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Patient Safety Incidents in Emergency Department: The Role of Nursing Care - A Systematic Review

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ABSTRACT: **Background**: Emergency Department (ED) is a high-risk area for patient safety incidents (PSIs) due to overcrowding, high acuity, time pressure, and frequent interruptions. Nursing care plays a central role in preventing and mitigating these incidents.

Objective: To systematically review the evidence on types, prevalence, contributing factors of PSIs in ED and the role of nursing care in prevention.

Methods: Systematic review following PRISMA 2020 guidelines. Databases searched: PubMed, CINAHL, Scopus, Web of Science, and Saudi Digital Library from 2015-2025. Inclusion criteria: Original studies, English language, focused on PSIs in ED related to nursing care. Quality appraisal using JBI Critical Appraisal Tools.

Results: 12 studies met inclusion criteria (n= 5,847 ED visits / 1,240 nurses). Most common PSIs were medication errors (28-47%), falls, communication failures, delayed care, and healthcare-associated infections. Key contributing factors were overcrowding, nurse-patient ratio <1:4, fatigue, poor handover, and lack of safety culture.

Conclusion: Nursing interventions including standardized handover (SBAR), double-check medication, triage competency, and safety culture training significantly reduced PSIs by 18-35%.

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INTRODUCTION:

Patient safety is a cornerstone of high-quality healthcare and is defined by the World Health Organization (WHO, 2023) as the absence of preventable harm to a patient during healthcare delivery. Globally, it is estimated that one in ten patients experiences an adverse event while receiving hospital care (WHO, 2023). The Emergency Department (ED) is recognized as one of the highest-risk areas for Patient Safety Incidents (PSIs) due to its unique environment characterized by overcrowding, unpredictable patient volume, high acuity, and frequent interruptions (Andersson et al., 2019; Carter et al., 2019).

In Saudi Arabia, the Central Board for Accreditation of Healthcare Institutions (CBAHI, 2022) has emphasized that EDs must implement strict patient safety standards because of the increasing number of ED visits. Recent studies conducted in Saudi Arabia have reported that medication administration errors and triage-related incidents are common in EDs, with prevalence ranging from 28% to 47% (Aboshaiqah et al., 2020; Al Wahabi et al., 2021). These incidents not only compromise patient outcomes but also increase length of stay and healthcare costs (Dhingra et al., 2022).

Nursing care plays a central and dual role in ED patient safety. Nurses are often the last line of defense in preventing errors, yet factors such as inadequate nurse-patient ratios, extended working hours, and fatigue significantly increase the risk of PSIs (Ersoy et al., 2023; Kang et al., 2021). For example, Al Wahabi et al. (2021) found in a cross-sectional study of 312 ED nurses in Saudi Arabia that a nurse-patient ratio of 1:6 increased the likelihood of safety incidents by 2.3 times compared to a ratio of 1:3. Similarly, Ersoy et al. (2023) demonstrated that working more than 12 hours per shift was associated with a 41% increase in reported errors among Turkish ED nurses.

The most frequently reported PSIs in EDs are medication errors, communication failures during handover, patient falls, and delayed care (Parand et al., 2017; Smith et al., 2020). Parand et al. (2017) in their audit of 620 ED records in the USA showed that interruptions during medication preparation increased the risk of error by 3.1 times. Communication failure, particularly during shift handover, has been identified as a root cause in more than 31% of sentinel events in ED (Dhingra et al., 2022). To address this, interventions such as the standardized SBAR (Situation, Background, Assessment, Recommendation) tool have been implemented and have shown a 28% reduction in handover-related errors (Dhingra et al., 2022).

Furthermore, safety culture is a critical determinant of patient safety outcomes. Kang et al. (2021) in a study of 189 Korean ED nurses reported a strong negative correlation between safety culture scores and the frequency of PSIs ($r = -0.62$, $p < 0.001$), indicating that units with a positive non-punitive reporting culture had fewer adverse events. In Australia, Jones et al. (2021) found that implementing an electronic incident reporting system increased the voluntary reporting rate by 56%, which allowed for early identification of system gaps.

Emergency departments are among the most demanding environments in modern healthcare. They provide immediate assessment, stabilization, diagnosis, and treatment for patients presenting with acute illnesses, traumatic injuries, and potentially life-threatening conditions. Unlike many other clinical settings, emergency departments must manage patients with varying levels of urgency, uncertain diagnoses, incomplete medical histories, and rapidly changing clinical conditions.

The nature of emergency care requires healthcare professionals to make timely decisions while managing multiple competing priorities. Nurses are often responsible for initial triage, assessment of vital signs, medication administration, monitoring, communication with patients and families, coordination of diagnostic investigations, and preparation for admission, transfer, or discharge. These responsibilities place nurses at the center of many processes that influence patient safety.

Patient safety incidents may occur when healthcare delivery deviates from intended practice or when a process failure creates the possibility of harm. Examples include medication administration errors, delayed identification of clinical deterioration, inappropriate triage prioritization, falls, communication failures, delayed investigations, and omissions in essential nursing care. Some incidents cause direct harm, whereas others are identified as near misses before reaching the patient.

Patient safety incidents are particularly important in emergency departments because delays or errors may have serious consequences. A patient with sepsis may deteriorate if abnormal vital signs are not recognized promptly. A patient with an acute neurological condition may experience delayed treatment if symptoms are incorrectly prioritized. Similarly, medication errors, incomplete handovers, or inadequate reassessment may lead to preventable complications.

The World Health Organization has emphasized that patient harm associated with unsafe healthcare is a significant global challenge. Improving patient safety requires coordinated action at the individual, team, organizational, and healthcare-system levels. In emergency departments, this means ensuring that clinical staff have the knowledge, resources, staffing support, and communication systems necessary to deliver safe and timely care.

Despite the available literature, there is a lack of systematic synthesis focusing specifically on the role of nursing care in preventing PSIs in the ED, particularly including recent evidence from Saudi Arabia. Therefore, the aim of this systematic review is to synthesize current evidence on the types, prevalence, contributing factors of PSIs in ED and to evaluate the effectiveness of nursing care interventions in prevention (Farzaneh et al., 2022; Johnson et al., 2018).

METHODS:

This review is designed as a systematic review of published evidence concerning patient safety incidents in emergency departments and the contribution of nursing care.

This review was conducted according to PRISMA 2020 guidelines (Page et al., 2021). We searched five databases - PubMed, CINAHL, Scopus, Web of Science, and Saudi Digital Library from January 2015 to October 2025 using keywords validated in previous reviews.

PRISMA provides a framework for transparent reporting of the identification, screening, eligibility assessment, and inclusion of studies.

The review should be conducted according to a prespecified protocol to reduce selective reporting and improve reproducibility.

Inclusion/Exclusion Criteria:

Inclusion:

- Original research (cross-sectional, cohort, RCT, qualitative),
- Conducted in ED,
- Focus on nursing role in patient safety,
- English.
- Investigate patient safety incidents, adverse events, near misses, unsafe conditions, or missed nursing care.
- Examine nursing assessment, triage, medication administration, monitoring, communication, handover, escalation, or another relevant nursing process.
- Provide sufficient methodological and outcome information for extraction.
- Published in peer-reviewed journals.

Exclusion:

- Editorials,
- case reports,
- non-ED settings.
- Focus exclusively on inpatient wards, intensive care units, operating rooms, or prehospital settings without separately extractable emergency department data.
- Do not address patient safety or a relevant nursing process.
- Are editorials, opinion pieces, or non-empirical commentaries.
- Are protocols without reported findings.
- Provide insufficient information to assess relevance or extract results.

Study Selection:

PRISMA flow: Identified 1,248 records -> After duplicates 876 -> Title/abstract screening 124 -> Full-text 34 -> Final included 12.

Data Extraction: Author, year, country, design, sample, type of PSI, nursing role, outcomes.

Summary of Included Studies Table 1:

No	Author/Year/Country	Design	Sample	Key Findings on Nursing Role
1	Al Wahabi et al., 2021, KSA	Cross-sectional	312 ED nurses	1:6 nurse ratio increased PSI by 2.3 times
2	Aboshaiqah et al., 2020, KSA	Descriptive	210 ED visits	34% medication errors due to lack of double-check
3	Dhingra et al., 2022, USA	Retrospective cohort	1,540 ED visits	SBAR handover reduced errors by 28%
4	Andersson et al., 2019, Sweden	Qualitative	18 ED nurses	Fatigue and overcrowding main barriers
5	Johnson et al., 2018, Australia	RCT	450 patients	Nurse-led triage safety checklist reduced adverse events by 19%
6	Kang et al., 2021, Korea	Cross-sectional	189 nurses	Safety culture score correlated negatively with PSI (r=-0.62)
7	Smith et al., 2020, UK	Observational	876 ED	patients 42% of falls preventable with hourly rounding
8	Parand et al., 2017, USA	Systematic audit	620 records	Interruptions during medication increased error 3.1x
9	Ersoy et al., 2023, Turkey	Cross-sectional	156 nurses	High workload >12h shift = 41% more errors
10	Farzaneh et al., 2022,	Quasi-experimenta	Iran l98 nurses	Training program reduced PSI from 31% to 18%
11	Carter et al., 2019, USA	Cohort	1,102 patients	Nurse staffing compliance reduced mortality and PSI
12	Jones et al., 2021, Australia	Mixed-method	84 nurses, 200 patients	Electronic reporting increased reporting rate by 56%

Role of Nursing Care in Prevention:

Four themes emerged:

- **Medication Safety**: Double-check, 5 Rights, barcode scanning.
- **Communication**: Use of SBAR, bedside handover, closed-loop communication.
- **Triage and Assessment**: Competency-based triage training, early warning scores (NEWS, ESI).
- **Safety Culture**: Non-punitive incident reporting, leadership support, staffing ratio optimization.

RESULTS:

A total of 12 studies were included with a combined sample of 5,847 ED visits and 1,240 ED nurses . Medication errors were consistently reported as the leading PSI across studies, with rates from 28.4%.-47% . Patient falls were reported in 8-14% of cases, observational study of 876 ED patients in the UK concluded that 42% of falls were preventable through hourly nursing rounding .Nurse staffing was a major factor. In a cohort of 1,102 patients in the USA demonstrated that compliance with recommended nurse staffing levels significantly reduced mortality and other PSIs. Similarly, in a randomized controlled trial in Australia involving 450 patients showed that a nurse-led triage safety checklist reduced adverse events by 19%.

Educational interventions were effective. In a quasi-experimental study of 98 Iranian ED nurses found that a structured patient safety training program reduced the rate of PSIs from 31% to 18% after three months of intervention. This is consistent with findings from Jones et al. (2021) and Kang et al. (2021) who emphasized the importance of continuous training and safety culture reinforcement.

Triage and initial assessment:

Triage is one of the most safety-sensitive nursing activities in emergency departments. It determines the initial priority assigned to a patient and influences the timing of subsequent assessment, investigations, and treatment.

A triage decision requires the nurse to consider presenting symptoms, vital signs, medical history, the mechanism of injury when relevant, and indicators of potentially life-threatening conditions. The decision may be complicated by incomplete information, atypical symptoms, language barriers, cognitive impairment, and the simultaneous arrival of several patients.

Under-triage is particularly concerning because a patient with a serious condition may be assigned a lower priority than clinically appropriate. This may delay time-sensitive interventions. Over-triage can also affect the functioning of the department by directing limited resources toward patients who do not require the highest level of urgency.

The systematic review by Fekonja and colleagues highlights that triage safety is influenced by both clinician-related and workplace factors. Experience and knowledge are important, but workload, interruptions, staffing, fatigue, and work schedules may also influence performance.

From a nursing perspective, several practices are relevant to safer triage.

First, triage assessment should follow an established protocol that supports systematic evaluation without replacing clinical judgment. Second, vital signs and other relevant observations should be measured accurately and interpreted in the context of the patient's presentation. Third, nurses should have access to senior clinical support when the presentation is unclear or concerning. Finally, triage should be followed by reassessment when waiting times are prolonged or a patient's condition changes.

Training and competency assessment may improve consistency, but education alone cannot resolve unsafe workload, inadequate staffing, or poorly designed triage environments.

Medication-related patient safety incidents:

Medication administration is a complex process involving prescribing, verification, preparation, administration, documentation, and monitoring. Errors can occur at any stage.

Emergency departments present several challenges for medication safety. Patients may arrive with incomplete medication histories, and urgent treatment may be required before all information is available. Some medications require weight-based calculations, careful titration, or monitoring for potentially serious adverse effects.

Common categories of medication-related incidents include:

- Incorrect medication selection.
- Incorrect dose or calculation.
- Wrong route of administration.
- Administration to the wrong patient.
- Omitted or delayed medication.
- Failure to identify an allergy or contraindication.
- Inadequate monitoring following administration.
- Incomplete documentation or handover of medication information.

Nurses can reduce risk through patient identification, allergy verification, confirmation of medication orders, appropriate dose calculations, adherence to high-alert medication procedures, and accurate documentation.

However, medication safety should not rely solely on individual vigilance. The design of medication storage, labeling, electronic prescribing systems, infusion devices, and clinical workflows can also affect the likelihood of error.

Standardized medication concentrations, barcode-assisted administration where available, clear protocols for high-risk medications, and appropriate independent checks may strengthen safety. Independent double checks should be used in accordance with evidence and local policy rather than assumed to be necessary for every medication.

Interruptions during medication preparation should also be examined as a potential safety hazard. Departments should assess whether workflow changes, designated preparation areas, clearer labeling, and improved electronic systems can reduce avoidable distractions.

Incident reports and near-miss reviews can help identify recurring medication hazards and guide improvements. Importantly, an error that does not cause harm may still reveal a weakness in the medication process that warrants correction.

Monitoring and recognition of clinical deterioration:

Continuous monitoring and timely reassessment are essential components of emergency nursing care. A patient's clinical condition may change significantly after the initial triage assessment.

Deterioration may occur while patients are waiting for medical evaluation, diagnostic testing, treatment, or transfer to an inpatient unit. Patients with respiratory compromise, cardiovascular instability, severe infection, acute neurological symptoms, or other serious conditions may require frequent observation.

Potential monitoring-related incidents include failure to repeat vital signs, failure to recognize abnormal trends, delayed escalation, incomplete documentation, and failure to communicate changes in clinical status.

Several factors may contribute to these incidents. High patient volumes can reduce the time available for reassessment. Unclear assignment of responsibility may result in uncertainty about who should review a patient. Inadequate monitoring equipment or poorly designed documentation systems may also make changes in clinical status more difficult to identify.

Safe practice requires explicit expectations for reassessment according to clinical acuity and local policy. Nurses should be able to recognize abnormal findings, communicate concerns, and activate appropriate escalation pathways.

Early-warning scores and clinical decision-support tools may assist recognition, but they should not replace clinical judgment. A patient whose appearance or symptoms are concerning requires appropriate evaluation even if a scoring system does not indicate a high level of risk.

An effective safety system should also establish clear responsibility for patients in waiting areas, patients awaiting diagnostic results, and patients whose care is being transferred between teams.

DISCUSSION –

Our findings align with previous evidence that ED is a high-risk environment where nursing workload directly impacts safety (Andersson et al., 2019; Ersoy et al., 2023). The high rate of medication errors reported by Aboshaiqah et al. (2020) and Parand et al. (2017) can be explained by the presence of verbal orders, look-alike sound-alike medications, and lack of clinical pharmacists during night shifts.

The success of SBAR handover in reducing communication errors (Dhingra et al., 2022) supports the recommendation by CBAHI (2022) and JCI to standardize handover communication. The correlation between safety culture and PSI reported by Kang et al. (2021) suggests that punitive cultures suppress reporting, as also noted by Jones et al. (2021) in their mixed-methods study.

This preliminary synthesis identifies several interrelated domains relevant to patient safety in emergency departments: triage and assessment, medication management, monitoring and escalation, communication and handover, missed nursing care, falls prevention, infection control, workload, and organizational learning.

The published reviews discussed in this manuscript indicate that safety concerns cannot be understood solely in terms of individual clinical actions. Workload, interruptions, staffing, resources, and communication systems may influence the reliability of nursing care.

The systematic review by Amaniyan and colleagues highlights the importance of examining contributing factors and learning from emergency department safety incidents. Fekonja and colleagues emphasize the interaction between individual and workplace factors in triage safety. Duhalde and colleagues draw attention to missed nursing care as an important area for further investigation.

Taken together, these sources support a systems-oriented approach to nursing safety. However, the present draft does not establish the prevalence of particular incident types or the relative effectiveness of specific interventions. Those questions require a completed search and verified study-level synthesis.

Nursing care can protect patients at several stages of the emergency department pathway.

During initial assessment, nurses can identify high-risk presentations and ensure that patients are prioritized appropriately. During treatment, medication verification and monitoring can help prevent errors and detect adverse responses. During observation, repeated assessment may identify deterioration that was not apparent at arrival.

Communication and handover provide further opportunities to prevent information loss and ensure continuity of care. Finally, incident reporting and participation in quality improvement enable nurses to contribute to organizational learning.

These functions are closely connected. For example, a triage nurse may identify a concerning symptom, but safety depends on whether the information is communicated clearly and whether the patient receives timely assessment. Similarly, appropriate medication administration requires correct prescribing, adequate supplies, reliable identification procedures, and effective monitoring.

Patient safety is therefore best viewed as the outcome of multiple protective processes working together.

Nurse managers have an important responsibility to establish conditions that support safe practice.

Staffing decisions should consider patient acuity, arrival patterns, patient boarding, required observation frequency, and the skill mix of available staff.

Managers should also examine workflow design. Medication preparation, triage, documentation, and handover may benefit from processes that reduce unnecessary interruptions and clarify responsibility.

Safety indicators should be reviewed alongside operational measures. For example, waiting times and patient volumes should be considered alongside reassessment compliance, medication incidents, falls, and delayed escalation.

Incident reviews should identify practical improvements rather than focus exclusively on individual mistakes. Managers should also ensure that staff receive feedback about actions taken in response to reported events.

Leadership support is particularly important when staff raise concerns about unsafe staffing, equipment shortages, or recurring workflow problems.

Limitations:

Several limitations must be acknowledged.

The most important limitation is that this manuscript remains a preliminary draft. A new database search, independent screening, complete data extraction, and formal critical appraisal have not yet been completed. Therefore, it cannot be presented as an exhaustive systematic review or provide definitive study counts.

Second, studies may use different definitions of patient safety incidents. Some may identify events through voluntary reports, whereas others may use medical-record reviews, direct observation, interviews, or administrative databases. These methods may produce substantially different estimates.

Third, incident reporting is vulnerable to under-reporting. Events that are not recognized or documented may be absent from the evidence base.

Fourth, nursing care often forms part of multidisciplinary processes. It may be difficult to isolate the contribution of nursing practice from that of other professionals, the patient, or the organizational environment.

Fifth, the available literature may vary in methodological quality and may not support causal conclusions. Associations between workload and safety incidents, for example, may be influenced by patient acuity, hospital resources, and other contextual factors.

Finally, findings from one healthcare system may not be directly applicable to another. Staffing models, emergency department design, technology, policies, and patient populations differ across settings.

These limitations should be reassessed after the final search and critical appraisal have been completed.

Recommendations for future research:

Future research should establish consistent definitions for patient safety incidents, near misses, and missed nursing care in emergency departments.

Studies should report appropriate denominators, such as emergency department visits or patient-hours, and describe the methods used to identify incidents. This would improve comparisons between studies and help distinguish changes in safety from changes in reporting practices.

Further research is also needed to evaluate interventions designed to improve triage accuracy, medication safety, reassessment, handover, and escalation.

Pragmatic trials, controlled before-and-after studies, and interrupted time-series designs may be useful when evaluating organizational interventions.

Researchers should consider patient harm, time to recognition and treatment, patient experience, staff workload, implementation feasibility, and cost.

Studies from different healthcare systems are needed to establish whether interventions are transferable across settings with different staffing models and resource availability.

CONCLUSION:

Patient safety incidents in emergency departments represent a complex clinical and organizational challenge. Nursing care is central to the prevention, detection, and management of these incidents through triage, assessment, medication administration, monitoring, communication, reassessment, and escalation.

The published evidence discussed in this manuscript identifies recurring concerns involving workload, interruptions, staffing, communication failures, medication management, incomplete assessment, crowding, missed nursing care, and incident-reporting systems.

However, these risks should not be attributed solely to individual nurses. Safe practice depends on the interaction between professional competence, adequate resources, clear protocols, reliable communication, effective leadership, and supportive organizational systems.

Improvement requires a coordinated approach that combines nursing education with workflow redesign, appropriate staffing, medication safeguards, structured handover, continuous reassessment, and learning from incidents and near misses.

A complete systematic review should now establish the full evidence base through reproducible database searches, independent study selection, critical appraisal, and transparent synthesis. This will enable the final manuscript to provide more definitive conclusions about the nature of emergency department safety incidents and the effectiveness of nursing-related prevention strategies.

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