

Exercise to prevent shoulder problems after breast cancer surgery: the PROSPER RCT

Julie Bruce,^{1*} Bruno Mazuquin,¹ Pankaj Mistry,¹
Sophie Rees,¹ Alastair Canaway,¹ Anower Hossain,^{1,2}
Esther Williamson,^{3,4} Emma J Padfield,¹ Ranjit Lall,¹
Helen Richmond,⁵ Loraine Chowdhury,¹ Clare Lait,⁶
Stavros Petrou,^{1,7} Katie Booth,¹ Sarah E Lamb,⁴
Raghavan Vidya⁸ and Alastair M Thompson⁹
on behalf of PROSPER Study Group

¹Warwick Clinical Trials Unit, Division of Health Sciences, University of Warwick, Coventry, UK

²Institute of Statistical Research and Training (ISRT), University of Dhaka, Dhaka, Bangladesh

³Centre for Rehabilitation Research, Nuffield Department of Orthopaedics, Rheumatology and Musculoskeletal Sciences, University of Oxford, Oxford, UK

⁴College of Medicine and Health, University of Exeter, Exeter, UK

⁵Primary Healthcare Research Unit, Faculty of Medicine, Memorial University of Newfoundland, St John's, NL, Canada

⁶Gloucestershire Care Services NHS Trust, Gloucester, UK

⁷Nuffield Department of Primary Care Health Sciences, University of Oxford, Oxford, UK

⁸Royal Wolverhampton NHS Trust, Wolverhampton, UK

⁹Baylor College of Medicine, Houston, TX, USA

*Corresponding author julie.bruce@warwick.ac.uk

Declared competing interests of authors: Julie Bruce is co-investigator on current research grants from the National Institute for Health Research (NIHR) (NIHR202618, HTA 17/129/02, NIHR128311, NIHR132046, HTA 131407 and HTA 10/42/02), British Heart Foundation (PG/19/22/34203) and Diabetes UK (17/0005690), and is supported by the NIHR Research Capability Funding via University Hospitals Coventry and Warwickshire NHS Trust. Clare Lait provides private physiotherapy to cancer patients outside the submitted work. Sarah E Lamb reports grants from the NIHR Health Technology Assessment (HTA) programme during the conduct of the study and was a member of the following boards: HTA Additional Capacity Funding Board (2012–15); HTA Clinical Trials Board (2010–15), HTA End of Life Care and Add on Studies (2015), HTA Funding Boards Policy Group (formerly Clinical Studies Group) (2010–15), HTA Post-board funding teleconference (policy group members to attend) (2010–15), HTA Maternal, Neonatal and Child Health Methods Group (2013–15), HTA Primary Care Themed Call Board (2013–14), HTA Prioritisation Group (2010–15) and NIHR Clinical Trials Unit Standing Advisory Committee (2012–16).

Published February 2022

DOI: 10.3310/JKNZ2003

Plain English summary

The PROSPER RCT

Health Technology Assessment 2022; Vol. 26: No. 15

DOI: 10.3310/JKNZ2003

NIHR Journals Library www.journalslibrary.nihr.ac.uk

Plain English summary

What is the problem?

Breast cancer is the most common cancer affecting women. Women now live longer because the detection and treatment of cancer has improved over the last 40 years. The side effects of breast cancer treatments can lead to complications, such as difficulties with arm movements, arm swelling (lymphoedema), pain and poor quality of life. These problems can last for many years after the cancer has been treated. Usual care after breast cancer surgery is to give patients an information leaflet explaining arm exercises that they can undertake after their operation. Offering exercise support from a physiotherapist may be a better way to help those at risk of developing shoulder problems after breast cancer treatment than providing a leaflet only.

What did we do?

We compared two strategies to prevent shoulder problems in women having breast cancer treatment: information leaflets and an exercise programme. We invited women with a new diagnosis of breast cancer who were at higher risk of developing shoulder problems than other women with a new diagnosis of breast cancer. We recruited 392 women aged 28–88 years from 17 breast cancer units across England. Women were allocated to one of two groups by chance using a computer. Everyone was given information leaflets that explained what type of exercises to do after surgery. Half of the women ($n = 196$) were then invited to take part in an exercise programme, supported by a trained physiotherapist. These women followed a programme of shoulder mobility, stretching and strengthening exercises for up to 1 year. We measured changes in arm function, pain, arm swelling (lymphoedema) and physical and mental quality of life, and the cost of treatments during the whole first year of recovery, in everyone. We also spoke to the women and physiotherapists to find out whether or not these treatment strategies were acceptable to them.

What did we find out?

Women doing the exercise programme had better arm function, less pain and better quality of life than the women given an information leaflet only. Women said that the exercise programme helped with their recovery during cancer treatment. Exercise was cheap to deliver (£129 per person) and led to improved overall quality of life at 1 year after breast cancer surgery.

Health Technology Assessment

ISSN 1366-5278 (Print)

ISSN 2046-4924 (Online)

Impact factor: 4.014

Health Technology Assessment is indexed in MEDLINE, CINAHL, EMBASE, the Cochrane Library and Clarivate Analytics Science Citation Index.

This journal is a member of and subscribes to the principles of the Committee on Publication Ethics (COPE) (www.publicationethics.org/).

Editorial contact: journals.library@nihr.ac.uk

The full HTA archive is freely available to view online at www.journalslibrary.nihr.ac.uk/hta. Print-on-demand copies can be purchased from the report pages of the NIHR Journals Library website: www.journalslibrary.nihr.ac.uk

Criteria for inclusion in the *Health Technology Assessment* journal

Reports are published in *Health Technology Assessment* (HTA) if (1) they have resulted from work for the HTA programme, and (2) they are of a sufficiently high scientific quality as assessed by the reviewers and editors.

Reviews in *Health Technology Assessment* are termed 'systematic' when the account of the search appraisal and synthesis methods (to minimise biases and random errors) would, in theory, permit the replication of the review by others.

HTA programme

Health Technology Assessment (HTA) research is undertaken where some evidence already exists to show that a technology can be effective and this needs to be compared to the current standard intervention to see which works best. Research can evaluate any intervention used in the treatment, prevention or diagnosis of disease, provided the study outcomes lead to findings that have the potential to be of direct benefit to NHS patients. Technologies in this context mean any method used to promote health; prevent and treat disease; and improve rehabilitation or long-term care. They are not confined to new drugs and include any intervention used in the treatment, prevention or diagnosis of disease.

The journal is indexed in NHS Evidence via its abstracts included in MEDLINE and its Technology Assessment Reports inform National Institute for Health and Care Excellence (NICE) guidance. HTA research is also an important source of evidence for National Screening Committee (NSC) policy decisions.

This report

The research reported in this issue of the journal was funded by the HTA programme as project number 13/84/10. The contractual start date was in March 2015. The draft report began editorial review in March 2020 and was accepted for publication in June 2021. The authors have been wholly responsible for all data collection, analysis and interpretation, and for writing up their work. The HTA editors and publisher have tried to ensure the accuracy of the authors' report and would like to thank the reviewers for their constructive comments on the draft document. However, they do not accept liability for damages or losses arising from material published in this report.

This report presents independent research funded by the National Institute for Health Research (NIHR). The views and opinions expressed by authors in this publication are those of the authors and do not necessarily reflect those of the NHS, the NIHR, NETSCC, the HTA programme or the Department of Health and Social Care. If there are verbatim quotations included in this publication the views and opinions expressed by the interviewees are those of the interviewees and do not necessarily reflect those of the authors, those of the NHS, the NIHR, NETSCC, the HTA programme or the Department of Health and Social Care.

Copyright © 2022 Bruce *et al.* This work was produced by Bruce *et al.* under the terms of a commissioning contract issued by the Secretary of State for Health and Social Care. This is an Open Access publication distributed under the terms of the Creative Commons Attribution CC BY 4.0 licence, which permits unrestricted use, distribution, reproduction and adaptation in any medium and for any purpose provided that it is properly attributed. See: <https://creativecommons.org/licenses/by/4.0/>. For attribution the title, original author(s), the publication source – NIHR Journals Library, and the DOI of the publication must be cited.

Published by the NIHR Journals Library (www.journalslibrary.nihr.ac.uk), produced by Prepress Projects Ltd, Perth, Scotland (www.prepress-projects.co.uk).

NIHR Journals Library Editor-in-Chief

Professor Ken Stein Professor of Public Health, University of Exeter Medical School, UK

NIHR Journals Library Editors

Professor John Powell Chair of HTA and EME Editorial Board and Editor-in-Chief of HTA and EME journals. Consultant Clinical Adviser, National Institute for Health and Care Excellence (NICE), UK, and Professor of Digital Health Care, Nuffield Department of Primary Care Health Sciences, University of Oxford, UK

Professor Andrée Le May Chair of NIHR Journals Library Editorial Group (HSDR, PGfAR, PHR journals) and Editor-in-Chief of HSDR, PGfAR, PHR journals

Professor Matthias Beck Professor of Management, Cork University Business School, Department of Management and Marketing, University College Cork, Ireland

Dr Tessa Crilly Director, Crystal Blue Consulting Ltd, UK

Dr Eugenia Cronin Consultant in Public Health, Delta Public Health Consulting Ltd, UK

Dr Peter Davidson Consultant Advisor, Wessex Institute, University of Southampton, UK

Ms Tara Lamont Senior Adviser, Wessex Institute, University of Southampton, UK

Dr Catriona McDaid Reader in Trials, Department of Health Sciences, University of York, UK

Professor William McGuire Professor of Child Health, Hull York Medical School, University of York, UK

Professor Geoffrey Meads Emeritus Professor of Wellbeing Research, University of Winchester, UK

Professor James Raftery Professor of Health Technology Assessment, Wessex Institute, Faculty of Medicine, University of Southampton, UK

Dr Rob Riemsma Reviews Manager, Kleijnen Systematic Reviews Ltd, UK

Professor Helen Roberts Professor of Child Health Research, Child and Adolescent Mental Health, Palliative Care and Paediatrics Unit, Population Policy and Practice Programme, UCL Great Ormond Street Institute of Child Health, London, UK

Professor Jonathan Ross Professor of Sexual Health and HIV, University Hospital Birmingham, UK

Professor Helen Snooks Professor of Health Services Research, Institute of Life Science, College of Medicine, Swansea University, UK

Professor Ken Stein Professor of Public Health, University of Exeter Medical School, UK

Professor Jim Thornton Professor of Obstetrics and Gynaecology, Faculty of Medicine and Health Sciences, University of Nottingham, UK

Please visit the website for a list of editors: www.journalslibrary.nihr.ac.uk/about/editors

Editorial contact: journals.library@nihr.ac.uk