

# Vestibular Physiotherapy and Care Pathways in BPPV across Primary and Acute Care Settings: A Systematic Review

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## Abstract

**Background:** Benign paroxysmal positional vertigo (BPPV) is the most common peripheral vestibular disorder and a frequent cause of dizziness. Despite the availability of effective bedside diagnostic and therapeutic maneuvers, BPPV remains underdiagnosed and is frequently associated with unnecessary healthcare utilization, including excessive imaging and specialist referrals. **Objective:** To systematically evaluate the evidence regarding vestibular physiotherapy and care pathways in the management of BPPV across primary and acute care settings. **Methods:** A systematic review was conducted in accordance with PRISMA 2020 guidelines. MEDLINE, Embase, Cochrane Library, CINAHL, PEDro, Web of Science, and Scopus were searched through April 2026. Studies evaluating vestibular physiotherapy, canalith repositioning maneuvers, diagnostic pathways, or physiotherapy-led models of care in adults with BPPV were included. Methodological quality was assessed using the Joanna Briggs Institute (JBI) critical appraisal tools. **Results:** Eighteen studies met the inclusion criteria. Evidence consistently demonstrated persistent diagnostic challenges, frequent neuroimaging utilization, and suboptimal adherence to BPPV clinical practice guidelines. The Epley maneuver showed the strongest evidence for symptom resolution and improvement in dizziness-related outcomes. Physiotherapy-led care pathways were associated with improved diagnostic processes, increased use of evidence-based vestibular assessments, reduced imaging utilization, and decreased demand for specialist consultations. Across studies, vestibular physiotherapy was found to be feasible in both primary and acute care settings and may facilitate earlier diagnosis and treatment. **Conclusion:** The principal challenge in contemporary BPPV care is not the lack of effective interventions, but their inconsistent implementation across healthcare settings. Vestibular physiotherapy appears to be a promising strategy for addressing this evidence-to-practice gap through improved im-

plementation of evidence-based assessment and treatment approaches. The available evidence suggests that physiotherapy-integrated care pathways may facilitate earlier diagnosis and treatment while potentially reducing unnecessary healthcare utilization. Further prospective studies are needed to evaluate long-term clinical and economic outcomes.

## Keywords

Benign Paroxysmal Positional Vertigo (BPPV), Vestibular Physiotherapy, Epley Maneuver, Primary Care, Emergency Department, Care Pathways

## 1. Introduction

Benign paroxysmal positional vertigo (BPPV) is the most common peripheral vestibular disorder and a leading cause of dizziness in primary care [1]. It is estimated to account for up to 20% - 30% of all vertigo cases, with a lifetime prevalence of approximately 2% - 3% in the general population [1] [2]. Although BPPV is considered a benign and highly treatable condition, it is frequently associated with significant functional impairment, increased risk of falls, particularly in older adults, and reduced quality of life [3].

In most healthcare systems, patients with dizziness initially present to general practitioners (GPs), who act as the primary gatekeepers of care; however, the management of BPPV in primary care is often suboptimal. Studies have shown that BPPV is underdiagnosed or misdiagnosed, leading to unnecessary imaging, inappropriate pharmacological treatment, and delayed referral to specialists or physiotherapists [4]. This traditional referral-based pathway may result in increased GP workload, inefficient use of healthcare resources, and prolonged patient suffering despite the availability of effective, low-cost, and rapid treatments [5] [6].

Vestibular physiotherapy, particularly through canalith repositioning maneuvers such as the Epley or Semont techniques, is highly effective in resolving symptoms of BPPV. These interventions are non-invasive, can often be delivered in a single or a limited number of sessions, and demonstrate high success rates with minimal risk. Given these characteristics, vestibular physiotherapists are well-positioned to play an important role in the early assessment and management of BPPV within primary and acute care pathways [7] [8].

In recent years, the concept of expanded physiotherapy roles, including first-contact and early-access models, has gained increasing attention. In musculoskeletal care, these models have been associated with reduced GP workload, decreased imaging and medication use, comparable clinical outcomes, and potential cost savings. Such findings have supported the integration of physiotherapists as part of multidisciplinary and physiotherapy-led care pathways in primary care settings [9].

Despite the growing evidence supporting direct access models in musculoskeletal conditions [8], their application to vestibular disorders, particularly within

structured primary care pathways, remains limited and insufficiently investigated. While vestibular physiotherapy is well established as an effective treatment for BPPV, its role as a first-contact or direct access service has not been adequately explored. Given the distinct clinical characteristics of BPPV, namely its well-defined diagnostic criteria, rapid response to repositioning maneuvers, and generally limited need for advanced investigations, it represents a highly suitable condition for evaluating the potential impact of direct access vestibular physiotherapy. The gap, therefore, lies not in the effectiveness of treatment, but in how patients access it [10]-[12].

Therefore, this systematic review aims to systematically evaluate the available evidence regarding the diagnosis, treatment pathways, healthcare resource utilization, and the role of vestibular physiotherapy in the management of BPPV across primary and acute care settings. Particular emphasis is placed on diagnostic pathways, vestibular physiotherapy interventions, healthcare resource utilization, and the integration of physiotherapy within existing models of care. By synthesizing the current evidence, this review seeks to identify potential benefits, implementation challenges, and future directions for physiotherapy-led care pathways in patients with BPPV.

## **2. Methods**

### **2.1. Study Design and Reporting Framework**

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) statement [13]. The review aimed to systematically identify, evaluate, and synthesize the available evidence regarding vestibular physiotherapy and care pathways in the management of benign paroxysmal positional vertigo (BPPV) across primary and acute care settings.

### **2.2. Information Sources and Search Strategy**

A comprehensive literature search was conducted in MEDLINE (via PubMed), Embase, Cochrane Library, CINAHL, PEDro, Web of Science, and Scopus from database inception to April 2026. Additional records were identified through grey literature sources, including Google Scholar, ClinicalTrials.gov, and the World Health Organization International Clinical Trials Registry Platform (ICTRP).

The search strategy combined terms related to benign paroxysmal positional vertigo (BPPV), vestibular physiotherapy, and healthcare delivery settings, including primary and acute care. Search terms included combinations of the following keywords:

("BPPV" OR "benign paroxysmal positional vertigo" OR "vertigo" OR "dizziness") AND ("vestibular physiotherapy" OR "vestibular rehabilitation" OR "physical therapy" OR "physiotherapist" OR "canalith repositioning" OR "Epley maneuver") AND ("primary care" OR "general practice" OR "family medicine" OR "emergency department" OR "emergency room" OR "acute care"). The complete

search strategies for all databases, including database-specific search strings, search dates, and applied limits, are provided in **Supplementary File 1**.

### 2.3. Study Selection

All identified records were imported into reference management software, and duplicate records were removed before screening. Titles and abstracts were independently screened by two reviewers for eligibility, followed by full-text assessment of potentially relevant studies.

Disagreements regarding study eligibility were resolved through discussion and consensus. When consensus could not be reached, a third reviewer was consulted.

The reference lists of all included studies were manually screened to identify additional eligible publications that were not captured through the electronic database search.

### 2.4. Data Extraction

Data extraction was performed independently by two reviewers using a standardized data extraction form developed for this review. The following variables were extracted from each included study: author and year of publication, study setting, study design, population characteristics, intervention or care pathway characteristics, comparator (when applicable), outcome measures, and key findings relevant to vestibular physiotherapy and BPPV management.

Disagreements between reviewers regarding extracted data were resolved through discussion and consensus. When necessary, a third reviewer was consulted to resolve unresolved discrepancies.

The extracted data were subsequently summarized narratively and presented in **Table 1**, and synthesized narratively according to study setting, population, and primary area of investigation.

**Table 1.** Characteristics and key findings of studies on BPPV management and vestibular physiotherapy across healthcare settings.

| Study | Setting       | Population                                   | Main Focus/Contribution                   | Key Findings                                                                                                                                                                                                                                                                   |
|-------|---------------|----------------------------------------------|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14    | ED/outpatient | Patients presenting with dizziness           | Resource utilization/neuroimaging overuse | Neuroimaging was frequently used in patients with dizziness, especially in ED settings. This supports the concern that many dizziness presentations undergo CT/MRI despite limited diagnostic yield, highlighting the need for better clinical triage and vestibular pathways. |
| 15    | ED            | Patients with dizziness/vestibular syndromes | Diagnostic error/ED diagnostic pathway    | Dizziness in the ED was shown to be diagnostically challenging, with frequent undifferentiated or incorrect diagnoses. The study supports the need for structured bedside vestibular assessment pathways.                                                                      |

## Continued

|    |                                                              |                                                                   |                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                   |
|----|--------------------------------------------------------------|-------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 16 | ED                                                           | Patients with acute dizziness/vertigo                             | Bedside diagnostic accuracy/HINTS                                                                  | Evaluated the diagnostic accuracy of the HINTS examination in the ED. This study supports the importance of structured bedside assessment to distinguish peripheral from central vestibular causes.                                                                                                                                                                                               |
| 17 | Emergency department/multicenter                             | Patients with BPPV                                                | Implementation study to improve BPPV diagnosis and treatment                                       | A multicenter implementation approach aimed to improve recognition and treatment of BPPV in acute care settings, supporting structured diagnostic and treatment pathways.                                                                                                                                                                                                                         |
| 18 | Emergency department (6 EDs, stepped-wedge randomized trial) | Adults presenting to the ED with dizziness, vertigo, or imbalance | Implementation of evidence-based BPPV care (Dix-Hallpike test and canalith repositioning maneuver) | Stepped-wedge randomized implementation trial demonstrated that a BPPV-focused educational and decision-support strategy significantly increased documentation and use of Dix-Hallpike testing and canalith repositioning maneuvers. The intervention was safe, improved adherence to evidence-based BPPV care, and was associated with lower head CT utilization without increasing stroke risk. |
| 19 | ED                                                           | Clinicians involved in ED vestibular care                         | Implementation of specialized vestibular physiotherapy                                             | Specialized vestibular physiotherapy in the ED was feasible and acceptable. Implementation depended on workforce capacity, clinician engagement, clear referral pathways, and organizational support.                                                                                                                                                                                             |
| 20 | ED                                                           | Patients with dizziness/vertigo                                   | ED vestibular rehabilitation                                                                       | ED vestibular therapy was feasible and associated with improvements in dizziness handicap, vestibular activity avoidance, and sedating medication use over 3 months, although differences were not statistically significant in this pilot study.                                                                                                                                                 |
| 21 | ED                                                           | Patients with BPPV                                                | PT use, resource use, cost                                                                         | Statewide analysis of PT use for BPPV in the ED. The study highlights underuse of vestibular-trained PTs and supports their potential role in bedside assessment, repositioning treatment, and reducing unnecessary resource use.                                                                                                                                                                 |
| 12 | ED                                                           | Patients with vertigo/dizziness                                   | ED clinical pathway with vestibular PT                                                             | An ED vertigo pathway incorporating vestibular physiotherapy was associated with improvements in care quality and operational efficiency, increased vestibular assessment, improved diagnostic specificity, and shorter time to assessment.                                                                                                                                                       |

## Continued

|    |                                |                                                                           |                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                        |
|----|--------------------------------|---------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 22 | ED                             | Emergency physicians involved in dizziness and BPPV care                  | Barriers and facilitators to evidence-based BPPV diagnosis and treatment                                                                              | Identified barriers to ED physician use of Dix-Hallpike testing and canalith repositioning maneuvers, including limited confidence, difficulty remembering maneuver techniques, and uncertainty regarding patient selection. Prior experience and familiarity with BPPV management facilitated greater use of evidence-based assessment and treatment. |
| 23 | Primary care                   | Primary care physiotherapists/ BPPV management                            | Training and feasibility                                                                                                                              | A structured training program improved physiotherapists' knowledge, confidence, and practical skills in assessing and managing BPPV. Practical skills improved by 73% after initial training, supporting the feasibility of physiotherapy-led BPPV care.                                                                                               |
| 24 | ENT/ primary-contact pathway   | Patients with suspected vestibulopathy on the ENT waiting list            | First-contact vestibular physiotherapy                                                                                                                | Primary-contact physiotherapy was associated with a 46% reduction in the need for ENT medical review, with a potential reduction up to 71% when follow-up physiotherapy appointments were included. This supports physiotherapy-led triage in vestibular care pathways.                                                                                |
| 25 | Primary care                   | Patients with BPPV                                                        | Guideline adherence/ real-world primary care                                                                                                          | Demonstrated gaps between BPPV guideline recommendations and real-world primary care, including underuse of diagnostic and treatment maneuvers and continued reliance on medication-based management.                                                                                                                                                  |
| 26 | Primary care/ multispecialty   | BPPV visits                                                               | Guideline adherence/imaging and medication trends                                                                                                     | Showed poor adherence to BPPV guidelines across specialties, including persistent use of imaging and vestibular suppressants despite recommendations favoring positional testing and repositioning maneuvers.                                                                                                                                          |
| 27 | Family practice (Primary Care) | Adults diagnosed with posterior canal BPPV in family medicine clinics     | Evaluated the effectiveness of the Canalith Repositioning Maneuver (CRM/Epley maneuver) when performed in a primary care setting by family physicians | Patients treated with CRM showed significantly greater resolution of vertigo symptoms and conversion to a negative Dix-Hallpike test compared with controls, demonstrating that BPPV can be effectively managed within primary care without specialist referral.                                                                                       |
| 28 | Primary care                   | Adults ≥18 years with posterior canal BPPV confirmed by Dix-Hallpike test | Randomized clinical trial evaluating a single Epley maneuver performed by GPs in primary care.                                                        | A single Epley maneuver performed in primary care was effective in reversing a positive Dix-Hallpike test and reducing vertigo severity, particularly among patients with baseline nystagmus. The study supports management of posterior canal BPPV in primary care.                                                                                   |

**Continued**

|    |                             |                                    |                                             |                                                                                                                                                                                                              |
|----|-----------------------------|------------------------------------|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 29 | Clinical/vestibular setting | Patients with posterior canal BPPV | Effectiveness of repositioning maneuvers    | Compared Epley, Semont, and Brandt-Daroff exercises. Epley showed the greatest improvement, supporting repositioning maneuvers as an effective treatment for BPPV.                                           |
| 30 | Clinical/vestibular setting | Patients with BPPV                 | Comparative effectiveness of BPPV maneuvers | Compared Brandt-Daroff, Semont, Epley, and Sham approaches. Epley showed superior improvement in nystagmus and dizziness-related outcomes, further supporting repositioning maneuvers as key BPPV treatment. |

## 2.5. Eligibility Criteria

Eligibility criteria were defined according to the Population, Intervention, Comparator, Outcomes, and Study Design (PICOS) framework.

**Population:** Adults ( $\geq 18$  years) with suspected or confirmed benign paroxysmal positional vertigo (BPPV) or presenting with vertigo/dizziness consistent with peripheral vestibular disorders.

**Intervention:** Vestibular physiotherapy interventions, including canalith repositioning maneuvers (e.g., Epley or Semont maneuvers), vestibular rehabilitation, physiotherapist-led assessment, and physiotherapy-led care pathways.

**Comparator:** Usual care, alternative vestibular interventions, specialist-led management, or studies without a comparator where relevant to the review objective.

**Outcomes:** Diagnostic accuracy, symptom resolution, dizziness-related disability, healthcare resource utilization, imaging use, referral patterns, implementation outcomes, and healthcare pathway efficiency.

**Study Design:** Randomized controlled trials, observational studies, cohort studies, implementation studies, and service evaluations relevant to the role of vestibular physiotherapy in BPPV management.

Systematic reviews and meta-analyses were excluded from the primary synthesis but were screened for additional relevant references. Case reports, small case series, study protocols, conference abstracts without full-text availability, and non-peer-reviewed publications were excluded.

## 2.6. Quality Assessment

Methodological quality was assessed independently by two reviewers using the Joanna Briggs Institute (JBI) Critical Appraisal Tools appropriate to each study design. Randomized controlled trials, observational studies, diagnostic accuracy studies, implementation studies, and qualitative studies were evaluated using the corresponding JBI appraisal checklist. Any disagreements between reviewers were resolved through discussion and consensus.

The quality assessment was conducted to evaluate the methodological rigor of the included studies and to support the interpretation of the review findings. Quality

ratings were summarized descriptively and are presented in **Table 2**.

For descriptive reporting, the results of the JBI critical appraisal tools were converted into overall quality categories based on the proportion of applicable checklist items rated as “Yes.” Studies with  $\geq 75\%$  positive responses were classified as high quality, studies with 50% - 74% positive responses were classified as moderate quality, and studies with  $< 50\%$  positive responses were classified as low quality. When studies fell close to the threshold between categories and demonstrated only minor methodological limitations, they were classified as moderate-high quality. These summary ratings were used to facilitate interpretation of the overall body of evidence and do not represent standard JBI categories **Table 2**.

**Table 2.** Methodological quality assessment of included studies using the Joanna Briggs Institute (JBI) critical appraisal tools.

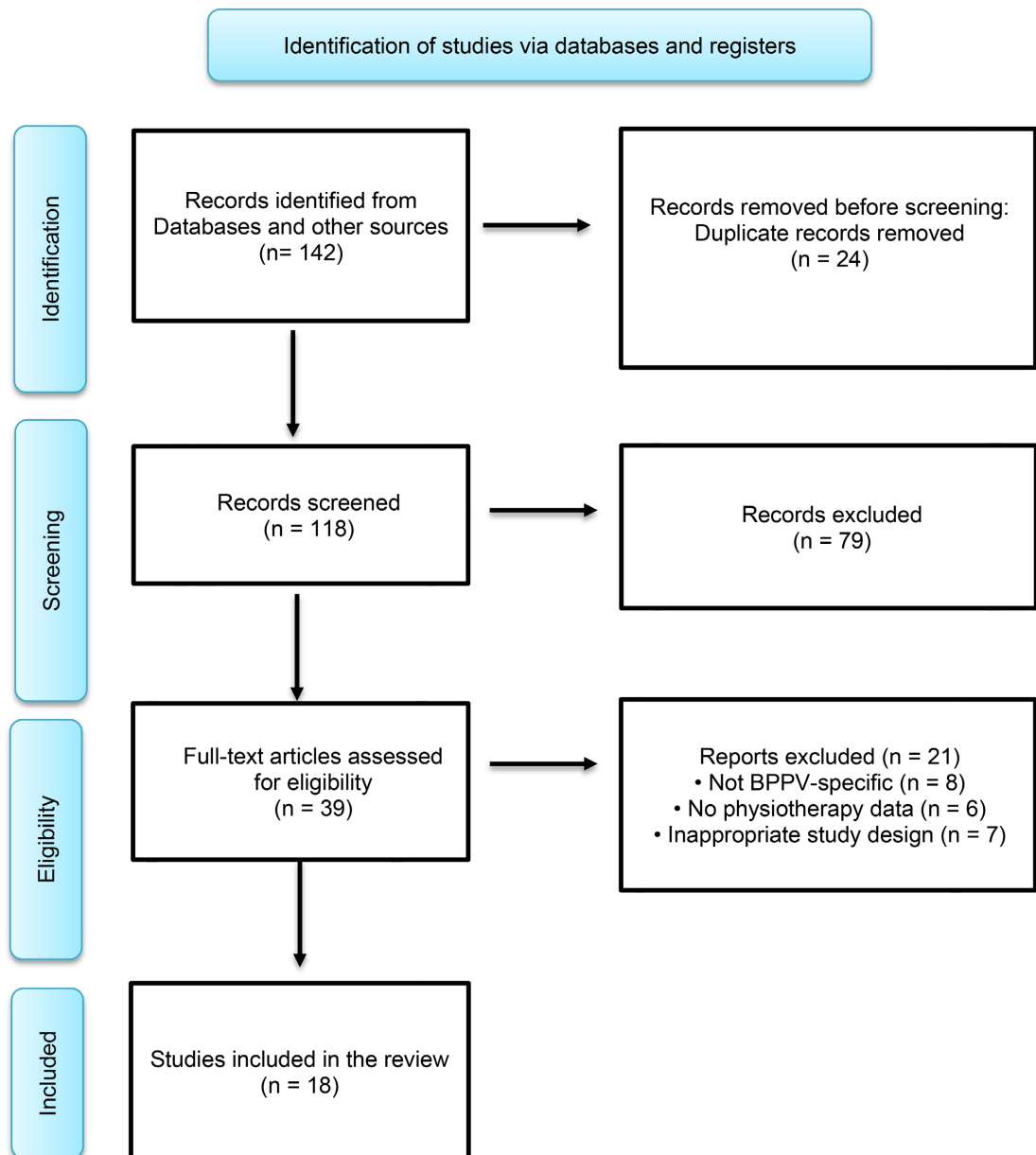
| Study | Study Design                                                       | JBI Tool                                                          | Quality Rating |
|-------|--------------------------------------------------------------------|-------------------------------------------------------------------|----------------|
| (14)  | Retrospective cross-sectional database study                       | JBI Analytical Cross-Sectional Checklist                          | High           |
| (15)  | Cross-sectional study                                              | JBI Analytical Cross-Sectional Checklist                          | Moderate       |
| (16)  | Diagnostic accuracy study                                          | JBI Diagnostic Test Accuracy Checklist                            | Moderate       |
| (17)  | Prospective multicenter implementation study                       | JBI Quasi-Experimental Checklist                                  | High           |
| (18)  | Stepped-wedge randomized implementation trial                      | JBI Randomized Controlled Trial Checklist                         | High           |
| (19)  | Qualitative study                                                  | JBI Critical Appraisal Checklist for Qualitative Research         | Moderate       |
| (20)  | Prospective nonrandomized clinical trial                           | JBI Quasi-Experimental Checklist                                  | High           |
| (21)  | Statewide retrospective cross-sectional analysis                   | JBI Analytical Cross-Sectional Checklist                          | High           |
| (12)  | Multisite retrospective cohort study (pre-post pathway evaluation) | JBI Cohort Studies Checklist                                      | High           |
| (22)  | Qualitative study                                                  | JBI Critical Appraisal Checklist for Qualitative Research         | Moderate       |
| (23)  | Pilot educational intervention study                               | JBI Quasi-Experimental Checklist                                  | Moderate       |
| (24)  | Retrospective cohort/service audit study                           | JBI Cohort Studies Checklist                                      | Moderate       |
| (25)  | Retrospective chart review                                         | JBI Analytical Cross-Sectional Checklist                          | High           |
| (26)  | National retrospective cohort study                                | JBI Cohort Studies Checklist                                      | High           |
| (27)  | Randomized controlled trial in family practice                     | JBI Randomized Controlled Trial Checklist                         | High           |
| (28)  | Randomized Controlled Trial (RCT)                                  | JBI Critical Appraisal Checklist for Randomized Controlled Trials | High           |
| (29)  | Prospective comparative interventional study                       | JBI Quasi-Experimental Checklist                                  | Moderate       |
| (30)  | Comparative clinical study                                         | JBI Quasi-Experimental Checklist                                  | Moderate       |

## 2.7. Selection Process

A total of 142 records were identified through database searching. After duplicate removal, 118 records remained for title and abstract screening. Of these, 79 records were excluded because they were not relevant to the review question.

Thirty-nine full-text articles were assessed for eligibility. Twenty-one articles were excluded because of a non-relevant population, lack of vestibular physiotherapy-related data, or inappropriate study design.

Finally, 18 studies met the eligibility criteria and were included in the systematic review. The study selection process is presented in **Figure 1** according to the PRISMA 2020 flow diagram.



**Figure 1.** PRISMA 2020 flow diagram illustrating the study selection process for the systematic review.

### 3. Results

A total of 18 studies were included in the final synthesis, encompassing research conducted across emergency department (ED), primary care, family practice, outpatient, ENT, and specialized vestibular care settings. To clarify the scope of the evidence, the included studies were categorized as evaluating either patients with confirmed benign paroxysmal positional vertigo (BPPV) or broader populations presenting with dizziness, vertigo, imbalance, or acute vestibular syndromes. The studies examined diagnostic pathways, guideline adherence, implementation of vestibular physiotherapy, healthcare resource utilization, vestibular rehabilitation, and the effectiveness of canalith repositioning maneuvers.

#### Characteristics of Included Studies

The included studies demonstrated substantial heterogeneity in both design and clinical focus. Ten studies were conducted primarily in emergency department settings and investigated diagnostic accuracy, imaging utilization, vestibular physiotherapy implementation, and clinical pathway development among patients presenting with dizziness or vertigo [12][14]-[22]. Several studies focused specifically on patients with confirmed BPPV and evaluated implementation of evidence-based BPPV care, guideline adherence, physiotherapy involvement, and canalith repositioning maneuvers in primary care, family practice, and emergency department settings [17] [18] [21] [23]-[30]. Additional studies examined broader vestibular care pathways and first-contact physiotherapy services for patients with vestibular disorders or suspected vestibulopathy [20]-[22].

#### Emergency Department Diagnostic Pathways and Resource Utilization

Several studies evaluated patients presenting to emergency departments with dizziness, vertigo, imbalance, or acute vestibular syndromes rather than confirmed BPPV cohorts [14]-[16] [18]. Diagnostic uncertainty was common, with many patients receiving nonspecific or incorrect diagnoses [15]. Diagnostic accuracy studies demonstrated the value of structured bedside vestibular assessments, including the HINTS examination, for differentiating peripheral from central vestibular disorders [16]. Furthermore, studies reported frequent use of neuroimaging despite limited diagnostic yield in patients without focal neurological deficits, highlighting opportunities to reduce unnecessary imaging through improved clinical assessment pathways [14]. In studies specifically addressing BPPV care, the implementation of evidence-based diagnostic pathways was associated with increased use of Dix-Hallpike testing and canalith repositioning maneuvers and improved adherence to guideline-recommended care [18].

#### Vestibular Physiotherapy in Emergency Care

Most studies evaluating vestibular physiotherapy in emergency settings involved broader dizziness populations rather than exclusively patients with confirmed BPPV [12] [19] [20] [22]. Specialized vestibular physiotherapy was consistently reported as feasible and safe and was associated with increased use of Dix-Hallpike testing and canalith repositioning maneuvers, as well as reduced rates of undifferentiated dizziness diagnoses and brain imaging [19] [22]. Structured

emergency department vertigo pathways incorporating vestibular physiotherapists improved assessment quality, diagnostic specificity, and operational efficiency, including reductions in assessment delays and emergency department length of stay [12]. Statewide analyses further highlighted the underutilization of vestibular-trained physiotherapists despite their potential contribution to bedside assessment, repositioning treatment, and healthcare resource stewardship [21].

### **Primary Care Management and Guideline Adherence**

Evidence from primary care studies demonstrated persistent gaps between guideline recommendations and real-world practice. Several investigations reported underutilization of positional diagnostic testing and canalith repositioning maneuvers, accompanied by continued reliance on vestibular suppressant medications and diagnostic imaging [25] [26]. Educational interventions targeting physiotherapists significantly improved clinician knowledge, confidence, and practical skills in BPPV management, supporting the feasibility of physiotherapy-led vestibular care models in primary care settings [23]. Additionally, first-contact vestibular physiotherapy reduced the need for specialist ENT review, suggesting a potential role for physiotherapists in triage and early management of vestibular disorders [24].

### **Effectiveness of Repositioning Maneuvers**

Four studies directly evaluated canalith repositioning maneuvers in patients with posterior canal BPPV [27]-[30]. Randomized controlled trials conducted in family practice and primary care settings demonstrated that the Epley maneuver can be effectively delivered outside specialist clinics, resulting in greater symptom resolution and higher rates of conversion to a negative Dix-Hallpike test compared with control interventions [27] [28]. Comparative clinical studies consistently identified the Epley maneuver as the most effective treatment strategy when compared with Semont and Brandt-Daroff maneuvers [29] [30]. Across studies, the Epley maneuver produced superior improvements in vertigo symptoms, nystagmus resolution, and dizziness-related quality of life outcomes, further supporting its role as the preferred first-line treatment for posterior canal BPPV.

### **Methodological Quality Assessment**

Quality appraisal using Joanna Briggs Institute (JBI) critical appraisal tools demonstrated generally favorable methodological quality across the included studies. Ten studies were rated as high quality, including randomized controlled trials, cohort studies, implementation studies, and large database analyses [12] [14] [17] [18] [20] [21] [25]-[28]. Most remaining studies were classified as moderate quality, largely due to limitations inherent to observational, feasibility, qualitative, diagnostic accuracy, or quasi-experimental designs [15] [16] [19] [22]-[24] [29] [30]. No study was rated as low quality. Overall, the body of evidence provides moderate-to-high confidence in the reported findings regarding vestibular physiotherapy implementation, clinical pathway development, and the effectiveness of repositioning maneuvers for BPPV management.

## 4. Discussion

One of the most consistent findings across the included studies was the persistent overreliance on diagnostic imaging for dizziness presentations, particularly in emergency departments. Several studies included in this review evaluated dizziness management pathways in emergency department settings and were not limited to patients with confirmed BPPV. While these studies were not restricted to patients with confirmed BPPV, they provide important contextual evidence regarding dizziness management pathways in emergency settings and help contextualize the role of physiotherapy-led assessment, diagnostic accuracy, and healthcare resource utilization in patients presenting with dizziness. Large-scale investigations demonstrated frequent use of CT and MRI despite relatively low diagnostic yield in patients without focal neurological deficits [14] [18]. These findings are supported by recent reviews emphasizing that imaging often contributes little to the diagnosis of peripheral vestibular disorders and should not replace careful clinical examination [31] [32]. Given the significant economic burden associated with vertigo-related healthcare utilization [33], reducing unnecessary imaging through improved bedside assessment represents an important opportunity to enhance both clinical effectiveness and resource stewardship.

Several studies highlighted the importance of structured vestibular assessment pathways in improving diagnostic accuracy. Emergency physicians frequently encounter difficulties distinguishing peripheral from central vestibular disorders, resulting in diagnostic uncertainty and potential misclassification [15]. The HINTS examination has demonstrated strong diagnostic utility in differentiating central from peripheral causes of acute vestibular syndromes when performed by appropriately trained clinicians [16]. Similarly, implementation studies showed that structured BPPV pathways increased the use of Dix-Hallpike testing and canalith repositioning procedures while reducing undifferentiated dizziness diagnoses and unnecessary imaging [17] [24]. These findings suggest that improving clinician confidence and competency in vestibular assessment may represent one of the most impactful interventions for dizziness management.

A particularly important observation emerging from this review is the growing role of vestibular physiotherapy across the continuum of care. Traditionally, vestibular disorders have been managed primarily by otolaryngologists or neurologists; however, several included studies demonstrated that physiotherapists can successfully contribute to assessment, triage, and treatment processes [19] [24]. Training programs significantly improved physiotherapists' knowledge and practical skills in BPPV management [23], while first-contact vestibular physiotherapy was associated with a reduced need for specialist ENT review [24]. Similar findings have been reported in broader physiotherapy literature, where direct-access physiotherapy models consistently reduce physician workload and healthcare utilization without compromising patient outcomes [9]. Collectively, these findings support the integration of vestibular-trained physiotherapists into both primary care and emergency care pathways.

The effectiveness of canalith repositioning maneuvers was another prominent theme throughout the review. Multiple randomized controlled trials and systematic reviews have consistently demonstrated the superiority of repositioning maneuvers over observation or medication-based approaches [7] [8] [27]-[35]. Notably, studies conducted in family practice and primary care settings confirmed that the Epley maneuver can be delivered effectively outside specialist clinics, resulting in significant symptom resolution and conversion to negative Dix-Hallpike testing [27] [28]. Comparative studies further demonstrated that the Epley maneuver consistently outperformed Semont and Brandt-Daroff interventions in terms of symptom resolution, quality of life improvement, and nystagmus reduction [29]-[31]. These findings align closely with previous meta-analyses and Cochrane reviews, which have identified the Epley maneuver as the most effective first-line treatment for posterior canal BPPV [8] [34].

Despite the strength of the evidence supporting repositioning maneuvers, guideline adherence remains suboptimal. Studies evaluating real-world clinical practice revealed persistent underuse of Dix-Hallpike testing and canalith repositioning procedures, alongside continued reliance on vestibular suppressants and diagnostic imaging [25] [26]. Recent qualitative research has further identified barriers, including lack of clinician confidence, insufficient training, time constraints, and uncertainty regarding maneuver performance [5]. These findings suggest that dissemination of evidence alone may be insufficient to change practice. Instead, successful implementation likely requires structured educational initiatives, organizational support, and integrated referral pathways similar to those described in successful emergency department implementation studies [17] [19] [22].

The findings of this review also have important implications for healthcare system design. Referral systems function most effectively when patients receive appropriate management at the lowest effective level of care [6]. The evidence synthesized in this review suggests that many patients with BPPV can be accurately diagnosed and effectively treated in primary care without specialist referral [4] [27] [28]. Early management may reduce symptom duration, improve quality of life, decrease unnecessary investigations, and reduce demand on specialist services [24] [25] [33]. Such an approach aligns with contemporary models of integrated healthcare delivery that emphasize early intervention, interdisciplinary collaboration, and efficient resource utilization.

Taken together, the evidence supports a shift toward more structured, physiotherapy-integrated vestibular care pathways. Emergency departments, primary care clinics, and ENT services reported potential benefits from incorporating vestibular-trained physiotherapists and standardized assessment protocols [12] [17] [20]-[24]. The consistent effectiveness of repositioning maneuvers, particularly the Epley maneuver, combined with the documented limitations of current practice, suggests that substantial improvements in BPPV management remain achievable through targeted implementation effort [36] [37].

Perhaps the most important finding of this review is that the major barrier to

optimal BPPV care is not the absence of effective interventions, but rather their inconsistent implementation across primary and acute care settings. Although the diagnostic criteria for BPPV are well established and repositioning maneuvers have demonstrated high success rates for decades, substantial gaps remain between guideline recommendations and routine clinical practice. The persistence of diagnostic uncertainty, excessive imaging utilization, underuse of positional testing, and low adoption of canalith repositioning maneuvers suggests that future efforts should focus less on developing new treatments and more on improving implementation of existing evidence-based care. In this context, vestibular physiotherapy may help bridge this evidence-to-practice gap because it directly addresses the major barriers identified across the included studies, including limited clinician expertise, delayed access to treatment, overreliance on imaging, and inefficient referral pathways.

## 5. Strengths and Limitations

A major strength of this review is the inclusion of studies from multiple healthcare settings, including emergency departments, primary care, family medicine, ENT services, and specialized vestibular clinics, providing a comprehensive overview of current BPPV management pathways. Additionally, methodological quality was generally moderate to high across the included studies.

However, several limitations should be acknowledged. Considerable heterogeneity existed regarding study designs, outcome measures, healthcare settings, and intervention strategies, limiting direct comparisons across studies. Several implementation and feasibility studies included relatively small sample sizes and lacked long-term follow-up [19] [20] [23]. Furthermore, some evidence originated from observational or quasi-experimental studies, which may be subject to selection bias and confounding. Finally, healthcare systems differ substantially between countries, potentially affecting the generalizability of implementation findings.

## 6. Clinical Implications and Future Directions

Future research should focus on large-scale implementation studies evaluating vestibular physiotherapy pathways across diverse healthcare systems. Additional investigation is needed to determine the most effective educational strategies for improving guideline adherence among primary care and emergency clinicians. Economic evaluations examining cost savings associated with reduced imaging, decreased specialist referrals, and earlier treatment are also warranted. Finally, future studies should assess long-term patient outcomes following physiotherapy-led vestibular care models and explore optimal integration of vestibular physiotherapists within multidisciplinary dizziness pathways.

Overall, the available evidence strongly supports earlier recognition of BPPV, wider adoption of evidence-based bedside assessment techniques, greater use of canalith repositioning maneuvers, and expanded integration of vestibular physiotherapy throughout the healthcare continuum. These strategies have the potential

to improve patient outcomes while simultaneously reducing unnecessary healthcare utilization and costs.

## 7. Conclusions

This review demonstrates that the principal challenge in contemporary BPPV management is not the lack of effective diagnostic or therapeutic interventions, but rather their inconsistent implementation across healthcare settings. Although evidence strongly supports the use of positional testing and canalith repositioning maneuvers, these interventions remain underutilized in both primary care and emergency departments. Vestibular physiotherapy appears to be a promising strategy for supporting the implementation of evidence-based assessment and treatment approaches. The available evidence suggests that physiotherapy-integrated care pathways may facilitate earlier diagnosis and treatment while potentially reducing unnecessary healthcare utilization.

Future research should focus on implementation strategies, workforce training, and health system integration to ensure that evidence-based BPPV care is consistently delivered in routine clinical practice.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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## Supplementary File S1

### Complete Database Search Strategies

This supplementary file provides the complete search strategies used for the systematic review “Vestibular Physiotherapy and Care Pathways in BPPV across Primary and Acute Care Settings: A Systematic Review”. Searches were performed from database inception through April 2026.

### Databases Searched

- MEDLINE (via PubMed)
- Embase
- Cochrane Library (CENTRAL)
- CINAHL
- PEDro
- Web of Science
- Scopus
- Google Scholar (grey literature)
- ClinicalTrials.gov
- WHO International Clinical Trials Registry Platform (ICTRP)

### Search Concepts

Concept 1: (BPPV OR “benign paroxysmal positional vertigo” OR vertigo OR dizziness)

AND

Concept 2: (“vestibular physiotherapy” OR “vestibular rehabilitation” OR “physical therapy” OR physiotherapist OR “canalith repositioning” OR “Epley maneuver” OR “Semont maneuver”)

AND

Concept 3: (“primary care” OR “general practice” OR “family medicine” OR “emergency department” OR “emergency room” OR “acute care”)

### MEDLINE (PubMed)

Search period: Database inception through April 2026.

#### *Search string:*

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((“Benign Paroxysmal Positional Vertigo”[Mesh] OR BPPV OR “benign paroxysmal positional vertigo” OR vertigo OR dizziness) AND (“Physical Therapy Modalities”[Mesh] OR “vestibular physiotherapy” OR “vestibular rehabilitation” OR “physical therapy” OR physiotherapist OR “canalith repositioning” OR “Epley maneuver” OR “Semont maneuver”) AND (“Primary Health Care”[Mesh] OR “Emergency Service, Hospital”[Mesh] OR “primary care” OR “general practice” OR “family medicine” OR “emergency department” OR “emergency room” OR “acute care”))

## Embase

Search period: Database inception through April 2026.

### *Search string:*

---

("benign paroxysmal positional vertigo"/exp OR bppv OR vertigo OR dizziness)  
AND ("vestibular rehabilitation"/exp OR "physical therapy"/exp OR physiotherapist OR "canalith repositioning" OR "epley maneuver" OR "semont maneuver")  
AND ("primary health care"/exp OR "emergency ward"/exp OR "acute care")

## CENTRAL

Search period: Database inception through April 2026.

### *Search string:*

---

(BPPV OR benign paroxysmal positional vertigo OR vertigo OR dizziness)  
AND (vestibular physiotherapy OR vestibular rehabilitation OR physical therapy OR Epley OR Semont)

## CINAHL

Search period: Database inception through April 2026.

### *Search string:*

---

(MH "Benign Paroxysmal Positional Vertigo+") OR BPPV OR vertigo OR dizziness AND vestibular rehabilitation OR physical therapy OR physiotherapist

## PEDro

Search period: Database inception through April 2026.

### *Search string:*

---

BPPV OR benign paroxysmal positional vertigo; vestibular rehabilitation; Epley

## Web of Science

Search period: Database inception through April 2026.

### *Search string:*

---

TS = ((BPPV OR "benign paroxysmal positional vertigo" OR vertigo OR dizziness) AND ("vestibular physiotherapy" OR "vestibular rehabilitation" OR "physical therapy" OR physiotherapist OR "Epley maneuver") AND ("primary care" OR "emergency department"))

## Scopus

Search period: Database inception through April 2026.

### *Search string:*

TITLE-ABS-KEY ((BPPV OR “benign paroxysmal positional vertigo” OR vertigo OR dizziness) AND (“vestibular physiotherapy” OR “vestibular rehabilitation” OR “physical therapy” OR physiotherapist OR “Epley maneuver”) AND (“primary care” OR “emergency department”))

### Google Scholar

Search period: Database inception through April 2026.

#### *Search string:*

---

BPPV vestibular physiotherapy primary care emergency department

### ClinicalTrials.gov

Search period: Database inception through April 2026.

#### *Search string:*

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BPPV OR benign paroxysmal positional vertigo

### WHO ICTRP

Search period: Database inception through April 2026.

#### *Search string:*

---

BPPV OR benign paroxysmal positional vertigo

### Limits

- Adults ( $\geq 18$  years)
- English language
- Peer-reviewed studies where applicable
- No study design restriction during the electronic search

### Additional Search Procedures

Reference lists of all eligible articles were manually screened for additional studies. Grey literature searches were performed using Google Scholar, ClinicalTrials.gov, and WHO ICTRP.