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ORIGINAL ARTICLE

Assessing patient safety implementation and its associate factors in a pediatric inpatient ward

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ABSTRACT

BACKGROUND
Patient safety is an emerging healthcare discipline with the ultimate goal of reducing errors and harm to patients by implementing quality health services. The provision of patient safety is complex and difficult to achieve. The purpose of this research was to assess patient safety in hospital pediatric inpatient care and factors affecting nurses implementing pediatric patient safety.

METHODS
This cross-sectional study involved 80 nurses (male and female) at several private and public hospitals in Surabaya City. The research instruments used were secondary data on patient safety in hospital pediatric inpatient wards, hospital medical records, as well as questionnaires, and observations of the implementation of pediatric patient safety goals. Data were analyzed using multiple logistic regression.

RESULTS
Most participants were female (71.3%), were over 45 years old (18%), and had more than 5 years of work experience in pediatric wards (76%). There were reportedly 145 patient safety incidents, consisting of 46% unexpected events (*Kejadian Tidak Diharapkan*), 48% nearly injurious events (*Kejadian Nyaris Cedera*), 6% potential injurious events (*Kejadian Potensial Cedera*), and 0% sentinel events. Multiple logistic regression analysis showed that nurses who work in less positive working settings are at higher risk of negative implementation of pediatric patient safety than those who work in positive working settings [AOR= 1.85 (95% CI 1.62-4.92)].

CONCLUSION
This study demonstrated that work setting and frequency of reported events were significantly associated with negative implementation of pediatric patient safety. Therefore, intervention is recommended to minimize unnecessary pediatric patient harm.

Keywords: Child safety, pediatric inpatient ward, hospital error, implementation

INTRODUCTION

Patient safety is a form of health services to patients at hospitals that is safe and does not harm patients. The components of health services include doctors, nurses, and other health workers. Previous research has shown that inpatients, especially hospitalized pediatric patients, are at high risk of experiencing unexpected events (*Kejadian Tidak Diharapkan*). [(1)] Nurses and other health workers providing services to pediatric patients must ensure patient safety and reduce adverse events in hospitals.

The concept of patient safety in hospitals aims to establish a system that prevents and minimizes mistakes and negligence in the healthcare provided to patients. The Joint Commission International (JCI) has established a patient safety standard that aims to incorporate patient safety measures in hospitals.[(2)] This standard, known as the National Patient Safety Goals for Hospitals, encompasses various aspects including accurate patient identification, enhancing communication, safe medication usage, verifying the correct location, procedure, and patient, minimizing infection risks, and identifying potential patient falls.[(3)] Pediatric patients who undergo hospitalization in the inpatient room, often experience patient safety incidents or errors/omissions in care, because pediatric patients are often fussy during treatment, uncommunicative, and families are also anxious about their child's condition, such that they are often uncooperative.

The goal of patient safety is to bring about specific enhancements in patient safety.[(4)] It brings attention to areas of concern in the healthcare system and outlines consensus-, evidence- and expertise-based solutions to these problems. The system of patient safety prevents adverse events from occurring due to actions taken or not taken by nurses or other medical staff. The system involves evaluating and addressing patient-related risks, reporting and analyzing incidents, incorporating lessons learned from such incidents, and implementing solutions to reduce the occurrence of risks.[(5)]

Based on the Ministry of Health Regulation (hereinafter referred to as PERMENKES) on Hospital Patient Safety, each hospital is required to implement patient safety management. The latter has been established since 2014 under the name of the Quality Improvement and Patient Safety Team (*Peningkatan Mutu Keselamatan Pasien*). The results of the conducted internal quality audit were as follows: the category of "nearly injurious events" *(Kejadian Nyaris Cedera)* accounted for 36.84%, which included incorrect medication route, patient fall, incorrect room rate information, and surgical site infection. The proportion of "potential injurious events" (*Kejadian Potensial Cedera*) was 21.05%, which included sample identification errors by nurses, while the proportion of "unexpected events" (*Kejadian Tidak Diharapkan*) was 15.79% which included phlebitis. [(6)] An Ethiopian study obtained 386 nurses placed in the five working units of the Gondar University hospital, including inpatients, outpatients, emergency cases, and operating room and ICU cases. The study results showed a relationship between nurses' knowledge and attitudes to support the implementation of patient safety programs.[(7)] This contradicts another study of 80 nurses in Yogyakarta Hospital, which states that knowledge does not affect the execution of measures to ensure the patient safety goals.[(8)]

Adverse events (AEs) occur in at least 10% of in-hospital patients. The three categories of adverse events (AEs) that were most often recorded in the included studies were infections connected to healthcare, medication or drug/fluid related AEs, and operative/surgical AEs, and half of the AEs are estimated to be preventable.[(9)] The research results in overseas hospitals found an adverse event rate of 8.2%, where the 15,548 records that were examined had at least one adverse event; this percentage varied by nation from 2.5% to 18.4%. Of these incidents, it was determined that 83% might have been avoided, and around 30% were linked to the patient's demise.[(9)] In very simple clinical scenarios, treatment mistakes accounted for about 34% of adverse outcomes. The majority of incidents were caused by clinical staff members who were not properly trained or properly supervised, or who disregarded rules or procedures.[(10)] The World Health Organization (WHO) has a vision on global action on patient safety and mandated for development of a global patient safety action plan 2021-2030. The action plan provides a framework for countries to develop their respective national action plans on patient safety, as well as to align existing strategic instruments for improving patient safety in all clinical and health-related programs.[(11)] The Institute of Medicine (IOM) report concluded 4 main points: i) the problem of accidental injury is a serious thing; ii) the cause is not individual carelessness, but system errors; iii)

the need to redesign the service system; and iv) patient safety must be a national priority. The Emergency Department (ED) is the third highest location in hospitals for errors next to the intensive care unit (ICU) and operating theater. Error conditions in the ED are influenced by several factors including diagnostic uncertainty, poor nurse knowledge and feedback, and lack of continuity of care in the Emergency Department (ED). Not only the ED but also inpatient wards had patient safety incidents.[12]

Hospitals have implemented patient safety measures to prevent and minimize errors when providing care to children. Pediatric patient safety refers to a mechanism of safeguarding children from injuries resulting from mistakes made while carrying out a task or neglecting to perform an essential task.[13] The successful execution of patient safety greatly relies on the competency, expertise, and mindset of nurses, and the conduct of other healthcare professionals. The ability, level of knowledge, and attitude of nurses and the behavior of other health workers play an important role in the implementation of patient safety. Hospital facilities will greatly affect the quality of provided health services. Nurses and other healthcare workers play an important role in pediatric patient safety by monitoring pediatric patients' conditions to prevent incidents, by providing health education, by detecting errors and near injuries, and by performing other tasks to ensure that pediatric patients receive high-quality care.

Children's physical characteristics can affect the predisposition to errors and harm: weight-based medication dosing, significant variation in size and weight, and predisposition to medical error. Moreover, the number of children with chronic diseases and the obesity rate increases, such that the physical features of children are to some extent changing.[14]

Problems related to pediatric patient safety and the process of overcoming the incidence of these problems in hospitals are highly important to discuss. This will add insight and reduce the incidence of negligence. The responsibility of health services, in particular, is crucial as it relates to patient safety. There has been an abundant literature describing patient safety incidents in several inpatient rooms.

Adult patient safety research in connection with knowledge and attitudes has been widely discussed in previous studies.[7,8] There are also several studies on the high incidence of pediatric patient safety incidents due to pharmaceutical mistakes, surgical complications, intravenous line issues, and hospital-acquired infections.[15] Therefore this study discusses the number of safety incidents that occur in pediatric patients and the causal factors of these incidents, namely nurses as health workers who are influenced by various factors. The present research study aims to describe the challenges related to the problems of the safety of child patients receiving care at pediatric hospitals, as well as to overcome these issues through the implementation of child patient safety objectives within the hospital setting.

METHODS

Research design

A cross-sectional study was conducted at 3 private and 2 public hospitals in Surabaya City, the study period being four months, starting from April 10, 2023 to August 23, 2023.

Study subjects

The target population was 120 associated nurses working in pediatric care wards, from various private and state hospitals located in the Surabaya City region. Cluster random sampling was employed for sample selection, i.e. cluster sampling based on 5 hospitals, combined with simple random sampling. The inclusion criteria were nurses directly involved in caring for pediatric patients, aged between 25 and 50 years, both male and female, and nurses employed on both temporary and permanent basis, in private or state hospitals. The exclusion criteria were nurses who were unit managers and members of quality improvement and patient safety committees in pediatrics wards, new nurses working in these hospitals and never having been socialized on patient safety and standard operating procedures by the managers.

The sample size of this research was 80 nurses, which required inclusion criteria. Sample size determination in this research used simple formula for calculating the adequate sample size in prevalence study with outcome the prevalence of the incidents is going to be between 10% and 90%. The number of subjects include in this research was based on the population size (120), confidence level (0.05), and margin error (0.05), with a result of 100 nurses. There were 20 nurses were excluded based on the exclusion criteria. The research sample of 80 nurses was divided equally among 5 hospitals based on hospital clusters (16

nurses in each hospital). A random sample to reduce bias and to estimate the prevalence of unknown parameter(s) from the target population. Random sample selection in this research based on odd numbering on the list of nurses' names that matched the research inclusion criteria.

Measurements

The independent variable was factors affected nurses and the dependent variable was the implementation of patient safety goals. The research instruments used were secondary data on patient safety in hospital pediatric inpatient wards for the last year, hospital medical records, as well as questionnaires, and observations on the implementation of pediatric patient safety goals using the Standard Operating Procedure (SOP) of Implementation of Pediatric Patient Safety that was modified from measurements of patient safety culture in pediatric long-term care. The SOP of patient safety culture has 24 questions (on a 5-point Likert scale) with 4 dimensions, namely work setting, supervisor support, communication about errors, and frequency of events reported. The SOP of patient safety culture is to measure the perceptions of nurses in connection with patient safety work standards in their respective work units, the perceptions of managers/supervisors/ heads of units on how to promote patient safety work standards, communications from nurses related to patient safety and medical errors, and reporting of patient safety incidents in work units by the nurse.[16] The measurements demonstrated validity, usability, feasibility, internal consistency, and reliability (Cronbach alpha = 0.94).[17] Patient safety culture in each dimension has several questions with positive and negative statement aspects. For negative statements the nurse's answer of disagree/strongly disagree shows a positive response. Conversely for a positive statements the nurse's answer of agree/strongly agree shows a positive response; if the respondent's answer is disagree/strongly disagree, this shows a negative response, and a neutral response if the respondent's answer is doubtful. The point of value of each dimension is based on summary positive responses of one dimension divided by all total responses (positive+ negative+ neutral) in one dimension. The point above 75% (>75%) is positive, indicating strong patient safety implementation and needs to be maintained. The point at 50-75% is less positive, this indicates that patient safety implementation is good and needs to be optimized. The point below 50% (<50%) is negative and indicates that the system needs to be improved regarding the part/dimension being assessed. [18]

Statistical analysis

The obtained data were checked, coded, tabulated, and analyzed using Chi-square test and multiple logistic regression at a significance level of 0.05.

Ethical clearance

This research has obtained ethical approval from the health research ethics committee of the Faculty of Public Health Airlangga University under number 75-KEPK dated April 7, 2023. This research has gone through ethical considerations by paying attention to data confidentiality, ensuring that there is no treatment endangering the research sample, and that this research has benefits for nurses and institutions providing pediatric health services.

RESULTS

Table 1 shows that nearly injurious events (*Kejadian Nyaris Cedera,* hereinafter referred to as KNC) are incidents to which patients have not been exposed and are more common than unexpected events, while the frequency of potential injurious events (*Kejadian Potensial Cedera*) is six to one hundred times greater than that of other events. According to the documentation report of hospitals for the past years, there have been a total of 145 incidents related to patient safety. The incidents of patient safety showed that 46.2% were classified as unexpected events (KTD), 47.6% categorized as nearly injurious events (KNC), and 6.2% classified as potential injurious events (KPC), while there were no reported incidents in the sentinel event category. It was discovered that the public hospitals had the highest number of incidents amounting to 57.2% of the total, whereas the remaining 42.8% occurred in private hospitals. The results of the Chi-square test showed a significant correlation between type of hospital and patient safety incidents (p=0.045).

Table 2 shows the characteristics of nurses in pediatric inpatient wards, with the majority of nurses being below 45 years old (82%), being of female gender (71.3%), having Diploma III in nursing education (57.5%), and permanent employment status (76%). Observations on the implementation of pediatric patient safety

comprised a positive safety culture of the work setting and frequency of events reported, but had a less positive safety culture of supervisor support and communication about errors. Based on the results of simple logistic regression analysis, it was found that all factors influenced the implementation of pediatric patient safety in hospital pediatric inpatient wards. Therefore, the variables with a p-value <0.25 were included in the multiple logistic regression analysis. Four variables were retained in the final model, with the Hosmer-Lemeshow test showing p-value= 0.885. The significant value being 0.885 >0.05 therefore H_0 is accepted, meaning that the model is acceptable or the model is able to predict the observed value. Nurses who work in less positive work settings are more likely to have overall negative implementation of pediatric patient safety than those who work in positive work settings with an adjusted odds ratio of 1.85 (95% CI 1.62-4.92). Additionally, in staff with a less positive frequency of events reported, the risk of negative implementation of pediatric patient safety was higher compared to staff whose frequency of events reported was positive (AOR=1.19;95% CI 1.01-2.82) (Table 3).

Table 1. Incidents of patient safety based on type of hospital (n=145)

Patient safety incidence	Type of Hospital				p value
	Public		Private		
	n	%	n	%	
Unexpected events (KTD)	34	23.4	33	22.8	0.045*
Nearly injurious events (KNC)	40	27.6	29	20.0	
Potential injurious events (KPC)	9	6.2	0	0.0	

*Chi-square test

Table 2. Characteristic of nurses in implementation of pediatric patient safety (n=80)

Characteristics	n	%
Age (years)		
25-30	18	22.5
31-35	13	15.8
36-40	20	25.2
41-45	15	18.5
46-50	14	18.0
Gender		
Female	57	71.3
Male	23	28.7
Education		
Diploma III of nursing	46	57.5
Bachelor of nursing	34	42.5
Employment		
Permanent	61	76.0
Temporary	19	24.0
Implementation of pediatric patient safety		**Category**
Dimension 1. work setting	80.7 %	Positive
Dimension 2. supervisor support	73.4 %	Less Positive
Dimension 3. communication about error	70.8 %	Less Positive
Dimension 4. frequency of events reported	79.2 %	Positive

Table 3. Logistic regression analysis to determine factors associated with negative implementation of pediatric patient safety

Variable	Simple logistic regression		Multiple logistic regression	
	COR (95% CI)	**p value**	**AOR (95% CI)**	**p value**
Age (years)				
≤45	1		1	
>45	441 (37.32-521.01)	0.000	0.16(0.04-0.68)	0.013
Gender				
Female	1			
Male	4.59 (1.45-14.52)	0.009		
Education				
DIII of nursing	1		1	
Bachelor of nursing	12 (1.00-14.13)	0.048	3.10(1.18-8.11)	0.021
Employment				
Permanent	1			
Temporary	0.08(0.02-0.28)	0.000		
Work setting				
Positive	1		1	
Less positive	10.72(1.97-58.35)	0.006	1.85(1.62-4.92)	0.000
Supervisor support				
Positive	1			
Less positive	0.78(0.19-3.12)	0.728		
Communication about error				
Positive	1			
Less positive	1.37(0.36-5.19)	0.641		
Frequency of events reported				
Positive	1		1	
Less positive	1.10(1.00-15.27)	0.014	1.19(1.01-2.82)	0.020

Key notes: COR = crude odds ratio; AOR = adjusted odds ratio; CI = confidence interval

DISCUSSION

The results of this research about patient safety incident showed that the incidence of nearly injurious events in pediatric inpatient wards is the highest that has been reported (48%). The unexpected incidents have a great number of medication errors in pediatric patients. Problems related to pediatric patient safety and the process of overcoming child patient safety incidents in hospitals are found in private and public hospitals where the incidents in question are related to hospital standards, and where incidents of pediatric patient safety resulted in the safety of pediatric patients being disrupted.[19,20] This study's observation of the implementation of pediatric patient safety showed a positive safety culture of work setting and frequency of events reported, but a less positive safety culture of supervisor support and communication about errors. The result of this research is consistent with other studies showing that the leadership of the head of the wards determines the implementation of pediatric patient care, including pediatric patient safety.[21] This study's findings are consistent with previous research showing that nurses who communicate well can prevent patient safety incidents from happening. To achieve this, nurses must learn more about communication, receive patient safety training, and provide compliance support when implementing standard operating procedures for patient safety.[22]

A hospital is one of the health service units that provides health services for all levels of society in fulfilling every need and right to obtain quality health services. As a complex health service facility, the hospital has resources with a variety of human resources and abilities. This is a multidisciplinary program, so there is a high possibility of problems or adverse events in the delivery of health services. For the successful execution of this program aimed at ensuring patient safety, a hospital needs to make more efforts to implement it, such as cultivating reporting and creating a conducive work environment.[23]

Nurses play a vital part in the patient's treatment process as essential members of the healthcare team. Nurses have a major role improving and maintaining patient health by encouraging patients to be more proactive if they need services while undergoing treatment. The

level of knowledge of medical personnel, especially nurses, is highly important in carrying out nursing care. Nurses who possess a deeper understanding of the code of ethics and health law tend to exhibit enhanced competence when delivering nursing care.[24] To enhance nurses' understanding of the ethical guidelines and legal principles in healthcare, nurses should engage in reading materials that specifically cover the code of ethics and health law for nursing. Furthermore, it is also possible to achieve this through the means of internet technology and by leveraging connections with professional acquaintances.

The clinical implication for this study is that efforts to increase the level of knowledge of nurses or other health workers are through training or seminars, that can be useful for evaluating programs and standards, including nursing care standards.[25] These standards must always be reviewed for accuracy so that no error can harm patients; besides that nurses must be encouraged to achieve professional and responsible performance. The performance of nurses is affected by the high level of knowledge that is necessary such that nursing care will be carried out properly and the possibility of malpractice or negligence is low. This happens because nurses or medical personnel have been equipped with knowledge about ethics and patient safety. The performance of nurses is influenced by the factors of fair and appropriate compensation, placement by their expertise, their light work burden, the work environment, supporting equipment, and the attitude of the leadership in providing guidance and coaching.[26,27] Hospital pediatric patient safety refers to a comprehensive approach followed by hospitals to enhance the safety of patient care. This includes evaluating and addressing potential risks associated with pediatric patients, reporting and analyzing incidents, and implementing measures to learn from these incidents and prevent harm caused by errors or omissions in carrying out necessary actions.

The future direction of hospital patient safety refers to a range of services within a hospital aimed at ensuring the provision of safe care for pediatric patients. These services encompass assessing potential risks, identifying and effectively addressing risks specific to pediatric patients, examining incidents, acquiring knowledge from them, conducting thorough follow-ups, and implementing remedies to diminish risks. It requires commitment and ethics in nursing. Pediatric patient safety is a system that is very much needed and is expected to minimize errors in the handling of pediatric patients in the emergency department and inpatients in the hospital pediatric wards.[28] The limitation of this research was that incidents reported were not confirmed to the family (child's parents), therefore the family (child's parents) as a factor needs to be involved in future studies on the research variables.

CONCLUSION

Based on the research findings, the implementation of pediatric patient safety had positive safety culture of work setting and frequency of events reported. Patient safety was impacted by work setting and frequency of events reported. For future research, a larger sample size should be used to cover all professional groups in the health service system.

Conflict of Interest

1. The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.
2. The authors declare there was no conflict of interest during research activity and the release of this article

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Author Contributions

All authors will take public responsibility for the content of the manuscript submitted to Universa Medicina. RM & EA were responsible for study conception and design; study supervision; critical revisions for important intellectual content; manuscript writing; and references. SNQ was responsible for data collection; literature review/analysis; manuscript writing; and references. All authors have read and approved the final manuscript.

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Data Availability Statement

The datasets generated and/or analyzed during the current study are available from the corresponding author.

Declaration of Use of Ai In Scientific Writing

Nothing to declare.

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