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Communication and the Monitoring, Analysis, Evaluation, and Control of Risk as Predictors of Clinical Risk Management Implementation

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ABSTRACT

Clinical Risk Management (CRM) is a systematic approach to identifying, analyzing, evaluating, and controlling risks to improve the quality and safety of patient care in hospitals. This study aimed to analyze the factors associated with the implementation of CRM at Pertamina Hospital Pangkalan Brandan, particularly in terms of organizational systems, leadership, culture, training, communication, and risk control. This study used a quantitative approach with a cross-sectional design. The sample consisted of 180 healthcare workers at Pertamina Hospital Pangkalan Brandan. Data were collected using a structured questionnaire and analyzed using multiple logistic regression tests to identify the dominant factors influencing CRM implementation. Bivariate analysis indicated that all independent variables; organizational systems (p = 0.000), leadership (p = 0.000), cultural understanding (p = 0.000), training (p = 0.000), communication (p = 0.000), and monitoring, analysis, evaluation, and risk control (p = 0.000) were significantly associated with CRM. Multivariate analysis revealed that the most influential variables in CRM implementation were communication (OR = 18.991) and monitoring, analysis, evaluation, and risk control (OR = 56.403). As conclusion, the dominant predictors of the implementation of CRM at Pertamina Hospital, Pangkalan Brandan are communication and the monitoring, analysis, evaluation, and control of risk.
Keywords: clinical risk management; communication; risk control; hospital; service quality

INTRODUCTION

Hospitals are healthcare institutions that play a strategic role in improving public health. As complex healthcare providers, hospitals are required to provide safe, high-quality, and efficient services. The quality of hospital services is not only assessed by the success of medical therapy but also by the extent to which the hospital is able to implement a comprehensive risk management and patient safety system.[1] The concept of patient safety has become a key indicator of healthcare quality in the modern era, as it encompasses systematic efforts to identify, assess, control, and evaluate risks that may arise during the service process.[2]

Globally, the World Health Organization (WHO) has emphasized that patient safety is a fundamental principle of healthcare and a key element in hospital quality management. The WHO estimates that millions of patients worldwide suffer injuries due to unsafe care each year, and most of these incidents are preventable. The WHO's World Alliance for Patient Safety program aims to strengthen a culture of patient safety through a global strategy. However, data shows that patient safety incidents remain high, even in internationally accredited hospitals.[3]

A multicenter study conducted by Pham et al., in 11 hospitals across five countries reported 52 patient safety incidents, with the highest proportions occurring in Hong Kong (31%), Australia (25%), India (23%), the United States (12%), and Canada (10%). In Brazil, adverse event incidents were estimated to reach 7.6% of all hospital admissions. These data confirm that even though patient safety goals have been well formulated, their implementation still faces serious challenges in various countries, both developed and developing.

A similar situation also occurs in Indonesia. Although the government has issued various regulations, such as Minister of Health Regulation No. 11 of 2017 concerning Patient Safety, which stipulates six patient safety targets (patient identification, effective communication, high-alert medication safety, proper surgical procedures, prevention of healthcare-associated infections, and prevention of falls), implementation in the field has not been optimal.[4] Reports from the Hospital Patient Safety Committee (KKPRS) for the 2013–2024 period recorded 249 reports of Adverse Events (KTD) and 283 reports of Near Misses (KNC). In terms of causative units, the most incidents came from nursing (207 reports), pharmacy (80 reports), and laboratories (41 reports). In terms of regional distribution, the most cases were reported in Banten (125 reports), Jakarta (105 reports), while other provinces such as Riau only recorded 5 reports. This data indicates the still low level of incident reporting and the uneven implementation of patient safety culture in Indonesian hospitals.

The reality on the ground also indicates a gap between standards and implementation. A preliminary study at Pertamina Hospital in Pangkalan Brandan, for example, found that patient safety target indicators had not been optimally achieved. Several indicators that did not meet targets included compliance by the physician in charge of the patient (DPJP) in providing written confirmation (TBAK), compliance by healthcare workers in washing their hands using the WHO 6-step/5-moment method (achieved at only 83.9%), and wearing fall risk bracelets (90%). This illustrates that formal policies and accreditation do not fully guarantee the internalization of a culture of safety in daily clinical practice.

In this context, Clinical Risk Management (CRM) is becoming an increasingly important approach. CRM is a specific form of clinical risk management that focuses on systematic efforts to identify, analyze, control, and

learn from patient-related risks.[3] CRM emphasizes not only incident prevention but also fostering a proactive organizational culture in addressing risk. CRM implementation in modern hospitals typically includes the development of a risk register, staff training, a risk management information system, and ongoing evaluation. In this way, CRM is expected to reduce the number of patient safety incidents while improving service quality. However, research on the level of CRM implementation in Indonesia is still very limited. Most previous studies have focused on service quality, accreditation, or the implementation of patient safety standards in general, while in-depth studies of the factors supporting successful CRM implementation are rare.[5] However, CRM success depends not only on the availability of regulations but also on supporting factors such as leadership, a safety culture, staff participation, learning from incidents, and education and training.

At Pertamina Hospital in Pangkalan Brandan, for example, the Risk and Quality Management Department has undertaken initiatives such as training pharmacy staff to develop risk registers and implement risk mitigation measures. Data from 2024 showed 59 risks registered in the Pharmacy Unit, but only six had been mitigated. In the Inpatient Unit, 125 risks were recorded, but only 25 had been mitigated. This indicates that CRM implementation at the hospital is not yet comprehensive and mature across all units.

Based on these conditions, it is clear that although CRM policies have been implemented in several hospitals in Indonesia, empirical evidence regarding the level of implementation and supporting factors for CRM is still limited. Few studies have examined the extent to which factors such as leadership, safety culture, staff participation, and learning systems contribute to the success of CRM implementation. Therefore, this study not only assesses the level of CRM implementation at Pertamina Hospital in Pangkalan Brandan but also identifies the influential supporting factors, thus providing a new scientific contribution to the literature on health risk management in Indonesia. The results of this study are expected to strengthen the empirical basis regarding the relationship between supporting factors and the success of CRM implementation, while also providing practical recommendations for hospitals to continuously improve service quality and patient safety.

Based the background, this study aimed to analyze the factors associated with the implementation of CRM at Pertamina Hospital Pangkalan Brandan, particularly in terms of organizational systems, leadership, culture, training, communication, and risk control

METHODS

This study used a quantitative analytic survey with a cross-sectional design to analyze the supporting factors of CRM implementation and its relationship with service quality and patient safety at Pertamina Hospital Pangkalan Brandan. The research was conducted from March to April 2025 at Pertamina Hospital Pangkalan Brandan. The population in this study consisted of all nurses working at the hospital, totaling 180 individuals. The total sampling technique was applied so that the entire population was used as respondents to obtain comprehensive and representative data. The inclusion criteria were nurses who had worked for at least one year at the hospital and were actively involved in patient care activities. The exclusion criteria were nurses who were on leave, undergoing training outside the hospital, or declined to participate in the study.

The research utilized primary and secondary data. Primary data were collected through structured questionnaires administered directly to respondents, while secondary data were obtained from hospital records, including data on the number of nurses and patient safety incident reports for 2025. Supporting information from literature and previous studies was also reviewed to contextualize the findings and strengthen the discussion.

Prior to analysis, all data were checked for completeness, then coded, entered, and processed using the SPSS program. Data analysis was carried out in three stages: descriptive analysis to describe the frequency and proportion of variables. Bivariate analysis using the Chi-Square test at a 95% confidence level to determine the relationship between independent and dependent variables ($p < 0.05$); and Multivariate analysis using multiple logistic regression test to identify the most influential factors on CRM implementation, service quality, and patient safety.

This research obtained ethical approval from the Health Research Ethics Committee of Pertamina Hospital Pangkalan Brandan, ensuring that all procedures adhered to ethical standards related to informed consent, confidentiality, and participant protection throughout the study process.

RESULTS

Pertamina Hospital, Pangkalan Brandan is an advanced healthcare facility managed by PT Pertamina Bina Medika Indonesia Healthcare Corporation (IHC), a state-owned holding company specializing in hospitals and healthcare services. In an effort to improve patient safety and minimize clinical risks, the hospital has begun gradually implementing the CRM concept, particularly in units at high risk of adverse events. This is relevant considering regulatory demands from the Ministry of Health and hospital accreditation, which increasingly emphasize the importance of risk management and service quality.

Based on the demographic characteristics data (Table 1), it is known that the majority of respondents were in the 36–45 years age group (49.4%). This shows that the majority of health workers are in their productive and mature age, who have the potential to have sufficient work experience in clinical services. Work experience is an important factor in supporting the implementation of CRM, considering that clinical risk management requires risk identification skills and wise clinical decision-making.

In terms of gender, 52.0% nurses were female, while 48.0% nurses were male (Table 1). This distribution is relatively balanced and reflects that both male and female healthcare workers have almost equal roles in the implementation of healthcare services in hospitals. Although gender does not directly influence CRM implementation, a balanced distribution can reflect the equitable distribution of roles and responsibilities within the quality and patient safety system.

Furthermore, the majority of respondents (71.1%) had a nursing professional education (Table 1). The high level of education among respondents reflects that healthcare workers at Pertamina Hospital have sufficient

competence in professional services, including in terms of understanding the importance of quality and patient safety. Professional nursing education enables healthcare workers to have adequate knowledge and skills in identifying clinical risks, reporting incidents, and implementing standard operating procedures in daily services.

Table 1. Distribution of age, gender, and education of nurses at Pertamina Hospital, Pangkalan Brandan in 2025

Demographic variable	Category	Frequency	Percentage
Age	<35 years old	37	20.6
	36-45 years old	89	49.4
	>45 years old	54	30.0
Gender	Man	72	48.0
	Woman	108	52.0
Education	D3	52	28.9
	Profession	128	71.1

Table 2. The influence of organizational system factors on CRM in CRM implementation, quality and patient safety at Pertamina Hospital, Pangkalan Brandan in 2025

Organizational system factors	Category	Implementation of CRM				p-value	Odds ratio
		Not good		Good			
		Frequency	Percentage	Frequency	Percentage		
Organizational system	Not good	74	41.1	19	10.6	0.000	11.507
	Good	22	12.2	65	36.1		
Leadership	Not good	81	45.0	12	6.7	0.000	32.400
	Good	15	8.3	72	40.0		
Cultural understanding	Not good	83	46.1	13	7.2	0.000	34.870
	Good	13	7.2	71	39.4		
Training	Incomplete	90	50.0	9	5.0	0.000	125.000
	Complete	6	3.3	75	41.7		
Communication	Not good	89	49.4	5	2.8	0.000	200.886
	Good	7	3.9	79	43.9		
Monitoring, analysis, evaluation and control risk	Incomplete	92	51.1	5	2.8	0.000	363.400
	Complete	4	2.2	79	43.9		

The results of the bivariate analysis reveal a consistent and statistically significant relationship between each organizational factor and the implementation of CRM. This significance is demonstrated by p-values below the conventional threshold of 0.05 for all variables examined (Table 2), indicating that the observed associations are unlikely to be due to chance. This indicates that each variable, namely the organizational system, leadership, understanding of safety culture, training, communication, and monitoring, analysis, evaluation, and risk control, has a significant relationship with the implementation of CRM. With a significant p-value, these six variables can be categorized as candidate supporting factors in the implementation of CRM in hospitals. This means that these variables have the potential to strongly influence the success of the implementation of clinical risk management, both directly and indirectly.

Table 3. Final stage results of logistic regression analysis

Variables	B	p-value	Exp(B) OR	95% CI For Exp (B)
Communication	2,944	0,000	18,991	4,121-87,523
Monitoring, analysis, evaluation, and risk control	4,033	0,000	56,403	12,214-260,451

Based on the results of the logistic regression analysis (Table 3), there were two variables that significantly influence the implementation of CRM, namely communication and monitoring, analysis, evaluation, and risk control. First, the communication variable has a regression coefficient (B) value of 2.944 with a p-value of 0.000, which indicates that communication has a significant effect on CRM implementation. The Exp(B) value of 18.991 means that respondents who rate communication in the hospital as good have an 18.99 times greater chance of implementing CRM well than respondents who rate communication as poor. The 95% confidence interval for Exp(B) is between 4.121 and 87.523, which indicates that this estimate is quite strong and does not cross the number 1, so it can be concluded that good communication greatly influences the success of CRM. Second, the monitoring, analysis, evaluation, and risk control variable showed a B value of 4.033 with a p-value of 0.000, which also indicates a significant effect. The Exp(B) value of 56.403 indicates that respondents who rate risk monitoring activities as complete are 56.4 times more likely to implement CRM well than those who rate it as incomplete. The 95% confidence interval for the odds ratio value is 12.214 to 260.451, indicating that the effect of this variable is very strong despite the wide range, but still does not cover the number 1.

DISCUSSION

Communication

The results of the study showed that the communication variable had a significant effect on the implementation of CRM. This indicates that respondents who rated communication in the hospital as “good” were 18 times more likely to support effective CRM implementation compared to those who rated communication as “poor”. These findings align with the theory of Fernandez et al. (2023), which emphasizes that effective communication is a core component of a clinical risk management system(6). Good communication is not only related to the transfer of information, but also involves clear instructions, transparency of processes, openness in reporting incidents, and the courage to express opinions in a psychologically safe work environment. Without clear and structured communication, the process of risk identification, near-miss reporting, and data-driven decision-making will not run optimally.

In clinical risk management, open and timely cross-professional communication is fundamental to preventing patient safety incidents.[7] Poor communication can lead to medical errors, negligence, and even sentinel events. In hospital organizations, a good communication process encompasses the delivery of information between units, between professins, and vertical communication between managers and service providers. Research by Liu et al. (2023) in a hospital in Shanghai also found that teams with high communication frequency and a good communication structure were able to reduce the rate of adverse events by up to 34%.[8] This is due to clear roles, rapid feedback, and a responsive risk reporting system that can be immediately followed up.

Furthermore, research by Chowdhury & Malik (2024) shows that hospitals with integrated clinical communication systems have a 45% reduction in patient safety incidents.[9] This study emphasizes the importance of using electronic communication systems that support incident reporting and the existence of cross-professional discussion forums (doctors, nurses, risk managers, and top management) to discuss risk findings and mitigation plans. The researchers' assumption in the context of Pertamina Hospital Pangkalan Brandan is that the communication barriers that occur are caused by a weak feedback loop between management and healthcare workers, a lack of open communication forums, and suboptimal patient safety-based clinical communication training. Therefore, it is important to improve communication capacity through effective communication training, the implementation of standard handovers (such as SBAR), and creating an open culture that supports risk reporting without fear of punishment (a non-punitive approach).

Based on field findings, researchers assume that the success of CRM at Pertamina Hospital in Pangkalan Brandan is highly dependent on communication patterns among medical staff, nurses, and management. Hospitals that foster a culture of open communication and avoid blame (just culture) have a greater chance of early risk detection, analysis, and control. Poorly structured, poorly documented, or unfollowed-up communication will hinder comprehensive CRM implementation.

Risk Monitoring, Analysis, Evaluation, and Control

This variable showed the strongest influence on CRM. If this aspect is fully implemented, the likelihood of successful CRM implementation increases dramatically. According to the Risk Management Cycle approach of ISO 31000 (2023), the risk monitoring and evaluation component is a critical step in the clinical risk management cycle. This process includes incident reporting, root cause analysis, clinical audits, and risk control through system improvements. Without this process, hospitals are merely reactive to incidents, not preventive.

Theoretically, according to the Institute for Healthcare Improvement (IHI, 2023), the risk monitoring and evaluation cycle is a crucial part of proactive risk management, where organizations not only respond to incidents that have already occurred but also actively identify potential hazards through audits, incident reporting, root cause analysis (RCA), and incident trend evaluation. This supports a systematic and structured approach to risk control and helps organizations achieve continuous quality improvement.[9]

Research conducted by Hayrili N. (2023) in a teaching hospital in China also showed that the presence of a technology-based incident reporting system and routine RCA for sentinel events reduced the adverse event rate by 32% within one year.[10] This demonstrates the essential importance of data-driven monitoring in CRM. A study by Khater et al. (2023) in 11 government hospitals in Egypt revealed that hospitals with real-time monitoring and risk analysis systems were able to reduce the number of medical incidents by up to 45% within one year.[11] Effective monitoring also contributes to increased patient and staff confidence in the safety system.

The researcher's assumption in the context of the hospital studied is that the constraints in the risk monitoring system are likely caused by a lack of capacity building in the field of quality and risk management, limited human resources trained to conduct RCA, and a lack of managerial commitment to using incident data as a basis for managerial decision-making. This indicates the need for structural intervention and systematic training for all units to conduct incident analysis and implement specific and measurable risk control measures. The researcher assumes that the weak implementation of the risk control evaluation system at Pertamina Hospital Pangkalan Brandan for most respondents is due to a lack of trained human resources, a weak incident reporting system, and suboptimal internal audits that detect risks regularly. When the hospital builds a continuous evaluation system and encourages analysis of clinical incident data, CRM can be optimized as part of sustainable quality and patient safety.

Organizational System

The hospital organizational system is also a factor that has a significant influence on CRM implementation. A good organizational system is characterized by a clear structure, appropriate division of tasks, coordination between departments, and an integrated service flow. Organizational theory in healthcare according to Mintzberg in emphasizes the importance of functional structures and effective coordination mechanisms in healthcare institutions, particularly hospitals. Complex hospital organizations require a risk management system that is embedded in the organizational culture, not as an additional activity.[12]

Research by Yuliani et al. at Dr. Soetomo General Hospital in Surabaya, an organizational system that supports quality and patient safety programs will improve incident reporting and accelerate interventions.[13] The researchers assumed that if a hospital's organizational system does not support comprehensive risk management; for example, there is no dedicated patient safety unit, roles are not clearly defined, or SOPs are not integrated with quality policies then CRM implementation will be hampered. This is exacerbated by a top-down bureaucratic style and minimal involvement of implementing staff in risk decision-making.

Leadership

Hospital leadership contributes significantly to CRM success. Visionary leaders, those who support incident reporting without blame, and those who actively participate in risk assessments foster a culture of safety.

Bass & Avolio's transformational leadership theory in healthcare, as updated by Wong et al. (2024), emphasizes that leaders who inspire, model, and provide individual support will increase adherence to safety procedures.

Research by Kim et al. in South Korea showed that hospitals with clinical leaders actively involved in patient safety training had significantly lower sentinel event incident rates.[14] The researchers concluded that leadership at Pertamina Hospital in Pangkalan Brandan plays a crucial role in building commitment to CRM. The lack of role models, the absence of direct monitoring from leaders, and the lack of staff involvement in decision-making contributed to staff feeling less responsible for implementing CRM.

Training

Training is a crucial indicator of hospital human resource readiness for CRM implementation. Findings indicate that comprehensive training significantly correlates with successful CRM implementation. Knowles' learning theory, developed by Ma et al. (2023), states that effective training must be experience-based and relevant to work practices. In the context of CRM, training should include incident reporting, RCA, sentinel event management, and risk management simulations.[15] Research by Reska darto et al. (2024) at Cirebon Regional General Hospital (RSUD) showed that periodic risk management training increased staff understanding and compliance by 63%.[16] The researchers assumed that CRM training at Pertamina Hospital was not optimal, as evidenced by the majority of staff who admitted not having completed the training. This was due to limited training budgets, high workloads, and a lack of monitoring of the effectiveness of the training.

Cultural Understanding

Organizational culture, particularly safety culture, significantly influences CRM implementation ($p = 0.000$). Hospitals with a culture that encourages fearless incident reporting, fair evaluation, and collective learning are better prepared to manage clinical risks. According to the "Safety Culture Maturity Model" (2023), hospitals ideally should move from a "pathological" culture (risk indifference) to a "generative" culture (risk is managed proactively and collectively).

The hospitals with a strong safety culture had better CRM scores, including in the dimensions of incident reporting, learning from mistakes, and open communication.[17-21] The researchers assumed that the safety culture at Pertamina Hospital in Pangkalan Brandan was not yet optimally developed. Staff were still reluctant to report errors for fear of sanctions, and not all units understood the importance of CRM as part of clinical routines. To improve CRM effectiveness, a comprehensive organizational culture transformation is necessary.

CONCLUSION

This study revealed that the implementation of Clinical Risk Management (CRM) at Pertamina Hospital in Pangkalan Brandan has not yet reached an optimal level. Most nurses perceived several supporting factors such as the organizational system, leadership, understanding of safety culture, training, communication, and monitoring as still inadequate. These findings indicate that the overall hospital environment and managerial support systems require strengthening to achieve effective CRM practices.

Among the examined factors, communication and the process of monitoring, analysis, evaluation, and risk control emerged as the most influential in determining the success of CRM implementation. The study highlights that when communication channels are clear, open, and responsive, and when the risk management process is conducted comprehensively and continuously, the quality of CRM improves significantly.

In conclusion, to enhance CRM implementation and achieve better patient safety outcomes, hospitals need to prioritize building a culture of effective communication and ensuring that every stage of the risk management cycle monitoring, analysis, evaluation, and control is carried out consistently and thoroughly. Strengthening these aspects can foster a safer, more accountable healthcare environment and contribute to overall service quality improvement.

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