

# Epidemiological analysis of community-acquired and hospital-acquired sepsis in an emergency department

*Análise epidemiológica da sepse comunitária e hospitalar em uma unidade de urgência e emergência*

*Análisis epidemiológico de la sepsis comunitaria y hospitalaria en una unidad de urgencias y emergencias*

Nayara Kalila dos Santos Bezerra<sup>1</sup> ; Barbara Almeida Soares Dias<sup>1</sup> ; Raquel Voges Caldart<sup>1</sup> ; Paulo Sérgio da Silva<sup>1</sup> 

<sup>1</sup>Universidade Federal de Roraima. Boa Vista, Brazil

## ABSTRACT

**Objective:** to analyze the epidemiological characteristics of community-acquired and hospital-acquired sepsis in an emergency department. **Method:** cross-sectional, descriptive, document-based study with a quantitative approach, approved by the Research Ethics Committee. Data from 143 medical records of patients hospitalized between January 2020 and December 2021 were analyzed using absolute and relative frequencies, mean, and dispersion. **Results:** Prolonged hospital stay was observed for hospital-acquired sepsis ( $\geq 7$  days). Pulmonary infection stood out as the main source of community-acquired sepsis (68.6%), and invasive procedures, such as peripheral venous access (62.2%), were the most used. **Conclusion:** The need for effective and immediate interventions to reduce mortality related to this condition is reinforced. Understanding the origin of sepsis can help implement infection control measures in hospital settings, guiding important clinical decisions, allowing more effective monitoring of treatment response, and ensuring therapeutic efficacy.

**Descriptors:** Public Health; Disease Transmission, Infection; Cross Infection; Sepsis; Emergency Service, Hospital.

## RESUMO

**Objetivo:** analisar as características epidemiológicas da sepse de origem comunitária e hospitalar em uma unidade de urgência e emergência. **Método:** estudo transversal, descritivo, de base documental, com abordagem quantitativa, aprovado pelo Comitê de Ética em Pesquisa. Analisados dados de 143 prontuários de pacientes internados entre janeiro de 2020 e dezembro de 2021, por meio de frequências absolutas, relativas, média e dispersão. **Resultados:** observou-se tempo de internação prolongado à sepse de origem hospitalar ( $\geq 7$  dias). A infecção pulmonar se destacou como a principal origem da sepse comunitária (68,6%) e os procedimentos invasivos, como o acesso venoso periférico (62,2%), foram os mais utilizados. **Conclusão:** reforça-se a necessidade de intervenções eficazes e imediatas para reduzir a mortalidade relacionada a essa condição. A compreensão da origem da sepse pode ajudar a implementar medidas de controle de infecção em ambientes hospitalares, guiando decisões clínicas importantes, permitindo o monitoramento mais eficaz da resposta ao tratamento, garantindo a eficácia terapêutica.

**Descritores:** Saúde Pública; Transmissão de Doença Infecciosa; Infecção Hospitalar; Sepse; Serviço Hospitalar de Emergência.

## RESUMEN

**Objetivo:** analizar las características epidemiológicas de la sepsis de origen comunitario y hospitalario en una unidad de urgencias y emergencias. **Método:** estudio transversal, descriptivo, documental, con enfoque cuantitativo, aprobado por el Comité de Ética en Investigación. Se analizaron datos de 143 historias clínicas de pacientes hospitalizados entre enero de 2020 y diciembre de 2021 mediante el uso de frecuencias absolutas, relativas, media y dispersión. **Resultados:** se observó estancia hospitalaria prolongada para la sepsis de origen hospitalario ( $\geq 7$  días). La infección pulmonar se destacó como el principal origen de la sepsis comunitaria (68,6%) y los procedimientos invasivos, como el acceso venoso periférico (62,2%), fueron los más utilizados. **Conclusión:** se destaca que es necesario realizar intervenciones efectivas e inmediatas para reducir la mortalidad relacionada con esta condición. Comprender el origen de la sepsis puede ayudar a implementar medidas de control de infecciones en entornos hospitalarios, que direccionen las decisiones clínicas importantes, permitan hacer un seguimiento más eficaz de la respuesta al tratamiento y garanticen la eficacia terapéutica.

**Descriptores:** Salud Pública; Transmisión de Enfermedad Infecciosa; Infección Hospitalaria; Sepsis; Servicio de Urgencia en Hospital.

## INTRODUCTION

Sepsis is defined as the syndrome of potentially life-threatening organ dysfunction caused by a dysregulated response of the organism to an infection, which, when not treated in a timely manner, can culminate in septic shock, multiple organ dysfunction, and death<sup>1</sup>. It is considered one of the most challenging diseases, causing a serious global public health problem that affects all ages and annually affects about 20 to 30 million people worldwide<sup>2</sup>.

Corresponding author: Nayara Kalila dos Santos Bezerra. E-mail: [nayara.kalila@gmail.com](mailto:nayara.kalila@gmail.com)  
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In Brazil, it is estimated that about 600,000 cases of sepsis occur, of which 58.5% and 34.5% progress to death in public and private institutions, respectively. One of the main factors for the high mortality rate from sepsis in the country is related to delayed diagnosis and late initiation of treatment<sup>2,3</sup>. Still in the hospital setting, studies indicate that 93.0% of patients develop sepsis in emergency departments and that 43.3% are admitted with organ dysfunction indicative of sepsis<sup>4</sup>.

Any infection can trigger sepsis, including those caused by viruses, bacteria, protozoa, or fungi; however, bacteria are the main etiological agents of these infections<sup>5</sup>.

Its clinical manifestations vary according to the site of infection and the degree of organ dysfunction, and this complexity of signs and symptoms makes the early diagnosis of sepsis a great challenge for health professionals, given that there is no specific diagnostic test<sup>3</sup>.

However, early identification and the establishment of therapeutic measures in a timely manner are crucial for increasing patient survival. Thus, knowledge about the particularities of infectious conditions and worsening of the clinical picture suggestive of sepsis becomes necessary, especially in the emergency department, where initial care for these cases occurs<sup>6,7</sup>.

Sepsis can be subdivided based on its origin, being classified as community-acquired if the patient contracts the infection within 48 hours after hospital admission, or nosocomial if the infection occurs after this initial 48-hour period of hospital admission<sup>8</sup>. Identifying the possible origin of the infection is crucial when considering the likely cause of sepsis, being essential to estimate the sensitivity of the microorganism to antimicrobials<sup>9</sup>.

Some conditions can compromise the individual's immune response and increase susceptibility to infections, such as aging, invasive procedures, immunosuppression, malnutrition, alcoholism, diabetes mellitus, systemic arterial hypertension, transplant procedures, nosocomial and community infections, bacterial resistance, and prolonged use of invasive devices<sup>10</sup>.

Scientific evidence underlines that factors related to mortality from sepsis include the time of initiation of antibiotics, infection control and fluid administration, as well as individual patient factors such as sex, age, and comorbidities<sup>11</sup>.

As it is a complex disease that requires equipment, medications, and specialized teams, it imposes additional costs on public or private health systems<sup>3</sup>.

For example, in the emergency department of a Brazilian university hospital, it is estimated that approximately BRL 3,692,421.00 per year is spent on septic patients, and it is emphasized that costs vary according to the patient's length of stay<sup>4</sup>.

For treatment, the 2021 "*Surviving Sepsis Campaign*" (SSC) recommends measures that should be instituted within the first hours, ideal for use in an emergency environment, as soon as the individual is diagnosed with sepsis. Among them are: i) lactate collection; ii) blood culture collection; iii) initiation of broad-spectrum antibiotic therapy; iv) volume replacement; v) use of vasopressors<sup>9</sup>.

Sepsis represents a significant challenge for health systems, with a substantial impact on morbidity and mortality<sup>1,3</sup>. Early identification, immediate treatment, and understanding of the origin of the infection are crucial to improve survival rates and enhance the therapeutic approach<sup>2,9</sup>. Thus, this study aimed to analyze the epidemiological characteristics of community-acquired and hospital-acquired sepsis in an emergency department.

## METHOD

This is a cross-sectional, descriptive, document-based study with a quantitative approach, developed in the emergency department of a large public hospital in the state of Roraima.

The emergency room covers traumatological, clinical, and surgical emergencies, divided into three sectors: Suture (for immediate urgencies and patient stabilization), Red 1, 2, and 3 (semi-intensive unit for critical care), and Resuscitation Room (for observation and invasive procedures for up to 24 hours). The emergency care area, considered the entry point, classifies patients according to risk and offers low and medium complexity care for hospitalization and monitoring.

The sample included medical records of patients of both sexes, diagnosed with sepsis at admission or during the hospitalization period in the emergency department. Indigenous patients were excluded (due to ethical issues involving research with indigenous populations), as well as those under 18 years old, readmissions with a new sepsis condition after having already participated in the study (to avoid duplication), and medical records lacking information on exams performed and their results, as well as the absence of records of relevant interventions for sepsis management.

The sample consisted of medical records of patients hospitalized in the emergency department of the referred hospital from January 2020 to December 2021. The survey of medical records was carried out with the Medical and Statistical Archiving Service (SAME), through the hospital's electronic admission record system, using as selection criteria the International Classification of Diseases (ICD-10) code, called "septicemia", comprising codes A41 (other septicemias), A41.9 (unspecified septicemia), A40.8 (other streptococcal septicemias) and A41.4 (anaerobic septicemia), for patients admitted during the period established by the researcher.

Thus, 193 medical records of patients diagnosed with sepsis were identified. After applying the criteria established in the research, 143 medical records were included in the sample.

Data were collected through a form adapted to the screening form model of the sepsis management protocol, recommended by the Latin American Sepsis Institute (ILAS) of 2019<sup>3</sup> containing the following variables: sex; age; smoking; alcoholism; comorbidities; origin; length of stay; site of infection; invasive procedures.

To evaluate and determine the degree of organ dysfunction, the SOFA score was calculated based on the data presented in the medical record. Thus, six organ systems were analyzed (respiratory, coagulation, hepatic, cardiovascular, nervous, renal), scoring between 0 and 4 points according to the evolution of dysfunction. All with a score higher than 21 were considered as organ dysfunction<sup>1</sup>.

Data were tabulated in electronic spreadsheets in *Microsoft Excel*<sup>®</sup>, and subsequently received statistical treatment using *R software* (version 3.6.3.), R Core Team (2023). Statistical analysis included descriptive analyses of individual and clinical characteristics of patients according to the origin of sepsis (community or hospital), using absolute and relative frequencies for categorical variables, as well as measures of central tendency (mean) and dispersion for quantitative variables. In addition, 95% confidence intervals (95% CI) were calculated for the proportions.

Subsequently, mortality rates for sepsis were calculated according to its origin by days of hospitalization, dividing the number of deaths from sepsis by the total hospitalization for sepsis for each day of hospitalization. Finally, the data were presented through tables and graphs. This study was part of an institutional investigative project that had the research protocol approved by the Research Ethics Committee of the institution involved.

## RESULTS

The total number of patients admitted with a diagnosis of sepsis in the emergency department was 143, with characterization presented in Tables 1 and 2.

**Table 1:** Individual and clinical characteristics of patients with hospital-acquired sepsis and community-acquired sepsis hospitalized in the emergency department of a reference hospital for adults in the state of Roraima (n=143). Boa Vista, RR, Brazil, 2021.

Variables	Total n (%)	Hospital		Community	
		n (%)	CI (95%)	n (%)	CI (95%)
<b>Gender</b>					
Male	73 (51.0)	28 (38.4)	27.0 - 51.0	45 (61.6)	49.0 - 73.0
Female	70 (49.0)	34 (48.6)	37.0 - 61.0	36 (51.4)	39.0 - 63.0
<b>Age</b>					
18-40 years	25 (17.5)	12 (48.0)	28.0 - 68.0	13 (52.0)	32.0 - 72.0
41-60 years	44 (30.8)	18 (40.9)	27.0 - 57.0	26 (59.1)	43.0 - 73.0
> 60 years old	74 (51.7)	32 (43.2)	32.0 - 55.0	42 (56.8)	45.0 - 68.0
<b>Smoking</b>					
No	134 (93.7)	58 (43.3)	35.0 - 52.0	76 (56.7)	48.0 - 65.0
Yes	9 (6.3)	4 (44.4)	15.0 - 77.0	5 (55.6)	23.0 - 85.0
<b>Alcoholism</b>					
No	132 (92.3)	59 (44.7)	36.0 - 54.0	73 (55.3)	46.0 - 64.0
Yes	11 (7.7)	3 (27.3)	73.0 - 61.0	8 (72.7)	39.0 - 93.0
<b>Comorbidities</b>					
Hypertension	75 (52.4)	33 (44.0)	33.0 - 56.0	42 (56.0)	44.0 - 67.0
Diabetes	72 (50.3)	31 (43.1)	32.0 - 55.0	41 (56.9)	45.0 - 68.0
Obesity	15 (10.5)	6 (40.0)	17.0 - 67.0	9 (60.0)	33.0 - 83.0
<b>Total</b>	143 (100.0)	62 (43.4)	35.0 - 52.0	81 (56.6)	48.0 - 65.0

**Notes:** n = absolute frequency; % = relative frequency; CI = confidence interval.

**Table 1:** Clinical and hospitalization characteristics of patients with hospital-acquired sepsis and community-acquired sepsis hospitalized in the emergency department of a reference hospital for adults in the state of Roraima (n=143). Boa Vista, RR, Brazil, 2021.

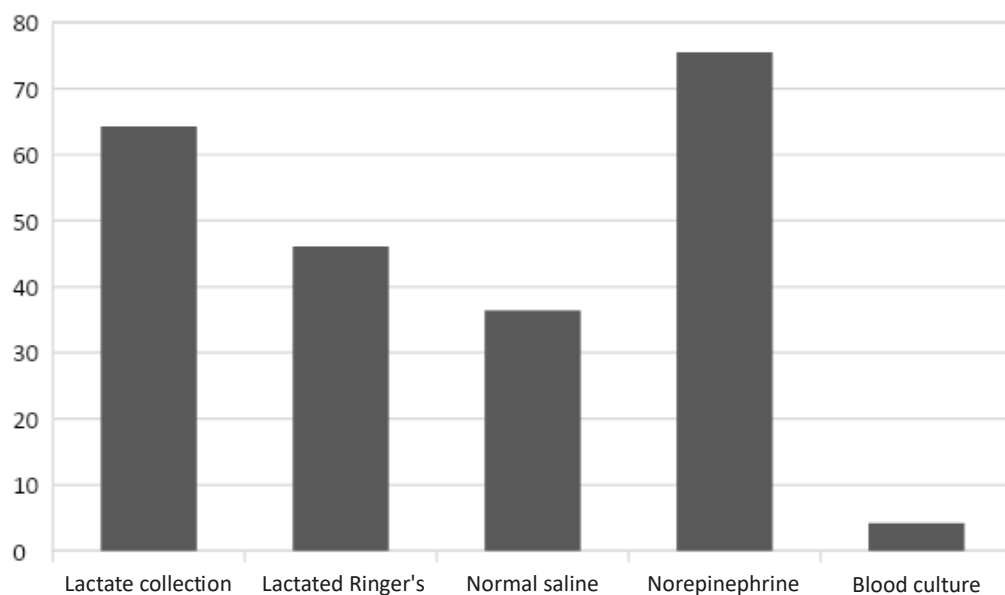
Variables	Total n (%)	Hospital n (%)	CI (95%)	Community n (%)	CI (95%)
<b>Hospitalization time*</b>					
< 7 days	93 (70.5)	37 (39.8)	30.0 - 50.0	56 (60.2)	50.0 - 70.0
≥ 7 days	39 (29.5)	21 (53.8)	37.0 - 70.0	18 (46.2)	30.0 - 63.0
<b>Place of infection</b>					
Abdominal	34 (23.8)	14 (41.2)	25.0 - 59.0	20 (58.8)	41.0 - 75.0
Pulmonary	35 (25.4)	11 (31.4)	17.0 - 49.0	24 (68.6)	51.0 - 83.0
Others	74 (51.7)	37 (50.0)	39.0 - 61.0	37 (50.0)	39.0 - 61.0
<b>Invasive procedures</b>					
Peripheral venous access	89 (62.2)	32 (36.0)	26.0 - 47.0	57 (64.0)	53.0 - 74.0
Central venous catheter	81 (56.6)	37 (45.7)	35.0 - 57.0	44 (54.3)	43.0 - 65.0
Mechanical ventilation	80 (55.9)	36 (45.0)	34.0 - 56.0	44 (55.0)	44.0 - 66.0
Indwelling urinary catheter	123 (86.0)	53 (43.1)	34.0 - 52.0	70 (56.9)	48.0 - 66.0
Nasogastric tube	105 (73.4)	48 (45.7)	36.0 - 56.0	57 (54.3)	44.0 - 64.0
<b>Severity</b>					
Sepsis	74 (51.7)	26 (35.1)	25.0 - 47.0	48 (64.9)	53.0 - 75.0
Sepsis and septic shock	69 (48.3)	36 (52.2)	40.0 - 64.0	33 (47.8)	36.0 - 60.0
<b>Total</b>	143 (100.0)	62 (43.4)	35.0 - 52.0	81 (56.6)	48.0 - 65.0

**Notes:** n = absolute frequency; % = relative frequency; CI = confidence interval; \*Differences in total due to missing data (n=11).

Among the participants, 51% were male, with a mean age of 59.2 years (ranging from 18 to 94 years), without smoking or alcoholism. About 52.4% had hypertension and 50.3% diabetes. The average length of stay in the emergency department was 17.6 days, with hospital-acquired occurrences (53.8%) staying for seven days or more.

Regarding the site of infection, 68.6% of community-acquired sepsis cases had pulmonary origin. Among invasive procedures, peripheral venous access was present in 62.2% of cases. Hospital-acquired events were more related to cases of sepsis and septic shock (52.2%). Of the patients admitted to the emergency department with sepsis and/or septic shock, 19.6% were transferred to the Intensive Care Unit (ICU), while 7% were discharged.

Regarding the main diagnoses on admission of patients who developed sepsis or septic shock, 28.0% were admitted with urinary tract infection, 17.5% polytrauma, 12.6% with pneumonia, and 10.5% with diabetic foot. Among the clinical manifestations presented by patients, the main ones were: altered consciousness (92.3%), followed by hypotension (90.9%), tachypnea (76.2%), and tachycardia (72.7%).



**Figure 1:** Relative frequency of therapeutic interventions performed in patients hospitalized for sepsis and sepsis and septic shock in the emergency department of a reference hospital for adults in Roraima. Boa Vista, RR, Brazil, 2021.

The administration of norepinephrine (75.5%) stands out, followed by lactate collection (64.3%) and administration of lactated Ringer's solution (46.1%).

Antibiotic therapy was administered to all patients (100%) within the first 24 hours. The most used antibiotics were Ceftriaxone (20.3%), Ceftazidime (11.9%), Imipenem (16.0%), Meropenem (7.7%), Vancomycin (9.8%), and Tazocin (13.3%). Regarding deaths, Figure 2 presents the mortality rate for sepsis based on origin and days of hospitalization (from 0 to  $\geq 7$  days).

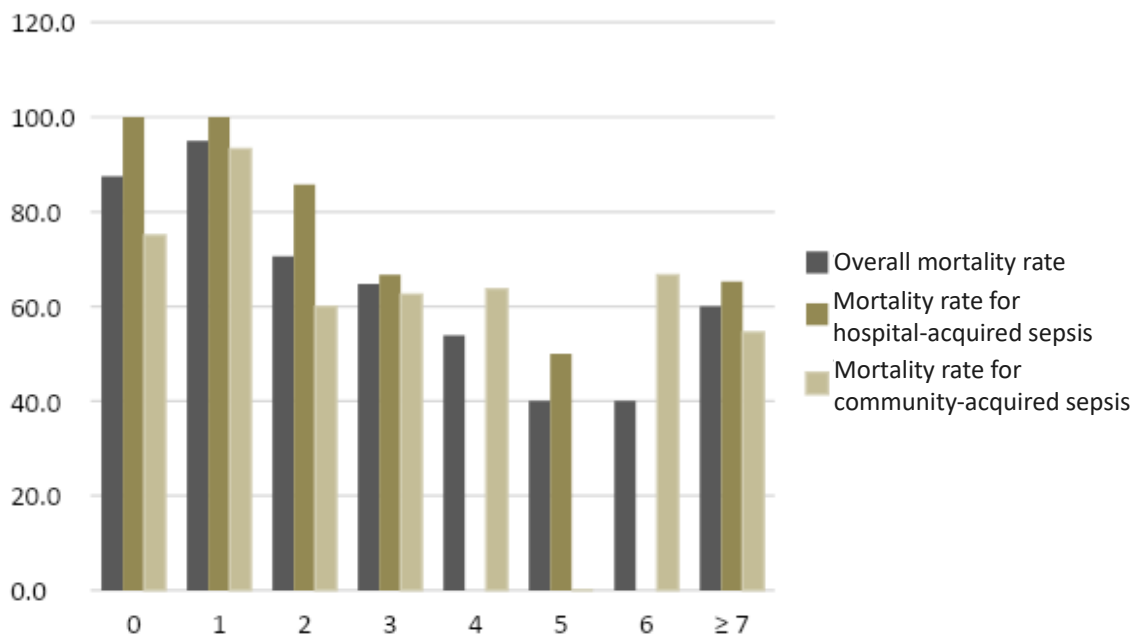


Figure 2: Distribution of sepsis mortality rate according to its origin by days of hospital stay. Boa Vista, RR, Brazil, 2021.

Thus, a percentage in hospital-acquired sepsis rates stands out, ranging from 100.0% on the first day to 65.2% above seven days, compared to community-acquired sepsis, with 75.0% on the first day and 66.7% above seven days, and an overall rate of 87.5% on the first day and 60.0% above seven days.

## DISCUSSION

From the data of this research, it was found that most patients who had community-acquired or hospital-acquired sepsis were over 60 years old. Although it affects all age groups, studies show that the advanced age of patients is a risk factor directly related to the disease<sup>10,12,13</sup>. In this case, the elderly are more susceptible to the development of sepsis and, consequently, have a higher risk of death, as they are usually people affected by some comorbidity and immunosuppression, due to changes in defense mechanisms related to immunosenescence, leaving the body vulnerable to infections<sup>14</sup>.

It is worth noting that all patients underwent at least one invasive procedure, such as bladder and enteral catheterization, central or peripheral venous catheter, and mechanical ventilation. However, among these procedures, peripheral venous access was the most performed. The performance of a large number of invasive procedures in patients with sepsis is necessary due to the severity of the case, but they represent a risk for the exacerbation of a disordered infectious process, as they predispose the patient to the acquisition of new infections by opportunistic microorganisms<sup>15,16</sup>.

Although the importance of using the catheter for drug therapy and hemodynamic stabilization of the patient is undeniable, bloodstream infection is one of the main complications related to its use and is involved in approximately 60% of cases<sup>17</sup>. Despite being considered mostly preventable, it ranks third among the most frequent adverse events related to care and has a mortality rate that can reach 40%<sup>18</sup>.

Bloodstream infection can be prevented through the adoption of appropriate measures for catheter insertion and management, in addition to the correct handling of the device, which is a responsibility of the nursing team<sup>19</sup>.

Combating Healthcare-Associated Infections (HAIs) is a challenge that requires a comprehensive approach, including continuous education, adequate provision of resources, promotion of a patient safety culture, and awareness of health professionals about the importance of infection prevention<sup>17</sup>.

The highest frequency of sepsis found was of community origin, but the most severe cases (sepsis that evolved to septic shock) presented a percentage of (52.2%) for hospital-acquired sepsis. In addition, the length of stay was significantly longer in these cases. A higher record of community-acquired sepsis is expected in an emergency unit, as it is where the first hospital care occurs<sup>20</sup>, however, nosocomial sepsis is more severe, being the main cause of death<sup>21</sup>.

In this perspective, a study conducted in Saudi Arabia pointed out that 60% of cases of sepsis and septic shock occurred secondary to hospital-acquired infections, while 40% were acquired in the community. This same research revealed that mortality and prolonged hospital stay were higher in patients with hospital-acquired sepsis (63%) compared to community-acquired sepsis (47.2%)<sup>22</sup>.

Hospital-acquired sepsis is considered more severe due to patients' preexisting medical conditions, compromised immune systems, and its close association with multidrug-resistant pathogens<sup>15</sup>. This makes treatment a challenge because therapeutic options for these patients are often absent or limited, increasing the risk of complications and making infection control more difficult, resulting in costly and harmful outcomes for both the patient and the hospital<sup>23</sup>.

Bacterial resistance increases treatment costs, prolongs hospital stay, and can increase mortality<sup>24</sup>. In a local study, which determined the molecular epidemiology of *Acinetobacter baumannii* strains, as well as their carbapenemase-encoding genes, revealed the presence of hospital infections caused by three high-risk pandemic lineages, called extensively drug-resistant (XDR) international clones (IC) in the same hospital where the present research was conducted<sup>25</sup>.

These clones have a high capacity to persist in clinical environments, a broad antimicrobial resistance profile and are associated with outbreaks in various regions of the world<sup>25</sup>. Such situation can probably be associated with infections by *A. baumannii* and its ability to resist and survive on surfaces in hospital environments, along with the transient colonization of the hands of health professionals<sup>26</sup>.

Thus, the importance of prevention and control actions is reinforced for a safer hospital environment<sup>25</sup>. The main conducts that stand out are hand hygiene<sup>27</sup>, application of precaution and isolation measures, management of antimicrobial use, use of cleaning, asepsis, and surface disinfection protocols, training on prevention practices<sup>22,23</sup>.

Regarding the length of stay, most patients remained for a long period in the emergency department, considering a stay of 7 days or more for hospital-acquired sepsis. According to Resolution No. 2,077/14 of the Federal Council of Medicine, the emergency care is designated to provide short-term care, aiming to stabilize a serious situation, and establishes a maximum stay time of up to 24 hours<sup>28</sup>.

However, it is admitted that severe patients, once stabilized, should remain under observation in the emergency until the availability of beds in closed hospital units, such as Intensive Care Units (ICU)<sup>29</sup>.

However, in practice, there is difficulty in obtaining beds in these units, due to high demand, which results in prolonged treatment of the severe patient in the emergency department itself. This negatively impacts the quality of care, as these units often do not have sufficient physical conditions and human resources to perform this type of care, leading to the mischaracterization of the sector<sup>30</sup>.

Analyzing mortality rates, in the present study, it is observed that they are very expressive at the beginning of hospitalization, but decrease as the days of hospital stay increase, demonstrating that patients arrive at the emergency with an exacerbated infectious condition, added to underlying medical conditions and difficulties in stabilization, dying soon at the beginning of treatment.

According to national data, 51.7% of patients with sepsis initially treated in emergency rooms of public hospitals die, compared to 22.8% in private hospitals. The possible reasons for this important difference include difficulties in early identification, late treatment, and insufficient number of professionals in the emergency departments of public hospitals<sup>20</sup>.

The fact that these mortality rates decrease as the duration of hospitalization increases may be related to the positive effect of treatment. Studies demonstrate that the appropriate initial choice of antimicrobial regimen increases the chance of survival of septic patients<sup>9</sup>. And, when applied in the first hour, it is capable of reducing mortality from



sepsis and septic shock by approximately 16%. It is worth noting that early diagnosis of sepsis constitutes a window of treatment opportunity<sup>5</sup>.

Thus, it reinforces the need for the multidisciplinary team, especially those providing care in critical care units, to always be alert to the clinical manifestations presented by patients, so that both identification and treatment can be initiated as quickly as possible. Additionally, continuous awareness and education of healthcare professionals, along with the implementation of effective protocols, are essential to minimize the risks associated with this critical condition<sup>2,6</sup>.

Regarding antibiotic therapy, although this study did not determine the exact moment of antibiotic initiation, what is known is that all patients received antimicrobials in the first 24 hours of sepsis diagnosis. Research conducted at the reference hospital for trauma in the State of Minas Gerais showed that patients who achieved better survival throughout the follow-up up to 28 days after suspicion of sepsis and/or septic shock were those who received antibiotics within 60 minutes (62%), those admitted to intensive care (67%) or who were already hospitalized in it (78%), and those who received sepsis treatment in compliance with the SSC (2021) guideline<sup>27</sup>.

A study conducted in Europe, when examining the association between delay in antibiotic treatment and 28-day mortality, observed that sepsis mortality was lower in patients who received antibiotics between one and nine hours. The highest mortality rates were found in patients treated more than nine hours after admission to the emergency<sup>31</sup>. Thus, it becomes crucial to start antibiotic therapy within a maximum of one hour after identifying signs of sepsis and/or septic shock<sup>9</sup>.

Identifying patients who need urgent antibiotic therapy from those who do not requires critical clinical judgment. Empirical therapy for patients with suspected sepsis should be based on patient risk factors, including site of infection, disease severity, and immunosuppression status, along with epidemiological factors such as site of infection acquisition (community or hospital) and antibiogram data. Health professionals should play an active role in these decisions to improve the chances of appropriate therapy<sup>32</sup>.

In this study, the absence of blood culture results was observed in most patient records, and this may have several explanations such as: lack of exam request, delay in results, technical problems, or even the fact that the samples have not yet been processed.

However, the lack of information in the patient's medical record regarding the cultures performed reveals a weakness in both medical and nursing documentation, which impacts the treatment and follow-up of these patients. If the vast majority of these patients did not undergo the appropriate tests, it means their prognosis will be compromised, leading to difficulties in controlling the infection and ultimately resulting in unfavorable outcomes<sup>33</sup>. Therefore, it is of utmost importance to always identify the pathogen causing the infection to guide treatment and adjust antibiotic therapy accordingly<sup>32</sup>.

### Study limitations

This study has some limitations that should be considered when interpreting the results. Firstly, it is a cross-sectional study, which limits the ability to infer causality between the analyzed variables. The study also presents a temporal limitation, which is restricted to a specific period, and may not reflect long-term changes and trends, in addition to the absence of sample size calculation.

The documentary base used for data collection may introduce problems of record and data quality, such as incomplete, incorrect information, not always clear or even present. In addition to the variability in medical records, inherent to the use of secondary data, which can affect the accuracy of collected data and make it difficult to present results.

Moreover, it presents uncontrolled factors, such as differences in treatment protocols and hospital infrastructure, which makes comparisons difficult and impacts results. Even in the face of these limitations, this study provides a valuable and robust view of sepsis in the context of emergency care, and can serve as a basis and guidance for future research. It is suggested to conduct studies with larger samples, as well as prospective studies, establishing a cause-and-effect relationship.

### CONCLUSION

The findings of this study reinforce the severity and complexity of sepsis in the context of an emergency department of a large public hospital in the state of Roraima, evidencing important characteristics of affected patients and applied treatment practices.

The data reveal a worrying scenario regarding hospital-acquired sepsis, which proved to be particularly more critical, related to prolonged hospital stay ( $\geq 7$  days). Pulmonary infection stood out as the main source of community-acquired sepsis (68.6%) and invasive procedures, especially peripheral venous access present in 62.2% of cases, highlight the urgent need to improve practices for preventing nosocomial infections.

Clinical outcomes were also alarming, considering that 19.6% of patients with sepsis needed transfer to ICU, and only 7.0% were discharged from the hospital, which points to the severity of clinical conditions presented by patients.

The therapeutic approach, with emphasis on immediate antibiotic administration (100% in the first 24 hours), demonstrates a commitment to the 2021 SSC guidelines. However, the mortality rate remains high, especially in the first days of hospitalization, with hospital-acquired sepsis presenting 100.0% mortality on the first day and 65.2% on days ( $\geq 7$  days). In comparison, community-acquired sepsis also presented high mortality, although slightly lower at 75.0% on the first day and 66.7% on days ( $\geq 7$  days).

These results highlight the urgent need for improvements in sepsis management and prevention strategies. The high mortality rate, particularly in the first 24 hours, emphasizes the importance of rapid and effective interventions. Knowing the origin of sepsis is crucial, as it impacts the patient's treatment and prognosis. Identifying the source of infection allows choosing the most appropriate antibiotic or antimicrobial treatment, preventing the spread of infection and additional complications.

In addition to drawing attention to control and prevention measures to face this devastating condition. The implementation of more rigorous protocols, awareness of health professionals, and constant updating of clinical practices are essential to ensure patient survival and improve the quality of care.

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#### Author's contributions

Conceptualization, N.K.S.B.; methodology, N.K.S.B. and B.A.S.D.; validation, P.S.S.; formal analysis, N.K.S.B., R.V.C. and P.S.S.; investigation, N.K.S.B.; resources, N.K.S.B., R.V.C., B.A.S.D. and P.S.S.; data curation, N.K.S.B. and B.A.S.D.; manuscript writing, N.K.S.B., R.V.C., B.A.S.D. and P.S.S.; writing – review and editing, N.K.S.B. and B.A.S.D.; visualization, N.K.S.B., R.V.C., B.A.S.D. and P.S.S.; supervision, R.V.C.; project administration, N.K.S.B. All authors read and agreed with the published version of the manuscript.