

Original Article

Lactate and SOFA Score as Predictors of Sepsis Mortality: A Retrospective Observational Study



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ABSTRACT

Background: Managing sepsis in the emergency room presents a significant challenge, as the condition is often difficult to recognize, leading to a delay in identification and diagnosis, frequently only after the patient has reached a critical state. This study aims to analyze the correlation between lactate levels and Sequential Organ Failure Assessment (SOFA) scores with mortality risk in patients with sepsis: a retrospective study conducted in the emergency room of Dr. Wahidin Sudirohusodo Hospital, Makassar. This study follows the STROBE guidelines for observational research.

Methods: This study employs a quantitative, analytical observational design with a retrospective approach. The sample consists of 321 sepsis patients diagnosed with sepsis or presenting comorbidities associated with sepsis in the Emergency Room of Dr. Wahidin Sudirohusodo Hospital, Makassar. The sample size was determined using the Slovin formula. Purposive sampling was employed as the sampling technique, while data analysis included descriptive statistics, chi-square tests, and binary logistic regression.

Results: Elevated lactate levels and SOFA scores were significantly associated with increased mortality ($p < 0.05$). Lactate levels demonstrated an odds ratio (OR) of 5.329, indicating that patients with low lactate levels were 5.3 times more likely to survive than those with high lactate levels. The SOFA score produced an OR of 10.058, suggesting that patients with lower SOFA scores had a 10.1 times greater chance of survival compared to those with higher scores. Lactate level was identified as the primary predictor of mortality.

Conclusion: The results of this study indicate a significant correlation between blood lactate levels and SOFA scores with sepsis-related mortality in the Emergency Department (ED). Among these two parameters, blood lactate emerged as the most dominant predictor. These results underscore the importance of implementing early detection tools for sepsis, such as lactate testing and simplified SOFA assessments, as part of routine triage workflows, particularly at Dr. Wahidin Sudirohusodo General Hospital in Makassar.

Keywords: Biomarker; Emergency Room; Lactate Level; Sepsis; SOFA Score.

Implications for Practice:

- These findings may also support the development of risk screening protocols and the training of healthcare professionals, particularly nurses in emergency departments, to systematically recognize early signs of patient deterioration.
- The findings of this study contribute to the development of emergency nursing education by serving as a foundational guideline. They may also serve as a preliminary reference for future, broader research, both prospective and multicenter in design, incorporating additional parameters such as specific biomarkers and clinical intervention variables.

Implications for Practice:

- For Dr. Wahidin Sudirohusodo General Hospital in Makassar, the results of this study may serve as a reference for enhancing the quality of emergency services in the management of sepsis patients. The identification of lactate and SOFA levels as mortality predictors is expected to expedite clinical decision-making, reduce delays in intervention, and lower mortality rates in the Emergency Room..

Introduction

Sepsis remains one of the most significant challenges in the global healthcare system. Each year, an estimated 49 million cases of sepsis are diagnosed worldwide, resulting in approximately 11 million deaths. This data indicates that sepsis accounts for approximately 19.7% of all global deaths ([Jarczак et al., 2021](#)). Sepsis is defined as life-threatening organ dysfunction caused by the dysregulation of the body's response to infection ([Anjelin et al., 2020](#)).

Non-specific clinical manifestations, which are often difficult to recognize in the early stages, pose a significant challenge in managing sepsis in the Emergency Room. Emergency patients require rapid, accurate, high-quality, and cost-effective care ([Rudiyanto et al., 2021](#)). Delays in identification often lead to diagnosis only when the patient is already in critical condition, contributing to increased morbidity and mortality rates ([Machado et al., 2023](#)). Although the management and early identification of sepsis have advanced rapidly, existing clinical scoring systems were primarily developed in high-income countries, which creates limitations when applied to low and middle-income countries ([Blair et al., 2023](#)).

Currently, several validated clinical assessments are available, including the Sequential Organ Failure Assessment (SOFA) and serum lactate biomarkers. SOFA is a screening tool used for the early identification and evaluation of mortality risk in sepsis ([Hatman et al., 2021](#)). The SOFA score consists of six organ system components, which require arterial blood gas and various laboratory parameters: respiratory (PaO₂/FiO₂), cardiovascular

(MAP > 65 mmHg), liver (bilirubin), coagulation (platelets), renal (creatinine, urine output), and neurologic (GCS). A SOFA score ≥2 is associated with a 10% increased risk of mortality ([Blair et al., 2023](#); [Iskandar & Siska, 2020](#)).

Lactate concentration is recognized as a crucial biomarker for assessing organ dysfunction and is used to indicate resuscitation success in patients with sepsis and septic shock ([Purwanto & Astrawinata, 2018](#)). Elevated lactate levels are consistently associated with decreased survival rates ([Lee et al., 2022](#)). Studies have shown that lactate levels <2 mmol/L are associated with a 100% survival rate, while levels of 4–5 mmol/L reduce survival to approximately 50%, and levels >10 mmol/L are associated with a survival rate of less than 50% ([Donaliazarti, 2022](#)). The 2021 Surviving Sepsis Campaign (SSC) emphasized the importance of lactate measurement as a key component in the management of sepsis and septic shock. Elevated lactate levels not only indicate impaired tissue perfusion but also serve as a predictor of mortality, making them an integral part of the initial treatment protocol, specifically the Hour-1 bundle ([Evans et al., 2021](#)).

Research on the predictive value of lactate levels and the SOFA score in the management of sepsis in Emergency Departments (ED) remains limited, particularly in low- and middle-income countries (LMIC) such as Indonesia. Significant obstacles in managing sepsis in the emergency department (ED) include inadequate healthcare staffing, limited availability of lactate testing, and inefficiencies in triage systems. These barriers frequently result in delayed

recognition and initiation of treatment for sepsis, thereby increasing the risk of morbidity and mortality ([Pratafa et al., 2022](#)). Moreover, few studies have integrated nursing theoretical frameworks to interpret the clinical implications of such findings holistically. This study aims to address this gap by adopting Levine's Conservation Model as a theoretical foundation. The model emphasizes the importance of conserving energy and maintaining structural integrity, two critical aspects in the care of critically ill patients ([Risniah & Irwan, 2021](#)). In this context, elevated lactate levels reflect an imbalance in energy and cellular metabolic dysfunction, which correlates with increased energy demands due to inadequate oxygen supply and cellular damage ([Mila & Nursanti, 2024](#)). Meanwhile, the SOFA score is used to assess structural and functional organ integrity, focusing on the prevention of physical deterioration and the promotion of structural recovery processes ([Mila & Nursanti, 2024](#); [Moreira et al., 2022](#)).

By integrating these two indicators within Levine's framework, this study offers a nursing-centered approach to evaluating the risk of clinical deterioration in sepsis patients. This integration of Theory and clinical data is expected to enhance early detection and strengthen evidence-based emergency nursing practice. A preliminary study conducted at Dr. Wahidin Sudirohusodo General Hospital in Makassar showed that from January 1, 2023, to December 31, 2024, a total of 1.636 sepsis patients were treated in the ED. Based on this background, the present study aims to analyze the correlation between serum lactate levels and SOFA scores with mortality risk among sepsis patients: a retrospective study in the ED of Dr. Wahidin Sudirohusodo General Hospital, Makassar.

This study employs a quantitative, analytical observational design with a retrospective approach.

Participants

The population in this study consisted of all patients diagnosed with sepsis or presenting with sepsis-related comorbidities who received treatment in the Emergency Room. Data were obtained from secondary sources in the form of patient medical records. The sample size was determined using the Slovin formula. Slovin's formula was employed because the total population of sepsis patients in the ED during the study period was known to be 1.636 cases. This approach enabled the researchers to calculate the minimum required sample size with a 5% margin of error to ensure representativeness, resulting in a total of 321 medical records included in the study. A purposive sampling technique was employed, based on the following inclusion criteria:

- Medical records of patients who received treatment in the Emergency Room between January 1, 2023, and December 31, 2024.
- Complete documentation of all relevant study variables, including age, gender, SOFA score components (PaO₂/FIO₂, platelet count [x10³/μL], bilirubin [mg/dL], mean arterial pressure >65 mmHg, Glasgow Coma Scale [GCS], creatinine [mg/dL], and urine output [mL/day]), serum lactate levels, and comorbidities.

Medical records of patients who exited the Emergency Room, either by transfer to another treatment unit or by being declared deceased, within a maximum of 8 hours after receiving initial treatment.

Study Design

Instruments

The data was collected using a structured documentation sheet that included patient demographics, laboratory results, and clinical outcome data. Two primary instruments were used to evaluate the independent variables (serum lactate levels and the SOFA score).

- **Serum Lactate Measurement:** Lactate levels were measured upon admission using enzymatic spectrophotometric analysis, as documented in the hospital's laboratory information system. The results were categorized as follows: Low (<2 mmol/L) and High (>2mmol/L), based on the 2021 Surviving Sepsis Campaign (SSC) guidelines.
- **SOFA Score Assessment:** The SOFA score assessment was based on the original 1996 version, which evaluates six organ systems: respiratory, coagulation, liver, cardiovascular, central nervous system, and renal function. A SOFA score >2 was considered indicative of organ dysfunction. Each component score ranges from 0 to 4 and was extracted from patient records within 8 hours of ED admission.

All instruments and assessments were conducted retrospectively based on data available in the hospital's electronic medical record (e-MR) system.

Data Collection

Data collection for this study was carried out between February 4 and February 25, 2025. Patient data were obtained from medical records of individuals admitted to the emergency department between January 1, 2023, and December 31, 2024. During this period, 1,636 patients were hospitalized with a diagnosis of sepsis. Of these, 1,117 were excluded due to not meeting the inclusion criteria, which included 1,031 cases with

incomplete electronic medical records and 86 cases involving patients who were discharged at their request or left against medical advice. Consequently, a total of 519 cases met the eligibility criteria for analysis. A flow diagram illustrating the sample selection process is presented below (**Figure 1**).

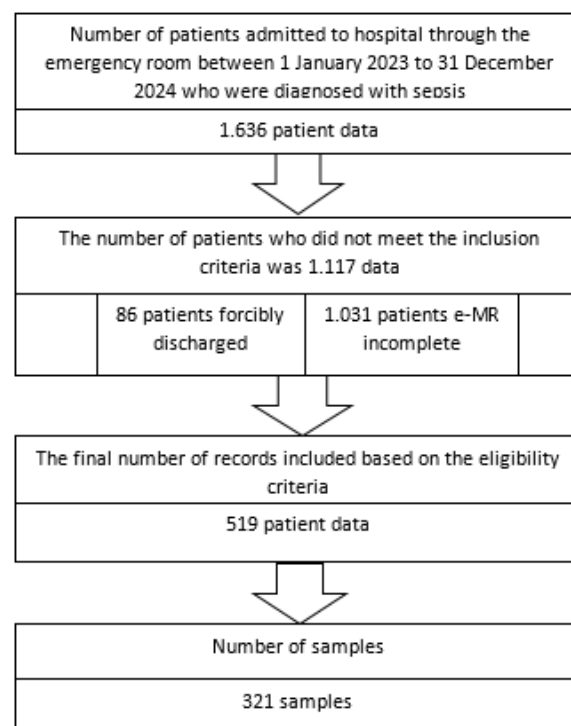


Figure 1. Sample Determination Scheme

Data Analysis

Data analysis was conducted in three stages. Univariate analysis aimed to describe the characteristics of the research subjects based on the variables of age, gender, serum lactate levels, SOFA scores, and comorbidities. Bivariate analysis was conducted using the chi-square test to assess the relationship between each independent variable and the dependent variable. Furthermore, multivariate analysis was conducted to evaluate the influence of several independent variables (age, gender, SOFA scores, serum lactate levels, comorbidities) on the dependent variable (mortality of sepsis patients in the

ER). All statistical analyses were performed with the help of the Software Product and Service Solution (SPSS) 27 for Windows.

Ethical Considerations

The utilization of patient medical records as secondary data in this study was approved by the Research Ethics Committee of Universitas Brawijaya (Approval No. 13259/UN10.F17.10.4/TU/2024). Missing data management and bias control: This study adhered to the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines for observational research. All variables were verified for completeness during the data screening process. Medical records with missing documentation for any variable, including SOFA components, lactate results, or clinical outcomes, were excluded from the analysis. This approach was implemented to minimize the risk of information bias. Furthermore, the findings of this study, particularly the

predictive value of lactate and SOFA scores, may serve as a foundation for the development of nurse-led early warning systems and triage protocols in emergency departments.

Results

The results of the analysis of 321 samples show that the gender distribution is dominated by (58.3%), while women account for 41.7%. The majority of respondents are in the elderly age group, specifically over 65 years old (26.8%), followed by the 56-65 years group (25.2%) and the 46-55 years group (19.3%). Regarding clinical parameters, 79.8% of respondents have high lactate levels, and 89.7% have high SOFA scores. The frequently reported comorbidities fall into the "others" (81.0%), followed by CKD at 12.1%. The recorded mortality rate of patients in this study was 53.9% (**Table 1**).

Table 1. Frequency Distribution of Respondent Characteristics

Variables	Category	n	%
Age	<17 Years	11	3.4
	17-25 Years	13	4.0
	26-35 Years	25	7.8
	36-45 Years	43	13.4
	46-55 Years	62	19.3
	56-65 Years	81	25.2
	>65 Years	86	26.8
Gender	Man	187	58.3
	Woman	134	41.7
Lactate Levels	Low	65	20.2
	Tall	256	79.8
SOFA Value	Low	33	10.3
	Tall	288	89.7
Accompanying Diseases	PJK	11	3.4
	COPD	11	3.4
	CKD	39	12.1
	Etc	260	81.0
Mortality Events	Die	173	53.9
	Not dead	148	46.1

Notes: PJK = Penyakit Jantung Koroner (Coronary Heart Disease); COPD = Chronic Obstructive Pulmonary Disease; CKD = Chronic Kidney Disease; SOFA = Sequential Organ Failure Assessment.

Based on **table 2**, the results of the bivariate analysis show that the probability values for the variables age ($p = 0.236$), gender ($p = 0.236$), and comorbidity ($p = 0.220$) are greater than the significance level 5% ($p > 0.05$), indicating no significant relationship between age, gender,

and comorbidity and mortality. Meanwhile, high lactate levels and SOFA scores each have p-values of 0.000, which are below the 5% significance level ($p < 0.05$), indicating a significant relationship between blood lactate levels and SOFA scores and mortality.

Table 2. Relationship between Risk Factors and Mortality Incidence

Variables	Die		Not Dead		P-Value
	n	%	n	%	
Age					
<17 Years	6	3.5	5	3.4	0.854
17-25 Years	7	4.0	6	4.1	
26-35 Years	13	7.5	12	8.1	
36-45 Years	22	12.7	21	14.2	
46-55 Years	39	22.5	23	15.5	
56-65 Years	41	23.7	40	27.0	
>65 Years	45	26.0	41	27.7	
Gender					
Man	106	61.3	81	54.7	0.236
Woman	67	38.7	67	45.3	
Lactate Levels					
Low	15	8.7	50	33.8	0.000
Tall	158	91.3	98	66.2	
SOFA Score					
Low	4	2.3	29	19.6	0.000
Tall	169	97.7	119	80.4	
Comorbidity					
PJK	5	2.9	6	4.1	0.220
COPD	6	3.5	5	3.4	
CKD	27	15.6	12	8.1	
Etc	135	78.0	125	84.5	

Notes: PJK = Penyakit Jantung Koroner (Coronary Heart Disease); COPD = Chronic Obstructive Pulmonary Disease; CKD = Chronic Kidney Disease; SOFA = Sequential Organ Failure Assessment.

Based on **Table 3**, the p-values for the lactate level and SOFA score variables are 0.000 ($p < 0.05$), indicating statistical significance. This demonstrates a significant relationship between lactate level and SOFA and the incidence of mortality in sepsis patients; meanwhile, the variables of age, gender, and comorbidity act as confounding variables.

The strength of the relationship between the independent and dependent variables can be seen from the Odds Ratio (OR) value. The analysis of the lactate level variable about mortality among sepsis patients demonstrated an odds ratio (OR) of 5.329, indicating that the chance of survival of sepsis patients with low lactate levels is

5.329 times higher than for those with high lactate levels (equivalent to a 4.33% increase in survival odds). Similarly, the analysis of the SOFA score variable demonstrated an odds ratio (OR) of 10.058, indicating that sepsis patients with low SOFA scores have 10.058 times higher probability of survival compared to those with high SOFA scores, equivalent to a 9.10% increase in survival rate.

The Wald value of the lactate level variable is 24,536, which is the highest compared to that of the SOFA score variable, which also shows a significance with mortality. This indicates that lactate levels are the most dominant factor related to

mortality in sepsis patients in the ER in this study.

Table 3. Results of the binary logistic regression test of dominant factors related to the mortality of sepsis patients in the ER

Variables	Coefficient	Wald	Sig.	OR
Gender (Men)	0.167	0.443	0.506	1.182
Serum Lactate Level (Low)	1,673	24,536	0.000	5.329
SOFA Value (Low)	2.308	16,510	0.000	10,058
Comorbidities		3,641	0.303	
Comorbid (CHD)	0.359	0.291	0.590	1,432
Comorbid (COPD)	-0.478	0.425	0.514	0.620
Comorbid (CKD)	-0.689	2,843	0.092	0.502
Constant	-0.657	12.807	0.000	0.518

Table: OR = Odds Ratio; SOFA = Sequential Organ Failure Assessment; CHD = Coronary Heart Disease; COPD = Chronic Obstructive Pulmonary Disease; CKD = Chronic Kidney Disease; ER = Emergency Room.

Discussion

Lactate Levels as a Dominant Factor in Sepsis Mortality

The results of this study indicate that lactate levels are the most dominant factor associated with mortality in sepsis patients in the ER. Lactate levels have the advantage of serving as a predictor of mortality in sepsis patients because they directly reflect the degree of tissue hypoperfusion and cellular metabolic disorders resulting from the sepsis ([Lee et al., 2022](#)). Consistent with the research of [Wiguna et al., 2021](#), blood lactate levels were shown to correlate significantly with mortality. This finding is also supported by [Jarczak et al. \(2021\)](#), who stated that elevated blood lactate is an independent predictor of mortality in various groups of patients with sepsis and septic shock ([Jarczak et al., 2021](#)).

Apart from being an indicator, lactate also functions as a therapeutic target, as a decrease in lactate levels correlates with improved perfusion and a decreased risk of death ([Jarczak et al., 2021](#)). The Surviving Sepsis Campaign (SSC) 2021 stated that lactate is one of the important aspects in the management of patients with sepsis and septic shock. Lactate is considered a significant biomarker for detecting tissue

hypoxia and metabolic dysfunction in patients with suspected or confirmed sepsis. Increased lactate levels correlate with an increased risk of mortality; therefore, lactate measurement is an integral part of the initial treatment bundle (Hour-1 bundle) ([Evans et al., 2021](#)).

Theoretically, this finding can be explained by the occurrence of lactic acidosis in sepsis patients, which is caused by tissue hypoxia, where the oxygen supply in the blood is insufficient to meet the body's overall oxygen needs. This condition is exacerbated by increased metabolic activity in sepsis patients. Lactic acidosis is produced through anaerobic metabolism, and under septic shock conditions, lactic acidosis is caused by impaired oxygen extraction at the tissue level and an inflammatory response that occurs ([Wiguna et al., 2021](#)).

A nursing approach to monitoring lactate levels aligns closely with the principle of energy conservation outlined in Levine's Conservation Model. This biomarker is emphasized in the 2021 Surviving Sepsis Campaign (SSC) guidelines as a critical component of the initial management protocol (hour-1 bundle). Early and appropriate nursing

interventions, guided by lactate measurements, can reduce energy expenditure and prevent further tissue damage ([Evans et al., 2021](#)). These findings are consistent with studies by Wiguna et al. (2021) and Jarczak et al. (2021), which further strengthen the predictive value of lactate and support integration into early triage assessment in emergency departments. Consequently, nurses play a pivotal role in maintaining energy balance and preserving physiological integrity ([Mila & Nursanti, 2024](#); [Moreira et al., 2022](#)). This role is essential not only in the delivery of effective nursing care but also in fostering a culture of patient safety ([Ahsan et al., 2023](#)).

Clinical Utility of the SOFA Score

The SOFA score was found to be significantly associated with mortality in sepsis patients in the ER. This finding is supported by research conducted by [D'Onofrio et al., \(2020\)](#), which demonstrated a significant association between the SOFA score and mortality in sepsis patients. Similarly, a study by [Sari et al., \(2021\)](#) showed a substantial difference in SOFA scores between surviving and deceased patients, indicating a relationship between SOFA scores and mortality. Furthermore, the findings of [Iskandar & Siska \(2020\)](#) revealed that the SOFA score has good predictive value in assessing the risk of mortality in sepsis patients.

The Sequential Organ Failure Assessment (SOFA) is a specially developed screening tool for assessing the severity of sepsis and was formalized in the updated definition of sepsis in 2016. This score evaluates the function of six vital organs: the respiratory system, coagulation, cardiovascular system, liver, central nervous system, and kidneys. Organ dysfunction is identified by an acute increase in the SOFA score of ≥ 2 , which indicates organ dysfunction due to infection. Similarly, lactate levels > 2 mmol/L are indicators of poor tissue

perfusion and are associated with increased mortality ([Rhodes et al., 2017](#)). This scoring system evaluates the structural and functional integrity of six organ systems, aligning with the principle of structural integrity conservation in Levine's Conservation Model. The core focus of this principle is the prevention of physical damage and the preservation of the body's structural recovery processes. Timely and appropriate nursing interventions such as early identification of deterioration risk factors, initiation of resuscitation and antibiotic therapy, and management of vital signs can help minimize tissue damage and maintain structural integrity ([Mila & Nursanti, 2024](#); [Moreira et al., 2022](#)).

Although the SOFA score has been validated and various studies have demonstrated its effectiveness in predicting outcomes in sepsis patients, it is not always practical to use it in all clinical settings. A full SOFA assessment requires access to laboratory parameters such as arterial blood gas analysis, bilirubin, and creatinine levels, resources that may not be readily available in primary emergency care settings in low and middle-income countries (LMIC) ([Blair et al., 2023](#)). These limitations can delay clinical decision-making and reduce the effectiveness of triage interventions in the emergency department. Therefore, simplified or modified scoring systems or prioritizing more accessible indicators, such as lactate levels, may serve as practical alternatives for frontline nursing staff in resource-constrained environments. Future research should explore adaptations of the SOFA score that can be effectively implemented in rural or underserved areas.

To enhance early detection and improve quality of care, the authors propose a practical roadmap, particularly applicable in low- and middle-income countries (LMICs), consisting of the following components: 1) Integration of lactate screening into standard triage

protocols through the use of point-of-care testing; 2) Emergency nurse training programs focused on early sepsis identification and modified SOFA assessment; 3) Implementation of audit systems to monitor adherence to sepsis management protocols, including timely lactate measurement and documentation of clinical decisions. These measures aim to support the development of nurse-led early warning systems, grounded in both clinical evidence and nursing Theory.

Based on the data and discussion above, as well as supporting literature, it can be concluded that lactate levels are dynamic and can be monitored periodically to evaluate the effectiveness of resuscitation and directly predict patient deterioration, thereby helping rapid clinical decision-making in the ER. Therefore, this study demonstrates that lactate levels are a dominant factor significantly related to mortality in the ER.

It should be noted that in this study, the retrospective approach using secondary data from medical records is highly dependent on the completeness and accuracy of existing documentation, making it impossible to validate the patient's clinical condition directly. In addition, this study was only conducted in one hospital, namely Dr. Wahidin Sudirohusodo Makassar General Hospital, so the results cannot be generalized to other health facilities with different population characteristics and resources. Nevertheless, the results of this study are expected to contribute meaningfully to the development of emergency nursing practices in the institution, especially in the early identification and management of mortality risk factors in sepsis patients in the ER. For health workers, these findings are expected to serve as a guideline in the management of sepsis patients by emphasizing the importance of monitoring lactate levels as a key indicator. The integration of lactate examination into the sepsis bundle protocol

is expected to improve the quality of care and reduce mortality. Furthermore, this study may serve as a foundation for further studies focusing on the exploration of other biomarkers for the early identification of sepsis patients in the ER.

Relevance to Clinical Practice

This study emphasizes the importance of monitoring lactate levels as a biomarker in the management of sepsis patients in the emergency department (ED). The findings contribute to improving diagnostic accuracy, risk evaluation, and clinical outcomes through timely interventions. Bedside lactate testing, now more feasible with point-of-care (POC) devices, supports rapid triage decisions even in resource-limited settings. Additionally, lactate monitoring and SOFA score assessment provide practical guidance for clinical decision-making and escalation of care. The study recommends integrating lactate testing into the initial sepsis management protocol (Hour-1 bundle) through standard operating procedures (SOPs), staff training, and continuous evaluation. These measures enhance the efficiency and safety of sepsis management and can inform hospital policy revisions. A proposed nurse-led triage flowchart—incorporating vital sign assessment, POC lactate testing, simplified SOFA screening, and prioritized disposition planning—can facilitate early interventions and reinforce evidence-based emergency nursing practices..

Conclusion

This study concludes that both blood lactate levels and SOFA scores are significantly associated with mortality in sepsis patients treated in the emergency department, with lactate emerging as the most dominant predictor. These findings highlight the critical role of early identification using lactate measurement and SOFA scoring as part of routine triage

protocols. Integrating these parameters into clinical practice can enhance early detection, support rapid decision-making, and ultimately improve patient outcomes. Specifically, the implementation of lactate testing within the initial sepsis management bundle is strongly recommended to reduce delays in treatment and lower mortality rates, particularly in resource-limited emergency settings such as Dr. Wahidin Sudirohusodo General Hospital in Makassar.

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CrediT Authorship Contributions Statement

Anugerah Hardianti: Conceptualization, Methodology, Investigation, Data Curation, Formal Analysis, Writing – Original Draft
Ahsan: Supervision, Validation, Writing – Review & Editing

Heri Kristianto: Supervision, Validation, Writing – Review & Editing

Hasriadi Lande: Resources, Project Administration

Conflicts Of Interest

There is no conflict of interest.

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