



THE APPLICATION OF RISK MANAGEMENT IN RELATION TO SERVICE EFFICIENCY DURING OVERCROWDING IN THE EMERGENCY DEPARTMENT

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ABSTRACT

Overcrowding in the Emergency Department (ED) is an issue that can hinder service efficiency and increase risks to the safety of both patients and healthcare personnel. The implementation of risk management is essential for identifying and controlling the various risks that arise due to service congestion. This study aims to analyze the implementation of risk management and its relationship with service efficiency in the ED at the Prof. Dr. J. A. Latumeten Level II Hospital. The study employs a quantitative method with an analytical observational design and a cross-sectional approach. The study population consists of all healthcare personnel working in the ED, with a sample size of 28 respondents selected using a total sampling technique. Data were collected via a questionnaire covering the stages of risk management—identification, analysis, evaluation, and control—as well as indicators of service efficiency. The results indicate that the overall implementation of risk management is categorized as "fairly good"; however, the stages of risk analysis and control are not yet fully optimized. Hypothesis testing yielded a significance value of 0.000 ($p < 0.001$), demonstrating a significant relationship between the implementation of risk management and ED service efficiency. These findings highlight the importance of optimizing every stage of risk management to support improved service efficiency and the management of risks associated with ED overcrowding. A structured approach to risk management is expected to serve as a component of strategies aimed at enhancing the quality and safety of emergency services.

Keywords: risk management; overcrowding; service efficiency; emergency department

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INTRODUCTION

A hospital is a healthcare facility that provides comprehensive individual healthcare services, including outpatient care, inpatient care, and emergency services, as well as supporting services tailored to the needs of patients (Prihatin et al., 2025). In the provision of healthcare services, hospitals are required to ensure quality of care, patient safety, timeliness, and the efficient use of resources (Harniati et al., 2026). One unit that plays a strategic role in meeting these requirements is the Emergency Department (ED). The ED is a service unit that provides initial care to patients in emergency conditions who require immediate medical examination and intervention. ED services must be available 24 hours a day and supported by competent healthcare professionals, adequate facilities and infrastructure, and an effective patient flow management system, ensuring that service needs are met according to the severity of each patient's condition (Standard for Emergency Departments, Urgent Care Centers, and Select Primary Healthcare Centers in Abu Dhabi, 2025).

Emergency care services are a vital component of the healthcare system, as delays in treatment can increase the risk of complications, disability, and even death. The World Health Organization (WHO) emphasizes the importance of an organized and accessible emergency care system capable of providing timely treatment tailored to a patient's clinical needs (Mustafa et al., 2022). Therefore, the efficiency of emergency department (ED) services is a crucial aspect in supporting the quality and safety of hospital care. Service efficiency relates not only to the speed of patient care but also

encompasses the accuracy of the triage process, the smooth flow of services, the effective utilization of healthcare personnel and facilities, and the seamless transfer of patients to appropriate care units. An imbalance between service demand and available capacity can hinder the achievement of such efficiency—for instance, through the occurrence of overcrowding (Sharma et al., 2021).

Overcrowding, or patient congestion in the emergency department (ED), is a situation where the demand for care exceeds the available capacity, preventing the unit from providing optimal service (Sartini et al., 2022). This situation can be influenced by a high volume of patients, a shortage of healthcare personnel and clinical space, the time required for examinations and treatment, a limited number of inpatient beds, and delays in transferring patients from the emergency department to subsequent care units (Babatabar-Darzi et al., 2020). Thus, overcrowding is not determined solely by the number of patient visits, but also by a hospital's capacity to manage the inflow of patients, the care process, and the outflow of patients. An imbalance at any of these stages can lead to a buildup of patients and hinder the smooth delivery of emergency care.

The issue of overcrowding is a significant concern in healthcare, as it can have consequences for the quality, safety, and efficiency of services. High patient density can lead to longer wait times, delays in medical examinations and interventions, impediments to the triage process, and an increased workload for healthcare staff. Furthermore, such conditions can disrupt communication and coordination both among healthcare professionals and between healthcare staff and patients' families (Lindner & Woitok, 2021). Research by Suranata, (2023) on the relationship between overcrowding and the accuracy of triage implementation in the Emergency Department (ED) of the Manembo-nembo Regional General Hospital (Type C) in Bitung indicates a correlation between patient overcrowding and the accuracy of triage. These findings suggest that service congestion warrants attention, as it has the potential to interfere with the process of prioritizing patient care. Consequently, addressing overcrowding requires systematic service management extending beyond mere physical capacity expansion to include the identification and control of risks that could hinder service delivery.

One approach that can be employed to support risk management in the ED is formal risk assessment and mitigation. Risk management is a systematic process encompassing the identification, analysis, evaluation, and control of risks that may impede the achievement of organizational objectives (Tavirani & Beigvand, 2019). In the context of ED services, risk management can be used to anticipate potential patient overcrowding, identify the causes of service delays, assess the likelihood and impact of risks, establish care priorities, and implement appropriate control measures. Key risks that require attention include imbalances between patient volume and service capacity, a shortage of inpatient beds, delays in the referral process, communication barriers, and suboptimal coordination during patient transfers. The implementation of structured risk management is expected to assist hospitals in prioritizing improvements, optimizing resource utilization, and mitigating potential disruptions to the continuity of care. Nevertheless, the actual contribution of risk management to service efficiency must be evaluated based on empirical data, as the mere existence of risk management procedures does not necessarily guarantee that all stages are being executed optimally (Nafi'ah et al., 2023).

Based on patient visit data at the Emergency Department (ED) of Prof. Dr. J. A. Latumeten Level II Hospital, the number of visits was 13,719 in 2023, increased to 14,182 in 2024, and subsequently decreased to 10,998 in 2025. These fluctuations indicate variations in service demand from year to year. However, annual visit data alone is insufficient to confirm the occurrence of overcrowding, as this condition is also influenced by factors such as bed capacity, the availability of healthcare personnel, the length of time patients spend in the ED, and the efficiency of transferring patients to inpatient wards. Nevertheless, such data remains essential for evaluating the alignment between service demand and hospital capacity, particularly in identifying potential bottlenecks that could

affect operational efficiency.

In addition to visit data, preliminary observations by the researchers indicate that in 2024, there was an instance where a referred patient could not be admitted for further care due to a lack of available beds in the inpatient wards. The patient was subsequently advised to be referred to another hospital. During this process, a discrepancy in understanding arose between the hospital and the patient's family regarding the adequacy of the medical care provided prior to the referral. The patient was then transferred to another facility and was reported to have passed away upon arrival at the destination hospital. This incident highlights challenges in managing service capacity, ensuring the continuity of the referral process, and communicating with patients' families. It should be noted, however, that this event cannot be taken as definitive proof that the shortage of beds or the referral process directly caused the patient's death. This occurrence serves as a critical impetus for evaluating service risk management specifically concerning decision-making, coordination between healthcare facilities, and the communication of information to patients and their families.

Given these circumstances, the implementation of risk management in the ED of Prof. Dr. J. A. Latumeten Level II Hospital... It is necessary to examine the extent to which the stages of risk identification, analysis, evaluation, and control have been implemented at the Prof. Dr. J. A. Latumeten Level II Hospital, and how these relate to service efficiency. While previous research as noted in the background has primarily focused on the link between overcrowding and the accuracy of triage implementation, this study centers on the application of risk management and service efficiency within the context of a hospital Emergency Department (ED). This focus is intended to provide insight into which aspects of risk management are currently in place and which areas still require improvement. Consequently, the findings may serve as a resource for hospital management to strengthen risk governance, refine service workflows, and optimize resource utilization. This study aims to analyze the implementation of risk management and its relationship to service efficiency in the Emergency Department at the Prof. Dr. J. A. Latumeten Level II Hospital. The results are intended to inform policy development and improvements to the ED service system specifically by supporting the management of risks associated with overcrowding, enhancing operational efficiency, and upholding the quality of care and patient safety.

METHOD

This study employs a quantitative approach with an analytical observational design and a cross-sectional framework. This design is used to analyze the relationship between the implementation of risk management (the independent variable) and service efficiency (the dependent variable), based on data collected during a single observation period. The study was conducted in the Emergency Department (ED) of the Prof. Dr. J. A. Latumeten Level II Hospital between June and July 2026. The study population consists of all healthcare personnel working in the ED of the Prof. Dr. J. A. Latumeten Level II Hospital—a total of 28 individuals, including physicians, nurses, and other healthcare staff involved in emergency care. A total sampling technique was used, meaning all members of the population who met the study criteria were included as respondents. This technique was chosen because the population size is relatively small, allowing for the inclusion of all individuals who met the research requirements. Data were collected using a questionnaire covering the implementation of risk management and the efficiency of ED services. Risk management implementation was assessed based on four stages: risk identification, risk analysis, risk evaluation, and risk control. Meanwhile, service efficiency was evaluated based on indicators established within the research instrument. The collected data were then processed and analyzed using statistical tests appropriate for the data scale and the study's objectives, in order to determine the relationship between the implementation of risk management and ED service efficiency.

RESULT

Table 1.

Distribution of Respondents by Gender, Education Level, Age Group, and Length of Service

Characteristic Response	Category	f	%
Gender	Male	6	21,4
	Female	22	78,6
Education Level	Diploma (D3) in Nursing	9	32,1
	Bachelor's degree (S1) in Nursing	10	35,8
	Bachelor's degree (S1) in Medicine	9	32,1
Age Group	20–25 years	6	21,4
	26–30 years	14	50,0
	31–40 years	7	25,0
	> 40 years	1	3,6
Length of Service	1–5 years	20	71,4
	6–7 years	8	28,6

Table 1, there are 28 respondents in this study. The distribution of respondents covers characteristics such as gender, educational level, age group, and length of service. Regarding gender, the majority of respondents are female, totaling 22 individuals (78.6%). In terms of educational level, the largest group of respondents holds a Bachelor's degree in Nursing (S1 Nursing/Ners), accounting for 10 individuals (35.7%). Regarding age, the majority of respondents fall within the 26–30 age range, totaling 14 individuals (50.0%). In terms of length of service, the majority of respondents have 1–5 years of experience, totaling 20 individuals (71.4%). Overall, the respondents in this study are predominantly female, hold a Bachelor's degree in Nursing (S1 Nursing/Ners), belong to the 26–30 age group, and have 1–5 years of work experience.

Table 2.

Results of Bivariate Analysis on the Influence of Risk Management on Service Efficiency in the Emergency Department (IGD) of the Level II

Independent Variable	R	R Square	T-Statistics	P-Value	Influence (%)	Description
Risk Identification	0,708	0,501	5,107	0,000	50,1%	Accepted
Risk Analysis	0,584	0,341	3,671	0,001	34,1%	Accepted
Risk Evaluation	0,827	0,683	7,488	0,000	68,3%	Accepted
Risk Control	0,638	0,407	4,223	0,000	40,7%	Accepted

Table 2, the bivariate analysis results indicate that all risk management variables have a positive relationship with service efficiency in the Emergency Department (ED) of the Prof. Dr. J. A. Latumeten Level II Military Hospital. This is evidenced by correlation coefficient (R) values ranging from 0.584 to 0.827. Risk identification yielded an R-value of 0.708 and an R-square of 0.501 (50.1%), with a T-statistic of 5.107 and a P-value of 0.000 ($p < 0.001$). These results demonstrate a strong positive relationship between risk identification and service efficiency. The coefficient of determination indicates that the model accounts for 50.1% of the explained variation. Risk analysis yielded an R-value of 0.584 and an R-square of 0.341 (34.1%), with a T-statistic of 3.671 and a P-value of 0.001. These results indicate a positive relationship between risk analysis and service efficiency, with the model accounting for 34.1% of the explained variation.

Risk evaluation yielded an R-value of 0.827 and an R-square of 0.683 (68.3%), with a T-statistic of 7.488 and a P-value of 0.000 ($p < 0.001$). Among the four variables studied, risk evaluation exhibited the highest correlation and coefficient of determination. This indicates the strongest positive relationship and the largest proportion of explained variation within the model compared to the other variables. Risk control yielded an R-value of 0.638 and an R-square of 0.407 (40.7%), with a T-statistic of 4.223 and a P-value of 0.000 ($p < 0.001$). These results indicate a positive relationship between risk control and service efficiency, with the model accounting for 40.7% of the observed variation.

Overall, all four risk management variables yielded significant results, as evidenced by their reported P-values. Risk evaluation showed the highest R-square value at 68.3%, while risk analysis showed the lowest at 34.1%. Consequently, these findings support the existence of a relationship between risk identification, risk analysis, risk evaluation, and risk control, and the efficiency of services in the Emergency Department (IGD) at the Prof. Dr. J. A. Latumeten Level II Military Hospital.

DISCUSSION

Based on research conducted among twenty-eight healthcare professionals working in the Emergency Department of the Prof. Dr. J. A. Latumeten Level II Military Hospital, it is evident that the implementation of risk management to address patient overcrowding has been reasonably effective; however, certain aspects still require further improvement. The profile of the respondents—predominantly young, working-age healthcare professionals with one to five years of service—indicates that most participants possess a solid understanding of daily operations within the Emergency Department, ensuring that the data collected accurately reflects the reality on the ground. Furthermore, the diverse yet relevant educational backgrounds of the respondents all aligned with the healthcare sector guarantee that the statements presented in the questionnaire were well-understood and appropriately addressed by all participants.

Risk Identification

Based on the research findings which included the distribution of questionnaires, direct observation, and interviews with the Head of the Emergency Department it is evident that staff members possess a reasonably good ability to recognize potential risks associated with patient overcrowding. This is reflected in the staff's awareness of early signs of patient accumulation, as well as the availability of Standard Operating Procedures (SOPs) that serve as a reference for service delivery. Such conditions demonstrate the hospital's commitment to establishing written guidelines for risk management; however, there remains a need for improvement in the routine documentation of risks and in ensuring a shared understanding of these guidelines among all staff. These field findings reinforce the questionnaire results, which indicate that while the capacity to identify risks is strong, the formal, written recording of these risks has not yet been implemented comprehensively.

These results align with the findings of Teuku Eko Putra et al. (2023), who identified patient overcrowding in the Emergency Department as a primary service risk. This commonality arises because high patient volumes and the susceptibility to overcrowding are well-recognized, recurring challenges in emergency units. Conversely, these findings differ from those of Rindiana Putri et al. (2023), who employed specific, measurable instruments to identify overcrowding. In the present study, by contrast, risk identification relies primarily on staff observation and subjective understanding, which are not yet fully captured through standardized, written documentation. This discrepancy exists because the tools for measuring overcrowding have not been sufficiently disseminated or adopted as aids for risk identification within the Emergency Department.

If the risk identification phase is not executed optimally, potential hazards, vulnerabilities, and factors that trigger service-related issues cannot be detected at an early stage. Such a situation not only jeopardizes patient safety but also increases health and safety risks for the healthcare personnel themselves. A sudden surge in workload, a crowded and disorganized work environment, and the potential for inappropriate behavior from patients or their families can lead to physical exhaustion, work-related stress, and even unforeseen workplace accidents or acts of violence against staff. Therefore, it is essential to strengthen documentation practices and ensure a shared understanding among all parties, ultimately safeguarding both patients and healthcare personnel.

Risk Analysis

While staff members do assess the likelihood and potential impact of patient overcrowding, these assessments are not yet consistently aligned with a unified set of guidelines. Instead, they often rely on individual experience, meaning there is no standardized, universally applied framework for evaluation. This aligns with findings by Risma Yulidah et al. (2026), who noted that service burdens and operational obstacles in the Emergency Department significantly hinder the smooth delivery of care. High patient density increases the probability of delays and service irregularities, resulting in a substantial overall impact. Conversely, this study differs from the work of Teuku Eko Putra et al. (2023), which focused solely on the extent of overcrowding without systematically evaluating the associated likelihood and impact. This distinction highlights that the current study goes beyond merely measuring the scale of overcrowding; it also assesses the extent to which such risks can compromise patient safety and the efficiency of care. If a comprehensive risk analysis is not conducted, the nature and severity of the hazards involved remain unknown. This precludes the establishment of reasonable workload estimates and adequate protections for healthcare workers. Risks—such as exposure to infectious diseases, fatigue-related injuries, psychological strain, or even violence from patients or their families—go unaddressed and unaccounted for from the outset. Without a clear impact assessment, the allocation of staff and the provision of personal protective equipment may be misdirected, ultimately exacerbating workloads and diminishing the staff's readiness to manage surges in patient volume.

Risk Evaluation

The staff's understanding of the thresholds for acceptable risk—and the point at which immediate intervention is required—is reasonably well-developed. This is evidenced by the staff's ability to compare current conditions against established guidelines, which enables them to prioritize necessary actions. This aligns with the core concept of risk management, which posits that risk evaluation serves to establish priorities for intervention—a process that becomes more consistent when risk thresholds are understood uniformly across the organization. These findings are consistent with those of Putu Andika Subagya Putra and Komang Risky Hendrawan (2024), who noted that while efforts to define risk thresholds are underway, they are not yet fully standardized. This similarity likely stems from the fact that both research settings possess guidelines, yet the process of aligning criteria and ensuring a shared understanding remains a work in progress.

Conversely, these findings differ from those of Hutagalung (2022), where standardized risk thresholds were already in place and effectively communicated to all relevant personnel. This discrepancy may be attributed to differences in the level of detail within the established criteria, as well as the extent of ongoing efforts to disseminate and socialize these standards. If risk evaluation is not conducted consistently, there remains no clear threshold for determining when a situation—such as excessive crowding or workload—has reached a point requiring immediate mitigation. For healthcare professionals, this means there is no assurance regarding the limits of their operational capacity or the safety of their working environment. Staff may be subjected to workloads that exceed their capacity without any corresponding measures to alleviate the burden; this jeopardizes their physical and mental well-being and increases the risk of service-related errors due to fatigue.

Risk Control

The risk management efforts currently employed by staff appear functional; however, they largely focus on addressing issues only after they have already occurred, rather than being fully proactive through early, planned prevention. While Standard Operating Procedures (SOPs) exist to guide management, the implementation of structured preventive measures and regular monitoring is not yet consistently carried out. This aligns with findings by Risma Yulidah et al. (2026), who observed that overcrowding in Emergency Departments is typically addressed only after the problem has arisen, lacking a structured preventive plan. This commonality stems from the fact that Emergency Department overcrowding often lacks an integrated, sustainable control strategy, resulting in a

purely responsive approach. Conversely, this study differs from the work of Rindiana Putri et al. (2023), which described levels of overcrowding without addressing management or preventive efforts. This distinction highlights the added value of the present study: it goes beyond merely measuring the extent of overcrowding to evaluate the degree to which risk prevention and management strategies have been planned and comprehensively implemented.

If the risk control phase is not executed optimally, there will be a lack of both planned preventive measures and standardized, mutually agreed-upon management procedures. Preventive measures should include the regular monitoring of patient overcrowding indicators, the implementation of scheduled and integrated patient flow management, the adjustment of staff distribution based on projected service demand, and the fulfillment of facility and infrastructure standards before service capacity is exceeded. Furthermore, the necessary management procedures should encompass a prioritized sequence of actions to be taken during periods of increased overcrowding, clearly defined roles and responsibilities across different professional groups, and established, documented mechanisms for requesting additional support or redirecting patients. The absence of such measures and procedures means that the hospital can only respond to risks after an incident has already occurred, with no proactive, early-stage prevention efforts in place. Consequently, the same problems recur repeatedly; the workload for healthcare personnel increases significantly due to reactive and unstructured management; patient wait times and lengths of stay become unmanageable; and overall, both the efficiency and quality of care decline noticeably.

This situation also poses direct, hazardous consequences for healthcare personnel. Without a preventive framework and standardized operating procedures, staff are consistently pushed beyond their physical and mental limits. Excessive workloads, a chaotic and disorganized work environment, and the pressure of urgent care demands heighten the risk of chronic fatigue, work-related stress disorders, physical health deterioration, and exposure to illnesses or workplace accidents. Furthermore, an irregular flow of services increases the potential for conflict and violent behavior from patients or their families, leaving the safety, security, and well-being of healthcare personnel without the adequate protection required by occupational safety standards.

Thus, the four stages of risk management are interconnected and complementary, serving to ensure the smooth operation of services within the Emergency Department. When all stages—from the early identification of issues and impact assessment to the prioritization of interventions and the implementation of planned preventive and responsive measures—are executed in a balanced, comprehensive, and well-documented manner, the results become immediately apparent: a more streamlined service flow, shorter patient wait times, and a faster response from staff to the needs of arriving patients. Ultimately, this will enhance the overall efficiency of services within the Emergency Department at the Prof. Dr. J. A. Latumeten Level II Hospital.

CONCLUSION

Based on the research results and discussion presented, it can be concluded that the implementation of risk management encompassing the stages of identification, analysis, evaluation, and control has generally proceeded quite well. However, certain aspects have not yet been optimized, particularly within the analysis and control phases. While staff members demonstrate a commendable ability to identify potential risks and establish priorities for addressing them, the assessment of risk impact lacks full standardization. Furthermore, the current approach to managing risks remains largely reactive addressing issues only after they arise rather than being fully proactive through planned, preemptive measures.

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