

# Implementing Specialized Vestibular Physiotherapy in An Emergency Department: A Process Evaluation

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## Short report

**Keywords:** Physiotherapy, vestibular rehabilitation, Benign Peripheral Positional Vertigo, dizziness, emergency department, allied health, implementation

**Posted Date:** October 1st, 2021

**DOI:** <https://doi.org/10.21203/rs.3.rs-141139/v2>

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# Abstract

**Background:** Dizziness and vertigo-like symptoms, often caused by common peripheral vestibular disorders such as Benign Paroxysmal Positional Vertigo (BPPV), may have a significant detrimental impact on function and quality of life. The impact of these symptoms often result in Emergency Department (ED) presentations. Evidence based clinical practice guidelines strongly recommend the use of physical assessment and treatment maneuvers for the assessment, diagnosis and treatment of these symptoms. The aim of this study was to evaluate the process of implementing specialized vestibular physiotherapy in an emergency department, from the clinician perspective.

**Methods:** This implementation study utilized a retrospective mixed methods process evaluation to understand how specialized vestibular physiotherapy operated in an Australian emergency department. The PARIHS Framework was embedded within the methodology and analytical approach of the study, to ensure a comprehensive approach which was closely aligned to implementation science. Nine clinicians retrospectively completed the Organizational Readiness for Change Assessment (ORCA), Acceptability of Intervention Measure (AIM), Intervention Appropriateness Measure (IAM) and Feasibility of Intervention Measure (FIM). Seven clinicians also participate in a focus group or interview.

**Results:** A range of barriers and facilitators to the implementation process were identified by participants, some of which spanned multiple domains of the PARIHS framework. Relationships with service leaders, champions and medical staff were found to be a key facilitator to implementation, along with a generally held perception that specialized vestibular physiotherapy was acceptable and feasible. The main barrier identified was a lack of capacity to deliver and support this innovation, both within the physiotherapy workforce and the broader multidisciplinary team.

**Conclusions:** This study demonstrates the process of implementation of a specialized vestibular physiotherapy team in an ED setting was generally well received by clinicians, but also involved some challenges and barriers. Services looking to implement specialized vestibular physiotherapy in the ED may refer to the recommendations arising from the findings of this study to guide their approach to innovation.

## Contribution To The Literature

- Emerging evidence supports the use of specialized physiotherapy for peripheral vestibular disorders, however implementation determinants, context and processes (particularly in emergency department settings) were unknown.
- In reference to the Promoting Action on Research Implementation in Health Services (PARIHS) framework, the most influential factors for clinicians related to facilitation and recipient characteristics.
- Barriers posed by varying terminology for symptoms and interventions between patients and multidisciplinary clinicians emerged as an important priority for action.

- This study describes the experience of implementing specialized vestibular physiotherapy from the perspective of multiple clinicians, which may guide the wider dissemination of this intervention.

## Background

A common cause of dizziness and vertigo presentation to emergency departments (ED) is Benign Paroxysmal Peripheral Vertigo (BPPV), which is defined as vestibular system disruption caused by calcium crystals being dislodged into the semi-circular canals (1). Clinical practice guidelines recommend the routine use of physical maneuvers for assessment and diagnosis of BPPV (2, 3). Failure to accurately diagnosis and treat BPPV can result in negative outcomes for patients, including inappropriate use of vestibular suppressants and other medications, increased falls risk, ongoing disruption of daily activities and decreased quality of life (4–6).

Specialised Vestibular Physiotherapy (SVP) utilizes maneuvers like the Dix-Hallpike test (DHT) and Supine Roll Test (SRT), and interventions such as Canalith-Repositioning Technique (CRT) to assess and treat BPPV (7). Treatment with a CRT results in symptom resolution in 67–89% of cases, in comparison to 0–48% spontaneous resolution (8). A recent prospective observational study (9), found patients attending a physiotherapist-led vestibular rehabilitation service within emergency and acute services experienced significant improvements in dizziness, vertigo and mobility (which were sustained for three months). A validated vestibular screening tool with good sensitivity and reliability has also been developed for physiotherapists working emergency and acute settings (10).

Evidence around the provision of evidence-based BPPV management by ED physiotherapists is beginning to emerge (11). The aim of this study was to evaluate the implementation of specialized vestibular physiotherapy in an ED from the clinician perspective. This study complemented a pilot study of safety and feasibility, which was reported elsewhere (12).

## Materials And Methods

### Design

This study utilized a retrospective mixed method process evaluation, to explore not only ‘what works’ but ‘why’ (13). To embed the study in established implementation theory, the Promoting Action on Research Implementation in Health Services (PARiHS) framework was used as an organizing theoretical structure. The PARiHS framework is designed to guide evidence-based practice implementation, and consists of four interacting domains – setting or context characteristics (Context), facilitation of evidence-based practice (Facilitation), individuals and team engaged in implementation (Recipients) and evidence quality and type (Innovation) (14).

### Context

SVP was implemented in the ED of a single tertiary metropolitan Australian health service. The health service provides acute and community-based services to aged, adult, pediatric and maternity populations. Approximately 250 patients present to the ED daily at this service (15).

## **Implementation Strategy**

SVP was implemented over the second half of the 16-week feasibility study, and was available to eligible patients during weekday business hours (8am to 4pm). Each morning, a study investigator identified potential patients, and determined their suitability in collaboration with medical officers. The investigator also periodically reviewed triage notes throughout the day to identify patients who subsequently presented.

## **Description of the Intervention**

The SVP service targeted adults aged  $\geq 18$  presenting to the ED with symptoms of dizziness, vertigo or imbalance. Exclusion criteria included; 1) Primary diagnosis by medical officer with a clear non-vestibular cause; 2) Patients unable to understand instructions and/or willingly participate (due to language, cognition, symptoms or any other reason); and 3) ED presentations outside SVP service hours (12).

The SVP service provided assessment and treatment as per clinical guideline recommendations (2, 3). Once able to safely mobilize, patients were discharged with educational resources and outpatient specialist physiotherapy referral. The outcomes evaluated in the feasibility study (12) are provided in Additional file 1.

## **Recruitment for Implementation Study**

Eligible participants included physiotherapy, medical and nursing clinicians from the ED, and inpatient acute care and community rehabilitation clinicians impacted upon by the trial of SVP. Acute and sub-acute clinicians were invited to participate if directly involved in the management of people with peripheral vestibular dysfunction.

Participants could indicate on the consent form what modes of data collection they preferred (i.e. outcome measure only, interview/focus group only, both). The sample size was informed by purposive selection, based on direct experience of SVP implementation. Not everyone chose to participate, and the final sample included 11 staff members (4 care coordinators, 3 doctors, 5 physiotherapists, and 1 nurse).

## **Outcomes of Implementation**

Organizational readiness for change, and clinician perceptions of implementation (including acceptability, appropriateness, feasibility and context) were the outcomes of interest. Four outcomes measures were used – the Organizational Readiness for Change Assessment (ORCA) (16), Acceptability of Intervention Measure (AIM), Intervention Appropriateness Measure (IAM) and Feasibility of Intervention Measure (FIM) (17).

The ORCA is a checklist that operationalizes PARIHS framework constructs (16), and has been found to have acceptable reliability and validity across most sub-scales (except those related to evidence). The AIM/IAM/FIM is a suite of measures, which monitor and evaluate the success of implementation. These scales have achieved reasonable structural validity, known groups validity, test-retest reliability and sensitivity to change (17). Higher scores indicate greater acceptability, appropriateness and feasibility, and means are used to calculate scale scores.

Qualitative data was collected via semi-structured interviews and focus groups. Bespoke prompts were developed (see Additional file 2), based upon published reflective questions for PARIHS framework facilitators (14). Interviews and focus groups initially focused on clinical guidelines around assessment and treatment, before encouraging a more general reflection on the implementation process. All interviews and focus groups were digitally recorded, and transcribed verbatim for analysis.

## Data Analysis

A convergent parallel mixed methods approach was utilized, with concurrent quantitative and qualitative data collection and equal valuation when formulating the overall interpretation (18). Ordinal responses were aligned to PARIHS domains. This alignment was undertaken by reviewing definitions of the four domains (Context, Facilitation, Recipients and Innovation), and assigning ORCA and AIM/IAM/FIM items to relevant domains (see Additional file 3). Alignment was initially undertaken by one researcher (DH), before being independently reviewed and confirmed (KI). This data was analyzed using SPSS Version 25.0, and reported using descriptively with proportions.

Qualitative transcriptions were subjected to content analysis, also aligned to the PARIHS framework. A codebook was developed to ensure consistency, including examples for all PARIHS Framework concepts (see Additional file 4). Data were coded and categorized to identify trends and patterns, their frequency and relationships. Independent analysis was completed by two researchers (KI, DH), and compared for consistency. A third researcher (ML or AL) also reviewed all coding, with few instances of disagreement resolved by consensus.

## Results

Nine participants responded to the outcome measures, and seven participated in a focus group or interview.

## Facilitation

As shown in Fig. 1, clinicians agreed or strongly agreed senior leadership and champions had a positive impact on SVP implementation in the ED. However, there was more uncertainty around general leadership, evaluation plans, implementation progress and communication.

Participants especially highlighted a need for exceptional communication and inter-personal skills; *“it really came down to [facilitator] ability to communicate and develop rapport”*.

# Innovation

Many participants (n = 6) perceived very strong evidence for SVP for BPPV, and that SVP fits service priorities and needs very or extremely well. As shown in Fig. 2, all participants believed the SVP service successfully assessed and treated BPPV.

The SVP service was generally perceived to have a positive impact on ED access and flow; *“there was someone there who could actually do the treatment and ... free them up maybe to do something else”*. Participants reported significant satisfaction with the implementation process, which was not perceived as burdensome and enabled a proactive approach; *“Doing things that we know work and actually make a difference”*.

SVP interventions have multiple and potentially confusing names, which required additional explanation to colleagues and patients; *“It looks strange, and there’s a lot of education that goes around that”*. Working with culturally diverse patient also presented challenges; *“the terms delirium, dizziness, light-headedness or vertigo can be used interchangeable, depending on your cultural background, your belief systems, your health literacy”*. The sporadic nature of BPPV presentations in ED was identified as a potential limitation, addressed by physiotherapists floating for other services when not required in ED; *“We had weeks where we’d have eight or nine patients, and then weeks where we’d have none”*.

## Recipients

Most participants strongly believed the SVP service was appropriate, acceptable and feasible in the ED (see Fig. 3).

Successful implementation relied upon the formation of good collegial relationships, especially given the novelty of SVP; *“Having to re-establish identity as who you are and what your skills are ... to have that relationship to go from”*. The medical team was acknowledged as crucial implementation stakeholders, with their enthusiasm and investment a significant facilitator; *“The ED doctors seem to be buying in ... we certainly needed buy in from the key physicians”*.

However, a general lack of knowledge and skill within physiotherapy was also flagged as a barrier to future scale up. While targeted training in SPV is available, experiential learning remains a common path to competence; *“I really learned from seeing clinicians, or from doing doubles and stuff”*. Variations in practice was also observed, suggesting a more widespread need for capacity building; *“I have seen the most weird, I wouldn’t say wonderful, variations of hallpikes ... your interpretation of results and what you do with it is not all on the same page”*.

## Context (Local, Organisational and External Health System)

The local ED team and broader organization was perceived as committed and receptive to enabling access to SPV (see Fig. 4). Clinical leaders facilitated implementation by establishing goals and providing feedback, however perceptions of the services’ ability to adequately resource SPV were more ambivalent.

Several measures to support SVP sustainability were identified, including greater clarity around referrals and pathways; *"You need to have this information if you're going to refer to us"*. Formal policies and specific SVP training were also perceived to important resources for sustainability: *"How it would fit in, so it's not just this little service that operates in ED"*.

Some participants believed physiotherapy department reconfiguration would be required to provide SVP within existing finite resources; *"withdraw our services from elsewhere ... or what extra resources we would need to be able to run that kind of program"*. This could enable an expanded 7 day service, therefore ensuring all BPPV patients had equal access; *"It needs to be a seven day service ... obviously dizziness happens seven days a week"*.

The role of general practitioners following discharged was also a strong theme. While some were supportive of SPV, others did not perceive it as an appropriate intervention; *"The GP said 'that's a load of rubbish. It's complete rubbish, don't bother doing that. It's wrong'"*. As a result, partnerships with community providers was perceived to be a high priority for the future.

## Discussion

These findings provide clinician perspectives of implementing SPV in an ED. The PARIHS Framework describes successful implementation as a function of facilitation (innovation + recipients + context) (19). Successful implementation is demonstrated by evidence of 1) achievement of implementation goals; 2) embedding of innovation in practice; 3) engaged and motivated stakeholders; and 4) minimal variation across settings. While the fourth benchmark was not applicable to this study, the findings of this study suggest the other three were met.

A variety of barriers and facilitators to implementation were identified, some of which spanned multiple PARIHS domains. For example, the role of service leaders and champions was discussed in relation to both facilitation and context. As found in other studies, service leaders have a significant impact on the attitudes, priorities and behaviours of their colleagues (20), and champions can support successful implementation in healthcare (21). Along with policy and procedure development, recruitment and workforce resources are also required for SPV in the ED to be sustainable.

The identification of medical staff as potential facilitators or barriers to SPV reflects their core role within Australian healthcare, and was dependent on their perception of the value of this intervention. The well recognized influence of workplace cultures and hierarchical relationships in acute health can become an implementation barrier when contribute to silo formation or dysfunctional care pathways (22). Medical and nursing colleagues were gatekeepers for this service, via triage and referral initiation. The multidisciplinary collaboration this contextual factor demands adds to the complexity of implementation of all allied health innovation (23), however these relationships were successfully negotiated for the most part during this trial.

Health service stakeholders were generally accepting and supportive of the SPV service, indicating a shared recognition of the potential for positive patient and organizational outcomes. Participant data also consistently supported the acceptability, appropriateness and feasibility of SPV in the ED. Developing a shared vision or goals for change is known to promote buy-in and participation whenever practice transformation is attempted (24). However not all participants were sure of the implementation and evaluation plan, so more explicit identification of goals and evaluation results is recommended for future scale up of this intervention.

A key barrier identified was variable knowledge about the specialized role of physiotherapy, and the value of the intervention. A lack of awareness may lead to missed opportunities for referrals, and poor utilization of the SPV service. The reported lack of capacity within the physiotherapy profession may also limit future implementation, as there may not be sufficient appropriate trained clinicians available for service delivery. A synthesis of previous research concluded educational strategies may be only effective in promoting implementation if they directly address barriers and facilitators to that process (25). This study therefore provides evidence for the design of tailored training targeted to specific implementation issues for this intervention.

## **Strengths and Limitations**

The collection of data from participants across different disciplines within the ED enabled a holistic perspective of the implementation process, which included multiple points of view. Rigorous analysis, such as the multiple coding and peer review of qualitative data, supported the quality of data interpretation. Embedding the PARIHS Framework in the methodological approach also ensured a consistent and informed focus on implementation, which enabled a comprehensive approach to this complex process.

However, the small sample size introduces some significant limitations to the interpretation of the findings. The majority of interview and focus group participants were physiotherapists, and therefore these findings may not be representative of all stakeholders. This study is also only reflective of implementation at one health service within the Australian health service context. Finally, retrospective data collection may have missed changes in perception and experience over time which could inform a more tailored approach to future implementation.

## **Implications**

This study provides preliminary data that demonstrates SPV implementation in the ED is a complex and sometimes challenging experience. As the first implementation study on SPV, it extends the existing evidence in a new direction that is important to ongoing development. The findings provide a basis for future research, education and practice, as a guide to promote effective and efficient scale up and clinicians consider the adaptations required for this innovation to meet the needs of their local context.

## **Conclusion**

This study found the implementation of a SPV team in an ED setting was generally perceived positively by clinicians. Recommendations for future implementation were also identified including building stakeholder relationships, developing a shared vision, explicitly reporting goals and evaluation outcomes, embedding SPV in organizational processes, procedures and policies, and increasing workforce capacity to deliver the intervention to patients with BPPV. The findings indicate this innovation has significant potential to make a meaningful impact on the function of both ED teams and patients presenting with dizziness.

## List Of Abbreviations

AIM - Acceptability of Intervention Measure

BPPV – Benign Paroxysmal Positional Vertigo

CRT - Canalith-Repositioning Technique

DHT - Dix-Hallpike Test

ED – Emergency Department

FIM - Feasibility of Intervention Measure

IAM - Intervention Appropriateness Measure

ORCA - Organizational Readiness for Change Assessment

PARiHS - Promoting Action on Research Implementation in Health Services framework

SRT - Supine Roll Test

SVP - Specialised Vestibular Physiotherapy

## Declarations

### *Ethics approval and consent to participate*

Ethical approval to proceed with this study was granted by the Western Health Ethics Committee (HREC/18/WH/120). Explicit written consent was obtained from all participants.

### *Consent for publication*

Not applicable.

### *Availability of data and materials*

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request

### ***Competing interests***

The authors declare that they have no competing interests.

### ***Funding***

The parent study was funded by an internal health service grant, however this implementation study was completed using existing resources.

### ***Authors' Contributions***

Conception or design of the work – KI, ML, AL, DH

Data collection – KI, AL, DH

Data analysis and interpretation - KI, ML, AL, DH

Drafting the article – KI, DH

Critical revision of the article – KI, ML, AL, DH

Final approval of the version to be published – KI, ML, AL, DH

### ***Acknowledgments***

The authors thank the staff of the Sunshine Hospital Emergency and Physiotherapy Departments for their support of the Dizzy-PT study. Anne-Maree Kelly, Harin Karunajeewa, Sharon Klim, Tissa Wijeratne and Catherine Grant assisted with the study design and implementation of the parent comparative study.

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## Figures

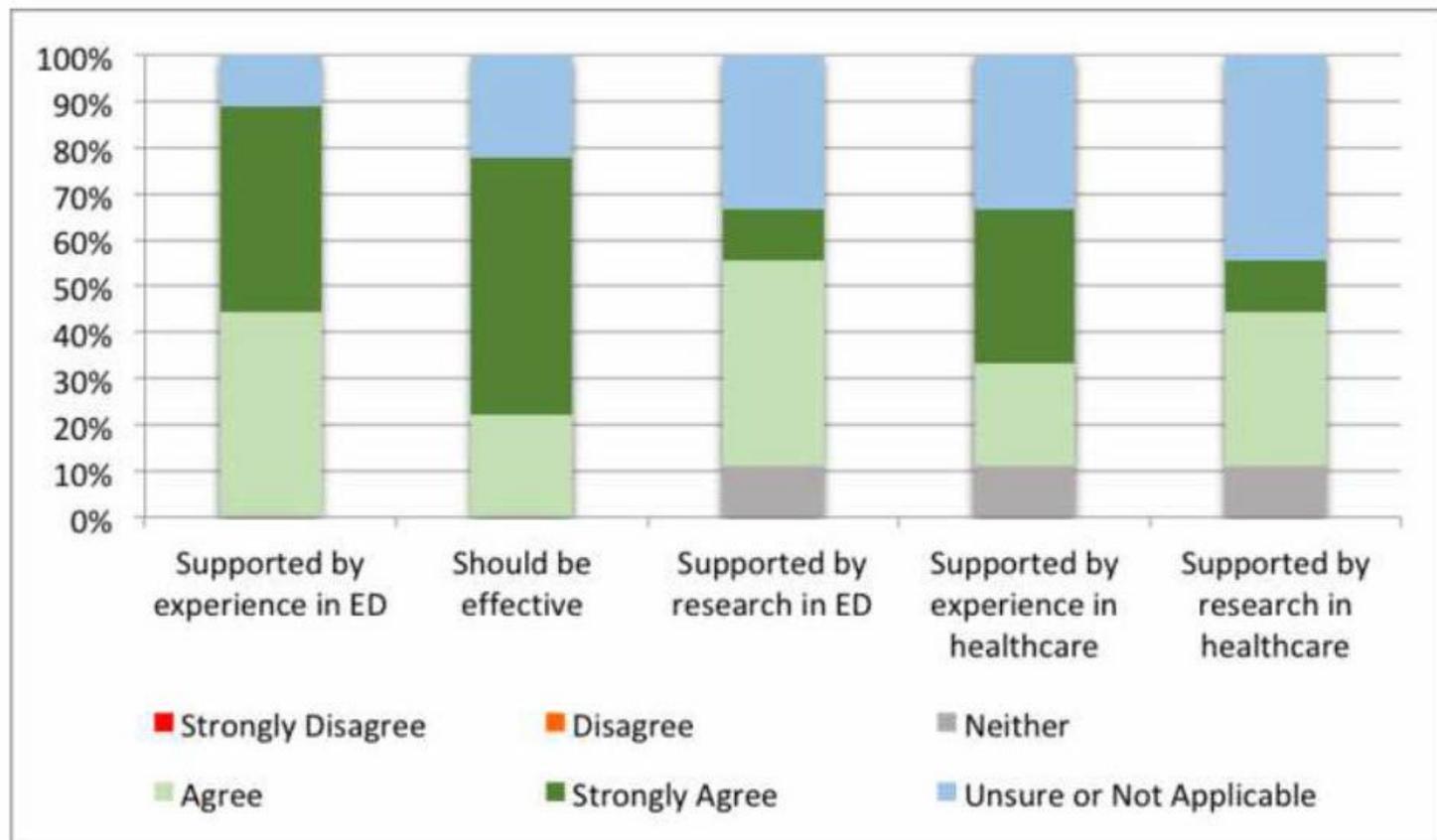


Figure 1

Participant perceptions of the way in which evidence was facilitated for Specialized Vestibular Physiotherapy

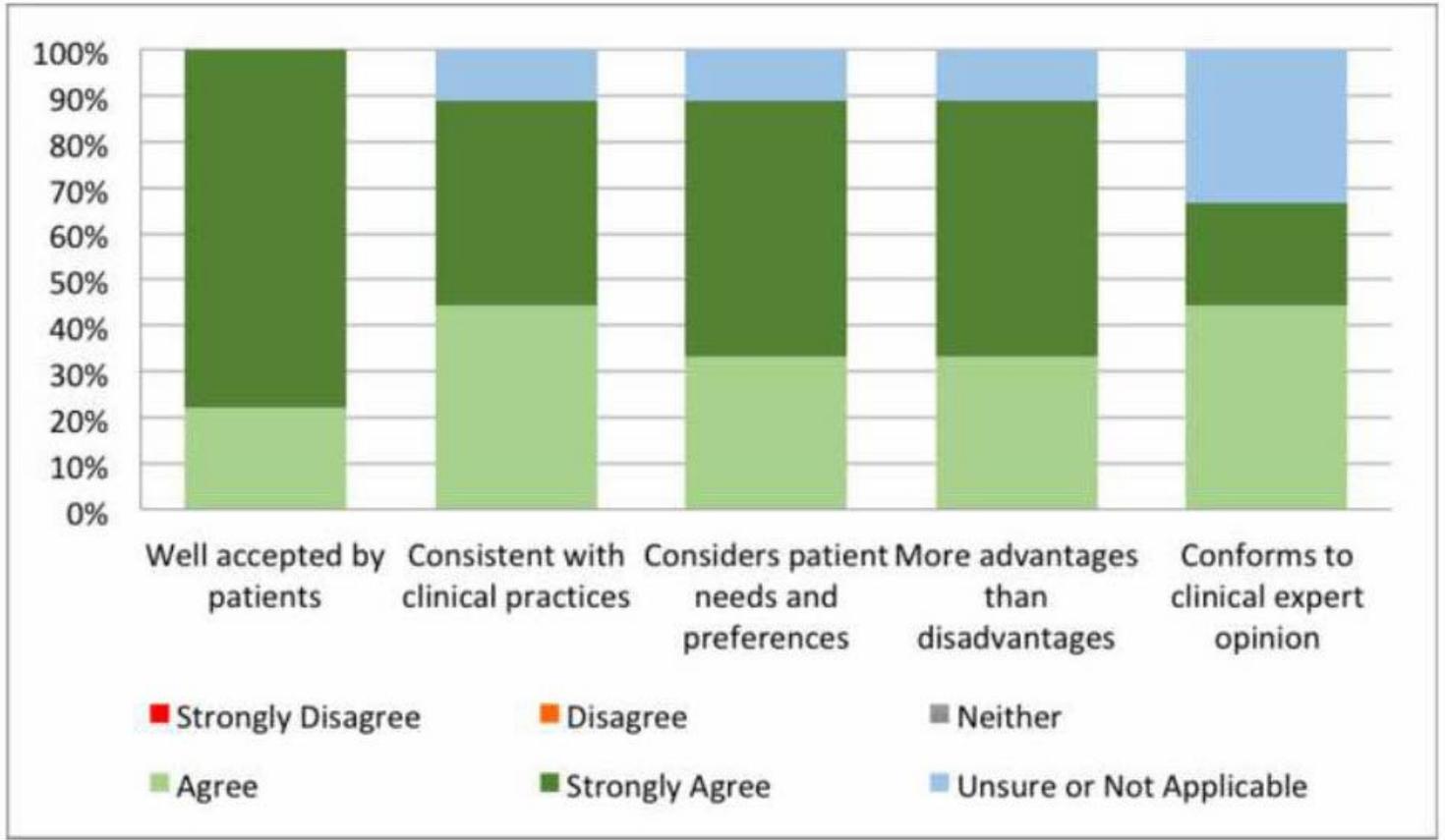
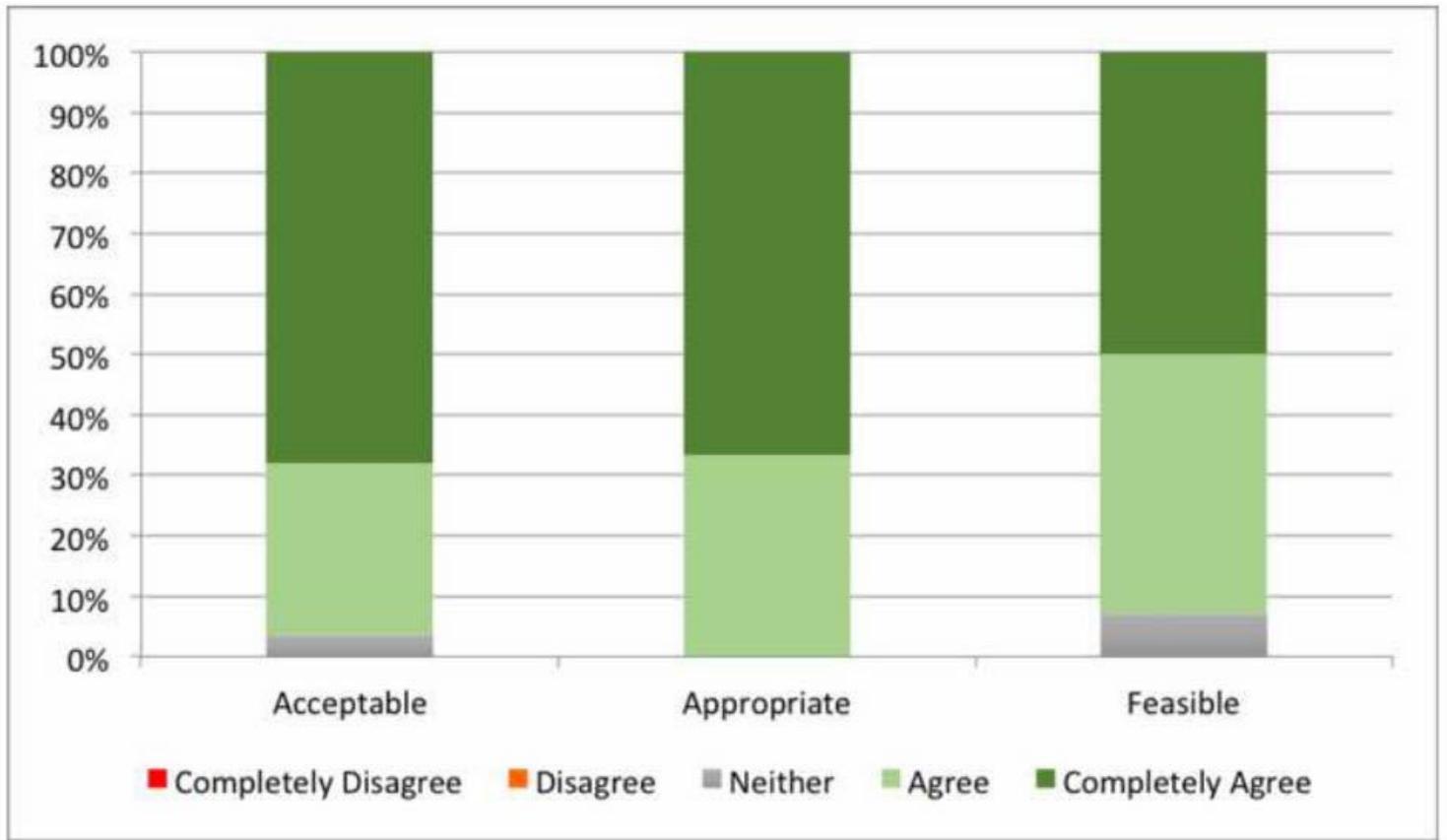


Figure 2

Participant Perceptions of Specialized Vestibular Physiotherapy



**Figure 3**

Recipient Perceptions of the Acceptable, Appropriateness and Feasibility of Specialized Vestibular Physiotherapy

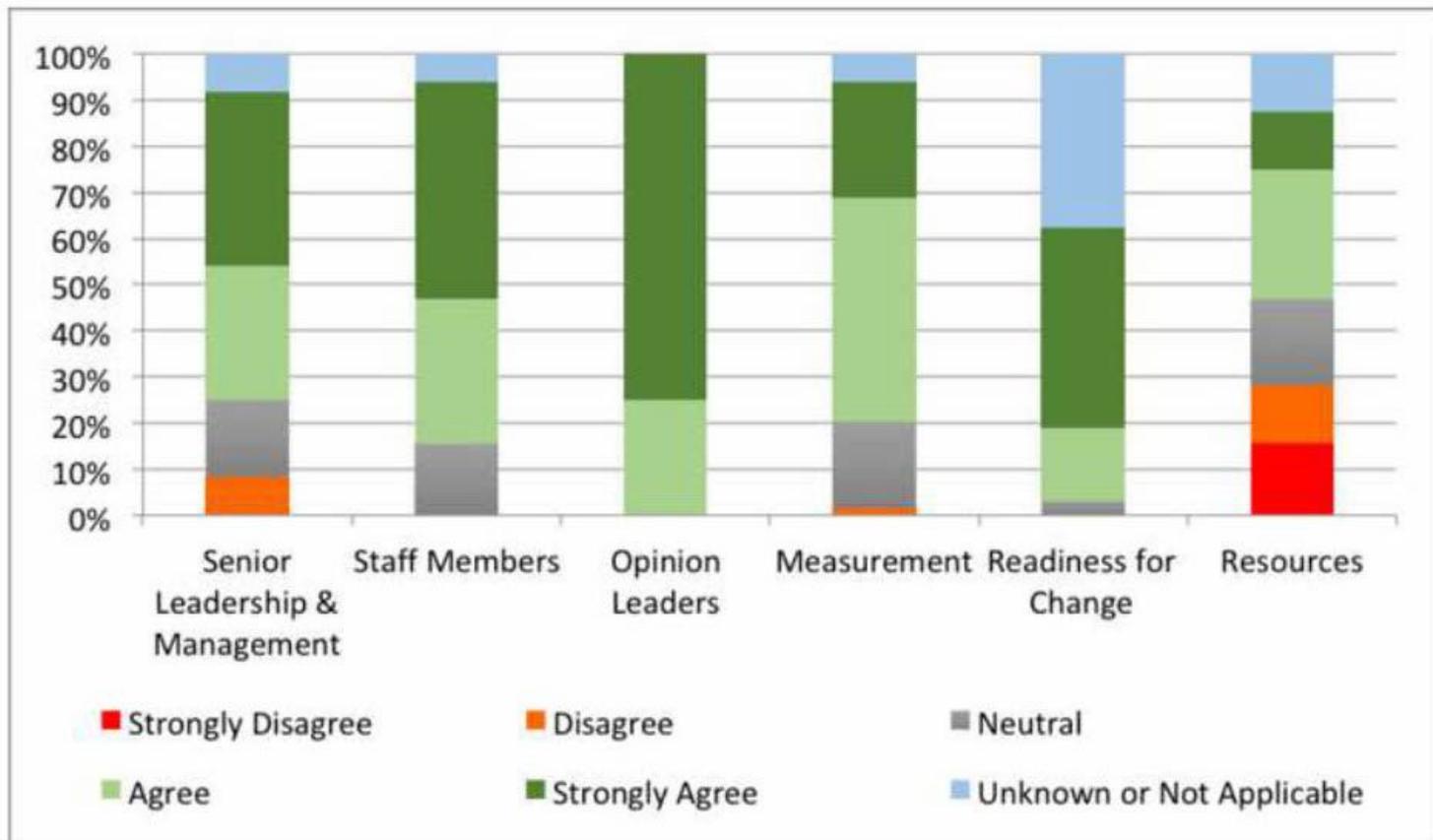


Figure 4

Participant Perceptions of the Context for Specialized Vestibular Physiotherapy

## Supplementary Files

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