BMJ Open

How and why educational interventions work to increase knowledge of delirium among healthcare professionals in nursing homes: a protocol for a realist review

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To cite: Molitor V, Busse TS, Giehl C, *et al*. How and why educational interventions work to increase knowledge of delirium among healthcare professionals in nursing homes: a protocol for a realist review. *BMJ Open* 2023;**13**:e072591. doi:10.1136/bmjopen-2023-072591

► 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-2023-072591).

Received 07 February 2023
Accepted 19 July 2023

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ABSTRACT

Background Delirium is a neuropathological condition that impairs cognitive performance, attention and consciousness and can be potentially life-threatening. Nursing home residents are particularly vulnerable to developing delirium, but research thus far tends to focus on the acute hospital setting. Healthcare professionals (HCPs) working in nursing homes seem to be little aware of delirium. To improve healthcare for affected or at-risk individuals, increasing knowledge among HCPs is highly relevant. Using the realist review method helps to understand how and why an educational intervention for HCPs on delirium in nursing homes works.

Methods and analysis In accordance with the Realist And Meta-narrative Evidence Syntheses: Evolving Standards publication standards for realist syntheses, the review process will include the following five steps: (1) search strategy and literature review; (2) study selection and assessment; (3) data extraction; (4) data synthesis and (5) development of an initial programme theory. The literature search will be conducted in the databases Medline (PubMed), CINAHL (Ebsco), Scopus, Web of Science, GeroLit and Carelit. Additional focuses are on snowballing techniques, hand research and grey literature. Studies of any design will be included to develop the initial programme theory. The literature will be selected by two researchers independently. In addition, the experiences of HCPs from nursing homes will be reflected in group discussions. To this end, Context–Mechanism–Outcome configurations (CMOcs) will be established to develop an initial programme theory.

Ethics and dissemination The results will be disseminated within the scientific community. For this purpose, presentations at scientific conferences as well as publications in peer-reviewed journals are scheduled. In the next step, the CMOcs could serve for the development of a complex educational intervention to increase the knowledge of HCPs on delirium in nursing homes.

Registration details This protocol has been registered at Open Science Framework (https://doi.org/10.17605/OSF.IO/HTFU4).

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The realist review method fits perfectly for explaining the context, mechanisms and outcomes of a complex educational intervention.
⇒ The Context–Mechanism–Outcome configurations that are developed can provide valuable information for the development of a complex educational intervention to improve the delirium-specific knowledge of healthcare professionals in nursing homes.
⇒ The realist review approach provides enlightenment rather than generalisability.
⇒ Studies that are written in languages other than German or English will not be integrated in the realist review.
⇒ For practical reasons and because of limited resources, a full iterative process will not be possible, while snowballing, hand research and checking for grey literature as well as specific individual searches will supplement the initial search to ensure resource-saving yet comprehensive information.

BACKGROUND

Delirium is a serious psychopathological condition characterised by fluctuating episodes of confusion that impair attention, consciousness and cognitive performance.[1] Causes for the development of delirium are multifactorial and often related to an acute illness such as urinary tract infection or a lack of fluid or are triggered by the effects of pharmacotherapy.[2] An acute episode of delirium during hospitalisation is associated with an increased risk of mortality.[3] Furthermore, complications such as pressure sores, falls, functional declines and prolonged hospital stays may accompany delirium.[4 5]

Delirium in nursing homes

While the focus of delirium-related research tends to be on the acute clinical setting, such

as intensive care units, where established best practice models for delirium prevention have already been developed, the setting of nursing homes has received little attention thus far.[6 7] However, residents of nursing homes are highly vulnerable to developing delirium due to risk factors including advanced age, neurodegenerative diseases such as dementia and polypharmacy.[8 9] Nursing homes in the present context are understood to be facilities where persons of advanced age permanently live and receive assistance with activities of daily living from healthcare professionals (HCPs) such as nurses, assistance professionals and physicians. This setting differs from situations where persons receive support in their original home through outpatient services and is, instead, a place where on-site nursing support is available 24 hours a day, 7 days a week.[10]

In nursing homes, prevalence estimates of delirium vary from 1.4% to 70.3%.[11] One possible reason for the wide variations could be different study designs. While some studies measure point prevalence, others measure period prevalence. Furthermore, studies use different diagnostic tools to determine the presence of delirium. The lack of precision of the concept of 'long-term care' may be another reason for the differences in prevalence estimates.[12]

People with delirium may have hyperactive episodes, such as restless behaviour and agitation, as well as hypoactive episodes, characterised by insomnia and withdrawal.[13] Clinically, the overall picture of delirium is characterised by difficulty in distinguishing between delirium, dementia or delirium superimposed on dementia.[14] It has been described comprehensively that after delirium, dementia can manifest for the first time and that delirium can worsen existing dementia.[15] Therefore, in addition to individual complications, there is also a large health economic burden associated with the need for increased care of patients who may experience delirium.[5]

Based on these facts, it is of considerable importance that HCPs caring for residents at risk of delirium in nursing homes have adequate knowledge to help prevent delirium at best, to detect it at an early stage, and to deal with and treat it. However, existing research shows that nursing staff have little knowledge about how to differentiate delirium, dementia and delirium superimposed on dementia.[16 17] The results of studies indicate that educational interventions for HCPs on delirium can have positive effects on the frequency, duration and severity of delirium episodes.[18] In addition, subjective workload improves along with expertise and the ability to identify delirium.[19 20] Hence, it is of great importance to develop an educational intervention specifically for HCPs working in nursing homes to improve their knowledge. Those HCPs include nurses who are employed in nursing homes as well as general practitioners/physicians in private practice who care for residents in nursing homes in the context of home visits. Such an intervention is also recommended by international guidelines on delirium such as the National Institute for Health and Care Excellence Clinical Guideline 103.[21]

Educational interventions for delirium prevention, detection and management

The development and implementation of such educational interventions, however, are highly complex. This is also shown in a recent Cochrane review of non-pharmacological interventions for the prevention of delirium in institutional long-term care. The review included three studies, one of which focused on an educational intervention.[22] All three studies were characterised by the authors as providing very low and moderate evidence. The included study on an educational intervention was a 16-month cluster-randomised controlled feasibility trial in 14 care homes that reviewed the 'Stop Delirium!' educational intervention. In the intervention, a delirium practitioner provided three learning sessions and encouraged nursing staff to conduct delirium prevention by screening residents at risk of delirium. In addition, a delirium champion was to be selected for each nursing home to reinforce delirium prevention over the long term and working groups were formed to develop learning materials and customise care pathways. The control group performed care as usual. Ultimately, no impact on the incidence and prevalence of delirium could be demonstrated by 'Stop Delirium!'.[23] Surprising in this regard is the fact that studies have previously been conducted to develop 'Stop Delirium!'[24] and verify its feasibility,[25] for delirium detection, prevention and management which reported positive results. This underscores the multitude of variables involved in ensuring the success of an educational intervention on delirium and highlights the complexity of this. The authors of the Cochrane review recommended further large-scale trials of enhanced educational interventions to evaluate the effects, including how and why educational interventions work.[22]

Realist review methodology

There is increasing criticism that systematic reviews taking a positivist philosophical approach fail to do justice to the complexity of the real world.[26 27] Especially for complex interventions, the realist review methodology is recommended. Interventions are considered complex if they depend on the behaviour of those who use them or on those who developed the intervention, when they consist of several components, or when different outcomes occur.[28] According to the Medical Research Council, educational interventions that serve to increase the knowledge of HCPs are complex interventions.[29] An educational intervention also consists of different components that interact with each other in complex, often non-linear ways.[30] Therefore, using a realist review methodology will help understand what underlying mechanisms are at work when HCPs receive an educational intervention on delirium in nursing homes and can account for the high

context dependency when developing future educational interventions with maximal effectiveness.

Project Delirium in nursing homes

This realist review is part of the project DeliA (Delir in Altenpflegeeinrichtungen/Delirium in nursing homes; funded by the Innovation Committee at the Federal Joint Committee with the number 01VSF200003). One of the aims of the project is to determine the prevalence of delirium in nursing homes in Germany and the subtypes of delirium by carrying out a (systematic) literature review and an empirical prevalence study. Within another part of the project, nurses and physicians, especially general practitioners, will be interviewed to obtain knowledge about current practices on the prevention, detection and treatment of delirium. A further aim is the identification of reasons why educational interventions focusing on delirium in nursing homes work and for whom they might work. In addition to capturing enabling factors, this also includes capturing hindering factors for educational interventions. This aim will be addressed with the realist review methodology in the present review. Ultimately, an interdisciplinary and interactive educational intervention on the topic of the diagnosis and treatment of acute delirium in nursing homes will be developed to train HCPs based on the previous results of the review and interviews. Specifically, the DeliA Project is developing an educational intervention that is delivered online, which is referred to as technology-enhanced learning (TEL). In this way, expertise can be provided to large groups at low cost.[31] The TEL will be publicly available after project completion so that it can be incorporated into the curricula of universities, schools of health, education and training institutions.

Philosophy and methodology of a realist review

While the positivist approach, which guides the functioning of systematic reviews, is designed to evaluate the effectiveness of an intervention in a quantitative way, realism takes an explanatory approach.[27] The guiding questions are as follows: How and why does an intervention work, for whom does it work and under what circumstances does it work? (ie, 'How does X lead to Y?').[32] The central assumption in realism is a stratified reality in which levels do exist that can be observed and levels that cannot be seen directly. However, these invisible levels are no less real and also have implications for reality.[33] Those causal phenomena that cannot be observed are considered mechanisms in realism. Mechanisms are the result of the resources offered by an intervention or programme and the individual response of users within a context.[32] Context is often referred to as the background of an intervention or programme. For example, cultural norms or experiences of the target group for which an intervention was developed also cover political structures, geographical locations or types of funding for the project.[34] Context can be explained as conditions that modify a mechanism and influence the outcomes.[35] Outcomes are intended or unified effects based on interactions between context and mechanism, such as changed perspectives, resilience or self-efficacy. The results are usually measurable and at the level of behavioural or system change.[36]

Pawson and Tilley[37] recommend Context–Mechanism–Outcome configurations (CMOcs) to describe these causal relationships and how an intervention works. These CMOcs are meant to represent the patterns that operate when a potential behaviour change of the target group to a resource such as an educational programme occurs, which is influenced by the surrounding context.[37] Typically, a realist review begins with an initial programme theory that describes the relationships among contexts, mechanisms and outcomes. This process usually involves the use of existing theories from other disciplines. These newly developed programme theories are then tested against existing evidence and may then lead to testable hypotheses that can be used to confirm or refine the initial programme theory through the formation of CMOcs.[27]

Applied to the present study, the realist logic suggests that educational interventions on delirium bring certain resources into a situation that elicit various possible responses and reactions (also referred to as 'arguments') from HCPs in nursing homes.

The outcome of the planned realist review will allow us to develop hypotheses on how educational interventions increase knowledge regarding the phenomenon of delirium work for HCPs in nursing homes.

AIM

The aim of the present realist review is to understand how, why and under what circumstances educational interventions improve knowledge about the phenomenon of delirium in nursing homes among HCPs. As a result of this study, we will present an initial programme theory on educational interventions and how they work to reduce delirium in nursing home residents.

OBJECTIVES

1. To review the literature to understand how and why educational interventions on delirium-specific knowledge of HCPs work in nursing homes.
2. To synthesise the results to develop an initial programme theory for the effect of an educational intervention for HCPs working in nursing homes.

METHODS

The protocol has been registered at Open Science Framework (https://doi.org/10.17605/OSF.IO/HTFU4). Because the review will follow the RAMESES (Realist And Meta-narrative Evidence Syntheses: Evolving Standards) guideline, the corresponding checklist will be used for reporting.[38] The Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols checklist was used additionally and can be found in the online supplemental

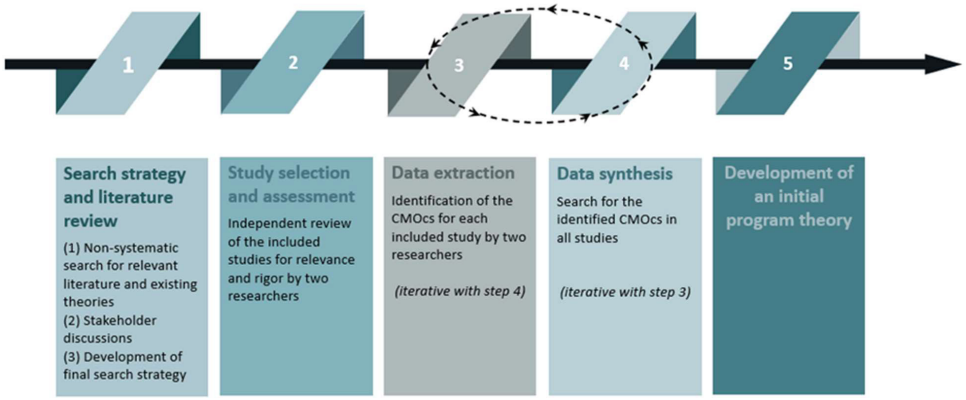

Figure 1 Stages of the realist review. CMOcs, Context–Mechanism–Outcome configurations.

appendix. Based on RAMESES, the following steps are planned for the realist review: (1) search strategy and literature review; (2) study selection and assessment; (3) data extraction; (4) data synthesis and (5) development of an initial programme theory. It is important to emphasise that the process is not a linear path but, rather, an iterative process. That means that the steps of the full review process should be conducted several times to refine the programme theory and reach theoretical saturation. Due to limited resources, we will not conduct several full theory iteration processes, but will aim for multiple iteration cycles within the steps 3–4 (see figure 1).

Any changes that occur between the protocol and the realist review will be mentioned in the publication of the results.

Step 1: search strategy and literature review

To obtain a first broad overview, an exploratory, non-systematic literature review will be conducted to search for government statements and international guidelines on delirium prevention, with a particular focus on educational interventions. A setting-independent search will be carried out to develop more in-depth knowledge on educational interventions to improve HCPs' knowledge regarding delirium. In addition, existing theories that focus on the development of educational interventions will be searched. As an example, the Predisposing, Reinforcing, and Enabling Constructs in Educational Diagnosis and Evaluation model can be cited here, which was originally developed to address behaviour change in the context of health promotion.[39] This initial search of literature and existing theories aims to get an initial insight to the topic of delirium-specific education while developing a basis for discussion during the planned stakeholder consultations. The stakeholder consultations will be conducted to reflect the experiences of HCPs in nursing homes related to delirium. Therefore, five to seven HCPs (nurses, general practitioners/physicians in private practice) will be recruited through the authors' networks with expertise in the care of nursing home residents. Due to the high presence of nurses in nursing home facilities in Germany and the nearly exclusive contact of physicians with residents through home visits, more nurses than physicians/general practitioners are included in the exchange of experiences. Based on the results, further discussions will be held within the research team.

A next step is a systematic literature review to look for evidence that will serve as the basis of the initial programme theory. In contrast to the search strategy of traditional systematic reviews, the search in realist synthesis does not aim to find every published paper that addresses the topic, but focuses on theoretical saturation. For the realist review, a comprehensive electronic literature search will be conducted in the relevant databases Medline (PubMed), CINAHL (Ebsco), Scopus, Web of Science, GeroLit and Carelit for literature that addresses educational interventions intended to improve the knowledge of HCPs working in nursing homes on the topic of delirium. Further literature will be reviewed by hand research as well as forward and backward citation tracking. In addition, a targeted search will be conducted for grey literature. For the systematic search, the three keyword groups A=*delirium*, B=*nursing*home and C=(*educational*)-*intervention* will be linked using the Boolean operators OR and AND. Indexable terms (eg, Medical Subject Headings terms) will be used when possible. Search strategies will be adapted to the different databases and attached for transparency. The following inclusion criteria have been formulated:

- (Educational)-interventions or multicomponent interventions to improve delirium-specific knowledge of HCPs (eg, nurses, assistance professionals, physicians).
- International nursing home setting, including short-term care and 24-hour care.
- Delirium in any form (according to the International Statistical Classification of Diseases and Related Health Problems 10th Revision[40] or Diagnostic and Statistical Manual of Mental Disorders[1] classifications).
- German or English language.
- Studies of any design.
- Publications of any form (including grey literature).

Exclusion criteria are studies from the hospital, hospice and outpatient settings as well as alcohol-induced delirium.

All included publications will be imported to the literature management program EndNote (www.endnote.de), and duplicates will be removed.

Step 2: study selection and assessment

Two researchers will independently review the titles and abstracts as well as the full texts of all identified publications. For this purpose, the included documents will be exported to the program Rayyan (www.rayyan.ai) to identify, blinded to the two researchers, the studies that may be included in the review. Disagreements between the two reviewers will be discussed, and if consensus cannot be reached, another researcher will be consulted. Subsequently, two researchers will describe transparently in a flow chart why certain reviews are excluded.

The quality appraisal of realist methodology differs substantially from quality appraisals in other systematic literature reviews. Because the realist review quality appraisal does not hierarchise, the evidence and any study types are included to design the programme theory. To date, no established appraisal tools exist to assess the quality of included studies in a realist review. We will use a quality appraisal tool that was developed by experts. The quality appraisal can be found in the online supplemental appendix. In the quality appraisal, the relevance and rigour of the data are key principles.[38] Relevant data are determined in a realist review based on whether they can develop, refute, refine or confirm the programme theories of the research programme. In assessing rigour, researchers ask whether the literature quality is high enough to be included. This assessment is made according to whether the data are considered trustworthy, that is, whether the sampling strategy was described in detail. The following questions will guide the assessment:

- Does the study focus on educating HCPs working in nursing homes to increase delirium-specific knowledge?
- Is the study comprehensive enough in terms of information about context, mechanism and outcomes?
- Does the study contain relevant information for the programme theory?

The focus of the literature review is on the potential contribution that can be provided to formulate CMOcs. After reconciliation of the individually prepared quality appraisals, a joint quality appraisal will be prepared for each included publication that summarises the information and accompanies the publication.

Step 3: data extraction

Data extraction of the included documents will be undertaken by two researchers independently. As it is expected that different types of publications will be included in the review, an individual overview will be created since conventional documents are not suitable for this purpose of the review. This overview may contain the following descriptive characteristics: study title, author(s), publication year, nation, sample number, design, intervention, comments for relevance and rigour. All extracted data will be managed with Microsoft Excel (www.microsoft.com). Another step will be to import the full texts of the included papers into the software MAXQDA (www.maxqda.com). MAXQDA will be used to code sections of the document that can prove useful information for the construction of the theory and to identify context, mechanism and outcomes, according to Kuckartz and Rädiker's fact coding.[41] Two researchers will perform this procedure independently and compare their results. In case of disagreement, another member of the research team will be consulted.

Step 4: data synthesis

Two researchers will independently search for re-emergent patterns between contexts, mechanisms and outcomes of the included studies regarding the effectiveness of educational interventions to increase delirium-specific knowledge of HCPs working in residential care for elderly individuals. The goal here is to identify demi-regulatory relationships that are transferable.[27] The process of confirming, disproving and refining the theory continues as more cases are studied and is called retroductive.[42] The synthesis will lead to an initial theoretical explanation of what educational interventions to improve knowledge of delirium among HCPs working in nursing homes accomplish, under what circumstances, how and why.

Step 5: development of an initial programme theory

Finally, the results of the literature review will be discussed within the research team. An initial programme theory might be the following:

'HCPs with little knowledge about delirium which are given access to an educational intervention are able to close their knowledge gaps about delirium and provide more delirium-focused care because they are able to overcome their lack of knowledge about the topic and feel accountable and motivated.'

Patient and public involvement

The public was not involved in the design, conduct, reporting or dissemination plans of this research. Refer to the Methods section for further details.

ETHICS AND DISSEMINATION

No primary research data will be generated as part of the realist review methodology; therefore, ethical approval is not required for this review.

The results will be used for the next phase of the DeliA Project, which focuses on the development of a curriculum for educational intervention for HCPs working in nursing homes. This curriculum will then be used to create a TEL to train HCPs working in nursing homes for elderly individuals. The CMOcs have a particularly important role in this process. In addition, the results will be disseminated at conferences and in peer-reviewed journal articles. Finally, the initial programme theory

can guide subsequent realist evaluations of how and why an educational intervention works specifically for HCPs working in nursing homes.

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Contributors RP initiated the review. RP, VM, CG, RL and TSB formulated the methodology of the review. All authors discussed the methodology during a workshop. VM designed and drafted the initial protocol, which was subsequently reviewed by TSB, CG, RL, ICO, HCV, PT, BH and RP. VM and RP finalised the protocol. RP, HCV, ICO, PT and BH contributed to the project acquisition. All authors (VM, TSB, CG, RL, ICO, HCV, PT, BH and RP) approved the final manuscript.

Funding This work is funded by the German Federal Joint Committee (funding number: 01VSF200003).

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not required.

Provenance and peer review Not commissioned; externally peer reviewed.

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Record number# Reviewer:

Realist Synthesis Appraisal Form

Title:	
First Author/year:	Project name (if any)
List Companion Papers (multiple papers on the same study incl. grey literature):	

Appraisal Assessment (section to be completed at the end)

Usefulness and relevance of this study is: (see end of form for definitions)

High	Moderate	Low	None

A: Summary of the paper
(What is this about? What kind of data source? Quant, Qual, MM, Blog etc.)

B. What is interesting about this paper?:

In what way is this article relevant to the candidate programme theories, if at all?(include specific pages, paragraph, line)

What are the strengths and weaknesses of the article? Any 'red flags'?

Describe the connection(s) between the outcomes and the process (C+M=0):

Describe any unintended positive or negative impacts and their mechanism link to the outcomes:

C. Questions for the First Author and Research Partners

List any interview questions for the stakeholder that would serve to strengthen understanding of the programme theory or links between outcomes, mechanisms and contexts:

Molitor V, *et al. BMJ Open* 2023; 13:e072591. doi: 10.1136/bmjopen-2023-072591

Definition of the categories (the following definitions are only examples. You should modify these according to the needs of your study):

HIGH:

This category is for papers that have high relevance to the realist synthesis. This means that the framing of the research and, the research questions are highly matched to the review questions, the empirical findings are clearly described and there is a rich description of the process and context that can greatly advance the theoretical output of the review. The paper is a 'key informant'

MODERATE:

This category is for studies that show a 'moderately' relevant framing of the primary research to the review theories. This may mean that the article reports on a different (but related) intervention working toward similar outcomes of interest, or describes middle-range theories that may inform the review even if there is no relevant empirical data from the paper to populate the CMO configurations, or has a few areas that are of interest even if it is not entirely clear whether they will be used in the synthesis.

LOW:

This category is for research that has met the selection criteria in terms of relevance to the review questions and the initial programme theories (or MRT), but is relatively thin on the description of context and mechanism. It is not placed in the exclusion category because it contains at least one idea or statement about the context, about the mechanisms or about conceptualizing outcomes that can be used for refining the theory and building a CMO configuration.

EXCLUDE:

This category is for a research paper that showed promise on reading the citation, but upon reading the full-text paper does not correspond to the review questions, does not have any content that corresponds to the initial programme theories (or MRT), or does not describe at all the context, or the mechanisms (or process).

Realist Synthesis Appraisal Form (J. Jagosh, personal communication, November 17, 2022)