

Main Article

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Pilot study to evaluate a training programme for primary care physiotherapists in the assessment and management of benign paroxysmal positional vertigo

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Abstract

Objective. This pilot study aimed to evaluate a training programme for primary care physiotherapists focused on the assessment and management of benign paroxysmal positional vertigo.

Methods. A six-month training programme and toolkit utilising the revised Standards for Quality Improvement Reporting Excellence ('SQUIRE 2.0') guidelines was developed to facilitate the learning of new knowledge and skills in the assessment and management of benign paroxysmal positional vertigo following Gagne's model of instructional design. A pre- and post-training knowledge and confidence questionnaire evaluated the impact of the training programme.

Results. Eleven participants started the training programme and five completed it. On average, knowledge increased by 54 per cent (range, 41–95 per cent) and confidence increased by 45 per cent (range, 31–76 per cent). A 73 per cent improvement in practical skills acquisition was demonstrated after the initial training session.

Conclusion. A structured approach to learning demonstrates improvements in knowledge, skills and confidence of physiotherapists in the evidence-based management of benign paroxysmal positional vertigo.

Introduction

Vestibular dysfunction is associated with an increase in imbalance, falls, fractures, anxiety, depression and social isolation.¹ Benign paroxysmal positional vertigo (BPPV) is a condition of the peripheral vestibular system affecting balance control, and can contribute to falls and fractures.² It is characterised by the freeing of otoconia 'crystals' from the otolith bed in the utricle and their movement into the semi-circular canal(s).^{2,3} Whilst the head is still, the otoconia do not move, and there are no symptoms at that time. However, with head movement, for example looking up or down, quick turns or rolling in bed, the otoconia can move and cause symptoms of dizziness and imbalance.³ Symptoms have a latent onset after seconds; fatigue occurs between 10 and 60 seconds. In addition, there is an associated direction-specific nystagmus on positional testing (e.g. Dix–Hallpike, supine roll test).³

Benign paroxysmal positional vertigo increases in prevalence with age,^{4,5} and has several significant risk factors, including falls, head injuries, whiplash injuries, hypertension, diabetes and low vitamin D serum levels.^{1,2}

International BPPV guidelines² provide evidence-based 'statements' relating to the assessment and management of BPPV subtypes such as posterior canalithiasis and lateral cupulolithiasis. The National Institute for Health and Care Excellence guidelines on the recognition and referral of suspected neurological conditions⁶ suggest BPPV can be managed in primary care by 'suitably qualified' professionals. Clinicians – typically physiotherapists, audiologists, first contact practitioners, advanced clinical practitioners, nurses, general practitioners and so on – undertake post-qualification training in the assessment and management of BPPV.

Management of vestibular and balance system healthcare is often viewed as an expert area of practice; however, there are significant opportunities for therapists working in the community to be able to screen, assess and manage vestibular disorders. There is a lack of knowledge, skills and confidence across clinical communities,^{7,8} and poor recognition of the importance of training and competence at a national,⁶ local⁹ and advanced practice level.¹⁰ This is despite nationwide National Health Service (NHS) long-term plans¹¹ and local NHS commitment⁹ to develop evidence-based services that meet the needs of an ageing population.

A more structured approach to the development of knowledge, skills and confidence in the management of vestibular and balance system healthcare including BPPV is

required.^{7,8,12,13} Suitably qualified physiotherapists are well placed to: fulfil the demands of changing patterns of service delivery, contribute to and lead successful vestibular and balance system pathways of care,^{14–17} and change healthcare culture.¹³ To date, there has been no formal way for physiotherapists to develop knowledge and skills related to BPPV.¹³ The onus is on the individual to train, develop and demonstrate competence. A theoretical framework for the remote training of non-specialists assessing and treating BPPV,¹² and an educational plan utilising Gagné's model of instructional design, showed significant improvement in medics' knowledge of BPPV.^{18,19} There are no minimum training guidelines for BPPV across all professional groups, unlike other ENT skills (e.g. British Society of Audiology otoscopy minimum training guidelines).²⁰

This pilot evaluation study aimed to discuss and appraise the delivery of a competency-based training programme for primary care community-based physiotherapists in the assessment and management of BPPV. The training programme was developed to align with international guidelines.²

Materials and methods

Driven by a national publication⁶ and preliminary discussions with service managers, physiotherapists in a primary care NHS Trust were invited to undertake a learning needs analysis for the management of dizziness.⁶ It identified quality developments to service provision that could improve clinical pathways in primary care.⁶ Those individuals who identified dizziness as a learning need were invited to show interest in an internally delivered BPPV competency training programme. All specialties and professions were invited to attend. The NHS Health Research Authority online questionnaire identified that this project did not require ethical approval.²¹

Training programme development and contents

A six-month evidence-based training programme and toolkit utilising the revised Standards for Quality Improvement Reporting Excellence ('SQUIRE 2.0') guidelines were developed by a consultant physiotherapist in vestibular and balance system healthcare, an allied health professions lead and an independent university lecturer (Appendix 1 of the supplementary material, available online) to facilitate the learning of new knowledge and skills in the assessment and management of BPPV. Gagné's nine-point instructional design framework²² was used to facilitate learning of new knowledge and skills in the assessment and management of BPPV,¹⁹ incorporating Bloom's revised stages of taxonomy: remembering, understanding, applying, analysing, evaluating and creating²³ (Table 1). The British Society of Audiology²⁰ approach to learning to perform otoscopy also informed development. Pre- and post-training knowledge and confidence questionnaires were developed, trialled, reviewed and amended. Content was based on the international guidelines for BPPV.² An answer template was developed for the knowledge component of the questionnaire, to ensure transparency, and intra- and inter-rater reliability.

The pre-training questionnaire comprised four sections: (1) demographics (questions 1–5); (2) knowledge (questions 6–14), with short-answer questions and key feature questions,^{24,25} which aimed to assess awareness, knowledge and application of BPPV guidelines, assessment, treatment, when to refer onward, and post-treatment advice; (3) confidence

(question 16) in five areas of BPPV assessment and management, measured on a 0–10 visual analogue scale adapted from the Student Satisfaction and Self Confidence in Learning tool;²⁶ and (4) previous learning experience (question 15) (Appendix 1).

For the knowledge questions, there was a focus on comprehension, to evaluate lower-order cognitive skills,²⁷ because this is a predictor of better skills in application and analysis activities. A pass mark of 75 per cent was agreed between assessors for the knowledge component, to ensure a recognised level of competence, and because better knowledge is linked to better performance of skills in medical students.²⁸ There are significant consequences for the patients involved in the misdiagnosis of BPPV² and this was reflected in the high pass mark. A pluralistic and pragmatic approach was taken to assessing competence throughout the training programme.²⁹

The training programme (Table 1) was delivered by an experienced consultant vestibular physiotherapist, assisted by the organisation's allied health professional lead and an independent university physiotherapy lecturer with a special interest in vestibular and balance system healthcare. Training included an initial 4-hour didactic session and observation of skills, videos of nystagmus, practice of assessment and treatment skills, and observation of expert practice in a clinical setting with the opportunity for supervised practice.

An assessment of learning²⁵ (Table 2) was undertaken by the consultant vestibular physiotherapist and external university lecturer, and included: observed structured clinical examination on assessment and treatment techniques; a 10-minute case study presentation by participants (with a marking template; Appendix 1); four case-based discussions by each participant with expert clinicians; observed clinical practice; and a second knowledge questionnaire to assess learning, which was administered at the end of the programme (with a marking template). The confidence questionnaire was repeated post training.

Data from the knowledge, skills and confidence questionnaires were collected and stored on an Excel® spreadsheet, on a password-protected computer; national data protection rules were followed. The data were then reviewed and analysed.

Results

Participant demographics

Eleven clinicians, all physiotherapists, responded and attended the initial training (4 male, 7 female); all were fluent in English, with 10 having English as a first language. Five (female) physiotherapists completed the six-month training programme. Reasons for not completing the course included: unable to attend because of work pressures ($n = 4$), left the organisation ($n = 1$) and maternity leave ($n = 1$). Ten clinicians worked in community settings and one in an intermediate care home. Five clinicians worked in falls teams, two in stroke teams, three in the care of older persons and one in intermediate care. Of the 11 clinicians, 6 were UK NHS band 5, 1 was band 6 and 4 were band 7. Of those who completed the training, three clinicians were band 7, one was band 6 and one was band 5.

Pre-training knowledge, confidence and experience

On initial assessment, 2 of the 11 clinicians were aware of BPPV guidelines and 7 came across dizziness in practice 5–10 times a month (Figure 1). An increase in the frequency of patients seen with dizziness when comparing pre- and

Table 1. Learning of new knowledge and skills in BPPV assessment and management*

Gagné's model of instructional design	Bloom's revised taxonomy	Description
Gain attention	Remembering	Learning needs analysis & quality improvement requests regarding dizziness, balance & falls across the primary healthcare organisation
Inform learners of objectives	Remembering & understanding	Aims of learning outlined:
		(1) To be able to demonstrate a basic theoretical understanding of: - Anatomy & physiology of peripheral vestibular system - Theories of BPPV - Epidemiology & prognosis of BPPV - Precautions & modifications to testing & treatment - Evidence base for assessment & treatment - Prioritising physical assessment order
		(2) To be able to demonstrate practical skills to: - Conduct oculomotor assessment - Safely & effectively perform positional testing - Effectively interpret any observed nystagmus - Identify appropriate management of BPPV - Safely & effectively perform canal repositioning manoeuvres (Epley & barbeque roll, or Gufoni) - Recognise alternative forms of BPPV & seek appropriate support - Give post-treatment advice & agree an appropriate review
		(3) To be able to: - Complete a risk assessment - Communicate test procedures & treatment plans effectively - Communicate the diagnosis - Document assessment findings & treatment interventions accurately - Ensure timely reporting of outcomes & interventions to medical staff - Manage adverse incidents, & complete adverse incident report if indicated
Stimulate recall of prior learning	Remembering & understanding	Knowledge & confidence questionnaire
Present stimulus	Remembering & understanding	Content delivered, including use of case presentation, evidence base & videos of procedure & different nystagmus types
Provide learner guidance	Remembering & understanding	Observing practical skills, e.g. ocular motor assessment, positional testing & canal repositioning manoeuvres
Elicit performance	Remembering & understanding	Paired to practice of ocular motor assessment, positional testing & canal repositioning techniques on simulated patient, with expert clinician supervision
Provide feedback	Understanding	Verbal & written feedback given on diagnostic & therapeutic manoeuvres
Assess performance	Understanding & applying	Observed clinical practice with observed BPPV competency assessment tool
Enhance retention & transfer	Applying, analysing, evaluating & creating	Knowledge & confidence questionnaire, ×4 case-based discussion, 10-minute case presentation to group (grading grid for marking). Regular mentorship & network meetings to discuss case leads. Facilitated group video calls & email-based group discussions. Maintaining clinical activity log, reflections & continuing professional development activity. Portfolio development sessions

*Based on Gagné's model of instructional design and Bloom's revised taxonomy. BPPV = benign paroxysmal positional vertigo

post-training by those completing training was demonstrated. No participant had formal pre-registration training in BPPV assessment and treatment. Nine of the 11 clinicians had attended in-service training, 5 undertook self-directed learning, 3 observed a specialist, 3 had completed an external course and 3 an internal course. Two of the 11 clinicians were involved with a professional network (Association of Chartered Physiotherapists in Vestibular Rehabilitation), 1 used instructional videos, 1 used online resources, 1 had prior competency training and 1 had gained experience on student placement (Figure 1). Three of the 11 participants were performing positional test procedures and canal repositioning manoeuvres prior to the training.

Post training

All participants completing the programme were aware of the current guidelines for BPPV. All participants (100 per cent)

were able to perform positional tests and canal repositioning procedures effectively and safely after the initial didactic and practical training, showing a 73 per cent improvement in skill acquisition. Those who completed the six-month training programme had undertaken training activities of observed clinical practice and internal training before enrolling on this training programme (Figure 2).

All participants completing the training showed an increase in knowledge (Figure 3) and confidence from pre- to post-training, with the exception of one experiencing a loss of confidence. The average pre-learning knowledge score was 41 per cent, with one participant who had undertaken previous training having an initial score of 84 per cent (range, 9–84 per cent). The knowledge score increased on average to 95 per cent post-training (range, 77.5–100 per cent). The average confidence score was 31 per cent (range, 0–90 per cent) pre-training and 76 per cent (range, 66–84 per cent) post-training. On average, knowledge increased by 54 per cent and

Table 2. Assessment formats and their descriptions*

Assessment format	Assessment types	Descriptor
Written examinations	- Clinical investigations examination ('CLIX') - Extended matching questions - Key feature questions - Multiple-choice questions - Short-answer questions	Written examinations assess basic knowledge & understanding, & students' ability to interpret key clinical investigations & diagnostic reasoning
Practical examinations	- Mini-clinical evaluation exercise - Clinical investigations examination ('CLIX') - Multi-station assessment task - Observed structured clinical examination	Practical examinations involve formal assessment of performance-related skills through set practical tasks & questions
Extended written assignments	- Essay - Reflective writing - Individual learning plan	Extended written assignments typically require students to demonstrate conceptual understanding & higher order thinking skills (e.g. analysis, evaluation)
Oral assessment	- Poster presentation - Informal presentation	Oral assessments are usually undertaken individually or as a group, & can test communication & presentation skills, especially under pressure
Other	- Case report - Portfolio	Assessment tasks that require students to: engage in processes where they identify or respond to a problem, collect relevant information & generate possible solutions, appraise the best solution, plan for implementation, &, where possible, implement & evaluate

*As per Preston *et al.* (2020)

confidence by 45 per cent. One participant required further training and repeated the post-training knowledge questionnaire a third time, improving knowledge from 63 per cent and 67.5 per cent to 100 per cent on the third attempt. This participant had undertaken prior competency training, and confidence dropped from 90 per cent to 66 per cent.

Discussion

This evaluation demonstrates an effective structured approach that improves the overall knowledge, skills and confidence of physiotherapists in the assessment and management of BPPV. The findings are similar to those of a study¹⁸ that used Gagné's model of instructional design²² to demonstrate a 60 per cent improvement in medics' knowledge of BPPV, compared to 54 per cent in this study with physiotherapists. However, the multichoice questionnaire in that study¹⁸ showed only a 14 per cent improvement in knowledge, with a 60 per cent improvement in the ability to perform Hallpike–Dix and canal repositioning manoeuvres. In comparison, this small study demonstrated a 54 per cent improvement in knowledge (via the questionnaire) focused on comprehension to evaluate lower-order cognitive skills, with facilitated demonstrable improvements in the application, analysis, evaluation and creation stages of Bloom's taxonomy.²³

Only three people in our study were performing positional testing and canal repositioning manoeuvres for BPPV prior to

the training programme, demonstrating a 73 per cent improvement in skills acquisition, which can transfer to clinical practice. However, only 5 clinicians completed the training, leading to 6 of the 11 participants (with 1 already deemed competent after initial training) routinely monitoring, assessing and managing BPPV after all the training. Excluding the trainer, this represents a 100 per cent increase in 'suitably qualified' allied health professionals⁶ capable of safely and effectively assessing and managing BPPV in the organisation. A support network group helped maintain proficiency and participation in regular case-based discussions and observed practice, where activities were recorded in individuals' portfolios.

The study serves as a provisional roadmap with instructions to develop a comprehensive BPPV training programme. It can be updated with evidence-based practice, and applied to many professions, including physiotherapists, occupational therapists, audiologists, nurses, advanced clinical practitioners, first contact practitioners, general practitioners and medical practitioners. It can be applied and researched across specialties to deliver high impact care in primary and secondary settings for older adults. Although dizziness is a commonly reported symptom across primary and secondary healthcare settings,^{30,31} drivers of change – such as the 'roadmap' to the first contact practitioner and advanced clinical practitioner in musculoskeletal care¹⁰ – do not identify knowledge and skills related to BPPV or vestibular disorders as being required, thereby indirectly influencing

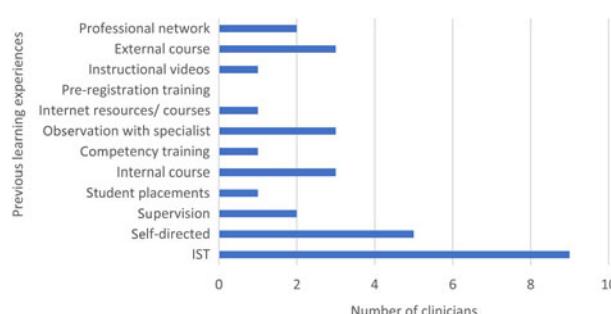


Figure 1. Previous learning experiences related to benign paroxysmal positional vertigo. IST = in-service training

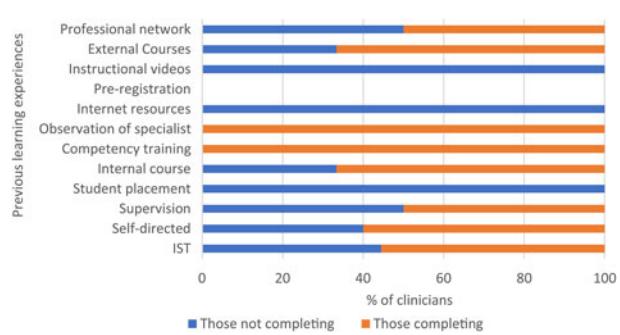


Figure 2. Comparison of previous learning experiences between those completing and those not completing the benign paroxysmal positional vertigo competency training. IST = in-service training

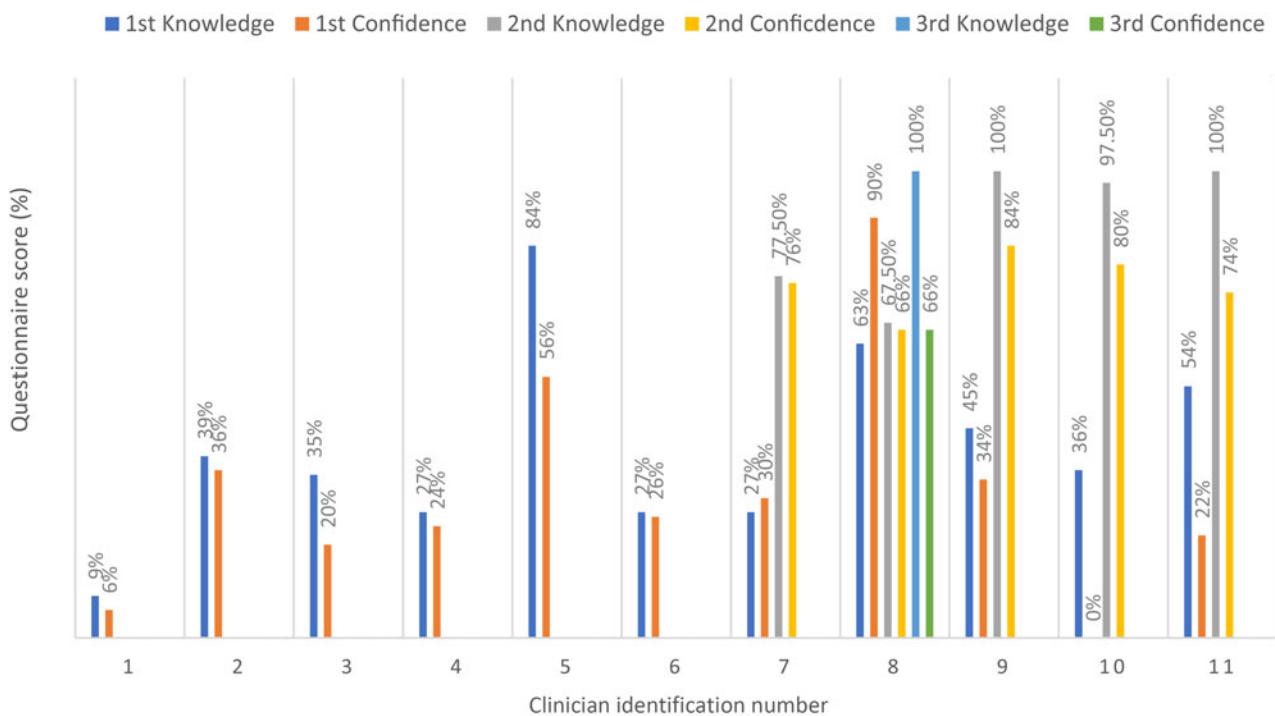


Figure 3. Results of the knowledge and confidence questionnaires.

training activities and patient care. The Association of Chartered Physiotherapists Interested in Vestibular Rehabilitation framework¹³ addresses this shortfall.

All participants in the current study demonstrated improved knowledge regardless of experience level, although one clinician did require further training and showed a drop in confidence. This emphasises the need for an individualised approach and the benefit of small-group training.³² The study, although small in participant numbers, adds to emerging evidence showing that the awareness, assessment and management of BPPV can be undertaken in a clinical setting, with novice and experienced practitioners. Physiotherapists can be ‘suitably qualified’ professionals for the assessment and management of BPPV.⁶ Improved recognition and effective treatment of BPPV with evidence-based practice, in primary care teams for older adults, falls and frailty and neurology teams, has the potential to improve patient outcomes and reduce falls.^{33–36}

Benign paroxysmal positional vertigo occurs frequently with traumatic brain injury,³⁷ and is associated with falls and stroke (although the link between BPPV and stroke remains unclear⁵). Therefore, this training programme can be considered a quality improvement programme that delivers primary healthcare in the right place, at the right time, to the right person, with the right treatment.⁶ Diagnostic skills differentiating central and peripheral signs are of significant importance in falls and stroke care.^{38,39} Improving the identification of BPPV nystagmus can trigger appropriate onward referrals and management for centrally mediated dizziness.^{6,40,41} Early intervention reduces the impact of dizziness, social isolation and depression,^{40,42,43} and reduces the burden on secondary care ENT and neurology services.^{14,15,43}

Training related to BPPV undertaken by general practitioners in the UK led to increased patient treatment choice, a reduced need for secondary care, improved cost efficiency, increased general practitioner confidence and reduced medication intervention.⁴⁴ This study supports the concept that other

professionals, including physiotherapists, advanced clinical practitioners, first contact practitioners and audiologists, can assess and treat BPPV in primary care, be more cost effective and reduce the burden on general practitioner surgeries (which have been under significant pressures since the start of the coronavirus disease 2019 pandemic).

Those clinicians in the current study who completed the training had undertaken other training activities – namely observed clinical practice and internal training – before enrolling on this training programme. This suggests they recognised a need to improve knowledge and skills in the management of BPPV, but a lack of support previously had limited their confidence and application of knowledge. This highlights the importance of the ‘higher’ stages of educational support in Bloom’s taxonomy²³ and of access to expert practice for guidance. Participants demonstrated an increased recognition of dizziness, although one participant less frequently. This is possibly because of service demands or improved recognition of dizziness presentations.

Reasons for not completing the training were mainly related to service pressures. One participant had a good level of knowledge initially and was deemed to have demonstrated competence after the first training session. Clinical supervision is an important part of skill development, and improves resilience and grit,⁴⁵ which can predict success in physical therapist students.⁴⁶ In this case, the initial training acted as a refresher training and was used to collaborate clinical skills for a portfolio, which is important to maintain competence and professional registration.⁴⁷

Confidence improved in all but one of the participants completing training and, in this case, identified outdated knowledge. Knowledge improved with further observations and tailored 1:1 tuition.⁴⁵ Participants at different stages of their development have different needs, requiring a flexible and responsive approach to training.⁴⁵ The training programme offered the opportunity for a variety of enhanced learning experiences with multi-modal assessments,²⁵ supporting the development

of competency in line with the changing evidence base. It is dependent on an expert practitioner having the dedicated time to provide education and supervision.

Multiple-choice questions may be used to assess knowledge.¹⁸ Alternatively, although multiple-choice questions may reflect study effort, short-answer questions more accurately reflect learning. Key feature questions, short-answer questions and Multi-Station Assessment Tasks are students' most favoured and effective learning assessments.²⁵

Gagné's model of instructional design^{19,22} allows the implementation of active learning, linking to Bloom's taxonomy^{23,48} (Table 1). This design is effective in other healthcare learning activities,^{49–52} including pharmacists learning to take blood pressure⁵³ and medics' knowledge of BPPV.¹⁸ This study supports an active learning style to effectively deliver BPPV training for physiotherapists.

Limitations

This study is based on data from a small group, and larger studies are needed to confirm the results. It required skilled facilitators and a central primary care location to deliver training. Clinicians worked across a large community organisation with a geographical footprint across three counties in the UK, delivering multiple specialties across community services. Solutions to this may involve initial online didactic sessions, supervision and video supervision sessions.¹²

- A structured approach to learning demonstrates improvements in physiotherapists' knowledge and confidence in the assessment and management of benign paroxysmal positional vertigo
- The findings of this small study add to a growing body of evidence
- Ongoing competency training and supervision is required to maintain evidence-based knowledge, skills and improved confidence levels

Adapting the confidence scale may change the validity of the confidence measure; in future, the Student Satisfaction and Self Confidence in Learning tool²⁶ may be applied in full. The pass mark standard can be formalised using a recognised method.^{28,29,54}

Conclusion

A structured approach to learning demonstrates improvements in physiotherapists' knowledge and self-assessed confidence in the evidence-based assessment and management of BPPV in adults. Studies are emerging to advise the best way to deliver competency training for BPPV. Physiotherapists are well positioned in healthcare, and can develop the knowledge, skills and confidence to effectively manage BPPV, which is a common cause of dizziness and falls in older adults.

Competing interests. None declared

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