



OPEN ACCESS

Cardiac rehabilitation for the transient ischaemic attack (TIA) and stroke population? Using the Medical Research Council (MRC) guidelines for developing complex health service interventions to develop home-based cardiac rehabilitation for TIA and 'minor' stroke patients

Neil Heron^{1,2,3}

¹Department of General Practice and Primary Care, Queen's University, Belfast, UK

²Centre for Public Health Research, Queen's University, Belfast, UK

³Centre for Public Health, UKCRC Centre of Excellence for Public Health Research (NI), Belfast, UK

Correspondence to

Dr Neil Heron, Department of Family Practice, Queen's University, Belfast, BT9 7HR, UK; neilheron@yahoo.co.uk

Accepted 20 August 2018

Published Online First

4 September 2018

WHAT DID I DO?

I developed a novel home-based rehabilitation programme, including *'The Healthy Brain Rehabilitation Manual'*, for patients with a first

transient ischaemic attack (TIA) or 'minor' stroke of atherosclerotic origin, using the core components



Figure 1 "The Healthy Brain Rehabilitation Manual" developed through the PhD study.

Check for updates

© Author(s) (or their employer(s)) 2019. Re-use permitted under CC BY. Published by BMJ.

To cite: Heron N. *Br J Sports Med* 2019;**53**:839–840.

of home-based cardiac rehabilitation (CR) and conducted a pilot randomised controlled trial (RCT) to evaluate its effectiveness.

WHY DID I DO IT?

CR is an effective form of secondary prevention for cardiovascular disease. CR after myocardial infarction results in reduced reinfarction risk and all-cause mortality.¹ However, despite sharing similar pathology with coronary heart disease and the 90-day risk of further vascular events after a TIA or 'minor' stroke being as high as 18%,^{2,3} the value of CR for patients with a TIA or 'minor' stroke is unclear.

HOW DID I DO IT?

I followed the Medical Research Council guidelines for developing complex health service interventions. First, I conducted a systematic review (SR) of secondary prevention lifestyle interventions initiated within 90 days of a TIA or 'minor' stroke and then a SR on the use of behaviour change techniques (BCTs) in home-based CR. I used the SRs' findings to adapt a home-based CR manual and design an intervention that was refined following stakeholder input (TIA/minor stroke patients and carers; clinical academics and health professionals). Then, to assess the applicability of the intervention, I conducted a feasibility study. Patients, recruited from hospital clinics within 4 weeks of a first TIA or minor stroke, were randomly allocated to three groups¹: (1) standard/usual care²; (2) CR manual³; and (3) CR manual plus a pedometer. All groups received telephone follow-up 1 and 4 weeks postenrolment and were reviewed after 6 weeks.

Following the feasibility study and further intervention refinement, I conducted a 12-week pilot study to test the study protocol before a definitive RCT. Participants, recruited from four different centres, <4 weeks after their first TIA or 'minor' stroke, were randomly allocated to: (1) standard care (n=12); (2) CR manual, pedometer and general practitioner follow-up (n=14); and (3) CR manual, pedometer and stroke nurse follow-up (n=14). Follow-up was by telephone at 1, 4 and 9 weeks. Outcome measures were assessed after 12 weeks. Participants' views on the intervention and research methods were explored using content analysis of poststudy focus group and interview data.

WHAT DID I FIND?

My first SR⁴ identified four eligible studies. While individual studies reported increased aerobic capacity, meta-analysis found no significant change in any cardiovascular risk factors. Thus, evidence of the effectiveness of early post-TIA secondary prevention lifestyle interventions was limited. My second SR⁵ included 11 studies of home-based CR with good methodological quality and identified the use of 20 different BCTs. The most frequently used were social support (unspecified) (11 studies) and goal setting (behaviour) (10 studies).

In the feasibility study,⁶ 28 patients were invited to participate: 15 (10 men, 5 women; 9 TIA, 6 minor stroke; mean age 69 years) consented and completed all assessment measures except VO_{2max} testing, which all declined. The intervention was welcomed, and pedometers were valued highly, particularly for goal setting.

In the pilot study, 35.2% of eligible patients (44/125) consented to contact from a researcher; 90.9% of these (40/44) participated and 97.5% (39/40) completed the study. At 12-week review, cardiovascular risk factors in both intervention arms had improved. Qualitative data confirmed the feasibility and acceptability of the research methods and intervention.

WHAT IS THE MOST IMPORTANT CLINICAL IMPACT/ PRACTICAL APPLICATION

The study's recruitment and retention rates, and the intervention's acceptability and potential effects, indicate that an RCT of a novel home-based CR programme based on 'The Healthy Brain Rehabilitation Manual',⁶ implemented early after a first TIA/minor stroke, is feasible, with important impact on secondary prevention of stroke.

Acknowledgements I would like to acknowledge the support provided to me throughout my PhD by my supervisors and colleagues, including Professor Frank Kee, Professor Jonathan Mant, Professor Philip M Reilly, Dr Mark Tully, Professor Michael Donnelly and Professor Margaret Cupples.

Collaborators Professor Margaret Cupples; Professor Frank Kee; Professor Michael Donnelly; Professor Jonathan Mant.

Contributors NH led the conception and design of study, collected the research data and prepared the first draft of the manuscript. MEC was involved in the conception and design of study, reviewing drafts, inputting on methodology and intellectual content. MD was involved in the qualitative analysis of results, and MAT (collaborator) was involved in screening the intervention manual for BCTs. MD, FK, PMR, MAT and JM were all involved in critical revisions and reviewing methodology. All authors critically reviewed the manuscript and approved the final version submitted for publication.

Funding This research was funded by the National Institute of Health Research (NIHR) PhD Academic Clinical Fellowship for Dr Neil Heron, as well as a British Association of Sport and Exercise Medicine (BASEM) Doctoral Research Award.

Competing interests None declared.

Patient consent Obtained.

Ethics approval The Office for Research Ethics Committees, Northern Ireland (REC reference 15/NI/0001, 21/09/2015) approved the study and it was listed on an appropriate registry (ClinicalTrials.gov, NCT02712385).

Provenance and peer review Not commissioned; internally peer reviewed.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution 4.0 Unported (CC BY 4.0) license, which permits others to copy, redistribute, remix, transform and build upon this work for any purpose, provided the original work is properly cited, a link to the licence is given, and indication of whether changes were made. See: <https://creativecommons.org/licenses/by/4.0/>.

REFERENCES

- 1 Lawler PR, Filion KB, Eisenberg MJ. Efficacy of exercise-based cardiac rehabilitation post-myocardial infarction: a systematic review and meta-analysis of randomized controlled trials. *Am Heart J* 2011;162:571–84.
- 2 Selvarajah JR, Smith CJ, Hulme S, et al. Prognosis in patients with transient ischaemic attack (TIA) and minor stroke attending TIA services in the North West of England: the NORTHSTAR Study. *J Neurol Neurosurg Psychiatry* 2008;79:38–43.
- 3 Coull AJ, Lovett JK, Rothwell PM. Oxford Vascular Study. Population based study of early risk of stroke after transient ischaemic attack or minor stroke: implications for public education and organisation of services. *BMJ* 2004;328:326–8.
- 4 Heron N, Kee F, Cardwell C, et al. Rehabilitation programmes with secondary prevention lifestyle interventions initiated within 90 days following a TIA or 'minor' stroke: systematic review and meta-analysis. *Br J Gen Pract* 2016.
- 5 Heron N, Kee F, Donnelly M, et al. Behaviour change techniques in home-based cardiac rehabilitation: a systematic review. *Br J Gen Pract* 2016;66:e747–57.
- 6 Heron N, Kee F, Mant J, et al. Stroke Prevention Rehabilitation Intervention Trial of Exercise (SPRITE) - a randomised feasibility study. *BMC Cardiovasc Disord* 2017;17:290.