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Risk Factors for Postoperative Delirium in Orthopedic Surgery Patients: A Systematic Review and Meta-Analysis

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ADMINISTRATIVE INFORMATION

Support - N/A.

Review Stage at time of this submission - Completed but not published.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 28 March 2025 and was last updated on 28 March 2025.

INTRODUCTION

Review question / Objective This study aimed to systematically review and meta-analyze the risk factors associated with postoperative delirium in orthopedic surgery patients.

Condition being studied Postoperative delirium is a serious and common complication that significantly impacts patient outcomes following surgery. It is characterized by an acute and fluctuating disturbance in attention, awareness, and cognition, typically occurring within days after a surgical procedure.

METHODS

Participant or population Orthopedic surgery patients who experience postoperative delirium.

Intervention No intervention.

Comparator No comparator.

Study designs to be included Retrospective study, cohort study, a systematic review and meta-analysis.

Eligibility criteria Titles and abstracts from the retrieved records were initially screened independently by two reviewers, followed by full-text evaluations of shortlisted articles. Conflicts were resolved through discussion or, when necessary, with the involvement of a third reviewer. Eligible studies included those:
1. Investigating risk factors for postoperative delirium in orthopedic patients.
2. Providing sufficient data for effect size calculations.
3. Published in English or Chinese.
Exclusions comprised non-original research, articles lacking delirium-related outcomes, duplicate records, and studies using overlapping patient cohorts.

Information sources PubMed, Cochrane Library, SpringerLink, Elsevier Science Direct, and CNKI.

Main outcome(s) Incidence of Postoperative Delirium: The primary outcome was the incidence of POD in orthopedic surgery patients, as reported in the included studies.

Additional outcome(s) Secondary outcomes included the identification and quantification of risk factors associated with POD. These were categorized into demographic factors (e.g., age, sex), comorbidities (e.g., diabetes, cardiovascular disease), preoperative cognitive function, and other clinical variables (e.g., BMI, type of surgery).

Quality assessment / Risk of bias analysis Data extraction was standardized, capturing details like study authorship, demographics, orthopedic surgery types, delirium diagnostic tools, and identified risk factors. Cognitive dysfunction was defined using the Mini-Mental State Examination (MMSE) in two studies and the Montreal Cognitive Assessment (MoCA) in one study, with thresholds of <24 for MMSE and <26 for MoCA. Two reviewers assessed study quality using the Newcastle-Ottawa Scale (NOS), which allocates up to 9 stars across domains such as group selection and comparability. Scores ≥7 denoted high quality, 4–6 moderate, and <4 low.This was measured using standardized diagnostic tools such as the Confusion Assessment Method (CAM) or criteria from the Diagnostic and Statistical Manual of Mental Disorders (DSM).

Strategy of data synthesis Meta-analyses utilized Stata 16.0 for adjusted relative risks (RRs) and weighted mean differences (WMDs) with 95% confidence intervals (CIs). A random-effects model accounted for inter-study variability, with heterogeneity assessed via I^2 statistics and Cochran's Q test. Subgroup and meta-regression analyses explored heterogeneity sources based on study design, surgery type, and delirium assessment methods. Adjusted RRs account for potential confounders such as age, comorbidities, and other demographic factors, thereby providing a more accurate estimate of the association between risk factors and postoperative delirium.Funnel plots and Egger's test assessed publication bias, with the trim-and-fill method applied if bias was significant. Sensitivity tests excluded individual studies to verify robustness, while cumulative meta-analyses examined evolving evidence. Statistical significance was set at $p < 0.05$ for most analyses, except heterogeneity ($p < 0.10$).

Subgroup analysis None.

Sensitivity analysis Funnel plots and Egger's test assessed publication bias, with the trim-and-fill method applied if bias was significant. Sensitivity tests excluded individual studies to verify robustness, while cumulative meta-analyses examined evolving evidence. Statistical significance was set at $p < 0.05$ for most analyses, except heterogeneity ($p < 0.10$).

Country(ies) involved China.

Keywords Postoperative delirium; Orthopedic surgery; Risk factors; Meta-analysis.

Contributions of each author

Author 1 - Yanan Niu conceived of the study, helped to draft the manuscript, read and approved the final manuscript.
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