BMJ Open

Impact of cardiovascular evaluations and interventions on fall risk in older adults: a protocol for a scoping review and evidence map

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► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online (http://dx.doi.org/10.1136/bmjopen-2021-057959).

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ABSTRACT

Introduction Cardiovascular disorders are increasingly recognised as important fall risk factors in older adults. Falls are a major public health problem in older adults, and therefore, effective interventions for reducing falls are essential for this population. Cardiovascular disease is a clinically relevant (but often overlooked) and potentially modifiable risk factor for falls. Literature describing the effects of cardiovascular assessments and treatments on fall prevention has generally focused on only one specific test or treatment. A comprehensive, comparative overview surrounding the effectiveness of available assessments and treatments on cardiovascular related fall risk is currently lacking.

Methods and analysis A scoping review and evidence map will be conducted to summarise the available evidence regarding the (comparative) effectiveness of cardiovascular assessments and therapeutic interventions on reducing fall risk in older individuals. A systematic and comprehensive literature search will be performed in MEDLINE and Embase using the key components 'older adults', 'cardiovascular evaluation', 'cardiovascular intervention' and 'falls'. Furthermore, we will create an evidence map to summarise the quantity and quality of currently available evidence identified in the scoping review. The evidence map will consider, but will not be limited to, observational studies, randomised controlled trials and reviews evaluating cardiovascular tests and treatments (vs controls) on fall risk in older adults.

Ethics and dissemination The scoping review and evidence map will only include data that are publicly available and, therefore, ethical approval is not required. The results will be submitted for publication in a peer-reviewed journal and presented at scientific conferences.

Strengths and limitations of this study

► Summarise published literature on the efficacy of cardiovascular assessments and treatments on fall prevention in older adults, and summarise the evidence in a user-friendly way using evidence map methodology.

► Our comprehensive search strategies were developed under the guidance of an experienced medical librarian.

► We will conduct and report a scoping review by following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews checklist.

► Estimation of fall risk reducing potential of single interventions may be complex because most studies are multimodal in nature.

► We will not summarise evidence for specific cerebrovascular diagnostic tests (eg, MRI of the brain).

INTRODUCTION

Cardiovascular conditions (eg, heart rhythm disorders) are important fall risk factors and contribute to the majority of unexplained recurrent falls and syncope in older persons.[1–4] Falls are a leading cause of morbidity and mortality in older adults,[5] and, therefore, identification of effective fall prevention interventions is crucial. In recent systematic reviews and (network) meta-analyses, Tricco *et al* and Dautzenberg *et al*[6 7] reported on the fall-reducing effects of various interventions, but a comprehensive overview solely focused on the fall risk reducing effects of cardiovascular assessments and treatments is currently lacking.[8] The European Society of Cardiology guideline on syncope[1] explicitly states that in case of unexplained falls, syncope is likely and therefore the same (cardiovascular) evaluation as for evident syncope is required. However, the aforementioned guideline does not provide detailed guidance for reducing fall risk with cardiovascular evaluation and treatment. As a result, (inter)national guidelines on fall prevention provide varying recommendations and there is considerable variation in cardiovascular diagnostic and therapeutic approaches between clinics and between clinicians.

We aim to summarise the evidence surrounding the (comparative) effectiveness of cardiovascular assessments and treatments

on reducing fall-related outcomes in older adults. We will update and extend our previous research (including a pilot study in 2015)[8 9] by conducting a scoping review and by summarising the available evidence in an evidence map (EM). Evidence mapping is an evolving methodology suitable for the summation of published evidence and research activity in broad topic areas and for the identification of research gaps to guide evidence-based decision-making.[10–13] These characteristics render EM particularly suitable for the unmet (clinical) need for evidence-based decision-making in fall prevention. Our results will be used to optimise fall prevention strategies and to develop an evidence-based fall prevention care pathway.

METHODS AND ANALYSIS

The scoping review will be conducted and reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) extension for Scoping Reviews checklist (online supplemental appendix A).[14] In addition, we will summarise the available evidence in an EM.

Eligibility criteria
Participants
We will consider studies or reviews that included adults aged ≥50 years (for all participants, or mean age ≥60 years), and consider papers for inclusion that report data on subgroups that match our target age limits. These cut-off values are based on the fact that literature shows that fall risk starts to increase from 50 years of age onwards,[15] and that consensus on these limits was reached among international fall experts. By selecting the same age cut-off values in other (review) papers published by this expert group,[2 16 17] comparability is ensured. In addition, the age cut-off values for this project were also adopted in its pilot phase.[8]

Interventions/exposure and comparators
We will consider studies or reviews that evaluate cardiovascular evaluations (diagnostic tests) and cardiovascular interventions (treatments), either as a single intervention or as part of a multimodal cardiovascular intervention approach. Cardiovascular evaluations refer to blood pressure recordings, tilt table testing, carotid sinus massage, ECG and cardiac ultrasonography. Cardiovascular interventions refer to pacemaker implantation, cardiac valve surgery/repair, coronary angioplasty/bypass grafting, catheter ablation, physical exercise programmes or other cardiophysiotherapy (eg, cardiofitness), non-pharmacological treatments (eg, elastic compression therapy) and pharmacotherapeutic treatments (eg, anti-arrhythmics) aimed at reducing fall risk (online supplemental appendix B; search strategy). We will consider studies that compare the intervention to no active intervention (eg, wait and see) or usual care.

Outcomes
We will consider studies or reviews reporting on (injurious) fall-related outcomes, for example, number of falls, time to first fall and fall-related hospital admissions or emergency department visits.

Study types
We will consider all available published evidence from inception and will not exclude articles based on research design (eg, observational studies, (non-)randomised controlled trials (RCT)). All settings (community-based, hospital and long-term care facility) will be included. Additionally, (systematic) review articles will be included. We will include studies without language restrictions, and also search for ongoing trials on the topic. We will exclude conference abstracts and papers for which no full text is available.

Search strategy
Search strategies were developed by the project team under the guidance of an experienced medical librarian (JD). The search strategy (online supplemental appendix B) included three concepts: (1) older adults; (2) cardiovascular evaluations/assessments; and (3) falls. We will not include specific cerebrovascular diagnostic (imaging) tests for this project, because this would yield a large number of additional hits, which is likely to have a negative impact on screening quality. Also, according to national and international clinical guidelines on unexplained falls, falls and syncope,[1 18–20] cerebrovascular imaging should not be routinely performed in the diagnostic work-up. Although falls may be caused by cerebrovascular disease this is usually accompanied by typical neurological complaints and follows a different acute diagnostic care pathway. Assessing the role of cerebrovascular abnormalities for fall risk (and mobility) is beyond the scope of our review as this is a research question on its own.

Information sources
Potentially eligible articles were systematically searched in MEDLINE and Embase from inception to 20 April 2021. Citation searches will be performed in Scopus, Web of Science and through Google Scholar. The authors of identified articles will be contacted if the full text is not accessible or if the data for extraction are missing.

Study selection
Following the search, the identified citations from the searches in MEDLINE and Embase will be combined and deduplicated. The citations will be subsequently uploaded to the web-based Rayyan screening platform.

First, a pilot test will be performed, in which two independent reviewers will screen the first 300 abstracts following the predefined study eligibility (inclusion and exclusion) criteria. Discrepancies will be discussed, and the inclusion and exclusion criteria will be optimised. Additional pilot phases of 200 abstracts will be subsequently performed. This will be repeated until the reviewers reach near-complete (≥99%) agreement and fully understand the selection criteria. Following this, the remaining abstracts will be divided and single screened

by the two reviewers. Furthermore, the reference lists of all included (systematic) reviews will be checked for additional relevant papers.

Following the title and abstract screening phase, full-text screening will be conducted by the two independent reviewers. The reasons for excluding articles will be recorded. A third reviewer will be consulted in case of disagreement and uncertainties in both screening phases. The results of the search will be presented in two separate PRISMA flow diagrams: one for cardiovascular diagnostic tests and one for cardiovascular therapies.

Data extraction
Two reviewers will extract data independently using a predefined data collection form in Microsoft Excel. Two separate Excel data collection forms will be built: one for cardiovascular assessments and one for cardiovascular treatments. The extracted data will include relevant study characteristics and results (eg, age of the population, study design, intervention type and fall-related outcomes).

Quality control of extracted data will be performed. Discrepancies will be resolved by the third reviewer. If required data are missing, incomplete or unclear, inquiries will be sent to the corresponding authors by email.

Critical appraisal of included studies
The Cochrane checklist[21] will be used to assess the risk of bias for eligible RCTs, and the ROBINS-I (Risk Of Bias In Non-randomized Studies of Interventions) tool will be used for eligible non-randomised intervention studies and observational studies[22]; the AMSTAR (A Measurement Tool to Assess Systematic Reviews) 2 checklist[23] will be used for critical appraisal of included systematic reviews. Critical appraisal of included studies will be conducted by two independent reviewers. Disagreement between the reviewers will be resolved by the third reviewer.

Data synthesis
We will quantitatively summarise the included study characteristics (eg, study design, type of interventions, quality of studies) and results. Additionally, we will qualitatively group and categorise the data based on the types/topics of cardiovascular diagnostics and cardiovascular treatments. These characteristics, categories and results of data will first be presented in text through a narrative synthesis. Moreover, to visualise the quantity and quality of currently available evidence (and gaps), we will group and categorise the data and summarise it graphically in tables and figures. Three matrix frameworks will be created: one for cardiovascular diagnostics, one for cardiovascular treatments and one for multifactorial (combined) interventions and their effect on (injurious) fall outcomes.

Patient and public involvement
Since this is a scoping review and EM, we will use currently published data; therefore, patients and the public will not be involved in the study.

ETHICS AND DISSEMINATION
The project involves publicly available data and, therefore, ethical approval is not required. The results will be submitted for publication in a peer-reviewed journal and presented at scientific conferences. We expect that the results will provide valuable information and evidence-based guidance for clinicians and policymakers, as well as improve cardiovascular fall prevention strategies.

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