



Assessment of Saudi Physicians and Physical Therapists' Adherence to the Updated Clinical Practice Guideline for Benign Paroxysmal Positional Vertigo: A Cross-Sectional Study

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Abstract

Introduction Variations in clinical practice regarding the management of benign paroxysmal positional vertigo (BPPV) among clinicians have been noted in previous studies. Such variations might be related to the different adherence to clinical practice guidelines.

Objective To evaluate clinicians' adherence to BPPV guidelines and investigate the variations in the adherence between different specialties and qualifications.

Methods This is a cross-sectional study with a vignettes-based survey conducted between June and August, 2020. We included clinicians engaged in managing BPPV that had at least one year of clinical experience. We excluded students, and clinicians who were not involved in the management of individuals with BPPV. Participants were asked to make their management choices based on four hypothetical patient vignettes. The sample ranged from 77 participants for the first vignette to 45 participants for the last vignette.

Results We included 77 clinicians in the study, with the majority being Otolaryngologists (31.2%). The respondents' mean adherence to the guideline was of 63.3%. Result showed that Otolaryngologists' adherence was higher than that of clinicians from different specialties ($p = 0.006$, $d = 0.72$). Furthermore, clinicians with a postgraduate degree were more likely to adhere than those with a bachelor's degree only ($p = 0.014$, $d = 0.58$) and participants who were aware of the guideline were more likely to adhere to it ($p < 0.001$, $d = 1.05$). Lastly, regression analysis exhibited that adherence was affected by postgraduate degree and guideline awareness.

Conclusion Otolaryngologists were more likely to adhere to the guideline than other specialties. Among all specialties, higher adherence was associated with guideline awareness and postgraduate degrees.

Keywords

- ▶ vertigo
- ▶ benign paroxysmal positional vertigo
- ▶ guideline adherence
- ▶ physical therapist
- ▶ otolaryngologist

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Introduction

Benign paroxysmal positional vertigo (BPPV) is the most common cause of vestibular vertigo, and accounts for approximately 17 to 42% of vertigo cases.¹⁻⁴ It can be defined as a mechanical peripheral vestibular disorder that is provoked by changes in head position relative to gravity;^{1,5} BPPV is often accompanied by nausea, vomiting, and positional nystagmus.^{1,5,6} Researchers have found that 27 to 38% of the symptoms related to BPPV resolve spontaneously without interventions.^{7,8} Nevertheless, waiting for a spontaneous resolution of symptoms is not desired, as the nature of BPPV may be severely disabling.⁹

During the presence of symptoms, adverse effects such as falling, restrictions in daily activities, and low quality of life might occur.¹⁰ Patients with vertigo also tend to quit or change jobs, give up driving, and avoid leaving the house.^{11,12} In Saudi Arabia, a study revealed that 65.7% of patients believed that social activities should be limited when they suffer from vertigo.¹³ Furthermore, 76% reported the need for certain precautions to prevent symptom provocation.¹³ Subsequently, this incurs a high cost to health services and the economy.¹⁴ Luckily, these complications can be avoided or controlled by effective management that well-trained healthcare professionals should be capable of providing.

The diagnosis of BPPV can be easily done by combining particle repositioning maneuvers with subjective knowledge obtained from patient history and clinical observation.¹⁵ Once it is identified and confirmed, clinicians can treat BPPV with the appropriate therapeutic maneuvers for a complete recovery.¹² Recent studies have found that diagnostic maneuvers were used on only 27% of vertigo cases.¹¹ Additionally, many patients with BPPV (71%) underwent at least one unnecessary test with no diagnostic findings related to BPPV.¹⁶ Furthermore, most patients diagnosed with BPPV received no medical care, whereas only 10% were treated with therapeutic maneuvers.¹¹ Unfortunately, researchers still found variations in the management of BPPV among clinicians from different specialties.^{17,18} To improve quality of care and clinical reasoning accuracy, evidence-based guidelines have come into clinical practice.¹⁹

A clinical practice guideline (CPG) for BPPV management was developed and recently updated by the American Academy of Otolaryngology, Head and Neck Surgery Foundation (AAO-HNSF).^{1,20} The purpose of this CPG was to improve the diagnostic accuracy of BPPV, and to decrease the use of radiographic imaging. The guideline also emphasized the use of appropriate therapeutic repositioning maneuvers such as the canalith repositioning procedure (CRP). This CPG also aims to reduce the inappropriate use of vestibular suppressant medication.¹

Implementing guideline recommendations in clinical practice is essential to reduce management variations and cost, as well as to enhance patient outcomes.^{21,22} Recently, a study found that 88.5% of physicians in Saudi Arabia used CPGs in their practice.²³ However, this cannot guarantee the implementation of guideline recommendations.²⁴ To monitor healthcare services and evaluate clinical decision-making,

adherence to CPG should be assessed.²⁵ In Saudi Arabia, previous studies looking at the quality of care and adherence to CPGs had found variations in the management of numerous disorders. These studies assessed the quality of care among clinicians from different specialties, and included disorders such as asthma, diabetes mellitus (DM), low back pain (LBP), and chronic obstructive pulmonary disease (COPD).²⁶⁻³⁰

To date, adherence to the CPG for BPPV among Saudi clinicians has not been studied. Consequently, the aim of this study was to examine clinicians' adherence to BPPV CPG, and to investigate the differences in adherence according to different variables, as well as to explore whether those variables can predict CPG adherence.

Based on the available literature, we hypothesized that we might see low adherence to the CPG among Saudi clinicians, with differences in adherence based on educational level and guideline awareness. To the best of our knowledge, this is the first study of its kind to examine clinician adherence to the CPG for managing BPPV in Saudi Arabia.

Method

Design and Participants

This was a cross-sectional study conducted in Saudi Arabia between June and August of 2020. We included licensed Saudi medical doctors and physical therapists, with at least one year of clinical experience, who are involved in managing adult patients with BPPV. We excluded students and clinicians who were not involved in the management of individuals with BPPV, and non-Saudis. Criteria regarding eligible participants, objectives, and the study's potential values were explained at the beginning of the survey. The opening page highlighted that clinician consent was obtained by starting the questionnaire and clicking "next." All responses were kept strictly confidential and coded appropriately.

Sample Size

We calculated the sample size using the G*Power 3.1.9.7 software.³¹ A medium effect size of 0.60 was used, based on the result obtained from the pilot study, to estimate the sample size needed. Assuming that the α error probability is 0.05, and considering a power of 80.0%,³² the acceptable sample size for this study was estimated to be 72.

Survey

A self-administered questionnaire was created and used for study purposes (→ **Supplementary Appendix A**, online only). The questionnaire's three sections were designed using SurveyMonkey (San Mateo, CA, USA). The first two sections included a series of questions regarding clinicians' demographic information and clinical practice. The third section contained clinical vignettes that asked whether clinicians assess and treat their patients according to the recommendations of the CPG developed by the AAO-HNSF.

The clinical vignette is a valid and acceptable method that researchers can use to assess CPG adherence.^{25,33,34} This study's survey contained four clinical vignettes that asked

participants to make their management choices based on hypothetical patients. The vignettes were developed using the recommendations in the AAO-HNSF's CPG as a framework. The general ideas in the case scenarios were based on published case studies, medical textbooks, and published articles.^{18,35,36} We wrote the vignettes, rephrased them, and modified them to reflect commonly encountered clinical presentations of patients with BPPV.

We followed a previously validated, vignette-based research methodology to build up patient scenarios.³⁴ Each vignette consisted of a sequence typical to a patient visit, and included present complaints, medical history, examination, diagnosis, and treatment. To assess adherence to the guideline recommendations, we included choices under each vignette regarding examination and treatment similar to a textbook example.³⁷ Moving between sections was not allowed in the survey, and the "back" button was hidden to obtain valid answers.

Pretesting and Piloting

Before data collection, five experts were asked to evaluate the questionnaire.³⁸ They reviewed the questions and case scenarios, and provided minor suggestions that were incorporated into the final draft. Furthermore, eleven participants were enrolled in a pilot testing and were asked to evaluate the quality of the information provided, as well as the vignettes' readability and comprehensibility.³⁹ Participants were also asked to provide information regarding the time needed to complete the survey, which was reported to be approximately 30 minutes.

Scoring the Vignettes

We gave all vignettes the same questions and answers for examination and intervention to determine guideline adherence. The differences were only in questions related to the diagnosis, to investigate the clinician's choices regarding the characteristics of nystagmus and the affected ear. We gave each answer a weighted value to enable a statistical analysis of the data (► **Supplementary Appendix B**, online only). Answers that matched the guideline recommendations were given a weighted score using an interval scale (2, 4, or 6) depending on the strength of evidence. Items with stronger evidence were given more weight, assuming that they are more important to follow. Finally, answers that contradicted the recommendations were given a zero.^{39,40}

Procedure

Data was collected electronically, as a time-efficient and cost-effective method to reach clinicians all over Saudi Arabia that manage BPPV. The survey link was sent to medical doctors and physical therapists, and they were requested to share it with their colleagues and field-related groups on social media platforms. It was also posted on the related scientific health associations' websites. The survey was open for three months, to allow more responses.

Statistical Analysis

Data was analyzed using the Statistical Package Social Sciences (SPSS, IBM Corp. Armonk, NY, USA) version 23.0.

Descriptive statistics were used to present participants' characteristics and calculate the percentage of guideline adherence. We calculated the percentage of guideline adherence for each vignette by dividing the actual score by the maximum possible score and multiplying the result by 100. For each clinician, a mean percentage of overall guideline adherence was calculated by adding up the percentages per vignette and dividing the total by the number of vignettes.³⁹ Moreover, clinicians' responses to important statements for the first vignette were analyzed according to each specialty, using a cross-tabulation.

The data were organized categorically into two groups for variables such as: (a) specialty (otolaryngologist/non-otolaryngologist [including physical therapists]), (b) having a postgraduate degree (yes/no), (c) years of experience (5 years or less/more than 5 years), (d) caseload that consists of patients with BPPV (10% or less/more than 10%), and (e) CPG awareness (yes/no). A comparison of the mean adherence score between groups for each variable was then explored using five independent sample *t*-tests. Moreover, clinicians' adherence rates were classified into either high adherence to the guideline (> 70),^{40,41} or low adherence (≤ 70). We used the same independent variables to investigate whether CPG adherence can be predicted using a binary logistic regression model.¹⁸ A *p*-value of < 0.05 was considered significant.

Results

Invitations were sent through social media platforms, and we acquired 201 responses with a completion rate of 37%. One hundred participants (49.8%) were excluded because they only completed the demographic section and left the vignettes blank. From the remaining 101 responses, 24 were excluded because they were either non-Saudis, or not engaged in BPPV management, as were those who were newly graduated and had no clinical experience or were from unrelated specialties. Of the included participants, 58.4% completed all four vignettes, and the sample ranged from 77 participants for the first vignette to 45 participants for the last vignette (► **Fig. 1**).

Characteristics of Participants

A total of 77 participants were enrolled in the study (► **Table 1**). The majority were otolaryngologists (31.2%). Among all the participants, 46.8% had more than five years of clinical experience, and more than half (55.8%) had a postgraduate degree (including Master of Science/clinical master, Doctor of Philosophy/Science, or Fellowships). A high percentage of the participants (70.1%) were aware of the CPG for BPPV. More than half of participants (54.5%) reported that they usually have a caseload of 10% or less that consists of patients with BPPV. Other variables related to the practice are presented in ► **Table 2**.

Adherence to the AAO-HNSF CPG for BPPV

For clinicians who completed more than one vignette, the mean adherence score was calculated by adding the

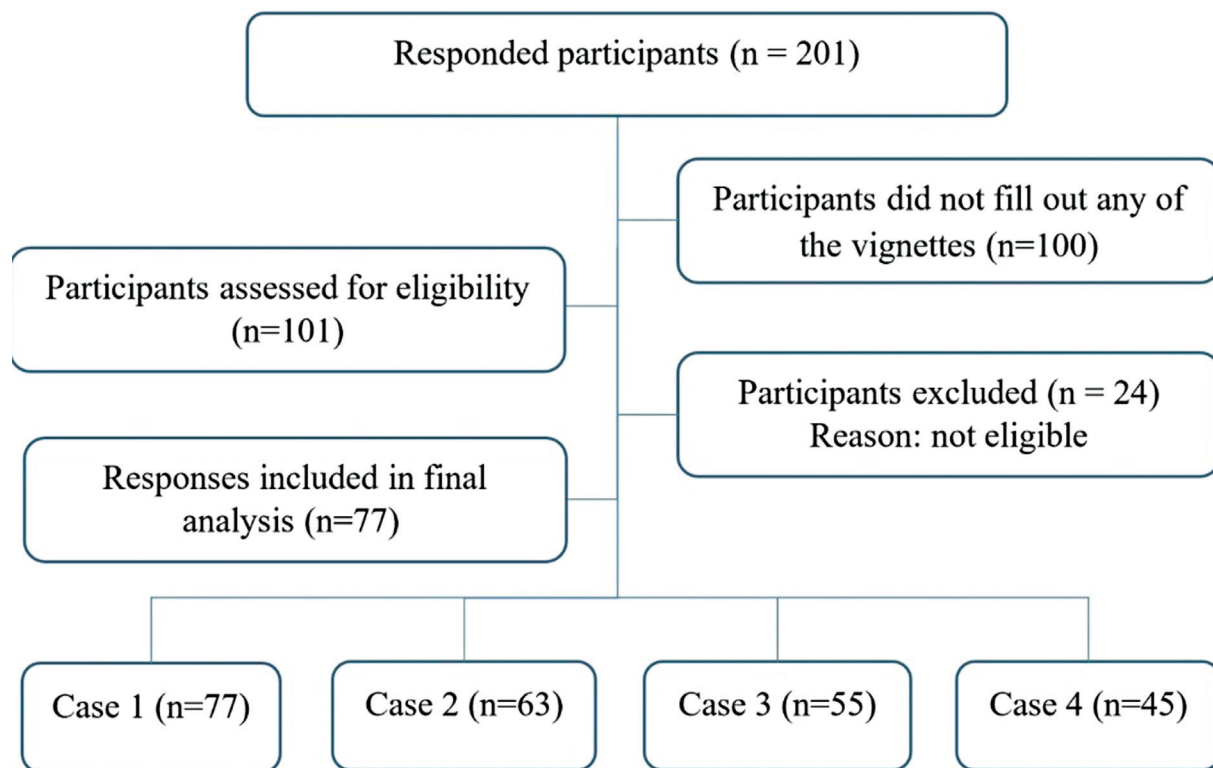


Fig. 1 Flow diagram of participants included in the study.

percentages per vignette and dividing this total by the number of vignettes they answered. This was considered the final score for each clinician. The respondents' mean adherence score according to the four vignettes was of 63.3% (SD = 11.57). A higher mean adherence score was seen among otolaryngologists, with a mean result of 68.6% (SD = 9.56) (► **Table 3**).

Guideline Adherence According to Different Variables

Adherence rates among the studied variables were normally distributed according to the Skewness-Kurtosis tests.⁴² The result of an independent samples *t*-test indicated that adherence scores for otolaryngologists were higher; however, significant differences were only seen when comparing otolaryngologists with other specialties together ($p=0.006$). The test also showed that clinicians with a postgraduate degree had higher adherence rates than those with a bachelor's degree only ($p=0.014$). Moreover, those who were aware of the CPG had significantly higher adherence rates than those who were not ($p<0.001$). Other demographic variables and variables related to clinical experience were not significant (► **Table 4**).

Associated Variables with Guideline Adherence

Logistic regression was performed to ascertain the effects of specialty, postgraduate degree, years of experience, case-load, and guideline awareness on the likelihood that clinicians have a high adherence (► **Table 5**). The inferential goodness-of-fit test (Hosmer–Lemeshow test) yielded a

$\chi^2(5)$ of 8.132 and was insignificant ($p=0.421$), which suggested that the model fit to the data well. The model explained 34.2% (Nagelkerke R^2) of the variance in adherence and correctly classified 75.4% of the cases. The results showed that clinicians with a postgraduate degree were 7.226 times more likely to adhere to the guideline than those with a bachelor's degree only. In addition, clinicians who were aware of the guideline were 28.49 times more likely to comply with the guideline than those who were not.

Vignette-related Clinicians' Responses

This study covered most responses regarding the important statements from the first vignette only (► **Table 6**). This was for the following reasons: a) the response rate for this case was 100% ($N=77$), b) this case represents a typical and common presentation of a patient with posterior canal BPPV, and c) the guideline recommendations were clearly indicated for these patients when no precautions or contraindication are present.

The results showed that 94.8% of clinicians (MDs and PTs) prefer to perform positioning maneuvers to assess a case of BPPV, whereas 35.1% chose to order radiographic testing. For evaluating factors that might interfere with the treatment plan, 85.7% of clinicians considered modifying and assessing these factors. Moreover, vestibular testing was chosen by 62.3% for a case that does not need additional tests. For the characteristics of the nystagmus, only 36.4% of clinicians got the right answer.

Table 1 Characteristics of participants (N = 77)

Characteristics	n	%
Gender		
Male	41	53.2
Female	36	46.8
Age group		
25–34 years old	44	57.1
35–44 years old	25	32.5
45–54 years old	5	6.5
55–64 years old	3	3.9
Specialty		
Family medicine	17	22.1
Otolaryngology	24	31.2
Emergency medicine	5	6.5
Neurology	7	9.1
Physical therapy	21	27.3
Internal medicine	3	3.9
Education		
Undergraduate degree	34	44.2
Postgraduate degree	43	55.8
Clinical experience		
5 years or less	41	53.2
More than 5 years	35	46.8

Note: Values are presented as frequency and percentage unless otherwise noted. n: number of participants.

Regarding treatment options, a therapeutic repositioning maneuver was chosen by 84.4% of clinicians, with the majority (67.5%) preferring not to treat this case with vestibular suppressant medications. For patient education, 94.8% of clinicians chose to educate the patient regarding the impact of BPPV, recurrency, and the importance of follow-up. Furthermore, 81.8% of clinicians decided to reassess the patient within one month after treatment. Lastly, although 71.4% of clinicians prescribed procedural restrictions following a successful therapeutic maneuver, the CPG strongly recommended against this.

Discussion

Adherence to the AAO-HNSF CPG for BPPV

It is important for clinicians examining and treating patients with BPPV to be familiar with the CPG and stay current with the latest evidence. Our study found that clinicians' adherence to AAO-HNSF CPG for BPPV was of 63.3%, which was lower than the high compliance rates (71–100%) that Burgers et al. (2003) suggested.¹³ Additionally, more published studies in Saudi Arabia indicated a low level of knowledge and application of the guideline recommendations in numerous disorders.^{26,28–30} This might indicate that Saudi practitioners have been facing barriers that limit their understanding and

Table 2 Source of learning and clinical practice related to BPPV

	n	%
Source of learning for vestibular disorders and its management		
Undergraduate degree	15	19.5
Postgraduate degree	15	19.5
Medical conferences/congresses	1	1.3
Courses/workshops	2	2.6
Self-learning (online/journal articles/books)	4	5.2
More than one source	40	51.9
Monthly caseload of patients with BPPV		
More than 10%	35	45.5
10% or less	42	54.5
Aware of the existing of clinical practice guidelines for BPPV		
Yes	54	70.1
Performing diagnostic maneuvers		
Yes	57	74.0
Reason for not performing diagnostic maneuvers (N = 20)^b		
No knowledge about diagnostic maneuvers	7	35.0
Not sure about its effectiveness	3	15.0
Not knowing how to perform it	7	35.0
There are other ways to diagnose BPPV	3	15.0
Performing particle repositioning maneuvers		
Yes	45	58.4
Reason for not performing particle repositioning maneuvers (N = 32)^b		
No knowledge about particle repositioning maneuvers	18	56.3
This treatment has no place in general practice	4	12.5
I am not sure about its effectiveness	3	9.4
I do not know how to perform it	7	21.9

Abbreviations: BPPV, benign paroxysmal positional vertigo. Notes: ^a. Multiple answers possible. ^b. Participants who answered "no" to the question.

implementation of the CPGs and its recommendations into clinical practice. One of the main barriers found among physicians in Saudi Arabia was a lack of guideline awareness.²³

Nevertheless, our study showed that although most clinicians (70.1%) reported guideline awareness, their adherence was low. This finding was similar to a previous study investigating physicians' awareness of DM guidelines in Saudi Arabia (71.3%).²⁷ Our results, combined with the findings of Amin et al. (2016), indicated that casual awareness of the CPGs does not guarantee understanding and adherence.^{28,43} Interestingly, we found that adherence was affected by guideline awareness, and participants who were

Table 3 Clinicians' adherences to the updated clinical practice guideline for BPPV

	n	M (SD)	Minimum	Maximum
According to cases				
Mean for all cases	77	63.29 (11.57)	29.03	87.10
Case 1	77	63.51 (16.03)	25.81	96.77
Case 2	63	66.96 (12.36)	31.82	90.91
Case 3	55	64.85 (16.01)	26.67	96.67
Case 4	45	55.28 (10.81)	34.15	73.17
According to specialties				
Family medicine	17	60.19 (8.76)	39.22	72.19
Otolaryngology	24	68.57 (9.56)	51.74	87.10
Emergency medicine	5	60.10 (8.20)	51.61	70.97
Neurology	7	58.94 (9.96)	46.38	70.97
Internal medicine	3	54.00 (1.29)	53.08	55.48
Physical therapy	21	63.30 (15.32)	29.03	81.81

Abbreviations: M, mean; SD, standard deviation; BPPV, benign paroxysmal positional vertigo; CRP, canalith repositioning procedure. Notes: Case 1: A typical case presentation for posterior canal BPPV (PC BPPV). Case 2: A case of PC BPPV for a patient who refused CRP. Case 3: A case of lateral canal BPPV (LC BPPV) for a patient who needs further investigation to rule out other causes. Case 4: A case of LC BPPV for a patient with musculoskeletal condition that needs management and precaution.

Table 4 Comparison of clinical practice guideline adherence according to different variables

Variables	n	M	SD	t (75)	p	Cohen d
Specialty						
Otolaryngologist	24	68.57	9.57	2.816	0.006*	0.72
Non-otolaryngologist	53	60.90	11.68			
Postgraduate degree						
Yes	43	66.14	11.61	-2.5	0.01*	0.58
No	34	59.68	10.6			
Years of experience						
5 years or less	40	61.65	11.33	-3.5	0.19	0.30
More than 5 years	37	65.17	11.76			
Caseload^a						
10% or less	42	61.65	12.28	-1.38	0.18	0.31
More than 10%	35	65.25	10.55			
Familiarity with the CPG						
Familiar	54	66.62	10.17	4.29	< 0.001*	1.05
Not familiar	23	55.47	11.04			

Abbreviation: CPG, clinical practice guideline. Notes: t (degrees of freedom) = the t statistic. * A significant difference ($p < 0.05$) using independent sample t-test to compare the main adherence score according to different variables. ^a. Consists of patients with BPPV.

aware of the CPG had higher adherence rates than those who were not. This was also seen among therapists who were engaged with whiplash-associated disorders (WAD).⁴⁴ They found statistically significant differences in physical therapists' adherence to the WAD guidelines between those who reported familiarity with guidelines and the remaining therapists.⁴⁴ As a result, we can say that awareness of the guideline might not indicate a remarkably high adherence rate, but it can somewhat predict better compliance.

Higher adherence rates were investigated and seen among otolaryngologists (68.6%) and physical therapists (63.3%) compared with other specialties. We noticed that most otolaryngologists (75%) and physical therapists (52.4%) reported having one or more postgraduate degrees. Our findings support and explain this higher adherence rate. We found that those who have postgraduate degrees had a higher adherence rate than those who did not. A similar result was also seen among therapists who were engaged in

Table 5 Multivariable binary logistic regression for adherence to the CPG

Variables	Estimate	S.E.	df	OR	95% CI for OR		p
					LL	UL	
Specialty ^a	.589	.624	1	1.802	.530	6.123	.35
Postgraduate degree ^b	1.978	.920	1	7.226	1.190	43.857	.03*
Years of experience ^c	-1.663	.921	1	.189	.031	1.152	.07
Caseload ^d	-.521	.572	1	.594	.193	1.824	.36
Familiarity with the CPG ^e	3.349	1.168	1	28.486	2.888	280.996	.004*

Abbreviations: CI, confidence interval; CPG, clinical practice guideline; df, degree of freedom; LL, lower limit; OR, odd ratio; S.E., standard error; UL, upper limit. Notes: * a significant difference ($p < 0.05$) using logistic regression investigate the associated variables with higher adherence score. ^a 0 = non-ENT, 1 = ENT. ^b 0 = No, 1 = Yes. ^c 0 = 5 years or less, 1 = More than 5 years. ^d 0 = 10% or less, 1 = more than 10%. ^e 0 = not familiar with the guideline, 1 = familiar with the guideline.

Table 6 Clinicians' answers to the important statements in the case of typical presentation for PC BPPV according to each specialty

Statement		Answer	Total n (%)	Specialty					
				Family medicine	Otolaryngology	Emergency medicine	Neurology	Internal medicine	Physical therapy
Examination	Radiographic testing	Yes	27 (35.1)	5 (29.4)	7 (29.2)	2 (40.0)	6 (82.8)	2 (66.7)	5 (23.8)
		No ^a	50 (64.9)	12 (70.6)	17 (70.8)	3 (60.0)	1 (14.3)	1 (33.3)	16 (76.2)
	Diagnostic maneuver	Yes ^b	73 (94.8)	16 (94.1)	24 (100.0)	5 (100.0)	5 (71.4)	3 (100.0)	20 (95.2)
		No	4 (5.2)	1 (5.9)	0 (0.0)	0 (0.0)	2 (28.6)	0 (0.0)	1 (4.8)
	Modifying factors	Yes ^a	66 (85.7)	17 (100.0)	19 (79.2)	3 (60.0)	6 (85.7)	3 (100.0)	18 (85.7)
		No	11 (14.3)	0 (0.0)	5 (20.8)	2 (40.0)	1 (14.3)	0 (0.0)	3 (14.3)
	Vestibular testing	Yes	48 (62.3)	8 (47.1)	14 (58.3)	1 (20.0)	5 (71.4)	3 (100.0)	17 (81.0)
		No ^a	29 (37.7)	9 (52.9)	10 (41.7)	4 (80.0)	2 (28.6)	0 (0.0)	4 (19.0)
	Correct nystagmus	Yes ^b	28 (36.4)	2 (11.8)	11 (45.8)	0 (0.0)	5 (71.4)	0 (0.0)	10 (47.6)
		No	49 (63.6)	15 (88.2)	13 (54.2)	5 (100.0)	2 (28.6)	3 (100.0)	11 (52.4)
Intervention	Repositioning procedure	Yes ^b	65 (84.4)	14 (82.4)	23 (95.8)	4 (80.0)	3 (57.1)	3 (100.0)	17 (81.0)
		No	12 (15.6)	3 (17.6)	1 (4.2)	1 (20.0)	3 (42.9)	0 (0.0)	4 (19.0)
	Medical therapy	Yes	25 (32.5)	9 (52.9)	5 (20.8)	0 (0.0)	3 (42.9)	2 (66.7)	6 (28.6)
		No ^a	52 (67.5)	8 (47.1)	19 (79.2)	5 (100.0)	4 (57.1)	1 (33.3)	15 (71.4)
	Patient education	Yes ^a	73 (94.8)	16 (94.1)	23 (95.8)	5 (100.0)	7 (100.0)	3 (100.0)	19 (90.5)
		No	4 (5.2)	1 (5.9)	1 (4.2)	0 (0.0)	0 (0.0)	0 (0.0)	2 (9.5)
	Outcome assessment	Yes ^a	63 (81.8)	13 (76.5)	23 (95.8)	4 (80.0)	4 (57.1)	3 (100.0)	16 (76.2)
		No	14 (18.2)	4 (23.5)	1 (4.2)	1 (20.0)	3 (42.9)	0 (0.0)	5 (23.8)
	Postprocedural restrictions	Yes	55 (71.4)	12 (70.6)	17 (70.8)	4 (80.0)	6 (85.7)	3 (100.0)	13 (61.9)
		No ^b	22 (28.6)	5 (29.4)	7 (29.2)	1 (20.0)	1 (14.3)	0 (0.0)	8 (38.1)

Notes: n= number of participants (N = 77). ^a. Recommended by the guideline. ^b. Strongly recommended by the guideline.

the management of patients with WAD.⁴⁴ The study found a significant difference in CPG adherence between therapists who have advanced certification and those who do not ($p = 0.01$).⁴⁴ Moreover, our regression analysis showed that adherence was also affected by postgraduate degree; however, another study concerning a LBP guideline found that adherence was independent of higher educational degrees.²⁹

Clinicians' Responses to the First Case

Results related to the clinical decisions were discussed based on the answers related to the examination and intervention

for a typical case presentation for posterior canal BPPV. Decisions regarding statements concerning radiographic imaging and medical therapy were also involved physical therapists. Even when these statements are out of their scope of practice, we believe that it is important for clinicians from all related specialties—including physical therapy—to know about each statement and understand every recommendation listed in the guideline. This is especially important for medications, because it may affect the patient's symptoms and the diagnostic sensitivity. Nevertheless, they should be able to differentiate BPPV from other cases

and to know when radiographic imaging is needed, to return the patient to a physician.

We found that only 35.1% of the clinicians answered that radiographic imaging was needed to diagnose a patient with BPPV; however, it has been found that there are no radiographic findings that are useful in diagnosing BPPV.⁴⁵ Consequently, it was recommended that clinicians should not order radiographic imaging in the absence of additional symptoms inconsistent with BPPV.¹ Furthermore, to improve diagnostic accuracy and efficiency, a Dix-Hallpike maneuver should be performed.¹ We found that 94.8% of clinicians were willing to perform diagnostic positioning maneuvers such as the Dix-Hallpike test. Our result was closely matched with the guideline's recommendation, and in line with the results obtained from a study done in Japan by Numata et al. (2019). They found that 41.3% of the participants chose to use medical imaging for a case of posterior canal BPPV, and 94% of them preferred to perform Dix-Hallpike.¹⁸

Posterior canal BPPV can be confirmed by the characteristic of nystagmus that Dix-Hallpike provokes. Unfortunately, the associated characteristic of nystagmus was incorrectly selected by 63.6% of the participants. Our result indicated that most clinicians were unable to link the characteristic of nystagmus with the diagnosis. Another related issue has been seen among emergency physicians in the United States.⁴⁶ A study has shown that 54.2% of the documented descriptions of nystagmus concerning peripheral disorders were not matching the definite diagnosis.⁴⁶ This is considered a problem because the nystagmus characteristic is essential to discriminate a vestibular disorder from a non-vestibular disorder, and one peripheral vestibular disorder from another.^{1,46,47} Additionally, it is essential in the decision-making process regarding the ideal intervention and proper maneuver for optimizing care.^{1,46}

Regarding interventions, the patient here presented with mild symptoms and was a candidate for CRP; thus, vestibular suppressant medication was not the preferred treatment.¹ We found that only 32.5% of clinicians indicated the need for the medications. This suggests that our participants might be aware of medication side effects and want to minimize the cost and use of unnecessary prescriptions. Conversely, in the Japanese study, practitioners were highly likely (66.2%) to prescribe an antihistamine to treat BPPV symptoms (which is against the CPG recommendations).¹⁸

We found that the majority (84.5%) of participants preferred to perform therapeutic maneuvers. Likewise, among Japanese clinicians, 77.5% used CRP to treat posterior canal BPPV.¹⁸ This was matching the guideline recommendation and current evidence that showed the effectiveness of particle repositioning maneuvers in treating posterior canal BPPV.^{1,48,49} Our results together with the findings of Numata et al. (2019) indicated that most clinicians support the use of particle repositioning maneuvers for BPPV.

Lastly, it has been found that postural restrictions after a CRP does not have a protective role in decreasing BPPV recurrence.^{50,51} Furthermore, complications such as neck stiffness were observed when patients were given these restrictions.⁴⁸ Although against the recommendation,

71.4% of clinicians in our study were willing to recommend postural restrictions after a successful treatment. Furthermore, 46.3% reported that they never performed therapeutic maneuvers during their actual practice. It is possible that their decisions were affected by their inability to perform the therapeutic maneuvers. Subsequently they might apply restrictions to prevent movements that provoke vertigo.

In summary, our participants followed the guideline recommendations concerning ordering radiographic imaging, performing Dix-Hallpike, modifying factors, performing CRP, prescribing medication, and educating the patient. This may possibly indicate an understanding of most of the recommendations. The CPG recommendations that were not followed by majority of clinicians included vestibular tests, the characteristic of nystagmus, and postprocedural restrictions. These items were given a weight of 4, 6, and 6 (respectively) depending on the strength of evidence. This might explain the reduction in their adherence rates.

Response Bias

We looked at our response bias by comparing participants who filled out the survey completely (including the four vignettes) versus those who filled out three vignettes or less. We found no differences between clinicians with a complete and incomplete survey in the bases of specialty, years of clinical experience, postgraduate degree, caseload, and guideline awareness. Moreover, we found that those who completed all four vignettes adhered better to the CPG than those who answered three vignettes or less. However, the differences were not statistically significant.

Study Limitations

This study has several limitations. First, objective tools to assess validity of the survey were not used. Second, many participants withdrew from the second vignette onwards; thus, we presented the mean as the final adherence score for each participant. Third, measuring clinicians' adherence to the CPG was based on multiple-choice questions, and may have guided their responses or caused the clinicians to feel limited. Finally, the study's results cannot be generalized to all clinicians, as it only involved Saudi clinicians with more than one year of clinical experience dealing with adult cases of BPPV.

Study Significance and Recommendation

Our results emphasize the need for a highly standardized educational system to implement healthcare services based on evidence in Saudi hospitals. A collaboration is needed between the ministry of health and scientific Saudi associations and societies for specialties who are engaging in BPPV management. This will work to enhance continuing medical education that focuses on specific CPG recommendations and raise awareness. Furthermore, health facilities should encourage their healthcare providers to follow guideline recommendations and provide them with both easy access and enough time to utilize the guidelines in practice. Finally, collaboration between healthcare professionals is needed to limit clinical practice variations and optimize patient care.

Conclusion

This study revealed significant differences between otolaryngologists and non-otolaryngologists' clinical adherence to the CPG for BPPV; with otolaryngologists having better adherence rates to the guideline. Among all specialties, high adherence was associated with awareness of the guideline and having postgraduate degrees.

Supplementary material

Requests for the supplementary material should be sent to the corresponding author by email.

Ethical Approval

The study was approved by the Research Ethics Committee at King Saud University Research Center (E-20-4836).

Conflict of Interests

The authors have no conflict of interests to declare.

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