Merowe University of Technology

Faculty of Medicine and Health Science

Medical Laboratory Science Program

Department of Microbiology

A Retrospective Study on the Epidemiology and Antimicrobial Susceptibility Patterns of Bloodstream Infections among Oncological Patients at Al-Daman Hospital, Merowe Locality, Sudan (2026-2025).

A proposal submitted in partial fulfillment for the degree of (B.Sc) Medical Laboratory Science , Microbiology Department , 2026

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Introduction:

1.1 Background:

Bloodstream infections (BSIs) are among the most serious infectious complications affecting oncology patients and remain an important cause of morbidity and mortality worldwide . Patients with cancer are at increased risk of developing BSIs because of disease-related immunosuppression, chemotherapy-induced neutropenia, disruption of mucosal barriers, and the frequent use of invasive devices such as central venous catheters . These infections are associated with prolonged hospitalization, delayed cancer treatment, increased healthcare costs, and poor clinical outcomes.

Recent studies have reported that Gram-negative bacteria are the predominant pathogens causing bloodstream infections among oncology patients, although Gram-positive organisms continue to contribute significantly in many healthcare settings (1,2). In addition, the emergence of multidrug-resistant (MDR)

bacteria, including extended-spectrum β-lactamase (ESBL)-producing Enterobacterales, carbapenem-resistant Gram-negative bacteria, methicillin-resistant Staphylococcus aureus (MRSA), and vancomycin-resistant Enterococcus (VRE), has become a major challenge in the management of bloodstream infections (1,2,4).

Antimicrobial susceptibility testing (AST) plays a vital role in guiding appropriate empirical and targeted antimicrobial therapy. Continuous surveillance of antimicrobial susceptibility patterns is essential for monitoring resistance trends, improving antimicrobial stewardship programs, and enhancing treatment outcomes in oncology patients (3,4).

1.2 Problem statement:

Bloodstream infections remain one of the leading causes of severe infection and death among oncology patients. The increasing prevalence of antimicrobial-resistant bacteria has reduced the effectiveness of empirical antibiotic therapy, leading to treatment failure, prolonged hospitalization, and increased mortality (1,2). In Sudan, particularly in Merowe Hospital, there is limited recent information regarding the bacterial pathogens responsible for bloodstream infections among oncology patients and their antimicrobial susceptibility patterns. This lack of local epidemiological data limits the selection of appropriate empirical antimicrobial therapy and highlights the need for local surveillance studies.

1.3 Justification;

Determining the antimicrobial susceptibility patterns of bacterial isolates causing bloodstream infections among oncology patients is essential for improving empirical antibiotic therapy and patient outcomes. The findings of this study will provide updated local data on antimicrobial resistance, support antimicrobial stewardship programs, strengthen infection prevention and control strategies, and serve as baseline information for future research and healthcare planning in Sudan.

Research Question:

What are the causative bacterial pathogens and their antimicrobial susceptibility patterns among cancer patients at Al-Daman Hospital and do the findings indicate a need to modify current empirical antibiotic policies?

3.Objectives

3.1 General objective:

To Determine the epidemiology and antimicrobial susceptibility patterns of bloodstream infections among oncological patients at Al-Daman Hospital, Merowe Locality, Sudan

3.2 Specific objectives:

1. To determine the prevalence of bloodstream infections among oncological patients.
2. To identify the bacterial pathogens isolated from blood cultures.
3. To determine the antimicrobial susceptibility patterns of isolated organisms.
4. To assess demographic characteristics associated with bloodstream infections.
5. To evaluate resistance patterns among isolated bacterial pathogens
6. To determine the distribution of bloodstream infections according to age, sex, and type of cancer

Materials and Methods

4.1Study design

Hospital-based retrospective descriptive cross-sectional study.

4.2 study area

The study will be conducted at Al-Daman Hospital, Merowe Locality, Northern State, Sudan.

4.3 study population

All oncological patients with suspected bloodstream infections who underwent blood culture testing during the study period

Inclusion criteria

Oncology patients admitted during the study period.

Patients with available blood culture results.

Patients with complete microbiological records.

Exclusion criteria

Incomplete patient records.

Missing antimicrobial susceptibility data.

4.4 Sampling technique:

Probability sampling techniques

Systematic sample technique

4.5 Sample Size

4.6 Study variables:

Dependent variables

Type of bacterial isolates recovered from blood cultures

Antimicrobial susceptibility patterns of the isolates

Antimicrobial resistance patterns

Independent variables

Age

Sex

Year of isolation (2025_2026)

4.7 Sample collection:

Data will be collected retrospectively from laboratory records of cancer patients diagnosed with bloodstream infection during the study period

4.8 Data analysis

Data will be entered and analyzed using SPSS version 26 .

4.9 Ethical considerations:.

Ethical approval will be obtained from the relevant institutional review board. Permission will be obtained from Al-Daman Hospital administration. Patient confidentiality will be maintained throughout the study by using anonymous data collection forms.

4.10 Time frame :

3 month

4.11 Budget :

500.000 SDG

4.10 References

1. Amanati A, Sajedianfard J, Khodavaisy S, et al. Bloodstream infections in adult patients with malignancy: epidemiology, microbiology, and risk factors associated with mortality and multidrug resistance. BMC Infect Dis. 2021;21:636. doi:10.1186/s12879-021-06362-1.

2. Choi JK, Kim SH, Lee SO, et al. Bloodstream infections in patients with hematologic diseases: causative organisms and factors associated with resistance. Infect Chemother. 2022;54(2):281-294. doi:10.3947/ic.2021.0158.

3. Banerjee R, Humphries R. Rapid antimicrobial susceptibility testing methods for blood cultures and their clinical impact. Front Med (Lausanne). 2021;8:635831. doi:10.3389/fmed.2021.635831.

4. Fekadu G, Wondimeneh Y, Bisetegn H, et al. Bacterial profile and antimicrobial susceptibility patterns among cancer patients. Infect Drug Resist. 2022;15:1809-1820. doi:10.2147/IDR.S356093.

Task	Week 1	Week 2	Week 3	Week 4	Week 5
Proposal writing					
Data collection					
Research practical					
Data analysis					
Thesis writing					■
Discussion and final report					■
Printing					

Item	Quantity	Price
Transportation		200.000
Printing		300.000