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Clinical checklists of multicomponent non-pharmacological interventions for delirium management in adult patients in non-ICU inpatient healthcare settings: a rapid review

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ABSTRACT

Objectives To identify clinical checklists of multicomponent non-pharmacological interventions for the prevention and treatment of delirium used in non-intensive care unit inpatient healthcare settings, their content and reported implementation.

Design Rapid review.

Data sources Medline, Embase, PsycINFO, CINAHL and Cochrane CENTRAL were searched from 1 January 1999 to 31 March 2022 and updated on 16 January 2025. A comprehensive grey literature search, including websites of guideline development groups and international delirium organisations, was conducted on 26 and 27 February 2024.

Eligibility criteria We included records reporting the use of a 'clinical checklist' used by the healthcare team, family carers or adult patient (≥18 years) to prompt and document multicomponent non-pharmacological interventions for the prevention or treatment of delirium. Publication language was restricted to English and French.

Data extraction and synthesis Using rapid review methodology, two independent reviewers screened the included records. A single reviewer undertook the data extraction, with a third independent reviewer verifying the data extraction for completeness. All included studies were assessed using the JBI critical appraisal tools according to the study design. A narrative synthesis was used to summarise the findings.

Results From the database searches, 4796 records were identified. After the removal of duplicates, 3513 records underwent title and abstract screening, with 344 records undergoing full-text screening. A final 32 records were included. From the grey literature search, 6593 records were reviewed for relevance, from which 62 records were included in full-text screening. No grey literature records were of high enough quality to be included. All studies were published in English, with most studies conducted in the USA, n=12/32 (37.5%). The 32 studies were quasi-experimental (n=18), randomised controlled trials (n=8), qualitative (n=4), expert opinion (n=1) and policy/consensus guidelines (n=1). Clinical checklists included structured protocols, algorithms and order sets, which were paper-based or part of electronic delirium order sets. People with dementia participated as key stakeholders for a guidance document during the COVID-19 pandemic, but the target population was not included in the development phase of other checklists. Target users of clinical checklists were usually healthcare staff and trained volunteers and rarely family carers and study intervention nurses. Four of the 32 studies included all 10 National Institute for Health and Care Excellence clinical factors/preventive strategies for non-pharmacological interventions. For the remaining 28 studies, missing domains varied and included: therapeutic/cognitive activity, hydration, nutrition, constipation, urinary catheterisation, hypoxia, infection, pain and medication review. Only two studies involved family carers as active partners in patient care. Reported formal economic analysis was limited.

Conclusions Codesign of future clinical checklists should involve patients and family carers. Further research is needed on the feasibility of using clinical checklists by all members of the interprofessional team and family carers,

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ Involvement of stakeholders and knowledge users at the outset to inform the research question and eligibility criteria.
⇒ Utilisation of an experienced university health sciences librarian to assist with the search strategy for the systematic literature search. The search strategy was peer reviewed using the Peer Review of Electronic Search Strategies checklist.
⇒ A single reviewer undertook the data extraction, which was verified by a second experienced delirium researcher. A risk of bias/quality assessment of all included studies was performed.
⇒ Language was restricted to articles in English and French.
⇒ The included studies were conducted in high- or upper-middle-income countries, which may limit generalisability. Only a small number of studies were conducted in long-term care settings, specialist palliative care units and inpatient hospices.

the factors needed to ensure high levels of adherence and sustainability of multicomponent non-pharmacological interventions for delirium management, in addition to economic evaluations.
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INTRODUCTION

Delirium is a serious neurocognitive syndrome due to global organic cerebral dysfunction as a result of the physiological impact of one or several medical conditions. It develops over a short period of time and is characterised by a disturbance in attention, awareness and cognition.[1] Delirium leads to increased morbidity with increased falls, functional impairment and decline, and psychological distress to patients and families, as well as healthcare providers, and increased mortality.[2] Delirium is harmful to the brain: it worsens pre-existing cognitive impairment, such as dementia, and can lead to the onset of de novo dementia.[3 4] A 2015 meta-analysis of 14 interventional studies of multicomponent non-pharmacological interventions found a significant reduction in delirium incidence and rate of falls.[5] By preventing the development of delirium, these serious adverse effects would be reduced, and patient safety would be enhanced.

Evidence for multicomponent non-pharmacological interventions

In 1999, a seminal, controlled clinical trial published by Inouye *et al* showed that a multicomponent-targeted intervention for multiple risk factors significantly reduced the incidence of delirium in hospital inpatients aged ≥70 years (9.9% in the intervention group vs 15.0% in the control (usual care) group, p=0.02).[6] This Elder Life Program intervention targeted six delirium risk factors: cognitive impairment, sleep deprivation, immobility, visual impairment, hearing impairment and dehydration, with an 87% overall adherence to the intervention.[6] In 2010, the National Institute for Health and Care Excellence (NICE) Delirium guideline (which excluded patients at the end of life) concluded that delirium can be prevented in about one-third of patients using evidence-based multicomponent non-pharmacological interventions.[7] This NICE guideline presented 10 clinical factors for non-pharmacological interventions for delirium.[8] To reflect the 10 NICE clinical factors, four additional Hospital Elder Life Program (HELP) protocols were added, namely the constipation, hypoxia, infection and pain management protocols.[9] By appraising the literature up to September 2020, the Cochrane review by Burton *et al* concluded that multicomponent non-pharmacological interventions were estimated to reduce delirium incidence by 43% (compared with usual care) in non-ICU hospitalised adults.[10] A recent umbrella review has reported that multicomponent interventions reduce delirium incidence by 27%–54% in people aged 60 years and older.[11]

In contrast, for palliative care patients who have a life-threatening illness, the evidence for the effectiveness of non-pharmacological interventions has been limited.[12] In a non-randomised prospective comparative cohort study in cancer patients admitted to Canadian palliative care centres, the use of a limited multicomponent intervention (comprising a structured assessment of risk factors for delirium, including medications, and daily orientation of the patient and family carer education) did not reduce delirium incidence or severity.[13]

During the recent implementation of an interprofessional delirium guideline on our inpatient palliative care unit,[14] a significant limitation was that we did not have an electronic medical record (EMR) template for clinical staff to document which non-pharmacological interventions had been completed.

Role of checklists in healthcare

Many checklists have been introduced into the clinical realm with the aim of improving patient safety,[15] such as the surgical safety checklist.[16] To our knowledge, the current use of 'clinical checklists' to support staff with the systematic implementation of non-pharmacological interventions for delirium in inpatient settings is not known. Thus, the aim of this review was to identify 'clinical checklists' of multicomponent non-pharmacological interventions for the prevention and treatment of delirium in non-ICU inpatient healthcare settings that could be used (with or without adaptation) to improve the daily implementation and sustained use of these interventions, and also associated documentation, to improve the quality of patient care. In addition, we wanted to examine the content of clinical checklists and details regarding their implementation and impact.

METHODS

Review methodology

Given our objective of sourcing clinical checklists for service development, we used a rapid review methodology rather than a systematic review to streamline the methods to produce evidence for our stakeholders.[17–19] As a crucial component of rapid review methodology, we included knowledge users at the start of this project to garner stakeholder input. We prioritised the inclusion of high-quality study designs and excluded conference abstracts. Whereas rapid reviews may exclude all articles in non-English languages, we included French language articles to meet the needs of our bilingual institution. As rapid reviews are a type of knowledge synthesis in which components of the systematic review process are simplified or omitted, we also took steps to reduce the time spent dually screening abstracts and full-text articles, with the second reviewer checking only the excluded abstracts/studies. Data extraction and risk of bias/quality assessment were also conducted in an expedited manner by using a single reviewer with verification by a second reviewer.[18] Certainty of evidence was not performed as part of this rapid review. Although rapid reviews often limit the grey literature search component,[20] this review included a grey literature search, as a previous study by

our group found that a significant number of clinical guideline-related resources were found on a grey literature search, as opposed to the database search.[21]

This review was conducted using the 2020 interim guidance from the Cochrane Rapid Reviews Methods group that was available at the initiation of this review[20] and is reported according to the interim guidance for the reporting of rapid reviews by Stevens *et al*[18] and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement.[22] See the online supplemental file S1 for the completed PRISMA checklist.

Initial professional stakeholder meeting

A virtual meeting of 10 key local stakeholders, which included members of the project team, was held to discuss the future development of a checklist of multicomponent non-pharmacological interventions for delirium prevention to meet the needs of the inpatient population of our organisation and to refine the research question. Our academic healthcare organisation (Bruyère Health) specialises in ageing, rehabilitation, care for those living with multiple complex medical conditions and includes a 31-bed inpatient palliative care unit. Bruyère Health has over 1000 beds (including long-term care beds) for adult patients across four sites in Ottawa, Ontario, Canada.

Stakeholders included knowledge users (physicians and senior nurses working on the palliative care, care of the elderly and stroke rehabilitation units) and the manager of clinical informatics. An information specialist from the university library and local researchers also attended the meeting. We used the Interim Guidance from the Cochrane Rapid Review Methods Group[20] as a reference document for the project meeting. First, the group clarified that the focus of interest, a standardised clinical checklist, would be a checklist, structured protocol, or explicit template (including order sets) used by the healthcare team or family carer and/or patient to prompt and document multicomponent non-pharmacological interventions that had been used in a healthcare system as part of clinical care or a research study for the prevention and/or treatment of delirium. (Of note, the term 'checklist' has been a Medical Subject Headings term on PubMed since 2010). To set the research question, the Population, Intervention, Comparison, Outcomes, Timestamp, Setting and Study Design (PICOTSS) criteria were reviewed and discussed. The group agreed on using 1999 as the 'Timestamp', as this was the publication year for the multicomponent intervention trial by Inouye *et al*[6] (see table 1 for the final PICOTSS criteria). Eligibility criteria and search terms were discussed and finalised by consensus. For example, 'inpatient settings' was clarified as 'institutional inpatient settings' and expanded to include long-term care/nursing homes and specialised geriatric settings.

The study protocol was prospectively registered with PROSPERO[23] and published on the Open Science Framework[24] (see online supplemental file S2 for a copy of the study protocol). International study collaborators contributed to the list of suggested websites for the grey literature search component.

Patient and public involvement

There was no patient or public involvement for this review.

Eligibility criteria

Table 2 shows the review inclusion and exclusion criteria.

Information sources and search strategy

Database source

The following databases were searched by a health sciences librarian (LS): Medline and Medline in Process via Ovid (1946–30 March 2022), Embase Classic+Embase via Ovid (1947–30 March 2022), APA PsycINFO via Ovid (1806–Week 4, March 2022), CINAHL via EbscoHost (1947–March 2022) and Cochrane CENTRAL (January 2020 issue). A search strategy was developed in Medline,

Table 1 Population, Intervention, Comparison, Outcomes, Timestamp, Setting and Study Design (PICOTTS) criteria

PICOTSS criteria	
Population	Adults (≥18 years) at risk of developing delirium or who have delirium
Intervention	Clinical checklists for multicomponent non-pharmacological interventions for the prevention or treatment of delirium
Comparison	Standard or usual care
Outcomes	Reduced incidence of delirium or clinical effectiveness of multicomponent non-pharmacological interventions for delirium
Timestamp	1999 (the year when Inouye *et al* published the results of a multicomponent intervention to prevent delirium in hospital inpatients ≥70 years as part of the Elder Life Program,[6] the precursor to the Hospital Elder Life Program (HELP)
Setting	Institutional inpatient healthcare settings (excluding intensive care, critical care, perioperative and postoperative settings and emergency department)
Study design	Systematic reviews, randomised controlled trials, controlled trials, observational studies (eg, before and after studies), longitudinal studies, quasi-experimental studies, natural experiments, implementation studies, process evaluations and economic evaluations

Table 2 Inclusion and exclusion criteria

	Inclusion criteria	Exclusion criteria
Timestamp	Published in 1999 and onwards	Study conducted before 1999
Condition	Delirium	Postoperative or postprocedural delirium; Alcohol-related delirium (delirium tremens)
Population	Adult (≥18 years)—at risk of developing delirium or who have delirium	Paediatric (<18 years)
Intervention: Clinical checklist for multicomponent non-pharmacological interventions for delirium	Clinical checklist used by healthcare team/ family carer/patient to prompt and document multicomponent non-pharmacological interventions for the prevention or treatment of delirium	Checklists used solely for pharmacological interventions for delirium; Non-clinical checklists
Setting	Institutional inpatient healthcare settings, including: Hospitals Palliative care units Inpatient hospices Long-term care settings (including nursing homes) Specialised geriatric settings	Intensive care units Critical care units Inpatient perioperative and postoperative settings Emergency departments Outpatient settings Home or retirement home
Types of studies	Systematic reviews, randomised controlled trials, controlled trials, observational studies (eg, before and after studies), longitudinal studies, quasi-experimental studies, natural experiments, implementation studies, process evaluations and economic evaluations	Conference/ meeting abstracts, case reports, case series, narrative articles on delirium, staff delirium education only, study protocols, commentaries, editorials, opinion pieces, books and theses
Language	Published in English or French	Published in a language other than English or French

and then translated into the other databases, as appropriate (see online supplemental file S3 for the database search strategy). All databases were searched from 1 January 1999 (as per the Timestamp in PICOTSS) to 31 March 2022. The database search was updated on 16 January 2025. There were no other publication restrictions. The search strategy was peer reviewed using the Peer Review of Electronic Search Strategies checklist[25] by another academic librarian. All references were entered into an EndNote file for processing and then into Covidence for deduplication and screening.

Grey literature source

The grey literature search strategy for clinical checklists was developed from previously published guidelines and articles[21 26 27] and stakeholder input. The comprehensive website search was conducted on 26 and 27 February 2024 by MK using guidelines from the University of Toronto, adapted from Godin *et al*.[28] The grey literature search strategy (provided in online supplemental file S4) included guideline development groups; international delirium organisations for Europe, America and Australia and Google (using the Advanced Search feature). We planned to review only the first 100 records from each website search, if over 100 were retrieved via Google, as per guidance from Godin *et al*.[28] Results were entered into a search strategy tracking sheet.

Selection process

Database source

For title and abstract screening, a standardised form was independently piloted by two reviewers (MK and SHB), using 30 abstracts. The two reviewers continued independent screening of 20% of abstracts, with conflicts to be resolved by discussion between them. Using Covidence to calculate inter-rater reliability for title and abstract screening, Cohen's kappa was 0.71. A third team member was available to adjudicate if consensus was not reached. The remaining abstracts were screened by a single reviewer (MK), with the second reviewer (SHB) screening all excluded abstracts. For full-text screening, after independently conducting a pilot exercise of 10 full-text records to test a standardised form, SHB completed screening of full-text records, with excluded records screened by MK.

Grey literature source

A single reviewer (SHB) reviewed the records retrieved from the grey literature search.

Risk of bias/quality assessment

As per the interim guidance from the Cochrane Rapid Review Methods Group,[20] we limited risk of bias

assessments to the most important outcomes for this rapid review.

Database source

As we anticipated a range of study methodologies, we used validated critical appraisal tools from the JBI suite of appraisal tools according to study design (randomised controlled trial (RCT), quasi-experimental studies, qualitative studies, expert opinion pieces and policy/consensus guidelines).[29] Each JBI appraisal tool includes a final overall study appraisal assessment item with three options: include, exclude or seek further information. The quality assessment was completed by a single reviewer (MK), with a second reviewer (SHB) verifying the results for all included records. Disagreements on quality assessments were resolved by consensus between the two reviewers.

Grey literature source

Grey literature records meeting inclusion criteria were appraised by a single reviewer (SHB) using the AACODS (Authority, Accuracy, Coverage, Objectivity, Date, Significance) checklist.[30]

Data collection process

An a priori Microsoft Excel data extraction form was developed to record study characteristics (including first author, year of publication, published language and country) and data items. A single reviewer (SHB) undertook the data extraction. A third reviewer (PL) reviewed all included records to ensure that the extracted data were correct and complete.

Data items

The following data items were extracted: study design, setting, target population for the clinical checklist, target population involvement for checklist development, intended users of the checklist, strategy used to search for evidence to inform checklist development, non-pharmacological interventions included on the checklist and/or content of the checklist, checklist format (eg, paper, electronic), frequency of use, adherence, facilitators and barriers to implementation, reported benefits or harms, health economic evidence, sustainability (if reported) and patient/family carer preferences or values in respect to checklist items. Other extracted items included the type and number of participants in identified studies, their age and sex and key study outcomes.

Synthesis methods

We anticipated a diverse set of included studies regarding study designs and reported outcomes. As such, we planned to report the main findings of the included records using a narrative synthesis around the elements of the PICOTSS criteria, including population, outcomes (including outcomes for both potential benefits and potential harms), setting and study design[19] and some items from the Appraisal of Guidelines for Research and Evaluation-Recommendation Excellence.[31] Due to the expected heterogeneity, we did not anticipate that a meta-analysis of the quantitative findings would be possible.

RESULTS

Study selection

The initial database search identified 4105 records. The updated database search identified an additional 691 records, resulting in 4796 records. After the removal of duplicates, 3513 records underwent title and abstract screening, with 344 undergoing full-text screening for eligibility. With the addition of one study from citation searching, a final 32 records with clinical checklists were included in the review.

For the grey literature search, 6593 records were reviewed for relevance, including the first 100 records from each website using Google as the search engine. 22 records were duplicates of the database-searched literature. A final 62 grey literature records were included for screening. Four reports contained a clinical checklist, but none were of high enough quality to be included. Given that no quality records were found on the grey literature search, this search was not updated for the purposes of this review. See figure 1 for the PRISMA flow diagram for details of flow of records for database and grey literature searches.

Study characteristics

The characteristics of the 32 included studies[6 32–62] are reported in online supplemental file S5. The majority of studies were conducted in the USA (n=12),[6 32–42] followed by Australia (n=6),[43–48] UK (n=3)[49–51] and Spain (n=2).[52 53] The remaining nine studies were conducted in Canada,[54] Chile,[55] China,[56] Denmark,[57] Germany,[58] Korea,[59] New Zealand,[60] Poland[61] and Singapore[62] (one study in each country). All studies were published in English. There was a range of study types: quasi-experimental (n=18),[6 32–34 36–43 48 50 53–55 61] RCT (n=8),[35 45 47 51 52 56 59 62] qualitative (n=4),[44 49 57 60] expert opinion (n=1)[58] and policy/consensus guideline (n=1).[46]

Studies were conducted in medical inpatient settings (n=20),[6 32 33 36–43 46–48 54–58 61] specialist elderly care settings (n=6),[49–53 62] long-term care settings (n=3),[34 35 59] specialist palliative care units (n=2)[44 45] and inpatient hospice (n=1).[60] Nine studies excluded patients who were terminally ill or receiving hospice care.[6 34 35 37 38 47 51 53 62] Two reports were specific to implementing non-pharmacological interventions for delirium, while infection control measures were in place during the COVID-19 pandemic.[46 56]

Risk of bias/quality assessment results

Database source

Five JBI critical appraisal tools were used according to the study design: assessment of risk of bias for RCTs; assessment of risk of bias for quasi-experimental studies; checklist for qualitative research; checklist for textual evidence

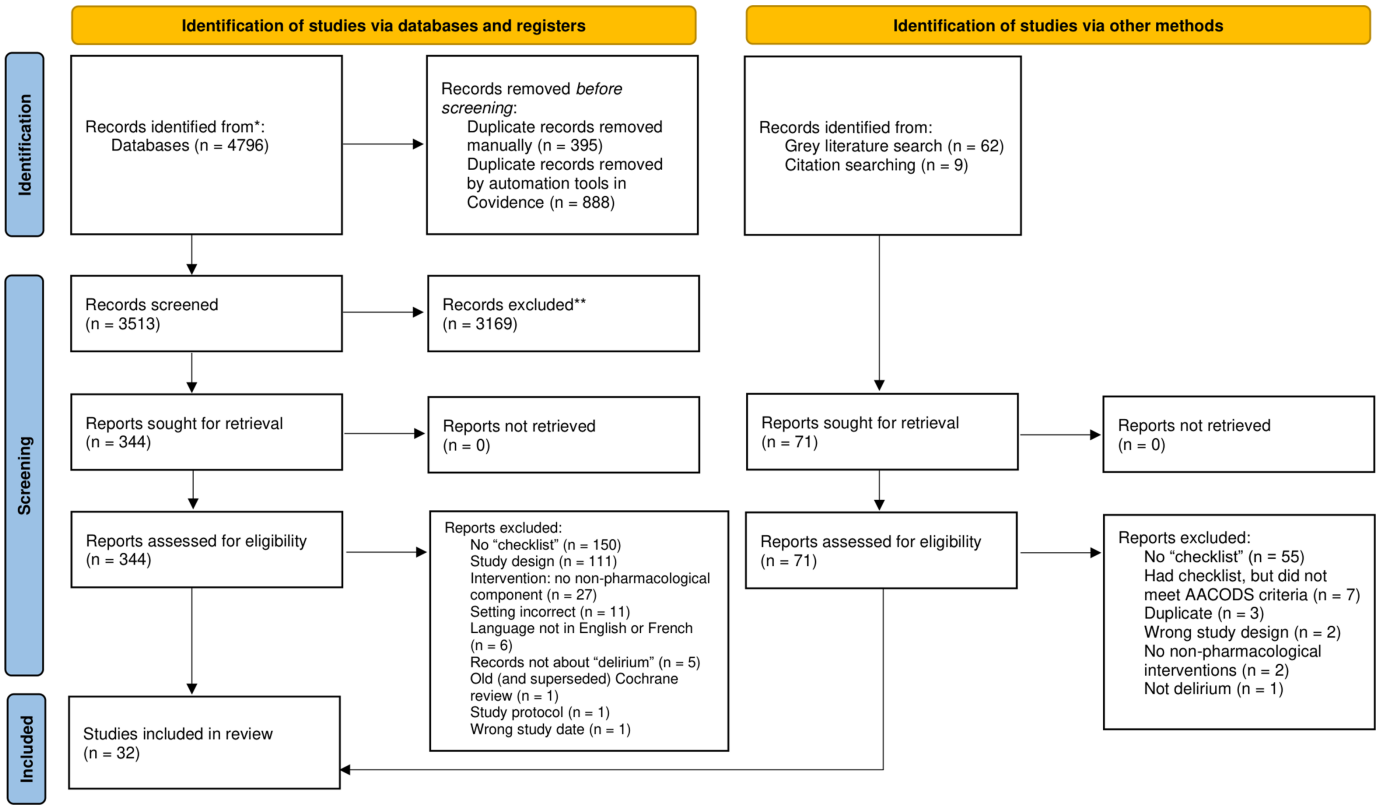


Figure 1 PRISMA 2020 flow diagram. From: Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71. AACODS, Authority, Accuracy, Coverage, Objectivity, Date, Significance.[30]

– expert opinion and checklist for textual evidence – policy/consensus guidelines. Each appraisal question was answered by 'yes', 'no', 'unclear' or 'not applicable'. The final overall appraisal assessment was to include all 32 studies. See online supplemental file S6 for the overall results of the quality assessment.

Grey literature source

No grey literature records were of high enough quality, as assessed by the AACODS checklist,[30] to be included in this review.

Characteristics of clinical checklists

Online supplemental file S7 provides a summary of the characteristics of the clinical checklists. Clinical checklists were usually used for the prevention of delirium but were used solely for the treatment of delirium in three studies.[56 58 62] The clinical checklists included structured protocols, algorithms, flowcharts and order sets. These were rarely included in the publication. One recent publication reported the use of a web-based application in long-term care.[59] Many of the structured protocols were derived from the original HELP published by Inouye *et al* in 1999.[6] The frequency of checklist utilisation ranged from 1 to 3 times per day, but this was not always reported.

Four studies reported the use of a tick box format checklist for staff or family carer to record the non-pharmacological interventions they had delivered.[44 45 48 60] The original HELP trial, which used volunteers to deliver multicomponent non-pharmacological interventions, reported the

> 'completion of checklists to ensure competency and consistent and complete adherence to the intervention protocols,'

but no specific detail on their content was provided.[6] The Hospital Elder Life Program - Long-Term Care (HELP-LTC) project for nursing home residents included a visit form for certified nursing assistants to complete,[34 35] and in the recent nurse-led HELP study, nurses completed visit forms.[56] A specific 'Family Caregiver tracking form' was used in Family-HELP.[42] Gorski *et al* reported the use of specific forms for trained volunteers to complete.[61]

Target population for clinical checklist

Older adults were the most frequent target population for the clinical checklists (online supplemental file S7). However, they were rarely involved in codesigning the checklist. One study included people with dementia as key stakeholders in guidance development, as well as their care partners, during the COVID-19 pandemic.[46] In the PRevent delirium through Eating and drinking, Sleep, Exercise, Reorientation, Vision and hearing, and Enabling family (PRESERVE) Aotearoa New Zealand study, study resources were codesigned by a Māori researcher in partnership with an inpatient hospice and a large Māori health provider, before being trialled with

a small group of whānau (family) from the local marae (Māori meeting grounds) in New Zealand.[60] In the original PRESERVE study in Australia, multicomponent non-pharmacological interventions could be tailored by the clinical team according to the patient's wishes.[45] For the interview component of the study by Chong *et al*,[62] family carers were asked to grade the multicomponent interventions according to how helpful they were to their family member's recovery. Family carers reported that therapeutic activities were the most useful, followed by reality orientation, thrice-daily mobilisation, reminiscence therapy, light therapy, sleep protocol and nutritional intervention. They rated addressing sensory impairment to be the least useful intervention. Three other studies described the involvement of the clinical team in the development of the clinical checklist.[34 39 54]

Target users of clinical checklists

The target users of clinical checklists were usually bedside nurses, clinical staff and/or trained volunteers (online supplemental file S7). In contrast, specially trained healthcare staff were the target users in seven studies.[32 34 35 37 52 56 62] In the study by Davies *et al*, inpatient hospice patients and family carers were included as target users, in addition to clinical staff.[60] Family carers were the exclusive target users in one study.[42]

Multicomponent non-pharmacological interventions included in clinical checklists

The non-pharmacological interventions reported in each study clinical checklist are shown in online supplemental file S8. All interventions were delivered face to face (as opposed to virtual) to patients or long-term care residents. The Prevention of Delirium programme developed a bespoke implementation manual where non-pharmacological interventions were organised into three distinct delirium prevention 'bundles' depending on complexity and usual clinical practice: (1) physician/nurse roles (2) therapist/nurse roles, possibly volunteer role and (3) volunteer role.[49]

We undertook a content analysis for the NICE clinical factors and NICE preventive strategies for non-pharmacological interventions, that is, cognitive impairment or disorientation (requiring orientation/reorientation protocols as well as cognitively stimulating activities), dehydration or constipation, hypoxia, immobility or limited mobility, infection (this includes avoiding unnecessary urinary catheterisation), multiple medications, pain, poor nutrition, sensory impairment (vision/hearing) and sleep disturbance[9]—and found that four studies included all 10 NICE clinical factors/NICE preventive strategies in their clinical checklist.[46 49 51 56] Orientation was used in 31/32 studies: in Davies *et al*, while the orientation domain was not included on their checklist, some orientation interventions were instituted throughout the two hospices during the study (eg, clocks and information whiteboards).[60] Missing domains varied across studies and included therapeutic/cognitive activity, hydration, nutrition, constipation, urinary catheterisation, hypoxia, infection, pain and medication review. See online supplemental file S8 for details. Online supplemental file S9 portrays the 10 NICE clinical factors/NICE preventive strategies for non-pharmacological interventions[8 9] as a heatmap to provide a quick visualisation of the clinical factors for each clinical checklist. The colour coding for the heatmap is as follows: green (yes, meets NICE criteria), amber (partially meets criteria) and red (does not meet criteria). Important note: four studies[6 33 37 38] predated the publication of the NICE Delirium guideline in 2010 and so would not be expected to meet all of the clinical factors/preventive strategies.

Family carer participation

In 12/32 studies (37.5%), family carers were invited by the healthcare team to participate in performing the non-pharmacological interventions.[36 40–42 44–46 52 54 56 60 61] However, only 2/32 studies actively involved family carers as partners in carrying out non-pharmacological interventions.[42 60] Family carers were provided with a delirium information brochure alone in another six studies.[39 43 48 51 53 55]

Adherence to multicomponent non-pharmacological interventions

Inouye *et al* showed the importance of high levels of adherence for the effectiveness of multicomponent non-pharmacological interventions for delirium prevention.[38] Adherence was reported in 12 studies,[6 34 35 37 45 50–53 55 56 62] with online supplemental file S8 providing more detail regarding adherence rates for individual non-pharmacological interventions when reported.[6 34 35 45] Up to 100% compliance was achieved in a specialised 5-bed Geriatric Monitoring Unit[62] and in an Acute Geriatric Unit where the scheduled interventions were performed by a designated study intervention nurse.[52] Ni *et al* attained an 83.9% adherence rate for three basic protocols (early mobilisation, therapeutic activities and orientation).[56] Vidán *et al* had 75.7% overall adherence to their non-pharmacological protocols, with the highest rate in mobilisation (91%) and the lowest rate in sleep preservation (50%).[53] Garrido *et al* demonstrated an improvement in global adherence from 58.2% at baseline to 77.9% after training.[55] Adherence rates for individual interventions varied from 27% to 57% (with the highest adherence for reorientation and hydration and the lowest adherence for mobility and constipation) when completed by ward staff in specialist acute elderly wards (comprising 80 beds in a general hospital).[50] However, accurate reporting of adherence rates was dependent on staff completing protocol charts after performing the intervention, so adherence may have been underestimated at times.[50] Smith *et al* did not report adherence % but found that infection, nutrition, hypoxia and pain had the highest adherence, whereas cognitive activity, sensory impairment and medication review had the lowest adherence.[51] In the HELP where trained volunteers deliver the core non-pharmacological interventions, the overall

intervention adherence rate (complete and partial) was 89%.[37] The major reasons for non-adherence in HELP were lack of staff or volunteers (32%), patient refusal (26%) and medical contraindication (22%).[37]

Sustainability

Sustainability of non-pharmacological interventions was rarely reported. In a phase II cluster randomised waitlist-controlled trial, 36 non-pharmacological interventions were implemented in four Australian palliative care units using a checklist.[45] The PRESERVE study initially achieved 5%–25% full adherence and 25%–45% partial adherence across domains, but this was not sustained at 6 months. After 6 months, there was no full adherence and 30% partial adherence to the non-pharmacological interventions.[45] In contrast, Garrido *et al* used an implementation science framework to implement non-pharmacological interventions. At 6 months, global adherence had only slightly dropped from 77.9% to 75.6%.[55]

Facilitators and barriers to implementation

Several studies reported facilitators and barriers to their projects. Leadership support was vital to the success of projects,[41 57] with Cody *et al* emphasising that 'strong' leadership is needed.[43] Using a codesign approach with key stakeholders from hospital units can help with project buy-in.[54] Environmental design with natural light and easy access to outdoor spaces may also be an important factor in facilitation. For example, in the PRESERVE Aotearoa New Zealand study, the two inpatient hospice units had single soundproof rooms with sliding doors that opened onto private patios and gardens.[60] Multidisciplinary education was an important facilitator,[32 43 54] as was clinician engagement[41] and teamwork.[57] Hospital nurses described how a lack of delirium education was a significant barrier,[57] and the need for ongoing education to rotating resident physicians was highlighted by Rohatgi *et al*.[41] Many studies used unit delirium champions[41 43 54] or specially trained facilitators with dedicated time specific to the role.[37 47] Boockvar *et al* used dedicated nursing assistants to perform non-pharmacological interventions.[34] Conversely, the turnover of delirium team members and clinical staff was a barrier,[32 37 41] as was the training time required for nursing assistants[34] and volunteers.[37] Long and complex checklists were a barrier to implementation, such as the 36-item checklist used in the PRESERVE study.[44] Being able to tailor the intervention according to a patient's specific delirium risk factors or wishes[45 56] and using a delirium order set were facilitators to the implementation of non-pharmacological interventions,[39 40 54] although there were challenges with the process needed to make the required changes on the EMR.[41] Other reported barriers were nurse-related and organisational level factors that hindered compliance to recommended delirium care practices,[43] competing time demands,[32 42] simultaneous quality improvement projects[43] and staff fatigue.[43]

Reported benefits or harms

Inouye *et al*[6] and Hosie *et al*[45] reported no adverse effects to the non-pharmacological interventions. Multicomponent non-pharmacological interventions were shown to prevent cognitive and functional decline in at-risk older patients.[37] From a postdischarge patient–family carer survey, there was >90% satisfaction with the HELP programme.[37] The social engagement intervention was felt to validate the time taken by staff in providing holistic care.[60]

A small number of potential harms were reported. In the implementation study by Gorski *et al*, where psychology and medical students were trained as volunteers, one female student withdrew after the death of their patient.[61] Some hospice patients viewed multicomponent interventions as task-focused and repetitive.[60] Finally, some physicians questioned the appropriateness of non-pharmacological interventions for patients in the last weeks or days of life.[44]

Economic evaluation

Economic evaluation was very limited, but the length of stay was commonly measured. Six studies reported a reduced hospital length of stay with the use of multicomponent non-pharmacological interventions.[32 36 39 41 47 61] The Elder Life Program did not conduct a formal cost-effectiveness analysis but estimated the cost of each case of prevented delirium to be US$6341.[6] No other studies reported the cost per delirium case prevented. Preliminary results of the Elder Life Program study extension suggested an overall reduced hospital cost of US$1500 per patient.[37] In a more recent single-centre study, hospital costs for medical patients were reduced by 7%—a median savings of US$1237 per hospitalisation[39] (online supplemental file S5). There was a lack of formal economic evaluation in 12 applicable studies.[34 35 40 43 45 48 50 52 53 55 56 62]

Some studies required extra trained staff,[47 56] but training costs were not reported. Programme costs could be expected to increase if staff visits were time-intensive. For example, in one study, the median visit duration by a geriatric specialist nurse per person per day was 102.2 min.[56] Volunteer training could also be resource-intensive. For the study by Gorski *et al* in older adults, volunteers received 12-hour structured training and monthly 2-hour supervision meetings. In addition, volunteers were supported by 24-hour access to psychological support.[61] Conversely, four studies reported that additional resources above the normal clinical staff roster were not used.[39 41 48 53]

DISCUSSION

Multicomponent non-pharmacological interventions for delirium management are key recommendations in delirium guidelines.[8 63] In this review of 32 studies, we identified different types of clinical checklists to facilitate the implementation of multicomponent non-pharmacological interventions. These interventions were

frequently delivered as protocols, order sets or algorithms/flowcharts. Checklist formats included tick box, paper or EMR order sets and, more recently, electronic in the form of an app. Clinical checklists were predominantly used in medical inpatient settings and to prevent (as opposed to treat) delirium across settings. There were limited studies in long-term care,[34 35 59] inpatient palliative care or inpatient hospice settings,[44 45 60] despite delirium occurring in up to 88% of patients prior to death.[64]

We found that involvement of the target population (usually older adults) in the checklist development phase was very limited. In contrast, the PRESERVE Aotearoa New Zealand study used a codesign approach and purposely sought to include cultural considerations and public engagement in the intervention development.[60] Codesign of interventions provides a voice to participants who are often excluded and leads to increased satisfaction and patient experience with an intervention that better meets the users' needs.[65] Codesign to develop suitable intervention-based checklists for delirium prevention and treatment should include active engagement and collaborative participation by patients, residents and their family carers to gain insights into their values and preferences pertaining to checklist items, in addition to clinical staff and key institutional stakeholders (including information systems) for inpatient settings.[66–69]

The non-pharmacological interventions in the identified clinical checklists varied, but all the checklists included mobilisation, vision and hearing. The most common missing NICE clinical factors/preventive strategies were infection (including avoiding unnecessary urinary catheterisation), hypoxia, constipation, polypharmacy management, pain management and nutrition. The implications for this are that common delirium precipitants are missed and not optimally managed. It also means that the development of more comprehensive checklists in keeping with NICE guidance will likely necessitate increased staff resources for implementation, such as a pharmacist to conduct medication review and monitoring, a dietician and provision of feeding assistance to optimise nutrition, in addition to increased staff education and monitoring of bowel and bladder function and avoiding the unnecessary use of urinary catheters. Orientation and hydration were typically rated as high-adherence items in studies, whereas mobility, constipation and sleep enhancement were low-adherence items. Barriers to adherence included staffing levels, patients declining to participate and patient medical illness. A significant finding of this review was that family carer participation in actively performing the interventions was limited.

Our findings suggest that implementation of clinical checklists would be aided by ensuring that they are not overly long to optimise acceptance and adherence (with checklist modifications to reduce burden in end-of-life populations and people with declining performance status), and reflect how patients, family carers and clinicians prioritise interventions to prevent delirium.[70] A focus on checklist design features and appropriateness[71 72] is needed to enable them to be embedded into routine patient care and their utility maximised by designing a process that works with clinicians' workflow.[73] Using electronic versions of clinical checklists for non-pharmacological interventions and electronic order sets, which are triggered by administrative data risk factor analysis to identify patients at a higher risk for delirium, may enhance sustainability.[32] EMR notifications can be used to alert physicians about potentially deliriogenic medications.[39] Ideally, EMR builds should be constructed in such a way as to enable different interprofessional team members to seamlessly access the clinical checklist in real time, with dedicated fields for them to record the specific intervention/s completed and its duration.

While clinical checklists may improve patient care, it is important that a comprehensive implementation plan includes the tracking of balancing measures to ensure that improvements in one part of the system do not cause any unintended negative impacts. Clinical checklists can be a useful tool not only to prompt all members of the interprofessional team to carry out non-pharmacological interventions, but also aid their confirmatory documentation of completed interventions. Patients, residents and families could also actively use checklists, and document the interventions that they carried out. However, it is paramount that clinical checklists are not viewed simply as an exercise to 'just tick the box' that adds burden to clinical staff, but that the non-pharmacological interventions for delirium themselves are considered meaningful and valued interventions to improve care. Another challenge is care/documentation overlap or duplication, as elements of delirium prevention care are also important for falls prevention, pressure area care and nutrition, indicating that an integrated approach drawing on EMR capabilities would be extremely valuable. Appropriate time investment in comprehensive clinical staff education on both delirium and how to use a clinical checklist before implementation starts, and also on an ongoing basis, is needed to ensure the appropriate application of any clinical checklist. Determining organisational readiness for change and using formal implementation frameworks should be considered.[55 74] Leadership champions[75] with dedicated time for implementation efforts are crucial, and methods should be put into place to monitor practice and ensure adherence to interventions, for example, repeat assessments of intervention staff/volunteers on a quarterly basis to ensure that the intervention protocols are conducted in a standardised manner and regular audits.[6 38]

Future research

Further studies are needed to establish the feasibility of using clinical checklists for multicomponent non-pharmacological interventions by all members of the interprofessional team to improve fundamental delirium care and the factors (patient, resident, family carers and staff) facilitating the high level of adherence needed to

optimise the effectiveness of the interventions and integration into daily clinical practice. Formal economic evaluations should be included in future studies, and studies involving patient/resident and family carer partners in the codesign of checklist interventions should be prioritised. Further research is also needed to determine which core clinical checklist items are suitable and feasible for long-term care and end-of-life populations. Shifting to a goal focus, as opposed to a task focus, may also promote patient/resident and family carer engagement.

Strengths and limitations

A strength of this review is that it was conducted using a systematic methodology as proposed by the Cochrane Methods Group. While our database search included Cochrane CENTRAL, Medline and Embase+Embase Classic databases as recommended,[20] we also searched the CINAHL and PsycINFO databases to ensure that nursing, allied health and psychology/psychiatric literature were included, given our review topic. Our collaboration with an experienced health sciences librarian (LS) with peer review of the search strategy increased the rigour of the search. Unlike when sourcing delirium guidelines,[21] we found that the systematic grey literature search was not valuable in identifying clinical checklists. Data extraction and the final quality assessment of all included studies was verified by a second author.

Limitations include that all 32 studies were in English, with no French-language papers found in the literature search. Studies were conducted in high- or upper-middle-income countries, which may limit the generalisability of the results. This review provides only limited details regarding the use of clinical checklists in long-term care settings, specialist palliative care units and inpatient hospices due to the small number of studies in these settings, with another nine studies excluding people who were terminally ill or receiving hospice care. Four authors for this review (SHB, PL, AH and MA) authored three included articles.[44 45 60] To minimise bias, title and abstract screening and the initial quality assessment for study inclusion were undertaken by MK.

CONCLUSION

Most of the clinical checklists identified in this review were structured protocols, algorithms and order sets, which varied in their coverage of domains of delirium risk factors. While some studies incorporated the provision of delirium information brochures to family carers by staff, few studies actively involved family carer participation in delivering non-pharmacological delirium interventions. Patients, long-term care residents and family carers should be engaged in the codesign of future clinical checklists. Future studies should examine the feasibility of using clinical checklists by all interprofessional team members and family carers, the factors needed to ensure high levels of adherence and sustainability of multicomponent non-pharmacological interventions for delirium management, in addition to economic evaluations.

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