

Risk Factor Analysis of Mortality Among Patients with Sepsis Admitted to the Intensive Care Unit at Anutapura Regional General Hospital, Palu, 2023-2025

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ARTICLE INFO	ABSTRACT
Article History: Received : 25 May 2026 Accepted : 18 June 2026 Published online	<i>Sepsis is a condition of organ failure that can be life-threatening due to the host's improper response to infection. Sepsis is often the leading cause of morbidity and mortality in the world. This study to analyze risk factors related to mortality in sepsis patients hospitalized in the ICU of RSUD Anutapura Palu in 2023-2025. This study is an analytical study with a case-control study design, using secondary data and total sampling. Each data obtained was analyzed univariate, bivariate and multivariate using SPSS 30.0. The results showed that the distribution of mortality frequency in sepsis patients was recorded as many as 24 patients who died from 47 patients hospitalized in the ICU of RSUD Anutapura Palu in 2023-2025. Based on demographic characteristics, age and sex were not associated with mortality ($p=0.618$; $p=0.181$). In terms of clinical characteristics, GCS, heart rate, and respiratory rate were associated with mortality ($p<0.001$), while MAP, comorbid diseases, and body temperature were not associated with mortality ($p=1.000$; $p=0.137$; $p=1.000$; $p=0.471$; $p=0.260$; $p=0.474$; $p=1.000$; $p=0.266$). Based on the characteristics of the action, the amount of antibiotic administration was not associated with mortality ($p=0.434$), but the amount of invasive device use was associated with mortality ($p=0.002$). In terms of treatment characteristics, length of treatment and duration of infusion were not associated with mortality ($p=0.181$; $p=0.423$), while catheter urine duration and duration of NGT were associated with mortality ($p=0.021$; $p<0.001$). Multivariate analysis showed that increased respiratory rate ($OR=1,335$; $p=0.003$) and duration of NGT ($OR=9,849$; $p=0.003$) were independent risk factors for mortality in people with sepsis</i>
Keywords: Sepsis; Mortality; ICU. This is an open access article under the  CC-BY-SA license.	

INTRODUCTION

Sepsis is a life-threatening condition characterized by organ dysfunction resulting from a dysregulated host response to infection.¹ It is a leading direct cause of death among critically ill patients admitted to the Intensive Care Unit (ICU) and remains one of the major contributors to morbidity and mortality worldwide.² According to the World Health Organization (WHO), there were an estimated 48.9 million cases of sepsis and 11 million sepsis-related deaths globally in 2020, accounting for approximately 20% of all deaths worldwide.³ In Indonesia, the incidence of sepsis is relatively high, reaching 30.29%, with reported mortality rates ranging from 11% to 49%.⁴ Observational data from the ICU of Anutapura Regional General Hospital (RSUD Anutapura), Palu, between 2023 and 2025 recorded 88 deaths among patients diagnosed with sepsis or septic shock.⁵

In patients with sepsis, the risk of developing severe infection and adverse outcomes in the ICU is influenced by several interrelated factors, including advanced age, disease severity, the use of central venous catheters, and invasive mechanical ventilation. Furthermore, the prognosis of critically ill patients with sepsis is affected by multiple factors such as underlying medical conditions, the causative infectious microorganisms, comorbid diseases, and the therapeutic interventions provided during ICU admission.⁶

Given the limited understanding of the prognostic factors influencing outcomes in patients with sepsis, as well as the lack of comprehensive information and the absence of studies investigating factors associated with mortality among patients with sepsis admitted to the ICU of Anutapura Regional General Hospital (RSUD Anutapura), Palu, this study was considered necessary. The present study, entitled "Risk Factor Analysis of Mortality Among Patients with Sepsis Admitted to the Intensive Care Unit at Anutapura Regional General Hospital, Palu, 2023–2025," aims to identify the factors contributing to sepsis-related mortality. The findings are expected to provide evidence that supports the implementation of appropriate preventive strategies, timely therapeutic interventions, and

optimal clinical management to reduce mortality among patients with sepsis receiving intensive care.

MATERIAL AND METHOD

This study was an analytical study using secondary data with a case-control study design. The case group consisted of patients with sepsis who died during their ICU stay, while the control group comprised patients with sepsis who survived and recovered from the critical phase following admission to the Intensive Care Unit (ICU) at Anutapura Regional General Hospital (RSUD Anutapura), Palu, between 2023 and 2025.

The research instruments and materials included a laptop, IBM SPSS Statistics version 30.0, the ICU registry, and the medical records of patients with sepsis. The study population consisted of all patients with sepsis admitted to the ICU of RSUD Anutapura Palu during the 2023–2025 period, totaling 134 patients. A total sampling technique was employed.

Following data selection based on the inclusion and exclusion criteria, 47 patients met the eligibility criteria and were included in the study. A total of 87 patients were excluded due to missing medical records, age younger than 18 years, ICU length of stay of only one day, discharge against medical advice, or the absence of a documented diagnosis of sepsis in their medical records.

Data were analyzed using univariate, bivariate, and multivariate analyses with IBM SPSS Statistics version 30.0. The variables analyzed included the frequency distribution of mortality, demographic characteristics, clinical characteristics, medical intervention characteristics, and treatment-related characteristics.

RESULTS

Table 1. Frequency Distribution of Mortality Among Patients with Sepsis Admitted to the ICU at Anutapura Regional General Hospital, Palu, 2023-2025

No	Frequency Distribution	n	(%)
1.	Live	23	48.9
2.	Deceased	24	51.1
Total		47	100.0

Based on the univariate analysis presented in Table 1, the frequency distribution of mortality among patients with sepsis admitted to the ICU at Anutapura Regional General Hospital (RSUD Anutapura), Palu, during the 2023-2025 period showed that 24 patients (51.1%) died, while 23 patients (48.9%) survived and were discharged from the ICU alive. These findings indicate that the proportion of mortality among patients with sepsis was slightly higher than the proportion of patients who survived during the study period.

Table 2. Demographic Characteristics of Patients with Sepsis Admitted to the Intensive Care Unit at Anutapura Regional General Hospital, Palu, 2023-2025

No.	Demographic Characteristics	n	%
1.	Age		
	Late Adolescent (17-25 Years)	2	4.3
	Early Adulthood (26-35 Years)	2	4.3
	Late Adulthood (36-45)	5	10.6
	Early Older Adulthood (46-55 Years)	8	17
	Late Older Adulthood (>65 Years)	18	38.3
	Elderly (65 Years)	12	25.5
2.	Gender		
	Male	21	44.7
	Female	26	55.3
Total		47	100.0

Based on Table 2, the majority of patients with sepsis admitted to the ICU at Anutapura Regional General Hospital (RSUD Anutapura), Palu, during the 2023-2025 period were in the late elderly age group (56-65 years), comprising 18 patients (38.3%). This was followed by the

older adult age group (>65 years) with 12 patients (25.5%), the early elderly group (46-55 years) with 8 patients (17.0%), the late adulthood group (36-45 years) with 5 patients (10.6%) the early adulthood group (26-35 years) with 2 patients (4.3%), and the late adolescence group (17-25 years) with 2 patients (4.3%).

Regarding sex distribution, the majority of patients with sepsis admitted to the ICU at RSUD Anutapura Palu were female, accounting for 26 patients (55.3%), while 21 patients (44.7%) were male.

Table 3. Association Between Demographic Characteristics and Mortality Among Patients with Sepsis

Demographic Characteristics	Group				Total	p-Value
	Live		Deceased			
	n	%	n	%	n	%
Age						
Late Adolescent (17-25 Years)	1	50	1	50	2	100
Early Adulthood (26-35 Years)	0	0	2	100	2	100
Late Adulthood (36-45)	4	80	1	20	5	100
Early Older Adulthood (46-55 Years)	4	50	4	50	8	100
Late Older Adulthood (>65 Years)	9	50	9	50	18	100
Elderly (65 Years)	5	41.7	7	58.3	12	100
Gender						
Male	8	38.1	13	61.9	21	100
Female	15	57.5	11	42.3	26	100
Total	23	48.9	24	51.1	47	100

Based on the bivariate analysis presented in Table 3, the results of the Kruskal-Wallis and Chi-square tests demonstrated that age and sex were not significantly associated with mortality among patients with sepsis ($p = 0.618$ and $p = 0.181$, respectively). These findings indicate that neither age nor sex was a significant predictor of mortality in patients with sepsis admitted to the ICU during the study period.

Table 4. Association Between Clinical Characteristics and Mortality Among Patients with Sepsis

Clinical Characteristics	Group				Total		p-Value
	Live		Deceased				
	n	%	n	%	n	%	
GCS							
<15 Point	5	21.7	18	78.3	23	100	<0.001
≥15 Point	18	75	6	25	24	100	
Map							
≥65 mmHg	19	50	19	55	38	100	1.000
<65 mmHg	4	44.4	5	55.6	9	100	
Comorbid Disease							
Gastroenterohepatology							
Present	2	22.2	7	77.8	9	100	0.137
Absent	21	55.3	17	44.7	38	100	
Heart							
Present	3	50	3	50	6	100	1.000
Absent	20	48.8	21	51.2	41	100	
Lungs							
Present	11	44	14	56	25	100	0.471
Absent	12	54.5	10	45.5	22	100	
Kidney							
Present	6	37.5	10	62.5	16	100	0.260
Absent	17	54.8	14	45.2	31	100	
Diabetes Mellitus							
Present	11	55	9	45	20	100	0.474
Absent	12	44.4	15	55.6	27	100	
Severity							
Present	1	33.3	2	66.7	3	100	1.000
Absent	22	50	22	50	44	100	
Total	23	48.9	24	51.1	47	100	

Clinical Characteristics	Group		p-Value
	Live	Deceased	
Heart Rate	90.74 ± 18.60	116.33 ± 25.30	<0.001*
Respiratory Rate	22 (19-25)	27 (24-32)	<0.001*
Body Temperature	36.5 (36-37)	36.5 (36-37,7)	0.266

Based on Table 4, the results of the Chi-square test demonstrated a significant association between the Glasgow Coma Scale (GCS) score and mortality among patients with sepsis (p < 0.001). In contrast, the Fisher's Exact

Test showed no significant association between mean arterial pressure (MAP) and mortality (p = 1.000).

The results of the Chi-square and Fisher's Exact tests also indicated no significant associations between the presence of comorbid diseases and mortality among patients with sepsis (p = 0.137, 1.000, 0.471, 0.260, 0.474, and 1.000, respectively).

The Independent t-test revealed a significant association between heart rate and mortality (p < 0.001). Furthermore, the Mann–Whitney U test demonstrated a significant association between respiratory rate and mortality (p < 0.001), whereas body temperature was not significantly associated with mortality (p = 0.266) among patients with sepsis admitted to the ICU at Anutapura Regional General Hospital (RSUD Anutapura), Palu, during the 2023–2025 study period.

Table 5. Association Between Medical Intervention Characteristics and Mortality Among Patients with Sepsis

Treatment Characteristics	Group				Total		p-Value
	Live		Deceased		n	%	
	n	%	n	%			
Therapeutic Interventions							
Number of Antibiotics Administered							
One Antibiotic	11	57.9	8	42.1	19	100	0.434
Two Antibiotic	8	40	12	60	20	100	
Three Antibiotic	4	57.1	3	42.9	7	100	
Four Antibiotic	0	0	1	100	1	100	
Number of Invasive Device Administered							
One Invasive Device	6	85.7	1	14.3	7	100	0.002*
Two Invasive Devices	11	64.7	6	35.3	17	100	
Three Invasive Devices	6	26.1	17	73.9	23	100	
Total	23	48.9	24	51.1	47	100	

Based on Table 5. the results of the Mann–Whitney U test showed no significant association between the number of antibiotics

administered and mortality among patients with sepsis ($p = 0.434$). However, there was a significant association between the number of invasive devices used and mortality ($p = 0.002$). These findings suggest that while the number of antibiotics administered was not associated with mortality, greater use of invasive devices was significantly associated with an increased risk of death among patients with sepsis.

Table 6. Association Between Treatment Characteristics and Mortality Among Patients with Sepsis

Treatment Characteristics	Group				Total		p-Value
	Live		Deceased				
	n	%	n	%	n	%	
Treatments Duration							
≥7 Days	10	62.5	6	37.5	16	100	0.181
<7 Days	13	41.9	18	58.1	31	100	
Duration of Invasive Device Applied:							
Duration of Urinary Catheterization							
Not Used	6	75	2	25	8	100	0.021
>5 Days	10	58.8	7	41.2	17	100	
≤5 Days	7	31.8	15	68.2	22	100	
Duration of Intravenous							
>3 Days	16	53.3	14	46.7	30	100	0.423
≤3 Days	7	41.2	10	58.8	17	100	
Duration of Nasogastric Tube							
Not Used	17	73.9	6	26.1	23	100	<0.001*
>2 Days	5	31.3	11	68.8	16	100	
≤2 Days	1	12.5	7	87.5	8	100	
Total	23	48.9	24	51.1	47	100	

Based on Table 6, the results of the Chi-square test showed no significant association between length of ICU stay and intravenous (IV) infusion duration with mortality among patients with sepsis ($p = 0.181$ and $p = 0.423$, respectively).

In contrast, the Mann-Whitney U test demonstrated significant associations between

the duration of urinary catheterization and nasogastric tube (NGT) placement with mortality among patients with sepsis ($p = 0.021$ and $p < 0.001$, respectively). These findings indicate that prolonged urinary catheterization and NGT use were significantly associated with mortality in patients with sepsis admitted to the ICU at Anutapura Regional General Hospital (RSUD Anutapura), Palu, during the 2023–2025 study period.

Table 7. Independent Risk Factors for Mortality Among Patients with Sepsis

Variable	OR	CI95%		p-Value
		Lower	Upper	
Clinical Characteristics				
Respiratory Rate	1.335	1.106	1.611	0.003*
Treatment Characteristics				
NGT Duration	9.849	2.219	43.721	1.000

Based on the multivariate analysis presented in Table 7, each 1 breath/minute increase in respiratory rate (RR) was found to significantly increase the risk of mortality among patients with sepsis ($p = 0.003$; OR = 1.335; 95% CI: 1.106–1.611). In other words, patients with a higher respiratory rate had a 1.335-fold greater odds of mortality for every 1 breath/minute increase in RR.

Furthermore, the duration of nasogastric tube (NGT) use was identified as an independent risk factor significantly associated with increased mortality among patients with sepsis ($p = 0.003$; OR = 9.849; 95% CI: 2.219–43.721). Patients who required longer durations of NGT placement had approximately a tenfold higher risk of mortality compared with those who underwent NGT placement for a shorter duration.

DISCUSSION

This study demonstrated that the proportion of mortality among patients with sepsis

admitted to the ICU at Anutapura Regional General Hospital (RSUD Anutapura), Palu, during the 2023–2025 period was slightly higher than the proportion of patients who survived. This finding is expected, as sepsis is a life-threatening condition characterized by organ dysfunction resulting from a dysregulated host response to infection.⁷ If sepsis is not recognized and managed promptly, it may progress to septic shock, multiple organ dysfunction syndrome (MODS), and ultimately lead to increased in-hospital mortality.⁸

Physiologically, advanced age is associated with progressive deterioration of organ function, reduced cardiopulmonary compensatory capacity, and immunosenescence. These age-related changes make older adults more susceptible to rapid clinical deterioration, septic shock, and MODS, thereby increasing the risk of mortality.⁹

In addition, biological sex has been proposed to influence the immune response in patients with sepsis. Estrogen in females exerts immunomodulatory effects by enhancing immune cell activity, whereas testosterone in males may suppress immune responses, particularly cell-mediated immunity, making males theoretically more susceptible to severe sepsis and higher mortality.¹⁰

However, the present study found that age and sex were not significantly associated with mortality among patients with sepsis. The absence of significant associations may be attributable to the relatively small sample size and the homogeneous distribution of age across the study population, particularly among the adult and elderly groups, where the differences in the proportions of survivors and non-survivors were minimal. Such characteristics may have reduced the statistical power to detect significant associations. Likewise, the proportions of male and female patients were relatively similar between the survivor and non-survivor groups, which may explain why no statistically significant relationship was observed between sex and mortality in this study.

The findings demonstrated that the Glasgow Coma Scale (GCS) was significantly associated with mortality among patients with sepsis, consistent with the theory that a decreased GCS score reflects neurological dysfunction resulting

from severe systemic infection. Systemic infection triggers an excessive immune response that causes damage to vascular endothelial cells and tight junction proteins, leading to disruption of the blood–brain barrier (BBB) and allowing peripheral immune cells to infiltrate brain tissue. Consequently, glial cell activation and neuroinflammation occur, impairing neurological function and resulting in decreased consciousness in patients with sepsis.⁴ Furthermore, a GCS score below 15 has been shown to be associated with an increased risk of clinical deterioration and mortality in patients with sepsis.¹¹

The present study found no significant association between mean arterial pressure (MAP) and sepsis-related mortality. This finding may be explained by the prompt correction of hypotension during the initial management of sepsis, enabling most patients to maintain the recommended target MAP of ≥ 65 mmHg, thereby minimizing differences in mortality based on MAP values.¹²

The results also indicated that comorbid diseases were not significantly associated with mortality among patients with sepsis. This lack of association may be attributable to the relatively similar distribution of comorbidities between the survivor and non-survivor groups, resulting in no statistically significant differences. In addition, the limited sample size of the present study may have reduced the statistical power to detect an association between comorbidities and mortality.

This study further demonstrated a significant association between heart rate (HR) and mortality among patients with sepsis. This finding is consistent with the physiological response to sepsis, in which the body initially compensates for systemic infection by increasing cardiac output through elevated heart rate, enhanced myocardial contractility, and other mechanisms to maintain hemodynamic stability.¹³ However, as sepsis progresses and the cardiovascular system loses its ability to compensate, excessive catecholamine release, increased myocardial oxygen consumption, and shortened diastolic filling time resulting from persistent tachycardia impair coronary perfusion. Consequently, inadequate tissue perfusion develops, leading to

multiple organ failure and an increased risk of mortality.¹⁴

The findings demonstrated a significant association between respiratory rate (RR) and mortality among patients with sepsis. This is consistent with the physiological response to sepsis, in which the body increases respiratory rate as a compensatory mechanism for metabolic acidosis and tissue hypoperfusion. The release of inflammatory cytokines and endotoxins stimulates the respiratory center, leading to hyperventilation that exceeds metabolic demand. In addition, metabolic acidosis and sepsis-induced lung injury further contribute to an increased respiratory rate. Consequently, an elevated RR reflects greater disease severity and impaired tissue oxygenation, both of which are associated with an increased risk of mortality in patients with sepsis.¹⁵

The present study found no significant association between body temperature and mortality among patients with sepsis. This finding may be explained by the median body temperature measured at the time of sepsis diagnosis, with most patients presenting within the normothermic range. Moreover, the relatively small number of patients with extreme body temperature abnormalities may have limited the influence of body temperature on mortality outcomes.

The results also showed no significant association between the number of antibiotics administered and mortality among patients with sepsis. This finding suggests that the quantity of antibiotics administered during hospitalization does not directly influence mortality outcomes. Instead, other factors—such as the appropriateness of antibiotic selection, the timing of antibiotic administration, and the adequacy of antimicrobial therapy—are likely to play a more important role in determining the clinical outcomes of patients with sepsis.

The present study demonstrated a significant association between the number of invasive devices used and mortality among patients with sepsis, indicating that the use of a greater number of invasive devices is associated with an increased risk of infection and mortality.¹⁶ Invasive medical devices play a crucial role in the management of critically ill patients, including those with sepsis. Common invasive

procedures performed in the intensive care setting include intravenous catheter insertion, nasogastric tube (NGT) placement, urinary catheterization, and other invasive interventions required to support patient care.¹⁷

However, according to current evidence, the use of multiple invasive medical devices increases the risk of healthcare-associated infections and prolonged hospitalization.¹⁶ When infection occurs and the host immune response becomes dysregulated, sepsis may develop. The presence of organ dysfunction, which defines sepsis, further worsens the patient's clinical condition and substantially increases the risk of life-threatening complications and mortality.¹⁸

The findings showed no significant association between length of ICU stay and mortality among patients with sepsis. This may be explained by the relatively smaller impact of ICU length of stay compared with other factors, such as patients' clinical condition and the severity of illness, which are more influential determinants of mortality.¹⁹

The present study demonstrated significant associations between the duration of urinary catheterization and the duration of nasogastric tube (NGT) use with mortality among patients with sepsis. These findings are consistent with the study by Fei et al. (2018), which reported that prolonged urinary catheterization is a major risk factor for developing catheter-associated urinary tract infection (CAUTI), a complication that is associated with increased mortality.²⁰ Similarly, prolonged NGT use may increase the risk of healthcare-associated infections and other complications, thereby contributing to poorer clinical outcomes and a higher risk of mortality in patients with sepsis.

These findings are also consistent with the study conducted by Meriyanti, Rohana N., and Windyastuti in 2017, which reported that patients who required nasogastric tube (NGT) placement for more than 48 hours had a greater tendency to develop pneumonia compared with those whose NGT was used for 48 hours or less.²¹

Community-acquired pneumonia (CAP) is a common infectious disease that can induce both local and systemic inflammatory responses. When the host immune response becomes dysregulated, CAP may progress to sepsis, resulting in multiple organ dysfunction

syndrome (MODS), septic shock, and ultimately death.²² Consequently, prolonged NGT use may indirectly contribute to increased mortality by increasing the risk of pneumonia and subsequent sepsis-related complications.

The findings demonstrated no significant association between the duration of intravenous (IV) catheter use and mortality among patients with sepsis. This result suggests that IV catheter insertion and maintenance were performed in accordance with the hospital's Standard Operating Procedures (SOPs) and that appropriate nursing knowledge and insertion techniques effectively minimized the risk of catheter-related infections. Phlebitis is one of the most common complications associated with peripheral intravenous catheterization and is classified as a healthcare-associated infection (HAI).²³ Healthcare-associated infections acquired during hospitalization are recognized as important contributors to increased morbidity and mortality.²⁴

The present study further demonstrated that respiratory rate (RR) was an independent predictor of mortality among patients with sepsis admitted to the ICU at Anutapura Regional General Hospital (RSUD Anutapura), Palu, during the 2023–2025 period ($p = 0.003$; OR = 1.335; 95% CI: 1.106–1.611). Specifically, each increase of one breath per minute in RR was associated with a 1.335-fold increase in the odds of mortality.

Furthermore, the duration of nasogastric tube (NGT) use was also identified as an independent risk factor for mortality ($p = 0.003$; OR = 9.849; 95% CI: 2.219–43.721). Patients requiring prolonged NGT placement had approximately a tenfold higher risk of mortality than those who required NGT placement for a shorter duration. These findings suggest that close monitoring of respiratory status and careful evaluation of the necessity and duration of NGT use may be important strategies for improving outcomes in critically ill patients with sepsis.

CONCLUSION AND RECOMMENDATION

Conclusion

Based on the findings of this study on the risk factors for mortality among patients with sepsis admitted to the Intensive Care Unit (ICU)

at Anutapura Regional General Hospital (RSUD Anutapura), Palu, during 2023–2025, the following conclusions can be drawn:

1. The mortality rate among patients with sepsis admitted to the ICU at RSUD Anutapura Palu during the study period was 51.1%, with 24 of 47 patients dying during hospitalization.
2. There were no significant associations between demographic characteristics, including age ($p = 0.618$) and sex ($p = 0.181$), and mortality among patients with sepsis.
3. Significant associations were found between the following clinical characteristics and mortality: Glasgow Coma Scale (GCS) score <15 ($p < 0.001$), heart rate ($p < 0.001$), and respiratory rate ($p < 0.001$). In contrast, mean arterial pressure (MAP) ($p = 1.000$), body temperature ($p = 0.266$), and comorbidities ($p > 0.05$) were not significantly associated with mortality.
4. Regarding medical intervention characteristics, the number of invasive devices used was significantly associated with mortality ($p = 0.002$), whereas the number of antibiotics administered was not ($p = 0.434$).
5. Regarding treatment-related characteristics, the duration of urinary catheterization ($p = 0.021$) and the duration of nasogastric tube (NGT) use ($p < 0.001$) were significantly associated with mortality. However, length of ICU stay ($p = 0.181$) and duration of intravenous (IV) catheter use ($p = 0.423$) were not significantly associated with mortality.
6. The most influential independent risk factors for mortality among patients with sepsis were an increased respiratory rate (RR) (OR = 1.335; 95% CI: 1.106–1.611; $p = 0.003$) and prolonged duration of NGT use (OR =

9.849; 95% CI: 2.219–43.721; $p = 0.003$). These findings indicate that each 1 breath/minute increase in RR was associated with a 1.335-fold increase in the odds of mortality, while patients requiring prolonged NGT placement had approximately a tenfold higher risk of mortality than those with shorter durations of NGT use.

Recommendation

1. For the Intensive Care Unit (ICU) of Anutapura Regional General Hospital (RSUD Anutapura), Palu, it is recommended to maintain close and regular monitoring of vital signs, particularly respiratory rate (RR), in patients with sepsis. An increase in RR should be regarded as an early clinical warning sign, prompting immediate clinical assessment and appropriate intervention to prevent further deterioration.
2. For healthcare professionals working in the ICU, it is recommended to regularly evaluate the indication for nasogastric tube (NGT) use, minimize the duration of NGT placement whenever clinically feasible, and strengthen infection prevention protocols related to invasive medical devices as part of continuous quality improvement in patient care. In addition, healthcare providers should consistently adhere to the hospital's Standard Operating Procedures (SOPs), including routine monitoring and timely replacement of invasive devices according to established protocols, in order to prevent device-related complications that may increase the risk of mortality among patients with sepsis.
3. For future researchers, it is recommended to conduct prospective cohort studies with larger sample sizes

and to include additional clinical variables and prognostic parameters that may provide a more comprehensive understanding of the factors associated with mortality among patients with sepsis. Such studies may help identify additional independent predictors of mortality and contribute to improving the management and outcomes of critically ill patients with sepsis.

AUTHOR CONTRIBUTIONS

Conceptualization, S.S.M, A.M.I., I.; Methodology, S.S.M.; Validation, A.M.I., I.; Formal Analysis, S.S.M.; Investigation, S.S.M., Resources, S.S.M.; Data Curation, S.S.M.; Writing-Original Draft Preparation, S.S.M., A.M.I. and I.; Visualization, S.S.M All authors have read and agreed to the published version of the manuscript.

CONFLICTS OF INTEREST

The Author declares no Conflicts of Interest

REFERENCES

1. Rahajeng EP, Handayani I, Esa T, Bahrin U. Analisis laktat, albumin dan rasio laktat albumin sebagai prediktor luaran pada penderita sepsis dan syok septik di RSUD Dr. Wahidin Sudirohusodo Makassar. *Jurnal Kesehatan Andalas*. 2020.
2. Srzic I, Adam VN, Pejak DT. Sepsis definition: what's new in the treatment guidelines. *Acta Clin Croat*. 2022;61(suppl 1):67-72. doi:10.20471/acc.2022.61.s1.11.
3. World Health Organization. Sepsis. Published 2024. Accessed March 12, 2026. <https://www.who.int/news-room/fact-sheets/detail/sepsis>.
4. Harahap AF, Sayuti M, Maulina M. Hubungan Glasgow Coma Scale (GCS) dan kadar trombosit dengan lama rawat pasien sepsis di RSUD Cut Meutia Aceh Utara. *Sci-Tech Journal*. 2025;4(1).
5. Rumah Sakit Umum Daerah Anutapura Palu, Observasi RSUD Anutapura Palu. Sulawesi

Tengah; 2025.

6. Chen X, Ling X, Liu G, Xiao J. Antimicrobial coating: tracheal tube application. *Int J Nanomedicine*. 2022;17:1483-1494.
7. Wicaksono A, Adisasmita A. Frekuensi dan mortalitas penderita sepsis dan syok septik di ICU rumah sakit swasta tipe B di Tangerang Selatan. *Jurnal Epidemiologi Kesehatan Indonesia*. 2022;6. doi:10.7454/epidkes.v6i1.6031.
8. World Health Organization. Improving the prevention, diagnosis and clinical management of sepsis. Published 2019. Accessed March 12, 2026. <https://www.who.int/sepsis/en/>
9. Wardani IS. Tatalaksana sepsis berat pada pasien lanjut usia. *Jurnal Kedokteran Unram*. 2018;7(4):33-39.
10. Rose N, AGrama I, Nachtigall I, et al. Sex differences in sepsis outcomes across the lifespan: a population-based cohort study in Germany. *Crit Care*. 2025;29(1):408.
11. Sari EK, Hayati YS, Rokhmawati NL. Hubungan skor SOFA dengan mortalitas pasien sakit kritis. *Majalah Kesehatan*. 2021;8(3):149-155.
12. Purba PGA, Wahyuni A, Carolia N, Sidharti L. Analisis faktor risiko terhadap mortalitas pasien sepsis di ruang intensive care unit (ICU) RSUP Dr. H. Abdul Moeloek Provinsi Lampung tahun 2018-2021. *Medula*. 2026;16(2).
13. Ngan C, Zeng X, Lia T, Yin W, Kang Y. Cardiac index and heart rate as prognostic indicators for mortality in septic shock: a retrospective cohort study from the MIMIC-IV database. *Heliyon*. 2024;10(8):e28956.
14. Wang XL. Beta-blockers in the treatment of septic shock. *New Knowledge in Medicine*. 2017;27:400-401.
15. Loots FJ, Dekker I, Wang RC, et al. The accuracy and feasibility of respiratory rate measurements in acutely ill adult patients by GPs: a mixed-methods study. *BJGP Open*. 2022;6(4):0029.
16. Hatman FA, Semedi BP, Budiono. Analisis faktor risiko terhadap lama perawatan pasien sepsis yang meninggal di ruang perawatan intensif RSUD Dr. Soetomo Surabaya. *Jurnal Anestesiologi Indonesia*. 2021;13(2).
17. Beda NS, Situngkir R, Sumua LS, Pinulogod JJ. Edukasi kesehatan terhadap kecemasan keluarga dalam pelaksanaan tindakan invasif. *EMPIRIS*. 2024;1(2):104-113.
18. Ardiani T, Mangerangi Y, Mulyadi FE, Sommeng F, Irmandha SK. Literature review uji sensitivitas antibiotik terhadap bakteri penyebab penyakit sepsis. *Fakumi Medical Journal*. 2022;2(4).
19. Krisnawati I. Hubungan komorbiditas dengan tingkat mortalitas pada pasien sepsis di Rumah Sakit PKU Muhammadiyah Yogyakarta. Published 2020.
20. Fei L, Meixuan S, Linxia X, et al. Risk factors for catheter-associated urinary tract infection among hospitalized patients: a systematic review and meta-analysis of observational studies. *J Adv Nurs*. 2018;75(3):517-527.
21. Meriyanti, Rohana N, Windyastuti. Penggunaan nasogastric tube berhubungan dengan terjadinya pneumonia. *JNWH*. 2017;4(1).
22. Ceccato A, Torres A. Sepsis and community-acquired pneumonia. *Ann Res Hosp*. 2018;2.
23. Sikora A, Zahra F. Nosocomial infections. In: *StatPearls*. StatPearls Publishing; 2021.
24. Mariana D, Asrul M. Hubungan jumlah insersi dengan kejadian flebitis pada pasien anak di rumah sakit umum daerah Kota Kediri. *Jurnal Keperawatan*. 2020;8(2):87-94.