Delirium management in critically ill patients: an integrative review

Gestão do Delirium na pessoa em situação crítica: uma revisão integrativa da literatura

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ABSTRACT

Introduction: The critically ill patient is at high risk of developing delirium, which is an independent predictor of mortality, morbidity, increased length of stay, health costs and safety incidents. The incidence of this disturbance can reach 80% in this population, with severe impact on short and long-term outcomes of patients and family. Objectives: To analyse and summarise evidence regarding nursing interventions that are effective on delirium management in critically ill patients. Methodology: For this integrative review, literature research was conducted in electronic databases MEDLINE, CINAHL and Cochrane Database of Systematic, as well as other sources, from January 2013 to September 2021. Results and Discussion: The search retrieved 140 documents, 135 obtained from electronic databases and five from other sources. After assessing eligibility, 22 final documents were obtained for data extraction and analysis. The results show that the implementation of multicomponent interventions have greater benefits in reducing delirium incidence and duration. Non-pharmacological interventions, like early mobilization and family participation, also stand out. Nurses play a significant role in delirium management, and this review can help nurses to choose interventions based on clinical evidence, improving the outcomes of the critically ill patient. Conclusion: The implementation of multicomponent interventions demonstrates greater benefits in reducing delirium incidence and duration, with impact on other person-centred outcomes. Further multicentric studies are needed to prove unequivocal benefits of engaging the family of critically ill adults with delirium, and its benefits in their outcomes.

Keywords: *delirium*, critical care, critically ill patients, nursing research, *delirium* management.

RESUMO

Introdução: A pessoa em situação crítica apresenta um elevado risco de desenvolver *delirium*, sendo este, um preditor independente de mortalidade, morbilidade, aumento do tempo de internamento, aumento dos custos em saúde e ocorrência de eventos adversos. A sua incidência na pessoa em situação crítica (PSC) pode atingir os 80%, com um impacto negativo nos seus *outcomes* a curto e longo prazo, tal como da sua família. Objetivos: Identificar e analisar quais as intervenções de enfermagem com impacto positivo na gestão do *delirium* na PSC. Metodologia: Foi efetuada uma revisão integrativa da literatura, com pesquisa nas bases de dados da CINAHL, MEDLINE e Cochrane Database of Systematic Reviews, assim como, em outras fontes, de janeiro de 2013 a setembro de 2021. Resultados e discussão: Obtiveram-se 140 documentos, 135 obtidos nas bases de dados e cinco em outras fontes. Após verificação da elegibilidade dos mesmos, foram obtidos 22 documentos finais, para extração e análise. Os resultados demonstram que as intervenções multimodais têm benefícios na redução da incidência e duração do *delirium*. As intervenções não farmacológicas, como a mobilização precoce e a participação da família, também se destacam. Assim, a intervenção de enfermagem é significativa na gestão do *delirium* da pessoa em situação crítica. Esta revisão integrativa da literatura permite ao enfermeiro, conhecer as intervenções de enfermagem baseadas em evidência neste âmbito, para que possa implementá-las, melhorando assim os *outcomes* na pessoa. Conclusão: A implementação de intervenções de enfermagem multimodais nesta área, demonstram benefícios na redução da incidência e duração do *delirium*, com impacto nos resultados centrados na pessoa. Estudos multicêntricos devem ser desenvolvidos no sentido de provar de forma inequívoca os benefícios do envolvimento da família da pessoa em situação crítica com *delirium*, nos seus *outcomes*.

Palavras-chave: *delirium*, pessoa em situação crítica, investigação de enfermagem, gestão do *delirium*.

1 INTRODUCTION

Over the past few years, a growing concern about delirium arose in the scientific community, recognising delirium as complex syndrome, not yet completely understood.[1] The aetiology of delirium is considered multifactorial, with multiple and simultaneous disturbances contributing to its development. It also depends on patient resilience and coping abilities in face of acute stress events, that commonly decreases with age.[1-6] Delirium is frequent in older complex critically ill patients, that have at least one or more chronic diseases, comorbidities, frailty, demanding a high level of health resources and with a higher risk of mortality.[3,6–9]

A vast number of tools have been developed for delirium assessment, aiming for early identification of patients with delirium, however it remains a challenge, being under recognized and misdiagnosed by nurses and physicians. This is an ongoing research topic, also because the incidence of delirium in critically ill adults remains frequent and can reach about 80% in patients under mechanical ventilation.[3,10–15]

Delirium is a neurocognitive syndrome caused by a systemic disturbance, which leads to a transient disruption of normal neuronal activity. This causes a brain disfunction leading to an acute disorder of attention and consciousness, associated with a disturbance of cognition, with fluctuations during the day that cannot be explained by another neurocognitive disorder, and it cannot be considered in comatose states.[16] Delirium is classified into three subtypes: hyperactive, hypoactive, or mixed states. Patients with hyperactive delirium have an increased psychomotor activity, which can be associated with agitation, mood swings, and refusal to cooperate with health professionals, with attempts to remove medical devices.[16,17] In contrast, patients with hypoactive subtype have psychomotor slowing, lethargy, and slowness. In mixed states, the patient has a normal level of psychomotor activity despites attention and cognition disturbance or oscillate between the previous two subtypes.[1,16] Hypoactive and mixed delirium occur in about 90% of critically ill patients with delirium, being the hypoactive the predominant, with higher rates of underdiagnosis and mortality.[14,17,18]

The development of delirium is an independent predictor of mortality, morbidity, increased length of stay, increased hospital costs and prolonged mechanical ventilation.[4,15,19,20] The critically ill patient with delirium is at risk of developing long-term cognitive impairment and being discharged to long-term care facilities, which represents a problem that also affects the family.[3,20] Delirium represents a safety risk to the patient, being a predictor of complications, such as accidental extubation, higher rates of reintubation and removal of other medical devices.[4,20,21]

The risk factors for developing delirium are numerous, with more than 100 potential factors described, divided in predisposing or precipitating, which can be modifiable or non-modifiable.[5] Predisposing risk factors include advanced age (over 65 years), hypertension, alcohol, smoking, heart disease, pre-existing dementia, and visual and hearing impairments.[3,4] Precipitating factors include severity of illness, surgical stress, respiratory failure including hypoxaemia, infection/sepsis, metabolic disorders, prolonged mechanical ventilation, pain, immobility/physical restrictions, and severe anaemia.[3,4] Certain drugs, like benzodiazepines and opioids, may also increase the risk of developing delirium as well as environmental exposure, and absence of visitors. [3,4]

The nature of nursing care implies proximity and narrow vigilance.[22] Nurses are in the front line to identify signs and symptoms of delirium in complex chronic critically ill patients. It is crucial to understand which patient-centred care can improve delirium management, to minimize its impact, decreasing incidence, duration, and severity of this condition.[3,4,23–25] This

review integrates the project *id.care_SMdS*, Centred-care for complex patients in critical and long-term settings: safety in self-management and decision support.

The main goal of this integrative review is to provide a comprehensive understanding about delirium management in critically ill patients. A review question was elaborated to guide the literature search, using as strategy the mnemonic PI[C]O: Which nursing interventions are effective (I) on delirium management (O) in critically ill patients (P)? Therefore, with this review we aim to analyse and summarise evidence regarding nursing interventions that are effective on delirium management in critically ill patients.

2 METHODOLOGY

This integrative literature review was conducted following Whittemore and Knafl[26] methodology, using a five-stage approach. Literature research was conducted during September 2021, through the EBSCO platform using electronic databases MEDLINE, CINAHL and Cochrane Database of Systematic Reviews. After a first search and identification of indexed terms, it was defined the following search strategy: [Critical illness OR Critically ill patients OR Emergency patients OR Acute patients OR Critical Patients] AND [Early diagnosis OR Early intervention OR Nursing Interventions OR Intervention OR Delirium Assessment OR Delirium interventions OR Delirium Instruments OR Delirium Scales OR Risk detection] AND [Delirium Management OR Delirium Prevention OR Delirium Control OR Delirium Treatment OR Risk control and safety OR Nursing Outcomes OR Treatment Outcomes OR Patient safety]. Medical Subject Headings (MeSH) and controlled vocabulary terms for each database were used, and in their absence, the terms were used as key words.

The inclusion criteria were established considering the strategy used by PI[C]O mnemonic: population, intervention, and outcome. Documents were included if they met the following criteria: (a) critically ill patients over 18 years old; (b) nursing interventions aiming to assess, prevent and treat delirium; (c) all documents with the outcome of reducing delirium incidence, duration, and severity; (d) documents written after 2013. In 2013 the guidelines Pain, Agitation and Delirium (PAD) emerged, and were developed by the American College of Critical Care Medicine (ACCCM) over more than six years, arising also in Portugal review articles about delirium.[20,27] The language was not a limitation or exclusion criteria. All documents that addressed paediatric or neonatal population were excluded, as well as all documents written before 2013. Background articles or letter to editors were also excluded.

This review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines and database search results were reported following the

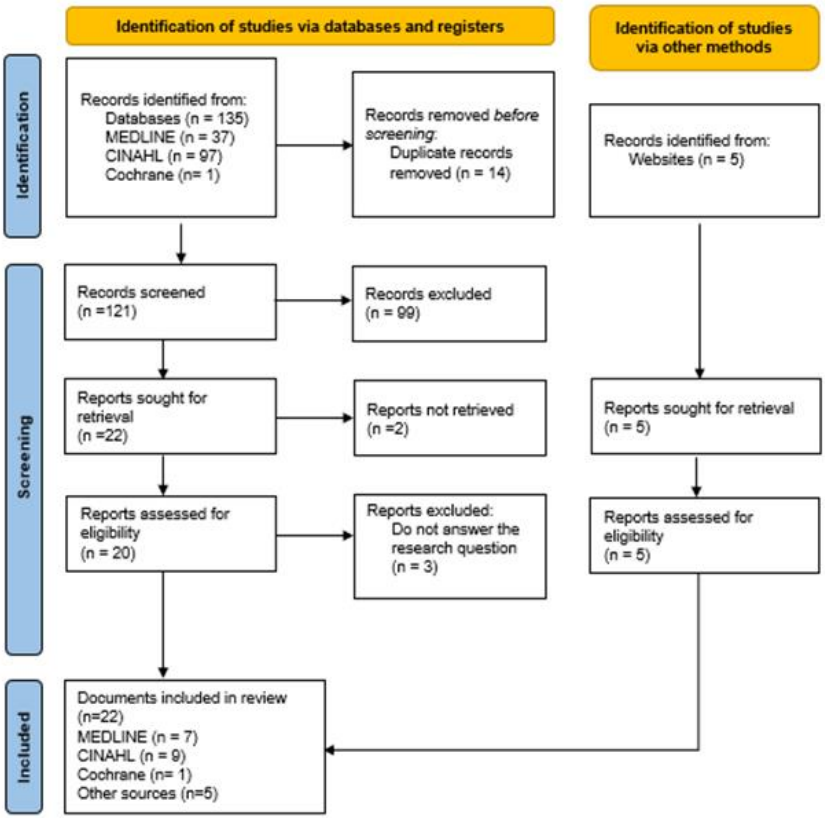
PRISMA flowchart.[28] The complete search was extracted to Rayyan software and duplicates were excluded, with manual confirmation.[29] After that, it was conducted a full review of titles, abstracts, and full text to evaluate their eligibility. The evidence level was evaluated using the Joanna Briggs levels of evidence database guide.[30]

All disagreements that occurred in every stage of this process, have been discussed and agreed by the authors.

3 RESULTS

Electronic databases search collected 135 documents, and other sources search compiled five documents, gathering a total of 140 documents for analysis. Duplicates removal returned 126 documents for screening, that were analysed by title and abstract, excluding 99 documents based on inclusion criteria. At this stage remained 27 documents for full-text review and eligibility assessment, remaining 22 final documents included in this review. This process is outlined in the PRISMA flowchart in figure 1.

Figure 1. PRISMA flowchart



Adapted from: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. BMJ. 2021;372

Among the 22 documents included in this integrative review, the following can be found: one (n=1) guideline, seven (n=7) systematic reviews (five with meta-analysis), four (n=4) randomized controlled trials, one (n=1) cohort study, three (n=3) quasi-experimental trials and six (n=6) narrative reviews. Only three documents (n=3) reviewed exclusively pharmacological interventions, while eight (n=8) assessed non-pharmacological interventions. The remaining eleven documents (n=11) evaluated both pharmacological and non-pharmacological interventions. A multicomponent approach was addressed in fourteen documents (n=14) and five (n=5) focused on delirium monitoring tools. All documents (n=22) were written in English language. A comprehensive characterization of each document is synthetised in table 1.

Table 1. Characterization of included documents

Author / Year	**Document design / Evidence level** (30)	**Purpose**	**Key findings**
Bannon et al., 2019 (31)	Systematic review with meta-analysis / Level 1	Evaluate the effect of non-pharmacological interventions on the incidence and duration of delirium in critically ill patients.	Does not support non-pharmacological interventions to reduce incidence and duration of delirium. Further investigation is advisable.
Burry et al., 2019 (32)	Systematic review with network meta-analysis / Level 1	Determine the effect that pharmacological treatment of delirium has on its duration in critically ill patients.	Only dexmedetomidine reduced delirium duration and mechanic ventilation duration in hyperactive delirium.
Contreras et al., 2021 (33)	Quasi-experimental / Level 2	Determine the efficacy of nursing intervention in delirium prevention in critically ill patients.	Interventions of cognitive stimulation and family participation reduced delirium incidence.
Deemer et al., 2020 (34)	Systematic review / Level 1	Determine the effects of early cognitive interventions on delirium outcomes (incidence, duration, and severity) in critically ill patients.	It was not possible to conclude and support early cognitive intervention by the low quality of the studies. Further investigation of this intervention is needed.
Deng et al., 2020 (35)	Systematic review with network meta-analysis / Level 1	Compare non-pharmacological interventions in their ability to prevent delirium in critically ill patients.	Family participation, early mobilization, and multicomponent interventions are the most effective in reducing the incidence of delirium. Further investigation of family participation is advisable.
Devlin et al., 2018 (36)	Guidelines / Level 1	Update and expand the 2013 recommendations on clinical practice for the management of pain, agitation, and delirium in critically ill patients in intensive care unit (ICU).	Delirium should be assessed with Confusion Assessment Method for Intensive Care Unit (CAM-ICU) and Intensive Care Delirium Screening Checklist (ICDSC). Multicomponent approach, like the ABCDEF bundle was associated with lower rates of delirium. Family engagement (F) was also included. Further investigation of this component is advisable.
Ghaeli et al., 2018 (37)	Narrative review / Level 5	Review effective non-pharmacological interventions that may reduce the incidence or duration of delirium in critically ill patients.	The authors highlight as interventions early mobilization, frequent reorientation, physical and occupational therapy. They also emphasize acting on environmental factors, professional formation, and education about delirium.

Author / Year	Document design / Evidence level (30)	Purpose	Key findings
Herling et al., 2018 (38)	Systematic review with meta-analysis / Level 1	To evaluate the existing evidence on the effect of preventive interventions of delirium in critically ill patients in ICU.	Although the study failed to identify an effect of multicomponent interventions, these may have the potential to prevent delirium in critically ill patients. Future large multicentric studies are necessary.
Hsieh et al., 2013 (39)	Narrative review	Review strategies for early identification, prevention, and reduction of delirium in critically ill patients.	Delirium should be assessed with CAM-ICU and ICDSC. Dexmedetomidine should be considered for sedation in critically ill patients. Early mobilization and occupational/physical therapy demonstrated reduction in delirium incidence and duration. Multicomponent approach, like the ABCDE bundle was associated with lower rates of delirium.
Khan et al., 2020 (40)	Randomized controlled trial / Level 1	Determine the viability and acceptability of personalized music (PM), slow-tempo music (STM) and attention control (CA) in patients under mechanical ventilation in ICU and estimate the effect of music on delirium.	Although STM reveals more delirium-free days and lower severity, statistically there are no significant differences. Further research is needed.
Lavrentieva et al., 2017 (41)	Narrative review / Level 5	To describe recent evidence about pain, delirium and agitation management in ICU and Burn Unit.	Delirium should be assessed with CAM-ICU and ICDSC. Analgaesia and sedation strategies should consider the use of dexmedetomidina, pain assessment and management, using the lowest opioid dose and non-opioid analgesics.
Liang et al., 2021 (42)	Systematic review with meta-analysis / Level 1	Determine the effects of non-pharmacological interventions on delirium prevention and on improving the clinical, psychological, and family outcomes of critically ill patients.	Non-pharmacological multicomponent interventions are more effective than single interventions. Further research is suggested on the impact of family participation on patients' psychological recovery and on families' satisfaction with care.
Malik et al., 2021 (43)	Randomized controlled trial / Level 1	Determine whether the implemented delirium prevention bundle significantly reduces the incidence compared to standard care strategies in patients under mechanical ventilation in ICU.	The interventions focused seven components: sleep quality improvement, analgaesia and sedation strategies, family engagement, early mobilization, ventilatory weaning, early removal of medical devices, no administration of antipsychotics prophylactically, and no administration of benzodiazepines. A 20% decrease in delirium incidence was found in the intervention group, however, they did not achieve the expected results. Future multicentric studies with a larger sample are suggested.
Mart et al., 2021 (3)	Narrative review / Level 5	Review strategies for prevention and treatment of delirium in ICU patients.	Non-pharmacological interventions represent the cornerstone for delirium management in critically ill patients. The ABCDEF bundle reduces delirium risk and mechanical ventilation duration. The relevance of sedation and analgaesia strategies is highlighted, while early mobilization and family engagement are encouraged as strategies for delirium management.
Moon & Lee, 2014 (44)	Randomized controlled trial / Level 1	Examine the effects of implementing a delirium preventive protocol adapted to ICU patients.	The application of a protocol based in multicomponent interventions resulted in a decrease of mortality, readmission, and length of stay in ICU.

Author / Year	Document design / Evidence level (30)	Purpose	Key findings
Munro et al., 2017 (45)	Randomized controlled trial / Level 1	Determine the effect of an automated reorientation intervention on critically ill patients with delirium in ICU.	Reorientation through automated messages in a familiar voice reduced delirium incidence in critically ill patients. Studies with a larger sample are suggested.
Reznik & Slooter, 2019 (46)	Narrative review / Level 5	Highlight recent results on delirium prevention and treatment.	The use of non-pharmacological multicomponent interventions focused on delirium modifiable risk factors is emphasized. The implementation of multicomponent strategies, such as the ABCDEF bundle, demonstrated a potential benefit in patients' outcomes. Future studies of new non-pharmacological interventions and pharmacological agents are suggested.
Schnitker et al., 2013 (47)	Systematic review / Level 1	Identify practices to meet the specific care needs of elderly patients with cognitive impairment in emergency services.	Multicomponent interventions reduced delirium incidence. Early mobilization, environmental and sensory modifications, maintenance of nutritional intake, orientation strategies, and effective communication have shown to enhance the functional capacity of elderly people but had no impact on delirium incidence. Additional research is needed to identify the most appropriate way to care for elderly patients with cognitively impaired in emergency department.
Smith & Grami, 2017 (48)	Cohort Study / Level 3	Evaluate the effectiveness of a delirium prevention bundle in reducing its incidence.	The bundle settled in multicomponent interventions, lead to a significant decrease of delirium incidence in the intervention group (78%). It is suggested future research exploring the contribution of each bundle element separately.
Taburyanskaya & Hassig, 2015 (49)	Narrative review / Level 5	Examine recently published literature evaluating the effect of statins on the prevention of delirium.	The review reveals heterogeneous results, and it is not possible to conclude for or against their use.
van de Pol et al., 2017 (50)	Quasi-experimental / Level 2	Determine the effect of a nocturnal noise reduction protocol on the incidence of delirium and sleep quality in critically ill patients admitted to ICU.	There was a significant decrease in delirium incidence in critically ill patients after implementation of a nocturnal noise reduction protocol, although it did not have an immediate effect. Future research should involve a larger number of participants and a longer follow-up period.
van den Boogaard et al., 2013 (51)	Quasi-experimental / Level 2	Determine the effect of prophylactic administration of haloperidol in patients at risk of delirium.	Prophylactic administration of haloperidol resulted in a lower delirium rate and more days without delirium in the intervention group. It is suggested to conduct a prospective randomized study.

3.1 DELIRIUM ASSESSMENT

Delirium assessment in critically ill patients should use valid and appropriated instruments.[36,39,41,46] The CAM-ICU and the ICDSC are reliable delirium assessment tools, with good psychometric properties and a high degree of sensitivity and specificity, including in adults under mechanic ventilation, therefore systematic delirium monitoring with these tools is

recommended.[3,36,39,41,46] With an early delirium recognition, a prompt correction of precipitating factors can be attempted aiming to decrease delirium duration and severity.[36,46]

To detect patients with higher risk of developing delirium, and act preventively, predictive models were identified.[36,46] PREdiction of DELIRium for Intensive Care (PRE-DELIRIC) and Early (E)-PRE-DELIRIC have similar predictive rates and should be applied at ICU admission or in the first 24 hours.[36,46] These models are recommended in every patient admitted in ICU, and are based in predictors like age, urgent admission, analytic values, and medication use, among others.[36,46]

3.2 PHARMACOLOGICAL INTERVENTIONS

Regarding pharmacological interventions, the routine use of haloperidol, atypical antipsychotics (e.g., quetiapine, ziprasidone, olanzapine), dexmedetomidine, statins, or ketamine to prevent or treat delirium in critically ill patients is not recommended.[3,36,46,47,49] Only one quasi-experimental study by van den Boogaard et al.,[51] confirms a decrease in delirium incidence and duration in the intervention group receiving prophylactic treatment with haloperidol. However, the same author conducted a study in 2018 where the administration of haloperidol, in the same type of population, did not reduce the incidence or duration of delirium.[46] Nevertheless, in situations of agitation, distress, anxiety, fear, hallucinations that represent a safety risk to the person, or others, patients may benefit from the use of typical (e.g., haloperidol) or atypical (e.g., quetiapine, olanzapine) antipsychotics. They must be limited to the time strictly necessary, and evaluated case to case, in a patient-centred perspective.[3,31,36,46] Burry et al.,[32] cites two studies in which the administration of haloperidol and quetiapine resulted in fewer hours with agitation and according to van den Boogaard et al.,[51] also led to a decrease of unplanned removal of medical devices. Cholinesterase inhibitors (rivastigmine) seem to be associated with an increase of delirium duration.[32,39,46]

Sedation with dexmedetomidine (vs. placebo) in ventilated patients with hyperactive delirium appears to result in a reduction of delirium duration and mechanical ventilation.[3,32,36,38,46] Though, Burry et al.,[32] mentions that these results fade away when meta-analysis was applied. As such, the use of dexmedetomidine is suggested in situations where agitation is preventing ventilatory weaning or extubation.[31,36] The need of future studies to corroborate these benefits is highlighted.[3,32,36,38,46]

Dexmedetomidine is indicated as a sedation strategy for critically ill patients under mechanical ventilation, and is recommended as an alternative to benzodiazepines, that have been recognized as a delirium risk factor.[3,36,38,39,41,46]

A light sedation approach is suggested for critically ill adults, either continuously or with daily interruption.[36,46] Deep sedation has negative consequences, increasing mechanical ventilation duration, later extubation, increased mortality, and potential risk of developing delirium.[36,46]

Pain represents a delirium risk factor, but opioids, especially morphine, have also been associated with delirium risk, mainly when combined with sedatives.[3,39,46] Systematic pain assessment with reliable and valid tools, opioids at lowest effective dose, and simultaneous use of non-opioid analgesics is suggested.[3,36,39,46]

3.3 NON-PHARMACOLOGICAL INTERVENTIONS: SINGLE COMPONENT

Among the non-pharmacological single component interventions, early mobilization/rehabilitation and family engagement stand out as the most relevant interventions in critically ill patients with delirium.[33,35,39,42,46]

Early mobilization/rehabilitation emerges as a safe and well tolerated intervention in the critically ill, even those under mechanical ventilation.[3,36,39,46] Physical restraints and medical devices in these patients are factors that potentiate delirium development, contributing to immobility, and should be removed as soon as possible.[3,36,46,48] The risk of developing delirium increases up to 2.82 times due to physical restraints.[48] Early mobilization has demonstrated to be effective in reducing delirium incidence and duration, and also ICU length of stay.[35,39,42,46]

Family engagement is a promising intervention to reduce delirium incidence and duration in critically ill patients, but further research is needed.[33,35,36,42,45,46] This also represents benefits regarding psychological recovery of patients and their families, stress reduction, as well as satisfaction with care.[36,42] Family presence also facilitates interventions, such as cognitive reorientation, which is more efficient when carried out in a familiar voice, leading to less days with delirium, disclosing the importance of person-centred care.[34,45]

Single component intervention focused on reorientation (e.g., visible clocks and calendars) and cognitive stimulation, including vision and hearing, show effectiveness in reducing confusion[42] and decreasing delirium incidence.[33,36,39,46] The importance of correcting existing visual and hearing impairments, by providing glasses and hearing aids, is emphasized.[36–38,42,48] A systematic review on cognitive interventions reported that it was not possible to conclude and support clearly the use of cognitive interventions in delirium outcomes.[34]

Management of environmental factors emerges as an intervention to be integrated, particularly the reduction of noise and light, to promote sleep and circadian cycle.[36,37,46] It is

important to maximize natural light during the day, minimize light and noise during night-time, and cluster interventions at a single moment, in order to minimize nocturnal stimuli.[36,37,46] The use of earplugs during the night demonstrated improvement in sleep quality,[31,36] later development of delirium[38] and may also result in a lower incidence.[36,46] The implementation of a night-time noise reduction protocol seems to lead to a significant decrease in delirium incidence, but its benefit is only verified after the third day.[50] Finally, one study also identified that slow-tempo music resulted in more days without delirium, though, this study did not show statistical significance.[40]

3.4 MULTICOMPONENT INTERVENTIONS

The mechanism that leads to delirium is not yet fully understood, but since its cause is multifactorial, the approach should target the precipitating cause(s) and modifiable risk factors, and as so should be person-centred.[36,37,39,46] A multi-layered strategy with multicomponent interventions that target different components will lead to better outcomes in delirium incidence and duration.[3,35–37,39,42,46–48]

Multicomponent interventions focus on several dimensions, such as: reorientation and cognitive stimulation, sleep promotion, pain control, sedation strategy, early mobilization/rehabilitation and family participation.[3,36–38,43,44,46]

Assuming the importance of a multicomponent approach in critically ill patients with delirium, bundles aiming to incorporate this strategy have emerged, such as the bundle ABCDEF (Assess, prevent, and manage pain; Both SAT and SBT; Choice of analgaesia and sedation; Delirium: assess, prevent, and manage; Early mobility and exercise; Family engagement and empowerment).[3,36,39,46] A multicentric cohort study with 15,000 adults, conducted by the ICU Liberation Collaborative, proved that the ABCDEF bundle resulted in a reduction in delirium incidence along with improvements in other person-centred outcomes.[3,36,46] Similarly, a cohort study that established a bundle strategy focused on sedation, pain control, sensory stimulation, early mobilization and sleep promotion, produced promising results, decreasing delirium incidence by 78%.[48] Despite recognizing the benefits of a multicomponent approach, some authors point out that significant results in reducing delirium incidence have not been stablished, and therefore suggest future multicentric trials.[31,38,41,43,44]

4 DISCUSSION

This integrative review allowed to acknowledge and analyse nursing interventions regarding delirium management in critically ill patients. Delirium monitoring should be

regularly assessed with valid tools, to detect and assess delirium, being CAM-ICU and ICDSC established as reliable and recommended instruments.[3,36,39,41,46] Aiming to detect patients with higher risk of developing delirium in ICU settings, it was identified the PRE-DELIRIC and E-PRE-DELIRIC as predictive models with similar psychometric properties.[36,46]

Currently there is no recommendation for routine pharmacological interventions in delirium prevention and treatment of critically ill patients.[3,36,46,47,49] Dexmedetomidine seems to be the preferred choice when sedation is required in patients under mechanical ventilation, nevertheless, further research in this area is recommended.[3,32,36,38,46]

Within the scope of non-pharmacological interventions, early mobilization/rehabilitation, family engagement, management of environmental factors aiming to promote sleep, frequent reorientation and cognitive stimulation were identified.[3,33,35–37,39,46,47,50] Age is the most important predisposing risk factor for delirium, that leads to age-related changes in cerebral blood flow, metabolic rate, neurochemical activity, conducting to brain vulnerability with less ability to handle stress factors, and with a high incidence of multimorbidity.[1,3,5,46] As such, interventions that target cognitive stimulation, adapted to person's preferences in older complex patients are crucial.[33,47]

Single component interventions related with early mobility/rehabilitation and family engagement, stand out with better outcomes in caring for the critically ill patient with delirium.[34,36,40,43,47] Family engagement emerges like a promising intervention, with positive results in delirium incidence and duration, but also at psychological recovery and satisfaction of the person and family with the care provided.[3,33,35,36,42,46] The family's deep knowledge of the patient, also facilitates reorientation and cognitive stimulation, adjusted to patient needs and preferences, enhancing person-centred care.[3,45,46]

Multicomponent interventions, addressing modifiable risk factors, show greater benefit when compared to single component interventions and should be adapted to each person needs.[3,35–37,39,42,46–48] The ABCDEF bundle demonstrates benefits not only in decreasing the incidence and duration of delirium, but also in other patients' outcomes, such as decreasing the number of days of mechanical ventilation.[3,36,46] It is imperative to simultaneously adopt analgaesia and sedation strategies to minimize delirium risk, targeting light sedation, pain assessment and management by using the lowest effective opioid dose, and considering the use of non-opioids analgesics.[3,36,38,39,41,46] At the same time early mobilization/rehabilitation, sleep promotion by managing environment factors, frequent reorientation and cognitive stimulation should be integrated, especially in older complex patients, involving the family in such

interventions, thus enhancing patient-centred care and the outcomes of critically ill patients.[3,36,37,45,46]

Nurses are at the best position to identify mental status changes, and using valid tools, like CAM-ICU or ICDSC, can promptly identify delirium in critical patients.[36,46] An early delirium identification can improve patients' outcomes, by correcting the causes and implementing guided interventions. This way, nurses should have interventions that are effective, based on evidence, and adapted to their patients. Protocols with multicomponent interventions, that include family participation and early mobilization, should be designed and integrated into the care routine of each critical care setting.[3,33,35,36,39,42,44,46,48] Family participation, where the family can choose the visiting hours, or can participate into care of their loved ones can bring better results not only to patients, but also to families.[3,33,35,42]

Nurses' education about aetiology of delirium and interventions on delirium management is also crucial for better outcomes.[37] As such, programs that provide nurses with knowledge and tools for understanding the impact of delirium, enhance these interventions to be used more effective and sustainably.[37]

Despite the results of some studies that consider multicomponent interventions efficient in delirium management of critically ill patients, there is also the need to enhance the importance of each bundle component isolated.[31,38,41,43,44,48] Therefore, studies that include family engagement,[35,36,42,45,46] cognitive interventions,[34,47] and research regarding dexmedetomidine effect, or new pharmacological agents that can act in delirium pathways, are encouraged.[3,32,36,38,46] We also suggest future research that addresses delirium management specific in complex patients in critical settings, improving person-centred care**.**

5 CONCLUSION

Delirium has a major impact in critically ill patients, and a high economic burden in health institutions.[4,15,19,20] This leads to an urgent need of implementing efficient interventions in critical settings which allow to reduce delirium incidence and duration. Multicomponent interventions, due to the multifactorial cause of delirium, seem to be the most effective, integrating different components.[3,33,35,36,39,42,44,46,48] This approach should be incorporated in critical settings, adapting the multiple interventions to each patient and family in order to achieve better outcomes. Early mobilization and family participation stand out in single component interventions with better outcomes to decrease ICU length of stay and improve psychological recovery of patients and their families, improving satisfaction with care.[36,42]

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