Shock-absorbing flooring for fall-related injury prevention in older adults and staff in hospitals and care homes: the SAFEST systematic review

Amy Drahota,1* Lambert M Felix,1 James Raftery,2 Bethany E Keenan,3 Chantelle C Lachance,1 Dawn C Mackey,4 Chris Markham,1 Andrew C Laing,5 Kirsten Farrell-Savage1 and Olanrewaju Okunribido6

1School of Health and Care Professions, University of Portsmouth, Portsmouth, UK
2Wessex Institute, University of Southampton, Southampton, UK
3School of Engineering, Cardiff University, Cardiff, UK
4Department of Biomedical Physiology and Kinesiology, Simon Fraser University, Burnaby, BC, Canada
5Department of Kinesiology, University of Waterloo, Waterloo, ON, Canada
6Health and Safety Executive Science and Research Centre, Buxton, UK

*Corresponding author amy.drahota@port.ac.uk

Declared competing interests of authors: Amy Drahota and Bethany E Keenan collaborated with the Health and Safety Laboratory (2018–20) on some unfunded academic research using a new testing procedure to assess the shock absorbency of various floor coverings. Five flooring manufacturers delivered free samples for use in the project; Amy Drahota and Bethany E Keenan have no stake in any of these companies. In 2015, Amy Drahota was involved in a collaborative funding application with Polyflor Ltd (Manchester, UK) for some SBRI Healthcare innovation funding. The application was shortlisted, but was unsuccessful. Amy Drahota has no stake in Polyflor Ltd. Andrew C Laing reports grants from SofSURFACES Inc. (Petrolia, ON, Canada), and grants and personal fees from SorbaShock LLC (Fort Wayne, IN, USA) and Viconic Sporting (Dearborn, MI, USA) outside the submitted work. Andrew C Laing was a member of an ASTM International Work Group (WK38804), whose technical contact is the president of Seamless Attenuating Technologies (STATECH), Inc. (Chehalis, WA, USA). SATECH, Viconic Sporting and Mannington Mills (Salem, NJ, USA) have donated flooring materials to Andrew C Laing’s laboratory that have formed the basis of several studies examining the biomechanical effectiveness of compliant flooring (i.e. safety flooring). Andrew C Laing has never had (nor does he currently have) any financial links to these companies. Chantelle C Lachance is employed at the Canadian Agency for Drugs and Technologies in Health (CADTH) outside the submitted work. Amy Drahota, Dawn C Mackey, Chantelle C Lachance and Andrew C Laing authored original research papers that were included in this review. James Raftery is a member of the National Institute for Health Research Health Technology Assessment and Efficacy and Mechanism Evaluation Editorial Board (2012–present). He was also director of the Wessex Institute, University of Southampton (2005–12), and was concurrently director of the NIHR Evaluation, Trials and Studies Coordinating Centre, part of the Wessex Institute, which was funded by NIHR.
Plain English summary

SAFEST systematic review
Health Technology Assessment 2022; Vol. 26: No. 5
DOI: 10.3310/ZOWL2323

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

The aim of this study was to summarise what is known about shock-absorbing flooring for reducing injurious falls in hospitals and care homes.

Background

Falls and fall-related injuries are a major problem for older adults in both hospitals and care homes. Shock-absorbing flooring (such as carpet, sports floors or specially designed floors) provides a more cushioned surface and is one potential solution to help reduce the impact forces from a fall.

Methods

From literature searches, we identified relevant studies on shock-absorbing flooring use in hospitals and care homes. We gathered data on the quality of the studies' methods, what and who the studies involved, and the study findings. Members of the public were involved throughout the project. They helped improve the clarity of the reporting and collaborated in meetings to help guide the study team.

Findings

One high-quality study in a care home found that vinyl overlay with novel shock-absorbing underlay was no better at reducing injuries than vinyl overlay with plywood underlay on concrete subfloors. We found very low-quality evidence that shock-absorbing flooring may reduce injuries in hospitals and care homes, without increasing falls; if this were true, then economic evidence suggested that shock-absorbing flooring would be the best-value option for patients (lower cost and improved outcomes). There was insufficient evidence to determine the effects of shock-absorbing flooring on fractures or head injuries, although wooden subfloors resulted in fewer hip fractures than concrete subfloors. Shock-absorbing flooring made it harder for staff to move equipment such as beds and trolleys, and led to staff changing how they work.

Implications

The evidence suggests that one type of shock-absorbing floor may not work in care homes, compared with rigid flooring; however, gaps still exist in the knowledge. The evidence in favour of shock-absorbing flooring was of very low quality, meaning it is uncertain. There is a lack of robust evidence in hospitals, which often have concrete subfloors and different population characteristics. If planning to install shock-absorbing flooring, it is important to consider the wider impacts on the workplace and how best to manage these.
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 17/148/11. The contractual start date was in February 2019. The draft report began editorial review in August 2020 and was accepted for publication in January 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 Drahota et al. This work was produced by Drahota 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 adaption 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