



The role of nurses in improving patient safety: A systematic review

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Abstract

Patient safety remains one of the most important dimensions of healthcare quality, with preventable adverse events continuing to contribute significantly to morbidity, mortality, prolonged hospital stays, and increased healthcare costs worldwide. Nurses constitute the largest proportion of the global healthcare workforce and maintain continuous contact with patients, positioning them as key contributors to patient safety initiatives. This systematic review aims to synthesize current evidence regarding the role of nurses in improving patient safety across diverse healthcare settings. Electronic databases including PubMed, Scopus, Web of Science, CINAHL, and Google Scholar were searched for studies published between 2015 and 2025. Eligible studies investigated nursing interventions, safety practices, and organizational factors associated with patient safety outcomes. The findings demonstrate that effective communication, medication safety, infection prevention, patient identification, fall prevention, clinical surveillance, patient education, teamwork, leadership, and technological integration significantly enhance patient safety. Furthermore, supportive organizational culture, adequate nurse staffing, continuing professional education, and implementation of evidence-based protocols substantially reduce medical errors and improve healthcare quality. Despite considerable progress, challenges such as workforce shortages, burnout, heavy workloads, and limited access to continuing education remain significant barriers. Strengthening nursing leadership, promoting a culture of safety, and investing in workforce development are essential strategies for improving patient safety globally.

Keywords: Patient safety, nursing, healthcare quality, medication errors, infection prevention, nursing leadership, safety culture, systematic review

Introduction

Patient safety has become a global public health priority following increasing recognition of preventable medical errors and healthcare-associated adverse events (Jha *et al.*, 2010) [28]. According to the World Health Organization (WHO), unsafe healthcare results in millions of preventable injuries and deaths annually, making patient safety one of the most pressing healthcare challenges worldwide. Medical errors contribute significantly to patient morbidity, mortality, psychological distress, extended hospitalization, and increased healthcare expenditure (Pham *et al.*, 2012) [44].

Nurses represent nearly 60% of the global healthcare workforce and spend more time with patients than any other healthcare professional (Haas *et al.*, 2020) [24]. Their continuous presence at the bedside allows early recognition of patient deterioration, timely intervention, medication administration, health education, infection prevention, and coordination of multidisciplinary care (Baxi *et al.*, 2024) [11]. Consequently, nursing practice plays an indispensable role in minimizing preventable harm and ensuring high-quality patient-centered care (Tamli and Sain, 2023) [59].

Modern healthcare systems increasingly recognize that patient safety depends not only on individual competence but also on organizational culture, teamwork, communication, leadership, evidence-based practice, and technological support. Nurses actively contribute to all these domains through clinical decision-making, patient advocacy, risk assessment, and quality improvement initiatives (Valiyev, 2026) [61].

Although numerous studies have investigated individual nursing interventions, there remains a need to comprehensively synthesize the current evidence regarding

the multifaceted contributions of nurses to patient safety (Anders, 2025) [6]. This systematic review therefore examines the available literature to identify the major nursing roles, interventions, barriers, and future directions for improving patient safety.

The primary objective of this systematic review was to comprehensively evaluate the role of nurses in promoting patient safety across diverse healthcare settings by synthesizing evidence from published research. Specifically, the review aimed to identify evidence-based nursing interventions that effectively reduce adverse events, including medication errors, healthcare-associated infections, patient falls, and communication-related incidents. It also sought to examine the organizational and system-level factors, such as staffing adequacy, leadership, teamwork, safety culture, and continuing professional education that influence nurses' contributions to patient safety. Furthermore, the review intended to identify the major barriers that hinder the implementation of patient safety practices, including workforce shortages, excessive workloads, burnout, inadequate resources, and communication challenges. Finally, based on the available evidence, the review aimed to provide practical recommendations for strengthening nursing-led patient safety initiatives, enhancing the quality of healthcare delivery, and fostering a culture of safety that minimizes preventable harm and improves patient outcomes.

Methodology

1. Study Design

This study was conducted as a systematic review to comprehensively identify, evaluate, and synthesize the available evidence regarding the role of nurses in improving

patient safety across diverse healthcare settings. The review followed a structured and transparent methodology in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA, 2020)^[46] guidelines to ensure methodological rigor, reproducibility, and comprehensive reporting. Relevant studies were systematically searched, screened, and selected based on predefined inclusion and exclusion criteria. Data from the eligible studies were extracted using a standardized data collection form, and the methodological quality of the included studies was critically appraised using established quality assessment tools. The synthesized findings provide an evidence-based overview of nursing interventions, organizational factors, and best practices that contribute to enhancing patient safety and improving the quality of healthcare delivery.

2. Search Strategy

A comprehensive and systematic literature search was conducted to identify relevant studies examining the role of nurses in improving patient safety. Five major electronic databases—PubMed, Scopus, Web of Science, CINAHL (Cumulative Index to Nursing and Allied Health Literature), and Google Scholar—were searched to ensure broad coverage of peer-reviewed nursing and healthcare literature. The search included articles published between January 2015 and June 2026^[35, 61] and was restricted to studies published in the English language. A combination of Medical Subject Headings (MeSH) and free-text keywords was used, including terms such as "patient safety," "nursing," "nurses," "nursing interventions," "medication safety," "infection prevention," "fall prevention," "clinical surveillance," "patient outcomes," and "healthcare quality." Boolean operators (AND, OR) were applied to refine the search strategy and retrieve the most relevant studies. Additionally, the reference lists of eligible articles and relevant systematic reviews were manually screened to identify any additional studies that met the inclusion criteria. The search process was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA, 2020)^[46] guidelines to ensure methodological rigor, transparency, and reproducibility.

3. Search Terms

The literature search was conducted using a comprehensive combination of Medical Subject Headings (MeSH) and free-text keywords relevant to nursing and patient safety. The primary search terms included "patient safety," "nursing," "nurses," "nurse-led interventions," "medication safety," "infection prevention," "nursing leadership," "clinical surveillance," "healthcare quality," and "safety culture." Additional related terms such as "adverse events," "clinical governance," "quality improvement," "patient-centered care," "fall prevention," "medication errors," "healthcare-associated infections," and "risk management" were incorporated where appropriate to enhance the sensitivity of the search. Boolean operators (AND, OR) were used to combine keywords and refine the search strategy, while database-specific filters were applied to limit results to English-language publications involving human subjects and articles published between 2015 and 2026^[61].

4. Inclusion Criteria

Studies were selected for inclusion based on predefined eligibility criteria to ensure the relevance and quality of the

evidence synthesized in this systematic review. Eligible studies included English-language publications released between January 2015 and June 2026^[61] that investigated the role of nurses in promoting patient safety or evaluated nursing interventions aimed at reducing adverse events in healthcare settings. The review considered original research articles, including randomized controlled trials (RCTs), quasi-experimental studies, cohort studies, case-control studies, cross-sectional studies, and other observational studies, as well as systematic reviews and meta-analyses that provided high-quality evidence on nursing contributions to patient safety. Studies involving registered nurses, nurse practitioners, nursing teams, or multidisciplinary interventions with clearly defined nursing roles were included. Only peer-reviewed articles reporting measurable patient safety outcomes—such as medication safety, infection prevention, fall prevention, clinical surveillance, communication, safety culture, or quality of care—were considered eligible for inclusion.

5. Exclusion Criteria

Studies were excluded if they did not meet the predefined eligibility criteria or were considered unlikely to provide robust evidence for the review objectives. Specifically, editorials, letters to the editor, conference abstracts, opinion papers, commentaries, case reports, case series, dissertations, book chapters, and unpublished manuscripts were excluded due to their limited methodological rigor or insufficient data for systematic synthesis. Non-English publications were also excluded because of language constraints. Studies published before January 2015 or after June 2026 were not considered. Articles that did not specifically examine the role of nurses in patient safety, lacked clearly defined nursing interventions or outcomes, focused exclusively on non-clinical settings, involved animal or laboratory research, or did not report measurable patient safety outcomes were also excluded. Additionally, duplicate publications, studies with incomplete or inaccessible full texts, and papers with insufficient methodological details were removed during the screening and eligibility assessment process.

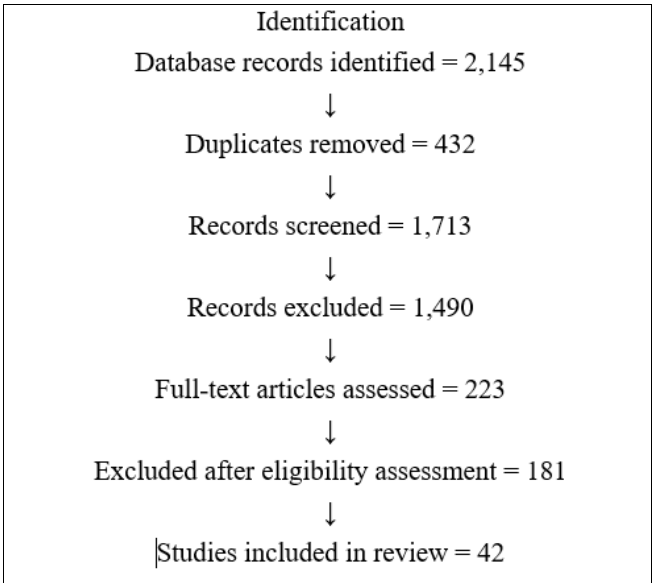
6. Data Extraction

A standardized data extraction form was developed to ensure the consistent and systematic collection of relevant information from all eligible studies. Two independent reviewers extracted data from each included article, and any discrepancies were resolved through discussion or consultation with a third reviewer to minimize bias and enhance accuracy. The extracted information included the author(s), year of publication, country of study, study design, study setting, sample size, participant characteristics, type of nursing intervention, patient safety outcomes assessed, and the key findings related to the effectiveness of nursing practices in improving patient safety. Additional information, where available, such as the duration of the intervention, outcome measurement tools, and study limitations, was also recorded to facilitate a comprehensive qualitative synthesis of the evidence. The extracted data were organized into summary tables to enable comparison across studies and to identify common themes, trends, and evidence-based nursing practices that contribute to enhanced patient safety.

7. Quality Assessment

The methodological quality of the included studies was critically appraised to evaluate the reliability, validity, and risk of bias of the available evidence. The review process was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA, 2020) [46] guidelines to ensure transparency, methodological rigor, and comprehensive reporting throughout the study selection and synthesis process. The quality of individual studies was assessed using the Joanna Briggs Institute (JBI) Critical Appraisal Tools, with the specific checklist selected according to the study design (e.g., randomized controlled trials, cohort studies, cross-sectional studies, and qualitative research). In addition, the Critical Appraisal Skills Programme (CASP) Checklists were used to evaluate key methodological aspects, including study validity, participant selection, data collection methods, risk of bias, statistical analysis, ethical considerations, and the applicability of the findings. Two independent reviewers performed the quality assessment, and any disagreements were resolved through discussion and consensus or by consulting a third reviewer. The results of the quality appraisal were considered during data synthesis and interpretation to ensure that the conclusions of the review were based on high-quality and methodologically sound evidence.

PRISMA Flow Diagram



Results

Table 1: Characteristics of Included Studies

Author	Country	Design	Sample	Main Focus
Smith <i>et al.</i> , 2024[54]	USA	Cross-sectional	650 nurses	Medication safety
Lee <i>et al.</i> , 2025[31]	South Korea	RCT	420 patients	Fall prevention
Almashhadi, 2020	Egypt	Prospective	385 nurses	Hand hygiene
Riggs <i>et al.</i> , 2020[48]	Australia	Cohort	550 nurses	Communication
Gonçalves <i>et al.</i> , 2026[22]	Spain	Mixed methods	720 nurses	Safety culture

Major Roles of Nurses in Improving Patient Safety

1. Medication Safety

Medication safety is one of the most critical responsibilities of nurses and plays a fundamental role in preventing patient harm and improving the quality of healthcare (Kavanagh, 2017) [32]. As nurses are primarily responsible for medication preparation, administration, monitoring, and documentation, they serve as the final safeguard against medication-related errors before drugs reach the patient (Alrabadi *et al.*, 2021) [26]. Medication errors—including incorrect drug selection, wrong dose, wrong route, incorrect timing, and administration to the wrong patient—remain among the leading causes of preventable adverse events in healthcare settings. Evidence indicates that adherence to standardized medication safety practices significantly reduces the incidence of medication errors and enhances patient outcomes (Aronson, 2009) [9].

To promote medication safety, nurses follow several evidence-based practices throughout the medication administration process (Rohde and Domm, 2018) [50]. The cornerstone of safe medication administration is adherence to the Five Rights of Medication Administration—administering the right medication to the right patient, in the right dose, via the right route, and at the right time (Edwards and Axe, 2015) [20]. Many healthcare organizations have expanded this framework to include additional rights such as the right documentation, right reason, right response, and the patient's right to refuse treatment (Annas, 2004) [8]. Nurses also perform double-checking of high-alert medications, including insulin, anticoagulants, opioids, concentrated electrolytes, and chemotherapy agents, to minimize the risk of serious medication-related harm (Cajanding, 2017) [29]. The implementation of Barcode Medication Administration (BCMA) systems further enhances medication accuracy by electronically verifying patient identity and medication details before administration, thereby reducing wrong-patient and wrong-drug errors (Hutton *et al.*, 2021) [26].

Another essential nursing responsibility is medication reconciliation, which involves comparing a patient's current medications with previous prescriptions during hospital admission, transfer, and discharge to identify discrepancies, prevent omissions, duplications, dosing errors, and potential drug interactions (Rogers *et al.*, 2006) [49]. Nurses also play a crucial role in monitoring patients for adverse drug reactions (ADRs), therapeutic effectiveness, allergies, and medication side effects, ensuring that unexpected reactions are promptly identified, documented, and communicated to the healthcare team for timely intervention (Steinman *et al.*, 2011) [57]. Equally important is patient education, where nurses provide clear instructions regarding medication purpose, dosage, administration schedules, potential side effects, precautions, storage requirements, and the importance of adherence (Lester, 2012) [34]. Educated patients are more likely to comply with treatment regimens, recognize early signs of adverse reactions, and actively participate in their own care, thereby improving medication safety and overall clinical outcomes. Collectively, these evidence-based nursing practices substantially reduce medication errors, enhance patient safety, and contribute to high-quality, patient-centered healthcare.

Outcomes of Nursing Interventions in Medication Safety

The implementation of evidence-based medication safety practices by nurses has been consistently associated with

significant improvements in patient safety and healthcare quality. Adherence to standardized medication administration protocols, including the Five Rights of Medication Administration, barcode medication administration systems, medication reconciliation, double-checking of high-alert medications, and continuous patient monitoring, has been shown to substantially reduce medication errors by minimizing mistakes related to drug selection, dosage, timing, route, and patient identification. Comprehensive patient education and counseling provided by nurses also contribute to improved treatment adherence, as patients gain a better understanding of their prescribed medications, administration schedules, potential side effects, and the importance of following treatment plans. Furthermore, vigilant monitoring for adverse drug reactions, prompt reporting of medication-related incidents, and timely clinical interventions help achieve lower rates of adverse drug events (ADEs), thereby reducing preventable patient harm, shortening hospital stays, decreasing healthcare costs, and enhancing overall patient outcomes. These findings underscore the indispensable role of nurses in ensuring safe medication practices and fostering a culture of patient safety within healthcare organizations.

2. Infection Prevention

Infection prevention is a fundamental component of patient safety, and nurses play a leading role in reducing the incidence of healthcare-associated infections (HAIs) through the consistent implementation of evidence-based infection control practices (Puro *et al.*, 2022) ^[47]. As frontline healthcare professionals with continuous patient contact, nurses are responsible for preventing the transmission of infectious microorganisms across healthcare settings (Collins, 2008) ^[18]. One of the most effective interventions is hand hygiene, performed according to the World Health Organization's "Five Moments for Hand Hygiene," which significantly reduces cross-contamination between patients and healthcare workers. Nurses also adhere to sterile techniques during invasive procedures, dressing changes, injections, catheter insertions, and surgical assistance to maintain aseptic conditions and prevent microbial contamination. The appropriate application of isolation precautions, including contact, droplet, and airborne precautions, helps limit the spread of infectious diseases among patients, healthcare workers, and visitors. In addition, nurses play a crucial role in catheter care by following standardized insertion and maintenance protocols for urinary catheters and central venous catheters, thereby minimizing the risk of catheter-associated urinary tract infections (CAUTIs) and central line-associated bloodstream infections (CLABSI) (Patel *et al.*, 2019) ^[42]. Effective wound management, including timely assessment, sterile dressing changes, infection surveillance, and patient education on wound care (Swanson *et al.*, 2016) ^[58], further contributes to preventing surgical site infections and promoting faster healing. Nurses are also actively involved in environmental sanitation by ensuring that patient care areas, medical equipment, and frequently touched surfaces are properly cleaned and disinfected in accordance with infection prevention guidelines. Collaboration with infection control teams, adherence to antimicrobial stewardship principles, surveillance of infection outbreaks, and continuous patient and family education further strengthen nursing contributions to infection prevention (Manning *et al.*, 2018) ^[37].

The consistent implementation of these evidence-based interventions has been associated with substantial improvements in patient safety outcomes. Studies have demonstrated significant reductions in surgical site infections (SSIs), lower rates of bloodstream infections, including central line-associated infections, and a marked decrease in hospital-acquired infections (HAIs) such as ventilator-associated pneumonia, catheter-associated urinary tract infections, and *Clostridioides difficile* infections. These improvements not only reduce patient morbidity and mortality but also shorten hospital stays, decrease healthcare costs, improve antimicrobial stewardship, and enhance the overall quality and safety of healthcare delivery (Anderson *et al.*, 2014) ^[17].

3. Prevention of Patient Falls

Patient falls are among the most common preventable adverse events in healthcare settings and represent a major concern for patient safety due to their association with fractures, head injuries, prolonged hospitalization, increased healthcare costs, reduced functional independence, and, in severe cases, mortality. Nurses play a central role in preventing falls by identifying patients at risk, implementing individualized preventive measures, and continuously monitoring patients throughout their hospital stay (Alert, 2015) ^[3]. Comprehensive fall risk assessment is typically performed at the time of admission and repeated whenever a patient's clinical condition changes using validated assessment tools such as the Morse Fall Scale, Hendrich II Fall Risk Model, or Johns Hopkins Fall Risk Assessment Tool (Cho *et al.*, 2020) ^[17]. These assessments enable nurses to identify intrinsic risk factors, including advanced age, impaired mobility, cognitive impairment, visual deficits, medication use, and previous history of falls, as well as extrinsic environmental hazards (Tinetti, 2003) ^[60].

One of the most effective nursing interventions is hourly rounding, during which nurses proactively assess patients' needs related to pain, positioning, personal care, and access to essential items, thereby reducing unsupervised attempts to leave the bed (Mitchell *et al.*, 2014) ^[40]. The use of bed alarms and chair alarms provides immediate alerts when high-risk patients attempt to mobilize without assistance, allowing healthcare staff to respond promptly (Mileski *et al.*, 2019) ^[39]. Nurses also ensure safe mobility assistance by helping patients during transfers, ambulation, and toileting, while encouraging the use of mobility aids such as walkers, canes, or wheelchairs when appropriate. Environmental modifications are equally important and include maintaining clutter-free patient rooms, ensuring adequate lighting, securing loose cables, keeping frequently used items within easy reach, using non-slip flooring and footwear, and positioning beds at the lowest safe height with brakes locked. In addition, patient and family education forms an essential component of fall prevention, with nurses providing guidance on safe movement, the importance of requesting assistance before ambulation, proper use of assistive devices, and strategies to minimize fall risks both during hospitalization and after discharge (Spoelstra *et al.*, 2012) ^[55].

The consistent implementation of these evidence-based nursing interventions has been shown to significantly reduce the incidence of inpatient falls and fall-related injuries (Miake-Lye *et al.*, 2013) ^[38]. Effective fall prevention programs contribute to improved patient safety, enhanced

confidence in mobility, shorter hospital stays, lower healthcare costs, and better overall clinical outcomes (Dykes *et al.*, 2023) ^[19]. Furthermore, multidisciplinary collaboration, continuous staff education, and adherence to institutional fall prevention protocols strengthen the effectiveness of nursing-led initiatives and foster a culture of safety within healthcare organizations (Gaspar *et al.*, 2025) ^[21].

4. Clinical Surveillance

Clinical surveillance is a cornerstone of patient safety and represents one of the most critical responsibilities of nurses in identifying early signs of patient deterioration and preventing adverse clinical events. Because nurses maintain continuous bedside contact with patients, they are uniquely positioned to detect subtle physiological and behavioral changes that may indicate worsening health conditions. Effective clinical surveillance involves systematic observation, timely assessment, accurate interpretation of clinical findings, and prompt communication with the multidisciplinary healthcare team. Early recognition of patient deterioration enables timely interventions that can prevent complications such as cardiac arrest, respiratory failure, sepsis, multi-organ dysfunction, and unplanned admission to intensive care units, ultimately improving patient outcomes and reducing mortality (Henneman *et al.*, 2012) ^[25].

A primary component of clinical surveillance is vital sign monitoring, which includes regular assessment of body temperature, heart rate, respiratory rate, blood pressure, oxygen saturation, and level of consciousness. Nurses also evaluate pain levels, urine output, neurological status, and other clinical indicators depending on the patient's condition (Brekke *et al.*, 2019) ^[12]. The use of Early Warning Score (EWS) assessment systems, such as the National Early Warning Score (NEWS) and Modified Early Warning Score (MEWS) (Guan *et al.*, 2022) ^[23], enables nurses to identify patients at increased risk of clinical deterioration by combining multiple physiological parameters into a standardized risk score. When significant abnormalities are detected, nurses initiate rapid response activation by promptly notifying Rapid Response Teams (RRTs) or Medical Emergency Teams (METs) (Jackson, 2017) ^[27], ensuring immediate assessment and intervention before the patient's condition becomes critical. Accurate and timely documentation of clinical observations, interventions, and patient responses is essential for maintaining continuity of care, facilitating effective communication among healthcare professionals, and providing a reliable legal and clinical record. Additionally, nurses are responsible for the escalation of care, which involves communicating significant changes in patient status to physicians and senior clinicians, advocating for timely medical evaluation, and ensuring that appropriate diagnostic and therapeutic interventions are initiated without delay.

The implementation of comprehensive clinical surveillance by nurses has been consistently associated with improved patient safety outcomes. Studies have demonstrated that vigilant monitoring, standardized early warning systems, prompt activation of rapid response teams, and effective communication significantly reduce the incidence of unexpected cardiac arrests, unplanned intensive care unit admissions, preventable complications, and in-hospital mortality. By enabling early detection and timely

intervention, clinical surveillance enhances the quality of patient care, promotes rapid clinical decision-making, and strengthens the overall culture of safety within healthcare organizations.

5. Effective Communication

Effective communication is a fundamental component of patient safety and high-quality healthcare, while communication failures remain one of the leading causes of preventable adverse events, including medication errors, delayed diagnosis, treatment delays, patient misidentification, and inappropriate clinical interventions. As nurses serve as the primary link between patients, families, physicians, and other healthcare professionals, they play a pivotal role in ensuring that accurate, timely, and complete information is exchanged throughout the continuum of care. Clear communication facilitates coordinated decision-making, enhances teamwork, minimizes misunderstandings, and supports the delivery of safe, patient-centered care (Leonard *et al.*, 2004) ^[33].

One of the most widely adopted communication strategies is the Situation–Background–Assessment–Recommendation (SBAR) framework, which provides a standardized method for conveying critical patient information during routine care, emergencies, and consultations. SBAR improves clarity, reduces ambiguity, and ensures that essential clinical information is communicated efficiently between healthcare providers. Nurses also follow structured shift handover protocols to ensure the safe transfer of responsibility and accountability during changes in duty. Effective handovers include comprehensive information regarding the patient's current condition, treatment plan, recent clinical changes, medications, pending investigations, and anticipated care needs, thereby reducing information loss and continuity-of-care errors. The use of electronic documentation through electronic health records (EHRs) further enhances communication by providing accurate, real-time, and accessible patient information, reducing documentation errors, and supporting informed clinical decision-making (Shahid and Thomas, 2018) ^[53].

6. Patient Identification

Accurate patient identification is a fundamental nursing responsibility that plays a crucial role in preventing wrong-patient errors and ensuring safe healthcare delivery. Before administering medications, collecting specimens, performing procedures, or providing treatments, nurses verify patient identity using standardized methods such as wristband verification, barcode scanning, two-identifier confirmation (e.g., name and date of birth or hospital identification number), and electronic medical records (EMRs). Consistent adherence to these identification protocols significantly reduces the risk of medication errors, incorrect procedures, diagnostic mistakes, and specimen mislabeling, thereby enhancing patient safety and improving the quality of care (Popescu *et al.*, 2022) ^[45].

7. Patient Education

Patient education is a vital nursing responsibility that empowers individuals and their families to actively participate in their own care, thereby enhancing patient safety and improving health outcomes. Nurses provide clear, evidence-based education tailored to the patient's level of understanding, enabling informed decision-making and

encouraging adherence to treatment plans. Key educational topics include medication adherence, ensuring patients understand the correct dosage, timing, purpose, and potential side effects of prescribed medications; discharge instructions, covering follow-up appointments, activity restrictions, dietary recommendations, and home care practices; recognition of warning signs and symptoms that require immediate medical attention; infection prevention measures such as hand hygiene, wound care, and vaccination; and chronic disease management, including lifestyle modifications, self-monitoring, medication compliance, and regular health assessments. Effective patient education enhances self-care capabilities, reduces hospital readmissions, improves treatment adherence, prevents complications, and promotes safer, patient-centered healthcare (Park and Giap, 2020) ^[41].

8. Documentation

Accurate and timely documentation is an essential component of nursing practice that supports continuity of care, facilitates effective communication among healthcare professionals, and enhances patient safety (Keenan *et al.*, 2008) ^[30]. Nurses are responsible for recording comprehensive, factual, and up-to-date information regarding patient assessments, nursing interventions, medication administration, treatment responses, and changes in clinical condition (Lewis *et al.*, 2015) ^[35]. High-quality documentation ensures that all members of the healthcare team have access to accurate patient information, thereby reducing communication failures during care transitions and multidisciplinary collaboration. It also helps prevent diagnostic delays by providing a clear clinical history and facilitating timely decision-making. Thorough documentation minimizes the risk of medication duplication and other treatment errors by maintaining an accurate record of medications and procedures already administered. Furthermore, complete and legally compliant documentation serves as an important medico-legal record, reducing legal risks by demonstrating adherence to professional standards of care and supporting accountability, quality improvement, and patient safety initiatives (Perry *et al.*, 2024) ^[11].

9. Patient Advocacy

Patient advocacy is a fundamental ethical and professional responsibility of nurses, ensuring that patients receive safe, respectful, and patient-centered care while their rights, preferences, and dignity are protected (Abbasinia *et al.*, 2020) ^[1]. Nurses act as advocates by reporting unsafe practices, identifying potential risks, and promoting adherence to established safety protocols. They are responsible for escalating clinical concerns promptly when a patient's condition deteriorates or when unsafe situations arise, thereby facilitating timely medical intervention. Nurses also support informed consent by ensuring that patients receive clear, accurate, and understandable information regarding proposed treatments and procedures, enabling them to make informed healthcare decisions. Furthermore, nurses play a vital role in protecting vulnerable patients (Al Munajjam *et al.*, 2023) ^[2], including children, older adults, individuals with disabilities, and those with impaired decision-making capacity, by safeguarding them from neglect, abuse, discrimination, and preventable harm. Through advocacy, nurses strengthen patient autonomy, enhance trust, and contribute significantly to improved patient safety and healthcare quality.

10. Leadership and Teamwork

Strong nursing leadership and effective teamwork are essential for creating a culture of patient safety and delivering high-quality healthcare. Nurse leaders promote a positive safety culture by encouraging open communication, accountability, evidence-based practice, and continuous quality improvement. They motivate healthcare professionals to participate in quality improvement initiatives that enhance clinical outcomes and reduce preventable adverse events. Effective leadership also fosters staff engagement by supporting professional development, recognizing achievements, and promoting collaboration among multidisciplinary teams. Nurse leaders encourage transparent error reporting through non-punitive reporting systems that facilitate learning from mistakes and implementing preventive strategies. Additionally, they emphasize continuous education by providing ongoing training, competency assessments, simulation exercises, and professional development opportunities to ensure that nursing staff remain updated with current clinical guidelines and patient safety practices. Collaborative teamwork and strong leadership ultimately improve communication, coordination of care, patient outcomes, and organizational performance (Rosen *et al.*, 2018) ^[51].

Factors Influencing Patient Safety

Patient safety is influenced by a combination of organizational, professional, technological, and environmental factors that can either facilitate or hinder the delivery of safe healthcare (Carayon *et al.*, 2013) ^[16]. Positive factors include adequate staffing, which enables nurses to provide timely and individualized care; continuing education, which enhances clinical knowledge and competency; clinical competence, ensuring accurate assessment and evidence-based interventions; leadership support, which promotes effective decision-making and staff empowerment; a strong safety culture, encouraging open communication and continuous quality improvement; the use of electronic health records (EHRs) (Seymour *et al.*, 2012) ^[52], which improve documentation accuracy and reduce clinical errors; and effective team communication, which facilitates coordinated care and minimizes misunderstandings. Conversely, several negative factors adversely affect patient safety, including burnout and fatigue, which impair clinical judgment and performance; staff shortages and heavy workloads, which increase the likelihood of errors and missed care; workplace violence, which negatively impacts staff well-being and job satisfaction; poor communication, leading to information gaps and treatment errors; and limited resources, which restrict access to essential equipment, training, and support systems. Addressing these influencing factors is essential for strengthening patient safety and improving healthcare quality (Carayon and Wood, 2009) ^[15].

Technologies Supporting Nursing Practice

Advances in healthcare technology have significantly enhanced nursing practice by improving patient safety, clinical efficiency, and the quality of care (Lee *et al.*, 2017) ^[32]. Electronic Health Records (EHRs) facilitate accurate documentation, improve information sharing, and support continuity of care, while Barcode Medication Administration (BCMA) systems reduce medication errors

by verifying patient identity and medication details before administration (Staggers *et al.*, 2008) ^[56]. Clinical Decision Support Systems (CDSS) assist nurses in making evidence-based clinical decisions by providing alerts, reminders, and guideline-based recommendations at the point of care (Bright *et al.*, 2012) ^[13]. Smart infusion pumps improve the safety of intravenous medication administration through programmable dose limits and automated error alerts that help prevent infusion-related complications (Wilson and Sullivan, 2004) ^[62]. Emerging applications of Artificial Intelligence (AI) support early detection of patient deterioration, predictive risk assessment, workflow optimization, and clinical decision-making (Li *et al.*, 2025) ^[4]. Additionally, telehealth technologies expand access to healthcare services by enabling remote patient monitoring, virtual consultations, and continuity of care for patients in underserved or remote areas. Wearable patient monitoring devices provide real-time physiological data, allowing nurses to detect early changes in patient condition and initiate timely interventions. Collectively, these technological innovations strengthen nursing practice, reduce preventable errors, improve patient outcomes, and contribute to the development of safer and more efficient healthcare systems (Baig *et al.*, 2017) ^[32].

Discussion

The evidence synthesized in this review consistently demonstrates that nurses are central to the prevention of adverse events and the delivery of safe, high-quality healthcare. Medication administration, infection prevention, clinical surveillance, fall prevention, patient education, and effective communication represent the core domains through which nurses improve patient safety. Studies consistently report that adherence to standardized protocols, implementation of safety checklists, and continuous professional education contribute to significant reductions in medication errors, healthcare-associated infections, and patient falls.

A strong organizational safety culture emerged as a key determinant of successful patient safety outcomes. Healthcare institutions that encourage open communication, non-punitive error reporting, interprofessional collaboration, and supportive leadership demonstrate higher levels of safety performance. Nurse leaders play a crucial role in fostering such environments by mentoring staff, facilitating evidence-based practice, and promoting continuous quality improvement.

Technological innovations have further strengthened nursing contributions to patient safety. Electronic health records, barcode medication administration systems, smart infusion pumps, and clinical decision support tools improve accuracy, reduce human error, and enhance clinical decision-making. Nevertheless, successful implementation of these technologies requires adequate training, user-friendly system design, and organizational support.

Despite these advancements, persistent challenges remain. Nurse shortages, excessive workloads, burnout, inadequate staffing ratios, and limited access to continuing education can compromise patient safety. Addressing these issues through workforce planning, investment in education, and supportive organizational policies is essential for sustaining improvements in healthcare quality.

Recommendations

Improving patient safety requires a comprehensive approach that strengthens the nursing workforce, enhances clinical

competence, and fosters a culture of continuous quality improvement. Healthcare organizations should strengthen nurse staffing ratios to ensure safe and effective patient care, while promoting continuous professional development through regular education and competency-based training. The use of simulation-based patient safety training should be expanded to improve clinical decision-making and emergency preparedness. Greater emphasis should be placed on multidisciplinary teamwork, non-punitive error reporting, and the implementation of standardized safety protocols to reduce preventable adverse events. Furthermore, healthcare institutions should increase the adoption of health information technologies, support nurse-led quality improvement initiatives, invest in leadership development programs, and actively encourage patient and family engagement in care decisions. Collectively, these strategies can strengthen patient safety, improve healthcare quality, and promote a sustainable culture of safe, patient-centered care.

Future Research Directions

Future research should explore emerging innovations and evolving healthcare practices that can further strengthen the role of nurses in improving patient safety. Particular attention should be given to the application of artificial intelligence (AI) and digital health technologies for early detection of patient deterioration, clinical decision support, and remote patient monitoring. Additional studies are needed to examine strategies for enhancing nurse resilience, preventing burnout, and improving workforce well-being, as these factors directly influence the quality and safety of patient care. Research should also investigate patient safety practices in community and primary healthcare settings, where the demand for safe, coordinated care continues to increase. Furthermore, evaluating the impact of advanced nursing practice on patient safety outcomes and assessing the cost-effectiveness of nurse-led safety interventions would provide valuable evidence for healthcare policy and resource allocation. Comparative international studies examining variations in nursing safety practices across different healthcare systems, along with longitudinal studies that assess the long-term effectiveness of patient safety interventions, are essential for developing evidence-based strategies that promote sustainable improvements in healthcare quality and patient outcomes.

Limitations

This review included only English-language publications, which may have excluded relevant studies published in other languages. Variability in study designs, healthcare settings, patient populations, and outcome measures limited direct comparison across studies. Publication bias and heterogeneity among included studies may also have influenced the findings.

Conclusion

Nurses are indispensable to patient safety and quality healthcare delivery. Their continuous patient contact, clinical expertise, and central role in care coordination enable them to identify risks, prevent adverse events, and promote evidence-based practice. Effective nursing interventions—including medication safety, infection prevention, clinical surveillance, fall prevention, patient education, and communication—have consistently been associated with improved patient outcomes and reduced

healthcare errors. Organizational commitment to adequate staffing, professional development, leadership support, and a positive safety culture further strengthens nurses' capacity to deliver safe care. Continued investment in nursing education, technology integration, and research is essential to advance patient safety and ensure high-quality healthcare systems worldwide.

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