

**Clinical leadership and knowledge management: Essential role in patient safety culture?****Makiah Makiah<sup>a\*</sup>, Noermijati Noermijati<sup>b</sup>, Djumilah Hadiwidjojo<sup>b</sup> and Wahdiyati Moko<sup>b</sup>**<sup>a</sup>PhD student at Department of Management, Faculty of Economics and Business, Brawijaya University, Indonesia<sup>b</sup>Department of Management, Faculty of Economics and Business, Brawijaya University, Indonesia**ABSTRACT***Article history:*

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The subject of patient safety culture has attracted international interest. However, implementing these patient safety policies and practices is not easy, as significant challenges remain. This study analyzes the influence of clinical leadership effectiveness on patient safety culture by distributing questionnaires to 237 nurses in Hospital “X” in West Nusa Tenggara. Structural Equation Modeling (SEM) based on Partial Least Square (PLS) was used for data analysis and knowledge management was placed as a mediating variable in this study. It was found that the effectiveness of clinical leadership has a significant effect on patient safety culture. Thus, this study opens the scope of clinical leadership research in hospitals by exploring the effectiveness of leadership on patient safety culture. The role of clinical leaders in creating a patient safety culture with the mediation of knowledge management was also examined.

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**1. Introduction**

Hospitals as health care organizations have a huge role to play in advancing health services. On the other hand, hospitals are risky places that can endanger patients and their families and this is the reason why the concept of patient safety is important. Patient safety is a hot topic of discussion because care is patient-centered (Gutberg & Berta, 2017); and the emergence of medical errors in recent years in print and electronic mass media reports is one of the hidden potential evidence of adverse events (Dwiprahasto, 2010). Medical errors occur in 5-15% of all healthcare administrations in hospitals worldwide (Al-Mugheed & Bayraktar, 2020). While in Indonesia, data at the national level mentioned 132 incidents in 2013, then increased to 668 incidents in 2016 (Dhamanti et al., 2019). Many countries have recognized patient safety as demonstrated by the World Health Organization’s (WHO’s) global awareness of patient safety. However, implementing these patient safety policies and practices is not easy, as there are still significant challenges (Emanuel et al., 2009).

Leadership is one of the elements that shape patient safety culture. In addition, patient safety culture is also shaped by the elements of teamwork within the work unit, communication, management support, commitment to safety, a non-punitive approach to errors and near misses, and belief in the importance of safety culture (Sorra et al., 2016; Jarrett, 2017). Leadership in nursing is one of the factors that influence security or safety and quality of care in hospitals. The creation of a patient safety culture in hospitals cannot be separated from the elements of leadership, service implementers and support staff as an effort to improve the quality of effective hospital services (Bea et al., 2013). It is the leadership element that drives organizational members to show attitudes and behaviors related to safety culture. The role of leadership as one of the elements shaping organizational culture is evidenced by several previous studies which have found that the effectiveness of clinical leadership has an influence on the implementation of patient safety culture as found in the studies of (Künzle et al. 2010; Morello et al. 2013; Setiowati et al. 2013; Anwar et al. 2014). However, other research findings reveal that leadership has no significant effect on organizational culture (Li et al., 2018). Maxwell (2017) and Wong et al. (2013) then stated the need for effective leadership approaches in nursing leadership and the testing of nursing models. The difference in the two research results raises

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the questions: Does clinical leadership effectiveness have a significant effect on patient safety culture? Does clinical leadership effectiveness have a significant effect on knowledge management? Does knowledge management have a significant effect on patient safety culture? Is knowledge management variable able to mediate the effect of clinical leadership effectiveness on patient safety culture? Politis (2002) claimed that the role of leadership is able to increase the change from information to knowledge (knowledge creation) and to share knowledge for all employees.

This study attempts to (1) examine the influence of clinical leadership effectiveness on patient safety culture and (2) to explore the potential mediating variable of knowledge management on the influence of both clinical leadership effectiveness and patient safety culture. To answer the questions in this study, we used SEM PLS analysis. This study describes the theoretical concepts of research variables and the results of previous relevant research. The results of data analysis are described to discuss research findings based on the theoretical concepts of clinical leadership, organizational culture (patient safety), knowledge management and the relationship between variables.

## 2. Background

### 2.1 Leadership Effectiveness and Patient Safety Culture

Hospitals, places which are full of risks that can endanger patients and their families are one of the important reasons for the increasing concept of patient safety. Safety has become one of the global issues in five important issues related to hospitals. Safety is the first domain of quality, which views the importance of concern for patient safety in providing health services, and the second is the provision of health services that must ensure the implementation of medical efforts based on the latest and valid scientific evidence. The discussion of patient safety culture has also attracted international interest. This is evidenced by many countries establishing government agencies to monitor and manage patient safety in the healthcare system, such as the National Patient Safety Agency in the UK and the Canadian Patient Safety Institute (Flin., 2007).

Taiwan also has the Taiwan Patient Safety Reporting System (TPR), as a learning system, where all healthcare organizations are expected to report medical errors honestly and voluntarily without sanction. Malaysia, meanwhile, has a mandatory incident reporting system with an open reporting concept, where all patient safety incidents, including near misses, need to be reported. Even when there are no incidents, hospitals are required to submit patient safety indicator reports. Based on the components of the incident reporting system developed by WHO, Taiwan had the highest number of patient safety incidents reported, followed by Malaysia and Indonesia. In contrast, Indonesia does not have specific deadlines with regards to patient safety incident reporting system for external reports or report to the National Patient Safety Committee. Previous data shows that patient safety incidents continue to increase. There were 132 incidents reported in 2013 at the national level which then increased to 668 incidents in 2016 (Dhamanti et al., 2019).

The increasing number of patient safety incidents in Indonesia and especially in West Nusa Tenggara has attracted the attention of hospital officials to implement a patient safety culture. Lucian Leape as a surgeon and also known as the father of patient safety stated that lack of leadership in hospital organizations is associated as a barrier to safety culture, therefore leadership is an important subculture in creating a patient safety culture (Sammer et al., 2010). Leaders are central to the process of creating cultures, systems and structures that encourage knowledge creation, knowledge sharing and cultivation (Bryant., 2003). Leaders are those at the forefront of the clinical area level in the context of a hospital. In general, it is the leadership level that provides direction and standards for hospital quality management. Thus, leadership is required to create or improve safety culture, whether at the top level, department, inpatient or outpatient care unit. Thus, it is important that the actual task of formulating the vision of safety culture, monitoring the culture and implementing the different visions depends on the leadership position and the leader's area of responsibility in the organization (Kristensen et al., 2016).

The role of leadership is also believed to be important in hospitals. However, research on leadership in the context of hospitals is still rare. The importance of the role of leadership is due to a strong hierarchical culture in an organization which is created by the leader. This was proven by Setiowati et al. (2013) who found that there was a positive influence between effective leadership of head nurses on the implementation of patient safety. Furthermore, research by Anwar et al. (2014) found that the effective leadership component influences the implementation of patient safety culture in Makassar City Hospital. Künzle et al., (2010) in their study stated that leader effectiveness plays an important role in promoting performance and patient safety. Furthermore, Morello et al. (2013) in their systematic review found that leadership in the form of walkrounds as one of the strategies in improving patient safety culture.

Different research results were found by Wardhani et al. (2013) that have shown that effective leadership has no significant effect on patient safety culture. Other studies have found that leadership has no significant effect on organizational culture (Bell et al., 2014; Li et al., 2018; Abadiyah et al., 2020). Maxwell (2017) in his literature review also stated the debate of effective leadership approaches in nursing leadership. Wong et al. (2013) first revealed that there is a need for future testing of leadership models to examine the mechanisms of influence on patient outcomes. Leadership also started to play an important role in fostering and maintaining the necessary elements of patient safety (Kim & Newby-Bennett, 2012). Leaders then declared to have a role in managing information and knowledge management in organizations. Knowledge management

is the only management activity in the organization (Novak et al., 2020). The central role of leaders in the organization was also researched by Politis (2001) who found a relationship between leadership and various knowledge management attributes. Furthermore, Politis (2002) revealed that the role of leadership is able to increase the change from information to knowledge creation and knowledge sharing for all employees. Other research results emphasizing the importance of leaders in managing knowledge were also presented by Chu (2016); and Millar et al. (2016). Koohang et al. (2017) also confirmed the results of this study and found that there is a significant positive influence between effective leadership and knowledge management.

The key role of leaders in implementing knowledge management programs can help improve patient safety (Stock et al., 2010). Research on knowledge management on performance has been widely conducted in the manufacturing industry, while the scope of the health sector is still limited, and most of the previous studies explored the relationship of patient safety outcomes and health care quality. Thus, this study is expected to fill the gap. A review of the research results of Altindis and Kurt, (2010); Ocak et al. (2015) revealed that there is a positive and significant relationship between knowledge management and patient safety.

The success of leaders in encouraging knowledge management practices is inseparable from the involvement of people/employees at all levels of the organization. However, the right leadership approach in delivering knowledge management is still unclear (Analoui et al., 2013). Leadership has been found as one of the main factors that influences the implementation of knowledge management in organizations (Bryant, 2003). Many studies have also been conducted on aspects of knowledge management. However, limited studies have been performed in clinical leadership effectiveness. Lunden et al. (2018, 2020) mentioned the availability of research evidence for leadership and knowledge management in nursing which is limited. The presence of excellent leaders is one of the main factors required in implementing knowledge management successfully.

## 2.2 Hypothesis

To answer the first research question, an effective leader is needed to lead the implementation of patient safety. Patient safety will never be implemented without strong support and solid teamwork. Research results in health care show recent evidence that leadership involvement at various levels of the organization strongly influences long-term organization (Willis et al., 2016). Therefore, a hypothesis can be formulated with regards to the effectiveness of clinical leadership which has an influence on patient safety:

**Hypothesis 1:** *Clinical leadership effectiveness has a significant positive effect on patient safety culture.*

Leaders play a central role in managing organizational knowledge processes. Managing knowledge requires a conscious effort on the part of leaders at all levels of the organization in managing the key knowledge processes of creating knowledge, sharing knowledge, storing and applying knowledge (Hayat et al., 2015).

**Hypothesis 2:** *Clinical leadership effectiveness has a significant positive effect on knowledge management.*

Knowledge management has been shown to be effective in improving patient safety in several healthcare organizations (Orzano et al., 2008). Knowledge management has a role because knowledge can support healthcare professionals in patient safety decisions (Liebowitz et al., 2010).

**Hypothesis 3:** *Knowledge management has a significant positive effect on patient safety culture.*

Leaders in the organization are in control of an effective knowledge management process that will ultimately affect the quality of actions and decisions taken by leaders.

**Hypothesis 4:** *Knowledge management significantly mediates the effect of clinical leadership effectiveness on patient safety culture.*

## 3. Data and methods

### 3.1 Data Sources

Data sources in this study were obtained from two sources. Primary data were obtained from research respondents in accordance with the research target, i.e. nurse data which includes respondent characteristics such as age, gender, latest education, marital status, and work period. Secondary data were obtained from scientific journal articles, books, research reports and literature studies that are relevant to this research. Data were obtained from data collection conducted by directly observing the object of research. Other data collection was obtained by distributing research questionnaires to 237 nurses at Hospital "X" West Nusa Tenggara.

### 3.2 Variables in the Study

The variables in this study consisted of three variables, i.e. the patient safety culture variable as the dependent variable. The second variable is the effectiveness of clinical leadership as the independent variable and the third one is the knowledge management variable as the mediating variable in this study.

### 3.3 Outcome Variable

Measurement of research variables using a questionnaire derived from each variable indicator on a Likert scale with a score range of 1 (strongly disagree), 2 (disagree), 3 (neutral), 4 (agree) and 5 (strongly agree). Indicators for measuring patient safety culture research variables were adopted from The Safety Attitudes Questionnaire (SAQ) used by Sexton et al. (2006). The first indicator of patient safety culture is the teamwork climate which consists of three items. The second indicator, safety climate, consists of four items. The third indicator is job satisfaction which includes three items. The fourth indicator is stress recognition which consists of two items and the last indicator is working conditions with two items. Furthermore, indicators of clinical leadership effectiveness measurement use the Leadership Effectiveness Scale (LES) adopted from Shipton et al. (2008) and Clay-Williams et al. (2019). LES indicators include the search for new opportunities, the proposal of creative ideas, direction towards patient needs, consideration of staff needs, the power of building relationships within the organization and the power of building cooperation outside the organization. The measurement indicators of knowledge management variables are adopted from the knowledge management indicators developed by Darroch (2003). Knowledge management indicators include: knowledge acquisition, knowledge dissemination and responsiveness to knowledge.

**Table 1**  
Outcome Variable

	Construct	Items	References
Patient Safety Culture	Teamwork climate	1) Feedback is welcome 2) Coworker support 3) Good communication	Sexton et al. (2006).
	Safety climate	4) Patient safety as a priority 5) Good handling of medical errors 6) Appropriate feedback 7) Patient safety incident reporting	
	Job satisfaction (work experience)	8) Like the job 9) Feeling proud 10) Part of the hospital's extended family	
	Stress recognition	11) Handle stress due to work pressure 12) Handling stress due to patient pressure	
	Perceptions of management	13) Hospital management support 14) Sufficient number of coworkers	
	Working conditions	15) Disciplinary supervision of new nurses 16) Patient diagnostic information is routinely available	
	Effectiveness of Clinical Leadership	New opportunities for the organization	
Pposes creative idea		18) Propose new creative ideas	
Briefing on patient needs		19) Fulfilling patient needs 20) Increase attention for patient safety	
Consideration of Staff Needs		21) Fulfilling staff needs 22) Be a role model	
The power of relationship building in organizations		23) Building positive relationships with staff 24) Mutual respect in work	
The power of building cooperation with other organizations.		25) Relations with the community. 26) Relations with other organizations.	
Knowledge Management	Knowledge acquisition	27) Provision of regular training 28) Encouragement of knowledge improvement through training	Darroch (2003)
	Knowledge dissemination	29) Knowledge application 30) Knowledge dissemination	
	Knowledge responsiveness	31) Patient complaint response 32) Service change response 33) Technology change response	

### 3.4 Research Sample

The population in this study were all nurses in the inpatient room, totaling 581 nurses. The data on the number of nurses was obtained from the nursing staff data in 2021. The sample criteria are nurses who have a minimum work period of 1 year so that a research sample of 237 nurses is obtained.

### 3.5 Methods

SEM-PLS model testing was carried out in several stages. First, measurement model testing or outer model testing was used to validate the research model or construct validity testing, namely convergent validity and discriminant validity. In addition, it was also used to test internal consistency or construct reliability. Second, the structural model or inner model was carried out to predict the causal relationship between variables. Structural model testing can be seen through the bootstrapping process, T-statistic test parameters. Furthermore, the structural model or inner model was evaluated by looking at the percentage of variance explained by the goodness of fit (R2 value) in the dependent latent construct using the Stone-Geisser Q Square Test measure and also paying attention to the structural path coefficient. Finally, the mediating effect of direct influence and indirect influence was tested. The use of SEM-PLS method is due to the influence of direct and indirect causality relationships in this study (Ghozali, 2021).

## 4. Results

### 4.1 Respondent Description

The characteristics of respondents including, gender, age, marital status, latest education, period of work in the hospital and period of work in the work unit can be seen in Table 2.

**Table 2**  
Description of Respondents

	Characteristics	Frequency	Frequency (%)
<b>Gender</b>	Female	165	69.6
	Male	72	30.4
<b>Age</b>	≤ 25	21	8.9
	26 – 30	93	39.2
	31 – 40	84	35.4
	41 – 50	31	13.1
	>50	8	3.4
<b>Marital Status</b>	Unmarried	59	24.9
	Married	175	73.8
	Widowed	3	1.3
<b>Level of education</b>	Associate's degree of nursing	70	29.5
	Undergraduate (Bachelor) of nursing	162	68.4
	Graduate (Master) of nursing	5	2.1
<b>Hospital Period of Work</b>	1 – 5 years	145	61.2
	6 – 10 years	28	11.8
	11 – 15 years	20	8.4
	16 – 20 years	23	9.7
	>20 years	21	8.9
<b>Work Period in the Unit</b>	< 1 years	20	8.4
	1 – 5 years	157	66.2
	6 – 10 years	22	9.3
	11 – 15 years	14	5.9
	16 – 20 years	10	4.2
	>20 years	14	5.9

Source: Primary Data Processed, 2023

Based on Table 2 above, it can be seen that the gender of nurses is dominated by women, which is 165 or 69.6% and the remaining male nurses are 72 or 30.4%. In general, female nurses are more dominant. This is a fact that female nurses are more painstaking in providing nursing care to patients. Furthermore, nurses in the age range of 26 - 30 years are the most nurses with a total of 93 people (39.2%). However, senior nurses in the age range of 41-50 years also participated in this study. Nurses in a productive age have high work enthusiasm, supported by excellent endurance so that they can certainly provide nursing services that tend to be good. However, work enthusiasm and endurance alone are not enough, work experience from senior nurses are also required. Marital status in nursing care indirectly affects the continuity of nursing services. This can be seen from nurses who are late for picket due to family interests. The working period of nurses in the hospital has an influence in providing nursing care. A long period of work in the hospital is an indicator of a nurse's experience in providing nursing services and also affects the level of their position based on their skills and expertise in providing comprehensive nursing care. The number of nurses based on the period of work in the hospital, that is, nurses who work in the period of 1 - 5 years are the highest with a total of 145 people or 61.2%. In terms of period of work in each work unit, those who work for 1 - 5 years in the work unit found to be as many as 157 people or 66.2%.

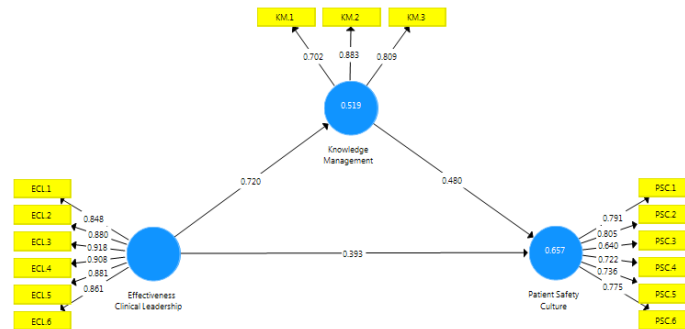
### 4.2 Results of SEM - PLS Model Analysis

Table 3 shows the results of the measurement model evaluation.

**Table 3**  
Measurement Model Evaluation

	Construct	Label	Loading Factor	Cronbach's Alpha (CA)	Rho_A	Composite Reliability (CR)	AVE
Patient Safety Culture	Teamwork climate	PSC1	0.791	0.841	0.853	0.883	0.558
	Safety climate	PSC2	0.805				
	Job satisfaction (work experience)	PSC3	0.640				
	Stress recognition	PSC4	0.722				
	Perceptions of management	PSC5	0.736				
	Working conditions	PSC6	0.775				
Effectiveness of Clinical Leadership	New opportunities for the organization	ECL1	0.848	0.943	0.945	0.955	0.780
	Poposes creative idea	ECL2	0.880				
	Briefing on patient needs	ECL3	0.918				
	Consideration of Staff Needs	ECL4	0.908				
	The power of relationship building in organizations	ECL5	0.881				
	The power of building cooperation with other organizations.	ECL6	0.861				
Knowledge Management	Knowledge acquisition	KM1	0.702	0.723	0.770	0.842	0.642
	Knowledge dissemination	KM2	0.883				
	Knowledge responsiveness	KM3	0.809				

Table 3 presents the loading factor value, Cronbach's Alpha (CA) value, Composite Reliability (CR) value and Average Variance Extracted (AVE). The Cronbach's Alpha value is used to measure the lower limit of the reliability value of a construct. The Cronbach's Alpha value ranges from 0.723 to 0.943. While the Rho\_A value is in the range of 0.770 to 0.945. While the composite reliability value ranges from 0.842 to 0.955. A construct is said to be reliable, if it has a Cronbach's Alpha value and the Composite Reliability value which are greater than 0.7, although a value of 0.6 is still acceptable (Abdillah & Hartono, 2015). The AVE values on all constructs are more than 0.5 in accordance with the rule of thumb. The results of the SEM - PLS Model Analysis can be found in the following Fig. 1.



**Fig. 1.** Output Model of Smart PLS

**4.3 Hypothesis Testing**

Hypothesis testing in this study found that H1, H2, and H3 were accepted. It can be stated that the knowledge management variable is able to mediate the effect of clinical leadership effectiveness on patient safety culture. The results of hypothesis testing are presented in Table 4 below.

**Table 4**  
Test of Direct and Indirect Effects

Hypothesis	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics ((O/STDEV))	P Values	Decision
H1: Effectiveness of Clinical Leadership → Patient Safety Culture	0.393	0.394	0.052	7.559	0.000	Received
H2: Effectiveness of Clinical Leadership → Knowledge Management	0.720	0.718	0.050	14.321	0.000	Received
H3: Knowledge Management → Patient Safety Culture	0.480	0.476	0.055	8.710	0.000	Received
H4: Effectiveness of Clinical Leadership → Knowledge Management → Patient Safety Culture	0.346	0.343	0.051	6.816	0.000	Received

**Partial Mediation**

## 5. Discussion

The role of an effective leader would be to support the work of employees by defining the goals and values of the organization to make the organization live and breathe in the process of providing care to patients (Leonard & Frankel 2012). The results of this study are in line with research conducted by Setiowati et al. (2013) which found that there is a positive relationship between effective leadership of the head nurse and the implementation of patient safety. Furthermore, research from Anwar *et al.* (2014) found that the effective leadership component is related to the implementation of patient safety culture in Makassar City Hospital. Künzle et al. (2010) in their study stated that leader effectiveness plays an important role in promoting performance and patient safety. The results of this study are also reinforced with previous studies by Morello et al. (2013) and Kristensen et al. (2016) which revealed that leadership is one of the strategies in improving patient safety culture and strengthening leadership as a catalyst for improving patient safety culture.

The sustainability of an organization is supported by the activities of the resources in it. Knowledge management activities in an organization are a challenge in itself. Knowledge is considered the most important and valuable resource in an organization and leaders are the ones who have the power to influence the knowledge management process in an organization (Hayat et al., 2015). The role of leadership in managing knowledge in organizations has long been discussed and presented clearly by Cleveland (1985 in Singh 2008). Empirical evidence from Politis (2001) found a relationship between self-management, leadership and various knowledge management attributes. The results of this study are emphasized by Koohang et al. (2017) that there is a significant positive relationship between effective leadership and knowledge management. Other research results mentioning the importance of leaders in managing knowledge are also stated by Chu (2016); and Millar et al. (2016). The same research results were also previously proven by Liu and Phillips (2011) that the role of leaders can improve knowledge management (knowledge sharing) in organizations. Other findings revealed by Gamo-Sanchez & Cegarra-Navarro, (2015) and Sayyadi (2019) state that leadership is a key factor and has an important role in building and facilitating knowledge sharing or knowledge transfer in organizations.

In the knowledge era, knowledge has become a major asset in organizations including health care organizations. The use of this knowledge is required in planning, decision-making, nursing actions, control and evaluation of health services in order to access better health safety (Altindis & Kurt, 2010). The importance of managing knowledge is required in healthcare organizations for decision-making which is a critical point of knowledge application. Hospitals are rarely structured in the management of knowledge management. However, nurses and clinicians are faced with decision-making that occurs all the time and sometimes under pressure such as in operating rooms and intensive care units (Pereira de Souza et al., 2020). With having a good knowledge base, nurses are able to make the best decisions in supporting patient health care. In addition, findings from Liu & Phillips (2011) state that the role of leaders is able to improve knowledge management (knowledge sharing) in organizations which can have a positive impact on organizational culture so as to create a work environment for employees to share knowledge.

## 6. Implication

### 6.1 Theoretical Implications

The results of this study support Schein's theory of organizational culture that an organizational culture is driven by the role of leaders. That safety culture and patient safety culture can be analyzed according to the main cultural levels proposed by Schein. The concept of patient safety culture is multi-dimensional, which means that the formation of a patient safety culture consists of several different dimensions, including leadership support for patient safety. The findings in this study reinforce Darroch's (2003) concept of knowledge management, which measures knowledge management based on three aspects, which are knowledge acquisition, knowledge dissemination and knowledge response.

### 6.2 Practical Implications

The findings in this study are input for the organization on how to make patient safety culture as a work habit, so that the hospital's strategic issues in implementing patient safety can be achieved, supported by solid teamwork and increasing the knowledge and skills of nurses.

## 7. Limitations and future research

This study was conducted in only one hospital, due to limited transparency of patient safety incident data. The target of this study was focused on the nursing profession, while there are many other health professions in the hospital. For this reason, it is hoped that future research can be carried out at more hospital locations or health facilities and research targets on other health professions, such as doctors, midwives, health analysts, pharmacists, nutritionists and radiographers..

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