



Research Article

Overview of Risk Management Identification with the Root Cause Approach Analysis of the Cause of Safety Incidents in Hospital X

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ABSTRACT

Medical errors are among the most significant patient safety incidents, with a sharp increase of 92.8% in medication errors at Hospital X from 2023 to 2024. This study aims to identify the root causes of these incidents and propose follow-up actions to support the hospital's Quality Improvement and Patient Safety Committee. Employing a cross-sectional design, the study analyzed data from the 2024 patient safety incident reports using the Root Cause Analysis (RCA) method. The five RCA stages—problem identification, data collection, data analysis, root cause identification, and corrective action planning—were conducted with assistance from the RCA team at Hospital X. From 54 recorded incidents, 11 were classified as green grading and 43 as yellow, which were further analyzed using the CMP table and fishbone diagram. The root causes were predominantly linked to human resource factors, such as the presence of new staff, lack of knowledge about medications, unfamiliarity with the electronic medical record (EMR) system, insufficient training, and inadequate patient anamnesis. These findings suggest that targeted training, identified through Training Needs Analysis (TNA), is essential to address competency gaps. The study recommends implementing structured training programs as a strategic intervention to reduce medication errors. Further research is needed to evaluate the impact of such training on improving patient safety outcomes.

Keywords: Patient Safety, Root Cause of Problem, Medication Error, Training, TNA

INTRODUCTION

Worldwide, healthcare systems seek to provide appropriate care to individuals when they are ill or to help them maintain good health (Alrabadi *et al.*, 2021). Health facilities are obligated to improve the quality of health services through comprehensive, integrated, and timely measures in responding to unwanted incidents so that similar incidents do not recur (Indonesia, 2017). Hospitals play a crucial role in improving public health; therefore, they must prioritize patient safety (Amalia and Basabih, 2023). Patient safety is defined as a system designed to make healthcare safer, including risk assessment, patient risk identification and management, incident reporting and analysis, the ability to learn from incidents and their follow-up, and the implementation of solutions



to minimize risks and prevent injuries caused by mistakes due to carrying out an action or not taking the action that should have been taken (Indonesia, 2017).

Patient safety is an organized framework of activities that fosters a culture, processes, procedures, behaviours, technologies, and environments in healthcare that consistently and sustainably reduces risks, decrease the occurrence of avoidable harm, lower the likelihood of errors, and mitigate the impact of hazards when they occur (World Health Organization, 2021). World Health Organization reports that in developing countries, one in ten patients receiving hospital care is at risk of medication errors and adverse events (World Health Organization, 2021). Medication errors are among the types of errors that receive the greatest attention in efforts to improve the quality and safety of health services as they can significantly increase healthcare costs (Epriani Puji Hastuti, Noorchalam, 2017).

Medication errors are classified into four categories: prescription errors, transcription errors, compounding errors and medication administration errors (Amalia and Basabih, 2023). In one hospital in Uganda, medication error incidents consisted of 33 cases (42.3%) of prescription errors, 29 cases (37.2%) of medication administration errors, 9 cases (11.5%) of transcription errors, and 7 cases (9%) of compounding errors (Dorothy, Yadesa and Atukunda, 2021). In Australia, 462 cases of medication errors were identified in hospitals during anaesthesia, including errors related to incorrect dosages, routes of administration, timing, and administration of the wrong medication to patients (Kim *et al.*, 2022). In a hospital in Malaysia, medication errors accounted for 30.5% of cases (Shitu *et al.*, 2020). Similarly, a study conducted at the international clinic of hospital X in Manado reported medication errors rates ranging from 0.3% to 72.8% among 301 prescriptions (Citroning, Angoa and Malanghen, 2020).

Table 1. Incidence Rate of Patient Safety Incidents at Hospital X based on the type of near-injury incident grading

It	Year	Patient Safety Incidents	Grading (Kejadian Nyaris Cedera) KNC	
			Green	Yellow
1	2023	23	8	15
2	2024	54	11	43
Sum		77	19	58

Table 1 presents information on the increase in patient safety incidents and the incidence of near-miss events classified as yellow grading, along with the types of near-miss incidents based on error categories. This increase in incidence affects the patient quality of care and safety; therefore this study aims to analyze the root cause of the rising incidence of medical errors at Hospital X. The purpose of this study is to conduct *root cause analyses*, which involves identifying the underlying cause of unexpected event in order to their recurrence (Great, 2021). In Addition, this study seeks to conduct a risk assessment of existing incidents to ensure that similar events do not occur in the future.

Root Cause Analysis (RCA) is a problem-solving method used to identify the causal factors underlying a problem or unexpected event (Marfuah, Sari and Pratomo, 2024). This method helps answer key questions such as 'what happened?', 'how did it happen?', and 'why did it happen?' (Kuswardana, Mayangsari and Amrullah, 2017). The primary objective of RCA is to identify contributing factors related to the nature, magnitude, location and timing of events, which arise from specified habits, actions and conditions that must be modified to prevent avoidable errors (Petty Wahyuningtyas, Eka Ratnawati and Yudi Setiawan, 2023). RCA is widely applied across various

sectors, including business operations and construction projects. For example, the identification of key factors contributing to material waste using the RCA method can obtain precise and systematic results (Zein, 2022)

Risk management plays a crucial role in preventing and addressing medical errors. Several studies have shown that developing a comprehensive and in-depth understanding of medical error management can improve patient care, particularly in relation to incident reporting (Rumbewas, 2018). Furthermore, the implementation of risk management strategies has been shown to reduce error rates in emergency departments (Khairton Naziha *et al.*, 2023). In addition, a prospective risk management approach has been found to effectively enhance patient safety in hospitals (Firmansyah, 2022).

Yulianingtyas *et al* (2016) reported that 20% of incidents occur the operating rooms and that the implementation of risk management can reduce the number of such incidents. Similarly, Handel stated that the implementation of a risk management program can effectively reduce the number of medical errors (Golo *et al.*, 2023). It is therefore important for hospitals to assess the current status of their risk management implementation as a basis and guideline for the development of clinical risk management programs. Risk management assessment in hospitals serves as a foundation for crisis management implementation plan, which represent one of the fundamental issues in the field of medicine (Putu *et al.*, 2024). This study aims to identify the root causes of patient safety incidents at Hospital X and provide recommendations to prevent the recurrence of such incidents in the future.

MATERIAL AND METHODS

This study employed a cross-sectional design, which involves analyzing variables related to patient safety incidents collected at a specific point in time across the entire study population or a predetermined subset. This research used a quantitative approach, utilizing data from patient safety incident reports at the pharmacy unit of Hospital X during 2023–2024. To identify the root causes of incidents, direct observation were conducted in the pharmacy unit and patient service areas. The research instrument was the Root Cause Analysis (RCA) method, which consists of five stages (Groot, 2021): (1) Problem identification; (2) Data collection; (3) Data analysis; (4) Root cause identification; and (5) Corrective actions identification.

The research process was guided by relevant theories and standard operating procedures applied at Hospital X to determine the workflow. In identifying root cause, observational methods and analytical input from both the researcher and the hospital-appointed RCA team were employed. The RCA team consisted of the head of the medical support department, the head of the pharmacy unit, specialist physicians responsible for prescription writing, and nurses from the outpatient unit. The researcher acted as a facilitator in inducting the RCA, and led Focus Group Discussion (FGDs) to formulated recommendations. Based on the table of criteria of the Patient Safety Committee at Hospital X, risk management analysis was conducted by assessing impact and probability, each scored on a scale of 1-5, as determined through team consensus. The risk score was calculated by multiplying the impact and the probability values and was used to determine the incident grading. Incidents graded as yellow or red underwent further root cause identification using a fish bones diagram. Subsequently, the RCA team determined improvement actions, which were then evaluated by the Hospital Quality Committee.

RESULT AND DISCUSSION

The results of the data analysis conducted by the researcher are from the data of 54 reported incidents that were found *to be graded* green as many as 11 incidents and yellow as many as 43 incidents (Table 1).

Table 2 Rate of Near Injury Incidence at Hospital X by Type of Event in Action

No	Year	KNC Type		Amount
		Mistaken Identity	Misprescribing	
1	2023	11	12	23
2	2024	23	31	54
		34	43	77

Table 2 presents an overview of medication errors incidents at Hospital X in Mojokerto. In 2023, a total of 23 incidents were reported, whereas in 2024 the number increased to 54 incidents, representing an increased of 92.8%. The most common type of incident was near-miss incidents (Kejadian Nyaris Cedera/KNC), primarily involving patient misidentification and prescribing errors. A near-miss incident refers to an event that did not reach the patient and therefore did not result in injury. Near-miss incidents occur seven to one hundred times more frequently than adverse events. Consequently, near-miss data must be analyzed to support preventive measure and system improvements to avoid actual patient harm.. In many case, near-miss incidents contribute to the development of incident causation models, illustrating the processes leading to potential injury. Near-miss incident play a critical early role before the occurrence of adverse events (Kejadian Tidak Diharapkan/KTD)(Putu et al., 2024). Near-miss incidents provide two important types of information related to patient safety: weakness of the health care system (errors and failures including inadequate defense systems) and the strength of the health care system (no planning, informal recovery actions). Table 2 also presents the grading results related to patient safety incidents.

Grading matrix assessment is a visual tool used to evaluate and prioritize risks based on their probability of occurrence and potential impact. This matrix assists in identifying and managing risks by clearly illustrating the relationship between the likelihood of a risk event and its impact. In this matrix, risks are mapped according to probability and impact, providing a structured overview of risk levels. Qualitative risk analysis is considered one the most effective and cost-efficient stages of risk management because it enables organizations to improve project performance by focusing on *high-priority risks*. The result of qualitative risk prioritization can also serve as basis for conducting quantitative risk analysis, if necessary. Once the probability (*likelihood*) and impact of risks have been identified, an evaluation is conducted to determine which risks should be addressed s priorities.

Table 2.4 Probability Criteria

<i>Likelihood Rating</i>	<i>Criterion</i>	<i>Information</i>	<i>Frequency</i>
1	<i>Sweet</i>	Risk almost never occurs	>2 years
2	<i>Unlikely</i>	Rare risks	1-2 years
3	<i>Possible</i>	Risks sometimes occur	7-12 months/year
4	<i>Likely</i>	Frequent risks	4-6 months/year
5	<i>Certain</i>	Risks are bound to occur	1-3 months/year

Table 2.5 Impact Criteria

Impact Rating	Criterion	Information
1	<i>Insignificant</i>	Does not interfere with the company's operations and activities
2	<i>Minor</i>	Processes and activities are disrupted, but they do not hinder the company's core tasks or activities
3	<i>Moderate</i>	Business processes are disrupted so that some activities are hampered and delayed.
4	<i>Major</i>	Hinders almost all business processes and company activities
5	<i>Catastrophic</i>	Business processes are completely disrupted so that the company's activities stop completely and business processes are not achieved

a. Risk Evaluation

This stage conducts *Risk Evaluation* or compares the risks that have been calculated above with the standardized risk criteria whether the risks are *low* which means low or acceptable risk, *moderate* means medium or need to be watched out, or *high* means high or unacceptable, and prioritize mitigation or handling (Lluka and Chunduri, 2015).

Table 2.6 Risk Evaluation Matrix

LIKELIHOOD	<i>Certain/ Definitely Happened (5)</i>	<i>Moderate</i>	<i>Moderate</i>	<i>High</i>	<i>High</i>	<i>High</i>
	<i>Likely / Often (4)</i>	<i>Low</i>	<i>Moderate</i>	<i>High</i>	<i>High</i>	<i>High</i>
	<i>Possible/ Sometimes (3)</i>	<i>Low</i>	<i>Low</i>	<i>Moderate</i>	<i>High</i>	<i>High</i>
	<i>Unlikely. Rare (2)</i>	<i>Low</i>	<i>Low</i>	<i>Moderate</i>	<i>Moderate</i>	<i>High</i>
	<i>Rare/ Very Rare (1)</i>	<i>Low</i>	<i>Low</i>	<i>Low</i>	<i>Moderate</i>	<i>Moderate</i>
		<i>Insignificant/ Very Small (1)</i>	<i>Minor/ Small (2)</i>	<i>Moderate/ Usual (3)</i>	<i>Major/ Big (4)</i>	<i>Catastrophic/ Very Large (5)</i>
	IMPACT					

From the existing data, a grading assessment is then carried out on several causes of the problem, as follows

Table 3. Grading Results of Near Injury Incidence Rate at Hospital X based on the type of Event in Action

No	Variable	Obstacles and Obstacles	Impact	Probability	Grading
Man					
1	Not used to RME	5	2	4	40
2	<i>Patient overload</i>	3	3	5	45
3	Inaccuracy of officers	3	4	2	24
4	The officer did not know the type of drug	3	4	2	24
Matherial					

1	Lack of knowledge about LASA drugs	5	5	3	75
2	No LASA label	3	4	1	12
3	The officer did not know the type of drug	5	4	3	60
Measurement					
1	Patient overload	3	3	5	45
2	No double check	5	4	3	60
3	The officer did not know the type of drug	5	4	3	60
4	Lack of training	5	4	3	60
Method					
1	Lots of new energy	4	4	1	16
2	Lack of teamwork	3	2	3	18
3	Lack of energy	4	4	1	16
4	Lack of trained manpower	5	4	2	40
5	Division of tasks within a team	3	2	1	6
6	Lots of new energy	4	4	1	16
Machine					
1	Lack of training	5	4	3	60
2	No LASA label	3	4	1	12
3	The officer did not know the type of drug	5	4	3	60
Mother Nature					
1	Less anamnesia	3	4	2	24
2	Presence of allergies	4	4	1	16
3	Less anamnesia	3	4	2	24
4	Same identity	4	4	1	16
5	There is no label with the same name yet	4	4	1	16

Table 3 presents the results of the incident analysis, indicating that medication errors are predominantly caused by human factors. To date, these patient safety incidents have not been systematically recorded, resulting in limited organizational learning that should have emerged from such events. A patient safety incident is defined as unintentional event that occurs during patient care due to care management problems (CMP) or hospital environmental conditions, including facilities and infrastructure, which may potentially cause or have caused harm to patients. Patient safety incidents may arise from flaws in system or process design, system failures, equipment malfunctions, or human error. Therefore, such incidents should serves as important learning opportunities and as targets for quality improvement initiatives (Putu et al., 2024). The following section presents the care management problem (CMP) incidents identified in this study.

Table 4. Care Management Problem (CMP) Patient Savety Insident

Impact	Caused by	Cause
Medication errors		Lack of scrutiny

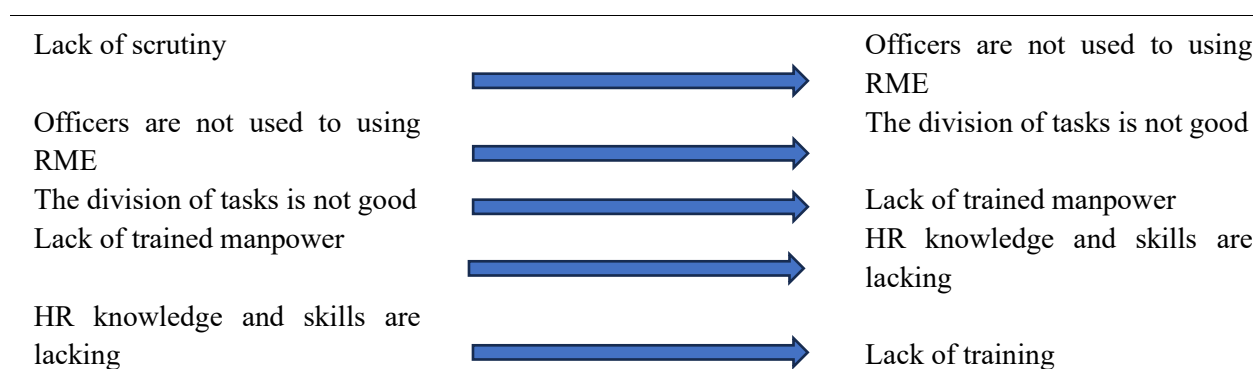


Table 4 presents findings from a more in-depth analysis, indicating that medication errors are largely associated with staff unfamiliarity with the Electronic Medical Record (RME) system recently implemented at Hospital X. This lack of familiarity is primarily due to insufficient training provided to staff. The analysis was conducted using six contributing factors, namely material, *manpower*, *method*, *measurement*, *machine*, *mother nature*. Based on the analysis of these six factors, the root causes of medication errors were predominantly related to human resource factors, including of high number of new staff, limited knowledge of medications, unfamiliarity with the RME system, lack of trained personnel, lack of anamnesis of officers. This human resource factor, according to the researcher, can be prevented with good training and mentoring planning so that medical errors do not increase (Amalia and Basabih, 2023).

Misdiagnosis is a global problem, with approximately 50% of cases resulting in death, and nearly 50% considered preventable (Alrabadi *et al.*, 2021). Medical errors can be classified into several categories, including context-based, modul-based,, mental-based, and stage-based errors (Alrabadi *et al.*, 2021). Medication errors based on stages include prescribing errors, transcription errors, dispensing errors, dosing errors (Amalia and Basabih, 2023), as well as discharge summary errors and monitoring errors (Alrabadi *et al.*, 2021).

The results of the root cause identification at Hospital X indicate that medication errors most frequently occur at the prescribing stage. This finding is consistent with previous studies reporting that missprescription is a leading cause morbidity and mortality (Amalia and Basabih, 2023). Furthermore, the root causes identified at Hospital X were primarily related to insufficient training and lack supervision. Supporting this finding, other study have shown that one type of mental-based medication error is a knowledge-based error, which is often associated with inadequate training (Alrabadi *et al.*, 2021).

Training is face-to-face learning process that uses systematic and planned instructional activities to accelerate learning (Armstrong and Taylor, 2020). In addition, training involves providing the necessary skills for both new and existing employees to effectively support their job responsibilities (Gary Dessler and Varrkey, 2005). The most appropriate form of training to address the problems identified in Hospital X is *on the job training*, as this method enables employees to learn directly while performing their duties within the organization. *On the job training* is considered an effective and productive approach to employee training and development (Ngcobo, 2022)

CONCLUSION AND SUGGESTION

At Hospital X, patient safety incident related to medication errors were found to be relatively high, particularly at the prescribing stage in inpatient services. Based on patient safety incident reporting data, this study identified the root cause of these incidents. Therefore, it is recommended that

hospital management conducts a Training Needs Analysis (TNA) to identify appropriate training programs for Hospital X staff. Implementing targeted training based on TNA is expected to ensure more evenly distributed staff knowledge and to reduce the incidence of medication errors.

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CONFLICT OF INTEREST

The researcher stated that there was no conflict of interest related to this publication with Hospital X. had obtained permission to conduct the publication on the condition that the name of Rumah Sakit was disguised

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