relation to the supine decubitus; we maintain this position until the nystagmus ceases (if it appears) or, at least 30 s; (f) we sit the patient upright.

Retrieved from Practice Guidelines for the Diagnosis and Management of Benign Paroxysmal Positional Vertigo Otoneurology Committee of Spanish Otorhinolaryngology and Head and Neck Surgery Consensus Document[8].

- The Semont maneuver aims to rapidly relocate the otoconia from the posterior semicircular canal to the utricle. The mechanism for performing the test is shown in Figure 4.

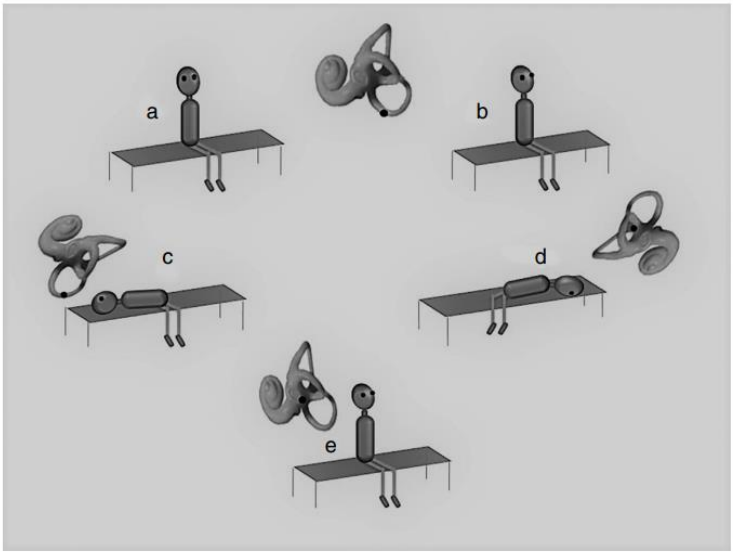


Figure 4. *Semont maneuver for canalithiasis of the posterior canal (right side).*

(a) the patient is seated in the middle of the bed; (b) we turn their head 45° towards the left side; (c) without modifying the position of the head in relation to the trunk we quickly lie the patient down on their right side; we maintain this position for 4 min; (d) without changing the position of the head in relation to the trunk, we quickly turn the patient 180° so that they are lying on their left side with their face towards the bed; we maintain this position for another 4 min; (e) we sit the patient upright.

Retrieved from Practice Guidelines for the Diagnosis and Management of Benign Paroxysmal Positional Vertigo Otoneurology Committee of Spanish Otorhinolaryngology and Head and Neck Surgery Consensus Document[8].

- In both tests the onset of an "orthotropic" nystagmus is a sign of good prognosis. This is a nystagmus in the second step of the maneuvers (Figs. 3d and 4d), of the same characteristics in terms of direction and sense as that triggered in their initial position.
- The presence of this nystagmus confirms the accurate movement of the otoconia along the canal towards the utricle and enhances the likelihood of the maneuver's success. However, the absence of this nystagmus does not necessarily rule out the effectiveness of the maneuver. On the contrary, in the Epley maneuver, the presence of a reverse nystagmus (non-orthotropic) in this second position indicates a likely failure of the maneuver. Therefore, it is recommended to closely observe eye movements during the repositioning maneuvers.
- Both the Semont and Epley maneuvers are highly effective for treating PSC-BPPV, with similar recurrence rates.

- Some experts prefer one maneuver over the other, and there are protocols suggesting their combined or sequential use, but no clear superiority has been demonstrated.
- The choice of maneuver typically depends on the clinician's experience and any specific anatomical challenges the patient may have (e.g., severe obesity, spinal rigidity).
- Traditional post-maneuver recommendations, such as avoiding lying on the treated side, sleeping semi-upright, and using a cervical collar, have not shown significant efficacy improvements to warrant their routine use.
- BPPV is considered resolved when nystagmus is not observed in the relevant provocation test.
- Several treatment protocols exist for managing BPPV, ranging from conducting a single maneuver during each session over multiple days to a week, to repeating the maneuvers within a single session until the BPPV is resolved. Among these approaches, the most commonly described in the literature involves performing one maneuver per session and assessing the results after one week.

II. Horizontal Canal Benign Paroxysmal Positional Vertigo

There are two recognized forms of Horizontal Canal Benign Paroxysmal Positional Vertigo (HC-BPPV), known as canalithiasis and cupulolithiasis, with canalithiasis being the more prevalent of the two. Additionally, within the category of canalithiasis, there are two subtypes based on whether the particles are located in the posterior or anterior arm of the canal. Consequently, we can distinguish three distinct types of HC-BPPV.

1. Canalithiasis of the posterior arm (routinely referred to as the geotropic variant in the literature).
2. Canalithiasis of the anterior arm (usually included in the literature within the so-called ageotropic variant, although not always specified as canalithiasis.
3. Cupulolithiasis (ageotropic variant in the literature).

Diagnosis

- One challenge associated with diagnosing issues related to the horizontal canal is that the diagnostic tests simultaneously stimulate both horizontal semicircular canals. This dual stimulation makes it challenging to identify the affected side, which is crucial for devising an appropriate treatment plan.
- The Pagnini-McClure test, also known as the roll test, serves as the diagnostic provocation test for the horizontal canal.

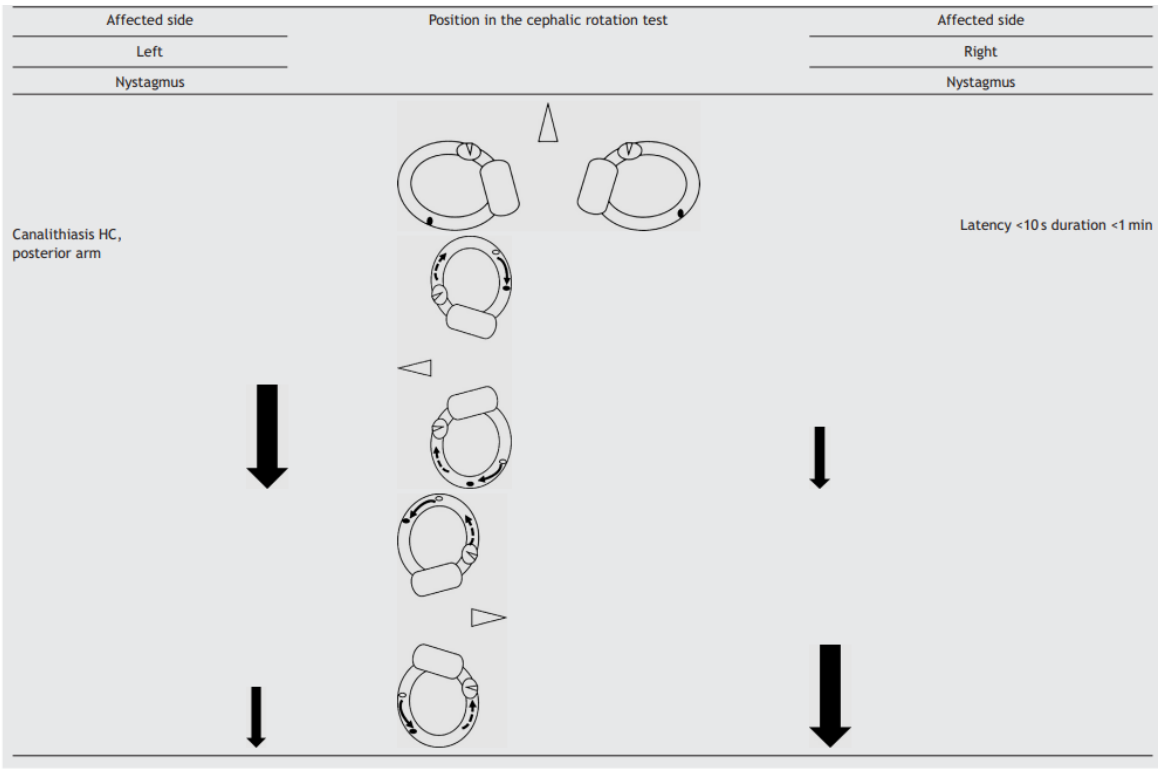


Figure 5. *Diagnosis of canalithiasis of the posterior arm of the horizontal canal.*

Retrieved from Practice Guidelines for the Diagnosis and Management of Benign Paroxysmal Positional Vertigo Otoneurology Committee of Spanish Otorhinolaryngology and Head and Neck Surgery Consensus Document[8].

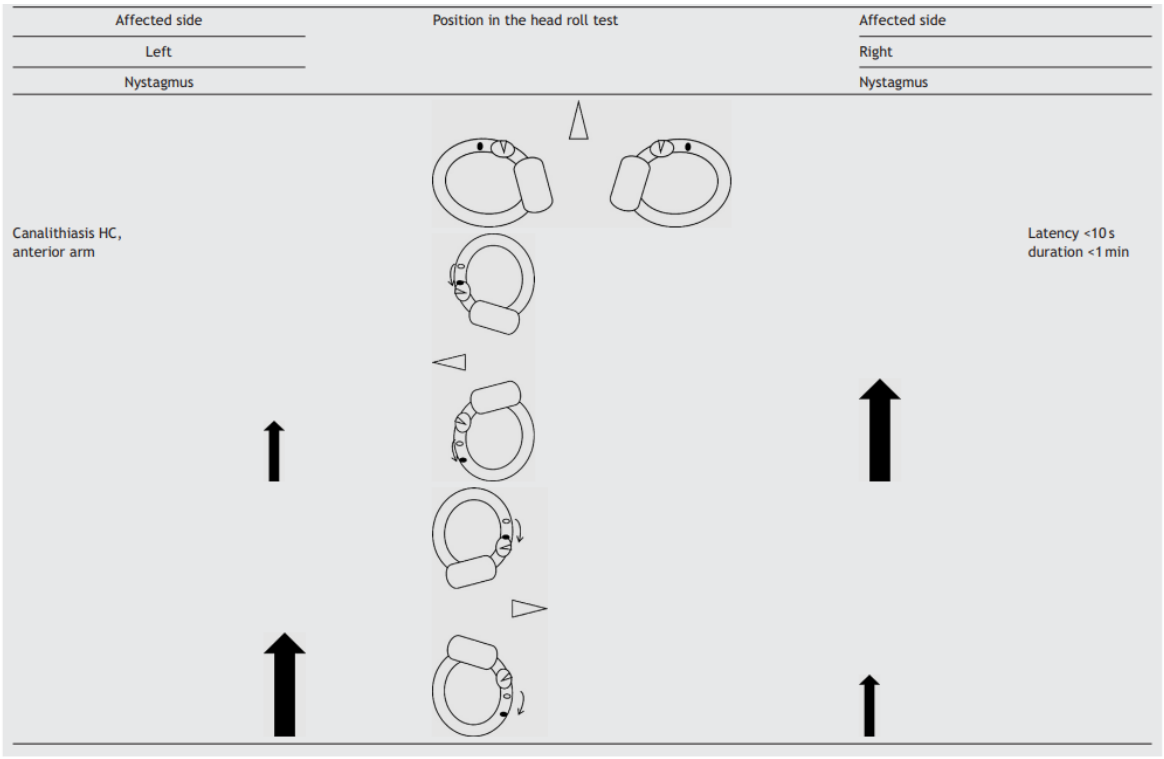


Figure 6. *Diagnosis of canalithiasis of the anterior arm of the horizontal canal.*

Retrieved from Practice Guidelines for the Diagnosis and Management of Benign Paroxysmal Positional Vertigo Otoneurology Committee of Spanish Otorhinolaryngology and Head and Neck Surgery Consensus Document[8].

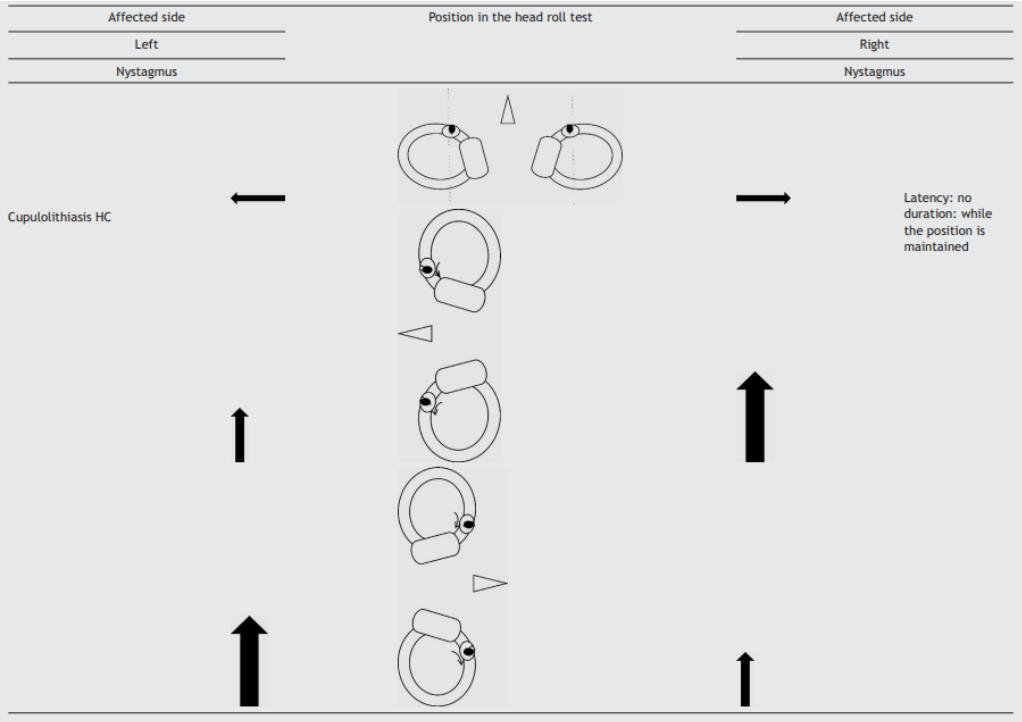


Figure 7. *Diagnosis of cupulolithiasis of the horizontal canal.*

Retrieved from Practice Guidelines for the Diagnosis and Management of Benign Paroxysmal Positional Vertigo Otoneurology Committee of Spanish Otorhinolaryngology and Head and Neck Surgery Consensus Document[8].

Treatment of Posterior Arm Canalithiasis (Geotropic Variant)

- Gufoni's maneuver is recommended for the treatment of posterior arm canalithiasis.

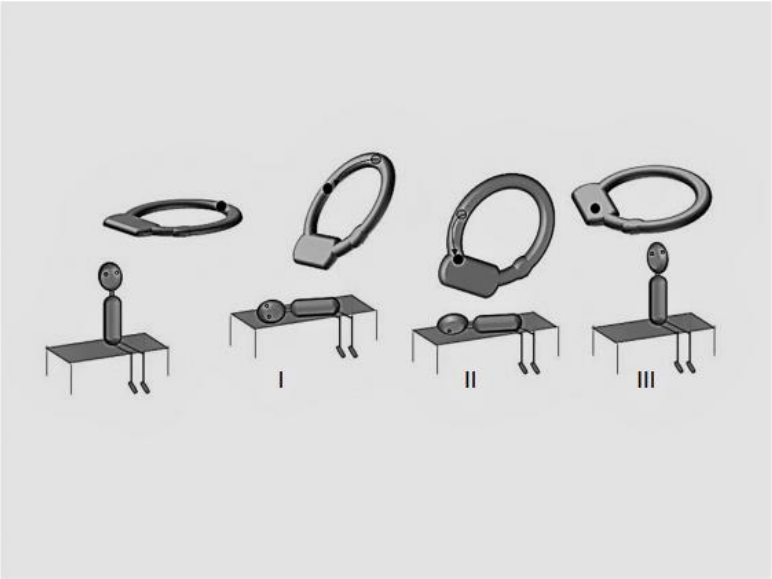


Figure 8. *Gufoni maneuver for canalithiasis of the posterior arm of the horizontal canal (left side).*

We start with the patient seated on the edge of the bed. (I) we lie the patient down on their health side (in this case the right side); (II) we turn the patient's head 45° towards the health side (with their nose facing the bed); (III) we sit the patient upright.

Retrieved from Practice Guidelines for the Diagnosis and Management of Benign Paroxysmal Positional Vertigo Otoneurology Committee of Spanish Otorhinolaryngology and Head and Neck Surgery Consensus Document[8].

- Lempert or BBQ roll maneuver is another option.

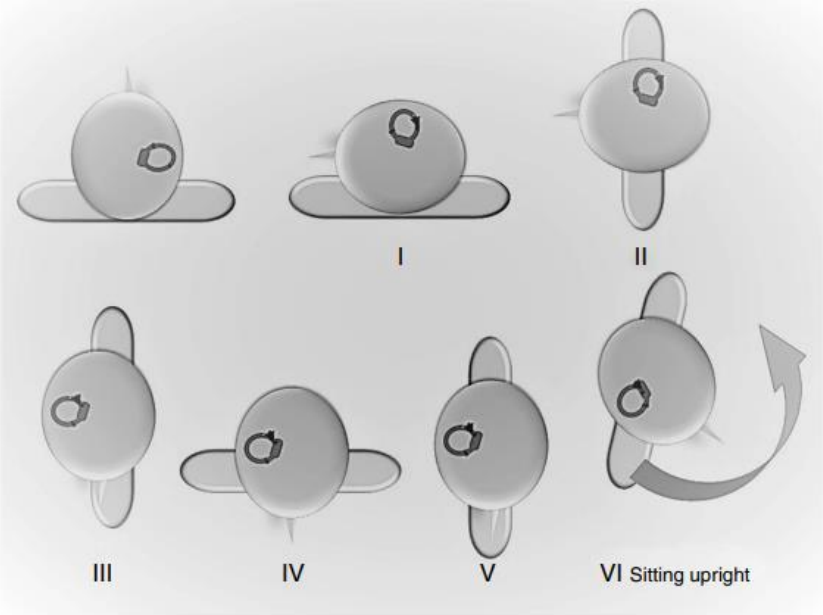


Figure 9. *Lempert or barbecue maneuver for canalithiasis of the posterior arm of the horizontal canal (right side).*

Starting in the supine decubitus position we gradually turn the patient towards their healthy side: (I) we turn their head towards the healthy side (left in this case); (II) we turn their body to the left; (III) we turn their head another 45° towards the healthy side (they will be looking downwards); (IV) we turn the patient's body to the left, leaving them fully in the prone position; (V) we turn their body 45° towards the left; (VI) we sit the patient upright.

Retrieved from Practice Guidelines for the Diagnosis and Management of Benign Paroxysmal Positional Vertigo Otoneurology Committee of Spanish Otorhinolaryngology and Head and Neck Surgery Consensus Document[8].

Treatment of Anterior Arm Canalithiasis

- Gufoni maneuver for the ageotropic variant, also termed Appiani maneuver is the best approach for the management of anterior arm canalithiasis.

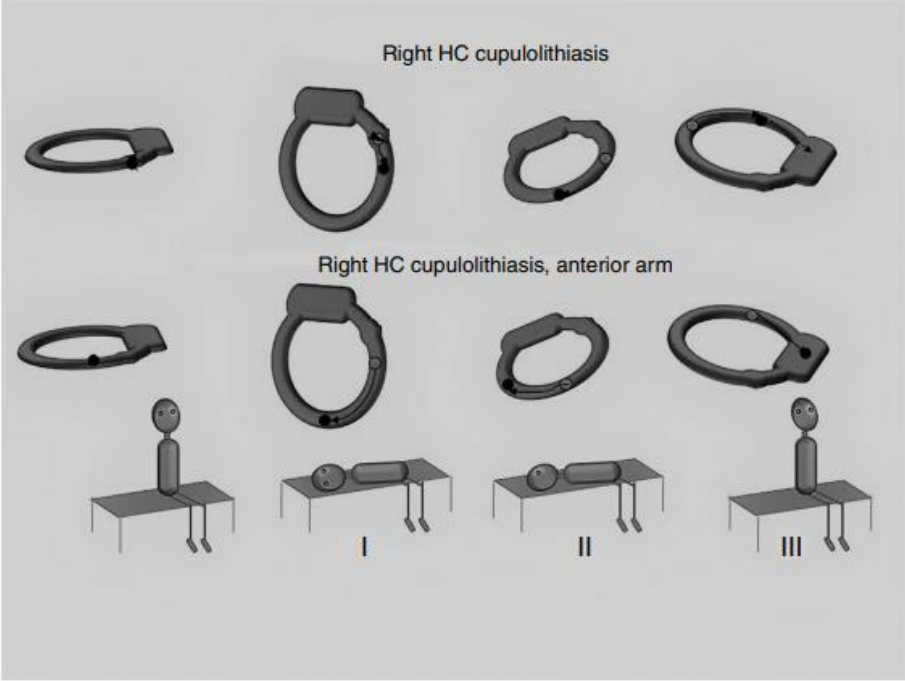


Figure 10. *Gufoni maneuver for ageotropic nystagmus/Appiani, for cupulolithiasis of the anterior arm of the horizontal canal (right side).*

We start with the patient sitting on the edge of the bed. (I) We lie the patient down on the affected side (right in this case); (II) we turn the head 45° towards the healthy side (nose facing upwards); (III) we sit the patient upright.

Retrieved from Practice Guidelines for the Diagnosis and Management of Benign Paroxysmal Positional Vertigo Otoneurology Committee of Spanish Otorhinolaryngology and Head and Neck Surgery Consensus Document[8].

Treatment of Cupulolithiasis

- The same treatment as that for anterior arm canalithiasis will be used (Gufoni maneuver for ageotropic variant/Appiani maneuver) with longer times between the different positions.
- Initially, the aim is to convert it into posterior arm canalithiasis after the particles are released from the cupula. The treatment is then completed with the appropriate maneuvers.
- A modified version of the barbecue maneuver has been outlined for anterior arm canalithiasis and cupulolithiasis, involving a preliminary step where the head is turned towards the affected side.

- HC-BPPV is considered resolved when no nystagmus is elicited during provocation tests.

III. Probable Benign Paroxysmal Positional Vertigo, Spontaneously Resolved

- The absence of nystagmus during provocation tests in a patient displaying symptoms that suggest BPPV does not necessarily eliminate the possibility of a BPPV diagnosis. It's possible that there aren't enough particles present to induce positional nystagmus. This scenario is frequently encountered in clinical practice and is referred to as "probable BPPV, spontaneously resolved".

IV. Anterior Canal Canalithiasis

- The anterior canal (AC) is the least commonly involved (occurring in only 3% of BPPV cases), and this can be attributed to its orientation, which makes it less susceptible to problems. However, the limited number of cases and the scarcity of current series mean there is a lack of class I or II studies that can serve as a foundation for diagnosing and treating AC canalithiasis. This condition is somewhat controversial, and it falls within the category of emerging BPPV syndromes according to the Bárány Society classification.

Diagnosis

- AC canalithiasis would be diagnosed by the cephalic hyperextension or Dix-Hallpike test.

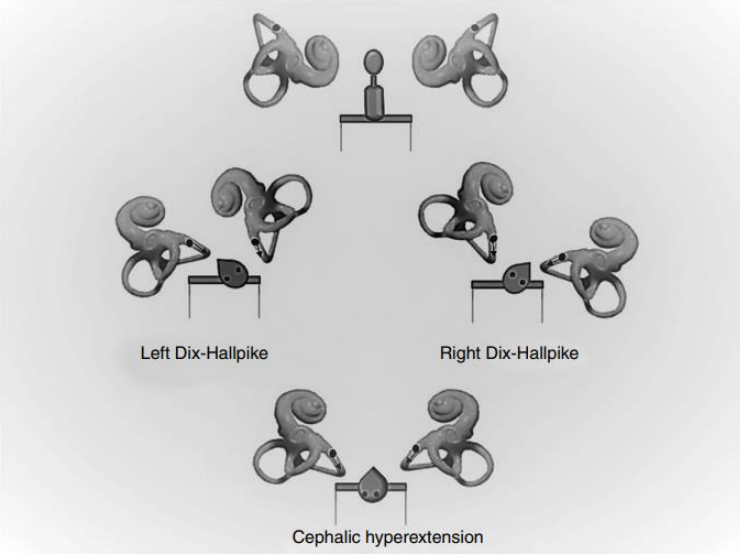


Figure 11. *Diagnostic tests for canalithiasis of the anterior canal.*

Retrieved from Practice Guidelines for the Diagnosis and Management of Benign Paroxysmal Positional Vertigo Otoneurology Committee of Spanish Otorhinolaryngology and Head and Neck Surgery Consensus Document[8].

Treatment

- Numerous treatment options have been proposed, often derived from treatments originally designed for posterior canal BPPV but with modifications aimed at addressing the anterior canal. Among these approaches, the Yacovino maneuver has gained notable popularity. One of its advantages is that it doesn't necessitate identifying the affected side since it can effectively treat either of the two anterior canals.

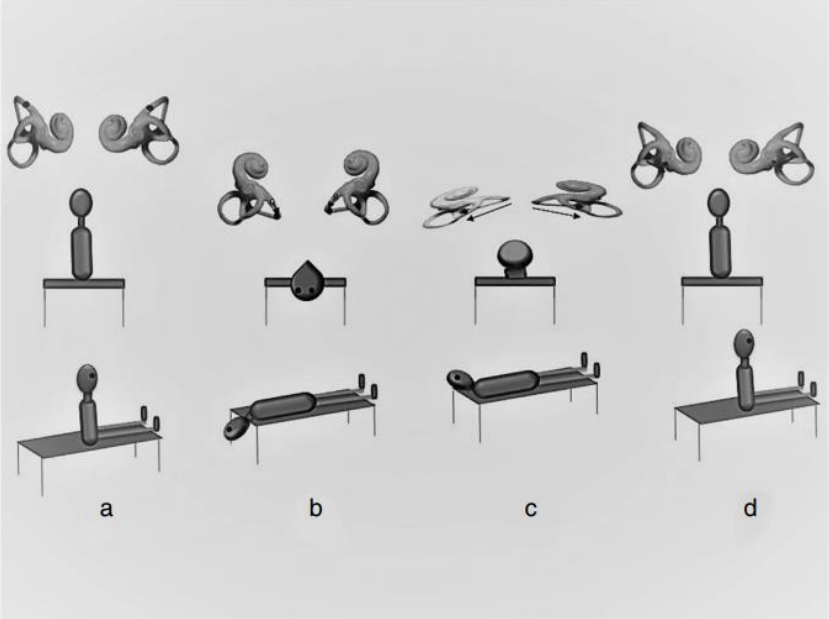


Figure 12. *Yacovino maneuver for canalithiasis of the anterior canal (irrespective of the side).*

Starting with the patient seated on the bed (a), they are put into the cephalic hyperextension position (b), after 30 s (or after the nystagmus has ceased) the head is rapidly bent until the chin touches the chest (c). After 30 s (or the nystagmus has ceased) the patient is sat upright (d).

Retrieved from Practice Guidelines for the Diagnosis and Management of Benign Paroxysmal Positional Vertigo Otoneurology Committee of Spanish Otorhinolaryngology and Head and Neck Surgery Consensus Document[8].

Benign Paroxysmal, Positional Vertigo with Involvement of Multiple Canals

- It is believed that this condition may not be diagnosed as often as it occurs, and its prevalence may be higher in cases of posttraumatic BPPV. The most reported combination involves issues in both the posterior and horizontal canals within a labyrinth, although theoretically, any combination of canal involvement could occur.
- Nonetheless, there is a subset of patients (ranging from 3.5% to 12% based on different studies) in whom symptoms and nystagmus persist despite multiple

attempts at the maneuvers. It is imperative to always validate the diagnosis by ruling out other causes of positional vertigo apart from BPPV. Once a BPPV diagnosis is confirmed, there are various treatment options available for the posterior canal (PC):

- Habituation exercises, those proposed by Brandt and Daroff being the prototype. Brandt and Daroff's exercises have proven less effective in resolving PC-BPPV than the particle repositioning maneuvers, but they might play a role for patients for whom these maneuvers have failed. They have two objectives: the dispersion and disaggregation of otoconia, repeatedly moving them in the canal, and promoting central habituation mechanisms.
- Surgical intervention: In cases where treatment options have been exhausted and symptoms significantly impact a patient's quality of life, surgical interventions such as singular nerve section or occlusion of the posterior semicircular canal may be considered. However, these surgical measures are reserved for patients who are entirely unresponsive to treatment or whose symptoms are severely debilitating.
- There are emerging approaches in development, including the use of methylprednisolone injections in conjunction with repositioning maneuvers.

V. Recurrent Benign Paroxysmal Positional Vertigo

- Regardless of the specific therapeutic maneuver employed, there is a reported recurrence rate that tends to rise as the follow-up period extends, possibly reaching close to 50%.
- The treatment does not vary, and the repositioning maneuver will be performed for the ear affected by the recurrence.

VI. Differential Diagnosis of Benign Paroxysmal Positional Vertigo

- Conditions that might be mistaken for BPPV can be categorized into three groups: otological, neurological, and various other entities.

Table 4. Differential Diagnosis with Other Otological Processes

Diagnosis	Trigger	Duration	Hearing loss associated with the episode of vertigo
Meniere's disease	No	Hours	Yes
Unilateral vestibulopathy (neuritis, labyrinthitis)	No	Hours	Possible
Perilymphatic fistula, anterior canal fistula	Pressure, sound	Minutes	Possible
BPPV	Changes of position	< 1 min	No

Adapted from Practice Guidelines for the Diagnosis and Management of Benign Paroxysmal Positional Vertigo Otoneurology Committee of Spanish Otorhinolaryngology and Head and Neck Surgery Consensus Document[8].

Table 5. Neurological Processes That Might Simulate a BPPV

Vestibular migraine	
Vestibular paroxysmia	
Lesions in the structures around the 4th ventricle	Demyelinizing lesions
Cerebellar lesions	Tumors
Brainstem lesions	Ischemic lesions
Arnold-Chiari disease	Degenerative lesions

Adapted from Practice Guidelines for the Diagnosis and Management of Benign Paroxysmal Positional Vertigo Otoneurology Committee of Spanish Otorhinolaryngology and Head and Neck Surgery Consensus Document[8].

Table 6. Other Entities That Might Emulate a BPPV

Orthostatic hypotension	
Panic or anxiety disorders	
Drugs	Mysoline, carbamazepine, phenytoin, lithium, sedatives, antihypertensives
Rotational cervical vertigo	
Positional convergence spasm	

Adapted from Practice Guidelines for the Diagnosis and Management of Benign Paroxysmal Positional Vertigo Otoneurology Committee of Spanish Otorhinolaryngology and Head and Neck Surgery Consensus Document[8].

A brain MRI is typically recommended when there is suspicion of central disease, as seen in the following scenarios:

1. Signs or symptoms of brainstem and/or cerebellar dysfunction.
2. Vertigo and positional nystagmus that are not compatible with stimulation of any canal in particular.
3. Persistent BPPV.
4. Recurrent BPPV on at least 3 occasions confirmed by the appropriate positional tests.

Pharmacological Treatment of Benign Paroxysmal Positional Vertigo

- There is no scientific evidence available in the literature to support the use of medications as a conclusive treatment for BPPV, nor do any drugs exist that can replace therapeutic maneuvers (level of evidence C according to the clinical practice guidelines of the American Academy of Otolaryngology).

1.2.2 Research Diagnostic and Therapeutic Strategies for Vestibular Neuritis of the Japan Society for Equilibrium (2022)

The aim of this research by the Japanese Society of Otorhinolaryngology-Head and Neck Surgery is to provide diagnostic and therapeutic strategies for vestibular neuritis in accordance with the Japanese Clinical Practice Guidelines for Vestibular Neuritis. Diagnostic criteria for vestibular neuritis, as well as answers to clinical questions, recommendations, and evidence levels for the treatment of vestibular neuritis were proposed[4].

Methods for adoption of levels of evidence and strengths of recommendations are detailed in tables 7 and 8.

Table 7. Levels of Evidence

Levels of evidence	
Ia	Meta-analysis of randomized controlled trials.
Ib	At least one randomized controlled trial.
IIa	Concurrently-controlled cohort study without randomization (e.g., prospective study, concurrent cohort study).

IIb	Non-concurrently controlled cohort study without randomization (e.g., historical cohort study, retrospective cohort study).
III	Case control study (retrospective study).
IV	Before-after study without control.
V	Case report, case series study.
VI	Expert opinions (including committee reports).

Table 8. Strengths of Recommendations

Decision criteria for recommendations and for the grading of recommendations	
A	Strongly recommended because the scientific basis is strong.
B	Recommended because there is some scientific basis.
C1	Recommended despite having only a weak scientific basis.
C2	Not recommended because there is only a weak scientific basis.
D	Not recommended because scientific evidence shows the treatment to be ineffective or harmful.

Vestibular neuritis is a disease that causes sudden vertigo symptoms without auditory symptoms such as hearing loss, tinnitus, and ear fullness.

Symptoms of vestibular neuritis

1. The condition typically manifests as an abrupt bout of vertigo, frequently occurring as a solitary episode.
2. Following this episode, individuals commonly experience dizziness or lightheadedness when changing positions or walking.
3. There are no accompanying auditory symptoms like hearing loss, ringing in the ears (tinnitus), or a sensation of fullness in the ears associated with the vertigo.
4. With the exception of symptoms related to the eighth cranial nerve, there are no other neurological symptoms observed.

Examination for the diagnosis of vestibular neuritis include:

- Nystagmus is easily observed under non-gaze testing (Frenzel glasses or infrared video Frenzel)
- Stepping test

- Caloric test
- Vestibular evoked myogenic potential: VEMP
- Head impulse test (HIT)
- Subjective visual vertical: SVV
- Galvanic body sway test (GBST) and galvanic cVEMP
- Imaging: MRI: In contrast MRI examinations for vestibular neuritis, it has been noted that the vestibular nerve typically does not exhibit enhancement, even with the use of high-dose contrast medium and a 1.5 Tesla MRI scanner, which can make diagnosing vestibular neuritis challenging. However, there is a contrasting report indicating that a 3 Tesla MRI scanner demonstrated enhancement of the vestibular nerve on the affected side.

Treatment

- The treatment of vestibular neuritis is categorized into three stages: acute, subacute, and chronic. During the acute phase, the focus is on relieving symptoms like vertigo, nausea, and vomiting. In the subacute phase, when symptoms start to subside, patients are encouraged not to remain inactive. They should gradually resume activities like standing and walking, with the guidance to perform safe exercises such as walking while holding onto a handrail. In the chronic phase, individuals with persistent chronic imbalance experience ongoing feelings of lightheadedness and floating during body movements. Vestibular rehabilitation is recognized as an effective approach to improve balance issues in this chronic phase.
- There is insufficient evidence to confirm the efficacy of anti-vertigo medications in treating acute vestibular neuritis. Nevertheless, betahistine, which can be effective for peripheral vertigo, might be taken into consideration (Grade of recommendation: C1).
- The use of a combination comprising 20 mg of cinnarizine and 40 mg of dimenhydrinate might be beneficial for enhancing symptoms and activities of daily living during the initial phase of vestibular neuritis (Grade of recommendation: B).
- The available evidence does not firmly establish the effectiveness of anti-emetic medications for treating acute vestibular neuritis. Nevertheless, first-generation antihistamines have been found to be effective in alleviating nausea and vomiting linked to sudden dizziness and could be contemplated as a treatment option for acute vestibular neuritis (Grade of recommendation: C1).

- Diphenidol has been found to be effective in addressing different types of nausea and vomiting and can be contemplated as a treatment option during the initial phase of vestibular neuritis (Grade of recommendation: B).
- Additionally, a combination of domperidone and cinnarizine might be effective and could be considered for managing vomiting associated with acute vestibular symptoms (Grade of recommendation: C1).
- The use of corticosteroid therapy in vestibular neuritis may aid in the recovery of canal paresis but is not a well-established treatment option (Grade of recommendation: C1).
- Steroid treatment for vestibular neuritis has the potential to assist in the process of vestibular compensation. (Grade of recommendation: C1).
- There is little evidence in demonstrating the effectiveness of antiviral medications in treating vestibular neuritis, and it is not advisable to use antiviral drugs for the treatment of this condition (Grade of recommendation: D).
- Vestibular rehabilitation has been found to be effective in treating long-term cases of vestibular neuritis (Grade of recommendation: A).

1.2.3 American Academy of Family Physicians (AAFP) Approach to Evaluation and Management of Dizziness (2017)

The 2017 American Academy of Family Physicians Approach to Evaluation and Management of Dizziness[9] introduced a set of recommendations accompanied by a grading scheme, outlined as follows:

Table 9. Evidence Rating

Evidence rating	
A	Consistent, good-quality patient-oriented evidence
B	Inconsistent or limited-quality patient-oriented evidence
C	Consensus, disease-oriented evidence, usual practice, expert opinion, or case series

Titrate the evaluation

- TiTrATE represents an innovative diagnostic method for identifying the likely cause of dizziness or vertigo.
- The approach uses the Timing of the symptom, the Triggers that provoke the symptom, And a Targeted Examination.

- The responses categorize the dizziness into one of three clinical situations: dizziness triggered by events, dizziness occurring spontaneously at intervals, or persistent vestibular dizziness.

Table 10. Differential Diagnosis of Dizziness and Vertigo: Common Causes.

Cause (most to least frequent)	*Clinical description*
Peripheral causes	
Benign paroxysmal positional vertigo	Transient triggered episodes of vertigo caused by dislodged canaliths in the semicircular canals
Vestibular neuritis	Spontaneous episodes of vertigo caused by inflammation of the vestibular nerve or labyrinthine organs, usually from a viral infection
Meniere disease	Spontaneous episodes of vertigo associated with unilateral hearing loss caused by excess endolymphatic fluid pressure in the inner ear
Otosclerosis	Spontaneous episodes of vertigo caused by abnormal bone growth in the middle ear and associated with conductive hearing loss
Central causes	
Vestibular migraine	Spontaneous episodes of vertigo associated with migraine headaches
Cerebrovascular disease	Continuous spontaneous episodes of vertigo caused by arterial occlusion or insufficiency, especially affecting the vertebrobasilar system
Cerebellopontine angle and posterior fossa meningiomas	Continuous spontaneous episodes of dizziness caused by vestibular schwannoma (i.e., acoustic neuroma), infratentorial ependymoma, brainstem glioma, medulloblastoma, or neurofibromatosis
Other causes	
Psychiatric	Initially episodic, then often continuous episodes of dizziness without another cause and associated with psychiatric condition (e.g., anxiety, depression, bipolar disorder)
Medication induced	Continuous episodes of dizziness without another cause and associated with a possible medication adverse effect
Cardiovascular/ metabolic	Acute episodic symptoms that are not associated with any triggers
Orthostatic	Acute episodic symptoms associated with a change in position from supine or sitting to standing

Retrieved from Dizziness: Approach to Evaluation and Management by the American Academy of Family Physicians (2017)[9].

History: timing, triggers, and medications

- Individuals who report experiencing a feeling of self-motion when they are stationary or a sensation of altered self-motion during typical head movements may be exhibiting vertigo.

- Vertigo arises from an imbalance in the vestibular system or a malfunction in the peripheral labyrinth or its neural connections.
- The presence of vertigo alongside unilateral hearing loss should prompt concern for the possibility of Meniere's disease (Level of evidence, C).

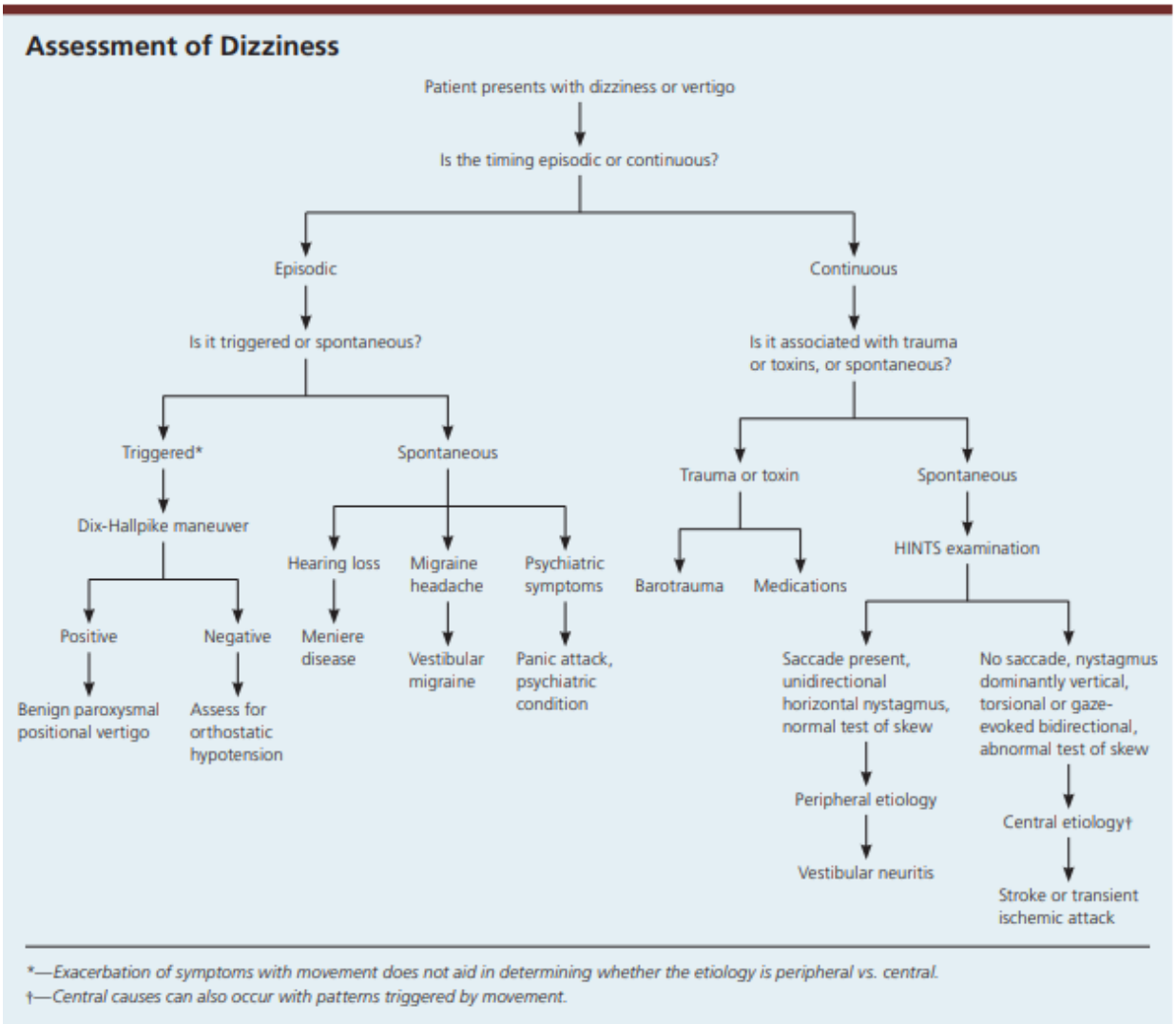


***Figure 13**. Algorithm for the diagnostic evaluation of dizziness. (HINTS = head-impulse, nystagmus, test of skew).*

Retrieved from Dizziness: Approach to Evaluation and Management by the American Academy of Family Physicians (2017)[9].

- Medications were found to be a contributing factor in 23% of instances of dizziness among elderly individuals in a primary care context.
- The risk of experiencing dizziness is elevated when using five or more medications.

- Older patients are especially vulnerable to the adverse effects of medications due to age-related alterations in drug metabolism and response mechanisms.

Table 11. Medications Associated with Dizziness

Medication	*Causal mechanism*
Alcohol Antiarrhythmics, class 1a Antidementia agents Antiepileptics Antihistamines (sedating) Antihypertensives Anti-infectives: anti-influenza agents, antifungals, quinolones Antiparkinsonian agents Attention-deficit/hyperactivity disorder agents Digitalis glycosides Dipyridamole Narcotics Nitrates Phosphodiesterase type 5 inhibitors Skeletal muscle relaxants Sodium–glucose cotransporter-2 inhibitors Urinary anticholinergics	Cardiac effects: hypotension, postural hypotension, torsades de pointes, other arrhythmias
Skeletal muscle relaxants Urinary and gastrointestinal antispasmodics	Central anticholinergic effects
Antiepileptics Benzodiazepines Lithium	Cerebellar toxicity
Antidiabetic agents Beta adrenergic blockers	Hypoglycemia
Aminoglycosides Antirheumatic agents	Ototoxicity
Anticoagulants Antithyroid agents	Bleeding complications (anticoagulants), bone marrow suppression (antithyroid agents)

Retrieved from Dizziness: Approach to Evaluation and Management by the American Academy of Family Physicians (2017)[9].

Physical examination

- When evaluating patients with dizziness, the physical examination should encompass measuring orthostatic blood pressure, assessing nystagmus,

and performing the Dix-Hallpike maneuver for induced vertigo (Level of evidence, C).

- During the assessment of individuals experiencing dizziness, it is important to conduct a physical examination that involves monitoring orthostatic blood pressure, evaluating nystagmus, and executing the Dix-Hallpike maneuver to provoke vertigo if necessary (Level of evidence, C).
- BPPV is diagnosed with the Dix-Hallpike maneuver.

Laboratory testing and imaging

- It is not advisable to pursue laboratory testing and imaging when there are no neurological irregularities detected during the examination (Level of evidence, C).
- Nonetheless, the presence of any neurological anomaly, such as uneven or one-sided hearing loss, necessitates the use of computed tomography or magnetic resonance imaging to investigate potential cerebrovascular conditions.
- In cases of hearing loss combined with vertigo and unremarkable neuroimaging results, Meniere's disease may be indicated.

Peripheral Etiologies

- Dizziness of peripheral origin originates from irregularities in the peripheral vestibular system, consisting of the semicircular canals, saccule, utricle, and vestibular nerve.
- Typical peripheral causes of dizziness/vertigo encompass benign paroxysmal positional vertigo (BPPV), vestibular neuritis (also known as vestibular neuronitis), and Meniere's disease.

A. Benign Paroxysmal Positional Vertigo (BPPV)

- BPPV develops when small, loose particles called canaliths (otoconia) dislocate and enter the semicircular canals, typically affecting the posterior canal.
- Benign paroxysmal positional vertigo is managed through a canalith repositioning maneuver, such as the Epley procedure (Level of evidence, A).
- Home remedies, including the practice of Brandt-Daroff exercises (available at http://www.youtube.com/watch?v=voZXtTUdQ00), can yield positive results.

- In cases where repeated repositioning maneuvers fail to bring improvement or if there are unusual or persistent nystagmus accompanied by nausea, alternative causes should be explored.
- The use of medication is not recommended for BPPV treatment.
- Vestibular suppressant drugs should be avoided, as they disrupt central compensation and may elevate the risk of falling.

B. Vestibular neuritis

- Vestibular neuritis, the second most common cause of vertigo, is thought to be of viral origin.
- Vestibular neuritis is diagnosed on the basis of clinical history and physical examination.
- This condition can lead to intense spinning dizziness accompanied by feelings of nausea and a perception of objects in the visual field appearing to move (referred to as oscillopsia).
- It may also result in spontaneous nystagmus with horizontal rotation towards the unaffected side or an unusual walking pattern characterized by a leaning tendency towards the affected side.
- Reassurance, explanation, and advice are essential, in combination with symptomatic treatment for the first few days.
- Symptoms of vestibular neuritis can be alleviated using medication and vestibular therapy (Level of evidence, C).

Table 12. Vestibular Suppressant Medications

Medication	*Dosage*	*Adverse effects*
Antiemetics		
Metoclopramide (Reglan)	5 to 10 mg orally every 6 hours, or 5 to 10 mg slowly IV every 6 hours	Akathesia, atrioventricular block, bradycardia, bronchospasm, dizziness, drowsiness, dystonic reaction, gynecomastia, nausea, tardive dyskinesia
Prochlorperazine	5 to 10 mg orally or IM every 6 to 8 hours	Agitation, dizziness, drowsiness, dystonic reaction, extrapyramidal symptoms, photosensitivity, tardive dyskinesia
Antihistamines		
Dimenhydrinate	50 mg orally every 6 hours	Anorexia, blurred vision, dizziness, drowsiness, nausea
Meclizine (Antivert)	12.5 to 50 mg orally every 4 to 8 hours	Blurred vision, drowsiness, fatigue, headache, vomiting
Promethazine	25 mg every 6 hours orally, IM, or rectally every 4 to 12 hours	Agitation, bradycardia, confusion, constipation, drowsiness, dizziness, dystonia, extrapyramidal symptoms, gynecomastia, photosensitivity, urinary retention
Benzodiazepines		
Diazepam (Valium)	2 to 10 mg orally or IV every 4 to 8 hours	Amnesia, drowsiness, slurred speech, vertigo
Lorazepam (Ativan)	1 to 2 mg orally every 4 hours	Amnesia, dizziness, drowsiness, slurred speech, vertigo

IM = intramuscularly; IV = intravenously.

Retrieved from Dizziness: Approach to Evaluation and Management by the American Academy of Family Physicians (2017)[9].

- Antiemetics and antinausea medications should be used for no more than three days because of their effects in blocking central compensation.
- Vertigo and associated nausea or vomiting can be treated with a combination of antihistamine, antiemetic, or benzodiazepine.
- Although systemic corticosteroids have been recommended as a treatment for vestibular neuritis, there is insufficient evidence for their routine use.
- Antiviral medications are ineffective.

C. Meniere disease

- Meniere disease causes vertigo and unilateral hearing loss. Other symptoms include sudden slips or falls, and headache with hearing loss worsened during an attack.
- The primary treatment approach for Meniere's disease involves making lifestyle adjustments, which encompass reducing dietary salt intake to less than 2,000 mg per day, cutting back on caffeine consumption, and limiting alcohol consumption to one drink daily.

- If vertigo persists despite these lifestyle changes, daily thiazide diuretic therapy may be introduced.
- Low-salt diet and the use of diuretics can lead to an improvement in the symptoms of Meniere's disease (Level of evidence, B).
- Transtympanic injections of glucocorticoids and gentamicin can provide relief from vertigo. While transtympanic glucocorticoids may offer benefits to hearing, the use of transtympanic gentamicin is linked to potential hearing loss and is best reserved for patients already experiencing significant hearing impairment.
- For managing acute attacks, vestibular suppressant medications can be employed, including effective options like prochlorperazine, promethazine, and diazepam (Valium).
- Surgery remains a viable choice for patients with resistant symptoms.
- Patients with unilateral peripheral vestibular dysfunction may find vestibular exercises beneficial, and those with persistent tinnitus or hearing loss may require vestibular rehabilitation.

Central Etiologies

- The central vestibular system comprises the vestibular nuclei, cerebellum, brainstem, spinal cord, and vestibular cortex.
- Central irregularities account for about a quarter of dizziness cases in patients.
- Common central causes include conditions like vestibular migraine and vertebrobasilar ischemia.
- Patients with central abnormalities may exhibit a sense of unsteadiness and ataxia as opposed to genuine vertigo. Nonetheless, it's important to note that vertigo can serve as an initial symptom indicating an impending cerebrovascular event.
- The HINTS examination demonstrates high sensitivity and specificity when it comes to detecting stroke in individuals with an acute vestibular syndrome. It surpasses diffusion-weighted magnetic resonance imaging in its effectiveness at excluding stroke.

A. Vestibular migraine

- Episodic vertigo experienced by a patient with a migraine history may indicate the presence of vestibular migraine.
- Vestibular migraine ranks among the most prevalent origins of episodic vertigo, especially in children.

- The diagnostic criteria for vestibular migraine include at least five episodes of vestibular symptoms of moderate or severe intensity lasting five minutes to 72 hours; current or previous history of migraine headache; one or more migraine features, and at least 50% with vestibular symptoms; and no other cause of vestibular symptoms.
- The initial approach focuses on the identification and avoidance of migraine triggers.
- Stress management is advised, and it's essential to ensure sufficient sleep and engage in regular physical activity.
- The use of vestibular suppressant medications can be beneficial. However, due to a lack of well-structured randomized clinical trials, recommendations for prevention are primarily based on expert opinions.
- Preventive medications encompass a range of options, such as anticonvulsants, beta-adrenergic blockers, calcium channel blockers, tricyclic antidepressants, butterbur extract, and magnesium.
- The objective is to achieve a 50% reduction in the frequency of attacks. The effectiveness of migraine abortive therapy in treating vertigo remains unclear.

B. Vertebrobasilar ischemia

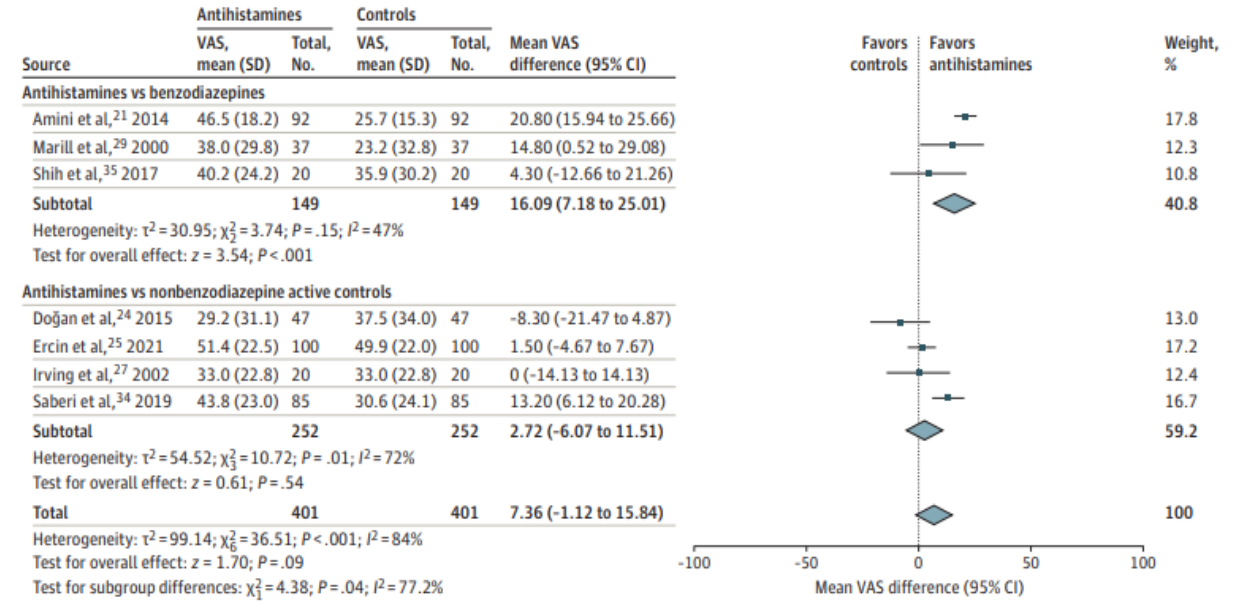
- The brainstem, cerebellum, and inner ear receive their blood supply from the vertebrobasilar system. The occlusion of a major branch within this system can lead to vertigo.
- Diagnosis typically hinges on a patient's history of brainstem-related symptoms, like diplopia, dysarthria, limb weakness, or clumsiness.
- In some cases, vertigo is the initial symptom, occurring in 48% of patients, although less than half of them will show concurrent neurological abnormalities.
- Treatment involves antiplatelet therapy and the reduction of risk factors associated with cerebrovascular disease.
- In instances of significant vertebral or basilar artery stenosis, warfarin (Coumadin) has been utilized.

1.2.4 Efficacy of Benzodiazepines or Antihistamines for Patients with Acute Vertigo: A Systematic Review and Meta-analysis (2022)

This systemic review and meta-analysis published in September 2022 in JAMA Neurology aimed to assess the efficacy of antihistamines and benzodiazepines in

the treatment of acute vertigo from any underlying cause. Findings are summarized below[10]:

- Randomized or quasi-randomized clinical trials (RCTs) were eligible for inclusion if they examined the effects of any antihistamine or benzodiazepine in comparison to a comparator, placebo, or no intervention in human patients experiencing acute vertigo (lasting up to 2 weeks).
- The predetermined primary outcome was the alteration in the visual analog scale (VAS) score for vertigo or dizziness, rated on a scale of 10 or 100 points, assessed two hours after the treatment. Results within the time range of 30 minutes to 4 hours were considered, but preference was given to the timeframe closest to two hours.
- Secondary outcomes encompassed changes in the VAS score for nausea at the two-hour mark, the necessity for rescue medication or intervention at two hours, the resolution of vertigo at one week, resolution at one month, improvement at one week, improvement at one month, as well as nystagmography results. Any adverse events were documented based on the information provided within the individual studies.
- In the case of the primary outcome, data from 802 patients were pooled for meta-analysis from seven trials.



VAS indicates visual analog scale.

Figure 14. *Change in vertigo visual analog scale (VAS) scores at 2 hours.*

Retrieved from Hunter BR, Wang AZ, Bucca AW, et al. Efficacy of Benzodiazepines or Antihistamines for Patients with Acute Vertigo: A Systematic Review and Meta-analysis. JAMA Neurol. 2022;79(9):846-855. doi:10.1001/jamaneurol.2022.1858[10]

- In 3 trials with a low risk of bias antihistamines were associated with a 16.1-point greater decrease in vertigo (95% CI, 7.2 to 25.0; I 2 = 47%) than benzodiazepines.
- Antihistamines performed similarly to other active comparators (mean difference, 2.7 [95% CI, –6.1 to 11.5]; I^2 = 72%).
- When all 7 studies were combined, antihistamines were not associated with a statistically significant improvement over other comparators (difference, 7.4 [95% CI, –1.1 to 15.8]; I^2 = 84%).
- Two more studies provided data on the alteration of VAS scores at the two-hour mark, but they did not furnish the necessary standard deviations (SDs) for inclusion in the meta-analysis. To incorporate these trials, we conducted an unplanned sensitivity analysis. In this analysis, we computed the average SD based on the data from the seven studies that were already included and then applied this calculated SD to the results of the two additional studies.
- The outcomes of the sensitivity analysis, which included 1152 patients, exhibited point-estimate results that were almost indistinguishable from those in the primary analysis. However, due to the slight enhancement in statistical power in the sensitivity analysis, antihistamines showed a more substantial improvement in VAS scores when compared to all combined comparators. The difference amounted to 7.5 (with a 95% confidence interval of 0.8 to 9.2), and the I^2 value was 81%.
- In general, there were no distinctions in the outcomes measured at the two-hour mark between antihistamines and the comparison groups. However, it is worth noting that the single study that compared antihistamines and benzodiazepines for these specific outcomes reported antihistamines as being more effective than benzodiazepines.
- After one week, there was no statistically significant difference in improvement favoring antihistamines among the 269 patients included in five trials that compared antihistamines to placebo or no intervention. The relative risk (RR) was 1.15 (with a 95% confidence interval of 1.00 to 1.32), and the I2 value was 41%.
- There was no indication of a heightened probability of achieving complete resolution at one week with antihistamines. The relative risk (RR) was 1.03, with a 95% confidence interval of 0.56 to 1.89, and the I2 value was 81%. Similarly, at one month, there were no discernible differences between

antihistamines and other comparators concerning either improvement or complete resolution.

- Only one study involving benzodiazepines (study 30) provided results for the one-week and one-month time points. Among the 13 patients who received benzodiazepines and the 7 patients who received a placebo, none of them reported any improvement at one week. In terms of the one-month follow-up, improvement was reported by 5 out of 12 patients who received benzodiazepines (about 42%), while 4 out of 7 patients who received a placebo (around 57%) reported improvement. Complete resolution was achieved by 2 out of 12 patients who received benzodiazepines (approximately 17%) and by 3 out of 7 patients who received a placebo (about 43%). Notably, these differences were not statistically significant.

Section 2.0 Drug Therapy in Vertigo

This section comprises three subsections: the first one contains the newly recommended drugs, the second one covers drug modifications, and the third one outlines the drugs that have been withdrawn from the market.

2.1 Additions

Since the publication of the previous CHI report, there have been no vertigo drugs that have received FDA or EMA approval.

2.2. Modifications

No modifications have been made since April 2020 to the drugs included in the previous CHI report.

2.3 Delisting

The medications below are no longer SFDA registered, therefore, it is advisable to delist the following drugs from CHI formulary. *Please refer to* ***Drug therapy in Vertigo-section 2*** *of CHI Vertigo original clinical guidance*

- Acetazolamide
- Lorazepam
-

Section 3.0 Key Recommendations Synthesis

- In the treatment of Benign Paroxysmal Positional Vertigo affecting the Posterior Semicircular Canal (PSC-BPPV), the main approach is to perform maneuvers aimed at repositioning particles. Typically, medications are not successful in addressing this condition[8].
- The Epley and Semont maneuvers are the most commonly used techniques, backed by substantial agreement in the literature and supported by a substantial body of class A studies[8].
- The selection of the maneuver often relies on the clinician's expertise and any unique anatomical obstacles the patient might encounter, such as extreme obesity or spinal stiffness[8].
- Conventional post-maneuver suggestions, such as refraining from lying on the treated side, sleeping in a partially upright position, and wearing a neck brace, have not demonstrated notable enhancements in effectiveness to justify their standard application[8].
- BPPV is considered resolved when nystagmus is no longer detected during the relevant provocation test[8].
- Gufoni's maneuver is recommended for the treatment of posterior arm canalithiasis[8].
- Lempert or BBQ roll maneuver can be considered an alternative for the management of posterior arm canalithiasis[8].
- The preferred method for treating anterior semicircular canalithiasis, particularly the ageotropic variant also known as the Appiani maneuver, is the Gufoni maneuver[8].
- When all treatment possibilities have been explored, and a patient's quality of life is greatly affected by symptoms, surgical procedures like singular nerve section or closure of the posterior semicircular canal may be contemplated. Nevertheless, these surgical interventions are reserved for individuals who do not respond at all to treatment or have extremely debilitating symptoms[8].
- The effectiveness of anti-vertigo medications for managing acute vestibular neuritis is not well-established due to limited evidence. However, betahistine, which has shown potential in alleviating peripheral vertigo, could be a consideration (Grade of recommendation: C1)[4].
- The existing data does not definitively confirm the efficacy of anti-emetic drugs in the treatment of acute vestibular neuritis. However, first-generation antihistamines have demonstrated effectiveness in relieving nausea and

vomiting associated with sudden dizziness, making them a potential consideration as a treatment option for acute vestibular neuritis (Grade of recommendation: C1)[4].

- Steroid therapy for vestibular neuritis has the potential to aid in the vestibular compensation process (Grade of recommendation: C1)[4].
- There is limited evidence supporting the effectiveness of antiviral medications in managing vestibular neuritis, and their use for treating this condition is not recommended (Grade of recommendation: D)[4].
- Vestibular rehabilitation has proven to be successful in the treatment of prolonged cases of vestibular neuritis (Grade of recommendation: A)[4].
- For individuals diagnosed with Meniere's disease (MD), it is recommended to use vestibular suppressant medications solely when experiencing an acute bout of vertigo. These suggested vestibular suppressants encompass first-generation antihistamines, anticholinergic medications, and benzodiazepines[11].
- Diuretics and/or betahistine may be offered as options for ongoing treatment aimed at diminishing or preventing MD symptoms. It is essential to understand that this maintenance therapy is not designed to eliminate symptoms during an acute MD episode; instead, its purpose is to manage chronic and persistent symptoms in individuals affected by the condition[11].
- When noninvasive treatments prove ineffective, intratympanic (IT) steroids like methylprednisolone and dexamethasone may be considered. These steroids are frequently employed, and their side effects and complications are minimal[11].
- If noninvasive treatments do not yield results, consider intratympanic (IT) gentamicin therapy when administered by an experienced healthcare provider[11].
- Surgical ablative therapy is advised for individuals with active Meniere's disease, nonfunctional hearing, and unsuccessful prior treatments. This procedure, known as labyrinthectomy, should be performed by a qualified medical practitioner[11].

Section 4.0 Conclusion

This report serves as **an annex to the previous CHI Vertigo report** and aims to provide recommendations to aid in the management of Vertigo. It is important to note that these recommendations should be utilized to support clinical decision-making and not replace it in the management of individual patients with Vertigo.

Health professionals are expected to consider this guidance alongside the specific needs, preferences, and values of their patients when exercising their judgment.

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Section 6.0 Appendices

Appendix A. Prescribing Edits Definition

I. Prescribing Edits (ensure consistent use of abbreviations, e.g., CU, ST)

Some covered drugs may have additional requirements, rules, or limits on coverage. These requirements and limits may include:

Prescribing edits Tools	Description
AGE (Age):	Coverage may depend on patient age
CU (Concurrent Use):	Coverage may depend upon concurrent use of another drug
G (Gender):	Coverage may depend on patient gender
MD (Physician Specialty):	Coverage may depend on prescribing physician's specialty or board certification
PA (Prior Authorization):	Requires specific physician request process
QL (Quantity Limits):	Coverage may be limited to specific quantities per prescription and/or time period
ST (Step Therapy):	Coverage may depend on previous use of another drug
EU (Emergency Use only):	This drug status on Formulary is only for emergency use
PE (Protocol Edit):	Use of drug is dependent on protocol combination, doses, and sequence of therapy

Appendix B. Vertigo Scope

2020	Changes	2023	Rationale
Section 1.0 Vertigo Clinical Guidelines			
Clinical Practice Guideline: Meniere's Disease Executive Summary-American Academy of Otolaryngology–Head and Neck Surgery Foundation 2020	N/A		
International consensus (ICON) on treatment of Ménière's disease [2	N/A		
European Position Statement on Diagnosis, and Treatment of Meniere's Disease-The European Academy of Otology and Neurotology and The Politzer Society [2018]	N/A		
NATIONAL CLINICAL GUIDELINE FOR THE TREATMENT OF MÉNIÈRE'S DISEASE-Published by the Danish Health Authority, September 2018	N/A		
Clinical Practice Guideline: Benign Paroxysmal Positional	N/A		

Vertigo(BPPV) (Update)- American Academy of Otolaryngology—Head and Neck Surgery Foundation [2017			
	Missing	Practice Guidelines for the Diagnosis and Management of Benign Paroxysmal Positional Vertigo Otoneurology Committee of Spanish Otorhinolaryngology and Head and Neck Surgery Consensus Document (2017)[8]	**Canalithiasis of the Posterior Semi-circular Canal** **Diagnosis** - The Dix-Hallpike test is the gold standard for the diagnosis of Benign Paroxysmal Positional Vertigo. **Treatment** - The management of Posterior Semicircular Canal Benign Paroxysmal Positional Vertigo (PSC-BPPV) primarily involves performing particle relocation maneuvers. Generally, pharmaceutical interventions are not effective in treating Benign Paroxysmal Positional Vertigo. - The two most employed maneuvers, which have garnered significant consensus in the literature and are supported by a sufficient number of class A studies, are the Epley and Semont maneuvers. - Several treatment protocols exist for managing BPPV, ranging from conducting a single maneuver during each session over multiple days to a week, to repeating the maneuvers within a single session until the BPPV is resolved. Among these approaches, the most commonly described in the literature involves performing one maneuver per session and assessing the results after one week.

			Horizontal Canal Benign Paroxysmal Positional Vertigo **Diagnosis** - The Pagnini-McClure test, also known as the roll test, serves as the diagnostic provocation test for the horizontal canal. **Treatment of Posterior Arm Canalithiasis (Geotropic Variant)** - Gufoni's maneuver , also termed Gufoni's maneuver for the geotropic variant - Lempert or BBQ roll maneuver **Treatment of Anterior Arm Canalithiasis** - Gufoni maneuver for the ageotropic variant, also termed Appiani maneuver is the treatment of choice. **Treatment of Cupulolithiasis** - The same treatment as that for anterior arm canalithiasis will be used (Gufoni maneuver for ageotropic variant/Appiani maneuver) with longer times between the different positions. **Probable Benign Paroxysmal Positional Vertigo, Spontaneously Resolved** - The absence of nystagmus during provocation tests in a patient displaying symptoms that suggest BPPV does not necessarily eliminate the possibility of a BPPV diagnosis. It's possible that there aren't enough particles present to induce positional nystagmus. This scenario is frequently encountered in clinical practice and is referred to as "probable BPPV, spontaneously resolved."

			Anterior Canal Canalithiasis **Diagnosis** - AC canalithiasis would be diagnosed by the cephalic hyperextension or Dix-Hallpike test. **Treatment** - Numerous treatment options have been proposed, often derived from treatments originally designed for posterior canal BPPV but with modifications aimed at addressing the anterior canal. Among these approaches, the Yacovino maneuver has gained notable popularity. One of its advantages is that it doesn't necessitate identifying the affected side since it can effectively treat either of the two anterior canals. **Benign Paroxysmal, Positional Vertigo with Involvement of Multiple Canals** - The clinical presentation would align with the syndrome, and during the examination, there would be multiple positive diagnostic positional tests that exhibit the described characteristics specific to the relevant canal. However, it's worth noting that nystagmus related to other affected canals, either entirely or partially overlapping, could potentially complicate the diagnosis. **Persistent Benign Paroxysmal Positional Vertigo** - Partial repositioning maneuvers are highly efficient, particularly for the posterior canal. It is estimated that approximately 90% to 95% of cases

			can be resolved with just one to three maneuvers on average. - Habituation exercises, those proposed by Brandt and Daroff being the prototype. Brandt and Daroff's exercises have proven less effective in resolving PC-BPPV than the particle repositioning maneuvers, but they might play a role for patients for whom these maneuvers have failed. They have two objectives: the dispersion and disaggregation of otoconia, repeatedly moving them in the canal, and promoting central habituation mechanisms. - Surgical intervention: In cases where treatment options have been exhausted and symptoms significantly impact a patient's quality of life, surgical interventions such as singular nerve section or occlusion of the posterior semicircular canal may be considered. However, these surgical measures are reserved for patients who are entirely unresponsive to treatment or whose symptoms are severely debilitating. **Recurrent Benign Paroxysmal Positional Vertigo** - The treatment does not vary, and the repositioning maneuver will be performed for the ear affected by the recurrence. **Differential Diagnosis of Benign Paroxysmal Positional Vertigo** - The disorders that could be confused with BPPV can be grouped into 3 categories:

			otological, neurological and other entities. **Imaging Tests for Benign Paroxysmal Positional Vertigo** - Imaging Tests for Benign Paroxysmal Positional Vertigo (level of evidence C according to the clinical practice guideline of the American Academy of Otolaryngology) - A brain MRI is typically recommended when there is suspicion of central disease in specific cases. **Pharmacological Treatment of Benign Paroxysmal Positional Vertigo** - There is no scientific evidence available in the literature to support the use of medications as a conclusive treatment for BPPV, nor do any drugs exist that can replace therapeutic maneuvers (level of evidence C according to the clinical practice guidelines of the American Academy of Otolaryngology).
	Missing	Diagnostic and therapeutic strategies for vestibular neuritis of the Japan society for equilibrium research (2023)[4]	- **Symptoms of vestibular neuritis** - **Examination for the diagnosis of vestibular neuritis** - **Treatment** - The treatment of vestibular neuritis is categorized into three stages: acute, subacute, and chronic. During the acute phase, the focus is on relieving symptoms like vertigo, nausea, and vomiting. In the subacute phase, when symptoms start to subside, patients are encouraged not to remain inactive. They should gradually resume activities like standing and walking,

			with the guidance to perform safe exercises such as walking while holding onto a handrail. In the chronic phase, individuals with persistent chronic imbalance experience ongoing feelings of lightheadedness and floating during body movements. Vestibular rehabilitation is recognized as an effective approach to improve balance issues in this chronic phase. - There is insufficient evidence to confirm the efficacy of anti-vertigo medications in treating acute vestibular neuritis. Nevertheless, betahistine, which can be effective for peripheral vertigo, might be taken into consideration (Grade of recommendation: C1). - The use of a combination comprising 20 mg of cinnarizine and 40 mg of dimenhydrinate might be beneficial for enhancing symptoms and activities of daily living during the initial phase of vestibular neuritis (Grade of recommendation: B). - The available evidence does not firmly establish the effectiveness of anti-emetic medications for treating acute vestibular neuritis. Nevertheless, first-generation antihistamines have been found to be effective in alleviating nausea and vomiting linked to sudden dizziness and could be contemplated as a treatment option for acute vestibular neuritis (Grade of recommendation: C1). - Diphenidol has been found to be effective in addressing different

			types of nausea and vomiting and can be contemplated as a treatment option during the initial phase of vestibular neuritis (Grade of recommendation: B). - Additionally, a combination of domperidone and cinnarizine might be effective and could be considered for managing vomiting associated with acute vestibular symptoms (Grade of recommendation: C1). - The use of corticosteroid therapy in vestibular neuritis may aid in the recovery of canal paresis but is not a well-established treatment option (Grade of recommendation: C1). - Steroid treatment for vestibular neuritis has the potential to assist in the process of vestibular compensation. (Grade of recommendation: C1). - There is little evidence in demonstrating the effectiveness of antiviral medications in treating vestibular neuritis, and it is not advisable to use antiviral drugs for the treatment of this condition (Grade of recommendation: D). - The available evidence is insufficient to confirm the efficacy of anti-vertigo medications in the treatment of acute vestibular neuritis. Nevertheless, betahistine might be considered as it could help alleviate vertigo symptoms (Grade of recommendation: C1). - Anti-vertigo medications that include betahistine may prove effective in addressing peripheral

			vertigo (Grade of recommendation: C1). - Vestibular rehabilitation has been found to be effective in treating long-term cases of vestibular neuritis (Grade of recommendation: A).
	Missing	Clinical Practice Guidance for Ménière Disease (2020) by Lippincott Nursing Center[11]	- **Categories of Ménière Disease (MD)** **Diagnosis** - Audiogram testing is strongly recommended for the diagnosis of MD. - Patients diagnosed with Meniere's disease (MD) and confirmed asymmetric sensorineural hearing loss through audiometric testing should be recommended to undergo magnetic resonance imaging (MRI) scans of the internal auditory canal and the posterior fossa. - Diagnosing MD with routine vestibular function testing or electrocochleography (ECochG) is not recommended. **Management and Treatment** 1. Symptomatic Management of Vertigo: In the case of individuals with Meniere's disease (MD), the use of vestibular suppressant medications is advisable only during an acute vertigo episode. These recommended vestibular suppressants include first-generation antihistamines, anticholinergic drugs, and benzodiazepines. 2. Symptom Reduction and Prevention: Offer patient education regarding dietary changes and

			lifestyle adjustments to minimize or prevent symptoms associated with MD. Some factors contributing to MD may be associated with allergies, stress, or excessive intake of salt and caffeine, all of which are modifiable. 3. Oral Pharmacotherapy for Maintenance: Diuretics and/or betahistine can be presented as choices for continuous treatment aimed at reducing or preventing symptoms of MD. It's important to note that this maintenance therapy is not meant to eliminate symptoms during an acute MD episode but rather to address chronic and persistent symptoms in affected patients. 4. Positive Pressure Therapy: Avoid using positive pressure therapy for MD, which involves small pressure pulses via an earpiece placed in the external ear canal. 5. Intratympanic (IT) Steroid Therapy: Consider IT steroids, such as Methylprednisolone and dexamethasone, when noninvasive treatments are ineffective. These steroids are commonly used and have minimal side effects and complications. 6. Intratympanic Gentamicin Therapy: If noninvasive treatments are not successful, IT gentamicin may be recommended when administered by an experienced provider. 7. Surgical Ablative Therapy: For patients with active MD, nonfunctional hearing, and unsuccessful previous treatments, a

			labyrinthectomy performed by a qualified provider is recommended. 8. <u>Vestibular Therapy for Chronic Imbalance:</u> Vestibular physiotherapy is advised for MD patients with chronic imbalance, particularly those experiencing unsteadiness following ablative therapy with medication or labyrinthectomy. 9. <u>Vestibular Therapy for Acute Vertigo:</u> Vestibular physiotherapy is not recommended for managing acute vertigo episodes in MD patients, as its benefits are unproven.
	Missing	Dizziness: Approach to Evaluation and Management by the American Academy of Family Physicians (2017)[9]	**Titrate the evaluation** - TiTrATE represents an innovative diagnostic method for identifying the likely cause of dizziness or vertigo. **Differential diagnosis** **History: timing, triggers, and medications** - Individuals who report experiencing a feeling of self-motion when they are stationary or a sensation of altered self-motion during typical head movements may be exhibiting vertigo. - Medications were found to be a contributing factor in 23% of instances of dizziness among elderly individuals in a primary care context. **Physical examination** - When evaluating patients with dizziness, the physical examination should encompass measuring orthostatic blood pressure,

			assessing nystagmus, and performing the Dix-Hallpike maneuver for induced vertigo (Level of evidence, C). **Laboratory testing and imaging** - It is not advisable to pursue laboratory testing and imaging when there are no neurological irregularities detected during the examination (Level of evidence, C). **Peripheral Etiologies** **Benign Paroxysmal Positional Vertigo (BPPV)** - Benign paroxysmal positional vertigo is managed through a canalith repositioning maneuver, such as the Epley procedure (Level of evidence, A). **Vestibular neuritis** - Symptoms of vestibular neuritis can be alleviated using medication and vestibular therapy (Level of evidence, C). **Meniere disease** - Low-salt diet and the use of diuretics can lead to an improvement in the symptoms of Meniere's disease (Level of evidence, B). - Transtympanic injections of glucocorticoids and gentamicin can provide relief from vertigo. While transtympanic glucocorticoids may offer benefits to hearing, the use of transtympanic gentamicin is linked to potential hearing loss and is best reserved for patients already experiencing significant hearing impairment.

			- For managing acute attacks, vestibular suppressant medications can be employed, including effective options like prochlorperazine, promethazine, and diazepam (Valium). **Central Etiologies** **Vestibular migraine** - The initial approach focuses on the identification and avoidance of migraine triggers. - Stress management is advised, and it's essential to ensure sufficient sleep and engage in regular physical activity. - The use of vestibular suppressant medications can be beneficial. However, due to a lack of well-structured randomized clinical trials, recommendations for prevention are primarily based on expert opinions. **Vertebrobasilar ischemia** - Treatment involves antiplatelet therapy and the reduction of risk factors associated with cerebrovascular disease. - In instances of significant vertebral or basilar artery stenosis, warfarin (Coumadin) has been utilized.
	Missing	Efficacy of Benzodiazepines or Antihistamines for Patients With Acute Vertigo: A Systematic Review and Meta-analysis (2022)[10]	- In 3 trials with a low risk of bias antihistamines were associated with a 16.1-point greater decrease in vertigo (95% CI, 7.2 to 25.0; I 2 = 47%) than benzodiazepines. - Antihistamines performed similarly to other active comparators (mean difference, 2.7 [95% CI, –6.1 to 11.5]; I^2 = 72%).

			- In general, there were no distinctions in the outcomes measured at the two-hour mark between antihistamines and the comparison groups. However, it is worth noting that the single study that compared antihistamines and benzodiazepines for these specific outcomes reported antihistamines as being more effective than benzodiazepines. - After one week, there was no statistically significant difference in improvement favoring antihistamines among the 269 patients included in five trials that compared antihistamines to placebo or no intervention. The relative risk (RR) was 1.15 (with a 95% confidence interval of 1.00 to 1.32), and the I2 value was 41%. - The reporting of adverse events lacked consistency and seldom had predefined criteria. None of the comparisons between antihistamines and benzodiazepines, as well as other control groups or placebos, yielded statistically significant results. - There is a widespread agreement that repositioning maneuvers are the preferred initial treatment for BPPV. However, it is important to note that these maneuvers may not always produce the desired results, and patients frequently need additional measures to address their vertigo symptoms. - Both benzodiazepines and antihistamines are employed as agents to suppress vestibular symptoms in patients with vertigo. - It remains uncertain whether antihistamines can provide relief for patients experiencing acute vertigo when used for one week to one month, but our review did not yield

			consistent evidence of a strong effect. - There is a scarcity of evidence regarding the use of benzodiazepines for the treatment of acute vertigo, and the existing studies do not endorse their efficacy.

Appendix C. MeSH Terms PubMed

C.1 Pubmed Search for Vertigo

The following is the result of the PubMed search conducted for vertigo guideline search:

Query	Filters	Search Details	Results
((Vertigo[MeSH Terms]) OR (Vertigos[Title/Abstract])) OR (Vertigo, Subjective[Title/Abstract])) OR (Subjective Vertigo[Title/Abstract])) OR (Subjective Vertigos[Title/Abstract])) OR (Vertigos, Subjective[Title/Abstract])) OR (Spinning Sensation[Title/Abstract])) OR (Sensation, Spinning[Title/Abstract])) OR (Sensations, Spinning[Title/Abstract])) OR (Spinning Sensations[Title/Abstract])) OR (Positional Vertigo[Title/Abstract])) OR (Vertigo, Positional[Title/Abstrac	Guideline, in the last 5 years	("Vertigo"[MeSH Terms] OR "Vertigos"[Title/Abstract] OR "vertigo subjective"[Title/Abstract] OR "subjective vertigo"[Title/Abstract] OR (("Subjective"[All Fields] OR "subjectively"[All Fields] OR "subjectiveness"[All Fields] OR "subjectives"[All Fields] OR "subjectivities"[All Fields] OR "subjectivity"[All Fields]) AND "Vertigos"[Title/Abstract]) OR (("Vertigo"[MeSH Terms] OR "Vertigo"[All Fields] OR "Vertigos"[All Fields] OR "vertigoes"[All Fields]) AND "Subjective"[Title/Abstract]) OR "spinning	9

t])) OR (Vertigo, Brain Stem[Title/Abstract])) OR (Brain Stem Vertigo[Title/Abstract])) OR (Brain Stem Vertigos[Title/Abstract])) OR (Vertigos, Brain Stem[Title/Abstract])) OR (Vertigo, Brainstem[Title/Abstra ct])) OR (Brainstem Vertigo[Title/Abstract])) OR (Brainstem Vertigos[Title/Abstract])) OR (Vertigos, Brainstem[Title/Abstra ct])) OR (Vertigo, Peripheral[Title/Abstra ct])) OR (Peripheral Vertigo[Title/Abstract])) OR (Peripheral Vertigos[Title/Abstract])) OR (Vertigos, Peripheral[Title/Abstra ct])) OR (Vertigo, Essential[Title/Abstract])) OR (Essential Vertigo[Title/Abstract])) OR (Essential Vertigos[Title/Abstract])) OR (Vertigos, Essential[Title/Abstract])) OR (Vertigo, Intermittant[Title/Abstr act])) OR (Intermittant Vertigo[Title/Abstract])) OR (Intermittant Vertigos[Title/Abstract])) OR (Vertigos, Intermittant[Title/Abstr act])) OR (Vertigo, Paroxysmal[Title/Abstr act])) OR (Paroxysmal Vertigo[Title/Abstract])) OR (Paroxysmal Vertigos[Title/Abstract])) OR (Vertigos, Paroxysmal[Title/Abstr		sensation"[Title/Abstract] OR (("sensate"[All Fields] OR "Sensation"[MeSH Terms] OR "Sensation"[All Fields] OR "Sensations"[All Fields]) AND "Spinning"[Title/Abstract]) OR "sensations spinning"[Title/Abstract] OR "spinning sensations"[Title/Abstract] OR "positional vertigo"[Title/Abstract] OR "vertigo positional"[Title/Abstract] OR (("Vertigo"[MeSH Terms] OR "Vertigo"[All Fields] OR "Vertigos"[All Fields] OR "vertigoes"[All Fields]) AND "brain stem"[Title/Abstract]) OR (("brain stem"[MeSH Terms] OR ("Brain"[All Fields] AND "Stem"[All Fields]) OR "brain stem"[All Fields]) AND "Vertigo"[Title/Abstract]) OR (("brain stem"[MeSH Terms] OR ("Brain"[All Fields] AND "Stem"[All Fields]) OR "brain stem"[All Fields]) AND "Vertigos"[Title/Abstract]) OR (("Vertigo"[MeSH Terms] OR "Vertigo"[All Fields] OR "Vertigos"[All Fields] OR "vertigoes"[All Fields]) AND "brain stem"[Title/Abstract]) OR "vertigo brainstem"[Title/Abstract] OR "brainstem vertigo"[Title/Abstract] OR (("brain stem"[MeSH Terms] OR ("Brain"[All Fields] AND "Stem"[All Fields]) OR "brain stem"[All Fields] OR	

act])) OR (Central Nervous System Origin Vertigo[Title/Abstract])) OR (Vertigo, Central Origin[Title/Abstract])) OR (Central Origin Vertigo[Title/Abstract])) OR (Central Origin Vertigos[Title/Abstract])) OR (Origin Vertigo, Central[Title/Abstract])) OR (Origin Vertigos, Central[Title/Abstract])) OR (Vertigos, Central Origin[Title/Abstract])) OR (CNS Origin Vertigo[Title/Abstract])) OR (CNS Origin Vertigos[Title/Abstract])) OR (Origin Vertigo, CNS[Title/Abstract])) OR (Origin Vertigos, CNS[Title/Abstract])) OR (Vertigo, CNS Origin[Title/Abstract])) OR (Vertigos, CNS Origin[Title/Abstract])) OR (Vertigo, Central Nervous System Origin[Title/Abstract])) OR (Vertigo, Constant[Title/Abstract])) OR (Constant Vertigo[Title/Abstract])) OR (Constant Vertigos[Title/Abstract])) OR (Vertigos, Constant[Title/Abstract])		"Brainstem"[All Fields] OR "brainstems"[All Fields] OR "brainstem s"[All Fields]) AND "Vertigos"[Title/Abstract]) OR (("Vertigo"[MeSH Terms] OR "Vertigo"[All Fields] OR "Vertigos"[All Fields] OR "vertigoes"[All Fields]) AND "Brainstem"[Title/Abstract]) OR "vertigo peripheral"[Title/Abstract] OR "peripheral vertigo"[Title/Abstract] OR "peripheral vertigos"[Title/Abstract] OR (("Vertigo"[MeSH Terms] OR "Vertigo"[All Fields] OR "Vertigos"[All Fields] OR "vertigoes"[All Fields]) AND "Peripheral"[Title/Abstract]) OR (("Vertigo"[MeSH Terms] OR "Vertigo"[All Fields] OR "Vertigos"[All Fields] OR "vertigoes"[All Fields]) AND "Essential"[Title/Abstract]) OR (("Essential"[All Fields] OR "essentials"[All Fields]) AND "Vertigo"[Title/Abstract]) OR (("Essential"[All Fields] OR "essentials"[All Fields]) AND "Vertigos"[Title/Abstract]) OR (("Vertigo"[MeSH Terms] OR "Vertigo"[All Fields] OR "Vertigos"[All Fields] OR "vertigoes"[All Fields]) AND "Essential"[Title/Abstract]) OR (("Vertigo"[MeSH Terms] OR "Vertigo"[All Fields] OR "Vertigos"[All Fields] OR "vertigoes"[All Fields]) AND	

		"Intermittant"[Title/Abstract]) OR (("Intermittant"[All Fields] OR "intermittence"[All Fields] OR "intermittencies"[All Fields] OR "intermittency"[All Fields] OR "intermittent"[All Fields] OR "intermittently"[All Fields]) AND "Vertigo"[Title/Abstract]) OR (("Intermittant"[All Fields] OR "intermittence"[All Fields] OR "intermittencies"[All Fields] OR "intermittency"[All Fields] OR "intermittent"[All Fields] OR "intermittently"[All Fields]) AND "Vertigos"[Title/Abstract]) OR (("Vertigo"[MeSH Terms] OR "Vertigo"[All Fields] OR "Vertigos"[All Fields] OR "vertigoes"[All Fields]) AND "Intermittant"[Title/Abstract]) OR "vertigo paroxysmal"[Title/Abstract] OR "paroxysmal vertigo"[Title/Abstract] OR "paroxysmal vertigos"[Title/Abstract] OR (("Vertigo"[MeSH Terms] OR "Vertigo"[All Fields] OR "Vertigos"[All Fields] OR "vertigoes"[All Fields]) AND "Paroxysmal"[Title/Abstract]) OR (("central nervous system"[MeSH Terms] OR ("Central"[All Fields] AND "Nervous"[All Fields] AND "System"[All Fields]) OR "central nervous system"[All Fields]) AND	

		"origin vertigo"[Title/Abstract]) OR "vertigo central origin"[Title/Abstract] OR "central origin vertigo"[Title/Abstract] OR ((("Central"[All Fields] OR "centrally"[All Fields] OR "centrals"[All Fields]) AND ("Origin"[All Fields] OR "originate"[All Fields] OR "originated"[All Fields] OR "originates"[All Fields] OR "originating"[All Fields] OR "origination"[All Fields] OR "originations"[All Fields] OR "origins"[All Fields])) AND "Vertigos"[Title/Abstract]) OR (("Origin"[All Fields] OR "originate"[All Fields] OR "originated"[All Fields] OR "originates"[All Fields] OR "originating"[All Fields] OR "origination"[All Fields] OR "originations"[All Fields] OR "origins"[All Fields]) AND "vertigo central"[Title/Abstract]) OR ((("Origin"[All Fields] OR "originate"[All Fields] OR "originated"[All Fields] OR "originates"[All Fields] OR "originating"[All Fields] OR "origination"[All Fields] OR "originations"[All Fields] OR "origins"[All Fields]) AND ("Vertigo"[MeSH Terms] OR "Vertigo"[All Fields] OR "Vertigos"[All Fields] OR "vertigoes"[All Fields])) AND "Central"[Title/Abstract]) OR (("Vertigo"[MeSH Terms] OR "Vertigo"[All Fields] OR "Vertigos"[All Fields] OR "vertigoes"[All	

		Fields]) AND "central origin"[Title/Abstract]) OR (("ieee conf commun netw secur"[Journal] OR "clin nurse spec"[Journal] OR "clin nurs stud"[Journal] OR "CNS"[All Fields]) AND "origin vertigo"[Title/Abstract]) OR ((("ieee conf commun netw secur"[Journal] OR "clin nurse spec"[Journal] OR "clin nurs stud"[Journal] OR "CNS"[All Fields]) AND ("Origin"[All Fields] OR "originate"[All Fields] OR "originated"[All Fields] OR "originates"[All Fields] OR "originating"[All Fields] OR "origination"[All Fields] OR "originations"[All Fields] OR "origins"[All Fields])) AND "Vertigos"[Title/Abstract]) OR ((("Origin"[All Fields] OR "originate"[All Fields] OR "originated"[All Fields] OR "originates"[All Fields] OR "originating"[All Fields] OR "origination"[All Fields] OR "originations"[All Fields] OR "origins"[All Fields]) AND ("Vertigo"[MeSH Terms] OR "Vertigo"[All Fields] OR "Vertigos"[All Fields] OR "vertigoes"[All Fields])) AND "CNS"[Title/Abstract]) OR ((("Origin"[All Fields] OR "originate"[All Fields] OR "originated"[All Fields] OR "originates"[All Fields] OR "originating"[All Fields] OR "origination"[All Fields] OR "originations"[All Fields] OR "origins"[All	

		Fields]) AND ("Vertigo"[MeSH Terms] OR "Vertigo"[All Fields] OR "Vertigos"[All Fields] OR "vertigoes"[All Fields])) AND "CNS"[Title/Abstract]) OR (("Vertigo"[MeSH Terms] OR "Vertigo"[All Fields] OR "Vertigos"[All Fields] OR "vertigoes"[All Fields]) AND "cns origin"[Title/Abstract]) OR (("Vertigo"[MeSH Terms] OR "Vertigo"[All Fields] OR "Vertigos"[All Fields] OR "vertigoes"[All Fields]) AND "cns origin"[Title/Abstract]) OR (("Vertigo"[MeSH Terms] OR "Vertigo"[All Fields] OR "Vertigos"[All Fields] OR "vertigoes"[All Fields]) AND "central nervous system origin"[Title/Abstract]) OR (("Vertigo"[MeSH Terms] OR "Vertigo"[All Fields] OR "Vertigos"[All Fields] OR "vertigoes"[All Fields]) AND "Constant"[Title/Abstract]) OR "constant vertigo"[Title/Abstract] OR (("Constant"[All Fields] OR "constants"[All Fields]) AND "Vertigos"[Title/Abstract]) OR (("Vertigo"[MeSH Terms] OR "Vertigo"[All Fields] OR "Vertigos"[All Fields] OR "vertigoes"[All Fields]) AND "Constant"[Title/Abstract])) AND ((y_5[Filter]) AND (guideline[Filter]))	

Appendix D. Treatment Algorithm

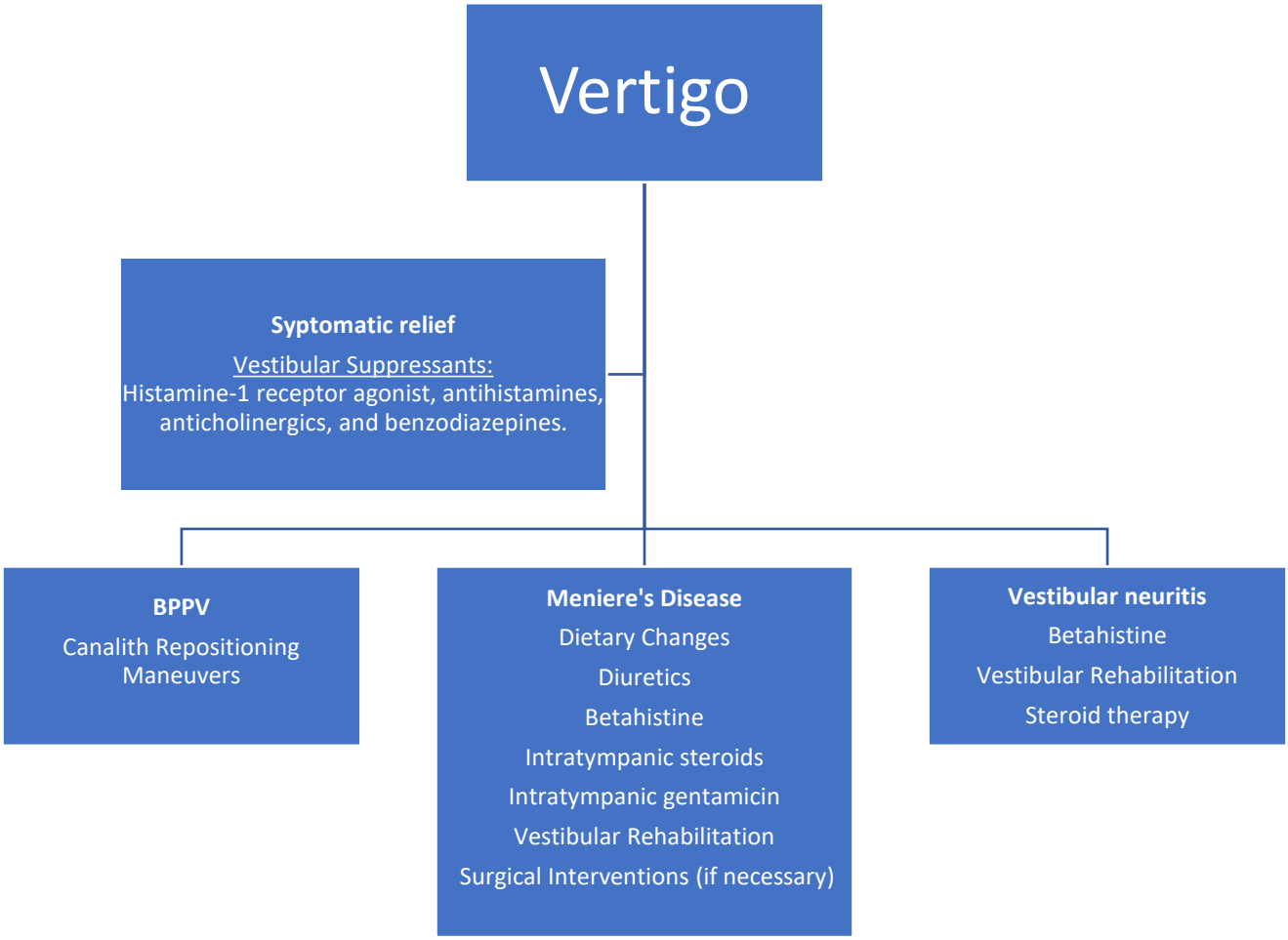

Figure 15. *Treatment algorithm for the management of vertigo*[3,4,11]

ضمان
مجلس الضمان الصحي
Council of Health Insurance