

Clinical Practice Guideline: Benign Paroxysmal Positional Vertigo (Update)

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Otolaryngology—
 Head and Neck Surgery
 2017, Vol. 156(3S) S1–S47
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 Surgery Foundation 2017
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sagepub.com/journalsPermissions.nav
 DOI: 10.1177/0194599816689667
<http://otojournal.org>


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Abstract

Objective. This update of a 2008 guideline from the American Academy of Otolaryngology—Head and Neck Surgery Foundation provides evidence-based recommendations to benign paroxysmal positional vertigo (BPPV), defined as a disorder of the inner ear characterized by repeated episodes of positional vertigo. Changes from the prior guideline include a consumer advocate added to the update group; new evidence from 2 clinical practice guidelines, 20 systematic reviews, and 27 randomized controlled trials; enhanced emphasis on patient education and shared decision making; a new algorithm to clarify action statement relationships; and new and expanded recommendations for the diagnosis and management of BPPV.

Purpose. The primary purposes of this guideline are to improve the quality of care and outcomes for BPPV by improving the accurate and efficient diagnosis of BPPV, reducing the inappropriate use of vestibular suppressant medications, decreasing the inappropriate use of ancillary testing such as radiographic imaging, and increasing the use of appropriate therapeutic repositioning maneuvers. The guideline is intended for all clinicians who are likely to diagnose and manage patients with BPPV, and it applies to any setting in which BPPV would be identified, monitored, or managed. The target patient for the guideline is aged ≥ 18 years with a suspected or potential diagnosis of BPPV. The primary outcome considered in this guideline is the resolution of the symptoms associated with BPPV. Secondary outcomes considered include an increased rate of accurate diagnoses of BPPV, a more efficient return to regular activities and work, decreased use of inappropriate medications and unnecessary diagnostic tests, reduction in recurrence of BPPV, and reduction in adverse events

associated with undiagnosed or untreated BPPV. Other outcomes considered include minimizing costs in the diagnosis and treatment of BPPV, minimizing potentially unnecessary re- turn physician visits, and maximizing the health-related quality of life of individuals afflicted with BPPV.

Action Statements. The update group made *strong recommendations* that clinicians should (1) diagnose posterior semicircular canal BPPV when vertigo associated with torsional, upbeat nystagmus is provoked by the Dix-Hallpike maneuver, performed by bringing the patient from an upright to supine position with the head turned 45° to one side and neck extended 20° with the affected ear down, and (2) treat, or refer to a clinician who can treat, patients with posterior canal BPPV with a canalith repositioning procedure. The update group made a *strong recommendation against* postprocedural postural restrictions after canalith repositioning procedure for posterior canal BPPV. The update group made *recommendations* that the clinician should (1) perform, or refer to a clinician who can perform, a supine roll test to assess for lateral semicircular canal BPPV if the patient has a history compatible with BPPV and the Dix-Hallpike test exhibits horizontal or no nystagmus; (2) differentiate, or refer to a clinician who can differentiate, BPPV from other causes of imbalance, dizziness, and vertigo; (3) assess patients with BPPV for factors that modify management, including impaired mobility or balance, central nervous system disorders, a lack of home support, and/or increased risk for falling; (4) reassess patients within 1 month after an initial period of observation or treatment to document resolution or persistence of symptoms; (5) evaluate, or refer to a clinician who can evaluate, patients with persistent symptoms for unresolved BPPV and/or underlying peripheral vestibular or central nervous system disorders; and (6) educate patients regarding the impact of BPPV on their safety, the potential for disease recurrence, and the importance of follow-up. The update group made *recommendations against* (1) radiographic imaging for a patient who meets diagnostic criteria for BPPV in

the absence of additional signs and/or symptoms inconsistent with BPPV that warrant imaging, (2) vestibular testing for a patient who meets diagnostic criteria for BPPV in the absence of additional vestibular signs and/or symptoms inconsistent with BPPV that warrant testing, and (3) routinely treating BPPV with vestibular suppressant medications such as antihistamines and/or benzodiazepines. The guideline update group provided the *options* that clinicians may offer (1) observation with follow-up as initial management for patients with BPPV and (2) vestibular rehabilitation, either self-administered or with a clinician, in the treatment of BPPV.

Keywords

benign paroxysmal positional vertigo, BPPV

Received October 19, 2016; revised November 17, 2016; accepted December 29, 2016.

Differences from Prior Guideline

This clinical practice guideline is as an update and replacement for an earlier guideline published in 2008 by the American Academy of Otolaryngology—Head and Neck Surgery Foundation (AAO-HNSF).¹ An update was necessitated by new primary studies and systematic reviews that might suggest a need for modifying clinically important recommendations. Changes in content and methodology from the prior guideline include the following:

- Addition of a patient advocate to the guideline development group
- New evidence from 2 clinical practice guidelines, 20 systematic reviews, and 27 randomized controlled trials (RCTs)
- Emphasis on patient education and shared decision making
- Expanded action statement profiles to explicitly state quality improvement opportunities, confidence in the evidence, intentional vagueness, and differences of opinion
- Enhanced external review process to include public comment and journal peer review

- New algorithm to clarify decision making and action statement relationships
- New recommendation regarding canalith repositioning postprocedural restrictions
- Expansion of the recommendations regarding radiographic and vestibular testing
- Removal of the “no recommendation” for audiometric testing
- Addition of a diagnostic and treatment visual algorithm

Introduction

A primary complaint of dizziness accounts for 5.6 million clinic visits in the United States per year, and between 17% and 42% of patients with vertigo ultimately receive a diagnosis of benign paroxysmal positional vertigo (BPPV).²⁻⁴ BPPV is a form of positional vertigo.

- *Vertigo* is defined as an illusory sensation of motion of either the self or the surroundings in the absence of true motion.
- Positional vertigo is defined as a spinning sensation produced by changes in head position relative to gravity.
- BPPV is defined as a disorder of the inner ear characterized by repeated episodes of positional vertigo (Table 1).

Traditionally, the terms “benign” and “paroxysmal” have been used to characterize this particular form of positional vertigo. In this context, the descriptor *benign* historically implies that BPPV was a form of positional vertigo not due to any serious central nervous system (CNS) disorder and that there was an overall favorable prognosis for recovery.⁵ This favorable prognosis is based in part on the fact that BPPV can recover spontaneously in approximately 20% of patients by 1 month of follow-up and up to 50% at 3 months.^{6,7} However, the clinical and quality-of-life impacts of undiagnosed and untreated BPPV may be far from “benign,” as patients with BPPV are at increased risk for falls and impairment in the performance of daily activities.⁸

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Table 1. Definitions of Common Terms.

Term	Definition
Vertigo	An illusory sensation of motion of either the self or the surroundings in the absence of true motion.
Nystagmus	A rapid, involuntary oscillatory movement of the eyeball.
Vestibular system/apparatus	The sensory system within the inner ear that, with the vestibular nerve and its connections in the brain, provides the fundamental input to the brain regarding balance and spatial orientation.
Positional vertigo	Vertigo produced by changes in the head position relative to gravity.
Benign paroxysmal positional vertigo (BPPV)	A disorder of the inner ear characterized by repeated episodes of positional vertigo.
Posterior canal BPPV	A form of BPPV in which dislodged inner ear particles in the posterior semicircular canal abnormally influence the balance system producing the vertigo, most commonly diagnosed with the Dix-Hallpike test.
Lateral canal BPPV	A form of BPPV in which dislodged inner ear particles in the lateral semicircular canal abnormally influence the balance system producing the vertigo, most commonly diagnosed by the supine roll test.
Canalithiasis	A theory for the pathogenesis of BPPV that proposes that there are free-floating particles (otoconia) that have moved from the utricle and collect near the cupula of the affected canal, causing forces in the canal leading to abnormal stimulation of the vestibular apparatus.
Cupulolithiasis	A theory for the pathogenesis of BPPV that proposes that otoconial debris attached to the cupula of the affected semicircular canal cause abnormal stimulation of the vestibular apparatus.
Canalith repositioning procedures (CRPs)	A group of procedures in which the patient moves through specific body positions designed to relocate dislodged particles within the inner ear for the purpose of relieving symptoms of BPPV. The specific CRP chosen relates to the type of BPPV diagnosed. These have also been termed <i>canalith repositioning maneuvers</i> or <i>canalith repositioning techniques</i> .

Furthermore, patients with BPPV experience effects on individual health-related quality of life, and utility measures demonstrate that treatment of BPPV results in improvement in quality of life.⁹ The term *paroxysmal* in this context describes the rapid and sudden onset of vertigo, initiated at any time by a change of position, thus resulting in BPPV. BPPV has also been termed *benign positional vertigo*, *paroxysmal positional vertigo*, *positional vertigo*, *benign paroxysmal nystagmus*, and *paroxysmal positional nystagmus*. In this guideline, the panel chose to retain the terminology of BPPV, as it is the most common terminology encountered in the literature and in clinical practice.⁸

BPPV is most commonly clinically encountered as 1 of 2 variants: BPPV of the posterior semicircular canal (posterior canal BPPV) or BPPV of the lateral semicircular canal (also known as horizontal canal BPPV).¹⁰⁻¹² Posterior canal BPPV is more common than horizontal canal BPPV, constituting approximately 85% to 95% of BPPV cases.¹² Although debated, posterior canal BPPV is most commonly thought to be due to canalithiasis, wherein fragmented otolith particles (otoconia) entering the posterior canal become displaced, cause inertial changes to the cupula in the posterior canal, and thereby result in abnormal nystagmus and vertigo when the head encounters motion in the plane of the affected semicircular canal.^{12,13} Lateral (horizontal) canal BPPV accounts for 5% to 15% of BPPV cases.^{11,12} The etiology of lateral canal BPPV is also felt to be due to the presence of abnormal debris within the lateral canal, but the pathophysiology is not as well understood as that of posterior canal BPPV. Other rare variations include anterior canal BPPV, multicanal BPPV, and bilateral multicanal BPPV.

Guideline Purpose

The primary purposes of this guideline are to improve quality of care and outcomes for BPPV by improving the accurate and efficient diagnosis of BPPV, reducing the inappropriate use of vestibular suppressant medications, decreasing the inappropriate use of ancillary testing such as radiographic imaging, and increasing the use of appropriate therapeutic repositioning maneuvers. The guideline is intended for all clinicians who are likely to diagnose and manage patients with BPPV, and it applies to any setting in which BPPV would be identified, monitored, or managed. The target patient for the guideline is aged ≥ 18 years with a suspected or potential diagnosis of BPPV. The pediatric population was not included in the target population, in part due to a substantially smaller body of evidence on pediatric BPPV. No specific recommendations are made concerning surgical therapy for BPPV.

The guideline focuses on BPPV, recognizing that BPPV may arise in conjunction with other neurologic or otologic conditions and that the treatment of the symptom components specifically related to BPPV may still be managed according to the guideline. This guideline does not discuss BPPV affecting the anterior semicircular canal, as this diagnosis is quite rare and its pathophysiology is poorly understood.^{14,15} It also does not discuss benign paroxysmal vertigo of childhood, disabling positional vertigo due to vascular loop compression in the brainstem, or vertigo that arises from changes in head position *not* related to gravity (ie, vertigo of cervical origin or vertigo of vascular origin). These conditions are physiologically distinct from BPPV.

Table 2. Interventions Considered in Benign Paroxysmal Positional Vertigo Guideline Development.

Diagnosis	Clinical history Review of the medication list Physical examination Dix-Hallpike (positional) testing Supine roll test and bow and lean test side-lying maneuver Post-head-shaking nystagmus Audiometry Magnetic resonance imaging Computed tomography Blood tests: complete blood count, serum chemistry, etc Frenzel lenses and infrared goggle testing Electronystagmography Videonystagmography Vestibular evoked myogenic potentials Balance and gait testing Vestibular function testing Computerized posturography Orthostatic balance testing Vestibular caloric testing
Treatment	Watchful waiting/observation Education/information/counseling Medical therapy (vestibular suppressant medications, benzodiazepines) Cervical immobilization with cervical collar Prolonged upright position Patient self-treatment with home-based maneuvers or rehabilitation Brandt-Daroff exercises Epley maneuver and modifications of the Epley maneuver Semont maneuver Gufoni maneuver Physical therapy/vestibular physical therapy Spinal manipulative therapy Mastoid vibration Posterior semicircular canal occlusion (excluded from guideline) Singular neurectomy (excluded from guideline) Vestibular neurectomy (excluded from guideline)
Prevention	Head trauma or whiplash injury as potential causative factors Use of helmets to prevent head trauma and/or cervical collars Fall prevention

In 2008, the AAO-HNSF published a multidisciplinary clinical practice guideline on benign positional vertigo.¹ As 8 years have elapsed since the publication of that guideline, a multidisciplinary guideline update group was convened to perform an assessment and planned update of that guideline, utilizing the most current evidence base. Our goal was to revise the prior guideline with an a priori determined transparent process, reconsidering a more current evidence base while taking into account advances in knowledge with respect to BPPV.

The primary outcome considered in this guideline is the resolution of symptoms associated with BPPV. Secondary outcomes considered include an increased rate of accurate diagnoses of BPPV, a more efficient return to regular activities and work, decreased use of inappropriate medications and unnecessary diagnostic tests, reduction in recurrence of BPPV, and reduction in adverse events associated with undiagnosed or untreated BPPV. Other outcomes considered include minimizing costs in the diagnosis and treatment of BPPV, minimizing potentially unnecessary return physician visits, and maximizing

the health-related quality of life of individuals afflicted with BPPV. The significant incidence of BPPV, its functional impact, and the wide diversities of diagnostic and therapeutic interventions for BPPV (**Table 2**) make this an important condition for an up-to-date evidence-based practice guideline.

Health Care Burden

Overall, the prevalence of BPPV has been reported to range from 10.7 to 140 per 100,000 population.¹⁶⁻¹⁸ However, studies of select patients have estimated a prevalence of 900 per 10,000.¹⁹⁻²¹ Others have reported a lifetime prevalence of 2.4%, a 1-year prevalence of 1.6%, and a 1-year incidence of 0.6%.²² Women are more frequently affected than men, with a female:male ratio of 2.2 to 1.5:1.²³ BPPV is also the most common vestibular disorder across the life span,^{12,24,25} although the age of onset is most commonly between the fifth and seventh decades of life.⁵ Given the noteworthy prevalence of BPPV, its health care and societal impacts are tremendous.

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The costs to the health care system and the indirect costs of BPPV are also significant. It is estimated that it costs approximately \$2000 to arrive at the diagnosis of BPPV and that

>65% of patients with this condition will undergo potentially unnecessary diagnostic testing or therapeutic interventions.²⁶ Therefore, health care costs associated with the diagnosis of BPPV alone approach \$2 billion per year. Furthermore, despite the fact that the natural history of BPPV includes a spontaneous resolution rate ranging from 27% to 50%, this often takes a significant amount of time, and almost 86% of patients with BPPV will suffer some interrupted daily activities and lost days at work due to BPPV.^{22,27} In addition, 68% of patients with BPPV will reduce their workload, while 4% will change their job and 6% will quit their job as a result of the condition.²⁸ Furthermore, BPPV is more common in older individuals, with a correspondingly more pronounced health and quality-of-life impact. It has been estimated that 9% of elderly patients undergoing comprehensive geriatric assessment for nonbalance-related complaints have unrecognized BPPV.¹⁹ More recent studies of symptomatic individuals have found BPPV to be present in 40% of geriatric patients seen for dizziness, with an overall general prevalence of 3.4% in individuals aged >60.^{22,29}

Older patients with BPPV experience a greater incidence of falls, depression, and impairments of their daily activities.¹⁹ Persistent untreated or undiagnosed vertigo in the elderly leads to increased caregiver burden with resultant societal costs including decreased family productivity and increased risk of nursing home placement. Among an estimated 7.0 million elderly individuals reporting dizziness in the prior 12 months, 2.0 million (30.1%) reported vertigo, and there were 230,000 office visits among the elderly with a diagnosis of BPPV.^{30,31} With the increasing age of the US population, the incidence and prevalence of BPPV may correspondingly increase over the next 20 years.

BPPV may be diagnosed and treated by multiple clinical disciplines. Despite its significant prevalence and quality-of-life and economic impacts, considerable practice variations exist in the management of BPPV across disciplines.³² These variations relate to diagnostic strategies for BPPV, timeliness of referral and rates of utilization of various treatment options available for BPPV within and across the various medical specialties and disciplines involved in its management. For example, the utilization of medications for the treatment of BPPV vary substantially among primary care providers and across specialties.³³ Delays in the diagnosis and treatment of BPPV have cost and quality-of-life implications for patients and their caregivers.

Fife and FitzGerald found that patients with BPPV suffer from delays in diagnosis and treatment on the order of months.³³ Other authors have found that only 10% to 20% of patients with BPPV seen by a physician will receive appropriate repositioning maneuvers.^{22,34} Furthermore, a large number of patients with BPPV will undergo unnecessary diagnostic testing and treatments prior to referral to a specialist. A recent study reported that 70% of patients with BPPV will undergo magnetic resonance imaging scanning, 45% will have a computed tomography scan, and 41% will

have

an electrocardiogram, while 53% will be treated with medications.³⁵ Therefore, significant improvements in the diagnosis and treatment of patients with BPPV may lead to significant health care quality improvements as well as medical and societal cost savings. Such improvements may be achievable with the composition and implementation of a well-constructed clinical practice guideline for BPPV.

Methods

General Methods and Literature Search

In developing this update of the evidence-based clinical practice guideline, the methods outlined in the third edition of the AAO-HNSF's guideline development manual were followed explicitly.³⁶

An executive summary of the original BPPV guideline¹ was sent to a panel of expert reviewers from the fields of general otolaryngology, otology, neurotology, neurology, family practice, nursing, physical therapy, emergency medicine, radiology, audiology, and complementary medicine who assessed the key action statements to decide if they should be kept in their current form, revised, or removed and to identify new research that might affect the guideline recommendations. The reviewers concluded that the original guideline action statements remained valid but should be updated with minor modifications. Suggestions were also made for new key action statements.

An information specialist conducted 2 systematic literature searches using a validated filter strategy to identify clinical practice guidelines, systematic reviews, and RCTs published since the prior guideline (2008). Search terms used were “Benign Paroxysmal Positional Vertigo”[Mesh] OR “Benign Paroxysmal Positional Vertigo”[tab] OR “Benign Positional Vertigo”[tiab] OR BPPV[tiab] OR (BPV[tiab] AND vertigo). In certain instances, targeted searches for lower-level evidence were performed to address gaps from the systematic searches identified in writing the guideline. The original search was updated from January 2008 to September 2015 to include MEDLINE, National Guidelines Clearinghouse, Canadian Medical Association Database, NHS Evidence ENT and Audiology, National Institutes for Health and Care Excellence UK, Australian National Health and Medical Research Council, Guideline Internal Network, Cochrane Database of Systematic Reviews, EMBASE, Cumulative Index to Nursing and Allied Health, Web of Science, and the Allied and Complementary Medicine Database.

1. The initial search for clinical practice guidelines identified 2 guidelines. Quality criteria for including guidelines were (a) an explicit scope and purpose, (b) multidisciplinary stakeholder involvement, (c) systematic literature review, (d) explicit system for ranking evidence, and (e) explicit system for linking evidence to recommendations. The final data set retained 2 guidelines that met inclusion criteria.
2. The initial search for systematic reviews identified 44 systematic reviews or meta-analyses that were

distributed to the panel members. Quality criteria for including reviews were (a) relevance to the guideline topic, (b) clear objective and methodology, (c) explicit search strategy, and (d) valid data extraction methods. The final data set retained was 20 systematic reviews or meta-analyses that met inclusion criteria.

3. The initial search for RCTs identified 38 RCTs that were distributed to panel members for review. Quality criteria for including RCTs were (a) relevance to the guideline topic, (b) publication in a peer-reviewed journal, and (c) clear methodology with randomized allocation to treatment groups. The total final data set retained 27 RCTs that met inclusion criteria.

The AAO-HNSF assembled a guideline update group representing the disciplines of otolaryngology–head and neck surgery, otology, neurotology, family medicine, audiology, emergency medicine, neurology, physical therapy, advanced practice nursing, and consumer advocacy. The guideline update group had several conference calls and 1 in-person meeting, during which it defined the scope and objectives of updating the guideline, reviewed comments from the expert panel review for each key action statement, identified other quality improvement opportunities, and reviewed the literature search results.

The evidence profile for each statement in the earlier guideline was then converted into an expanded action statement profile for consistency with our current development standards.³⁶ Information was added to the action statement profiles regarding the quality improvement opportunity to which the action statement pertained, the guideline panel's level of confidence in the published evidence, differences of opinion among panel members, intentional vagueness, and any exclusion to which the action statement does not apply. New key action statements were developed with an explicit and transparent a priori protocol for creating actionable statements based on supporting evidence and the associated balance of benefit and harm. Electronic decision support software (BRIDGE-Wiz; Yale Center for Medical Informatics, New Haven, Connecticut) was used to facilitate creating actionable recommendations and evidence profiles.³⁷

The updated guideline then underwent GuideLine Implementability Appraisal to appraise adherence to methodologic standards, to improve clarity of recommendations, and to predict potential obstacles to implementation.³⁸ The guideline update group received summary appraisals and modified an advanced draft of the guideline based on the appraisal. The final draft of the updated clinical practice guideline was revised according to comments received during multidisciplinary peer review, open public comment, and journal editorial peer review. A scheduled review process will occur at 5 years from publication or sooner if new compelling evidence warrants earlier consideration.

Classification of Evidence-Based Statements. Guidelines are intended to reduce inappropriate variations in clinical care, to produce optimal health outcomes for patients, and to mini-

mize harm. The evidence-based approach to guideline

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development requires that the evidence supporting a policy be identified, appraised, and summarized and that an explicit link between evidence and statements be defined. Evidence-based statements reflect both the *quality of evidence* and the *balance of benefit and harm* that is anticipated when the statement is followed. The definitions for evidence-based statements are listed in **Tables 3** and **4**.

Guidelines are never intended to supersede professional judgment; rather, they may be viewed as a relative constraint on individual clinician discretion in a particular clinical circumstance. Less frequent variation in practice is expected for a strong recommendation than what might be expected with a recommendation. Options offer the most opportunity for practice variability.³⁹ Clinicians should always act and decide in a way that they believe will best serve their individual patients' interests and needs, regardless of guideline recommendations. Guidelines represent the best judgment of a team of experienced clinicians and methodologists addressing the scientific evidence for a particular topic.⁴⁰

Making recommendations about health practices involves value judgments on the desirability of various outcomes associated with management options. Values applied by the guideline update group sought to minimize harm and diminish unnecessary and inappropriate therapy. A major goal of the panel was to be transparent and explicit about how values were applied and to document the process.

Financial Disclosure and Conflicts of Interest. The cost of developing this guideline, including travel expenses of all panel members, was covered in full by the AAO-HNSF. Potential conflicts of interest for all panel members in the past 5 years were compiled and distributed before the first conference call and were updated at each subsequent call and in-person meeting.⁴¹ After review and discussion of these disclosures, the panel concluded that individuals with potential conflicts could remain on the panel if they (1) reminded the panel of potential conflicts before any related discussion, (2) recused themselves from a related discussion if asked by the panel, and (3) agreed not to discuss any aspect of the guideline with industry before publication.⁴¹ Last, panelists were reminded that conflicts of interest extend beyond financial relationships and may include personal experiences, how a participant earns a living, and the participant's previously established "stake" in an issue.⁴²

Guideline Key Action Statements

Each evidence-based statement is organized in a similar fashion: a key action statement is in **bold**, followed by the strength of the recommendation in *italics*. Each key action statement is followed by an "action statement profile" that explicitly states the quality improvement opportunity, aggregate evidence quality, level of confidence in evidence (high, medium, low), benefit, harms, risks, costs, and a benefits-harm assessment. Additionally, there are statements of any value judgments, the role of patient preferences, clarification of any intentional vagueness by the panel, exceptions to the statement, any

Table 3. Strength of Action Terms in Guideline Statements and Implied Levels of Obligation.

Strength	Definition	Implied Obligation
Strong recommendation	A strong recommendation means that the benefits of the recommended approach clearly exceed the harms (or, in the case of a strong negative recommendation, that the harms clearly exceed the benefits) and that the quality of the supporting evidence is high (grade A or B). ^a In some clearly identified circumstances, strong recommendations may be made according to lesser evidence when high-quality evidence is impossible to obtain and the anticipated benefits strongly outweigh the harms.	Clinicians should follow a strong recommendation unless a clear and compelling rationale for an alternative approach is present.
Recommendation	A recommendation means that the benefits exceed the harms (or, in the case of a negative recommendation, that the harms exceed the benefits), but the quality of evidence is not as high (grade B or C). ^a In some clearly identified circumstances, recommendations may be made according to lesser evidence when high-quality evidence is impossible to obtain and the anticipated benefits outweigh the harms.	Clinicians should also generally follow a recommendation, but should remain alert to new information and sensitive to patient preferences.
Option	An option means either that the quality of evidence is suspect (grade D) ^a or that well-done studies (grade A, B, or C) ^a show little clear advantage to one approach versus another.	Clinicians should be flexible in their decision making regarding appropriate practice, although they may set bounds on alternatives; patient preference should have a substantial influencing role.

^aSee Table 4 for definitions of evidence grades.

Table 4. Aggregate Grades of Evidence by Question Type.^a

Grade	CEBM Level	Treatment	Harm	Diagnosis	Prognosis
A	1	Systematic review ^b of randomized trials	Systematic review ^b of randomized trials, nested case-control studies, or observational studies with dramatic effect	Systematic review ^b of cross-sectional studies with consistently applied reference standard and blinding	Systematic review ^b of inception cohort studies ^c
B	2	Randomized trials or observational studies with dramatic effects or highly consistent evidence	Randomized trials or observational studies with dramatic effects or highly consistent evidence	Cross-sectional studies with consistently applied reference standard and blinding	Inception cohort studies ^c
C	3-4	Nonrandomized or historically controlled studies, including case-control and observational studies	Nonrandomized controlled cohort or follow-up study (postmarketing surveillance) with sufficient numbers to rule out a common harm; case-series, case-control, or historically controlled studies	Nonconsecutive studies; case-control studies; or studies with poor, nonindependent, or inconsistently applied reference standards	Cohort study, control arm of a randomized trial, case series, or case-control studies; poor-quality prognostic cohort study
D	5	Case reports, mechanism-based reasoning, or reasoning from first principles			
X	n/a	Exceptional situations where validating studies cannot be performed and there is a clear preponderance of benefit over harm			

Abbreviation: CEBM, Oxford Centre for Evidence-Based Medicine.

^aAdapted from Howick and coworkers.²⁰⁰

^bA systematic review may be downgraded to level B because of study limitations, heterogeneity, or imprecision.

^cA group of individuals identified for subsequent study at an early uniform point in the course of the specified health condition or before the condition develops.

Table 5. Summary of Guideline Key Action Statements.

Statement	Action	Strength
1a. Diagnosis of posterior semicircular canal BPPV	Clinicians should diagnose posterior semicircular canal BPPV when vertigo associated with torsional, upbeat nystagmus is provoked by the Dix-Hallpike maneuver, performed by bringing the patient from an upright to supine position with the head turned 45° to one side and neck extended 20° with the affected ear down. The maneuver should be repeated with the opposite ear down if the initial maneuver is negative.	Strong recommendation
1b. Diagnosis of lateral (horizontal) semicircular canal BPPV	If the patient has a history compatible with BPPV and the Dix-Hallpike test exhibits horizontal or no nystagmus, the clinician should perform, or refer to a clinician who can perform, a supine roll test to assess for lateral semicircular canal BPPV.	Recommendation
2a. Differential diagnosis	Clinicians should differentiate, or refer to a clinician who can differentiate, BPPV from other causes of imbalance, dizziness, and vertigo.	Recommendation
2b. Modifying factors	Clinicians should assess patients with BPPV for factors that modify management, including impaired mobility or balance, central nervous system disorders, a lack of home support, and/or increased risk for falling.	Recommendation
3a. Radiographic testing	Clinicians should <i>not</i> obtain radiographic imaging in a patient who meets diagnostic criteria for BPPV in the absence of additional signs and/or symptoms inconsistent with BPPV that warrant imaging.	Recommendation (against)
3b. Vestibular testing	Clinicians should <i>not</i> order vestibular testing in a patient who meets diagnostic criteria for BPPV in the absence of additional vestibular signs and/or symptoms inconsistent with BPPV that warrant testing.	Recommendation (against)
4a. Repositioning procedures as initial therapy	Clinicians should treat, or refer to a clinician who can treat, patients with posterior canal BPPV with a canalith repositioning procedure.	Strong recommendation
4b. Postprocedural restrictions	Clinicians should <i>not</i> recommend postprocedural postural restrictions after canalith repositioning procedure for posterior canal BPPV.	Strong recommendation (against)
4c. Observation as initial therapy	Clinicians may offer observation with follow up as initial management for patients with BPPV.	Option
5. Vestibular rehabilitation	The clinician may offer vestibular rehabilitation, either self-administered or with a clinician, in the treatment of BPPV.	Option
6. Medical therapy	Clinicians should <i>not</i> routinely treat BPPV with vestibular suppressant medications such as antihistamines and/or benzodiazepines.	Recommendation (against)
7a. Outcome assessment	Clinicians should reassess patients within 1 month after an initial period of observation or treatment to document resolution or persistence of symptoms.	Recommendation
7b. Evaluation of treatment failure	Clinicians should evaluate, or refer to a clinician who can evaluate, patients with persistent symptoms for unresolved BPPV and/or underlying peripheral vestibular or central nervous system disorders.	Recommendation
8. Education	Clinicians should educate patients regarding the impact of BPPV on their safety, the potential for disease recurrence, and the importance of follow-up.	Recommendation

Abbreviation: BPPV, benign paroxysmal positional vertigo.

differences of opinion, and a repeat statement of the strength of the recommendation. Several paragraphs subsequently discuss the evidence base supporting the statement. An overview of each evidence-based statement in this guideline can be found in **Table 5**.

The role of patient preferences in making decisions deserves further clarification. The guideline update group classified the role of patient preference based on consensus among the group as “none, small, moderate, or large.” For some statements where the evidence base demonstrates clear benefit, although the role of patient preference for a range of treatments may not be relevant (eg, with intraoperative decision making), clinicians should provide patients with clear and comprehensible information on the benefits to facilitate patient understanding and shared decision

making, which in turn lead to better patient adherence and outcomes. In cases where evidence is weak or benefits unclear, the practice of shared decision making—again, where the management decision is made by a collaborative effort between the clinician and an informed patient—is extremely useful. Factors related to patient preference include (but are not limited to) absolute benefits, adverse effects, cost of drugs or procedures, and frequency and duration of treatment, as well as certain less tangible factors such as religious and/or cultural beliefs or personal levels of desire for intervention.

STATEMENT 1a. DIAGNOSIS OF POSTERIOR SEMICIRCULAR CANAL BPPV: Clinicians should diagnose

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posterior semicircular canal BPPV when vertigo associated with torsional, upbeat nystagmus is provoked by the Dix-Hallpike maneuver, performed by bringing the patient from an upright to supine position with the head turned 45° to 1 side and neck extended 20° with the affected ear down. The maneuver should be repeated with the opposite ear down if the initial maneuver is negative. *Strong recommendation based on diagnostic studies with minor limitations and a preponderance of benefit over harm.*

Action Statement Profile for Statement 1a

- **Quality improvement opportunity:** Promoting accurate and efficient diagnosis of BPPV (National Quality Strategy domains: promoting effective prevention/treatments, affordable quality care)
- **Aggregate evidence quality:** Grade B based on diagnostic studies with minor limitations
- **Level of confidence in evidence:** High
- **Benefits:** Improved diagnostic accuracy and efficiency
- **Risks, harms, costs:** Risk of provoking temporary symptoms of BPPV
- **Benefits-harm assessment:** Preponderance of benefit over harm
- **Value judgments:** Conclusion that paroxysmal positional nystagmus induced by the Dix-Hallpike maneuver confirms the diagnosis of BPPV and is the gold standard test for diagnosis. The panel emphasized that a history of positional vertigo alone is not adequate to make the diagnosis of posterior canal BPPV
- **Role of patient preferences:** Small
- **Intentional vagueness:** None
- **Exceptions:** Patients with physical limitations including cervical stenosis, severe kyphoscoliosis, limited cervical range of motion, Down's syndrome, severe rheumatoid arthritis, cervical radiculopathies, Paget's disease, ankylosing spondylitis, low back dysfunction, spinal cord injuries, known cerebrovascular disease, and the morbidly obese
- **Policy level:** Strong recommendation
- **Differences of opinion:** None

Supporting Text. The purpose of this statement is to emphasize that clinicians should diagnose posterior semicircular canal BPPV when vertigo associated with torsional, upbeat nystagmus is provoked by the Dix-Hallpike maneuver (**Figure 1**), performed by bringing the patient from an upright to supine position with the head turned 45° to 1 side and neck extended 20° with the affected ear down. If the testing of the first side is negative, the Dix-Hallpike maneuver should be conducted with the other ear down before concluding a negative overall maneuver.

Posterior semicircular canal BPPV is diagnosed when (1) patients report a history of vertigo provoked by changes in

head position relative to gravity and (2) when, on physical examination, characteristic nystagmus is provoked by the Dix-Hallpike maneuver (**Table 6**). Although most cases of BPPV are due to freely mobile calcium carbonate material within the lumen of the affected semicircular canal (so-called canalolithiasis), a form of posterior canal BPPV due to calcium carbonate material actually attached to the cupula (cupulolithiasis) may occur that results in nystagmus that may persist for >1 minute.⁴³

History. Vertigo has been defined as an “illusory sensation of motion of either the self or the surroundings.”⁴⁴ The symptoms of vertigo resulting from posterior canal BPPV are typically described by the patient as a rotational or spinning sensation when she or he changes head position relative to gravity. The episodes are often provoked by everyday activities and commonly occur when rolling over in bed or when the patient is tilting the head to look upward (eg, to place an object on a shelf higher than the head) or bending forward (eg, to tie his or her shoes).^{22,45-47}

Patients with BPPV most commonly report discrete, episodic periods of vertigo lasting ≤1 minute and often report modifications or limitations of their general movements to avoid provoking the vertiginous episodes.⁴⁸ Other investigators report that true “room spinning” vertigo is not always present as a reported symptom in posterior canal BPPV, with patients alternatively complaining of light-headedness, dizziness, nausea, or the feeling of being “off balance.”^{3,22,45,49-54} Approximately 50% of patients also report subjective imbalance between the classic episodes of BPPV.²² In contrast, a history of vertigo *without* associated light-headedness may increase the a priori likelihood of a diagnosis of posterior canal BPPV.¹⁹ In up to one-third of cases with atypical histories of positional vertigo, Dix-Hallpike testing will still reveal positional nystagmus, strongly suggesting the diagnosis of posterior canal BPPV.⁵⁴

Other authors have loosened the historical criteria required for a BPPV diagnosis and have coined the term “subjective BPPV” without a positive Dix-Hallpike test.^{52,55} However, in clinical practice, there is a practical need to balance inclusiveness of diagnosis with accuracy of diagnosis. Given that the majority of treatment trials and systematic reviews of BPPV require both a history of episodic positional vertigo symptoms and a positive Dix-Hallpike test, history alone is insufficient to render an accurate diagnosis of BPPV.

Physical Examination. In addition to the historical criteria for the diagnosis of posterior canal BPPV, clinicians should confirm the diagnosis of posterior canal BPPV by performing the Dix-Hallpike maneuver (**Figure 1**).

The nystagmus produced by the Dix-Hallpike maneuver in posterior canal BPPV typically displays 2 important diagnostic characteristics. First, there is a latency period between the completion of the maneuver and the onset of subjective rotational vertigo and the objective nystagmus. The latency period for the nystagmus onset with this maneuver is largely unspecified in the literature, but the panel felt that a typical latency

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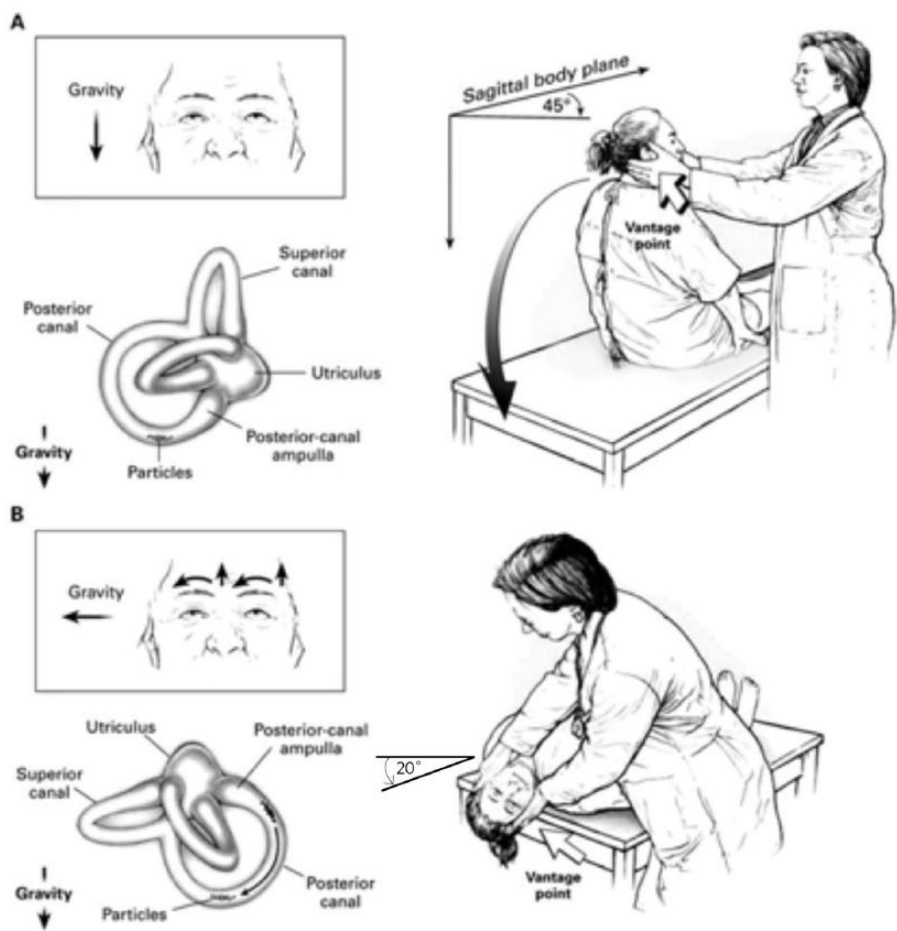


Figure 1. Diagrammatic representation of performance of the Dix-Hallpike maneuver for the diagnosis of posterior canal benign paroxysmal positional vertigo (BPPV). In panel A, the examiner stands at the patient's right side and rotates the patient's head 45° to the right to align the right posterior semicircular canal with the sagittal plane of the body. In panel B, the examiner moves the patient, whose eyes are open, from the seated to the supine right-ear-down position and then extends the patient's neck 20° so that the chin is pointed slightly upward. The latency, duration, and direction of nystagmus, if present, and the latency and duration of vertigo, if present, should be noted. The arrows in the inset depict the direction of nystagmus in patients with typical BPPV. A presumed location in the labyrinth of the free-floating debris thought to cause the disorder is also shown. From *New England Journal of Medicine*, Furman JM, Cass SP, "Benign Paroxysmal Positional Vertigo," 341:1590-1596. Copyright © 1999 Massachusetts Medical Society. Adapted and reprinted with permission from Massachusetts Medical Society.

Table 6. Diagnostic Criteria for Posterior Canal Benign Paroxysmal Positional Vertigo.

History	Patient reports repeated episodes of vertigo with changes in head position relative to gravity.
Physical examination	Each of the following criteria is fulfilled: • Vertigo associated with torsional (rotatory), upbeat (toward the forehead) nystagmus is provoked by the Dix-Hallpike test. • There is a latency period between the completion of the Dix-Hallpike maneuver and the onset of vertigo and nystagmus. • The provoked vertigo and nystagmus increase and then resolve within 60 seconds from the onset of the nystagmus.

period would range from 5 to 20 seconds. In rare cases, the latency period may be as long as 1 minute.⁵ Second, the provoked subjective vertigo and the nystagmus increase and then resolve within 60 seconds from the nystagmus onset.

The fast component of the nystagmus provoked by the Dix-Hallpike maneuver demonstrates a characteristic mixed torsional and vertical movement (often described as

upbeating-torsional) with the upper pole of the eye beating toward the dependent ear and the vertical component beating toward the forehead (when the eyes are positioned looking straightforward in the midorbit when the provoking position is assumed; **Figure 1**).^{45,56} Temporally, the rate of nystagmus typically begins gently, increases in intensity, and then declines in intensity as it resolves. This has been termed

crescendo-decrescendo nystagmus. After the patient returns to the upright head position, the nystagmus is again commonly observed, and the direction of the nystagmus may be reversed. Another classic feature associated with posterior canal BPPV is that the nystagmus typically fatigues (a reduced nystagmus response) when the maneuver is repeated.^{46,56} However, repeating the Dix-Hallpike maneuver to demonstrate fatigability is not recommended, because it unnecessarily subjects patients to repeated vertigo symptoms, which is discomforting. Furthermore, repeating Dix-Hallpike maneuvers may interfere with the immediate bedside treatment of BPPV.⁴⁵ Therefore, the panel did not include nystagmus fatigability as a diagnostic criterion.

In addition to posterior canal BPPV, patients may rarely have anterior canal BPPV. Even though anterior canal BPPV is uncommon accounting for 1% to 3% of cases,⁵⁷ it is important to recognize the direction of the vertical component of the provoked torsional nystagmus to make the correct diagnosis. A downbeating vertical component in addition to the torsional nystagmus toward the dependent ear could imply anterior canal rather than posterior canal BPPV.⁵⁷⁻⁵⁹ This diagnosis should be considered with caution because downbeating positional nystagmus related to brainstem or cerebellar lesion can produce a similar pattern and should be ruled out.⁶⁰

Performing the Dix-Hallpike Diagnostic Maneuver. The Dix-Hallpike maneuver is performed by the clinician moving the patient through a set of specified head positions to elicit the expected characteristic nystagmus of posterior canal BPPV (**Figure 1**).^{45,46} Before beginning the maneuver, the patient should be counseled regarding the upcoming movements and that he or she may experience a sudden onset of intense subjective vertigo, possibly with nausea, which should subside within 60 seconds. Since the patient is going to be placed in the supine position relatively quickly with the head position slightly below the body, the patient should be oriented so that when placed supine, the head can “hang” with support off the posterior edge of the examination table by about 20°. The examiner should ensure that she or he can support the patient’s head and guide the patient through the maneuver safely and securely, without the examiner losing support or balance.

1. The maneuver begins with the patient in the upright seated position with the examiner standing at the patient’s side.⁴⁵ If present, the patient’s eyeglasses should be removed. We initially describe the maneuver to test the right ear as the source of the posterior canal BPPV.
2. The examiner rotates the patient’s head 45° to the right to align the posterior semicircular canal with the midsagittal plane of the body and, with manual support, maintains the 45° head turn to the right during the next part of the maneuver. The patient is instructed to keep the eyes open. Fairly quickly, the examiner moves the patient from the seated to the supine right-ear-down position and then extends the patient’s neck slightly (approximately 20° below

the horizontal plane) so that the chin is pointed slightly

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