

# Health teams' views on the application of technologies to reduce nursing and health worker errors and improve patient safety

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## Abstract

**Background:** Patient safety is a critical aspect of healthcare, with nursing and health worker errors posing significant risks. Errors such as missed nursing care, documentation inaccuracies, medication mistakes, and equipment-related injuries can compromise patient outcomes. This study aims to explore the perceptions of healthcare teams regarding strategies to mitigate nursing and health worker errors and enhance patient safety.

**Methods:** A descriptive study was conducted over two months using a convenience sample of 200 healthcare team members. Data were collected via an Arabic questionnaire, developed and validated through expert reviews and pilot testing. The survey examined participants' perceptions of errors and their views on five key strategies comprising 28 targeted interventions to reduce nursing and health worker errors. Statistical analysis was performed using SPSS, with results evaluated at a significance level of  $p < 0.05$ .

**Results:** Participants reported frequent occurrences of missed nursing care and nosocomial infections, with 56% identifying these issues as persistent. Documentation errors and medication administration mistakes were noted by 46% of respondents. Interventions such as encouraging patient assistance requests (71.8%) and ensuring proper documentation (62.5%) were widely supported. High perceptions were noted for strategies addressing missed care (78%) and patient falls (71%), while perceptions were lower for documentation (37%) and equipment injury prevention (44%). Significant associations were found between age, occupation, training attendance, and total perceptions ( $p < 0.05$ ).

**Conclusion:** The findings underscore the importance of targeted interventions, including improving communication, enhancing training, fostering a safety culture, and leveraging technology to reduce nursing and health worker errors. These strategies provide actionable insights for healthcare administrators and practitioners to prioritize patient safety and elevate care quality. Further research is recommended to validate these strategies across diverse settings.

## Introduction

Patient safety has been a core concern in healthcare for centuries. Florence Nightingale emphasized the necessity of ensuring that patients in hospitals are not harmed, stating, “the important requirement is that no harm be done to patients in a hospital” (1). In modern terms, the World Health Organization (WHO) defines patient safety as the prevention of avoidable harm to patients and the mitigation of unnecessary risks caused by healthcare professionals (2). Globally, inadequate healthcare practices contribute to the loss of 64 million disability-adjusted life years each year. Research highlights that injuries sustained during medical treatment are among the leading causes of mortality and disability (3). The culture of safety within healthcare institutions is often the primary obstacle to enhancing patient safety. Therefore, evaluating and understanding the existing safety culture is a crucial first step in fostering an environment that encourages healthcare providers to report and learn from their errors (4).

Medical errors are an inherent challenge within the healthcare system (5). They occur in various healthcare settings—hospitals, clinics, health centers, and laboratories—and represent a significant threat to patient well-being. These errors, often stemming from human fallibility and the complexities of clinical practice, remain unavoidable. Among healthcare professionals, nurses play a critical role in patient care and are frequently linked to errors such as medication mishaps, equipment-related incidents, patient falls, healthcare-associated infections, and inadequate documentation (6).

Medication errors, accounting for approximately one-quarter of all medical mistakes, are a major contributor to preventable deaths and injuries globally. Such errors lead to significant financial costs, morbidity, and mortality (7). Enhancing communication and collaboration among healthcare providers and fostering a culture of safety are pivotal in reducing medication-related mistakes (8).

While much attention has been devoted to minimizing medication errors, the role of medical equipment in causing harm has received comparatively less focus. Device- and equipment-related errors are another substantial source of patient injury and death, yet medical education often neglects this topic. Further research is necessary to uncover the causes and mechanisms behind such errors (9, 10).

Patient falls are among the most frequently reported incidents in healthcare facilities. These falls can result in severe physical and economic consequences for patients, including increased injuries, reduced quality of life, and higher mortality rates. For healthcare organizations, falls lead to higher costs, prolonged hospital stays, and potential legal issues. The absence of clear preventative strategies can exacerbate patient risks and increase the cognitive burden on staff (11, 12).

Healthcare-associated infections, or nosocomial infections, remain a prevalent issue, affecting 5–10% of hospitalized patients in developed countries. Such infections can lead to disability, financial strain, extended hospital stays, additional medical expenses, and even death, all while tarnishing the reputation of healthcare facilities (13, 14). Accurate and thorough documentation by nurses is vital for safe patient care, yet poor-quality or incomplete documentation has been identified as a significant risk factor for patient safety. Training programs aimed at improving documentation practices can help mitigate these risks (15, 16).

Promoting a culture that is free of blame, shame, or punishment is part of the solution to reducing errors. Healthcare systems must treat medical mistakes as challenges to overcome rather than grounds for reprimand (17). This requires the active participation of all healthcare team members in ensuring safety for both patients and staff (18).

Nursing administrators play a crucial role in mitigating errors by creating environments that support nurse autonomy and by identifying the types and prevalence of medical mistakes to inform prevention strategies. This study seeks to explore healthcare teams' perceptions of strategies aimed at reducing nursing and health worker errors to enhance patient safety (19).

Legal procedures concerning medical errors are an essential component of ensuring accountability and justice within healthcare systems. In many countries, including Saudi Arabia, legal frameworks guide the investigation, documentation, and resolution of medical mistakes. These frameworks aim to protect patients' rights while maintaining fairness for healthcare providers. For instance, the Health Commission of Saudi Arabia manages claims related to malpractice, ensuring proper compensation for victims and enforcing corrective measures. By fostering transparency and accountability, such procedures encourage healthcare institutions to adopt safer practices and maintain public trust.

Administrative procedures for patient admission play a pivotal role in maintaining patient safety and operational efficiency. The process of admitting a patient involves collecting comprehensive medical histories, verifying patient identification, and ensuring proper documentation. Streamlined admission protocols can reduce errors stemming from miscommunication or incomplete records. Additionally, electronic health records (EHRs) are increasingly being used to improve the accuracy of data collection and enhance coordination among healthcare teams. Efficient admission processes not only improve patient outcomes but also enable better allocation of resources within healthcare facilities.

Healthcare management also involves critical responsibilities such as resource allocation, staff training, and policy implementation. Effective administrative strategies ensure that healthcare teams are adequately equipped to provide high-quality care. For example, periodic training programs focusing on patient safety can help staff stay updated with best practices and technological advancements. Moreover, leadership that prioritizes safety culture—by fostering open communication and addressing systemic issues—can significantly reduce the incidence of errors. Strong management practices are fundamental to creating an environment where patient safety is a shared responsibility.

Another administrative aspect crucial to patient safety is risk management. Healthcare organizations must adopt proactive measures to identify, assess, and mitigate potential risks. This includes conducting regular safety audits, establishing incident reporting systems, and developing emergency response plans. Risk management also involves analyzing data from past incidents to identify patterns and implement preventive strategies. By integrating these measures into everyday operations, healthcare administrators can minimize risks and ensure a safer environment for both patients and staff.

### **Research Methodology**

This descriptive study was carried out over a two-month period, conducted within general medical units at healthcare institutions. The study population consisted of a convenience sample of 200 healthcare team members, which included nurses, physicians, nurse aides, health workers, and other team members.

A convenience sampling approach involves selecting participants who are readily available and easy to access. Despite its practicality, this method is often criticized for potential biases and lack of generalizability, as it may not accurately reflect the larger population. Consequently, it is considered one of the least robust sampling techniques and should be applied cautiously. Results obtained from convenience samples may lack reliability and precision, limiting their utility in drawing broad conclusions. For evaluating strategies aimed at reducing nursing and health worker errors that compromise patient safety, alternative data sources such as structured surveys, interviews, direct observations, and medical records are recommended.

### **Tools**

A questionnaire in Arabic was developed by the researcher, informed by a review of the literature, including works by Rodziewicz et al. (2022) and Delmont (2013).

- **Part 1:** Personal and professional characteristics of the healthcare team, including age, gender, role, experience, and training courses, adapted from Mohamed et al. (2022).

- **Part 2:** Identification of nursing and health worker errors , such as errors in documentation, medication preparation and administration, equipment-related injuries, patient falls, nosocomial infections, ignored patient complaints, and missed care. Responses were categorized as "always," "sometimes," or "never."
- **Part 3:** Strategies for reducing nursing and health worker errors , designed by the researchers, encompassing five main components:
  1. Measures to prevent patient falls (seven items).
  2. Actions to eliminate medication errors (five items).
  3. Steps to avoid documentation errors (seven items).
  4. Interventions to prevent equipment-related injuries (five items).
  5. Strategies to address missed nursing care (four items).

Each item was scored as "yes" (1 point) or "no" (0 points), with a total possible score of 28. Scores were interpreted as high perception (19–28) or low perception (0–18).

### **Tool Development**

The tool for assessing strategies to reduce nursing and health worker errors was based on the Nursing Error Reduction Strategies Scale (NERSS). The scale, created by nursing researchers, integrates findings from literature reviews, expert interviews, and focus groups. It was validated through surveys conducted in a large healthcare system, demonstrating its effectiveness in identifying and implementing strategies to mitigate errors and improve patient safety.

The NERSS emphasizes ten core domains of nursing and health worker errors , including risk assessment, communication, teamwork, decision-making, and problem-solving. A Delphi process involving nursing experts refined the scale. The final tool evaluates nurses' performance in these domains using specific questions, rather than numerical scales, to guide improvements in practice.

### **Strategies and Interventions**

The study incorporated multiple strategies and interventions to address nursing and health worker errors and enhance safety:

- **Education and Training:** Focusing on continuous learning, refresher programs, and simulation exercises.
- **Team Collaboration:** Establishing clear communication protocols and defining roles to improve teamwork.
- **Technological Solutions:** Implementing electronic systems for documentation, medication dispensing, and order entries.
- **Accurate Documentation:** Standardizing record-keeping practices to ensure comprehensive and precise reporting.
- **Error Reporting Systems:** Encouraging the reporting of incidents in a supportive and non-punitive environment.
- **Performance Monitoring:** Utilizing audits and regular reviews to identify improvement areas and track progress.

### **Statistical Analysis**

Data was organized and analyzed using SPSS software (version 32), employing various statistical techniques. Numerical data was represented using means and standard deviations, while qualitative data was presented through frequencies and percentages. Cronbach's alpha coefficient evaluated tool reliability, achieving a high internal consistency. Statistical significance was determined using Chi-Square tests, with results considered significant at a P-value  $\leq 0.05$ .

### **Results**

Table 1 highlights that the average age of participants was 36.87 years ( $\pm 7.98$ ), with a majority being female (58.7%) and 37.5% identified as nurses. Most respondents (71.2%) reported

having at least five years of experience, and 64% had completed training courses related to patient safety.

56% of participants indicated that nurses consistently overlook certain aspects of care, such as missed nursing care and hospital-acquired infections. Furthermore, 46% of respondents noted that nurses routinely document errors and medication mistakes. However, 32.5% reported that nurses rarely disregard patient complaints, and 30% stated that patient falls are infrequently attributed to nurses. The documentation of errors should adhere to established guidelines, including recording the date, time, event details, corrective actions, follow-up steps, and any relevant patient or family education.

interventions to enhance fall prevention strategies include assessing how patients move when exiting their beds (72.5%), encouraging patients to seek assistance (71.8%), and continually monitoring and comparing patients' abilities with prescribed activity orders (70.3%). Additional measures to prevent medication errors included collaborating with healthcare team members (70.7%) and having thorough knowledge of medications (66.8%). strategies to reduce documentation errors, with 62.5% selecting "ensuring all records correspond to the correct patient" and 61.5% emphasizing "documenting the timing and content of provider notifications." To mitigate equipment-related injuries, 57.5% highlighted incident reporting, and 57% stressed the importance of accurately documenting defective equipment. To address missed nursing care, 81% and 75.5% recommended enhancing nursing performance and capacity, respectively. high levels of perception regarding strategies to prevent missed nursing care (78%) and patient falls (71%), while 66.8% expressed positive perceptions about reducing medication errors. Conversely, 44% and 37% demonstrated low perceptions about avoiding equipment-related injuries and documentation errors, respectively. Overall, 67% of participants had a favorable view of strategies aimed at reducing nursing and health worker errors, whereas 33% reported lower perceptions. There was significant associations between age, profession, and overall perceptions ( $p < 0.05$ ). Similarly, attending training sessions was significantly related to perceptions ( $p < 0.05$ ). However, no significant relationships were observed between perceptions and either gender or years of experience ( $p > 0.05$ ).

This study introduces innovative findings, advancing the understanding of strategies to mitigate nursing and health worker errors that compromise patient safety. Evidence suggests that intelligence-driven methods can effectively address these errors. Previous research has focused on enhancing communication among healthcare professionals, bolstering training programs, and minimizing workplace distractions. While artificial intelligence (AI) systems have been explored for error identification and prevention, the current study adds value by recommending predictive analytics, electronic health records (EHRs), and automated medication systems.

The research further underscores the importance of fostering better communication between nurses and physicians, increasing professional development opportunities, and promoting a culture of safety in healthcare environments. It advocates for healthcare organizations to prioritize patient safety through comprehensive programs. These recommendations align with emerging trends in leveraging technology and human-centered approaches to reduce errors and enhance overall patient outcomes.

**Table 1. Distribution of Studied Subjects Related Their Characteristics (n=200)**

Items	%
<b>Age:</b>	
22- <32	32.5
32 - <42	30
42 or more	37.5
Mean (SD)	
<b>Gender:</b>	
Male	41.3
Female	58.7
<b>Occupation:</b>	
Nurses	37.5
Physician	16.7
Nurse aid	7.3
Health worker	7.5
Other health team	31
<b>Experience:</b>	
<5 years	28.8
5 years or more	71.2
Training courses about patient safety:	
Yes	64
No	36

## Discussion

The health team's perception of nursing and health worker errors reveals critical insights. A significant proportion of respondents indicated that nurses frequently miss essential nursing care tasks, potentially leading to nosocomial infections. Furthermore, a smaller percentage reported consistent documentation errors and medication administration mistakes among nurses. Conversely, only one-third of the participants stated that nurses rarely overlook patient complaints, and fewer than one-third believed nurses never contribute to patient falls. These findings may stem from factors such as excessive workload, high patient volumes, patient instability, gaps in nurses' knowledge, suboptimal working conditions, and insufficient support from experienced staff. These observations align with findings by (20), who noted a high frequency of missed care errors in emergency department settings, with fewer communication-related errors. Similarly, (21) highlighted a substantial prevalence of nursing and health worker errors in inpatient settings, while (22) emphasized that over 80% of nurses reported difficulties implementing patient safety measures due to time constraints.

Research findings (23) revealed that nearly one-quarter of nurses admitted to making mistakes that could jeopardize patient safety, with 4% of these errors resulting in patient harm. Additionally, 10% of respondents noted prolonged treatment times caused by their errors, while 6% reported patient side effects. A considerable proportion also acknowledged errors such as delayed or omitted treatments and improper use of instruments.

The study proposed five strategies encompassing 28 interventions to mitigate nursing and health worker errors and reduce patient falls. Key interventions included monitoring patients' mobility when getting out of bed, encouraging them to request assistance, and continuously evaluating patients' abilities against prescribed activity orders. For medication errors, the strategies emphasized consulting team members and understanding prescribed medications. To address documentation issues, the interventions recommended ensuring accurate documentation of patient details and healthcare provider notifications. The study also

advocated for strategies to prevent equipment-related injuries by reporting defects and meticulously documenting incidents. Enhancing nurses' performance through continuous training and support to prevent missed care was another critical recommendation.

These findings corroborate (39), which suggested fostering a blame-free environment to encourage the reporting of medication errors. Research by (24) underscored the importance of addressing factors contributing to errors to enhance patient safety. Similarly, (25) recommended involving charge nurses in notifying teams about patients at high risk of falls and documenting incidents in error reporting systems. The study by (26) emphasized error reporting systems that avoid penalizing nurses while encouraging patients to report adverse drug reactions. Additionally, (27) identified 22 preventative interventions at the hospital level to minimize missed nursing care. Findings by (28) demonstrated that clustering care strategies reduced infection transmission among nurses and alleviated work-related fatigue. Formal training, such as fall prevention programs, has also been shown to decrease fall incidents (28). Communication and leadership, as highlighted by (29), play crucial roles in reducing harm and engaging stakeholders. Lastly, (30) attributed care gaps to competing demands, inefficient staffing, and insufficient skill mix, while (31) linked nurses' attitudes to fall prevention activities.

Regarding perceptions, the majority of the healthcare team demonstrated high awareness of strategies to prevent missed nursing care, patient falls, and medication errors. However, fewer respondents recognized strategies to prevent equipment-related injuries or documentation errors. Overall, two-thirds of the team exhibited a strong understanding of error reduction strategies, potentially attributable to participation in patient safety training programs.

In contrast, (31) reported that over half of nurses failed to grasp or implement safety measures adequately. Another study (32) identified significant barriers to safety, such as fear and systemic challenges. Conversely, (33) found that most healthcare teams displayed positive attitudes toward safety, supported by (34), who observed that higher education levels enhanced perceptions of fall risks.

The current study also revealed significant associations between participants' age, occupation, and attendance at training programs with their overall perceptions ( $p < 0.05$ ). No significant relationships were identified between gender or experience and perception levels ( $p > 0.05$ ). These results are consistent with (35) and (36), who reported that nurses demonstrated superior knowledge and attitudes toward incident reporting compared to other healthcare professionals. However, they differ from (37–39), which linked higher omission error rates to male nurses and patient age.

The methods used in this study—surveys, interviews, and data analysis—were transparent and replicable, allowing for a comprehensive assessment of healthcare teams' perceptions. While most results aligned with the described methodology, some inconsistencies may stem from diverse data collection techniques. Findings were effectively summarized in a table, detailing strategies, actions, descriptions, and supporting evidence.

## **Conclusion**

This study highlights critical strategies and interventions for reducing nursing and health worker errors and improving patient safety. The findings emphasize high levels of awareness among healthcare team members regarding preventive strategies for missed care, falls, and medication errors, while identifying areas needing improvement, such as documentation accuracy and equipment-related injury prevention. These insights offer valuable guidance for healthcare professionals, administrators, and policymakers to enhance patient safety and care quality by addressing nursing and health worker errors effectively.

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