

Review Article

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A critical appraisal of clinical practice guidelines for the diagnosis and management of benign paroxysmal positional vertigo

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Abstract

Background. Delays in the diagnosis and therapy of benign paroxysmal positional vertigo can greatly impact quality of life and increase healthcare costs for patients. This study aimed to appraise the quality of clinical practice guidelines for the diagnosis and management of benign paroxysmal positional vertigo.

Methods. A comprehensive database search of clinical practice guidelines was completed up to 30 October 2021. Four independent reviewers used the Appraisal of Guidelines for Research and Evaluation II instrument in the quality appraisal.

Results. The highest score was in ‘clarity and presentation’ (58.33 ± 22.7). The lowest score was in ‘applicability’ (13.96 ± 30.1). Overall, four clinical practice guidelines were ‘low quality’ and only one guideline was ‘high quality’.

Conclusion. This review identified a significant lack of quality in clinical practice guideline development for benign paroxysmal positional vertigo, highlighting the need for a more rigorous approach for future guideline development.

Introduction

Benign paroxysmal positional vertigo (BPPV) is the most common inner-ear pathology and type of vertigo seen in emergency departments, out-patient neurology and otolaryngology clinics today.^{1,2} It is characterised by brief sensations of dizziness and nystagmus induced by changes in head position with respect to gravity, with associated nausea and vomiting. Patients with BPPV are at an increased risk of depression, anxiety, falls and significant impairment of daily activities, with some studies suggesting an increased risk of osteoporosis.^{3–8} This disease most often occurs in middle-aged patients, with a peak onset between 50 and 60 years of age and an increased incidence among women.⁹ For older adult patients aged over 60 years, BPPV has been shown to increase the risk of neurodegenerative dementia.¹⁰ The seriousness of the long-term implications of BPPV for quality of life and associated health conditions highlights the need for efficient diagnosis and management.

The basic pathophysiology of BPPV is well elucidated in the literature. Calcium carbonate particles in the utricular otolith membrane of the elliptical capsule are dislodged and enter the semicircular canals.¹¹ When there is a change in position with respect to gravity, these particles are moved to different positions in the semicircular canals, leading to the sensation of motion and dizziness. Management for BPPV can vary depending on the suspected location of origin. The posterior semicircular canal is the most common origin site of BPPV (60–90 per cent of cases), as it is the most gravity-dependent canal.¹² The horizontal semicircular canal can also be involved, but this site is more likely to resolve spontaneously. Rarely, particles can gather in the anterior semicircular canal, the most anatomically superior site.

Although BPPV is a common disease with a good prognosis, evidence-based diagnosis and treatment are essential to effectively manage this condition. Studies show that the cost to ultimately diagnose BPPV is on average greater than \$2000 per patient, with a majority of patients receiving unnecessary diagnostic testing, including imaging such as magnetic resonance imaging and echocardiography, inappropriate medications, physical therapy and numerous office visits.^{13,14} The burden of vertigo has been shown to greatly affect the working population, with 63.3 per cent of afflicted patients losing workdays, 4.6 per cent changing their jobs and 5.7 per cent giving up their employment because of daily symptoms of dizziness.¹⁵ Delays in therapeutic intervention of BPPV can greatly impair quality of life and increase healthcare costs for patients.

Clinical practice guidelines are valuable tools used to assist healthcare practitioners to guide clinical decisions and improve patient outcomes. There are multiple guidelines currently available in the international literature, with varying recommendations for BPPV.

The Appraisal of Guidelines for Research and Evaluation II instrument is a validated set of tools used to measure the rigor and quality of clinical practice guidelines.¹⁶ The Appraisal of Guidelines for Research and Evaluation II tool is used to assess six domains: ‘scope and purpose’, ‘stakeholder involvement’, ‘rigor of development’, ‘clarity of presentation’, ‘applicability’ and ‘editorial independence’. The instrument has been widely used in scientific literature to analyse clinical practice guidelines and has been shown to be a valid measurement tool.^{17–20}

This study aimed to systematically assess the quality of all clinical practice guidelines describing the diagnosis and management of BPPV using the Appraisal of Guidelines for Research and Evaluation II tool.

Materials and methods

Search strategy

This study follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. We conducted a comprehensive search of clinical practice guidelines up to 30 October 2021 using PubMed, Scopus and Embase electronic databases, to identify diagnostic and treatment guidelines, recommendations, and consensus statements for BPPV. The references of relevant clinical practice guidelines were scanned for additional clinical practice guidelines. The database search query was: ((‘benign paroxysmal positional vertigo’ or ‘BPPV’) and (‘guideline’ or ‘recommendation’ or ‘consensus’)). For clinical practice guidelines published in languages other than English, we searched for translated versions of the guidelines and all supplemental materials.

Study selection

All records were exported to Excel and duplicates were removed. We screened all titles for relevant articles and retrieved the full text of relevant clinical practice guidelines for further analysis. Each guideline had to meet the following inclusion criteria: (1) clinical practice guidelines had to be developed by experts, and include recommendations or guidelines to improve patient care; (2) clinical practice guidelines must be available in English language; and (3) clinical practice guidelines must be evidence-based with a set of references. We excluded all clinical practice guidelines for: (1) other causes of dizziness; (2) no specific recommendations or guidelines outlined; and (3) older versions of guidelines. One author (SP) performed the data collection, which was reviewed for consistency by a different author (NVS). The complete clinical practice guideline document, with references, appendices and supplementary material, was collected for analysis.

Quality appraisal

Quality appraisal of the clinical practice guidelines was performed via the Appraisal of Guidelines for Research and Evaluation II instrument. This is a 23-item tool organised into 6 domains. Each item is rated on a seven-point scale. A score of 7 on an item indicates that the quality of the guideline meets all criteria outlined via the Appraisal of Guidelines for Research and Evaluation II tool. Each domain score was calculated as (obtained score – minimum possible score) / (maximal possible score – minimum possible score). Domain scores under 60 per cent were considered to indicate lower

quality. Each appraiser completed all necessary online training tools available on the Appraisal of Guidelines for Research and Evaluation II website (www.agreetrust.org) prior to analysing the included guidelines. Four academic appraisers (SP, VS, DR and ED) performed the methodological quality appraisals independently according to the Appraisal of Guidelines for Research and Evaluation II instrument.

Statistical analysis

Intraclass correlation co-efficients were calculated for each Appraisal of Guidelines for Research and Evaluation II domain using Python 3.8.2 and the ‘pingouin’ application programming interface. A random sample of *k* judges rate each target. The measure is one of absolute agreement in the ratings. Intraclass correlation co-efficient 2 is sensitive to differences in means between raters and is a measure of absolute agreement. The level of agreement was classified according to the following cut-offs: poor (less than 0.40), fair (0.40–0.59), good (0.60–0.74) or excellent (0.75–1.00).

Results

Literature search

The steps of the literature search performed are displayed in Figure 1. The initial literature search yielded 798 articles, of which 519 documents remained after duplicates were removed. These were screened by title, and 56 were selected for further review. These were then assessed for eligibility, and five met the inclusion criteria described earlier. Any discrepancies were addressed in verbal discussion between the authors (SP, NVS and KR).

Guideline characteristics

The general characteristics of the five included clinical practice guidelines are displayed in Table 1. One clinical practice guideline was written by the American Academy of Otolaryngology – Head and Neck Surgery (AAO-HNS),²¹ one by the Bárány Society,²² which is an international interdisciplinary society of neurotology, one by a group of experts from China,²³ and the other two by European nations: one from Spain²⁴ and one from Italy.²⁵ All the clinical practice guidelines were published between 2015 and 2019. One was developed using expert consensus via the Delphi study method, two by expert consensus, and the remaining two using both expert consensus and literature review. The developers were diverse, including general otolaryngologists, otologists, general practitioners, nurses, physical therapists, emergency medicine doctors, radiologists and audiologists. The target users in all cases were healthcare providers, with most guidelines specifying particular fields. Funding sources were reported in two of the clinical practice guidelines.

Guideline appraisal

The mean Appraisal of Guidelines for Research and Evaluation II domain scores are displayed in Table 2. The highest average scores were in domain 1 and domain 4, ‘scope and purpose’ and ‘clarity and presentation’, with scores of 51.11 and 58.33, respectively. The lowest scores were in domain 2, domain 3 and domain 5, ‘stakeholder involvement’, ‘rigor of development’ and ‘applicability’, at 35.28, 37.08 and

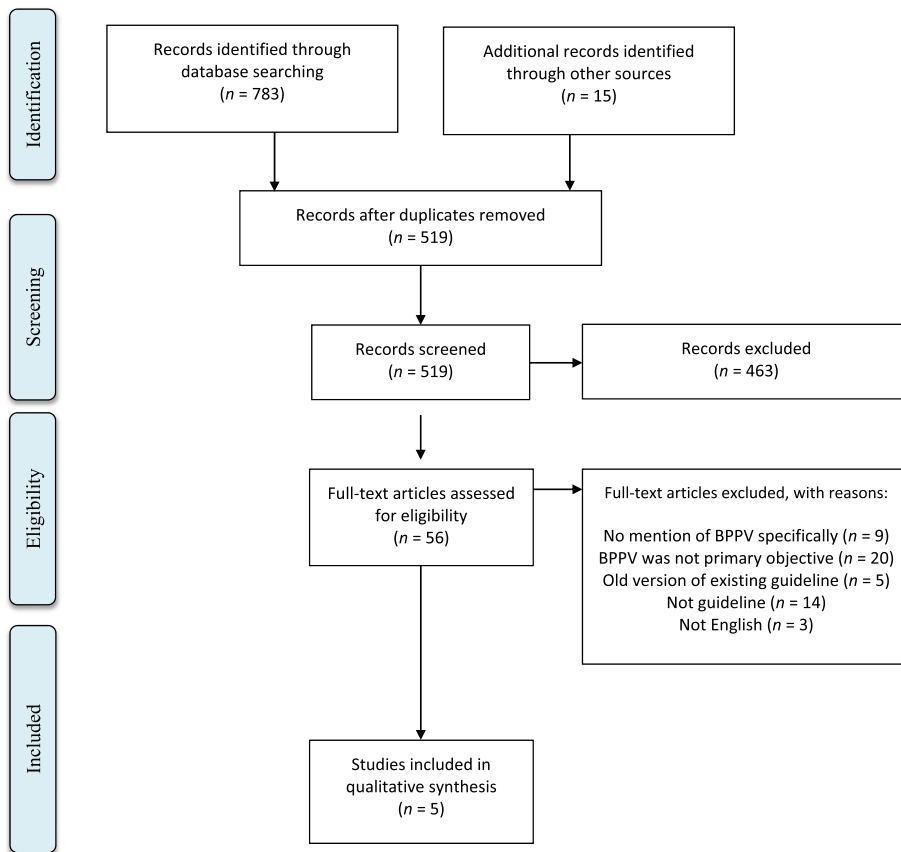


Fig. 1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses ('PRISMA') flowchart of systematic search strategy. BPPV = benign paroxysmal positional vertigo

13.96, respectively, with only the AAO-HNS 2017 guideline clearing the 60-point threshold required for these guidelines to be considered 'high quality'.²¹ The greatest variance between clinical practice guidelines was in 'stakeholder involvement', with a standard deviation of 34.2, and the lowest variance was in 'clarity and presentation', with a standard deviation of 22.7. Overall, four clinical practice guidelines were found to be 'low quality', and one, the AAO-HNS 2017 guideline, was found to be 'high quality'.¹¹

Intraclass reliability

The intraclass correlation co-efficients for the six domains are presented in Table 3. These values reflect the degree of consistency between the four reviewers (SP, VS, ED and DR). All six domains achieved the maximum 'very good' intraclass reliability.

Discussion

Because of the wide differential diagnosis for patients presenting with symptoms of dizziness and vertigo, BPPV is often underdiagnosed and misdiagnosed on initial presentation. Appropriate investigation to elucidate the cause of vertigo can be guided by clinical practice guidelines, which serve as valuable tools for clinicians when making healthcare decisions. High-quality clinical practice guidelines can decrease adverse patient outcomes, and they give a clear, standardised approach to managing disease while reducing variations in practice.^{26–28} International collaboration in the provision of evidence-based recommendations for BPPV is crucial to reduce treatment delays and improve quality of life for all patients worldwide. This study analysed five clinical practice guidelines on the diagnosis and management of BPPV, and found multiple

domains that can be standardised to improve clarity and guidance for clinical decision making.

The two highest-scoring domains in our analysis were 'scope and purpose' and 'clarity and presentation', demonstrating the well-defined objectives of each guideline, the intended audience and the easily identifiable recommendations. Multiple guidelines (Italy, 2015;²⁵ China, 2019;²³ and AAO-HNS, 2017²¹) presented flow diagrams to assist in directing next steps for varying clinical presentations, with well-defined timelines, diagnosis options and treatment plans. Additionally, the picture diagram representations of the performance of specific manoeuvres necessary for the diagnosis and management of BPPV, such as the Dix–Hallpike manoeuvre, supine roll test, Epley manoeuvre, Semont ('liberatory') manoeuvre, Lempert 360-degree roll manoeuvre and Gufoni manoeuvre, were clearly delineated in a series of steps in multiple guidelines, allowing a better understanding of how to properly execute these manoeuvres.

'Applicability' received the lowest average score out of all the domains, with only the AAO-HNS 2017 guideline²¹ achieving the 'high quality' threshold. This domain consists of presenting the facilitators, barriers, resource implications and monitoring criteria for guideline implementation. Our study consisted of international guidelines, with collaboration from physicians from over seven different countries. While the majority of diagnostic and management approaches for BPPV are relatively low cost, differences in international access to resources such as customised vestibular rehabilitation sessions for refractory BPPV cases can lead to an increase in healthcare costs and emergency department visits.²⁹ Moreover, BPPV has been shown to recur after treatment, with a recurrence rate of 37 per cent at 60 months.³⁰ The AAO-HNS 2017 guideline²¹ provided clear evidence, alternatives, risks, costs, exceptions and differences in opinions for each action statement

Table 1. General characteristics of included clinical practice guidelines

Organisation or authors	Journal	Publication year	Country or region	Development method	Developers	Target user	Number of references	Funding
AAO-HNS ²¹	<i>Otolaryngology-Head and Neck Surgery</i>	2017	USA	Systematic literature review, expert consensus	General otolaryngologists, otologists, neuro-otologists, neurologists, family practitioners, nursing, physical therapists, emergency medicine, radiologists, audiologists	General otolaryngologists, otologists, neuro-otologists, neurologists, family practitioners, nursing, physical therapists, emergency medicine, radiologists, audiologists	294	AAO-HNS Foundation
Bárány Society ²²	<i>Journal of Vestibular Research</i>	2015	International	Expert consensus via Delphi study, systematic literature review	Otolaryngologists, neurologists	Otolaryngologists, neurologists	81	Bárány Society, Neuro+ e.V. (Berlin)
Wang <i>et al.</i> ²³	<i>Therapeutics and Clinical Risk Management</i>	2019	China	Expert consensus	Otolaryngologists	General practitioners, otolaryngologists, neurologists	33	-
Gnerre <i>et al.</i> ²⁵	<i>Italian Journal of Medicine</i>	2015	Italy	Expert consensus	Internal medicine	-	60	-
Otology committee, Spanish Society of Otorhinolaryngology & Head & Neck Surgery ²⁴	<i>Acta Otorrinolaringológica Española</i>	2017	Spain	Expert consensus, non-systematic literature review	General otolaryngologists, otologists, neuro-otologists	General otolaryngologists, otologists, neuro-otologists	119	-

AAO-HNS = American Academy of Otolaryngology – Head and Neck Surgery

presented, allowing healthcare professionals to understand the full scope of each recommendation. In future updates to international guidelines, barriers to management should be recognised and alternative approaches must be appreciated.

‘Stakeholder involvement’ and ‘rigor of development’ also received low average domain scores. ‘Stakeholder involvement’ identifies the individuals responsible for creating the final recommendations, and determining patient views and target users for the guidelines. The initial BPPV presentation can be at a variety of healthcare settings, including the emergency room, primary care clinics, or neurology or otolaryngology clinics.³¹ One study found that the average time from first referral to BPPV diagnosis was 93 weeks, emphasising the need for oto-neurological skills in primary care settings to allow timely and cost-effective help for patients in need.³² The role and opinion of healthcare workers in multiple different specialties must be considered when designing guidelines, to ensure expert consensus for clinical diagnosis and management. Of note, the developers for all guidelines were diverse, including general otolaryngologists, otologists, general practitioners, nurses, physical therapists, emergency medicine doctors, radiologists and audiologists, appropriately representing professionals involved in the care of BPPV. Guidelines can be improved to optimise completeness and involve all stakeholders by including patient views and incorporating patient satisfaction from the recommendations presented.

The ‘rigor of development’ domain has been reported to have the greatest weight in determining the overall quality of clinical practice guidelines by some authors.³³ It consists of analysing the comprehensiveness and systematic methods used to search and include evidence for each guideline and provide an explicit methodology for updating procedures. One guideline (Bárány, 2015²²) was developed using expert consensus via the Delphi study method, which has been widely used in the literature to develop healthcare quality indicators.³⁴ It consists of using a series of questionnaires sent to experts to ultimately create a systematic set of consensus statements. However, a well-known methodological issue with the Delphi method is the lack of concrete definition for ‘consensus’ amongst experts for group agreement. This drawback can also be seen with two more guidelines (China, 2019;²³ and Italy, 2015²⁵), which used expert consensus without a well-defined method for consensus. The remaining two guidelines (AAO-HNS, 2017;²¹ and Spain, 2017²⁴) used both expert consensus and a literature review, with transparent procedures for including and excluding evidence. Each guideline had a robust set of references to support its recommendations.

Finally, the ‘Editorial Independence’ domain consists of explicitly declaring any conflicts of interests from group members and reporting any influence from funding bodies in the creation of the guidelines. Three guidelines reported no details of funding or conflicts of interests, which raises concern for possible bias (China, 2019;²³ Italy, 2015;²⁵ and Spain, 2017²⁴). The remaining two guidelines offered appropriate and transparent mention of any conflicts of interest and funding (AAO-HNS, 2017;²¹ and Bárány, 2015²²). This is essential for ensuring that evidence-based recommendations have no sources of bias.

Limitations

Our study has several limitations. First, while our search strategy was methodological and thorough, it is possible that some recommendations and guidelines were not included in this

Table 2. Quality appraisal of included clinical practice guidelines using scaled domain scores

Society or institution (year)	Domain 1 Scope & purpose (%)	Domain 2 Stakeholder involvement (%)	Domain 3 Rigor of development (%)	Domain 4 Clarity & presentation (%)	Domain 5 Applicability (%)	Domain 6 Editorial independence (%)	Overall (average) score (%)	Overall quality
AAO-HNS (2017) ²¹	94.4	94.4	92.2	91.7	67.7	81.3	87.0	High
Bárány (2015) ²²	23.6	19.4	23.4	29.2	2.1	20.8	19.8	Low
China (2019) ²³	48.6	34.7	16.1	50.0	0.0	70.8	36.7	Low
Italy (2015) ²⁵	41.7	11.1	35.4	63.9	0.0	6.3	26.4	Low
Spain (2017) ²⁴	47.2	16.7	18.2	56.9	0.0	68.8	34.6	Low
Total (mean ± SD)	51.11 ± 26.2	35.28 ± 34.2	37.08 ± 31.7	58.33 ± 22.7	13.96 ± 30.1	49.58 ± 33.6		

AAO-HNS = American Academy of Otolaryngology – Head and Neck Surgery; SD = standard deviation

study. Our analysis included the PubMed, Scopus and Embase databases, but there may be relevant literature that exists outside these resources. Furthermore, there were multiple guidelines with recommendations to diagnose and treat vertigo that may have included a diagnosis of BPPV but were ultimately not included, as these recommendations were not specific to BPPV.

In addition, although the Appraisal of Guidelines for Research and Evaluation II instrument is an evidence-based tool for assessing the rigour and quality of guidelines, the rating assigns equal weight to all domains, despite variations in importance. The tool can only be used to appraise the methodological rigour of included guidelines, but cannot assess the scientific accuracy of the subject matter. Moreover, the tool is based upon subjective interpretation by each reviewer, which is susceptible to individual biases. Although intraclass correlation co-efficient scores were consistent amongst appraisers, the subjective nature of assessing each domain must be considered. Clinical practitioners should use their own judgement and acknowledgement of available resources for each patient when identifying key recommendations from clinical practice guidelines to use in their everyday practice.

Recommendations

Based on the guidelines reviewed, there were certain key recommendations that were common across all clinical practice guidelines. These recommendations are summarised as follows.

Diagnosis of BPPV begins with a focused history and physical examination. The history should focus on defining characteristics, including whether the dizziness occurs with respect to

gravity, duration and accompanying symptoms. For the physical examination, the ‘gold standard’ for diagnosis is the Dix–Hallpike manoeuvre. It is important to note the direction of nystagmus and the side with worse symptoms when performing the manoeuvre. A positive Dix–Hallpike manoeuvre is when there is a period of latency of 1–2 seconds, followed by up-beating, torsional nystagmus, lasting less than 1 minute. A positive test confirms the diagnosis of posterior semicircular canal BPPV. If the Dix–Hallpike manoeuvre provides horizontal or no nystagmus, clinicians can proceed to perform the supine roll test. A positive supine roll test, demonstrated by horizontal nystagmus, confirms the diagnosis of horizontal semicircular canal BPPV. After diagnosis, treatment with particle repositioning manoeuvres such as the Semont or Epley manoeuvre can be performed. Patients should be closely followed and may need vestibular rehabilitation for persistent symptoms. Radiographic imaging is not routinely indicated for patients who meet diagnostic criteria for BPPV. Patients should not be prescribed vestibular suppressant medications, as there is no literature supporting their use in managing BPPV.

Conclusion

High-quality clinical practice guidelines and recommendations based on multidisciplinary and rigorous unbiased methodological development can create pathways for providers to optimise outcomes for patients. A variety of guidelines have been developed for the diagnosis and management of BPPV. Of the five guidelines assessed, only the AAO-HNS clinical practice guideline was rated as high quality. Our analysis shows that the ‘applicability’ domain has the greatest potential for improvement, emphasising the need for recommendations to include barriers to management and alternative approaches. In the future, international collaboration amongst multidisciplinary stakeholders should be promoted in order to standardise BPPV clinical practice guidelines, for better healthcare practice and patient care.

Competing interests. None declared

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Table 3. Intraclass correlation co-efficients for AGREE II domains

AGREE II domain	ICC	95% CI	ICC reliability
Scope & purpose	0.934	0.86–0.98	Very good
Stakeholder involvement	0.970	0.94–0.99	Very good
Rigor of development	0.931	0.89–0.96	Very good
Clarity of presentation	0.812	0.59–0.93	Very good
Applicability	0.983	0.97–0.99	Very good
Editorial independence	0.860	0.64–0.96	Very good

AGREE II = Appraisal of Guidelines for Research and Evaluation instrument; ICC = intraclass correlation co-efficient; CI = confidence interval

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