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Factors Influencing Length of Stay in Emergency Care (EDLOS) at Mohammad Noer Pamekasan Regional Hospital

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ABSTRACT:

Introduction: The high demand for healthcare services often causes hospitals, particularly emergency departments (EDs), to face problems such as poor service quality and long waiting times, resulting in patient congestion and prolonged Emergency Department Length of Stay (EDLOS). This study aims to analyze the factors that influence EDLOS.

Methods: A quantitative cross-sectional approach was used to analyze the input factors (infrastructure, hospital regulations, human resources, and patients) that influence Emergency Department Length of Stay (EDLOS). A purposive sampling technique (150) was used with a binary logistic regression test.

Results: Infrastructure had a significant influence on EDLOS (p-value = 0.001). Hospital regulations and policies had a significant influence on EDLOS (p-value = 0.001). Human resources also significantly influenced EDLOS (p-value = 0.001). Meanwhile, patient age and condition did not substantially influence EDLOS (p-value = 0.182). An EDLOS of <6 hours (64.7%) indicates that most patients received relatively prompt care. However, 35.3% of patients still experienced an EDLOS of ≥6 hours, suggesting areas for improvement in ED service efficiency.

Conclusion: Factors significantly influencing EDLOS include medical facility infrastructure, such as the speed of bed availability upon admission, the layout of treatment areas, particularly the arrangement of ED medical equipment, and administrative facilities related to patient comfort. Hospital policies and regulations have a significant influence on EDLOS. Some respondents reported that transfers from the ED to other units were hindered by the need to wait for an inpatient room to become available. Human resources significantly influence EDLOS, including improving communication to ensure that patients' families understand medical emergencies. Age was not shown to influence patient length of stay in the ED. Although the majority of patients were in the yellow triage category, there was no significant effect on ED length of stay based on the triage category applied.

KEYWORDS : Length of Stay in Emergency Room, EDLOS, Emergency Room

INTRODUCTION

The public's demand for high-quality hospital services is extremely high, particularly in emergency department (ER) services, due to the long wait times (Emergency Department Length of Stay (EDLOS)), which leads to patient overcrowding. (Kusumawati, Magarey and Rasmussen, 2019). Inefficient management, untimely maintenance, and reduced adherence to standard operating procedures (SOPs) can prolong EDLOS. (Mailani, Simandalahi and Purnama Sari, 2024). EDLOS is the length of time a patient is treated in the ER, calculated from the time the patient arrives until the patient is transferred or leaves the ER or leaves the hospital. (Alemu et al., 2019). The United Kingdom (UK) is one of the countries that sets a maximum EDLOS of 4 hours, although it is likely to take longer for critical patients. (Samavedam, 2020). Efforts have been made to reduce EDLOS by analyzing the factors that influence it.

In Southern Ethiopia, prolonged EDLOS reached 91.5% and is relatively high, especially in developing countries such as Taiwan 8.2%, Iran 10.2% and Brazil 42.1%). (Alemu et al., 2019). According to 2017 data, Indonesia saw 4,402,205 patients visiting the Emergency Unit. (Kementerian Kesehatan RI, 2019). Electronic medical record data on July 5, 2024, Mohammad Noer Pamekasan Regional Hospital recorded 11,846 emergency visits for one year (July 2023-June 2024) and 2,931 visits during the 2nd quarter (April-May-June 2024) and 193 visits for 1 week from June 29-July 5, 2024, with 67% declared Inpatient. Emergency Department service time at Mohammad Noer Pamekasan Regional Hospital for 1 week (June 29-July 5, 2024) of 193 patients, 33% or 63 patients experienced a length of stay in the Emergency Department >6 hours, this data is from the results of ERM observations from the beginning of the patient's arrival until being admitted to the inpatient unit but from this data does not directly see the time of each Emergency Department service process. The head of the emergency room, head of the emergency room team, head of the division, and head of the nursing section stated that no in-depth evaluation had been carried out regarding the EDLOS, which had

extended for more than 6 hours, which should have been released from the emergency room service and complaints were still found during the emergency room service.

The factors causing prolonged EDLOS are seen from the availability and completeness of hospital facilities and infrastructure, including medical, supporting, and administrative facilities, with emergency service infrastructure regulated in the Minister of Health Regulation Number 47 of 2018. The lack of infrastructure in terms of the availability of health facilities results in increased waiting times for services which results in increased EDLOS, thus extending the duration of treatment. (Alemu et al., 2019) (Kusumawati, Magarey and Rasmussen, 2019). Supporting examinations until the results are out are needed to ensure the diagnosis and initial examination (assessment) can have an impact on extending EDLOS. (Mailani, Simandalahi and Purnama Sari, 2024)(Kusumawati, Magarey and Rasmussen, 2019) (Fekadu et al., 2022) (Ahmed et al., 2020) (Alemu et al., 2019) (Dadeh and Phunyanantakorn, 2020). Administrative facilities in hospitals that support management, coordination, and administrative record keeping ensure that hospital operations and patient services run smoothly (Kementerian Kesehatan RI, 2012). Hospital policies such as inefficient procedures or regulations and long initial care can lead to delays in patient care resulting in prolonged EDLOS (Ahmed et al., 2020). Proper procedures directly impact EDLOS and improvements in those processes can result in better outcomes for patients and the healthcare system as a whole (Daly et al., 2021). Gronroos, (1984) divides service quality into technical services such as the expertise of medical staff in responding to client conditions and functionally focuses more on how services are provided such as communication. Human resource factors such as the speed of response of officers in providing health services (Hidayati et al., 2023) and effective and coordinated communication between staff are essential to coordinating patient care; poor communication can result in confusion, misunderstandings, and delays in patient care (Belayneh et al., 2023).

Analyzing EDLOS factors can be helpful for policymakers in formulating strategic plans to improve patient flow in the emergency department, enhance the efficiency of care requests and management procedures that result in long waiting times and increased length of stay, thereby improving service quality and patient satisfaction. (Mailani et al., 2024). Identifying factors that influence LOS in the emergency department is crucial to help optimize process management to avoid delays in diagnosis and intervention, and improve patient flow in the emergency department. These findings support the development of strategies to optimize processes in the emergency department, including efforts to reduce the "boarding" time between completion of care and discharge. (Otto et al., 2022). Therefore, it is essential to address the EDLOS problem by implementing efficient strategies that determine the factors influencing it.

METHOD

This study uses a quantitative cross-sectional approach to collect data from the population studied at a specific point in time (Boswell and Cannon., 2020). This study aims to analyze factors influencing EDLOS. The study was conducted in the Emergency Department of Mohammad Noer Regional Hospital, Pamekasan. Mohammad Noer Regional Hospital's vision and mission are to provide quality services that meet national standards. The focus on EDLOS demonstrates the hospital's commitment to improving service quality. The study was conducted from October 2024.

Population refers to the entire group of individuals who share certain characteristics that are the focus of the research. (Boswell and Cannon., 2020). Based on data from the Emergency Department (ER) visit report at Mohammad Noer Pamekasan Regional Hospital in the second quarter (April-May-June 2024), there were 2,931 ER visits, with an average of 244 ER visits per week.

The sample in this study was a subset of the population that met the inclusion and exclusion criteria. The sample size was determined based on the average number of ER visits per week to obtain representative and concise data, facilitating rapid analysis and adjustment. Patients' families completed questionnaires provided by the researchers, and researchers and enumerators conducted observations.

The inclusion and exclusion criteria for the phase 1 study are as follows:

1. Patient Inclusion Criteria
   Emergency patients with surgical and medical cases
2. Patient Family Inclusion Criteria
   Families with emergency patients, including surgical and medical cases.
3. Patient Exclusion Criteria
   1) Comprehensive Emergency Obstetric and Neonatal Care patients.
   2) Patients with disabilities, prisoners, and mental health patients.
   3) Dead on Arrival (DOA) and Dead After Arrival (DAA) patients.
   4) Patients who were forcibly discharged or absconded (left without examination).
   5) Patients referred for diagnostic purposes.
   6) Patients who will be referred.

4. Patient Family Exclusion Criteria
   1) Families with Comprehensive Emergency Obstetric and Neonatal Care patients.
   2) Families with patients with disabilities, prisoners, and mental health patients.
   3) Families of patients with Death on Arrival (DOA) and Death After Arrival (DAA)
   4) Families of patients who were discharged or did not receive care
   5) Families of patients referred for diagnostic purposes
   6) Families of patients who will be referred

The sample size formula (Krejcie, V.Morgan and W.Daryle, 1970) It was used to determine the required sample size based on the population size and the desired confidence level, thereby ensuring the representation and accuracy of the data in the study. Thus, the total sample size for this study was 150.

The sampling technique used is non-probability sampling with purposive sampling, where sample selection is determined by selecting respondents who have met the inclusion criteria (Boswell and Cannon., 2020). The patient's family filled out the questionnaire as respondents, while observations were conducted to measure the patient's EDLOS time.

The variables in this study comprise both independent and dependent variables. The following is an identification of the variables in this study:

a. Independent Variable

The independent variables in this study are input factors, including facilities and infrastructure, methods (such as hospital policy regulations), human resources, and patient factors (such as age and patient condition/triage).

b. Dependent Variable

The dependent variable in this study is the length of stay in the emergency department (EDLOS).

The instrument used was a questionnaire given to the patient's family to determine the factors that influence EDLOS. An observation sheet was used to measure EDLOS. The questionnaire was prepared and tested for validity and reliability before use. The EDLOS observation sheet was developed by the researcher and adapted to the Emergency Unit service process at Mohammad Noer Pamekasan Regional Hospital, which consists of grouping patient identities and service processes described by Martin et al., (2011) hich consists of 4 processes (arrival, triage, create/retrieve/update patient history/label and wait for the ER), then the researcher added the grouping into 7 processes adapted to the Emergency Unit service flow at Mohammad Noer Pamekasan Regional Hospital :

1) Patient arrival process
2) Patient registration process
3) Examination service process
4) Medication collection process at the pharmacy
5) Administrative payment process (Outpatient)
6) Inpatient registration process
7) Patient transfer process to the inpatient unit

Validity was measured using Pearson product-moment. A research instrument is considered valid if the calculated correlation coefficient r is greater than the critical value r (Sitoayu et al., 2020), In this study, the r table shows a value of 0.361, so the question is considered valid if the calculated r value is > 0.361. Reliability testing was measured using Cronbach's alpha. The instrument is deemed reliable if the Cronbach's alpha value is greater than 0.60. The minimum sample size required for a trial is at least 30 respondents to assess the reliability of the questionnaire (Bujang et al., 2024), so this study conducted validity and reliability tests on 30 respondents outside the research sample.

RESULT

Respondent Characteristics

A general description of patient characteristics in the study based on observation results on the EDLOS sheet includes gender, patient age, type of diagnosis, method of arrival, subsequent actions and payment method used.

Table 1 Distribution of Patient Characteristics 17-23 October 2024 Emergency Unit of Mohammad Noer Regional Hospital, Pamekasan (n=150)

Indicator	Category	Amount	Percentage (%)
Gender	Man	73	48.7
	Woman	77	51.3
Total		**150**	**100**
Age	<5 years (infants and toddlers)	10	6.7

	5-9 years (children)	6	4.0
	10-18 years (teenagers)	15	10.0
	19-59 years (adult)	78	52
	≥60 years old (elderly)	41	27.3
Total		**150**	**100**
Triage	Yellow	144	96
	Red	6	4
Total		**150**	**100**
Type of patient diagnosis	Medical	132	88
	Surgical	18	12
Total		**150**	**100**
How the patient came	Come alone	138	92
	References	12	8
Total		**150**	**100**
Next Action	MRS	142	94.6
	KRS	8	3.6
Total		**150**	**100**
Payment method/Warranty	BPJS	148	98.7
	General	2	1.3
Total		**150**	**100**

Table 1 shows that patients in the emergency department of Mohammad Noer Pamekasan Regional Hospital were predominantly adults (52%) and elderly (27.3%), with little difference between men and women. The majority of patients were in the yellow triage emergency (96%), and a greater number were hospitalized (94.6%), indicating a relatively high severity of illness in most patients. Most patients required non-surgical medical care, with a small number requiring further surgical intervention. Nearly all patients were covered by BPJS (98.7%), indicating that the majority of patients came from the government health insurance program user group.

Descriptive Analysis

1. Infrastructure Factors

Infrastructure factors consist of medical facilities, supporting facilities, and administrative facilities, indicating that overall medical facilities are in the inadequate category (31.3%) related to beds not being provided quickly and the IGD being inadequate (36%), procedures related to regulations for providing TT in the triage room of Mohammad Noer Pamekasan Regional Hospital are still lacking. Space in the treatment area still feels cramped, indicating deficiencies. Meanwhile, medical equipment still shows adequate results (24.7%) and inadequate (4%), indicating that the placement of emergency medical equipment is not yet neat. This requires serious attention to improve patient comfort and the quality of services provided. Laboratory and radiology examination parameters are in very good condition, indicating quality diagnostic support, although there is still room for improvement in the supporting facilities indicator. The administrative process at Mohammad Noer Pamekasan Regional Hospital is running very well, but patient comfort in administration can still be improved, with 8.7% considering it uncomfortable.

2. Hospital Policy Regulation Factors

Hospital regulatory policy factors include the Emergency Room (ED) service procedures. The hospital's ED service procedures are very easy to follow, with 98% of patients considering the service flow very simple and efficient, with only a few experiencing difficulties. The majority of patients felt the service time was quite efficient, although 26.7% felt the service process was quite easy and had no obstacles. However, there are still several aspects that can be improved to make the service time more efficient. This shows that although Mohammad Noer Pamekasan Regional Hospital is quite good in terms of time efficiency, there is still room for improvement to reduce patient waiting times. Overall, the ED service procedures at Mohammad Noer Pamekasan Regional Hospital are very good in terms of ease of flow, but for time efficiency, several improvements in the service process still need to be made. Regulations related to the process of transferring patients to other units already have procedures, in this process related to the availability of inpatient beds is a constraint, as seen from the BOR results for each room which is more than 90%.

3. Human Resource Factors

Human resource factors include staff responsiveness and effective communication. Overall, the staff response at Mohammad Noer Pamekasan Regional Hospital was excellent. Nearly all patients felt respected, received prompt attention, and were given access to participate in medical decision-making. However, there are several areas for improvement, such as maintaining privacy and confidentiality and ensuring a more consistent quality of care for all patients. Although most patients felt communication was good,

30% still felt the information provided regarding medical procedures was unclear. This highlights the importance of improving the clarity of information provided to patients and ensuring consistency across the medical team.

4. Patient Factors

Patient factor variables consisting of patient age and condition based on triage can be seen from the patient distribution results.

5. Distribusi *Emergency Department Length of Stay* (EDLOS)

The following table shows the results of the EDLOS measurements obtained from the EDLOS observation sheet as follows:

Table 2 EDLOS Distribution October 2024

Indicator	Category	Amount	Percentage (%)
EDLOS	<6 Hour	97	64.7
	≥6 Hour	53	35.3
Total		**150**	**100**

An EDLOS of <6 hours (64.7%) indicates that most patients received relatively prompt service, but 35.3% of patients still experienced an EDLOS of ≥6 hours, indicating areas requiring improvement in emergency department service efficiency.

Table 3 Distribution of Emergency Service Handling Time at Mohammad Noer Pamekasan Regional Hospital Emergency Unit in October 2024

No	Emergency Room Service Process	Average (Minutes)
1	Patient arrival process	2 Minutes
2	Patient registration process	7 Minutes
3	Patient examination service process :	154 Minutes
	Initial assessment	9 Minutes
	Diagnostic examination consists of:	41 Minutes
	laboratory	20 Minutes
	radiology	15 Minutes
	Consultation with a specialist doctor	69 Minutes
4	Drug Pickup Process at the Pharmacy	11 Minutes
5	Inpatient registration process	10 Minutes
6	The process of sending patients to other units	4 Hours 5 Minutes
7	*Emergency Department Length of Stay* (EDLOS)	5 Hours 30 Minutes

Based on the results of Table 3, the distribution of service processing time in the Emergency Unit at Mohammad Noer Pamekasan Regional Hospital, the patient arrival process (2 minutes) and patient registration (7 minutes) are quite efficient, however, there is still a need for further improvement. The patient examination process (154 minutes) starting from initial assessment/assessment, diagnostic examination, and consultation with a specialist doctor/DPJP, especially doctor consultation (69 minutes) takes a very long time. This may be caused by the complexity of cases in the Emergency Unit and requires consultation with more than one specialist doctor. The process of transferring patients to other units (245 minutes) is very problematic, this can be seen from its very long duration and indicates the need for improvements in the process of transferring patients between units to increase efficiency. EDLOS (5 hours 30 minutes) shows the length of stay in the Emergency Unit which can be accelerated by improving the hospital's service coordination and management system.

Analysis of the Influence of Factors (Infrastructure, Hospital Policy Regulations, Human Resources and Patients) on EDLOS

The results of the first stage of hypothesis testing indicate that infrastructure has a significant effect (p-value = 0.001). Hospital policy regulations show an effect on EDLOS (p-value = 0.001). Human resource factors also influence EDLOS (p-value = 0.001). Meanwhile, the patient's age and condition factors do not show a significant effect on EDLOS (p-value = 0.182). Infrastructure, especially those related to medical facilities such as the speed of bed provision and the adequacy of emergency unit space, is proven to have a significant effect. Hospital policy regulations regarding the patient transfer process between units also show an effect on the lengthening of EDLOS. Human resource factors, especially effective communication, have a significant effect on EDLOS. Meanwhile, the patient's age and condition factors do not show a significant effect on the lengthening of EDLOS.

DISCUSSION

Infrastructure factors related to medical facilities, support facilities, and administrative facilities influence the duration of EDLOS. The results of this study align with research conducted at a tertiary hospital in Padang, West Sumatra, Indonesia, which found that hospital infrastructure is one of the factors influencing EDLOS. (Mailani, Simandalahi and Purnama Sari, 2024).

Medical facilities, such as the speed of TT administration for new patients, the adequacy of emergency department space in the treatment area for the care provided, and the placement of medical equipment, significantly influence the length of EDLOS. Previous research has shown that adequate bed availability and good organization in emergency departments can reduce EDLOS, especially in countries with developing health systems such as Ethiopia, Iran, Taiwan, China, Israel, and Saudi Arabia (Belayneh et al., 2023). Therefore, it is important for Mohammad Noer Pamekasan Regional Hospital to increase the speed of bed availability to reduce patient survival time (EDLOS) and improve the efficiency of healthcare services for emergency patients. Based on research results, the emergency room in the treatment area still feels cramped, potentially affecting patient comfort and the effectiveness of medical treatment, especially in emergency conditions, thus resulting in extended EDLOS. Research conducted at the Hawassa University Comprehensive Specialist Hospital, Ethiopia, showed that inadequate infrastructure conditions were recognized as a contributing factor to EDLOS problems (Alemu et al., 2019).

Therefore, improvements in the design and capacity of emergency rooms are needed to ensure patient comfort and support the effectiveness of medical care, thereby reducing the length of EDLOS, which impacts the quality of service. Research results related to medical equipment indicate that the placement of medical equipment in emergency rooms is not neatly placed, although a small number of people feel this condition still has the potential to hinder the smoothness of medical procedures and slow down services, thus prolonging EDLOS. The placement of medical equipment in the study showed an effect on the length of EDLOS. This can hinder the accessibility and timely availability of equipment that is crucial for patient diagnosis and treatment. This is supported by research conducted in Ethiopia which suggests that infrastructure and inefficient equipment placement can prolong EDLOS (Alemu et al., 2019). The next infrastructure factor relates to supporting facilities, including laboratory and radiology examinations. This study did not show any impact on the length of EDLOS; however, there is still room for improvement in supporting facility indicators. Howot Fana Specialist University Hospital in Ethiopia found that laboratory and radiology factors significantly correlated with diagnostic examinations and EDLOS (Fekadu et al., 2022). Although the results of this study do not show a significant influence between supporting facilities and the extension of EDLOS, it is important for hospitals to continue to improve and enhance the quality of laboratory and radiology facilities so that they can support a faster and more effective diagnosis process and reduce the possibility of EDLOS extension.

A follow-up study of the infrastructure at the Mohammad Noer Pamekasan Regional Hospital's administrative facilities showed that the infrastructure was operating very well and did not impact patient waiting times (EDLOS). A small number of respondents still felt uncomfortable with the administrative facilities, which requires further improvement. Clean, well-organized, and comfortable rooms can enhance the patient and staff experience, thus impacting service efficiency (Alemu et al., 2019). Although the administrative facilities at Mohammad Noer Pamekasan Regional Hospital are already running well, patient comfort still needs to be considered by improving the 5R aspects that have been implemented by the hospital to support service efficiency and create a more positive experience for patients, so that it can contribute to reducing service time in the Emergency Room.

Hospital policy regulations regarding emergency department (ED) service procedures have been shown to significantly impact emergency department (ED) service times (EDLS), with EDLOS still exceeding 6 hours. The policy regulations on service procedures implemented at four comprehensive specialist hospitals in the Amhara region have significantly impacted the efficiency of service times and length of stay for patients in the ED (Belayneh *et al.*, 2023).

Hospital policies that establish EDLOS standards, such as the six-hour time limit, contribute to efficient service delivery. However, if these policies are not effectively implemented or if there are obstacles during the transfer process, patients can experience longer wait times in the emergency department. Therefore, it is crucial to evaluate and improve policies and procedures to improve patient flow and reduce EDLOS, thereby improving the quality of care and patient satisfaction.

Human resource factors related to effective communication indicate that the clarity of emergency department staff in providing clear and detailed information influences the extension of EDLOS. This aligns with research conducted in Ethiopia, which demonstrated that effective and coordinated communication is crucial for appropriate patient care (Belayneh *et al.*, 2023).

Effective communication between healthcare professionals and patients/families is crucial. Delays in communication or lack of coordination can lead to delays in diagnosis and treatment, thus prolonging the length of stay in the emergency department (ED). Therefore, improving healthcare professionals' communication skills and responsiveness can contribute to reducing the length of stay in the emergency department (ED), as well as improving service efficiency and patient satisfaction.

Patient factors indicate that patient age does not affect the length of EDLOS. This research is supported by research (Ahmed et al., 2020) This research is supported by research (Ahmed et al., 2020), which showed that age does not affect EDLOS. However, some studies have shown that patients with urgent needs receive faster attention, while patients with less urgent conditions may have to wait longer, which can affect EDLOS (Mailani et al., 2024). Despite the differences in research findings, patient condition and the triage process should be considered in efforts to improve service efficiency in the ED.

CONCLUSION

Infrastructure (medical facilities) significantly impacts EDLOS. This includes the speed with which a bed is available upon patient arrival. The spatial arrangement of treatment areas for the care provided, particularly the arrangement of medical equipment in the Emergency Department. Administrative facilities related to comfort were not shown to have a significant influence on EDLOS. This may indicate that while administrative comfort is important for patient satisfaction, this factor does not play a role in patient length of stay in the Emergency Department. Hospital policy regulations significantly impact EDLOS; some respondents reported that transfers from the Emergency Department to other units were not smooth while waiting for an inpatient room to become available. Human resources factors demonstrated a significant influence on EDLOS, improving communication regarding providing explanations to ensure the patient's family understands in medical emergencies. Age was not shown to influence length of stay in the Emergency Department, suggesting that other factors may play a greater role in determining EDLOS duration. Although the majority of patients were in the yellow triage category, there was no significant effect on length of stay in the Emergency Department based on the triage category applied. Statistical tests indicated that patient condition did not significantly impact EDLOS. The extension of EDLOS indicates the need to increase service time efficiency to reduce patient waiting times in the ER.

LIMTATION

1. The results of this study cannot be fully generalized to various types of hospitals.
2. This study only analyzed EDLOS factors from the perspective of patients' families. Therefore, future research could involve emergency department nurses in analyzing barriers to hospital care.
3. This study did not consider external factors within the emergency department, such as the inpatient discharge process (KRS), which can lead to long waiting times, or the role of patients' families during the care process..

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