Submitted: 10 July, 2025 Accepted: 25 September, 2025 Published: 08 January, 2026 DOI:10.22514/sv.2025.182

Open Access
Signa Vitae

SYSTEMATIC REVIEW

Non-pharmacological delirium care in ICU: a systematic review

Andrej Černi[1,*,†], Andrej Markota[1,†], Leona Cilar Budler[2,†]

[1]Medical Intensive Care Unit, University Medical Centre Maribor, 2000 Maribor, Slovenia
[2]Faculty of Health Sciences, University of Maribor, 2000 Maribor, Slovenia

***Correspondence**
andrej.cerni@ukc-mb.si
(Andrej Černi)

[†] These authors contributed equally.

Abstract

Background: Delirium is a frequent and serious complication in critically ill patients, particularly in intensive care units (ICUs). It is associated with prolonged hospital stays, increased morbidity, and long-term cognitive impairment. Non-pharmacological interventions are considered safe alternatives to pharmacological treatments and align with principles of person-centered care. The aim of this review is to evaluate and synthesize evidence on the effectiveness of non-pharmacological interventions in preventing and managing delirium in critically ill adult ICU patients. **Methods**: A systematic review was conducted using PubMed, Web of Science, and the Cochrane Library. Included studies assessed non-pharmacological interventions in adult ICU patients, reporting on delirium-related outcomes. Thematic synthesis and quality appraisal using the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) framework were performed. **Results**: Multicomponent interventions—particularly ABCDE/ABCDEF bundles—were most consistently effective in reducing delirium incidence and duration. Early mobility and structured physical activity showed positive effects when implemented early and consistently. Family engagement interventions, especially structured visitation and reorientation, were also effective. Other strategies, including cognitive stimulation, music therapy, and environmental modifications, showed mixed results. The quality of evidence ranged from low to high. **Conclusions**: Non-pharmacological interventions, especially when multicomponent and protocol-driven, are effective in managing delirium in critically ill patients. Their integration into ICU practice can reduce the delirium burden and improve patient outcomes. **The PROSPERO Registration**: CRD420251151545.

Keywords

Delirium; ICU; Critically ill; Cognitive function

1. Introduction

Delirium is a prevalent and serious complication in critically ill patients, particularly within intensive care units (ICUs). Characterized by acute disturbances in attention, cognition, and perception, delirium affects a significant proportion of ICU patients, with estimates suggesting that up to 70% of mechanically ventilated patients may experience this condition during their stay [1]. The incidence of delirium can vary widely, influenced by factors such as the severity of illness, use of sedatives, and pre-existing conditions [2, 3]. Notably, delirium is associated with adverse clinical outcomes, including increased morbidity, prolonged hospital stays, and elevated mortality rates [4, 5].

The implications of delirium extend beyond immediate clinical outcomes. Research indicates that patients who experience delirium are at a heightened risk for long-term cognitive impairment and diminished quality of life following hospitalization [6]. For instance, sedative-associated delirium has been identified as a modifiable phenotype that can significantly impact long-term cognitive function and disability [6]. Furthermore, caregivers of patients with delirium often report experiencing psychological distress, including symptoms of depression and anxiety, highlighting the broader emotional toll of this condition [7].

Despite its high prevalence and serious consequences, delirium often remains underdiagnosed and inadequately managed in ICU settings. Effective screening tools, such as the Confusion Assessment Method for the ICU (CAM-ICU), have been developed to facilitate the early detection of delirium [8]. However, the implementation of evidence-based management strategies, particularly non-pharmacological interventions, has been inconsistent across healthcare settings [9]. Multicomponent interventions that address the multifactorial nature of delirium have shown promise in reducing its incidence and duration, yet many ICUs have been slow to adopt these practices [9, 10].

Non-pharmacological interventions are increasingly recog-

nized as essential components of delirium prevention and management in critically ill patients. These strategies target modifiable risk factors, such as sensory deprivation, immobility, disrupted sleep-wake cycles, and social isolation—factors that are often exacerbated in the ICU environment. Interventions such as early mobilization, orientation protocols, family engagement, noise and light control, cognitive stimulation, and multicomponent care bundles (*e.g.*, ABCDE and ABCDEF) have demonstrated effectiveness in both reducing delirium incidence and shortening its duration. Compared with pharmacological approaches, non-drug interventions offer a safer alternative with fewer adverse effects and are aligned with the principles of person-centered and holistic care [11, 12]. Nonetheless, variability in implementation, staff training, and institutional culture remains a barrier to their widespread use.

Given the growing body of evidence supporting these approaches, there is a pressing need to systematically evaluate and synthesize current findings to guide clinical practice and policy. This systematic review aims to consolidate the available evidence on non-pharmacological strategies for delirium prevention and management in ICU patients, with the goal of informing evidence-based guidelines and improving the quality of care for this high-risk population.

The aim of this systematic review is to evaluate and synthesize current evidence on the effectiveness of non-pharmacological interventions for the prevention and management of delirium in critically ill patients admitted to intensive care units. By identifying the most effective strategies and examining their implementation contexts and outcomes, this review seeks to inform the development of evidence-based clinical practice guidelines and support the integration of non-drug interventions into routine ICU care.

2. Materials and methods

The systematic review was carried out following the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) [13] approach: (1) formulating the research question, (2) conducting an initial literature search, (3) constructing the search string and establishing inclusion and exclusion criteria, (4) performing a comprehensive literature search and analysis, (5) synthesizing the gathered literature, (6) evaluating the quality of the studies and identifying potential biases, and (7) interpreting the results and formulating recommendations, as seen in Fig. 1. PRISMA 2020 Checklist is provided in **Supplementary material**.

The following research question was developed using PIO framework [14]: Which non-pharmacological interventions (I) are most effective in the management of delirium (O) in critically ill patients (P)?

The literature search was performed between 13 and 24 March 2025 across multiple electronic databases, including PubMed, Web of Science, and the Cochrane Library. The search was limited to studies published in English involving adult patients aged over 18 years. All inclusion and exclusion criteria in the literature search process are presented in Table 1. Search string was as follows: ("ICU" OR "intensive care" OR "critically ill") AND (("non-pharmacologic*" OR "non-pharmacologic*") AND ("delirium prevention" OR "delirium management")) AND ("delirium" OR "cognitive function" OR "functional recovery" OR "confusion") AND ("cognitive stimulation" OR "early mobilization" OR "music therapy" OR "family involvement" OR "reorientation").

We included randomized controlled trials (RCTs) and cohort studies as the primary sources of evidence, given their strength in establishing causal inference and generalizability. However, due to the limited number of RCTs available in this field, we also incorporated quasi-experimental studies, systematic reviews, and meta-analyses to provide a broader overview of current knowledge. This inclusive approach allowed us to capture a wider scope of evidence on non-pharmacological interventions for delirium management in critically ill patients. The decision to include multiple study designs is consistent with approaches recommended in fields where RCT evidence is scarce, but where clinically relevant insights may be gained from alternative study types.

Two independent reviewers screened the titles and abstracts based on predefined inclusion and exclusion criteria. Full-text articles of eligible studies were reviewed, and any discrepancies were resolved by consensus or consultation with a third reviewer. Data extraction included reference, study design, sample, intervention details, outcomes measured, and key findings.

The quality of the data was evaluated using the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) system. This approach assesses five key aspects: study limitations, imprecision, inconsistency, indirectness, and publication bias. The GRADE system categorizes quality levels as high (++++), moderate (+++), low (++), or very low (+) [15].

A narrative synthesis was conducted for all the included studies. Results were synthesized by the authors.

3. Results

The systematic literature review of 47 studies reveals a growing body of evidence supporting the use of non-pharmacological interventions for preventing and managing delirium in critically ill patients in ICUs. These studies employed diverse methodological approaches, including RCTs, quasi-experimental designs, prospective and retrospective cohort studies, systematic reviews and meta-analyses, as well as qualitative and mixed-methods research. The target populations varied, encompassing adult ICU patients with different clinical profiles, including those who were mechanically ventilated, post-surgical, or elderly.

Across the included studies, 22 (47%) reported positive effects of non-pharmacological strategies, 9 (19%) reported no significant effect, 14 (30%) demonstrated mixed or unclear findings, and 3 (6%) were qualitative or survey-based and did not provide direct effectiveness data. Interventions with the most consistent evidence of benefit were multicomponent bundles and family engagement strategies, both associated with significant reductions in delirium incidence, severity, or duration. Early mobilization and structured rehabilitation also showed favorable outcomes, particularly in RCTs targeting elderly or ventilated patients. By contrast, single-component interventions, such as music therapy, mindfulness, or envi-

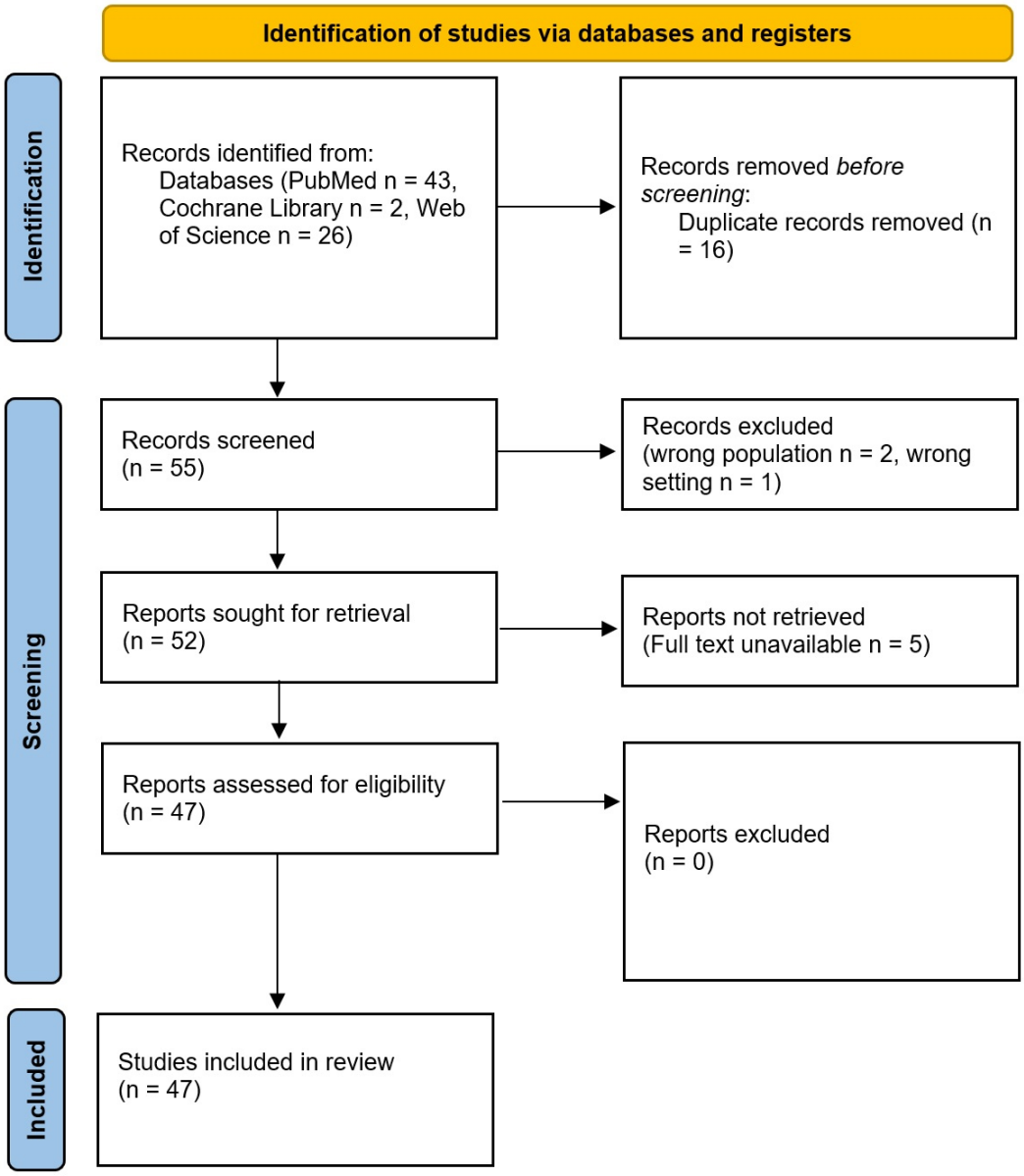

FIGURE 1. PRISMA 2020 flow diagram.

TABLE 1. Inclusion and exclusion criteria in the literature search process.

	Inclusion criteria	Exclusion criteria
Intervention	Non-pharmacological strategies for the management of delirium in critically ill patients.	Only pharmacological treatment of delirium.
Study type	Randomized controlled trials, cohort studies, systematic reviews and meta-analyses.	Literature reviews without systematic methodology.
Outcome	Relevant clinical outcomes (incidence, duration or severity of delirium).	Not involving critically ill patients.
Population	Adult patients (>18 years).	Pediatric or neonatal population.
Study access	Fully available articles.	Articles without available full texts.

ronmental modifications, produced more variable results, with some smaller studies suggesting potential benefit but larger trials often reporting no significant differences.

A detailed overview of study characteristics, including interventions, assessment tools, and effectiveness, is provided in Table 2 (Ref. [16–60]).

Based on a thematic analysis of 47 studies, six major themes were identified. These themes reflect the most recurrent and evidence-supported approaches to delirium care, and they provide a structured framework for understanding both the diversity of interventions and their respective strengths in terms of clinical effectiveness and evidence quality.

TABLE 2. Study characteristics.

Reference	Study design	Sample	Intervention	Results	Quality of the evidence (GRADE)	Effectiveness
Álvarez *et al.* [40], 2017	RCT, pilot	140 non-intubated ICU patients ≥60 years	Early and intensive OT (2×/day for 5 days); polysensory & cognitive stimulation, BADLs, family engagement	Lower incidence and severity of delirium compared to control	Low (pilot design, specific population)	Mixed/Unclear
Arbabi *et al.* [16], 2018	Quasi-experimental	148 general ICU patients >18 years	Multicomponent bundle (education, environment, early mobility)	Reduced incidence of delirium; better awareness among staff	Moderate (implementation project, not randomized)	Positive—reduced incidence
Balas *et al.* [17], 2014	Pre-post prospective cohort	296 ICU patients ≥19 years	ABCDE bundle (awakening/breathing trials, delirium monitoring, early mobility)	Reduction in delirium prevalence and ICU days with delirium	Moderate (large sample, good assessment frequency)	Positive—reduced prevalence
Bannon *et al.* [18], 2018	Qualitative study (focus groups)	68 ICU staff, 12 survivors, 2 family members	Multicomponent bundle for delirium prevention	Bundle deemed acceptable; barriers included resource limitations	Very low (qualitative, no outcome data)	Qualitative/Indirect
Bannon *et al.* [19], 2019	Systematic review and meta-analysis	15 RCTs, 2812 patients	Various non-pharmacologic strategies	No significant effect in most trials; one showed benefit of voice reorientation	Low to very low (heterogeneity, inconsistent results)	Mixed/Unclear
Bounds *et al.* [20], 2016	Retrospective study	159 ICU patients ≥18 years, ICU stay >24 h	ABCDE bundle (medication choice, mobility, coordination)	Lower prevalence of delirium in intervention group	Low (retrospective design)	Positive—lower prevalence
Bryczkowski *et al.* [21], 2014	Pre-post prospective cohort	123 SICU patients >50 years	Multicomponent bundle (sedation, sleep hygiene, education)	Reduced duration of delirium and improved satisfaction	Moderate (applied bundle, not RCT)	Positive—reduced incidence
Campbell [36], 2014	Evidence-based project	58 ICU patients ≥18 years on ventilation ≥48 h	Early mobility protocol post-sedation interruption	No significant change in delirium incidence	Low (small sample, limited design)	Null—no change
Chai [22], 2017	Pre-post, quasi-experimental QI	301 mixed ICU patients >18 years	ABCDEF bundle (pain, awakening, mobility, family engagement)	Reduction in delirium incidence	Moderate (quality improvement context)	Positive—reduced incidence
Colombo *et al.* [23], 2012	Quasi-experimental	314 (Control = 170; Intervention = 144)	Multi-component: reorientation, visual/acoustic stimulation, sensory deprivation	Incidence: 35.5% *vs.* 22% ($p = 0.02$)	Moderate	Positive—reduced incidence

TABLE 2. Continued.

Reference	Study design	Sample	Intervention	Results	Quality of the evidence (GRADE)	Effectiveness
Damshens *et al.* [50], 2018	RCT	80 ICU trauma patients >15 years	Music therapy (2×/day, 45 min, instrumental)	No significant difference in incidence	Low (small RCT)	Null—no significant difference
Eghbali-Babadi *et al.* [43], 2017	RCT	68 post-surgical ICU patients (18–70 years)	Family visitation (30–40 min, with sensory aids, reorientation)	Significant reduction in delirium incidence	Moderate (well-controlled, focused design)	Positive—reduced incidence
Eldean *et al.* [24], 2024	Quasi-experimental	60 mechanically ventilated ICU patients	Daily application of ABCDEF bundle for 7 days	Delirium incidence: 20% (study) *vs.* 70% (control); $p = 0.001$	Moderate—statistically significant results in a real-world ICU; lacks RCT control	Positive—reduced incidence
Fallahpoor *et al.* [56], 2016	Action research	100 CABG ICU patients >18 years	3-phase management model (before, during, after surgery)	Reduction in delirium incidence	Moderate (complex multi-phase design)	Mixed/Unclear
Giraud *et al.* [41], 2016	RCT, pilot time-cluster	223 ICU patients ≥70 years after cardiac surgery	Structured mirror usage during awakening, nursing care, procedures	No significant effect on incidence or duration of delirium	Low (pilot design, innovative method)	Null—no effect
Gómez Tovar *et al.* [57], 2024	RCT	213 ICU patients (≥18 years old)	DyDel nursing model: structured care plan delivered each shift	Delirium incidence: 5.6% *vs.* 14.8%; $p = 0.037$	High—well-designed RCT with significant clinical outcomes and adequate sample	Positive—reduced incidence
Guo *et al.* [25], 2016	RCT	160 oral cancer patients aged 65–80	Multicomponent non-pharm bundle (reorientation, sleep, sensory aids, music)	Significant reduction in incidence of delirium	Moderate (well-structured design)	Positive—reduced incidence
Hamzehpour *et al.* [26], 2017	RCT	100 ICU patients >18 years	Roy adaptation model (fluid balance, sleep, nutrition, oxygen, monitoring)	Significant improvement in confusion scores (NEECHAM)	Moderate (structured nursing model, measurable effects)	Positive—improved scores
Johnson *et al.* [44], 2024	Mixed-methods pilot study	15 patients, 15 family members	Family voice reorientation intervention	Feasible, acceptable; suggests psychological benefit	Low (pilot study, small sample)	Qualitative/Indirect
Karadas & Ozdemir, 2016	RCT	94 ICU patients ≥65 years	ROM exercises once daily (10 reps/exercise, passive-active)	No significant difference in delirium duration or incidence	Low (elderly population, physical therapy focused)	Null—no effect
Kersten & Reith, 2016	Narrative review	Not applicable	Summary of guidelines and delirium management in ICU	Highlights the importance of delirium diagnosis and management	Very low (review article, not original research)	Qualitative/indirect

TABLE 2. Continued.

Reference	Study design	Sample	Intervention	Results	Quality of the evidence (GRADE)	Effectiveness
Khan *et al.* [58], 2014	Pre-post implementation study	702 ventilated ICU patients ≥18 years	"Wake Up and Breathe" protocol (daily sedation interruption & breathing trial)	No significant difference in incidence or prevalence	Low (large sample, non-randomized)	Null—no effect
Khan *et al.* [51], 2020	RCT	52 ICU patients on mechanical ventilation	Personalized music, slow-tempo music, or audiobook control	Music well tolerated; no significant difference in delirium/coma-free days	Low (pilot nature, small sample, no significant effect)	Null—no effect
Kram *et al.* [27], 2015	Pre-post implementation study	83 ICU patients	ABCDE bundle (awakening/breathing trials, coordination, early mobility)	Lower delirium prevalence observed	Moderate (implementation with measurable outcome)	Mixed/Unclear
Li *et al.* [52], 2025	Systematic Review and Network Meta-Analysis	Multiple RCTs covering postoperative ICU patients	Non-pharmacological sleep interventions	RR = 0.32 to 0.61 depending on method; improved sleep	High—network meta-analysis with strong effects and large pooled data set	Positive—bundled care effective
Lisann-Goldman *et al.* [59], 2019	Mixed-methods pilot study	25 cardiac surgery patients ≥40 years	Mindfulness exercises (pre- & post-op Langerian approach)	No delirium observed in either group	Low (pilot study, small sample)	Mixed/Unclear
Lundström *et al.* [28], 2005	Quasi-experimental	400 (Control = 200; Intervention = 200)	Multi-component: staff education, patient-allocation, nursing guidance	No difference in incidence (31% *vs.* 31.5%, $p = 0.91$); duration significantly lower (59.7% *vs.* 30.2% on day 7, $p = 0.001$)	Moderate	Mixed/Unclear
Ma *et al.* [45], 2024	Qualitative Study	17 participants (6 patients, 11 family)	Auditory stimulation and family involvement	Improved emotional support and orientation	Moderate (Qualitative)—rich thematic insight but lacks generalizability and control	Mixed/Unclear
Mailhot *et al.* [46], 2017	RCT	30 patient/family caregiver dyads post-cardiac surgery	Mentoring-based intervention involving family in delirium management	Improved psycho-functional recovery; similar delirium severity in both groups	Low (small sample size, pilot study design)	Positive—reduced severity
Martinez *et al.* [29], 2012	Quasi-experimental	287 (Control = 60; Intervention = 227)	Multi-component: reorientation, sensory deprivation, sleep hygiene, family, early mobilization	Incidence: 38% *vs.* 24% ($p = 0.03$); Duration: 5.6 *vs.* 3.5 days ($p = 0.13$)	Moderate	Positive—reduced incidence

TABLE 2. Continued.

Reference	Study design	Sample	Intervention	Results	Quality of the evidence (GRADE)	Effectiveness
Matsuura *et al.* [30], 2022	Network meta-analysis	11 studies, 2549 patients	Multicomponent non-pharmacologic interventions	SP-CS-EM-PC-AS and SP-CS effective (OR 0.46–0.47)	Moderate to high (systematic method, consistent findings)	Positive—multicomponent effective
Moon & Lee [31], 2015	RCT	123 ICU patients ≥18 years	Multicomponent bundle (reorientation, early ambulation, sensory aids, *etc.*)	Significant reduction in delirium incidence	Moderate (structured, controlled)	Positive—reduced incidence
Munro *et al.* [42], 2017	RCT	30 ICU patients >18 years	Automated reorientation messages 8×/day	Increased delirium-free days in the intervention group	Low (small but innovative approach)	Mixed/Unclear
Parry *et al.* [37], 2014	Case-matched control study	16 ICU sepsis patients ventilated >48 h	Functional electrical stimulation (FES) cycling (20–60 min/day)	Reduced delirium duration (not statistically significant)	Low (small sample, case-control design)	Mixed/Unclear
Pun *et al.* [32], 2019	Prospective multicenter cohort	10,840 ICU patients	ABCDEF bundle (full *vs.* partial implementation)	Significant reduction in delirium with full implementation	High (large sample, strong prospective design)	Positive—reduced incidence
Rivosecchi *et al.* [33], 2016	Pre-post QI project	483 medical ICU patients	M.O.R.E. bundle (music, orientation, reorientation, eye/ear care)	Reduced incidence and duration of delirium	Moderate (implementation design, good outcomes)	Positive—reduced incidence
van Rompaey *et al.* [53], 2012	RCT	136 (Control = 67; Intervention = 69)	Use of earplugs at night	Higher NEECHAM score in intervention (26 *vs.* 24, $p = 0.04$), suggesting lower incidence	Moderate	Positive—reduced incidence
Rosa *et al.* [47], 2017	Pre-post prospective study	286 ICU patients ≥18 years	Extended visitation hours (12 h/day, family participation)	Significant reduction in incidence and duration of delirium	Moderate (clear intervention, measurable benefit)	Positive—reduced incidence
Schweickert *et al.* [38], 2009	RCT	104 (Control = 55; Intervention = 49)	Early exercise and mobilization (daily physical & occupational therapy)	Duration: 4.0 *vs.* 2.0 days ($p = 0.03$)	Moderate	Positive—reduced duration
Simons *et al.* [54], 2016	RCT	734 ICU patients ≥18 years	Dynamic Lighting Application (blue-white light in AM, dim in PM)	No significant effect on delirium incidence or duration	Moderate (large sample, novel environmental control)	Null—no effect
Smithburger *et al.* [48], 2017	Cross-sectional survey	60 nurses, 58 physicians, 60 family members	Survey on opinions about family involvement	High willingness from families and providers; gaps in communication noted	Very low (descriptive, no intervention tested)	Mixed/Unclear

TABLE 2. Continued.

Reference	Study design	Sample	Intervention	Results	Quality of the evidence (GRADE)	Effectiveness
Sonia *et al.* [49], 2024	Umbrella Review	12 studies	Multicomponent bundles including family and mobility	Multicomponent strategies most effective; family role crucial	High—synthesis of multiple systematic reviews; consistent findings for ICU interventions	Positive—reduced severity
Spies *et al.* [55], 2024	Prospective Observational Pilot Study	74 ICU patients in 2 ICU room types	ICU room design with dynamic lighting	Modified room reduced delirium severity; serum melatonin linked	Moderate—pilot study with significant effect, but small sample and exploratory design	Mixed/Unclear
Sullinger *et al.* [34], 2017	Pre-post, retrospective observational	89 ICU patients ≥18 years with acute delirium	Management bundle + nursing education (mobility, sensory support, massage, *etc.*)	Significant reduction in delirium days	Moderate (promising results, retrospective design)	Positive—non-pharma moderately effective
Veronese *et al.* [35], 2024	Umbrella Review of RCTs	59 systematic reviews, 110 meta-analytic estimates	Multiple non-pharmacologic and pharmacologic approaches	Non-pharma methods moderately effective; variable evidence quality	Moderate to High—umbrella review with consistent effects; based on 485 RCTs, though quality varied	Positive—reduced incidence
Zhang *et al.* [60], 2017	Pre-post prospective study	278 post-CABG ICU patients ≥18 years	Delirium risk factor screening & modification (pain, comfort, reorientation, sleep)	Significant reduction in incidence; shorter delirium duration	Moderate (structured, measurable effect)	Positive—reduced incidence
Zhou *et al.* [39], 2025	Systematic Review and Meta-Analysis	18 studies (n = 1794 intervention, n = 2129 control)	Early mobilization	Pooled OR: 0.65 (CI 0.49–0.86); $p = 0.003$	High—meta-analysis with consistent effect across studies, moderate heterogeneity	Positive—pooled OR 0.65

RCT: randomized controlled trials; GRADE: Grading of Recommendations, Assessment, Development, and Evaluation; ICU: intensive care units; OT: Occupational Therapy; BADLs: Basic Activities of Daily Living; QI: Quality Improvement; CABG: Coronary Artery Bypass Grafting; ROM: Range Of Motion; RR: Relative Risk; SP-CS-EM-PC-AS: Sleep Promotion, Cognitive Stimulation, Early Mobilization, Pain Control, and Assessment; OR: Odds Ratio; M.O.R.E.: Music, Orientation, Reorientation, Eye/ear care; NEECHAM: Neelon and Champagne Confusion Scale; CI: Confidence Interval; SICU: Surgical Intensive Care Unit.

3.1 Multicomponent bundles

The use of multicomponent care bundles—most notably the ABCDE and ABCDEF protocols—emerged as the most robust and consistently effective strategy. These bundles integrate various evidence-based elements including pain management, daily sedation interruption, spontaneous breathing trials, delirium assessment, early mobilization, and family engagement. Studies [16–35] demonstrated significant reductions in delirium prevalence, duration, and ICU length of stay, particularly when the bundles were comprehensively implemented. The evidence supporting these interventions ranged from moderate to high quality, with larger cohort studies and multicenter prospective designs contributing to their credibility. Implementation barriers included staff training demands and workflow integration, suggesting the need for institutional support to optimize adherence.

3.2 Early mobility and physical activity

Interventions focusing on early mobilization and physical activity represented a second major theme. These interventions included passive and active range-of-motion exercises, early physical therapy, and functional electrical stimulation (FES). While the strength of evidence was mixed, studies with structured and early application [36–39] showed reductions in delirium duration and incidence. Conversely, studies relying solely on passive movement or late-stage intervention tended to report null effects. The overall quality of evidence in this domain ranged from low to high, contingent upon study design and intensity of the intervention.

3.3 Cognitive and sensory stimulation

A number of studies examined interventions designed to enhance cognitive engagement and sensory orientation, such as the use of mirrors during awakening, automated verbal reorientation messages, and structured environmental cues. This theme, though theoretically promising, yielded less consistent results. Studies [40–42] provided evidence of modest improvements in delirium-free days or confusion scores; however, the small sample sizes and short intervention durations limited generalizability. The evidence quality for this theme was predominantly low.

3.4 Family engagement and visitation models

Structured family involvement, including extended visitation hours, participation in care routines, and sensory-based reorientation using familiar voices, was associated with improved outcomes in multiple studies. Studies [43–48] indicated that family engagement can significantly reduce the incidence and duration of delirium. These findings were further reinforced by an umbrella review [49], which underscored the central role of families in delirium prevention. The quality of evidence for this theme ranged from moderate to high, with high feasibility and acceptability reported across clinical settings.

3.5 Music and auditory interventions

Auditory stimulation through music therapy or structured voice messages constituted another thematic cluster. The results were variable: while some studies demonstrated minor improvements in patient orientation or psychological comfort, others found no significant effect on delirium-related outcomes [50, 51]. The evidence was generally of low to moderate quality, with most trials limited by small sample sizes, heterogeneity in music selection, and short intervention periods. Nonetheless, music interventions were consistently reported as safe, well-tolerated, and acceptable to patients and families, suggesting potential adjunctive value in broader multimodal programs.

3.6 Sleep promotion and environmental modifications

The final theme encompassed interventions aimed at optimizing the ICU environment to promote sleep and circadian rhythm regulation. These included the use of earplugs, dynamic lighting systems, noise reduction protocols, and environmental redesign. Studies [52, 53] supported the efficacy of sleep-promoting interventions in reducing delirium risk, particularly when implemented as part of broader care bundles. Isolated use of lighting interventions [54] and dynamic lighting [55] yielded mixed results. The quality of evidence for this category ranged from moderate to high, particularly in studies with rigorous methodology and longer observation periods.

A short summary of these major themes, with typical effectiveness, quality of evidence and other remarks are presented in Table 3.

TABLE 3. Summary by theme.

Theme	Typical Effectiveness	Quality of Evidence	Remarks
Multicomponent Bundles	High	Moderate to High	Most effective when fully implemented
Mobility/Physical Activity	Moderate to High	Low to High	Early, structured activity yields best outcomes
Cognitive/Sensory Stimulation	Low to Moderate	Low	Promising, needs stronger evidence
Family Engagement	Moderate to High	Moderate to High	Consistently beneficial across contexts
Music and Auditory Interventions	Mixed	Low to Moderate	Indirect benefits may exist
Sleep/Environmental Modifications	Moderate	Moderate to High	Best in combination with other interventions

Positive effects were observed in 22 studies, showing reduced incidence, duration, or severity of delirium—especially with multicomponent bundles, family engagement, and the ABCDEF protocol. No Effect was reported in 9 studies, typically in cases involving music therapy, range of motion (ROM) exercises, lighting changes, or pilot interventions. Qualitative/Indirect Insight was found in 3 studies, highlighting factors such as feasibility, acceptability, or emotional impact without measuring clinical outcomes directly. Unclear effects were identified in 14 studies, mostly due to ambiguous result wording or lack of clear outcome reporting.

4. Discussion

This systematic review demonstrates that non-pharmacological interventions play a crucial role in preventing and managing delirium among critically ill patients in the ICU. The evidence indicates that multicomponent bundles and structured family engagement are the most consistently effective strategies, while interventions such as early mobilization show promise but are more context-dependent, and single-component approaches like music therapy or isolated environmental modifications yield less consistent outcomes. These findings emphasize that delirium, as a multifactorial syndrome, is best addressed through comprehensive, bundled care rather than isolated interventions.

4.1 Quality appraisal

Fig. 2 presents the distribution of study outcomes across four levels of evidence quality as assessed by GRADE (Very Low, Low, Moderate, High). The majority of studies reporting a positive effect were rated with Moderate quality (n = 15). A substantial number also came from Low quality studies (n = 7), and a few from Very Low (n = 1) and High (n = 1). Interventions supported by moderate-quality evidence appear most consistently effective. However, positive results also occur in studies with lower rigor, raising questions about potential bias or overestimation. Very low and low GRADE levels are linked to both uncertainty and isolated reports of limited effectiveness, suggesting that these findings should be interpreted with caution.

4.2 Interpretation of main findings

Across the six themes identified, multicomponent bundles (such as the ABCDE and ABCDEF protocols) and family engagement strategies emerged as the most consistently effective interventions, producing reductions in delirium incidence, duration, and severity. Early mobilization showed benefit when applied systematically and early, while isolated physical activity protocols were generally less effective. By contrast, single-component interventions, such as cognitive stimulation, music therapy, and environmental modifications, yielded more mixed or uncertain outcomes, often due to methodological weaknesses or variable implementation fidelity. Together, these results emphasize that delirium, as a multifactorial syndrome, is best addressed through comprehensive, bundled strategies rather than isolated approaches.

4.3 Alignment with guidelines

Our findings are consistent with existing international guidance, including the Pain, Agitation/Sedation, Delirium, Immobility, and Sleep Disruption (PADIS) 2018 recommendations and the ICU Liberation (ABCDEF) bundle, both of which highlight delirium monitoring, daily sedation interruption, early mobilization, and family engagement as central to ICU care. Our review reinforces these recommendations and provides further evidence that integrating bundles into everyday ICU practice is likely to have the greatest impact on patient outcomes.

4.4 Heterogenity of findings

The variability in outcomes for interventions such as cognitive stimulation and music therapy can be attributed to several important sources of heterogeneity. First, differences in study populations played a major role. Studies conducted in elderly ICU patients often demonstrated more consistent benefits from cognitive stimulation, likely due to their higher baseline vulnerability to delirium, whereas studies focusing on post-surgical or mixed ICU populations reported less pronounced effects. Similarly, the inclusion or exclusion of patients with pre-existing cognitive impairment influenced the observed outcomes.

Second, the timing and intensity of interventions varied widely across studies. Some trials implemented daily structured sessions delivered by trained personnel, while others employed shorter or less frequent interventions, often delivered by non-specialists. Interventions with greater frequency and personalization tended to yield more favorable outcomes.

Third, considerable variability was observed in the choice of outcome measures. While some studies assessed delirium incidence, others focused on duration or severity. For example, music therapy appeared more effective in reducing delirium severity scores than in preventing new-onset delirium, leading to apparent discrepancies across studies.

Finally, methodological differences must be acknowledged. Smaller pilot studies or quasi-experimental designs often reported stronger effects, whereas larger, well-powered RCTs tended to show more modest or null results. Variability in blinding, control group design, and fidelity of intervention delivery further contributed to differences in reported effectiveness.

Taken together, these factors highlight the complex nature of evaluating single-component interventions for delirium management in critically ill patients. Future trials should strive for greater methodological consistency, including standardized outcome measures, clear definitions of intervention protocols, and sufficiently powered study designs to reduce heterogeneity and enhance comparability across studies.

4.5 Limitations

One of the major limitations of this review is the heterogeneity of included study designs. While RCTs and cohort studies were prioritized, the review also incorporated quasi-experimental studies, systematic reviews, and meta-analyses. Although this approach broadened the evidence base and allowed us to

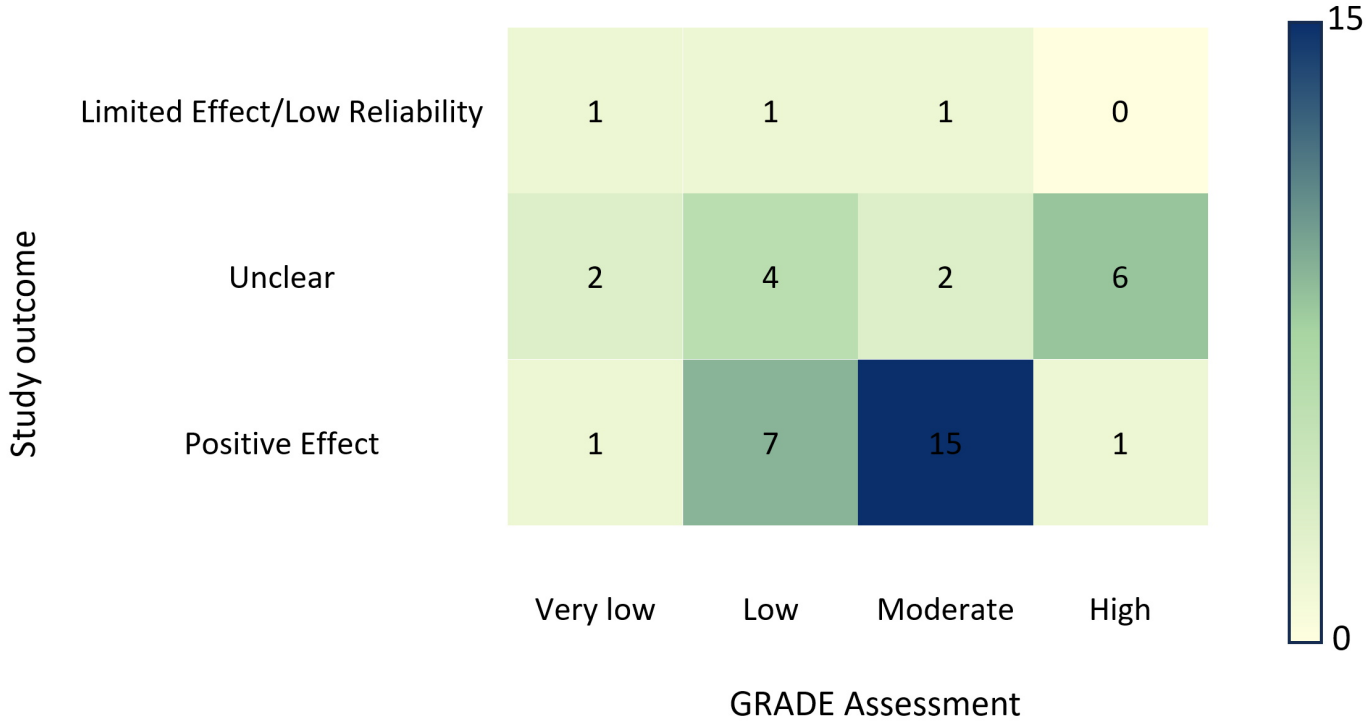

FIGURE 2. Study results by quality of evidence. GRADE: Grading of Recommendations, Assessment, Development, and Evaluation.

include important insights, it inevitably reduced comparability across studies and increased the risk of bias. The variability in methodological rigor, intervention protocols, and outcome measures must therefore be considered when interpreting the findings. Future research should focus on high-quality RCTs to strengthen the evidence regarding the effectiveness of nurse-led non-pharmacological interventions in ICU delirium management.

4.6 Clinical implications and future directions

From a clinical perspective, these findings emphasize the central role of ICU nurses in implementing non-pharmacological interventions. Nurses are well positioned to lead efforts in mobilization, reorientation, environmental optimization, and family engagement, thereby embedding evidence-based delirium prevention into routine care. Future research should prioritize high-quality, adequately powered RCTs, include predefined subgroup analyses (*e.g.*, elderly and ventilated patients), and address barriers to implementation, such as staff training and workflow integration.

5. Conclusions

The current body of evidence indicates that multicomponent non-pharmacological intervention bundles offer the most consistent benefits in the prevention and management of delirium in critically ill patients. These interventions are particularly effective when they integrate key elements, such as sleep promotion, cognitive reorientation, and early mobilization. The convergence of multiple supportive strategies appears to address the multifactorial nature of delirium more comprehensively than single interventions.

Family-led interventions have also emerged as a promising and acceptable approach within critical care settings. These strategies foster patient-centered care and have been well-received by both healthcare professionals and families. Nevertheless, the existing evidence, while supportive, is primarily based on pilot or small-scale studies. There is a clear need for larger, rigorously designed RCTs to establish their clinical effectiveness and to delineate the mechanisms through which family involvement may influence patient outcomes.

Music therapy and voice reorientation interventions have demonstrated feasibility and high levels of patient and staff acceptability. However, the current literature does not yet provide robust evidence to confirm their effectiveness in reducing the incidence or severity of delirium. Although these interventions show promise, their clinical utility remains to be validated through further empirical investigation.

Future research in this field should prioritize the implementation of large-scale, methodologically rigorous RCTs that employ standardized and validated outcome measures for delirium. Moreover, studies should adopt implementation science frameworks to evaluate the real-world feasibility, sustainability, and scalability of non-pharmacological interventions across diverse ICU environments. This approach is essential to bridge the gap between research findings and clinical practice, ensuring that effective interventions can be reliably translated into routine care.

ABBREVIATIONS

CAM-ICU, Confusion Assessment Method for the ICU; GRADE, Grading of Recommendations, Assessment,

Development, and Evaluation; ICU, Intensive Care Unit; OT, Occupational Therapy; RCT, Randomized Controlled Trial; FES, functional electrical stimulation; PRISMA, Preferred Reporting Items for Systematic reviews and Meta-Analyses; PIO, Population, Intervention, Outcome; PADIS, Pain, Agitation/Sedation, Delirium, Immobility, and Sleep Disruption; BADLs, Basic Activities of Daily Living; QI, Quality Improvement; CABG, Coronary Artery Bypass Grafting; ROM, Range of Motion; RR, Relative Risk; SP-CS-EM-PC-AS, Sleep Promotion, Cognitive Stimulation, Early Mobilization, Pain Control, and Assessment; OR, Odds Ratio; M.O.R.E., Music, Orientation, Reorientation, Eye/ear care; NEECHAM, Neelon and Champagne Confusion Scale; CI, Confidence Interval; SICU: Surgical Intensive Care Unit.

AVAILABILITY OF DATA AND MATERIALS

The authors declare that all data supporting the findings of this study are available within the paper and any raw data can be obtained from the corresponding author upon request.

AUTHOR CONTRIBUTIONS

AČ and LCB—designed the research study, performed the research and analysed the data. AM—provided help and advice on data analysis and synthesis. All authors wrote the manuscript. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Not applicable.

ACKNOWLEDGMENT

Not applicable.

FUNDING

This research received no external funding.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

SUPPLEMENTARY MATERIAL

Supplementary material associated with this article can be found, in the online version, at https://oss.signavitae.com/mre-signavitae/article/1991426647536877568/attachment/Supplementary%20material.docx.

REFERENCES

[1] Wilson JE, Ely EW. Delirium in the ICU. Qatar Medical Journal. 2020; 2019: 31.

[2] Naveen H, Kumar S, Venkataraman R, Ramakrishnan N, Vijayaraghavan B. Incidence and outcomes of delirium in nonintubated critically ill patients: a prospective observational cohort study. Apollo Medicine. 2019; 16: 213–215.

[3] Sánchez-Hurtado L, Hernández-Sánchez N, Moral-Armengol M, Guevara-García H, García-Guillén F, Herrera-Gómez Á, *et al.* Incidence of delirium in critically ill cancer patients. Pain Research and Management. 2018; 2018: 4193275.

[4] Dziegielewski C, Skead C, Canturk T, Webber C, Fernando S, Thompson L, *et al.* Delirium and associated length of stay and costs in critically ill patients. Critical Care Research and Practice. 2021; 2021: 1–8.

[5] Huang J, Zheng H, Zhu X, Zhang K, Ping X. The efficacy and safety of haloperidol for the treatment of delirium in critically ill patients: a systematic review and meta-analysis of randomized controlled trials. Frontiers in Medicine. 2023; 10: 1200314.

[6] Girard TD, Thompson JL, Pandharipande PP, Brummel NE, Jackson JC, Patel MB, *et al.* Clinical phenotypes of delirium during critical illness and severity of subsequent long-term cognitive impairment: a prospective cohort study. The Lancet Respiratory Medicine. 2018; 6: 213–222.

[7] Rosgen BK, Krewulak KD, Davidson JE, Ely EW, Stelfox HT, Fiest KM. Associations between caregiver-detected delirium and symptoms of depression and anxiety in family caregivers of critically ill patients: a cross-sectional study. BMC Psychiatry. 2021; 21: 406.

[8] Oh ES, Fong TG, Hshieh TT, Inouye SK. Delirium in older persons. JAMA. 2017; 318: 1161.

[9] Sahawneh F, Boss L. Non-pharmacologic interventions for the prevention of delirium in the intensive care unit: an integrative review. Nursing in Critical Care. 2021; 26: 166–175.

[10] Barbateskovic M, Krauss S, Collet M, Larsen L, Jakobsen J, Perner A, *et al.* Pharmacological interventions for prevention and management of delirium in intensive care patients: a systematic overview of reviews and meta-analyses. BMJ Open. 2019; 9: e024562.

[11] Barr J, Fraser GL, Puntillo K, Ely EW, Gélinas C, Dasta JF, *et al.* Clinical practice guidelines for the management of pain, agitation, and delirium in adult patients in the intensive care unit. Critical Care Medicine. 2013; 41: 263–306.

[12] Al-Qadheeb NS, Skrobik Y, Schumaker G, Pacheco MN, Roberts RJ, Ruthazer RR, *et al.* Preventing ICU subsyndromal delirium conversion to delirium with low-dose IV haloperidol: a double-blind, placebo-controlled pilot study. Critical Care Medicine. 2016; 44: 583–591.

[13] 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. The BMJ. 2021; 372: n71.

[14] Hosseini MS, Jahanshahlou F, Akbarzadeh MA, Zarei M, Vaez-Gharamaleki Y. Formulating research questions for evidence-based studies. Journal of Medicine, Surgery, and Public Health. 2024; 2: 100046.

[15] Balshem H, Helfand M, Schünemann HJ, Oxman AD, Kunz R, Brozek J, *et al*. GRADE guidelines: 3. Rating the quality of evidence. Journal of Clinical Epidemiology. 2011; 64: 401–406.

[16] Arbabi M, Zebardast J, Noorbala AA, Mohamadi M, Rahimnia M, Larijani R. Efficacy of liaison education and environmental changes on delirium incidence in ICU. Archives of Neuroscience. 2018; 5: e56019.

[17] Balas MC, Vasilevskis EE, Olsen KM, Schmid KK, Shostrom V, Cohen MZ, *et al.* Effectiveness and safety of the awakening and breathing coordination, delirium monitoring/management, and early exercise/mobility bundle. Critical Care Medicine. 2014; 42: 1024–1036.

[18] Bannon L, McGaughey J, Clarke M, McAuley DF, Blackwood B. Designing a nurse-delivered delirium bundle: what intensive care unit staff, survivors, and their families think? Australian Critical Care. 2018; 31: 174–179.

[19] Bannon L, McGaughey J, Verghis R, Clarke M, McAuley DF, Blackwood B. 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 Medicine. 2019; 45: 1–12.

[20] Bounds M, Kram S, Speroni KG, Brice K, Luschinski MA, Harte S, *et al*. Effect of ABCDE bundle implementation on prevalence of delirium

in intensive care unit patients. American Journal of Critical Care. 2016; 25: 535–544.

[21] Bryczkowski SB, Lopreiato MC, Yonclas PP, Sacca JJ, Mosenthal AC. Delirium prevention program in the surgical intensive care unit improved the outcomes of older adults. Journal of Surgical Research. 2014; 190: 280–288.

[22] Chai J. The effect of the ABCDEF bundle on incidence of delirium in critically ill patients [master's thesis]. Brandman University. 2017.

[23] Colombo R, Corona A, Praga F, Minari C, Giannotti C, Castelli A, *et al.* A reorientation strategy for reducing delirium in the critically ill: results of an interventional study. Minerva Anestesiologica. 2012; 78: 1026.

[24] Eldean TNN, Bakri MH, Aziz MAA, Khalaf GS. Effectiveness of the ABCDEF bundle to manage and prevent delirium: pre-and postintervention quasi-experimental study. Critical Care Nursing Quarterly. 2024; 47: 275–285.

[25] Guo Y, Sun L, Li L, Jia P, Zhang J, Jiang H, *et al.* Impact of multicomponent, nonpharmacologic interventions on perioperative cortisol and melatonin levels and postoperative delirium in elderly oral cancer patients. Archives of Gerontology and Geriatrics. 2016; 62: 112–117.

[26] Hamzehpour H, Valiee S, Majedi MA, Roshani D, Seidi J. The effect of care plan based on Roy adaptation model on the incidence and severity of delirium in intensive care unit patients: a randomised controlled trial. Journal of Clinical and Diagnostic Research. 2018; 12: LC21–LC25.

[27] Kram SL, DiBartolo MC, Hinderer K, Jones RA. Implementation of the ABCDE bundle to improve patient outcomes in the intensive care unit in a rural community hospital. Dimensions of Critical Care Nursing. 2015; 34: 250–258.

[28] Lundström M, Edlund A, Karlsson S, Brännström B, Bucht G, Gustafson Y. A multifactorial intervention program reduces the duration of delirium, length of hospitalization, and mortality in delirious patients. Journal of the American Geriatrics Society. 2005; 53: 622–628.

[29] Martinez FT, Tobar C, Beddings CI, Vallejo G, Fuentes P. Preventing delirium in an acute hospital using a non-pharmacological intervention. Age and Ageing. 2012; 41: 629–634.

[30] Matsuura Y, Ohno Y, Toyoshima M, Ueno T. Effects of non-pharmacologic prevention on delirium in critically ill patients: a network meta-analysis. Nursing in Critical Care. 2023; 28: 727–737.

[31] Moon KJ, Lee SM. The effects of a tailored intensive care unit delirium prevention protocol: a randomized controlled trial. International Journal of Nursing Studies. 2015; 52: 1423–1432.

[32] Pun BT, Balas MC, Barnes-Daly MA, Thompson JL, Aldrich JM, Barr J, *et al.* Caring for critically ill patients with the ABCDEF bundle: results of the ICU liberation collaborative in over 15,000 adults. Critical Care Medicine. 2019; 47: 3–14.

[33] Rivosecchi RM, Kane-Gill SL, Svec S, Campbell S, Smithburger PL. The implementation of a nonpharmacologic protocol to prevent intensive care delirium. Journal of Critical Care. 2016; 31: 206–211.

[34] Sullinger D, Gilmer A, Jurado L, Zimmerman LH, Steelman J, Gallagher A, *et al.* Development, implementation, and outcomes of a delirium protocol in the surgical trauma intensive care unit. Annals of Pharmacotherapy. 2017; 51: 5–12.

[35] Veronese N, Solimando L, Bolzetta F, Maggi S, Fiedorowicz JG, Gupta A, *et al*. Interventions to prevent and treat delirium: an umbrella review of randomized controlled trials. Ageing Research Reviews. 2024; 97: 102313.

[36] Campbell MR. The effect of an early mobility protocol in critically ill mechanically ventilated patients on incidence and duration of delirium and length of stay [doctoral dissertation]. Wright State University. 2014.

[37] Parry SM, Berney S, Warrillow S, El-Ansary D, Bryant AL, Hart N, *et al.* Functional electrical stimulation with cycling in the critically ill: a pilot case-matched control study. Journal of Critical Care. 2014; 29: 695.e1.

[38] Schweickert WD, Pohlman MC, Pohlman AS, Nigos C, Pawlik AJ, Esbrook CL, *et al.* Early physical and occupational therapy in mechanically ventilated, critically ill patients: a randomised controlled trial. The Lancet. 2009; 373: 1874–1882.

[39] Zhou L, Xie F, Zeng Y, Xia X, Wang R, Cai Y, *et al.* Preventive effects of early mobilisation on delirium incidence in critically ill patients: systematic review and meta-analysis. Medizinische Klinik Intensivmedizin und Notfallmedizin. 2025. PMID: 40085206.

[40] Álvarez EA, Garrido MA, Tobar EA, Prieto SA, Vergara SO, Briceño CD, *et al.* Occupational therapy for delirium management in elderly patients without mechanical ventilation in an intensive care unit: a pilot randomized clinical trial. Journal of Critical Care. 2017; 37: 85–90.

[41] Giraud K, Pontin M, Sharples LD, Fletcher P, Dalgleish T, Eden A, *et al.* Use of a structured mirrors intervention does not reduce delirium incidence but may improve factual memory encoding in cardiac surgical ICU patients aged over 70 years: a pilot time-cluster randomized controlled trial. Frontiers in Aging Neuroscience. 2016; 8: 228.

[42] Munro CL, Cairns P, Ji M, Calero K, Anderson WM, Liang Z. Delirium prevention in critically ill adults through an automated reorientation intervention: a pilot randomized controlled trial. Heart & Lung. 2017; 46: 234–238.

[43] Eghbali-Babadi M, Shokrollahi N, Mehrabi T. Effect of family-patient communication on the incidence of delirium in hospitalized patients in cardiovascular surgery ICU. Iranian Journal of Nursing and Midwifery Research. 2017; 22: 7–31.

[44] Johnson GU, Towell-Barnard A, McLean C, Ewens B. The implementation and evaluation of a family-led novel intervention for delirium prevention and management in adult critically ill patients: a mixed-methods pilot study. Nursing in Critical Care. 2024; 30: e13210.

[45] Ma Y, Cui N, Guo Z, Zhang Y, Jin J. Exploring patients' and families' preferences for auditory stimulation in ICU delirium prevention: a qualitative study. Intensive and Critical Care Nursing. 2024; 82: 103629.

[46] Mailhot T, Cossette S, Cote J, Bourbonnais A, Côté MC, Lamarche Y, *et al.* A post cardiac surgery intervention to manage delirium involving families: a randomized pilot study. Nursing in Critical Care. 2017; 22: 221–228.

[47] Rosa RG, Tonietto TF, da Silva DB, Gutierres FA, Ascoli AM, Madeira LC, *et al.* Effectiveness and safety of an extended ICU visitation model for delirium prevention: a before and after study. Critical Care Medicine. 2017; 45: 1660–1667.

[48] Smithburger PL, Korenoski AS, Kane-Gill SL, Alexander SA. Perceptions of family members, nurses, and physicians on involving patients' families in delirium prevention. Critical Care Nurse. 2017; 37: 48–57.

[49] Sonia M, Kaur S, Kothari N. Prevention of delirium in the intensive care unit through nonpharmacological interventions: an umbrella review. Indian Journal of Critical Care Medicine. 2024; 29: 75.

[50] Damshens MH, Sanie MS, Javadpour S, Khaef MA, Rastgarian A. The role of music on the delirium in traumatic patients: a case study in the ICU of Peymanieh Hospital of Jahrom, Fars Province, Iran. Ambient Science. 2018; 5: 97–101.

[51] Khan SH, Xu C, Purpura R, Durrani S, Lindroth H, Wang S, *et al.* Decreasing delirium through music: a randomized pilot trial. American Journal of Critical Care. 2020; 29: e31–e35.

[52] Li J, Fan Y, Luo R, Yin N, Wang Y, Jing J, *et al.* The impact of non-pharmacological sleep interventions on delirium prevention and sleep improvement in postoperative ICU patients: a systematic review and network meta-analysis. Intensive and Critical Care Nursing. 2025; 87: 103925.

[53] Van Rompaey B, Elseviers MM, Van Drom W, Fromont V, Jorens PG. The effect of earplugs during the night on the onset of delirium and sleep perception: a randomized controlled trial in intensive care patients. Critical Care. 2012; 16: 1–11.

[54] Simons KS, Laheij RJ, van den Boogaard M, Moviat MA, Paling AJ, Polderman FN, *et al.* Dynamic light application therapy to reduce the incidence and duration of delirium in intensive-care patients: a randomised controlled trial. The Lancet Respiratory Medicine. 2016; 4: 194–202.

[55] Spies C, Piazena H, Deja M, Wernecke KD, Willemeit T, Luetz A, *et al.* Modification in ICU design may affect delirium and circadian melatonin: a proof of concept pilot study. Critical Care Medicine. 2024; 52: e182–e192.

[56] Fallahpoor S, Abedi H, Mansouri M. Development and evaluation of care programs for the delirium management in patients after coronary artery bypass graft surgery (CABG). International Journal of Medical Research & Health Sciences. 2016; 5: 547–553.

[57] Gómez Tovar LO, Henao Castaño AM. Dynamic delirium—nursing intervention to reduce delirium in patients critically Ill, a randomized control trial. Intensive & critical care nursing. 2024; 83: 103691.

[58] Khan BA, Fadel WF, Tricker JL, Carlos WG, Farber MO, Hui SL, *et al*. Effectiveness of implementing a wake up and breathe program on sedation and delirium in the ICU. Critical Care Medicine. 2014; 42: e791–e795.

[59] Lisann-Goldman LR, Pagnini F, Deiner SG, Langer EJ. Reducing delirium and improving patient satisfaction with a perioperative mindfulness intervention: a mixed-methods pilot study. Holistic Nursing Practice. 2019; 33: 163–176.

[60] Zhang W, Sun Y, Liu Y, Qiu W, Ye X, Zhang G, *et al*. A nursing protocol targeting risk factors for reducing postoperative delirium in patients following coronary artery bypass grafting: results of a prospective before-after study. International Journal of Nursing Sciences. 2017; 4: 81–87.

How to cite this article: Andrej Černi, Andrej Markota, Leona Cilar Budler. Non-pharmacological delirium care in ICU: a systematic review. Signa Vitae. 2026; 22(1): 20-33. doi: 10.22514/sv.2025.182.