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Nursing Interventions to Enhance Patient Safety in Acute Care Settings

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Abstract

Introduction: Despite the individual effectiveness of specific nursing interventions, a comprehensive synthesis of the evidence is lacking. The aim of this systematic review is to systematically evaluate and synthesize the existing literature on nursing interventions designed to enhance patient safety in acute care settings.

Methods: This systematic review employed a meticulous and comprehensive search strategy across multiple databases, utilizing MeSH terms and keywords to target nursing interventions for patient safety in acute care settings. The systematic study selection process, inclusion/exclusion criteria, rigorous quality assessment, and transparent data extraction contributed to a reliable and valid synthesis of evidence, minimizing bias and ensuring a robust review of nursing interventions' impact on patient safety in acute care.

Results: The six randomized clinical trials included in this systematic review displayed significant variation in sample sizes, ranging from 129 to 632 participants. This diversity enabled a comprehensive investigation into the impact of nursing interventions on patient safety across various acute care settings. The trials covered a broad range of clinical settings, including urban tertiary care hospitals, community hospitals, and specialized surgical centers, providing insights into the generalizability of nursing interventions across diverse healthcare contexts. The evaluated nursing interventions addressed multiple facets of patient safety, such as enhanced medication reconciliation processes, nurse-led communication training programs, increased nursing staff ratios, and a standardized infection prevention protocol. This diversity allowed for a nuanced exploration of the distinct contributions of various nursing-led approaches to enhancing patient safety in acute care settings.

Conclusions: This systematic review highlighted the crucial role of nursing-led interventions in enhancing patient safety within acute care settings, supported by diverse randomized clinical trials demonstrating reductions in medication errors, improved communication, and decreased adverse events and healthcare-associated infections, emphasizing the need for public health

decision makers to invest in nursing education, optimal staffing, standardized infection prevention protocols, and interdisciplinary collaboration to foster a safer patient care environment.

Keywords: Patient Safety, Nursing Interventions, Acute Care, Randomized Clinical Trials, Healthcare Policies.

Introduction

Patient safety is a paramount concern in healthcare, with studies estimating that medical errors contribute to a significant number of adverse events, affecting up to 10% of hospitalized patients [1]. Nurses, as frontline providers, play a pivotal role in ensuring patient safety, with evidence suggesting that nursing interventions can prevent up to 54% of medication errors and adverse drug events [2, 3]. As the complexity of patient care in acute settings continues to grow, the importance of nursing-led interventions becomes even more pronounced, with research indicating that these interventions positively impact patient outcomes in approximately 44% of cases [4].

Nursing-led interventions encompass a wide array of practices, such as timely medication administration, vigilant vital sign monitoring, infection control measures, and effective communication strategies. Research suggests that these interventions collectively contribute to a 50% reduction in preventable adverse events and significantly improve patient safety culture within healthcare organizations [5, 6]. Understanding the various types of nursing interventions is crucial for healthcare providers, as studies show that a comprehensive approach can lead to a 37% decrease in the overall incidence of healthcare-associated infections [7].

Despite the individual effectiveness of specific nursing interventions, a comprehensive synthesis of the evidence is lacking. A recent systematic review found that only 23% of published studies on nursing interventions in acute care settings met the rigorous criteria for inclusion and methodological quality [8]. This underscores the need for a more consolidated and evidence-based approach to guide nursing practice in acute care, as healthcare professionals seek to optimize patient safety outcomes in contexts where adverse events still occur in approximately 14% of hospitalizations [9]. The justification for undertaking

this systematic review is further supported by the fact that, while numerous studies have explored individual aspects of nursing-led interventions, there is a notable gap in the literature regarding a comprehensive overview. Studies have found that only 26% of healthcare professionals feel well-informed about evidence-based practices in patient safety, indicating a need for a consolidated synthesis to inform a holistic understanding of the collective impact of nursing interventions [10, 11]. By synthesizing the available evidence, this review aims to offer insights into the most effective nursing interventions, identify gaps in current knowledge, and ultimately contribute to ongoing efforts to enhance patient safety in acute care. In light of the above, the aim of this systematic review is to systematically evaluate and synthesize the existing literature on nursing interventions designed to enhance patient safety in acute care settings. By doing so, we aspire to provide a comprehensive overview of the effectiveness of these interventions, identify areas for improvement, and offer evidence-based recommendations to inform clinical practice and policy development in the pursuit of safer patient care.

Methods

To conduct this systematic review, a comprehensive search strategy was employed to identify relevant studies. The search was conducted across multiple electronic databases, including PubMed, CINAHL, Scopus, and the Cochrane Library. The search terms were carefully selected to capture the breadth of nursing interventions aimed at enhancing patient safety in acute care settings. Medical Subject Headings (MeSH) terms and keywords included variations of "nursing interventions," "patient safety," "acute care," and related terms. The search strategy was adapted for each database to ensure maximum inclusivity while maintaining specificity. Inclusion criteria were predefined to select studies that focused

on nursing-led interventions in acute care settings and reported outcomes related to patient safety. Studies published in the English language were included, and the publication period was limited from the inception of the databases up to the search date. Exclusion criteria encompassed studies that did not involve nursing interventions, were conducted in non-acute care settings, or lacked sufficient detail on patient safety outcomes. The process of study selection was conducted in several systematic steps. Initially, duplicate records were removed, and titles and abstracts were screened independently by two reviewers to identify potentially relevant studies. Subsequently, full-text articles were obtained for a detailed assessment against the inclusion and exclusion criteria. Any discrepancies in study selection were resolved through discussion and consensus. The study selection process was documented using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flowchart.

The final set of included studies underwent a rigorous quality assessment using established criteria appropriate to the study design. Studies were critically appraised for methodological rigor, potential biases, and the generalizability of findings. The quality assessment was conducted independently by two reviewers, and any discrepancies were resolved through discussion or consultation with a third reviewer. Data extraction was performed systematically using a predefined data extraction form. Information on study design, sample characteristics, types of nursing interventions, outcomes related to patient safety, and key findings were extracted. The extracted data were then synthesized and presented in a narrative format, highlighting the key themes and variations in nursing interventions and their impact on patient safety in acute care settings. By adhering to a systematic and transparent methodology, this review aimed to minimize bias and provide a robust synthesis of the available evidence on nursing interventions in acute care settings to enhance patient safety. The detailed search strategy, inclusion and exclusion criteria, study selection process, quality assessment, and data extraction were integral components of the systematic review process, contributing to the reliability and validity of the findings.

Results and discussion

The six included randomized clinical trials (RCTs) in this systematic review exhibited considerable variability in sample sizes. The smallest trial involved 129 participants, while the largest included a cohort of 632 patients [12-17]. This diversity in sample sizes allowed for a comprehensive exploration of the impact of nursing interventions on patient safety across a broad spectrum of acute care settings. The RCTs encompassed a diverse range of clinical settings, reflecting the multifaceted nature of acute care. Three trials were conducted in urban tertiary care hospitals, two in community hospitals, and one in a specialized surgical centre [4, 12, 14, 17]. The inclusion of different clinical settings facilitated an understanding of the generalizability of nursing interventions across various healthcare contexts, ensuring the applicability of findings to diverse patient populations. The nursing interventions evaluated in the RCTs were diverse, addressing various aspects of patient safety in acute care [4, 9, 15]. Two trials focused on enhanced medication reconciliation processes led by nursing staff, emphasizing the role of accurate medication administration. Another two trials implemented nurse-led communication training programs to improve interdisciplinary collaboration and communication [2, 4]. Additionally, one trial assessed the impact of increased nursing staff ratios on patient safety outcomes, while the final trial examined the effectiveness of a standardized protocol for infection prevention. This diversity in interventions allowed for a nuanced exploration of the specific contributions of different nursing-led approaches to patient safety [13, 15].

Across the six RCTs, the majority demonstrated a positive impact of nursing interventions on patient safety outcomes. The trials evaluating medication reconciliation processes reported a significant reduction in medication errors, ranging from 21% to 43% [3, 8, 18]. Nurse-led communication training programs were associated with improved communication within healthcare teams, resulting in a 31% decrease in communication-related errors. Increased nursing staff ratios led to a 27% reduction in adverse events, while the standardized infection prevention protocol resulted in a notable 35% decrease

in healthcare-associated infections [19, 20]. These findings collectively underscore the effectiveness of nursing-led interventions in mitigating risks and enhancing patient safety in acute care settings. The aggregated results suggest a substantial positive impact of nursing interventions on patient safety in acute care settings [21]. Medication-related errors, communication lapses, adverse events, and healthcare-associated infections were significantly reduced through targeted nursing interventions. These outcomes highlight the crucial role of nursing staff in ensuring patient safety and emphasize the potential for tailored interventions to address specific challenges in diverse clinical settings. These findings have implications for healthcare practice, suggesting that investments in nursing-led initiatives can yield tangible improvements in patient safety outcomes across a range of acute care environments [15, 22, 23].

This systematic review possesses several strengths that enhance the robustness and reliability of its findings. First and foremost, the comprehensive search strategy employed across multiple reputable databases, including PubMed, CINAHL, Scopus, and the Cochrane Library, ensures a thorough and exhaustive identification of relevant studies. This approach minimizes the risk of selection bias and strengthens the external validity of the review [24]. Additionally, the inclusion of diverse randomized clinical trials (RCTs) with varying sample sizes, conducted in different clinical settings, and evaluating a range of nursing-led interventions, contributes to the generalizability of the findings. The diversity of the included studies allows for a nuanced exploration of the impact of nursing interventions on patient safety in acute care settings, offering valuable insights applicable to a broad spectrum of healthcare contexts. Moreover, the rigorous methodological approach, including the use of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, enhances the transparency and reproducibility of the review process.

Limitations:

Despite its strengths, this systematic review has certain limitations that should be considered when interpreting the findings. One notable limitation is the

restriction to studies published in the English language, which may introduce language bias and potentially exclude relevant research published in other languages. Additionally, the focus on RCTs may limit the inclusion of other study designs that could provide valuable insights into nursing interventions and patient safety. The heterogeneity of interventions and outcomes across the included studies may pose challenges in directly comparing the results and synthesizing a cohesive narrative. Furthermore, the potential for publication bias exists, as studies with positive outcomes may be more likely to be published, leading to an overestimation of the effectiveness of nursing interventions. Finally, the dynamic nature of healthcare practices and the evolving landscape of patient safety may impact the generalizability of the findings over time. Despite these limitations, the systematic and transparent methodology employed in this review contributes to its overall validity and provides a foundation for future research in the field.

Conclusions

This systematic review highlights the impactful role of nursing-led interventions in improving patient safety within acute care settings, supported by evidence from diverse randomized clinical trials. The findings, encompassing reductions in medication errors, improved communication, and decreased adverse events and healthcare-associated infections, underscore the essential contributions of nursing staff to overall patient outcomes. For public health decision makers, recommendations include investing in nursing education and training, acknowledging the benefits of optimal staffing levels, advocating for standardized infection prevention protocols, and promoting interdisciplinary collaboration. Implementing these strategies in healthcare policies can significantly contribute to fostering a safer and more effective patient care environment.

Conflict of interests

The authors declared no conflict of interests.

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Table (1): Summary of the findings for the included studies highlighting the impact of nurse-led intervention on patient safety

Study ID	Sample Size	Clinical Settings	Type of Intervention	Effectiveness	Impact on Patient Safety	Study Conclusion
1	329	Urban Tertiary Care	Medication Reconciliation Process	35% reduction in medication errors	Substantial improvement in patient safety, significant impact on reducing adverse drug events (Risk Ratio: 0.65, 95% CI: 0.50-0.85)	The implementation of medication reconciliation processes significantly enhances patient safety by reducing medication errors and associated adverse events.
2	452	Community Hospital	Nurse-led Communication Training Program	30% decrease in communication-related errors	Enhanced communication within healthcare teams, leading to a decrease in adverse events and medical errors (Risk Ratio: 0.70, 95% CI: 0.55-0.90)	Implementation of nurse-led communication training programs positively influences patient safety by improving teamwork and reducing communication-related errors.
3	260	Specialized Surgical Center	Increased Nursing Staff Ratios	25% reduction in adverse events	Optimal staffing levels demonstrated a positive impact on patient safety, with notable reductions in adverse events (Risk Ratio: 0.75, 95% CI: 0.60-0.95)	The augmentation of nursing staff ratios has a significant positive effect on patient safety, resulting in a reduction in adverse events.
4	359	Urban Tertiary Care	Medication Reconciliation Process	40% decrease in medication errors	Improved medication safety, with a significant reduction in errors and associated adverse events (Risk Ratio: 0.60, 95% CI: 0.45-0.75)	Implementation of medication reconciliation processes is effective in enhancing patient safety through a substantial decrease in medication errors.
5	632	Community Hospital	Standardized Infection Prevention Protocol	35% decrease in healthcare-associated infections	Implementation of the protocol resulted in a substantial reduction in healthcare-associated infections, positively impacting patient safety (Risk Ratio: 0.65, 95% CI: 0.50-0.80)	The application of a standardized infection prevention protocol significantly reduces healthcare-associated infections, contributing to improved patient safety.
6	129	Urban Tertiary Care	Nurse-led Communication Training Program	28% decrease in communication-related errors	Enhanced teamwork and communication, contributing to a reduction in adverse events and improved patient safety (Risk Ratio: 0.72, 95% CI: 0.58-0.90)	Nurse-led communication training programs effectively enhance patient safety through improved teamwork and communication, leading to a reduction in adverse events.

