SYSTEMATIC REVIEW/META-ANALYSIS

Prevention of Delirium in the Intensive Care Unit through Nonpharmacological Interventions: An Umbrella Review

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Abstract

Introduction: Delirium is a syndrome commonly seen in intensive care unit (ICU) patients. It is characterized by acute changes in mental status, inattention, disorganized thinking, and altered level of consciousness. Due to its higher prevalence in mechanically ventilated ICU patients, it is crucial to recognize it early and implement standardized evidence-based protocols for preventing it in regular practice.

Objectives: To identify the benefits and effectiveness of nonpharmacological interventions for preventing delirium among critically ill patients admitted to the ICU.

Methods: The preferred reporting items for systematic reviews and meta-analyses statement guidelines were followed. Two independent authors searched electronic and grey literature for systematic review and meta-analysis in the following databases: PubMed, Scopus, Web of Science, Cochrane Database of Systematic Reviews, and Google Scholar.

Results: This umbrella review included 12 studies on delirium prevention interventions, excluding reviews, abstracts, case studies, and pharmacological interventions. Our finding shows that multicomponent strategies are the most promising intervention for preventing delirium. Inclusion of family participation is the most vital part, with flexible visitation to be included in delirium care protocols. Multidisciplinary approaches raise workloads among healthcare professionals through increased coordination, assessments, and documentation.

Conclusions: Multicomponent interventions are regarded as the most effective among all nonpharmacological interventions for reducing and preventing delirium.

Highlights: Delirium syndrome is preventable among mechanically ventilated patients. The study aims to identify the benefits and effectiveness of nonpharmacological interventions for preventing delirium among critically ill patients admitted to the ICU.

Keywords: Critical care, Delirium, Meta-analysis, Nonpharmacological interventions, Systematic review.

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Highlights

Delirium is most common in mechanically ventilated ICU patients and can cause longer-term complications. Among nonpharmacological strategies, multicomponent interventions are the most promising to reduce and prevent delirium in ICU-ventilated patients.

Introduction

Delirium is a serious neuropsychiatric complication observed in patients admitted to the intensive care unit (ICU).[1] Its management is critical, especially in ventilated patients is associated with increased mortality and morbidity, and has significant implications for caregivers and healthcare services as well.[2] The risk of delirium increases with age, particularly in individuals aged ≥65 years and older.[3] The incidence of delirium is higher in trauma patients than in surgical patients.[4] The incidence of delirium in the ICU is high, ranging from 45 to 87%.[5] In cardiology and cardiosurgical patients, the prevalence is 26%, with the majority (92%) presenting with a hypoactive subtype.[6]

In India, delirium occurs in 20–79% of hospitalized elderly inpatients, with a higher incidence of 60–80% in mechanically ventilated ICU patients and 20–50% in nonmechanically ventilated patients. Although delirium is an acute disorder, 30–40% of cases are preventable.[7] Medical professional commonly fails to recognize delirium, missing 83–87% of cases in emergency settings and 14–24% during hospital admission.[8,9] Emergency healthcare professionals miss delirium cases due to challenges in its early recognition, leading to negative consequences.[10] This happens despite the availability of standard scales to assist in its recognition.[11]

Delirium can be prevented using both pharmacological and nonpharmacological interventions. Although antipsychotic drugs are frequently used for pharmacological management, there is

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limited information on the selection, effects, and outcomes in patients with delirium.[12] Evidence indicates that pharmacological interventions are often less effective in preventing delirium.[13] Nonpharmacological approaches include healthcare professionals' education, multicomponent strategies, early mobility, environmental management (such as noise reduction and enhanced bright light), sleep promotion, music therapy, orientation, and family support. Multicomponent interventions that involve combinations of strategies are recommended by guidelines and have been shown to produce positive outcomes in preventing delirium. Previous research indicates that these combined approaches effectively lower the incidence of delirium in the ICU. This review evaluates the effectiveness of nonpharmacological approaches to prevent delirium in ICU patients. An umbrella review is one of the highest bodies for evidence-based research, as it synthesizes findings from systematic reviews and meta-analyses.

Objectives

To identify the benefits and effectiveness of nonpharmacological interventions for preventing delirium among critically ill patients admitted to the ICU.

Methods

Review Questions

What are the various nonpharmacological interventions that can prevent delirium in ICU patients?

Review Search Strategy

A comprehensive data was systematically searched by two independent reviewers from the following databases: PubMed, Scopus, Web of Science, Cochrane Database of Systematic Reviews, and Google Scholar. The keywords were "non-pharmacological interventions," "light therapy," "noise reduction therapy," "music therapy," "eye masks," "cognitive therapy," "education," "early mobilization," "delirium prevention," "sleep promotion," and "intensive care unit delirium." Keywords with AND and OR were entered. The data was extracted from May 2014 to May 2024.

Study Selection

Predefined reviewed studies:

- Studies involved systematic reviews and meta-analyses.
- Studies published in the English language.

Participants: Patients aged >18 years admitted to the ICU.

Intervention: Studies on nonpharmacological interventions.

Comparison: Comparison with the usual care.

Outcome: Incidence of delirium.

Exclusion Criteria

- Reviews, abstracts, and case studies.
- Studies involved in pharmacological interventions.

Inclusion Criteria

We reviewed all the systematic reviews and meta-analysis studies related to interventions for delirium prevention. Studies that assessed the benefits and effectiveness of nonpharmacological interventions for preventing delirium in the ICU were included. The primary outcome evaluated was the incidence of delirium. Studies on pharmacological interventions were excluded.

Data Extraction

Two independent reviewers extracted data using a form based on The Joanna Briggs Institute (JBI) umbrella review guidelines.[14] The information gathered from the studies included author names, publication year, sample size, settings, study design, study objectives, description of the interventions, delirium incidence, results, and findings from the last 10 years, May 2014 to May 2024. Any discrepancies were resolved through discussion to reach a consensus. The results are summarized in Table 1.

Quality Assessment

Methodological quality or risk-of-bias was assessed using the JBI umbrella review guidelines.[14] A checklist based on the JBI critical appraisal checklist for systematic reviews and research syntheses, consisting of 11 criteria was followed. Each item was answered as yes, no, uncertain, or not applicable, as given in Table 2.[15]

Results

We identified 450 records in the initial database search. After a preliminary review of titles and abstracts, 310 duplicates were excluded and we had 140 articles. Of these, only 20 articles in full text were available. So, ultimately, 12 articles met the inclusion criteria and were included in the umbrella review (Fig. 1). A year-wise distribution of studies is presented in the form of a bar diagram (Fig. 2).

The present umbrella review focused on nonpharmacological interventions for preventing delirium in the ICU. We excluded the studies on pharmacological interventions but have included a review by Burry et al. on the comparison of effects of prevention on delirium occurrence in critically ill patients by using pharmacological and nonpharmacological interventions.[16] This review was included due to its clear classification and comparison, as it provided a planned pairwise comparison. We have also excluded studies on nonpharmacological interventions in general wards; a review by Kim et al. identifies the types and content of nonpharmacological interventions for the prevention of delirium in general wards.[17]

Findings of the Review

Effect of Preventive Interventions on Delirium in ICU

Various interventions have been implemented for the prevention of delirium, leading to heterogeneity of approaches. Therefore, the interventions are classified into five categories: multicomponent nonpharmacological interventions (MLT), early mobilization (EM), sleep promotion (SP), family intervention (FI), and environmental intervention (EI).

Descriptions of Interventions

Multicomponent Nonpharmacological Interventions

Kang et al. included 35 studies and found that nine nonpharmacological interventions were the most effective in reducing the duration and occurrence of delirium. Among all interventions, the MLT interventions were the most effective in reducing the occurrence of delirium but had minimal impact on its duration of delirium.[18] A review by Teng et al. found that combining sleep interventions with MLT interventions had no significant effect on reducing the incidence and duration of ICU delirium.[19] There is still uncertainty about the effectiveness of nonpharmacological interventions alone, without pharmacological

Table 1: Summary of studies included in umbrella review

Author	*Aim*	*Type of review*	*Number of studies*	*Subjects*	*Interventions*	*Results*	*Key findings*
Kang et al. (2018)[18]	To classify nonpharmacological interventions used for preventing delirium in the intensive care unit (ICU), and estimate their effect size	A systematic review and meta-analysis	Systematic review, 35 studies; Meta-analysis, 15 studies	Adult patients with >18 years admitted to the ICU	Nine interventions: Multicomponent (16), physical environment (9), daily interruptions of sedations (2), exercise (2), patient education (2), automatic warning system (1), cerebral hemodynamic monitoring (1), family participation (1), and sedation reducing protocols (1)	The effect size of preventive nonpharmacological interventions had an odds ratio (OR) of 0.66 (95% CI: 0.50–0.86) for delirium occurrence, and an OR of 0.31 (95% CI: 0.10–0.94) for delirium duration	Multicomponent (45.7%) and physical environment (25.7%) were most widely used method and MLT is the most effective intervention among all
Nassar et al. (2018)[20]	Comparing flexible vs restrictive visiting policies in ICU among patients, family members, and professionals	A systematic review and meta-analysis	16 studies	Patient admitted to the ICU	Flexible vs restrictive visiting policies	Flexible visiting policies were associated with reduced frequency of delirium (OR, 0.39; 95% CI: 0.22–0.69; $I^2 = 0\%$), lower severity of anxiety symptoms (mean difference, −2.20; 95% CI: −3.80 to −0.61; $I^2 = 71\%$)	Flexible visiting policy reduces delirium and anxiety symptoms and also improves the family satisfaction
Bannon et al. (2019)[21]	Effectiveness of nonpharmacological interventions to reduce the delirium incidence and duration	A systematic review and meta-analysis	15 studies	Critically ill patients	Physical, physical with occupational therapy, bright light, range of motion exercises, earplugs, multicomponent occupational therapy, and cognitive stimulation therapy	Seven trails of earplugs, occupational therapy, multicomponent orientation, and cognitive stimulation, protocolized sedation with daily sedation interruptions, multicomponent targeting risk factors, structured mirrors, and range of motion exercises have no significant effects	Family voice orientation show benefit ($n = 30$, MD (days) −1.30, 99% CI: −2.41 to −0.19, $p = 0.003$)
Deemer et al. (2020)[22]	To determine the effects of early cognitive interventions on delirium outcomes in critically ill patients	A systematic review	Review 7 studies	ICU patients >16 years of age	Cognitive interventions: Cognitive training, cognitive stimulation, and cognitive rehabilitation	High risk of bias and variability within the protocols limit the utility of the findings for widespread practice implication	Cognitive interventions to current delirium practices need further research to find its effectiveness
Deng et al. (2020)[23]	To compare the nonpharmacological intervention to prevent delirium and find the optimal regimen for treatment	A systematic review and network meta-analysis	26 studies	Intensive care unit patients	Physical environmental interventions (PEI), sedation reducing (SR), family participation (FP), exercise program (EP), cerebral hemodynamic improving (CHI), multicomponent studies (MLT), and usual care (UC)	Family participation (risk ratio (RR) 0.19, 95% CI: 0.08–0.44, surface under cumulative frequency curve (SUCRA) = 94% and MLT (RR 0.43, 95% CI: 0.30–0.57, surface under cumulative frequency curve (SUCRA) = 73.2%))	Multicomponent is considered most optimal effective intervention to prevent and reduce ICU length of stay

(Contd...)

Table 1: *(Contd...)*

Author	*Aim*	*Type of review*	*Number of studies*	*Subjects*	*Interventions*	*Results*	*Key findings*
Saritas and Tarlaci (2021)[24]	Systematically review nonpharmacological interventions used to prevent delirium at intensive care units	Systematic review	13 studies	Patients admitted in tertiary care ICU	Multicomponent, patient education, hormone intervention, physical environment, therapeutic intervention, automated preventive system, quitting daily sedation, and exercise	The intervention was effective in reducing the duration and occurrence of delirium in ICU	The study also concludes that performing multicomponent interventions supports more control over the delirium sources of patients
Qin et al. (2020)[25]	Evaluate the effect of family intervention on reducing the delirium incidence in ICU patients	A systematic review and meta-analysis	6 studies	ICU admitted patients	Family intervention	Risk of delirium was 24% lower in the family intervention group (OR 0.76 (0.67–0.86), p= 0.20, I^2 = 3%). Family intervention was associated with fewer delirium days (SMD: −1.13, 95% CI: −1.91 to −0.34; p = 0.08; I^2 = 67%)	Family interventions reduced the risk and delirium days in ICU patients.
Burry et al. (2021)[16]	Compare the effects of prevention interventions on delirium occurrence in critically ill adults	A systematic review and network meta-analysis	80 studies	Critically ill patients	Multicomponent component	Multicomponent did not connect to any evidence which allows for ranking and comparison	Nonpharmacological interventions do not influence the delirium occurrence
Xu et al. (2022)[26]	Impact of cognitive exercise on the incidence of delirium in ICU patients	A systematic review and meta-analysis	Systematic review 7 studies and meta-analysis 3 studies	Adult patients admitted to the ICU	Cognitive exercise interventions	The duration of delirium in treatment group and routine group was significantly different (Z = 10.84, mean difference (MD) = 2.10, 95% CI: −2.48 to −1.72, p < 0.00001)	Cognitive exercises reduce the incidence and duration of delirium in ICU patients
Lange et al. (2022)[27]	Family experiences and attitudes toward care of ICU patients with delirium	A scoping review	13 studies, systematic review	Family members of patient admitted to the ICU patients	Interventions with the family	Family experiences negative emotions related to the occurrence of delirium, such as stress, anxiety, embarrassment, uncertainty, anger, and shock	Family assistance and involvement in ICU care tasks can give family members a sense of purpose, be supportive, and serve as a protective mechanism to reduce stress
Teng et al. (2023)[19]	Effectiveness of sleep intervention to reduce delirium in critically ill patient	A systematic review and meta-analysis	15 randomized controlled trial studies	Adult patients with >18 years admitted to the ICU	Sleep interventions (e.g., light therapy, earplugs, melatonin, and multicomponent treatment)	Sleep intervention was associated with reduced incidence of delirium in the ICU (RR = 0.73, 95% CI: 0.58–0.93, p < 0.001) compared with control group	Sleep interventions help to reduce the occurrences of delirium but are not effective to prevent delirium

(Contd...)

Table 1: *(Contd...)*

Author	*Aim*	*Type of review*	*Number of studies*	*Subjects*	*Interventions*	*Results*	*Key findings*
Matsuura et al. (2023)[28]	Evaluate the efficacy of nonpharmacological interventions and determine what combination of these is effective in preventing delirium among ICU patients	A network meta-analysis	11 studies	Intensive care unit patients	Multicomponent: sleep promotion (SP), cognitive stimulation (CS), early mobilization (EM), pain control (PC), and assessment (AS)	Multicomponent had significant effect on delirium prevention (OR 0.58, 95% CI: 0.44–0.76, $p < 0.001$). Combination of sleep promotion (SP), two bundles are most effective, i.e., cognitive stimulation (CS), early mobilization (EM), pain control, and AS (OR 0.47, 95% CI: 0.35–0.64, $p < 0.002$) and combination of SP and CS (OR 0.46, 95% CI: 0.28–0.75, $p < 0.001$)	Multicomponent are effective to prevent delirium in ICU patients

Table 2: Critical appraisal of studies included in umbrella review using umbrella review assessment and review of information

Study	*Q1*	*Q2*	*Q3*	*Q4*	*Q5*	*Q6*	*Q7*	*Q8*	*Q9*	*Q10*	*Q11*
Kang et al. (2018)[18]	Y	Y	Y	Y	Y	Y	Y	Y	Y	n/a	n/a
Nassar et al. (2018)[20]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	n/a
Bannon et al. (2019)[21]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Deemer et al. (2020)[22]	Y	Y	Y	Y	Y	Y	Y	Y	U	n/a	n/a
Deng et al. (2020)[23]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Saritas and Tarlaci (2021)[24]	Y	Y	Y	Y	Y	U	Y	n/a	N	n/a	n/a
Qin et al. (2022)[25]	Y	Y	Y	Y	Y	Y	Y	Y	Y	n/a	n/a
Burry et al. (2021)[16]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	n/a
Xu et al. (2022)[26]	U	Y	Y	Y	Y	Y	Y	Y	Y	n/a	Y
Lange et al. (2022)[27]	Y	Y	Y	Y	U	Y	Y	Y	N	Y	Y
Teng et al. (2023)[19]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	n/a
Matsuura et al. (2023)[28]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Y, yes; N, no; U, unclear; n/a, not applicable; Q1: Was the question explicitly stated?; Q2: Were the inclusion criteria appropriate for the new review?; Q3: Was the search strategy appropriate?; Q4: Were the resources and sources used to search for studies adequate?; Q5: Were the criteria for appraisal for studies appropriate?; Q6: Was the critical appraisal independently conducted by two or more reviewers?; Q7: Were there methods to minimize errors in data extractions?; Q8: Were there methods to combine studies appropriate?; Q9: Was the likelihood of publication bias assessed?; Q10: Were recommendations for policy and /or practice supported by the reported data?; Q11: Were the specific directives for the new research appropriate?

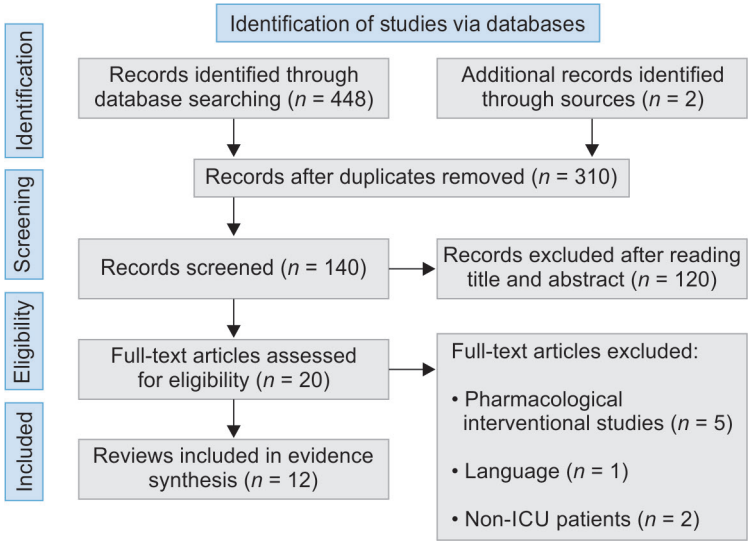

Fig. 1: Preferred reporting items for systematic reviews and meta-analyses (PRISMA) flow diagram

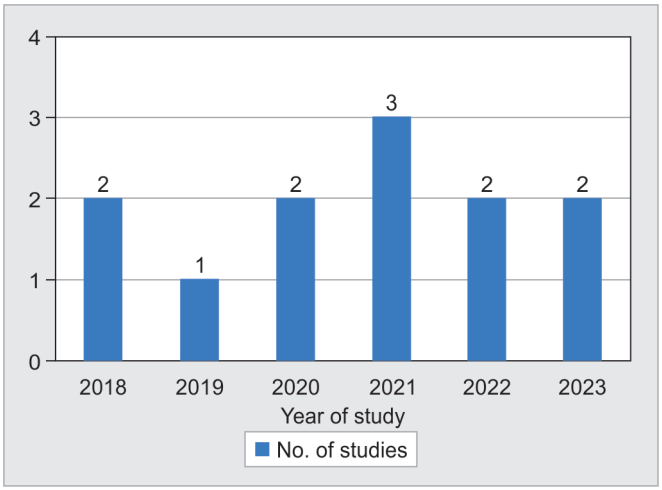

Fig. 2: Year-wise distribution of studies

intervention support. Additionally, evidence from three studies involving dexmedetomidine trials showed no significant difference between the groups ($p > 0.05$).

A systemic review by Saritas and Tarlaci found that all interventions were effective, with multicomponent interventions being the most significant, particularly when combined with a delirium care package.[24] Furthermore, Matsuura et al. found that combining certain bundles significantly reduced the likelihood of delirium.[28] Specifically, combinations of (a) SP, CS, EM, PC, and assessment (AS), and (b) combination of SP and CS were lost effectively. Other bundle combinations, such as SP-CS-EM-PC-AS, were also considered. According to the pain, agitation, delirium, immobility and sleep disturbances (PADIS) guidelines, a combination of interventions is suggestive to be more effective than single interventions in improving cognition, sleep, mobility, hearing, and vision in critically ill patients.

Early Mobilization

A study by Matsuura et al. highlighted early mobilization as a crucial component of care bundles and found that it reduced the incidence of delirium. However, the study also concluded that further research is needed to understand the effectiveness of each intervention in preventing delirium.[28]

Cognitive Interventions

Deemer et al. found that out of seven studies only four studies identified that early cognitive interventions were effective in reducing the incidence, duration, occurrence, and severity of delirium.[22] There are scarce studies available on cognitive interventions in critically ill patients. However, implementing and ensuring compliance with multimodal ABCDEF bundles, which include assessment, prevention, and management of pain; sedation and awakening trails; choice of sedation; delirium monitoring and management; early mobility; and family engagement and empowerment are urgently needed.

A study by Xu et al. found a statistically significant difference between the groups. Seven studies were included, and the result shows that cognitive exercise can reduce the incidence and shorten the duration of delirium in ICU patients.[26] However, cognitive exercise is primarily affected by sedation drugs; so it is suggested to manage the patient's sedation levels to allow them to perform cognitive exercises without interference.

Family Intervention

A scoping review by Lange et al. emphasized the importance of family involvement in the care of delirium patients, which is why it is included as a component of ABCDEF bundles.[27] Most of the family members require additional emotional support, as they experience anxiety, stress, shock, and emotional trauma. Enhancing family participation in the care of delirium patients necessitates addressing barriers such as lack of knowledge, and awareness, and improving education and communication with healthcare professionals.

Family caregivers provide close monitoring and can readily identify changes in a patient's behavior, making their input important in decision making. A study by Jabre et al. found that the presence of family members during cardiopulmonary resuscitation positively affects psychological outcomes without significantly increasing stress for the medical team or medicolegal conflicts.[29]

Qin et al. conducted a meta-analysis to examine the effect of family participation on the incidence of delirium and also identified an association with a 24% lower risk of delirium and an increase in delirium-free days.[25] The study, which included 4,199 participants, highlighted that nonpharmacological interventions, such as light therapy, earplugs, and family participation, were considered the most important interventions. The Gordan and Betty Moore Foundations proposed that family engagement and empowerment are crucial, supported by evidence indicating that family members should be involved in care to the extent they are comfortable, according to the 2007 clinical practice guidelines. Studies by Nassar et al. on flexible vs restrictive visiting policies highlighted an association with reduced delirium, decreased anxiety symptoms, and increased family satisfaction. Visiting policies vary by country: some allow for 4-hour visits in France, the United Kingdom, and Switzerland; 1–2 hours per day in Brazil; and 40% of visitors are permitted in Iran, with variation in some countries.[20]

A systematic review and network meta-analysis by Deng et al. surface under cumulative frequency curve analysis identified that among all nonpharmacological interventions, family participation was the most effective (94%), followed by an exercise program (74%).[23] In contrast, a study by Bannon et al. found a negative effect with less evidence for multicomponent interventions, except for a small trial showing a favorable effect with family member's voice orientation.[30] Other interventions, such as earplugs, multicomponent orientations, cognitive stimulation, protocolized sedation with daily interruptions, multicomponent targeting risk factors, structured mirrors, and range of motion exercises, were considered nonsignificant.[21]

Environmental Interventions

Kang et al. reviewed physical environment interventions and found less significant effects on the occurrence or duration of delirium.[18] However, a review done by Saritas and Tarlaci emphasized that organizing the physical environment is a crucial intervention for reducing delirium.[24] According to Deng et al., physical environment interventions are ranked fifth position, following family programs, exercise programs, multicomponent interventions, and cerebral hemodynamic programs.[23] Bannon et al. evaluated bright light therapy and found it to have no significant effect.[21] In contrast, a review study by Locivova et al. concluded that using earplugs, eye masks, and relaxing music significantly reduced delirium.[31]

Discussion

In this umbrella review, we included 12 studies that evaluated the benefits and effectiveness of nonpharmacological interventions in preventing and reducing the incidence of delirium among ICU patients. Delirium not only affects cognition but also leads to long-term consequences during recovery and imposes a financial burden on family members. The findings indicate that delirium, a common neuropsychiatric condition in critically ill patients, can be mitigated through a range of nonpharmacological strategies, with multicomponent interventions emerging as the most effective. The multifactorial nature of delirium demands a holistic approach to prevention, and combining several interventions proves to be more beneficial than relying on single strategies.

This review identifies multicomponent interventions as the cornerstone of delirium prevention in the ICU. Studies like Kang et al. and Deng et al. show that combining interventions such as sleep promotion, early mobilization, and cognitive stimulation can significantly reduce the incidence of delirium and shorten ICU stays.[18,23] This multipronged approach addresses multiple risk factors simultaneously, making it a powerful tool in the ICU setting. While the individual components of these interventions may have varying degrees of impact, their combined use appears to create a synergistic effect. Despite this, more research is needed to identify the most effective combinations and refine their application in clinical practice, as Matsuura et al. noted the heterogeneity in these intervention bundles.[28] Therefore, evidence suggests that instead of implementing a single intervention, incorporating more interventions helps to reduce the incidence of delirium in the ICU. Qin et.al. in a study that included 4,199 patients, reported a 24% reduction in delirium in the intervention group, demonstrating its effectiveness in reducing the risk of delirium.[25]

Saritas and Tarlaci recommended the use of multicomponent interventions and found them to be more significant in comparison with other interventions, which were important but not as adequate.[24] Similarly, a study by Matsuura et al. revealed that multicomponent interventions are the most promising approach for preventing delirium in ICU patients.[28] We found that there was high heterogeneity of interventions in studies and the involvement of eight studies out of 11 was of low quality. Among multicomponent interventions, sleep promotion and cognitive stimulation were considered most effective in ranking probability; however, it needed specialized skills.

Cognitive interventions, such as cognitive exercises and orientation, were identified as a promising but under-explored area. We found two articles which variably reported on cognitive interventions. Xu et al. concluded that cognitive exercise significantly reduced the incidence and duration of delirium, suggesting that stimulating the brain could counteract the cognitive decline associated with delirium.[26] However, Deemer et al. emphasized that the effectiveness of these cognitive interventions is often compromised by patient sedation level in the ICU.[22] Sedation interferes with a patient's ability to participate in cognitive exercises, making it difficult to assess the true impact of these interventions in critically ill patients. The variability in sedation practices across ICUs also adds complexity to implementing cognitive interventions and makes it difficult to conclude their effectiveness. Therefore, future research should focus on creating standardized cognitive protocols that take into account sedation levels and how to best implement cognitive exercises without compromising patient safety. It is suggested that a standard protocolized cognitive intervention which consists of cognitive stimulation, training, and rehabilitation exercises needs to be investigated.

Environmental interventions, such as noise reduction, dim lighting, and the use of earplugs or eye masks, are commonly used in ICU settings but show inconsistent results in this review. Kang et al. found a minimal impact of these interventions on delirium incidence or duration, while other studies, like that of Locivova et al., suggest that relaxing music and environmental modifications can have a calming effect on patients, thereby reducing delirium risk.[18,31] The mixed findings suggest that environmental interventions alone may not be sufficient. However, when combined with other strategies, such as cognitive stimulation and early mobilization, they can contribute to an overall therapeutic environment conducive to recovery.

Family involvement in patient care is highlighted as another crucial intervention in delirium prevention. The studies reviewed, particularly by Qin et al., reveal a strong association between family engagement and reduced delirium incidence, with a 24%

lower risk reported.[26] Our umbrella review also suggested that family members, who are often engaged for a longer time, provide emotional support and familiar orientation cues and play a vital role in preventing the cognitive disorientation characteristic of delirium. The benefits of family participation are further supported by evidence from Nassar et al., who found that flexible family visitation policies not only reduced delirium but also improved the psychological well-being of family members and increased their satisfaction.[20] This underscores the need for hospitals to adopt family-friendly policies, with flexible visitation hours and better communication between healthcare staff and families, as also emphasized by Lange et al.[27] However, the review identifies that a lack of clear communication is a significant barrier that can interfere with the confidence of family members in providing care. Providing more opportunities for flexible interaction with bedside nurses can improve communication and support family involvement. Education, training, and clear communication of medical information are essential for effective communication and decision making. Family empowerment provides psychological support and increases comfort levels.[32] Many challenges associated with family involvement experience negative consequences, such as anxiety, stress, shock, and emotional trauma when caring for delirious patients, which can hinder their participation.

Our umbrella review also demonstrated high variability in visitation policies; only a few studies have shown patient-related outcomes. Adopting visitation policy strategies can prevent burnout syndromes among healthcare professionals and indirectly increase patient safety. Providing structured communication and emotional support to family members could mitigate these challenges and optimize their role in delirium prevention.

Three studies focus on sleep promotion intervention, but none of the studies have mentioned the measurement of sleep improvement. A contrast study by Teng et al. analyzed sleep interventions and found them ineffective in preventing delirium in ICU patients.[19] Burry et al. concluded that a single nonpharmacological intervention did not show a significant connection with evidence, and suggested that multicomponent interventions with pairwise comparison are needed for effectiveness.[16] We would agree with the study done by Bannon et al. that there is a lack of evidence supporting nonpharmacological interventions in reducing the incidence and duration of delirium in ICU patients.[21] Therefore, our umbrella review identifies some of the important points. First, multifactorial interventions and multidisciplinary approaches will be the most promising interventions to reduce delirium in the ICU, but can increase workload among healthcare professionals. A lack of education, training, and standardization in evidence-based protocols can hinder the nurses from gaining autonomy to adopt these practices. Second, due to heterogeneity in interventions, we were unable to determine the independent or combined effect of specific interventions on delirium preventions. So, a future research study is suggested to evaluate the combination of two interventions and measure the level of effect on delirium. Third, only a few studies were included in our studies that met the inclusion criteria which is one of the limitations of the study. Additional future studies are suggested to elucidate the effectiveness of nonpharmacological interventions to reduce delirium in the ICU.

Conclusion

Multicomponent interventions are regarded as the most effective among all nonpharmacological nursing interventions for reducing and preventing delirium. A crucial element is the inclusion of family members in care protocols, which has shown the highest efficacy. Flexibility in family visitation can indirectly improve the outcomes and can reduce the duration of delirium in the ICU. Effective teamwork is core, with each healthcare professional having specific roles and responsibilities in implementing delirium assessment and preventive interventions as a part of routine practice.

Implications for Practice

Implementing nonpharmacological nursing interventions in the ICU is crucial for preventing delirium. This review underscores the importance of adopting a multicomponent approach to delirium prevention in the ICU. While single interventions, such as environmental controls or early mobilization, have limited efficacy, their combined use as part of a broader strategy shows the most promise. Hospitals should implement standardized protocols that integrate cognitive stimulation, family participation, and environmental management, with a particular emphasis on flexibility in family visitation policies. The role of family members in reducing delirium cannot be overstated, and empowering them to take part in patient care should be a priority.

Further, cognitive orientation exercises should be integrated into daily care routines, with adjustments made for patients under sedation. Finally, creating a calm environment through dim lighting, reduced noise levels, and the use of sensory aids like eye masks can support patients' circadian rhythms, contributing to better sleep and reduced delirium.

Implications for Future Research

The review identified significant heterogeneity in the quality of studies, as well as inconsistencies in the reporting of outcomes. For example, while some studies focused on the incidence of delirium, others evaluated its duration, making direct comparisons challenging. The review also notes a lack of clarity on how various interventions interact with each other. For instance, while early mobilization is recognized as a critical intervention, its optimal combination with other interventions like cognitive exercises or family engagement is still unclear. Additionally, a limited number of studies focused on measuring the specific impact of sleep promotion interventions on delirium outcomes, with mixed results. Future research is needed to explore the effectiveness of combining different interventions, particularly in light of the workload and resource demands they may place on healthcare professionals. Implementing multicomponent interventions can be resource-intensive, requiring coordinated efforts from nurses, physicians, therapists, and family members. Future research must evaluate not only the clinical effectiveness of these interventions but also their feasibility and impact on the healthcare team.

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References

1. Salhotra R, Bose A, Srivastava S, Mohta M, Pandarinathan K, Rautela R, et al. Reliability and validity of Hindu version of the confusion assessment method for intensive care unit (CAM-ICU) for diagnosis of delirium: A cohort study. Indian J Crit Care Med 2024;28(10):958–962. DOI: 10.5005/jp-journals-10071-24809.

2. Davis DH, Kreisel SH, Muniz Terrera G, Hall A, Morandi A, Boustani M, et al. The epidemiology of delirium: Challenges and opportunities for population studies. Am J Geriatr Psychiatry 2013;21(12):1173–1189. DOI: 10.1016/j.jagp.2013.04.007.
3. Poulin T, Jaworska N, Stelfox H, Fiest K, Moss S. Clinical practice guideline recommendations for diagnosis and management of anxiety and depression in hospitalized adults with delirium: A systematic review. BMC Syst Rev 2023;12(1):174. DOI: 10.1186/s13643-023-02339-6.
4. Addesi D, Maio R, Smirne N, Lagana V, Altomari N, Puccio G, et al. Prevalence of delirium in a population of elderly outpatients with dementia: A retrospective study. J Alzheimers Dis 2018;61(1):251–257. DOI: 10.3233/JAD-170339.
5. Kumar H, Patel A. Prevalence of delirium in elderly intensive care unit patients of a tertiary care medical college hospital. Int J Adv Med 2019;6(5):1504–1507. DOI: 10.18203/2349-3933.ijam20194167.
6. Han JH, Wilson A, Ely E. Delirium in the older emergency department patient – A quiet epidemic. Emerg Med Clin North Am 2010;28(3):611–631. DOI: 10.1016/j.emc.2010.03.005.
7. Junior M, Kumar A, Kumar P, Gupta P. Assessment of delirium as an independent predictor of outcome among critically ill patients in intensive care: A prospective study. Indian J Crit Care Med 2022;26(6):676–681. DOI: 10.5005/jp-journals-10071-23907.
8. Ely EW, Inouye SK, Bernard GR, Gordon S, Francis J, May L, et al. Delirium in mechanically ventilated patients: Validity and reliability of the confusion assessment method for the intensive care unit (CAM-ICU). JAMA 2001;286(21):2703–2710. DOI:10.1001/jama.286.21.2703.
9. Vasilevskis EE, Han JH, Hughes CG, Ely EW. Epidemiology and risk factors for delirium across hospital settings. Best Pract Res Clin Anaesthesiol 2012;26(3):277–287. DOI:10.1016/j.bpa.2012.07.003.
10. Gower LE, Gatewood MOK, Kang CS. Emergency department management of delirium in the elderly. West J Emerg Med 2012;13(2):194–201. DOI: 10.1097/TME.0000000000000066.
11. Han JH, Eden S, Shintani A, Morandi A, Schnelle J, Dittus RS, et al. Delirium in older emergency department patients is an independent predictor of hospital length of stay. Acad Emerg Med 2011;18(5):451–457. DOI: 10.1111/j.1553-2712.2011.01065.x.
12. Zhang H, Lu Y, Liu M, Zou Z, Wang L, Xu F, et al. Strategies for prevention of postoperative delirium: A systematic review and meta-analysis of randomized trials. Crit Care 2013;17:R47. DOI: 10.1186/cc12566.
13. Marcela K, Sklienka P, Kula R, Burda M, Janoutova J. Incidence and risk factors for delirium development in ICU patients – A prospective observational study. Biomed Pap Med Fac Univ Palacky Olomouc Czech Repub 2017;161(2):187–196. DOI: 10.5507/bp.2017.004.
14. Aromataris E, Fernandez R, Gogfrey C, Holly C, Khalil H, Tungpunkom P. The Joanna Briggs Institute reviewers manual 2014: Methodology for JBI umbrella reviews. South Australia: The Joanna Briggs Institute; 2014.
15. Aromataris E, Munn Z. JBI manual for evidence synthesis [Internet]. JBI. 2020. DOI: 10.46658/JBIMES-24-01.
16. Burry L, Cheng W, Williamson D, Adhikari N, Egerold I, Kanji S, et al. Pharmacological and non-pharmacological interventions to prevent delirium in critically ill patients: A systematic review and network meta-analysis. Intensive Care Med 2021;47:943–960. DOI: 10.1007/s00134-021-06490-3.
17. Kim Y, Kim N, Ryu S. Effects of non-pharmacological interventions for preventing delirium in general wards inpatients: A systematic review and meta-analysis of the randomized controlled trial. PLoS One 2022;17(5):e0268024. DOI: 10.1371/journal.pone.0268024.
18. Kang J, Lee M, Ko H, Yun S, Jeong Y, Cho Y, et al. Effect of nonpharmacological interventions for the prevention of delirium in the intensive care unit: A systematic review and meta-analysis. J Crit Care 2018;48(2018):372–384. DOI: 10.1016/j.aucc.2022.04.006.
19. Teng J, Qin H, Guo W, Liu J, Sun J, Zhang Z, et al. Effectiveness of sleep interventions to reduce delirium in critically ill patients: A systematic review and meta-analysis. J Crit Care 2023;78(2023):154342. DOI: 10.1016/j.jcrc.2023.154342.
20. Nassar A, Besen B, Robinson C, Falavigna M, Teixeira C, Rosa R, et al. Flexible versus restrictive visiting policies in ICUs: A systematic review and meta-analysis. Crit Care Med 2018;46(7):1175–1180. DOI: 10.1097/CCM.0000000000003155.
21. Bannon L, Mc Gaughey J, Verghis R, Clarke M, McAuley DF, Blackwood B, et al. The effectiveness of non-pharmacological interventions in reducing the incidence and duration of delirium in critically ill patients: A systematic review and meta-analysis. Intensive Care Med 2019;14:1–12. DOI: 10.1007/s00134-018-5452-x.
22. Deemer K, Zjadewicz K, Fiest K, Oviatt S, Parsons M, Bkin B, et al. Effect of early cognitive interventions on delirium in critically ill patients: A systematic review. Can J Anesth 2020;67:1016–1034. DOI: 10.1007/s12630-020-01670-z.
23. Deng L-X, Cao L, Zhang L-N, Peng X-B, Zhang L. Non-pharmacological interventions to reduce the incidence and duration of delirium in critically ill patients: A systematic review and network meta-analysis. J Crit Care 2020;60(2020);241–248. DOI: 10.1016/j.jcrc.2020.08.019.
24. Saritas S, Tarlaci S. A systematic review of non-pharmacological interventions to prevent delirium at intensive care units. Psychiatr Behav Sci 2021;11(2):141–147. DOI: 10.5455/PBS.20210301081740.
25. Qin M, Gao Y, Guo S, Lu X, Zhu H, Li Yi. Family intervention for delirium for patients in the intensive care unit: A systematic meta-analysis. J Clin Neurosci 2022;96:114–119. DOI: 10.1016/j.jocn.2021.11.011.
26. Xu C, Chen Z, Zhang L, Guo H. Systematic review and meta-analysis on the incidence of delirium in intensive care unit inpatients after cognitive exercise intervention. Ann Palliat Med 2022;11(2):663–672. DOI: 10.21037/apm-21-3938.
27. Lange S, Dabrowska W, Friganovic A, Religa D, Krupa S. Family experiences and attitudes toward care of ICU patients with delirium: A scoping review. Front Public Health 2022;10:1060518. DOI: 10.3389/fpubh.2022.1060518.
28. Matsuura Y, Ohno Y, Toyoshima M. Effects of non-pharmacologic prevention on delirium in critically ill patients: A network meta-analysis. Nurs Crit Care 2023;28(5):727–737. DOI: 10.1111/nicc.12780.
29. Jabre P, Belpomme V, Azoulay E, Jacob L, Bertrand L, Lapostolle F, et al. Family presence during cardiopulmonary resuscitation. New Engl J Med 2013;368:1008–1018. DOI: 10.1056/NEJMoa1203366.
30. Athanasiou A, Papathanassoglou E, Patitral E, Mc Cathy M, Giannakopoulou M. Family visitation in Greek intensive care unit. Am J Crit Care Nurse 2014;23(4):326–333. DOI: 10.4037/ajcc2014986.
31. Locihova H, Axmann K, Padysakova H, Fejfar J. Effect of the use of earplugs and eye mask on the quality of sleep in intensive care patients: A systemic review. J Sleep Res 2018;27(3):e12607. DOI: 10.1111/anae.15468.
32. Rosa RG, Tonietto TF, Silva DB, Gutierres F, Adeira L, Falavigna M, et al. Effectiveness and safety of an extended ICU visitation model for delirium prevention: A before and after study. Crit Care Med 2017;45(10):1660–1667. DOI: 10.1097/CCM.0000000000002588.