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PATTERN OF COMORBIDITIES IN PATIENTS WITH COMMUNITY-ACQUIRED SEPSIS ADMITTED TO MEDICAL WARDS AT A TERTIARY HOSPITAL IN GAUTENG PROVINCE, SOUTH AFRICA

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Summary
Objective. Community-acquired sepsis remains a significant public health issue in developing countries, often presenting in patients with pre-existing comorbidities. The scarcity of data concerning the prevalence of common comorbidities in sepsis patients within our setting is notable. Thus, this study aims to conduct a comprehensive exploration of the comorbidity pattern in sepsis patients.
Methods. The study utilized secondary data from a prospective observational study, entailing the review of medical records of patients who were admitted with community-acquired sepsis to the Medical Wards at a tertiary hospital in South Africa, spanning from August 1, 2022, to March 31, 2023.
Results. There were 169 hospitalized patients with a diagnosis of community-acquired sepsis. Their mean age was 43.4±16.5 years (ranged: 18 to 91). Half (52.7%) were under 40 years old and 63.3% were men. The average hospital stay was 10.5 ± 7.2 days. Approximately 16.6% of the patients required transfer to the Intensive Care Unit (ICU), and there was a 15.4% mortality rate. More than two-thirds 86.4% (n=146) of cases had comorbidities; the most prevalent were immunosuppression, acute kidney injury, diabetes mellitus, and hypertension. Women were significantly more prone to hypertension and diabetes mellitus than men, whereas men had a higher likelihood of being diagnosed with Hepatitis C compared to women.
Conclusion. Community-acquired sepsis is common in our environment and is associated with high mortality rates, underscoring the vital importance of preventive healthcare and early intervention to enhance sepsis management and increase patient survival rates.
Keywords: Comorbidity, Community-Acquired Sepsis, Gauteng Province, South Africa

Introduction

Globally, infectious diseases remain a public health concern which have a significant impact on hospital admissions, mortality, and medical expenses [1]. Notably, bacterial and fungal infections often lead to sepsis, a critical condition that stands as a primary cause of mortality among hospitalized patients [2]. Studies have shown that sepsis not only increases the risk of mortality and readmissions but also lead to longer hospital stays [3, 4, 5] and higher medical expenses [6]. Immediate and advanced medical intervention is crucial to avert grave complications and mortality. Prior studies have indicated that between 5.0% and 87.9% of hospitalized patients were admitted with community-acquired sepsis [2, 7], and an overwhelming 97.4% of these individuals had at least one diagnosed comorbidity [7]. The presence of chronic diseases can influence the prognosis of patients with sepsis, making it crucial to evaluate pre-existing comorbidities to enhance the accuracy of mortality predictions in sepsis cases [8, 9].

Extensive research has explored the incidence and consequences of common chronic medical conditions co-occurring with community-acquired sepsis [3, 5, 10, 11]. These studies underscore the significant presence of diabetes mellitus, cancer, immunosuppression, arterial hypertension, congestive heart failure, chronic obstructive pulmonary disease, and chronic kidney disease, which may increase mortality [3, 4, 5, 10, 11]. For patients with sepsis who also have comorbidity, treatment strategies are designed to tackle both the sepsis and the underlying health issues, potentially prolonging the recovery period. Recognizing and adapting to these patterns is vital for enhancing patient care and customizing therapeutic approaches. The scarcity of data concerning the prevalence and outcomes of common comorbidities in sepsis patients within our medical wards is notable. Consequently, this study is designed to explore these aspects thoroughly.

Methods

Study design and setting: The research utilized secondary data obtained from a prospective observational study, which involved reviewing the medical records of patients admitted with community-acquired sepsis to the Medical Wards at Dr. George Mukhari Academic Hospital, during the period from August 1, 2022, to March 31, 2023. The hospital is situated in Ga-Rankuwa within the North-Western area of Tshwane in Gauteng province, South Africa, is a key healthcare facility. Previously referred to as Ga-Rankuwa Hospital, this tertiary institution houses six medical wards and offers 1652 beds.

Additionally, it serves as a practical training ground for the Sefako Makgatho Health Sciences University.

Study population, inclusion, and exclusion criteria: The study encompassed patients 18 years or older with a primary diagnosis of suspected or confirmed infection. Inclusion necessitated at least two documented criteria of systemic inflammatory response syndrome (SIRS) in the medical records. Exclusions were patients with hospital-acquired sepsis, those readmitted for sepsis within one month of a previous discharge, those with incomplete records, and those transferred from other hospitals.

Sample Size and Sampling Technique: A sample size of 140 was determined by a single population proportion formula shown below with the following assumptions: level of confidence of the study 95%, sampling error 5%, between 5.0% and 87.9% of hospitalized patients were admitted with community-acquired sepsis [2, 7]. From the researcher's experience, 10% or less of the patients admitted to our medical wards had community-acquired sepsis, which was used to calculate the sample size.

$$n = \frac{(Z)^2 p(1-p)}{(e)^2}$$

This study included a consecutive sample of patients with confirmed community-acquired sepsis upon admission to the medical ward and monitored them until their discharge.

Data collection: Data was extracted from patients' medical records across all six medical wards using a data collection form. A daily list of patients admitted with suspected or confirmed infections was sourced from the casualty register. The collected information encompassed age, gender, comorbidities, vital signs, duration of hospital stay, intensive care transfers, in-hospital mortality as the patient outcome, and microbiological data. This data included the infection source/site, microbial culture results, antimicrobial sensitivity testing, and prescribed antibiotics.

Data Analysis: Data were collected using Microsoft Excel 2016 (Microsoft Corporation, Redmond, Washington, United States) and then imported into STATA version 17 (StataCorp., College Station, TX, USA) for analysis. Percentages and frequencies were utilized to interpret categorical data, whereas means and standard deviations were employed for continuous variable analysis.

Ethical approval: Ethical approval for the study was secured from the Sefako Makgatho University Research Ethics Committee (Ref: SMUREC/M/191/2022:PG). The hospital's management granted permission to carry out the study. It adhered to the revised 2013 version of the Declaration of Helsinki from 1975. To ensure confidentiality, patient identifiers were maintained separately from the study data.

Results

During the study period, out of the 2,305 Medical Wards admissions, 169 patients (7.3%) met the inclusion criteria. Their ages had a mean of 43.4±16.5 years, ranging from 18 to 91 years old. Of the patients, 63.3% were men and half (52.7%) were under 40 years old. The average hospital stay was 10.5 days with a standard deviation of 7.2, varying between 1 and 56 days. Approximately 16.6% of the patients required transfer to the Intensive Care Unit (ICU), and there was a 15.4% mortality rate in the Medical Wards.

Comorbidities were present in 86.4% (n=146) of the cases, which is more than two-thirds. Figure 1 illustrates that immunosuppression was the most common comorbidity, representing 54% of the cases. It was succeeded by acute kidney injury, diabetes mellitus, and hypertension, each constituting 14%. Other comorbidities include Nephrotic syndrome, dilated cardiomyopathy, asthma, biventricular heart failure, end-stage renal failure, pulmonary embolism, paraplegia, bronchogenic cancer, stroke, renal failure, and prostate cancer are among the other comorbidities, comprised 22.0% of the participants in the study.

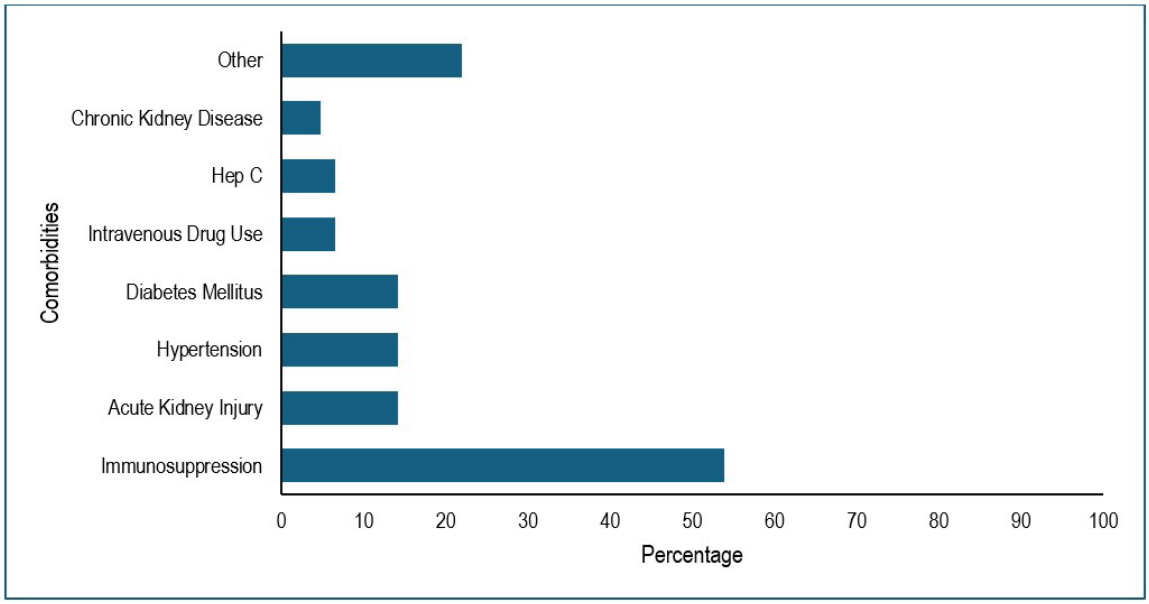

Figure 1. *Distribution of Comorbidities*

Table 1

Association between comorbidities and gender

	Gender		p-value
	Male, n=107	Female, n=62	
Comorbidities			
Immunosuppression	64(59.8)	27(43.6)	0.054
Acute Kidney Injury	17(15.9)	7(11.3)	0.497
Hypertension	9 (8.4)	15(24.1)	0.006
Diabetes Mellitus	11(10.3)	14(22.6)	0.042
Intravenous Drug Use	10(9.4)	1(1.6)	0.057
Hep C	11(10.3)	0(0.0)	0.008
Chronic Kidney Disease	6(5.6)	2(3.2)	0.712

Table 1 illustrates the relationship between comorbidities and gender. The data revealed no statistically significant correlation between the number of comorbidities per patient and their gender ($p > 0.05$). However, females were significantly more likely to have hypertension and diabetes mellitus compared to males, while males were more likely to be diagnosed with Hepatitis C than females ($p < 0.05$). No statistically significant association was found between gender and the presence of Immunosuppression, Acute Kidney Injury, Intravenous Drug Use, or chronic kidney disease ($p > 0.05$).

Discussion

The study evaluates the demographic and clinical features of patients with community-acquired sepsis admitted to the Medical Ward of a tertiary hospital. The participants' mean age was 43.4±16.5 years, which is younger than the mean age reported in prior studies [3, 4, 5, 10, 11]. The observed discrepancy might be due to the significant prevalence of HIV infections among the study's participants, which is reflective of the higher rates of HIV commonly found in this age group. Research indicates that most patients hospitalized with community-acquired sepsis are male [3, 4, 11], while other studies [5, 10], have reported a higher incidence in females. In this study, nearly two-thirds of the patients with community-acquired sepsis were male. This could be attributed to factors such as the higher incidence of certain comorbidities in males, behavioral patterns, and genetic or physiological differences.

In our research, the mean duration of hospitalization was 10.5 days, with a standard deviation of 7.2 days, and a range from 1 to 56 days. These results are comparable to those found in Szabo's study [5], yet they are lower than the findings of previous studies [3, 4]. However, our data indicate a longer average stay compared to the study conducted by Hantrakun [11]. The Organization for Economic Co-operation and Development (OECD) states that shorter hospital stays typically result in lower costs and a shift of care to less expensive post-acute settings [12]. This makes the average length of stay in hospitals a useful indicator of efficiency.

According to multiple studies [3, 4, 5, 10, 11], between 15.2% and 43.8% of patients needed to be admitted to the intensive care unit. A recent study found that approximately 16.6% of patients required transfer to an intensive care unit, suggesting that these individuals were in a critical condition. It's noteworthy that the estimated death rate in this study was 15.4%, lower than the 21% [11] and 32.1% [3] reported in other studies, yet higher than another study's 9% [10]. It aligns more closely with findings of 12.2% [4] and 14.0% [5] from additional studies. Accurate comparisons of death rates are crucial for evaluating the effectiveness of health policies. Moreover, Di Giuseppe and colleagues have highlighted in their research that improvements in hospital care can prevent deaths associated with sepsis [3].

Our findings indicate that immunosuppression is the most prevalent comorbidity, representing 54.0% of the cases, with a higher occurrence in males compared to females, although the difference is not statistically significant. This observation aligns with other research [3], which identifies immunosuppression as a frequent comorbidity in patients with community-acquired sepsis. Numerous studies have identified diabetes mellitus is a common chronic co-morbid medical condition in patients with sepsis [3, 4, 10,11, 13, 14]. This is consistent with the findings of the present study, which found diabetes mellitus was common in patients with community-acquired sepsis and was significantly higher in females than males.

Research has consistently shown a strong correlation between acute kidney injury and sepsis [15, 16]. In the present study, acute kidney injury was common, highlighting its prevalence as a co-morbid condition in clinical settings. A comprehensive retrospective cohort study conducted in Korea has highlighted hypertension as a considerable public health challenge among patients with sepsis [13]. Our research indicated that 14% of the cases studied were diagnosed with hypertension. Of these, a significant 83% had systolic blood pressure readings above 120 mmHg upon admission. Additionally, there was a notably higher incidence of hypertension among females as compared to males, which may suggest underlying gender-specific factors influencing this condition.

Study Limitation

The study is constrained by its focus on a single institution with a limited number of patients, which restricts the generalizability of its findings to other settings. To enhance the applicability of the results, future studies should be designed on a larger scale and include multiple centers. This would allow for a more comprehensive understanding that encompasses the variability in healthcare systems, the capacities of intensive care units, and the differing local guidelines for managing infectious diseases.

Conclusion

In conclusion, the study shows that most patients admitted to our Medical Wards with community-acquired sepsis have pre-existing comorbidities, particularly immunosuppression, require transfer to the intensive care unit, and have a higher mortality rate. This highlights the significance of early intervention and preventive healthcare in improving

sepsis management and improving patient survival rates. Prompt detection, appropriate antimicrobial treatment, control of the infection source, comprehensive monitoring, and prevention of organ failure and complications are all essential components of sepsis management. Additionally, it is imperative to inform patients and their families about the early signs and symptoms of sepsis and preventive measures to enhance patients' outcomes.

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