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Investigating factors threatening the safety of hospitalized children: A systematic review

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Abstract

Patient safety is a fundamental aspect of healthcare quality, defined as the prevention of harm or injury to patients during the provision of care. Ensuring and enhancing the safety of hospitalized children, as a vulnerable population, is particularly critical. Healthcare managers face significant challenges in identifying risks that may arise during treatment processes and potentially lead to irreversible consequences. This systematic review aimed to identify the factors that threaten the safety of children in hospital settings. A comprehensive search was conducted across Persian and English databases, including Google Scholar, PubMed, Scopus, ScienceDirect, CINAHL, SID, Magiran, and IranMedex, covering publications from 2015 to 2023. Keywords included patient safety, children's safety, safety threats, and pediatric wards. The findings indicate that major threats to child safety occur throughout different stages of care and include medication errors (wrong drug or dose), hospital-acquired infections, falls, pressure injuries, misidentification of patients, transfusion errors, organizational culture, parental experience, and healthcare staff knowledge, awareness, and attitudes toward errors. These threats can be categorized into factors related to tasks, communication, team dynamics, education and training, equipment and resources, organizational strategies, work environment, and individual characteristics of staff and patients. Preventive measures, such as adherence to correct medication protocols, hand hygiene compliance, safe patient transfer guidelines, fall prevention strategies, patient identification before procedures, proper therapeutic communication, and staff sensitization, are essential for mitigating these risks. Identifying and addressing these factors at each stage of care is crucial for enhancing child safety and minimizing adverse events in hospitals.

Keywords: Children's safety, safety threat factors, hospitalized children, hospital

Introduction

Patient safety refers to the proactive prevention of harm resulting from errors or lapses in care, emphasizing the design of systems and protocols to minimize adverse outcomes during healthcare delivery (1). Nursing errors, often unintentional, significantly impact patient safety and the quality of care provided (2). Among these, medication errors are recognized as one of the top five causes of preventable patient deaths worldwide, with the World Health Organization estimating that globally, ten million patients suffer injuries or fatalities due to unintentional medical care errors annually (3). Medication errors pose serious threats to healthcare systems, as even minor mistakes by a nurse in medication preparation or administration can lead to severe patient harm, including death (4, 5). For instance, in the United States, medication errors result in 44,000 to 98,000 hospital deaths each year, while in England and Australia, 10% and 16.6% of hospital admissions, respectively, involve adverse events (6).

In recent years, rising awareness of medical and nursing errors has prompted the Iranian healthcare system to prioritize patient safety, particularly for vulnerable populations such as children, and to implement interventions aimed at reducing preventable harm (7). Multiple factors—including systemic, individual, and organizational elements—can threaten patient safety, with human factors often playing the most significant role (8). Adverse events and fatalities due to medical errors impose substantial economic burdens on both patients and healthcare systems (3, 9). Although precise national data on the prevalence and costs of medication errors in Iran is limited, global estimates suggest preventable medical errors account for billions in healthcare expenditure (10).

Achieving a culture of patient safety requires awareness, shared values, beliefs, and practices across all levels of healthcare staff. When safety becomes a core organizational value, it transforms into a culture that promotes diligence, accountability, and professional competence (1, 2, 3). Key domains of concern include hospital-acquired infections, perioperative complications, maternal and neonatal care, and serious adverse events (13). Studies indicate that strategic interventions, particularly in governance and leadership, can elevate patient safety to a hospital-wide priority (14). Evaluating safety culture allows management to identify weaknesses, improve staff awareness, and assess the impact of corrective interventions (16).

According to the World Health Organization, patient safety is defined as the avoidance of unnecessary or preventable harm associated with healthcare services (16). A positive safety culture is one of the most critical determinants of safe care in hospitals (17). Factors such as staff shortages, excessive workload, fear of reporting errors, and limited involvement in decision-making can reduce the overall safety culture in healthcare centers (18). Research suggests that approximately 50% of adverse events are preventable, highlighting the need for hospitals to implement both structural programs and a strong safety culture among staff to improve quality and patient outcomes (19).

Medical errors, defined as incidents that should not occur and are preventable, can arise at any stage of care, including medication selection, dispensing, and administration (20). Today, medical errors are recognized as a major global health challenge, ranked as the eighth leading cause of death worldwide and the fifth in the United States, and are a key driver of malpractice claims (19). Hospital-acquired infections similarly threaten patient safety, imposing significant costs on healthcare systems; globally, at any given moment, approximately 1.4 million people are affected, with developing countries experiencing rates up to 40% higher due to preventable causes (18).

Given the critical importance of patient safety, especially for hospitalized children, a systematic review of factors threatening their safety is essential to guide interventions, enhance awareness, and improve the overall quality of pediatric healthcare delivery.

Methods

This study was a systematic review conducted in 2023 (1402 in the Iranian calendar) aimed at identifying factors threatening patient safety in pediatric hospital wards. The databases searched included Google Scholar, PubMed, Scopus, Science Direct, CINAHL, SID, Magiran, and Iran Medex. Searches were performed in both Persian and English using the following keywords: "patient safety," "children's safety," "safety threats," and "pediatric ward." Keyword selection and search strategies were determined by the researchers to ensure comprehensive coverage of relevant literature.

To assess the relevance of articles, titles were initially screened, followed by abstracts. Articles that met preliminary criteria were further reviewed in full text for verification regarding study location, year, and subject matter. Inclusion criteria comprised articles published between 2015 and 2023 in either Persian or English. Exclusion criteria included studies focused exclusively on other healthcare professionals or non-pediatric populations.

Data Extraction

Data were extracted using a standardized form capturing key information, including author details, year of publication, study objectives, research design, sample size, data collection methods, and main findings. Following data extraction, the results were systematically analyzed, categorized, and synthesized. Initially, 68 articles related to factors threatening pediatric patient safety were identified. After removing duplicates and studies lacking full texts, 13 articles met all eligibility criteria and were included in the final review.

Table 1. Findings

Author	Objective	Study Design / Type	Output	Population and Sample	Population and Sample	Outcome
(21) Ebrahimipour et al., (2014)	To prospectively assess the risk of blood transfusion in pediatric emergency departments	Cross-sectional	Educational factors, task factors, service delays, inadequacy of methods and procedures	Blood transfusion process in pediatric emergency department	Blood transfusion process in pediatric emergency department	Performing process reengineering, standardizing and updating the blood transfusion procedure, root cause analysis
Auling et al., (2015)	Major barriers to patient safety in care	Cross-sectional	Environment, equipment, supplies, staff and teamwork	Hospitals	Hospitals	Of catastrophic blood transfusion events, using patient identification bracelets, providing educational classes and pamphlets
(23) Labet and Sharma, (2016)	Identify potential barriers to patient safety interventions	Cross-sectional	Barriers to patient safety interventions	Members of surgical team (16)	Members of surgical team (16)	To raise staff awareness, and organizing monthly meetings of the Blood Transfusion Medicine Committee as implementation strategies.

(24) Eswart et al., (2015)	Nurses' educational background and their understanding of quality of care and patient safety	Cross-sectional	Nurses' perceptions of patient safety and quality of care	Nurses (149)	Nurses (149)	Negative: Poor teamwork and conflict between different professionals.
(25) Combie et al., (2020)	Patient safety culture and related factors among healthcare providers	Descriptive correlational	Patient safety culture, degree of patient safety, and	Number of incident reports, healthcare workers (518)	Number of incident reports, healthcare workers (518)	Pros: Leads to reduced patient harm and emphasis on quality of care.
(26) Ghalani and Bengo, (2020)	Patient safety incident reporting system	Cross-sectional	Types and frequency of patient safety incidents	Registered nurses (224)	Registered nurses (224)	Cons: Severe consequences for the health system, human resources, and hospital management, and poor access to health care.
(27) Akulugu et al., (2019)	Healthcare providers' perception of patient safety culture	Cross-sectional	Perception of patient safety culture	Number of clinical staff (406)	Number of clinical staff (406)	Pros: Leads to the presence of specialists and increased resilience of health workers.
(28) Yisma et al., (2020)	Patient safety culture of community pharmacists	Cross-sectional	Perception of patient safety	Number of local pharmacy staff (120)	Number of local pharmacy staff (120)	Registered nurses rated all patient safety as very good (51.0%) and acceptable (51.0%).
(29) Mohammad et al., (2021)	Patient safety culture and related factors among healthcare professionals	Cross-sectional	Patient safety culture and related factors	Size of healthcare professionals (422)	Size of healthcare professionals (422)	Cons: Medication errors, falls, and pressure ulcers
(30) Atakura et al., (2021)	Level of knowledge, perception and attitude towards patient safety	Quantitative study	Knowledge and understanding of patient safety	Size of physiotherapy clinical year students (80)	Size of physiotherapy clinical year students (80)	Overall level of patient safety culture (44.0%).
(31) Maing-Wolwaart, (2015)	Analysis of factors influencing patient safety culture	Cross-sectional	Factors affecting patient safety culture	Number of healthcare professionals and volunteers (200)	Number of healthcare professionals and volunteers (200)	Negative: Adverse events
(32) Enta et al., (2010)	Experience, awareness of medical error and willingness to participate in	Cross-sectional	Patient safety awareness and experience	60 healthcare professionals in 2 private hospitals and	60 healthcare professionals in 2 private hospitals and	The incidence of patient safety was negligible (18.0%), minor

	patient safety initiatives			2 public hospitals (80)	2 public hospitals (80)	(35.0%), moderate (25.0%), major (12.0%), and catastrophic (10.0%).
(33) Gizaw et al., (2018)	Understanding patient safety practice and related factors	Qualitative study	Perception of patient safety	Healthcare providers in 5 hospitals (306)	Healthcare providers in 5 hospitals (306)	The mean positive response for the 12 dimensions of patient safety culture was 58.1%.

Factors Promoting Patient Safety Practices in Hospitals

Several factors have been identified as promoting patient safety culture in hospitals. These include physician professionalism, weekly working hours, participation in patient safety programs, reporting of adverse events, teamwork within the hospital, organizational learning, openness of communication, frequency of event reporting, feedback and communication, management support for patient safety, hospital-wide teamwork, and handover processes. As shown in Table 2, these factors are significantly associated with patient safety culture (25).

Efforts to enhance patient safety and implement measures to reduce harm are currently being carried out in healthcare institutions (23). Nurses frequently reported issues such as loss of patient information during shift handovers, medication errors, patient falls and injuries, pressure ulcers, and fall-related injuries. Increasing the education level of registered nurses demonstrated a statistically significant positive effect on patient safety (24).

Healthcare staff expressed a willingness to learn more about patient safety and strategies to prevent medical errors. They also indicated preferred learning methods, including seminars, conferences, and symposia, continuing medical education (CME), interactive sessions, short courses, workshops, educational aids, and video-based learning using resources such as the internet, journals, booklets, and newsletters (32).

In Ethiopia, Blaire et al. (33) reported that for every one-unit increase in non-punitive response to error ($p < 0.001$), the perception of patient safety performance increased by 0.190.

Table 2. Distribution of factors affecting patient safety and key findings

Reference	Factors and dimensions	Key findings	Knowledge, awareness and perception
(21)	Educational factors, task factors, service delays, inadequacy of methods and procedures	Performing process reengineering, standardizing and updating blood transfusion procedures, root cause analysis of catastrophic blood transfusion events, using patient identification bracelets, providing educational classes and pamphlets	To improve staff awareness and organize monthly meetings of the Blood Transfusion Medicine Committee as executive solutions
(22)	Shortage of skilled nursing staff, lack of material resources, lack of access to necessary specialized training, limited, gaps in human resources, high turnover of staff	Factors related to patient safety include inefficient equipment, lack of trained maintenance staff, system failures, poor budget allocation, lack of access to necessary drugs, patient poverty, delays and other logistics processes.	• Hospital staff provided broad and aspirational definitions of patient safety. • Participants identified barriers across three main themes: material context,

			staffing issues, and interprofessional working relationships.
(23)	Characteristics of patient safety culture: paternalism, blame culture, ineffective support services, low salaries and armed conflicts, corruption, patient poverty and substance use by staff	Factors that affect patient safety include human resources and hospital management, access to healthcare, paternalistic organizational structure, blame culture, ineffective support services and low salaries, armed conflict, system failures, threats to patients and healthcare workers, increased corruption, poverty population, and substance abuse among healthcare workers. • Positive outcomes were associated with health workers' resilience and resourcefulness to overcome barriers.	Safety features were mainly seen as liabilities, managed with blame and punishment.
(24)	Loss of patient information, staff errors, verbal harassment, hospital infections, physical harassment and patient incidents	Registered nurses indicated that current efforts to prevent errors were sufficient, and registered nurses scored high on reporting patient safety incidents. • Nurses most frequently reported medication errors, pressure ulcers, and falls with injury.	Registered nurses (51.0%) rated patient safety as very good and registered nurses (51.0%) rated it as acceptable. • There was a significant difference between registered nurses and registered nurses' overall safety score ($\chi 2 = 34.1$ P < 0.001).
(25)	Staff classification, length of service, scope of work, participation in patient safety program, adverse event reporting, openness of communication, organizational learning and feedback exchange about an error	The highest positive response rate for items was related to people supporting each other on the unit (82.2%), while the lowest positive response rate was for the item "We have enough staff to handle the workload" (27.2%). • Physician categorization of staffing status, hours worked per week, primary work location (surgery and pharmacy), participation in patient safety program, and reporting of adverse events showed communication.	The overall level of patient safety culture was 44.0% (95% confidence interval: 43.3-44.6) and was rated as poor (12.4%) to excellent (29.3%), with positive response rates for each item ranging from 22.0% to 85.0%.
(26)	Hospital-related incidents, patient, care-related incidents, medication-related incidents, blood product-related incidents, procedure-related incidents	High rates of PSI with increasing length of stay were observed in multidisciplinary CCUs (49.0%), neonatal CCUs (29.0%), cardiac CCUs (20.0%), and pediatric CCUs (1.7%). • Blood-related incidents (5.0%) and medication-related incidents (7.0%) were more minor or insignificant.	The patient safety incident scores were negligible (18.0%), minor (35.0%), moderate (25.0%), major (12.0%), and catastrophic (10.0%).
(27)	Empathy, supervisor expectations and actions, organizational learning, continuous improvement, management support, feedback and communication about errors, openness, staff, frequency of reported events, non-punitive response to errors, overall perception of patient safety	Teamwork and organizational learning were the 12 patient safety dimensions with the highest scores. • The dimensions with the highest positive response rates were teamwork (81.5%), organizational learning (73.1%), and the lowest positive response rates (50.0%) were employee engagement (34.5%), non-punitive response to errors (33.9%), and frequency of reported events (45.7%).	Patient safety was rated as excellent (7.0%), very good (43.8%), acceptable (35.0%), poor (13.8%), and failed (1.0%). • Overall, perceptions of the patient safety dimension were positively correlated with patient safety culture dimensions for all categories except staff.

(28)	Teamwork, physical space and environment	Positive responses were shown in the areas of teamwork (90.2%), physical space and environment (83.1%), miscommunication (44.8%), and work pressure (45.0%). • The pharmacy's overall patient safety score was excellent (33.0%), very good (30.8%), good (25.1%), fair (7.5%), and poor (3.3%).	• Most participants did not provide any documentation of the errors. • In 59.0% of cases, there was no documentation of an error that could have harmed the patient.
(29)	Occupation, level of education, work experience, age, type of hospital and work units	Good patient safety culture was positively associated with working in primary hospitals. • Good patient safety culture was negatively associated with health among 25-34 year olds and working in pediatric and emergency departments. • Healthcare professionals working in pediatrics (61.0%, AOR = 0.39) and emergency departments (75.0%, AOR = 0.25) were less likely to have a good patient safety culture.	Well-perceived patient safety culture (44.8%), teamwork across hospital units (74.1%), and departments (53.1%), and supervisor expectations (51.9%) were positive dimensions of overall patient safety culture.
(30)	Duration of training, knowledge about patient safety	The majority (97.5%) had a moderate level of awareness about patient safety. • There was no significant relationship between the level of study and the awareness of clinical year physiotherapy students about patient safety.	Most respondents (97.5%) had moderate knowledge of patient safety. • High level of knowledge about workplace safety (72.5%) and healthcare system safety (60.0%)
(31)	Organizational learning, communication, personnel management, staff education and training, teamwork	Nurses only perceived positive organizational learning after a patient safety incident (62.9%), while physicians and staff educators scored the lowest (58.3%). • Overall patient safety was rated as acceptable (42.4%), very good (28.5%), excellent (14.6%), poor (11.8%), and failed (2.8%). • Nurses' positive perceptions were significantly related to understanding the causes of patient safety incidents ($p<0.003$). Patient safety incident investigation ($p<0.001$) and organizational learning after a patient safety incident ($p<0.001$).	There was also a positive perception of nurses and the causes of patient safety incidents, investigation of patient safety incidents, and organizational learning after a patient safety incident. • Social service professionals had significantly negative perceptions of permanent staff on the dimensions of: overall commitment to quality; organizational learning after a patient safety incident; and communication about safety issues.
(32)	Staff knowledge, perception of medical error, impact of medical error, availability of health care services	Frontline healthcare professionals were well aware of the culture of patient safety and medical errors. • Staff knew that errors could cause patient suffering and could even lead to death or damage the hospitals' reputation and cost them their jobs.	• Staff perceived adverse events as errors (75.0%) by healthcare personnel during patient treatment or management.
(33)	Teamwork, expectations and actions of supervisors, openness of communication, feedback	Teamwork within the unit was the only area with a higher positive response (79.4%). • The composite percentage of positive responses was frequency of incident	Overall understanding of patient safety was 36.8%. • Understanding of patient safety practices

	and communication about errors, frequency of incident reporting, non-punitive response to errors, staff, hospital management support, hospital and patient transfers and organizational learning, continuous improvement	reporting (28.3%), hospital management support for patient safety (34.7%), hospital transfers and transfers (41.3%), non-punitive response to error (44.7%), teamwork. across the unit (47.4%), and openness of communication (48.7%). • Patient safety was significantly associated with non-punitive response to error, teamwork, staff, unit collaboration, and openness of communication.	and teamwork increased across the unit.

Conclusion

This study synthesized and integrated the factors threatening patient safety in pediatric hospital wards. Ensuring patient safety is essential for improving health outcomes, reducing risks, and minimizing hazards associated with patient care. Since its inception, the concept of patient safety has been analyzed conceptually and can be described as the prevention of medical errors, avoidable adverse events, protection of patients from harm or injury, and ensuring collaborative efforts among individual healthcare providers and integrated care teams (34, 22).

In low- and middle-income countries, patient safety threats may arise from individual or professional negligence, systemic factors, lack of adequate knowledge, outdated equipment, technology failures or misuse, or the complete absence of necessary resources. Patient safety can be promoted by fostering a positive reporting culture, minimizing errors, raising awareness, providing training, ensuring the use of qualified healthcare professionals and appropriate equipment, adopting a non-punitive approach, and encouraging teamwork (34, 35). Fundamentally, patient safety entails ensuring a secure environment for both patients and healthcare professionals, minimizing the risk of harm (36). Safety practices should be embedded as a culture and integrated into the routine care processes of healthcare institutions (34). The World Health Organization emphasizes that patient safety discipline requires coordinated efforts to prevent harm, reduce risk, secure healthcare processes, and create minimal threat to patients (37, 35).

Based on the reviewed studies, the most significant threats to pediatric patient safety in hospitals include medication errors (such as incorrect prescriptions or dosages), hospital-acquired infections, falls, pressure ulcers, misidentification of patients, and errors in blood transfusion or blood product administration. These risks can be categorized into task-related factors, communication-related factors, team-related factors, education and training factors, equipment and resource factors, strategic and organizational factors, work environment factors, and individual factors (staff and patient).

Preventive strategies to enhance pediatric safety include proper medication administration protocols, mandatory hand hygiene compliance by all clinical staff, initial patient assessment using tools such as the Morse and Braden scales, safe patient transfer protocols, raising awareness among staff and accompanying children regarding fall risks, continuous monitoring of bed rails, active patient identification before any diagnostic or therapeutic procedure, effective therapeutic communication with patients, adherence to blood transfusion protocols, and identification and sensitization of vulnerable patients.

In summary, multiple factors within hospitals threaten pediatric safety, and identifying these threats at each stage of care is a fundamental step toward controlling and reducing adverse events. Promoting pediatric patient safety and preventing harm should be a programmatic priority. Increasing staff awareness and implementing preventive measures remain among the most critical tools for reducing errors. The findings of this study can serve as a foundation for improving the safety of hospitalized children.

Declaration

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