Luscombe Allison (Orcid ID: 0000-0002-0325-1505)
Wijeratne Tissa (Orcid ID: 0000-0002-1701-7111)
Kelly Anne-Maree (Orcid ID: 0000-0002-4655-5023)

TITLE

Specialised vestibular physiotherapy in the Emergency Department: A pilot safety and feasibility study

AUTHORS

Melanie Lloyd,[1,2] MPtySt*

Allison Luscombe,[2] BPhysio(Hons)*

Catherine Grant,[2] BPhysio(Hons)

Harin Karunajeewa,[1,3] MBBS PhD FRACP

Sharon Klim,[5] BN PGDACN(Emerg)

Tissa Wijeratne, [1,4] MD FRACP

Anne-Maree Kelly,[5] MD FACEM

*Joint first authors

Affiliations

[1]Melbourne Medical School – Western Precinct, University of Melbourne, St Albans VIC 3021

[2]Department of Physiotherapy, Western Health, St Albans VIC 3021

[3]Department of General Medicine, Western Health, St Albans VIC 3021

[4]Department on Neurology, Western Health, St Albans VIC 3021

[5]Joseph Epstein Centre for Emergency Medicine Research (JECEMR), Sunshine Hospital, St Albans VIC 3021

This is the author manuscript accepted for publication and has undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version of Record. Please cite this article as doi: 10.1111/1742-6723.13569

Corresponding Author: Allison Luscombe, Department of Physiotherapy, Sunshine Hospital, Furlong Rd, St Albans, VIC 3021 AUSTRALIA.

Email: allison.luscombe@wh.org.au

Acknowledgements

The authors thank Physiotherapy Department Managers Melina Shackell and Anna Nethercote for their operational support throughout the study, and members of the Emergency Department Medical, Nursing and Allied Health teams for their support of the project.

Contributors

ML, AL, CG and AMK conceived and designed the study and obtained research funding. AL ML and CG implemented the intervention. AL, ML, CG and SK contributed to data collection. ML completed the data analysis. ML and AL drafted the manuscript. All authors reviewed the manuscript for important intellectual content.

Funding

Funding for this study was received from a Western Health Foundation 2018 Seed Grant.

Competing interests

Anne-Maree Kelly is on the Editorial Board of Emergency Medicine Australasia. The other authors declare nil competing interests.

Patient consent

Written informed consent was provided by all participants.

Ethics Approval

Western Health Human Low Risk Ethics Panel approved this study (HREC/18/WH/120).

ABSTRACT

Objectives: To evaluate the safety and feasibility of vestibular physiotherapy in the Emergency Department (ED), and its impact on adherence to evidence–based clinical practice.

Methods: This prospective pre-post implementation study of adults presenting with dizziness symptoms of potential vestibular aetiology measured the proportion of participants safely completing vestibular physiotherapy assessment and treatment.

Results: 52 participants were recruited (20 usual care and 32 vestibular physiotherapy). 30 of 32 (93.8%) completed all components of physiotherapy assessment, and there were no adverse events recorded.

Conclusion: The results of this study support extending the role of physiotherapists to managing peripheral vestibular dysfunction in the ED.

Keywords

vestibular, Physiotherapy, BPPV, Emergency Department, dizziness

Number of words: 102 (Abstract), 886 (Main Text)

Number of Figures: 1

Number of Tables: 2

Number of references: 5.

INTRODUCTION

Benign Paroxysmal Positional Vertigo (BPPV) is the most prevalent vestibular disorder in adults[1], and a common contributing factor in dizziness presentations to the Emergency Department (ED)[2]. Clinical Practice Guidelines (CPG) set out evidence-based recommendations for the assessment, diagnosis and management of BPPV[3], however, research has shown that these are seldom implemented[2,3], and the condition remains under diagnosed.

Physiotherapists have expertise in the management of peripheral vestibular dysfunction, including BPPV and vestibular neuritis[4], but their potential role in assessing and treating acute dizziness presentations to the ED has not been evaluated[5].

METHODS

Design and setting

This prospective feasibility study had a pre-post fixed 16-week sampling period (8-week usual care period followed by 8-week intervention period) and was implemented during limited business hours (Monday-Friday 8am-4pm). The setting was a metropolitan tertiary hospital located in Melbourne, Australia, with an annual adult census of about 60,000. Adults who presented with symptoms of dizziness, vertigo or imbalance documented at triage were eligible for inclusion in the study. All patients were first assessed by the ED Medical Officer and the following exclusion criteria were then applied: 1) non-vestibular diagnosis by a

medical officer (e.g. a cardiac or central neurological event, disease or disorder); 2) inability to provide written informed consent.

Usual care involved assessment and management by a medical officer, with referral to allied health clinicians on an *ad hoc* basis. The vestibular physiotherapy intervention involved standardised assessment and treatment consistent with published recommendations (see Supplement 1)[3], in addition to usual care. This specialised vestibular physiotherapy service was provided by clinicians with advanced vestibular training. Participants were referred back to the treating medical officer if they displayed signs or symptoms indicating a non-vestibular problem.

Feasibility was measured by the proportion of suitable patients who were willing to participate in, and safely completed, vestibular physiotherapy assessment and treatment in accordance with CPG recommendations. Adverse events and barriers to successful completion were obtained from the hospital's patient incident reporting system and the vestibular physiotherapy assessment form (see Supplement 1). The following secondary outcomes were compared between study groups: 1) diagnosis recorded (via the medical or physiotherapy clinician assessment form); 2) proportion receiving brain imaging, a Hallpike-Dix test (HPD), and a Canalith Repositioning Technique (CRT); 3) ED length of stay (LOS); 4) proportion admitted or returning to ED within 5 and 30-days; 5) satisfaction with care and information provided about condition measured on a 10-point verbal-rating scale; 6) Dizziness Handicap Inventory (DHI) score; 7) proportion returned to usual activity levels at

5-days. Satisfaction and DHI scores were obtained via phone call at 5-days post-ED presentation by a clinician not involved with the participants' clinical management. Analysis was descriptive, with continuous variables presented as median [interquartile range] or mean (standard deviation) and dichotomous variables as counts and percentages.

RESULTS

During the recruitment period, 1229 patients presented to the ED with dizziness symptoms, representing 6.5% of all ED presentations, and 637 (51.8%) of these were in the ED during physiotherapy business hours (See Figure 1). Of 64 individuals who met study inclusion criteria, 52 were recruited to the study. 20 received usual care and 32 vestibular physiotherapy. Participant demographics were similar in both study arms (see Table 1).

Thirty of 32 (93.8%) participants completed all indicated components of vestibular physiotherapy assessment and treatment (see Table 2), though 19 (59.4%) required vestibular suppressant medications for symptom management in conjunction with physiotherapy assessment. There were no adverse events other than transient nausea and vomiting. Eleven (34.4%) participants who received vestibular physiotherapy remained undifferentiated post-assessment and were referred back to the responsible medical officer.

Vestibular physiotherapy was associated with an increase in documented definitive diagnosis, with 14 (43.8%) vs. 0 (0.0%) given a BPPV diagnosis, while only 11 (34.4%) vs. 17 (85.0%) remained undifferentiated at discharge from hospital (see Table 1). All 32 (100.0%) intervention participants received a Hallpike-Dix test (vs. 1 (5.0%) usual care), and fewer required brain imaging (11 (34.4%) vs. 11 (55.0%). Improvements were also seen in participant satisfaction and proportion returning to usual activities within 5-days (Table 1).

DISCUSSION

This is the first study, to our knowledge, to examine the feasibility and impact of specialised vestibular physiotherapy in the ED for patients with dizziness. The results were promising, and demonstrated that vestibular physiotherapy in the ED is safe, feasible, and may have a positive impact on adherence to evidence-based practice and patient satisfaction with care.

A lower proportion of participants assessed by an appropriately trained physiotherapist were given an undifferentiated diagnosis on discharge from the ED. Timely diagnosis may prevent the underlying condition becoming chronic, and therefore reduce both long-term debilitating illness and ongoing health-system costs[3]. The impact of vestibular physiotherapy treatment on longer-term use of vestibular suppressant medications would be of interest but beyond the scope of the data collected in this current study.

This feasibility study was not randomised and has inherent risk of confounding by temporal factors, primarily differences in patient characteristics, and there were several additional limitations to the design. The small sample and single ED design limit generalisation of feasibility and efficacy to other hospitals. A higher proportion of participants in the usual care arm were lost to follow-up, though the reason for this is unclear. As the diagnosis assigned was obtained retrospectively from the patient medical record, the reliability of this outcome is reliant on the underlying quality of documentation.

While a definitive multicentre trial is recommended to firmly establish the efficacy and cost effectiveness of this intervention, the results of this study support the role of physiotherapists in managing vestibular conditions in the ED.

REFERENCES

1 Von Brevern M, Radtke A, Lezius F, Feldmann M, Ziese T, Lempert T et al. Epidemiology of benign paroxysmal positional vertigo: a population based study. *J Neurol Neurosurg Psychiatry* 2007; **78(7)**: 710-715.

2 Kerber KA, Burke JF, Skolarus LE, Meurer WJ, Callaghan BC, Brown DL et al. Use of BPPV processes in emergency department dizziness presentations: a population-based study. *OTO Open* 2013; **148(3):** 425-430.

3 Bhattecharyya N, Gubbels SP, Schwartz SR, Edlow JA, El-Kashlan H, Fife T et al. Clinical practice Guideline: Benign Paroxysmal Positional Vertigo (Update). *OTO Open* 2017; **156(3S):** S1-S47

4 Kasbekar AV, Mullin N, Morrow C, Youssef AM, Kay T, Lesser TH. Development of a physiotherapist-led balance clinic; the Aintree Model. *J Laryngol Otol* 2014; **128:** 966-971 doi: 10.1017/S0022215114002060 [published online first: 14 October 2014]

5 Lefmann SA and Crane JL. Establishing the diverse value of the emergency department physiotherapist. *J Physiother* 2016; **62**: 1-3 http://dx.doi.org/10.1016/j.jphys.2015.11.001

Table 1. Comparison of diagnostic frequency, application of evidence-based clinical practice and outcomes between control and intervention periods

	Control Period (n=20)	Intervention Period (n=32)
Patient Demographics:		
Age, median [IQR]	57 [47-69]	56 [37-72]
Gender, n = Female (%)	10 (50.0)	18 (56.3)
Diagnosis:		
BPPV, *n (%):*		
Posterior canal	0 (0.0)	8 (25.0)
Horizontal canal	0 (0.0)	6 (18.8)
Neuritis, *n (%)*	0 (0.0)	5 (15.6)
Meniere's disease, *n (%)*	0 (0.0)	1 (3.1)
Undifferentiated dizziness or vertigo, *n (%)*	17 (85.0)	11 (34.4)
Other Diagnosis, *n (%)*	3 (15.0)	1 (3.1)
Evidence-based assessment and treatment:		
HPD, *n (%)*	1 (5.0)	32 (100.0)
CT or MRI brain, *n (%)*	11 (55.0)	11 (34.4)
CRT, *n (%)*	0 (0.0)	13 (40.6)
Use of vestibular suppressant medications in the ED, *n* (%)	14 (70.0)	25 (78.1)
Process outcomes:		
Admitted to inpatient ward, *n (%)*	3 (15.0)	2 (6.3)
ED LOS in hours, *median [IQR]*	9.1 [5.0-15.4]	9.1 [4.1-17.3]
Representation within 5-days, *n (%)*	1 (5.0)	0 (0.0)

Representation between 6 and 30-days, *n* (%)	0 (0.0)	3 (9.4)[a]
Adverse Events, *n* (%)	0 (0.0)	0 (0.0)
Patient-reported outcomes:[b]		
Return to usual function, *n (%)*	7 (46.7)[b]	20 (64.5)[b]
DHI at 5-days post discharge, *mean (SD)*	31.4 (27.0)[b]	30.06 (26.3)[b]
Overall satisfaction with care in ED, *median [IQR]*	8 [7-9][b]	10 [9-10][b]
Satisfaction with information about condition, *median [IQR]*	7 [5-9][b]	10 [8-10][b]

Abbreviations: BPPV: benign paroxysmal positional vertigo; HPD: Hallpike-Dix manoeuvre; CT: Computed tomography; MRI: magnetic resonance imaging; CRT: canalith-repositioning technique; ED: Emergency Department; LOS: length of stay; IQR: interquartile range; DHI: Dizziness Handicap Inventory; SD: Standard Deviation

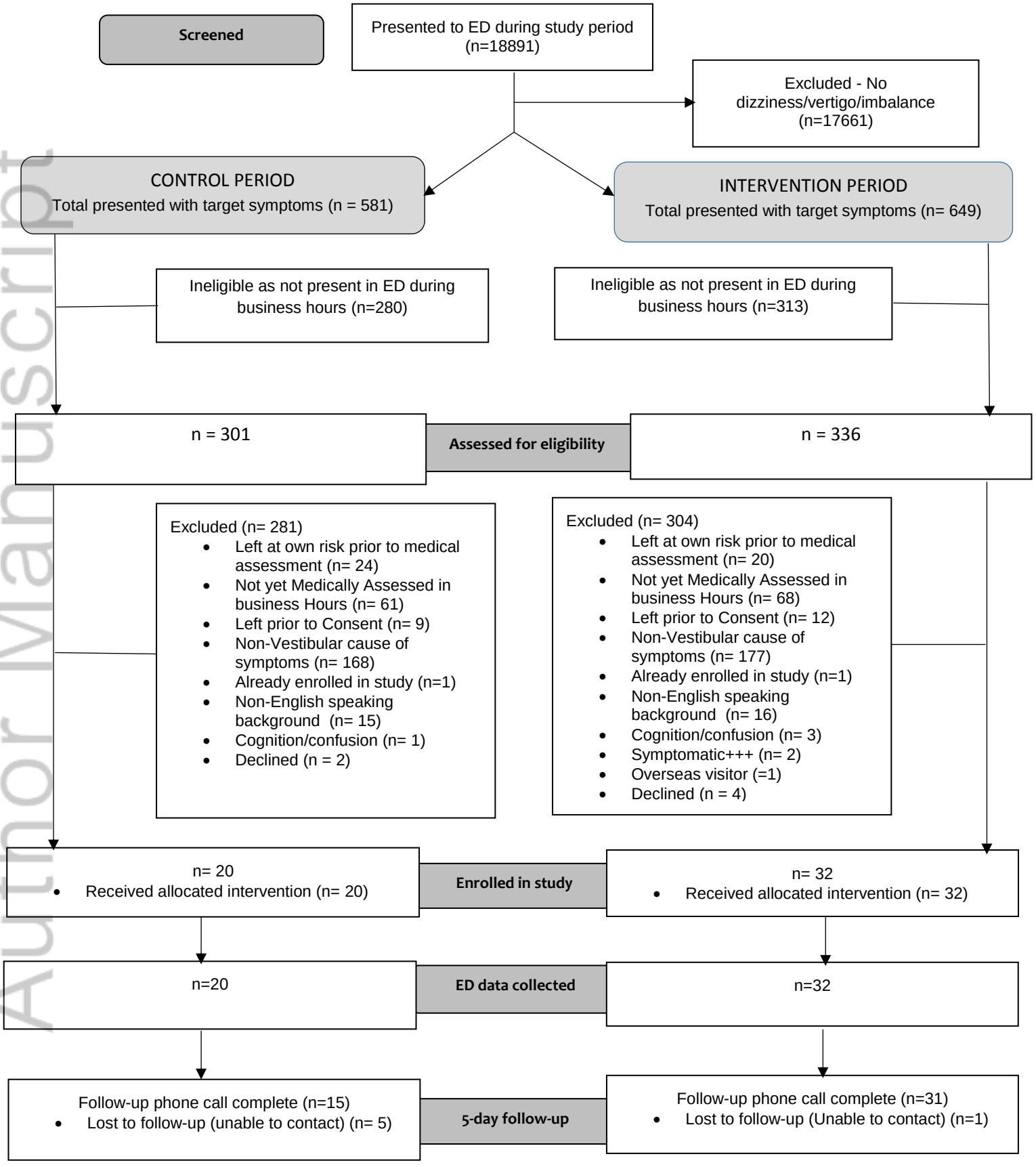
[a] Of the 3 representations between 6 and 30 days post for the intervention arm, 2 were for unrelated conditions.

[b]Participants lost to follow-up for patient reported outcomes: control period = 5, intervention period = 1. Proportions adjusted for loss to follow-up.

Table 2. Safety and successful completion of evidence-based assessment and treatment components

Component	Number indicated	Number completed	Adverse events and challenges to completion
Subjective assessment:	32	32 (100.0%)	n/a
Objective assessment:			
Vestibulo-occular assessment	32	31 (96.9%)	Too symptomatic
Hallpike-Dix	32	32 (100.0%)	n/a
Supine Roll Test	22	21 (95.5%)	Too symptomatic to tolerate manoeuvre
Functional Balance and Mobility	32	30 (93.8%)	Therapist time limited Patient required in radiology
Treatment:			
Canalith-repositioning technique	14	13 (92.9%)	Too symptomatic to tolerate manoeuvre
Habituation exercises	2	2 (100.0%)	n/a
Balance and mobility retraining	2	2 (100.0%)	n/a
Written patient education	14	13 (92.9%)	Therapist time limited

Figure 1.



Citation: Eldridge SM, Chan CL, Campbell MJ, Bond CM, Hopewell S, Thabane L, et al. CONSORT 2010 statement: extension to randomised pilot and feasibility trials. BMJ. 2016;355.

Author/s:
Lloyd, M; Luscombe, A; Grant, C; Karunajeewa, H; Klim, S; Wijeratne, T; Kelly, A-M

Title:
Specialised vestibular physiotherapy in the emergency department: A pilot safety and feasibility study

Date:
2020-07-06

Citation:
Lloyd, M., Luscombe, A., Grant, C., Karunajeewa, H., Klim, S., Wijeratne, T. & Kelly, A. -M. (2020). Specialised vestibular physiotherapy in the emergency department: A pilot safety and feasibility study. EMERGENCY MEDICINE AUSTRALASIA, 32 (5), pp.860-863. https://doi.org/10.1111/1742-6723.13569.