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Response time and length of stay in obstetric emergency management: A study in public hospital of Central Kalimantan

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Abstract

Purpose: This study aims to examine the relationship between response time and the length of stay (LOS) in obstetric emergency management at the public hospital of Central Kalimantan. **Methods:** A cross-sectional observational study was conducted using 205 medical records of pregnant women treated for obstetric emergencies between July and September 2024. Data on three types of response time—initial emergency action, obstetrician consultation, and patient disposition—were analyzed using univariate and Pearson correlation tests to assess their association with the LOS in the emergency department. **Results:** All patients received an initial emergency response within five minutes, indicating good early management. However, over 60% of patients experienced delays in obstetrician consultation. Most patients received timely disposition decisions, which showed the most decisive influence on patient LOS. Statistical analysis revealed a weak positive correlation between initial response time and LOS (r=0.33), a very weak negative correlation with obstetrician consultation time (r= -0.098), and a perfect positive correlation with disposition time (r=1.000). These results suggest that the speed of disposition decisions plays a critical role in determining how long patients remain in the emergency room. **Conclusion:** Disposition efficiency plays the most pivotal role in determining LOS. Improving administrative processes, increasing human resources, and optimizing infrastructure are essential. These findings provide practical insights for strengthening emergency service protocols and can guide health policy interventions to enhance maternal care quality in referral hospitals across Indonesia.

Keywords: length of stay; obstetric emergency; response time

INTRODUCTION

Maternal Mortality Rate (MMR) remains a critical indicator of national health development and is one of the priority targets in Indonesia's 2020–2024 National Medium-Term Development Plan (RPJMN), as stated in Presidential Regulation No. 18 of 2020 [1]. Based on the 2020 Population Census Long Form (SP2020), the MMR in Indonesia is 189 per 100,000 live births, showing a significant decline from 305 per 100,000 live births during the 2015–2020 period [2]. Although this figure approaches the RPJMN target of 183 by 2024, more intensive efforts are needed to meet the Sustainable Development Goals (SDGs) target of 70 per 100,000 live births by 2030 [3].

One of the essential components in reducing maternal mortality is the effective management of emergency obstetric referrals. The Indonesian Ministry of Health has implemented the Expanding Maternal and Neonatal Survival (EMAS) program, aiming to reduce MMR by 25% through enhanced standards of care in 150 comprehensive emergency obstetric and neonatal care in hospitals and 300 basic obstetric and neonatal emergency care in primary health centers [4,5]. This program also emphasizes the importance of an efficient and effective referral system between health centers and hospitals to ensure rapid and appropriate treatment, thereby preventing complications and deaths [6].

Response time is a critical indicator in assessing the quality of maternal emergency services. According to the Decree of the Minister of Health No. 1051/Menkes/SK/XI/2008, the standard response times for emergency services include less than five minutes in the emergency room, less than thirty minutes in the delivery room, less than one hour for blood services, and less than thirty minutes in the operating room [7,8]. A delayed response in any of these stages can increase the risk of maternal death, especially in critical conditions requiring immediate intervention. Previous research has shown that slow response times in emergency obstetric referrals are associated with prolonged length of stay and poor outcomes [9].

Length of stay (LOS) itself serves as a proxy indicator for hospital efficiency and service quality. Several studies, including those by Alkema et al., suggest that length of stay can be influenced by patient severity, hospital resource capacity, and administrative processes [10]. In Central Kalimantan Province, maternal health remains a pressing issue, with the region being one of the ten provinces with the highest maternal mortality rate in Indonesia—reaching 179 per 100,000 live births in 2023 [11]. Geographic barriers and uneven access to quality facilities contribute to low delivery coverage in health institutions (75% in 2022) and suboptimal emergency responses [12].

According to provincial data, 56% of maternal deaths occurred in hospitals, 24% at home, 15% during referral transportation, and 5% at health centers. Delayed response in obstetric emergencies has been identified as a leading contributor to prolonged stay in emergency departments, especially when clinical conditions are already critical upon arrival [13]. In this context, the quality and timing of emergency interventions play a vital role in reducing mortality.

Public hospital of Central Kalimantan is a Type B referral hospital providing 24-hour comprehensive emergency obstetric neonatal services [14]. Many patients admitted to its unit are in high-risk or critical condition, requiring immediate and efficient medical attention. Therefore, evaluating response times during each stage of emergency management and their effect on LOS is essential for identifying service gaps and enhancing overall maternal health outcomes.

Current research on emergency obstetric care has largely focused on individual elements, such as triage effectiveness or delays in specialist consultations. However, there is limited empirical evidence on how different response stages collectively influence patient flow and outcomes in real-world hospital settings, particularly in decentralized health systems like Indonesia's. This study adds to the existing literature by quantitatively analyzing the correlation between each response component and length of stay in a regional referral hospital with high maternal mortality rates. It contributes to the ongoing discourse on optimizing emergency care workflows in comprehensive emergency obstetric and neonatal care of hospitals and supports efforts to achieve national and global maternal health targets through evidence-based service management strategies.

METHODS

This study employed an observational analytic design with a cross-sectional approach. This study was conducted on all obstetric emergency referral patients at the comprehensive emergency obstetric and neonatal care in the emergency room, public hospital of Central Kalimantan. The population in this study consisted of all pregnant women who were referred to the comprehensive emergency obstetric and neonatal care unit during the study period. Using a simple random sampling technique, 205 respondents were selected to represent the sample. This sampling method was chosen to ensure that each eligible patient had an equal chance of being included in the study.

The inclusion criteria were patients presenting with obstetric emergencies who received complete care at the comprehensive emergency obstetric neonatal service in emergency room from initial arrival, through obgyn consultation, to final disposition. The exclusion criteria included: pregnant patients with non-obstetric medical conditions, and patients who refused medical treatment or were discharged upon personal request before receiving definitive care.

The independent variables in this study were: 1) initial response time, defined as the interval from the patient's arrival to the first medical action; 2) ob-gyn consultation response time, defined as the time required until the obstetrician provided consultation; and; 3) disposition response time, defined as the time taken to decide whether the patient would be admitted or discharged. The dependent variable was the length of stay, defined as the total duration the patient remained in the emergency unit from admission to final disposition.

The data collection was carried out over three months from July to September 2024. Patient data were recorded across three hospital shifts—morning, afternoon, and evening—to ensure the sample captured a range of emergency service conditions. Data were retrospectively collected from patient medical records using a standardized observation sheet. The sheet recorded timestamps for each critical response stage in the emergency care process, allowing accurate measurement of response times and length of stay. Ethical clearance for this research was granted by the Health Research Ethics Committee, Faculty of Public Health, number: 343/EA/KEPK-FKM/2024.

Data analysis was conducted using IBM SPSS Statistics software. Descriptive (univariate) analysis was conducted to summarize the characteristics of respondents and each study variable. Bivariate analysis was performed using Pearson correlation to examine the relationship between the response time variables (initial, ob-gyn, and disposition) and the length of stay. This approach enabled the assessment of how response time efficiency influences patient flow in obstetric emergency care.

RESULTS

Table 1 provides an overview of the respondents' characteristics. The majority were referral patients, and most utilized health insurance (Social Security Agency for Health) for payment. The dominant age group was women in their reproductive years. Nearly all respondents were in the third trimester of pregnancy. Most admissions occurred on weekdays, with a notable tendency for patients to be admitted in the afternoon. This profile reflects a patient population that primarily comprises late-stage pregnant women accessing healthcare services through formal referral systems and insurance coverage.

Table 1. Characteristics of respondents (n=205)

Variables	n	%
Type of patients		
References	130	63.4
General	75	36.6
Payment method		
Health insurance	165	77.6
Self-pay	46	22.4
Age (years)		
>20	8	3.9
21-35	152	74.1
>35	45	22
Gestational age		
First semester	1	0.5
Second semester	2	1
Third semester	202	98.5
Admission day		
Weekdays	166	81
Weekend	39	19
Arrival shift		
Morning	32	15.6
Afternoon	127	62
Night	46	22.4

Table 2. Characteristics of obstetric emergency management

Variables	n	%
Initial response time		
Slow	0	0
Fast	205	100
Obgyn consultation response time		
Slow	124	60.5
Fast	81	39.5
Disposition consultation response time		
Slow	9	4.4
Fast	196	95.6
Length of stay		
Slow	0	0
Fast	205	100

Table 2 presents the characteristics of obstetric emergency management. All patients received an immediate initial response and experienced a fast length of stay, indicating a prompt and efficient handling process. However, delays were noted in the obstetrician consultation response, with a significant portion of cases not receiving timely attention. In contrast, the response for disposition consultations was predominantly fast, suggesting better coordination at this stage. These findings highlight strengths in initial triage and discharge planning, but also point to potential delays in specialist involvement during emergency care.

Table 3. Bivariate analysis

Variables	Mean	SD	Min	Max	Pearson correlation
Initial response time	2.94	1.139	1	5	0.33
Obgyn response time	35.60	14,966	11	60	-0.098
Disposition consultation response time	31.71	16,425	10	69	1,000
Length of stay	31.71	16,425	10	69	

Table 3 presents the results of the bivariate analysis of variables related to obstetric emergency management. A moderate positive correlation was found between the initial response and the length of stay, suggesting that faster initial handling may contribute to more efficient patient care. In contrast, the response time for ob-gyn consultation showed a very weak and negative correlation, indicating a minimal association with the duration of hospitalization. Interestingly, the disposition consultation response showed a perfect linear relationship with the length of stay, which may indicate data redundancy or duplication, as both variables appear to have identical values.

DISCUSSION

Response time is a crucial aspect in managing obstetric emergencies, particularly in facilities that offer 24-hour comprehensive emergency obstetric and neonatal care, such as the public hospital in Central Kalimantan. According to Ministry of Health Regulation No. 1 of 2012 on the health service referral system, timely and efficient responses are crucial for preventing complications and reducing maternal mortality rates [15]. The hospital in this study, as a regional referral center, plays a central role in this system and is equipped to provide continuous emergency care for mothers [16].

The findings of this study demonstrate that initial response time at the public hospital of Central Kalimantan was satisfactory, with 100% of patients receiving emergency attention within five minutes. This aligns with national standards and indicates that the emergency unit's triage and early intervention systems function well under pressure. These findings support Widyantari and Dayani's review, which emphasizes the impact of comprehensive emergency services on maternal health outcomes [17].

However, disparities were observed in ob-gyn consultation response times. Delays exceeding 30 minutes in 60.5% of cases highlight a significant gap in service flow. This delay can be attributed to limited personnel availability or overlapping clinical responsibilities, particularly during off-hours or high-demand periods. Previous studies suggest that slow ob-gyn consultation times may compromise hemodynamic stabilization in shock patients and delay definitive treatment [18]. BPJS Kesehatan guidelines also emphasize the importance of inter-facility coordination and advanced preparation prior to referrals to ensure timely care delivery [19].

Moreover, studies have shown that healthcare provider competence, particularly among emergency nurses, significantly influences triage quality and referral outcomes [20]. The efficiency of this coordination process was reflected in the disposition response time, which was categorized as fast in 95.6% of cases. This is a strong indicator of effective administrative and clinical workflows that reduce prolonged waiting in emergency departments.

LOS is widely used as a performance indicator in emergency care. According to Fatimah et al., specialist responsiveness is a determining factor in ensuring fluid patient flow and reducing unnecessary delays [21]. Similarly, Efasusanti et al. highlighted that delays in transferring patients to inpatient wards, caused by bed shortages or administrative bottlenecks, also contribute to extended LOS [22]. In this study, the strong positive correlation between disposition response time and LOS affirms the centrality of this stage in optimizing patient throughput.

Additional external factors influencing LOS include the availability of medical resources, hospital capacity, and nighttime staffing ratios, all of which may hinder timely service provision [23]. These findings reinforce earlier research indicating that strengthening referral and triage systems enhances emergency care outcomes (24). Delays at the disposition stage, even if minimal, can produce a ripple effect across hospital departments, particularly when communication or bed management systems are inefficient [25].

In line with international best practices, prioritizing improvements in disposition speed and resource allocation is essential. Timely disposition facilitates either appropriate inpatient admission or safe discharge, which improves overall efficiency and reduces emergency department congestion [26]. Furthermore, Taylor et al. advocate using LOS as a metric to assess and improve emergency care quality and identify areas for targeted interventions [27].

The study's findings have important implications for public health, particularly in maternal emergency care. Efficient emergency response systems, especially at the disposition stage, can reduce overcrowding, improve patient outcomes, and enhance the overall quality of maternal healthcare services. Timely interventions may also contribute to lowering maternal mortality rates in regions with high-risk populations such as Central Kalimantan. Strengthening interprofessional coordination, increasing the availability of obstetricians, and streamlining hospital administrative processes are crucial steps toward achieving these improvements.

However, this study has several limitations. First, the retrospective design relied solely on the accuracy of medical records, which may not capture all response time nuances. Second, the perfect correlation found between disposition time and length of stay suggests potential duplication or overlap in the data, which could limit the validity of the conclusion. Lastly, the study was conducted in a single hospital, thereby limiting the generalizability of the findings to other settings with different resource constraints or management systems.

CONCLUSION

This study demonstrated that, among the various stages of emergency response, the disposition process plays the most significant role in determining the length of patient stay in an obstetric emergency setting. While the initial response was relatively fast and showed a weak correlation with patient stay duration, the response from the obstetrician consultation had minimal impact. However, the timing of the disposition decision exhibited a direct and strong relationship with how long patients remained in the emergency unit. These findings highlight that efficiency in the final stage of care determines the overall effectiveness of maternal emergency management.

Based on the findings, it is recommended that hospitals improve the speed of disposition decisions, as this stage has the most significant impact on the length of time patients stay in the emergency room. Efforts can include simplifying administrative procedures, ensuring better coordination between emergency staff and obstetricians, and increasing the number of medical personnel, especially during night shifts or weekends. The use of digital systems to support faster decision-making is also suggested. In addition, similar studies in other hospitals are needed to confirm these results and support broader improvements in emergency maternal care.

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