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ORIGINAL RESEARCH

Summary of the Clinical Evidence for Non-Pharmacological Management of Postoperative Delirium in Adults: An Evidence Synthesis

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Objective: To retrieve, evaluate, and summarise the clinical evidence for non-pharmacological interventions in adult postoperative delirium (POD), encompassing the preoperative, intraoperative, and postoperative phases.

Methods: The methods included conducting searches on UpToDate Clinical Consultants, the Scottish Intercollegiate Guidelines Network, the National Institute for Health and Care Excellence, the Registered Nurses' Association of Ontario, BMJ Best Practice, the Cochrane Library, Web of Science, PubMed, China National Knowledge Infrastructure, Wanfang, VIP, and the Chinese Biomedical Literature Service System. Clinical practice guidelines, clinical decision-making, evidence summaries, evidence synthesis, expert consensus, systematic reviews, and meta-analyses on non-pharmacological interventions for adult POD were examined, and the search period spanned between the establishment of each database and 30 October 2023.

Results: A total of 17 documents were included, comprising three guidelines, one expert consensus, one clinical decision-making article, four evidence summaries, three systematic reviews, and five meta-analyses. These documents primarily focused on the following three aspects: preoperative, intraoperative, and postoperative care. In total, 30 "best evidence" instances were compiled.

Conclusion: Considering the complexity and potential harm of adult POD, an accurate and timely evaluation of high-risk factors, alongside effective medical nursing strategies, is vital in its prevention and treatment. Non-pharmacological interventions remain the preferred choice for preventing and treating POD. Medical institutions should establish standardised processes for non-pharmacological intervention in adult POD, based on evidence-based medicine, to enhance the level of clinical care in this field.

Keywords: adult postoperative delirium, non-pharmacological intervention, evidence-based nursing, perioperative care, evidence-based medicine

Introduction

Postoperative delirium (POD) is a syndrome that occurs following anaesthesia and surgery and is characterised by acute alterations in mental status. These changes include disturbances in cognition, attention, and levels of consciousness, which tend to fluctuate.[1] Studies have demonstrated that the incidence of POD in elderly patients varies widely, ranging from 4.0% to 53.0%.[2] In China, the overall incidence of POD has been reported at 11.1%, with figures exceeding 15% in patients undergoing thoracic, upper abdominal, spinal, and joint surgeries.[3]

Moreover, POD can lead to severe postoperative complications, prolonged hospitalisation, increased financial burdens, and, in more severe cases, physical and cognitive decline or even death. The early and accurate identification of POD, combined with timely intervention, is critical for mitigating the adverse clinical outcomes associated with the

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syndrome.[4] However, standardised management of delirium is currently lacking in clinical practice, particularly in the prevention and care of POD.[5]

Furthermore, studies have highlighted a deficiency in nurses' knowledge regarding delirium and barriers to the clinical application of delirium assessment tools.[6] Furthermore, studies have highlighted that POD is a harbinger of postoperative cognitive dysfunction (POCD). POD usually occurs within the first 3 postoperative days, whereas POCD occurs at the end of the first week, does not affect consciousness, and may persist for a significantly longer duration.[7] Clinical healthcare professionals often underestimate the importance of delirium, and evidence-based, actionable clinical care guidelines are yet to be established. The related literature tends to focus predominantly on elderly patients or specific surgical procedures, with limited exploration into evidence concerning the prevention of adult POD across the entire perioperative period, encompassing preoperative, intraoperative, and postoperative phases.[8] A comprehensive understanding of the research status of POD, along with the implementation of active prevention, early diagnosis, and intervention for high-risk groups, is of substantial clinical importance for the prognosis of adult postoperative patients. Therefore, this study aims to utilise evidence-based methodologies, including a systematic literature search, quality appraisal, and evidence synthesis, to investigate the optimal preventive evidence for POD throughout the perioperative period. This study aspires to provide a valuable reference for clinical healthcare professionals.

Materials and Methods

Inclusion and Exclusion Criteria

This study constituted a secondary analysis. The foundational research question was devised using the Johns Hopkins Nursing Evidence-Based Practice Question Development Tool, aligned with the PICO framework (P [population] – adults with POD, I [intervention] – non-pharmacological interventions, C [comparator] – standard care, and O [outcome] – POD incidence, accident frequency, hospital stay duration, and hospitalisation costs). The inclusion criteria included the following: (1) study participants aged 18 years and older; (2) non-pharmacological interventions related to perioperative delirium; (3) evidence classified as guidelines, expert consensus, evidence summaries, clinical decision-making studies, systematic reviews, and meta-analyses; (4) study setting: hospital; (5) language restriction: publications in both Chinese and English; and (6) publications up to 30 October 2023. Original research articles were excluded as this study primarily focused on synthesizing existing clinical evidence from secondary sources such as guidelines, expert consensus, evidence summaries, clinical decision-making studies, systematic reviews, and meta-analyses. The exclusion criteria included the following: (1) study participants: children, end-stage patients, individuals undergoing drug withdrawal, and cases of drug-induced delirium; (2) study design: original studies; (3) study settings: community, nursing home; (4) guidelines interpretation, including guidelines and expert consensus directly translated from Chinese or English, or those redundantly included; (5) incomplete literature information or inability to access the full text; (6) literature superseded by updated versions; and (7) literature lacking a quality appraisal.

Literature Search Strategy

Following the 6S pyramid model, a top-down search approach was adopted for retrieving evidence sources from several databases: (1) clinical decision support systems, including BMJ Best Practice and UpToDate; (2) guideline websites, professional association websites, and evidence summaries, including the Scottish Intercollegiate Guidelines Network (SIGN), the National Institute for Health and Care Excellence (NICE), and the Registered Nurses' Association of Ontario (RNAO); (3) systematic review databases and journal databases, such as the Cochrane Library, Web of Science, PubMed, China National Knowledge Infrastructure, Wanfang Data, VIP Chinese Science and Technology Periodicals Full-Text Database, and the China Biomedical Literature Service System (SinoMed). When searching clinical decision support systems, guideline websites, and professional association websites, the Chinese terms used included "perioperative patient/preoperative/intraoperative/postoperative", "family involvement/health education/non-pharmacological intervention/nutritional supplement/early activity/hearing/interprofessional interaction", and "delirium incidence/unexpected events/length of stay/cost of hospitalisation". Correspondingly, the English terms included "patients during the perioperative period/preoperative/intraoperative/postoperative", "family participation/health education/non-pharmacological

intervention/supplement nutrition/early activities/aural comprehension/cross-professional interaction", and "incidence of delirium/accident/length of stay/hospitalisation cost".

A combination of controlled vocabulary and free terms was used for the systematic review and journal databases. The Chinese search terms included "perioperative patient/preoperative/intraoperative/postoperative", "family involvement/health education/non-pharmacological intervention/nutritional supplement/early activity/hearing/interprofessional interaction", "delirium incidence/unexpected events/length of stay/cost of stay", and "systematic review/expert consensus/summary of evidence/clinical decision making/Meta-analysis/guidelines". The English equivalents were "patients during the perioperative period/preoperative/intraoperative/postoperative", "family participation/health education/non-pharmacological intervention/supplement nutrition/early activities/aural comprehension/cross-professional interaction", "incidence of delirium/accident/length of stay/hospitalisation cost", and "system evaluation/expert consensus/summary of evidence/clinical decision-making/meta-analysis/guidebook". The search covered publications between the inception of each database and 30 October 2023.

Literature Screening and Data Extraction

Two researchers trained in systematic evidence methodology were tasked with independently screening the literature according to the predefined inclusion and exclusion criteria. Subsequently, they compared their findings. In instances of disagreement, a third researcher was consulted to make a final decision. Following cross-checking and verification, data were extracted from the selected literature utilising a pre-established table that outlines general information. The extracted data comprised the subject matter, publication type, details of the first author, institution or organisation, year of publication or update, search methodology, source database, quality appraisal criteria, and literature recommendations.

Literature Quality Appraisal Criteria

The guidelines were assessed by three researchers, all of whom had received systematic training in evidence methodology. Two researchers independently appraised other literature included in this study. In cases of disagreement, a third researcher's opinion was sought to reach a consensus.

Guidelines

Guidelines were evaluated on a 7-point scale utilising the Appraisal of Guidelines for Research & Evaluation II (AGREE II) system. A score of 1 indicated "strongly disagree", while a score of 7 signified "strongly agree". The inclusion or exclusion of guidelines was based on these standardised results.

Clinical Decisions

Clinical decision evidence was categorised as evidence summaries. The Critical Appraisal for Summaries of Evidence (CASE) tool, developed by Foster et al in 2013, was utilised for the quality appraisal of the included clinical decisions.[9]

Expert Consensus

Expert consensus was assessed using the authenticity evaluation tool developed by the Joanna Briggs Institute (JBI) Evidence-Based Healthcare Centre in Australia (2016 version).

Systematic Review

The quality of systematic reviews and meta-analyses was evaluated using AMSTAR (a measurement tool for the assessment of multiple systematic reviews).

Literature Quality Appraisal Process

Two qualified researchers trained at Fudan University's JBI Centre for Evidence-Based Nursing independently evaluated every piece of literature. Each category of literature was appraised using the respective assessment tools previously mentioned. In instances of disagreement, a third researcher was consulted to achieve a consensus on the eligibility of the literature.

Results

Literature Screening Process and General Characteristics of the Included Literature

Initially, 606 articles were identified. Following a thorough review of titles, abstracts, and full texts, 589 articles were excluded due to reasons such as duplication, mismatched populations, ineligible interventions, and inappropriate study designs. Consequently, 17 publications were selected for inclusion. These included three guidelines,[10–12] one expert consensus,[13] one clinical decision-making article,[14] four evidence summaries,[15–18] three systematic reviews,[19–21] and five meta-analyses.[22–26] The literature screening process and its results are depicted in Figure 1, and the general characteristics of the included literature are summarised in Table 1.

Quality Assessment Results of the Included Literature

Quality Assessment Results of Guidelines

Three guidelines, sourced from NICE,[10] SIGN,[11] and RNAO,[12] were included in this study. The AGREE II system was used for quality appraisal, with the results detailed in Table 2.

Quality Assessment Results of Expert Consensus

The study included one expert consensus.[13] Its quality was appraised using the authenticity evaluation tool from the JBI Evidence-Based Healthcare Centre (Australia, 2016 version). This expert consensus was deemed of high quality and was therefore included in the analysis (Table 3).

Quality Assessment of Clinical Decision-Making Articles

One clinical decision-making article was included.[14] The evidence presented in this article was comprehensive, properly cited, and aligned with the research topic, justifying its inclusion.

Quality Assessment Results of Evidence Summaries

Four evidence summaries[15–18] were included and assessed using the CASE checklist. Given their high quality, these evidence summaries were incorporated into the study (Table 4).

Quality Assessment Results of Systematic Reviews and Meta-Analyses

The study included three systematic reviews[19–21] and five meta-analyses.[22–26] The overall quality of these studies was found to be satisfactory (Table 5).

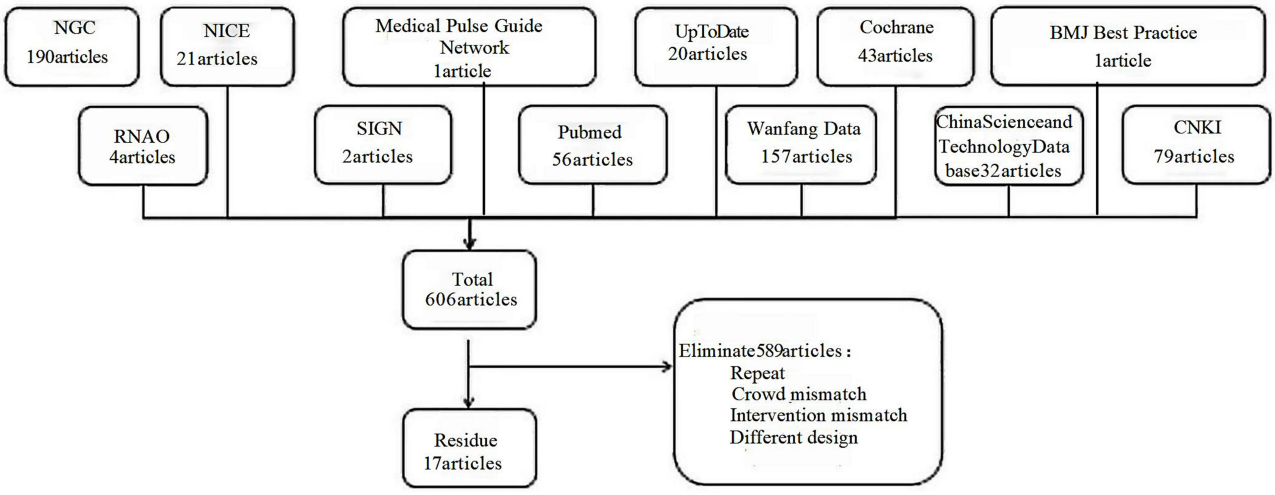

Figure 1 Paper screening flow chart.

Abbreviations: NGC, National Guideline Clearinghouse; NICE, National Institute for Health and Care Excellence; RNAO, Registered Nurses' Association of Ontario; SIGN, Scottish Intercollegiate Guidelines Network; CNKI, Chinese National Knowledge Infrastructure.

Table 1 General Information of Included Articles

Included Literature	Literature Topic	Publishing Institution	Evidence Type	Publication Year
NICE[10]	Delirium: Prevention, diagnosis, and management	NICE	Guidelines	2019
SIGN[11]	Risk reduction and management of delirium	SIGN	Guidelines	2019
RNAO[12]	Delirium, dementia, and depression in elderly patients	RNAO	Guidelines	2016
BJA[13]	Improving perioperative brain health	Web of Science	Expert consensus	2021
Joseph Francis et al[14]	Prevention, treatment, and prognosis of delirium and acute confusional state	UpToDate	Clinical decision	2019
Wu QQ et al[15]	Summary of the best evidence for the prevention of perioperative delirium in elderly patients with fractures	CNKI	Evidence summary	2020
Chen H et al[16]	Synthesis of best evidence on non-pharmacological management in patients with postoperative delirium	Wanfang Data	Evidence summary	2019
Wu M et al[17]	Evidence synthesis for nonpharmacological prevention of postoperative delirium in elderly patients	VIP Database	Evidence summary	2019
Lu FJ et al[18]	A best-evidence summary of prevention strategies for perioperative delirium in elderly patients with hip fractures	Wanfang Data	Evidence summary	2019
Siddiqi N et al[19]	Interventions for preventing delirium in hospitalised non-ICU patients	Cochrane	Systematic review	2016
Yuan XL et al[20]	Risk factors of postoperative delirium in elderly patients in China: A systematic review	CNKI	Systematic review	2015
Xu T et al[21]	BIS-guided anesthesia decreases postoperative delirium: A systematic and meta-analysis	CNKI	Systematic review	2017
Liu C et al[22]	The effect of cerebral oxygen saturation monitoring during non-cardiac surgery on postoperative delirium: A meta-analysis	CNKI	Meta-analysis	2019
Goldberg TE et al[23]	Association of Delirium With Long-term Cognitive Decline: A Meta-analysis.	Web of Science	Meta-analysis	2020
Burton JK et al[24]	Non-pharmacological interventions for preventing delirium in hospitalised non-ICU patients.	Web of Science	Meta-analysis	2021
Janssen TL et al[25]	Prevention of postoperative delirium in elderly patients planned for elective surgery: systematic review and meta-analysis.	Web of Science	Meta-analysis	2019
Kang J et al[26]	Effects of nonpharmacological interventions on sleep improvement and delirium prevention in critically ill patients: A systematic review and meta-analysis.	Web of Science	Meta-analysis	2023

Table 2 Quality Evaluation Results of Guidelines

Guidelines	Standardized Score in Each AGREE II Domain					
	Scope and Purpose	Stakeholder(s)	Rigor of Development	Clarity of Presentation	Applicability	Editorial Independence
NICE[10]	100%	85.19%	82.54%	100%	69.44%	77.78%
SIGN[11]	100%	72.22%	95.24%	100%	91.67%	100%
RNAO[12]	100%	100%	95.24%	100%	100%	100%

Summary of Evidence

The 13 publications included in this study provided insights into non-pharmacological interventions for POD in adults. After duplicates were removed, a total of 30 distinct pieces of evidence were compiled and subjected to grading. This grading process adhered to the Evidence Recommendation Level System established by the JBI Centre for Evidence-

Table 3 Quality Evaluation Results of Expert Consensus

Rating Criteria	Expert Consensus
	BJA[13]
(1) Clarity of the source of opinions	Yes
(2) Opinions derived from influential experts	Yes
(3) Focus on the welfare of the study population	Yes
(4) Conclusions based on results and presented with logical expression	Yes
(5) Reference to other existing literature	Yes
(6) Consistency with other opinions	No

Table 4 Quality Assessment Results of Evidence Summaries

Included Literature	Appraisal Criteria									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Wu QQ et al[15]	Yes	Yes	No	Not completely No	Yes	Yes	No	Yes	Yes	Yes
Chen H et al[16]	Yes	Yes	Not completely No	Yes	No	Yes	Yes	Yes	Not completely No	Yes
Wu M et al[17]	Yes	Yes	Not completely No	Not completely No	Yes	Yes	Yes	Yes	Not completely No	Yes
Lu FJ et al[18]	Yes	Yes	Not completely No	Yes	No	Yes	Yes	Yes	Not completely No	Yes

Notes: (1) Is the summary specific in scope and application? (2) Is the authorship of the summary transparent? (3) Are the reviewer(s)/editor(s) of the summary transparent? (4) Are the search methods transparent and comprehensive? (5) Is the evidence grading system transparent and translatable? (6) Are the recommendations clear? (7) Are the recommendations appropriately cited? (8) Are the recommendations current? (9) Is the summary unbiased? (10) Can this summary be applied to your patient(s)? (11) Has the included literature undergone quality appraisal?

Based Healthcare (Australia, 2014 version).[27] Evidence levels from 1 to 5 were assigned, reflecting the varying study design types. The designations of A-level recommendations (denoting strong recommendations) and B-level recommendations (representing weak recommendations) were based on the reliability and validity of each study's design (Table 6).

Discussion

Strengthening Knowledge Training for Medical Practitioners

The clinical manifestations of delirium primarily encompass alterations in consciousness levels, newly developed memory impairments, and disturbances in orientation. The occurrence of POD is associated with prolonged hospital stays, increased financial burdens for patients and their families, and elevated incidence and mortality rates.[23,28–33] A survey examining the knowledge, beliefs, and practices of orthopaedic nurses in POD management revealed that, despite their positive attitudes, many nurses lack essential knowledge in this area. Notably, less than 20% of the surveyed nurses had received formal training in POD management.[34] It is crucial for healthcare facilities to implement formal education programmes. These should provide both ongoing formal and informal refresher courses for medical staff who treat and care for surgical patients at high risk for delirium, enhancing their understanding of POD epidemiology, assessment, prevention, and treatment.[16,17]

A separate survey conducted in eight tertiary hospitals in Taiyuan City assessed the knowledge of intensive care unit (ICU) nurses regarding delirium. The results showed that nurses with higher professional titles, longer working experiences, and higher educational levels demonstrated a superior understanding of delirium. It is recommended that delirium-related educational content be included in the training of new employees and nursing students. Additionally, updating the curriculum regularly can provide professional development opportunities for both groups.[18] The survey indicated that nurses who had received specific training in delirium possessed considerably better knowledge compared with their counterparts without such training.[35] Consequently, it is imperative to enhance POD-related training for medical professionals, particularly new staff, to improve healthcare professionals' abilities in the early recognition, prevention, and effective management of delirium. This enhancement will, in turn, improve treatment outcomes for patients with POD.

Table 5 Quality Evaluation Results of Systematic Reviews

Included Literature	Appraisal Criteria															
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Siddiqi N et al[19]	Yes	Yes	Not completely No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Yuan XL et al[20]	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Not completely No	No
Xu T et al[21]	Yes	No	No	Not completely No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Not completely No	No
Liu C et al[22]	Yes	No	No	Not completely No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Not completely No	No
Goldberg TE[23]	Yes	Yes	No	Not completely No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Not completely No	Yes
Burton JK[24]	Yes	Yes	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Janssen TL[25]	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Kang J et al[26]	Yes	Yes	No	Yes	No	No	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes

Notes: (1) Did the research questions and inclusion criteria for the review include the components of PICO? (2) Did the report of the review contain an explicit statement that the review methods were established prior to the conduct of the review and did the report justify any significant deviations from the protocol? (3) Did the review authors explain their selection of the study designs for inclusion in the review? (4) Did the review authors use a comprehensive literature search strategy? (5) Did the review authors perform study selection in duplicate? (6) Did the review authors perform data extraction in duplicate? (7) Did the review authors provide a list of excluded studies and justify the exclusions? (8) Did the review authors describe the included studies in adequate detail? (9) Did the review authors use a satisfactory technique for assessing the risk of bias (RoB) in individual studies that were included in the review? (10) Did the review authors report on the sources of funding for the studies included in the review? (11) If meta-analysis was performed did the review authors use appropriate methods for statistical combination of results? (12) If meta-analysis was performed, did the review authors assess the potential impact of RoB in individual studies on the results of the meta-analysis or other evidence synthesis? (13) Did the review authors account for RoB in individual studies when interpreting/ discussing the results of the review? (14) Did the review authors provide a satisfactory explanation for, and discussion of, any heterogeneity observed in the results of the review? (15) If they performed quantitative synthesis did the review authors carry out an adequate investigation of publication bias (small study bias) and discuss its likely impact on the results of the review? (16) Did the review authors report any potential sources of conflict of interest, including any funding they received for conducting the review?

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Table 6 Summary of Clinical Evidence for Nonpharmacological Management of Postoperative Delirium in Adults

Topic		Description	Level	Recommendation Level
Personnel Requirements		1. Delirium assessment should be conducted by trained healthcare professionals capable of diagnosing delirium.[9,16]	I	A
		2. Healthcare institutions should provide training and continuing education on POD for medical staff.[15–17]	Ia	A
		3. Hospitals and healthcare institutions should provide formal education and training for new employees and/or other medical staff involved in caring for high-risk patients.[15]	I	A
		4. Evidence-based, multimodal, cross-professional, and targeted continuing education programs on delirium should be developed, and regular evaluations and revisions are required.[15]	I	A
Screening Tools		5. Effective tools should be employed to evaluate POD cases, and additional assessments should be considered as needed.[15]	I	A
		6. The delirium assessment tools frequently used in clinical practice include the CAM, CAM-ICU, DRS-R98, 4AT, and the Nursing Delirium Screening Scale (Nu-DESC).[9,14,17]	I	A
Timing of delirium monitoring		7. Assessment should be conducted within 24 hours of admission, at least once daily for high-risk patients, during changes in health status, and upon admission to the recovery room for all surgical patients, and should continue until day 5 postoperative.[14,15]	2	A
High-risk factors for delirium		8. Major risk factors for delirium include preoperative hypertension, lung infections, intraoperative transfusions, postoperative hypoxemia, and pain.[18,19]	I	A
Non-drug Intervention	Preoperative	9. Individualized care: Individualized, multimodal preventive intervention plans should be developed to prevent delirium.[16,17]	I	A
		10. Preoperative consultation with a geriatrician and a cross-professional team comprising clinical physicians and professional nurses should be available for the prevention of delirium in high-risk elderly patients.[16]	I	B
		11. Involvement of families/caregivers: Discussion is required to clarify individual risks of delirium, and formulate preventive intervention plans based on preoperative, intraoperative, and postoperative risk factors.[14]	Ib	B
		12. Health education should be provided for patients and their families/caregivers, including prevention, identification, and coping strategies for delirium.[14,16,17]	I	A
		13. A tailored, non-drug delirium prevention plan should be developed for patients at risk through cross-professional teamwork.[10,12,14,17,18]	I	A
		14. Physiological reserves should be enhanced through functional training, and the use of glasses and/or hearing aids.[12,13]	3	A
		15. Enteral nutrition, dietary guidelines, and dietary supplements should be provided scientifically during the early stage to improve the patient's nutritional status.[12,16]	I	A
	Intraoperative	16. BIS should be closely monitored to evaluate the anesthesia depth during surgery.[18,20]	I	A
		17. Cerebral oxygen saturation should be monitored during surgery to reduce the risk of early postoperative cognitive impairment.[21]	I	A
	Postoperative	18. Effective rating scales should be used for delirium assessment.[15]	I	A
		19. Patients should be under close observation to promptly identify, determine, and address precipitating factors for delirium, such as pain, sleep deprivation or disruption, malnutrition, sensory impairment, and infection.[9,15]	I	A
		20. The current medication should be reviewed carefully. If there are drugs that can possibly trigger delirium symptoms, discontinuance or substitution is recommended.[9]	5	B
		21. Cognitive function support: Patients are encouraged to participate in activities such as conversation, reading, and listening to broadcasts to improve their cognitive function.[9]	Ib	B
		22. Sensory stimulation: Oriented activities using clocks and calendars, effective communication with family members, or soothing music should be arranged according to each patient's interests and mental state to provide sensory stimulation for delirium prevention.[13,15,16]	I	B
		23. Sleep guidelines: Non-drug interventions should be developed to improve sleep quality and maintain a normal sleep-wake cycle, such as providing earplugs, blinders, and low-level nighttime lighting, as well as minimizing room noise.[9,12,13,15,16]	2	A
	Postoperative	24. Early activity guidelines: Patients are advised to engage in skeletal muscle exercises, such as early ambulation, respiratory exercises, physical therapy, nerve stimulation, and hand massage.[9,13,16]	I	A
		25. Maintenance of fluid balance: Patients should replenish fluid and stay hydrated postoperatively to prevent dehydration, and maintain electrolyte and acid-base balance.[9,16]	I	A
		26. Reduction of catheter retention time: When indwelling catheters are used in elderly patients, proper care is required to prevent urinary system infections.[16]	I	A
		27. Effective control of postoperative pain should be provided.[16]	I	A
		28. Healthcare professionals should provide targeted health education to patients and their families at high risk of delirium, focusing on patient and family-centered care with cultural sensitivity.[15]	5b	A
		29. Pertinent measures should be implemented to prevent delirium-related complications, such as falls and pressure injuries.[17]	2b	A
		30. If POD occurs, specialized intervention should be initiated as early as possible to identify the cause, implement appropriate postoperative management, regularly assess outcomes, and strengthen patient education, with timely referral for follow-up medical care and periodic follow-ups.[17]	I	A

Effective Utilisation of Delirium Rating Scales, Timely Monitoring, and Early Identification of High-Risk Factors for Delirium

It is essential to utilise effective tools for the evaluation of POD, enhancing the assessment process when necessary. Patients at high risk of delirium should be assessed at least once daily, especially when changes occur in their condition, such as alterations in cognitive function, social behaviour, or the emergence of visual and auditory hallucinations. Physical function changes, including reduced activity or agitation and sleep disorders, also necessitate a timely assessment of delirium.[16] The gold standard for diagnosing delirium is outlined in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders.[36] However, the appropriate application of this standard requires the expertise of a qualified physician.

The confusion assessment method (CAM) is a widely recognised and clinically applied tool for delirium assessment, noted for its high sensitivity and specificity. The CAM-ICU is primarily used for non-verbal and uncooperative ICU patients, whereas the Chinese version of the 3-minute diagnostic confusion assessment method is suitable for assessing awake elderly patients in internal and surgical wards. The 4 A's test (4AT) for delirium screening, validated by multiple centres, is an easy-to-use approach that does not require specialised training. However, its sensitivity and specificity are comparatively lower than other methods. The delirium rating scale (DRS) is suitable in scenarios in which clinically trained physicians are present. Compared with these methods, other scales have limited utility.[37]

Clinically, there is no universally adopted tool for delirium assessment. According to the 2023 guidelines,[38] the 4AT is recommended for healthcare professionals without specific training, whereas CAM, CAM-ICU, and DRS-Revised-98 are suggested for those with professional training. Delirium monitoring should include assessments upon admission, whenever the patient's condition changes, from admission until transfer to the recovery room, and for up to 5 days postoperatively. Daily assessments are advised for high-risk patients, with dynamic evaluations as needed. Moreover, early and accurate identification of high-risk factors for delirium, such as preoperative hypertension, lung infections, intraoperative transfusions, postoperative hypoxemia, and pain, is crucial.

Strengthening Preoperative Assessment of Delirium-Related Risk Factors

Postoperative delirium is not merely a postoperative disturbance of consciousness but rather a manifestation of the combined effects of multiple factors influencing the progression of the disease. Risk factors for delirium are assessed at the initial contact, and any changes in the patient's condition are noted.[17,18] To prevent delirium, addressing predisposing factors through preoperative delirium assessment is crucial. This assessment includes evaluating cognitive function (using the Mini-Mental State Examination, where a score <24 indicates cognitive impairment), depression status (using the Geriatric Depression Scale, where a score ≥5 suggests depression), functional mobility using the Timed Up and Go test, where a time >20 seconds indicates impaired mobility), visual acuity <20/70, hearing impairment (whispered voice test), malnutrition (BMI <18.5 kg/m2 or significant weight loss), chronic pain, sleep deprivation, and polypharmacy (use of ≥5 medications).[38] Non-pharmacological preventive measures should be emphasised, requiring collaborative efforts from a multidisciplinary team. Healthcare professionals, caregivers, and patients must collaborate under the guidance of a cross-professional team to enhance their collective ability to respond to POD. This collaboration involves two or more healthcare professionals jointly engaging in problem-solving and providing services in health and social care for the benefit of the patient.[39] Such a cross-professional collaborative model can effectively prevent or reduce the occurrence of delirium. Comprehensive preventive measures should be initiated based on potential risk factors.[23] These include cognitive impairment, disturbances in orientation, dehydration, constipation, hypoxemia, restricted mobility, infections, polypharmacy, pain, malnutrition, hearing and vision impairments, and sleep deprivation. Cross-professional team intervention is essential to tailor treatment regimens based on these risk factors, aiming to reduce the occurrence of POD. Treating adults with POD requires an approach tailored to the specific situation of each patient. Integrating these measures into practice presents a substantial challenge.

Strengthening the Monitoring of Intraoperative Parameters

The bispectral index (BIS), a computerised dual-frequency spectral index, has been clinically applied in the United States since 1998.[40] Moderate-quality evidence suggests that monitoring the depth of anaesthesia during surgery can effectively prevent or reduce the risk of POD.[19] This efficacy may be attributed to two mechanisms. First, the occurrence of low BIS values and burst suppression in the EEG during surgery has been associated with an increased incidence of POD. The occurrence of low BIS values and a high incidence of burst suppression in the EEG during surgery has been associated with an increased incidence of POD. Therefore, monitoring the depth of anaesthesia can help prevent or reduce the occurrence of POD.[21] BIS monitoring enables anesthesiologists to adjust anesthetic dosages according to an individual patient's brain response, taking into account their variable sensitivity to anesthetics. This is particularly important for patients with vulnerable brains at high risk for POD. Second, this monitoring can reduce the exposure to intraoperative anaesthetic agents.[41,42] An analysis based on intraoperative cerebral oxygen saturation monitoring for circulatory management[43] suggests that managing circulation during surgery can effectively reduce the risk of POD in cardiac surgery. However, this conclusion requires validation through further studies on other diseases. A comprehensive intraoperative monitoring approach, combining BIS with other modalities (EEG alpha power), could provide a more complete picture of the patient's response to surgery and anesthesia and further optimize POD prevention.

Postoperative management plays a crucial role in reducing POD incidence and promoting recovery. Key strategies, as outlined in Table 6, include early mobilization, effective pain control, maintaining adequate hydration and nutrition, promoting sleep hygiene, providing orienting communication, and involving family in care. Implementing these evidence-based postoperative interventions requires collaboration among the multidisciplinary team and should be tailored to each patient's individual needs and risk factors.

Conclusion

This study summarises non-pharmacological interventions for adult patients with POD, drawing upon the analysis of the 30 pieces of "best evidence" related to preoperative, intraoperative, and postoperative data. Given the complexity and harmfulness of POD in adults, an accurate and timely evaluation of high-risk factors, alongside effective medical and nursing strategies, is crucial in preventing and treating POD. However, this study has certain limitations. First, it only includes literature in Chinese and English, potentially overlooking high-quality studies in other languages. Second, the literature search strategy may not have achieved comprehensive coverage, and the detail provided in the interventions may not be sufficient to determine their clinical effects. In clinical practice, it is recommended that healthcare professionals standardise the prevention and management of non-pharmacological interventions for POD. This standardisation should be based on the best evidence available and consider the needs and preferences of the patients, aiming to reduce the incidence of POD and improve treatment outcomes.

In summary, the key strategies for preventing POD across the perioperative period include: (1) strengthening healthcare professionals' knowledge and training in POD; (2) conducting comprehensive preoperative assessments to identify high-risk patients; (3) optimizing intraoperative monitoring, particularly of anesthetic depth and cerebral oxygenation; (4) implementing multicomponent, nonpharmacological interventions postoperatively; and (5) ensuring regular postoperative evaluation and monitoring for POD. By adopting these evidence-based approaches, clinicians can significantly reduce the incidence and impact of POD in adult surgical patients.

Data Sharing Statement

All data generated or analysed during this study are included in this article. Further enquiries can be directed to the corresponding author.

Ethics Approval and Consent to Participate

An ethics statement is not applicable because this study is based exclusively on published literature.

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