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Efficacy of nursing intervention management in the operating room for patients undergoing cardiac surgery: a systematic review and meta-analysis

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ADMINISTRATIVE INFORMATION

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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 5 December 2024 and was last updated on 5 December 2024.

INTRODUCTION

Review question / Objective Cardiac surgery is a complex, high-risk procedure that necessitates specialized nursing care in the operating room (OR). Nursing intervention management is vital in ensuring patient safety and optimizing outcomes. This meta-analysis aims to assess the effectiveness of nursing intervention management in the OR for patients undergoing cardiac surgery.

Condition being studied Cardiac surgery is an intricate, high-risk procedure that necessitates specialized nursing care within the operating room (OR) .Nursing intervention management is paramount in ensuring patient safety and improving the outcomes of critical surgeries. The role of nurses in the OR encompasses a spectrum of essential tasks and responsibilities that directly affect patient care and surgical results. OR nurses are tasked with coordinating with the surgical team, monitoring patients' vital signs, administering medications, maintaining a sterile field, and offering emotional support to patients and their families. Through a meticulous observation of patients' conditions during surgical procedures, nurses can quickly identify and address potential complications. Moreover, effective nursing intervention management in the OR can considerably enhance the outcomes for patients undergoing cardiac surgery. The expertise and commitment of nurses are vital to ensuring that patients receive the highest standard of care throughout the surgical journey. Nursing intervention management in the OR is a crucial aspect of cardiac surgery, one that profoundly affects patient safety and outcomes. The landscape of nursing interventions in the OR has evolved remarkably, with recent advancements expanding the responsibilities and influence of OR nurses in cardiac surgery. Strategies, such as enhanced recovery after surgery (ERAS) protocols, the integration of cutting-edge technology for

immediate patient monitoring, and the adoption of evidence-based practice guidelines, have been shown to enhance patient outcomes. This meta-analysis aims to critically evaluate the effects of these nursing interventions in the OR on the success of cardiac surgeries. It addresses the research question of whether the implementation of these interventions can considerably improve patient outcomes in cardiac surgery. The hypothesis of this study is that a proactive, coordinated approach by OR nurses, which includes close collaboration with the surgical team, continuous patient monitoring, and provision of psychological support, contributes to safe patient care, reduces complications, and accelerates postoperative recovery. Recognizing OR nurses' critical role is essential for healthcare professionals to continually advance the quality of care provided to patients undergoing cardiac surgery.

METHODS

Search strategy Two researchers conducted independent searches on PubMed, Web of Science, China National Knowledge Internet, and Wanfang databases to identify pertinent articles concerning OR nursing in cardiac surgery published from January 1998 to March 2023. The search was conducted across all databases by using a conjunction of the following search terms: ("operating room nursing management" or "operating nursing care in the operating room" or "nursing intervention management in the operating room"), ("cardiac surgery" or "cardiac operation" or "cardiovascular surgery"), and ("impact of the intervention" or "outcome of intervention").

Participant or population Patients undergoing heart surgery.

Intervention Operating room nursing.

Comparator Operating room nursing.

Study designs to be included Randomized controlled trial.

Eligibility criteria The inclusion criteria were as follows:
(1) Study type: The study selection prioritized randomized controlled trials (RCTs) and quasi-RCTs that specifically examined the effects of OR nursing intervention management on patients undergoing cardiac surgery. RCTs and quasi-RCTs were chosen because they have strong internal validity and generalizability, and they randomly allocate participants to intervention and control groups, thereby reducing the influence of confounding factors. For this analysis, quasi-RCTs were defined as trials employing subject allocation methods other than randomization, such as systematic alternation, stratified random sampling, or purposive sampling. During the analysis, these methods were carefully examined to assess their effects on the study outcomes.
(2) Intervention methods: The intervention group received OR nursing intervention management, and the control group received standard nursing care.
The exclusion criteria included the following: (1) studies lacking full-text availability; (2) conference proceedings, abstracts, reviews, case reports, or duplicate publications of the same study; and (3) articles with incomplete information, inaccurate data, or inappropriate statistical methodologies.

Information sources PubMed, Web of Science, China National Knowledge Internet, and Wanfang databases.

Main outcome(s) ①:Adverse events; ②:Length of hospital stays; ③:Intraoperative blood loss; ④:ICU length of stay;⑤:Duration of surgery.

Quality assessment / Risk of bias analysis
Literature quality appraisal
The quality of the included studies was systematically evaluated using the Cochrane Risk of Bias Tool, which offers a comprehensive assessment of seven key criteria: randomization methods, allocation concealment, blinding, outcome reporting, selective reporting, and other sources of bias. The studies were meticulously examined to ensure that their randomization techniques were robust enough to mitigate selection bias. The studies' allocation concealment processes were assessed to confirm that the assignment of participants to intervention groups was effectively concealed from the allocators and the participants, thus preventing bias. In addition, whether the studies maintained double-blinding, which is critical in ensuring that the participants and those delivering interventions are unaware of the treatment allocation, was determined. Furthermore, we checked if the studies comprehensively reported all predefined outcomes and adhered to their protocols.

Strategy of data synthesis Statistical analysis was performed using Review Manager 5.4.1 . The risk ratio (RR) was used as the effect size for the binary variables because it is suitable for comparing the relative risks between groups. The mean difference, which allows researchers to assess the magnitude of the mean effect across

studies, was employed for the continuous variables. Heterogeneity was evaluated using the Q test and I2. An I2 value greater than 50% is commonly used as a threshold to indicate significant heterogeneity ($P < 0.1$). Considering the observed heterogeneity, we adopted random-effects models to estimate pooled effect sizes. Random-effects models are employed when study characteristics and populations exhibit variability to provide a conservative estimate of the overall effect size. Moreover, sensitivity analyses were conducted to ensure the stability and reliability of the analysis results. These analyses involved removing each study in turn and assessing the effect on the overall results.

Subgroup analysis No.

Sensitivity analysis One-by-one elimination method.

Country(ies) involved China - nursing department, Taizhou Hospital of Zhejiang Province affiliated to Wenzhou Medical University.

Keywords Nursing intervention management; Operating room; Cardiac surgery; Outcome; Patient satisfaction.

Contributions of each author

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