https://doi.org/10.54361/ajmas.269104

Original article

Isolation and Identification of Bacteria in Post-Operated Wound Patients at Sabratha Teaching Hospital in Libya

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Abstract
Hospital-acquired infections (HAIs) remain a serious global health concern, with wound infections representing the most common nosocomial infection, particularly among surgical patients. Surgical site infections are the second most frequent type of HAI, accounting for approximately 24% of all hospital-acquired infections. In this study, samples from post-operative wounds were collected and inoculated onto blood agar and MacConkey's agar under aseptic conditions. Plates were incubated at 37°C for 18–24 hours. All cultures were examined macroscopically for growth, colonial morphology, and changes in the media. Plates showing visible growth were subjected to standard bacteriological tests, including catalase, coagulase, oxidase, urease, and citrate utilization. Plates without visible growth were re-incubated and examined daily for up to seven days. Colonies were identified by Gram staining and conventional bacteriological methods for Gram-positive and Gram-negative organisms. A total of 22 patients were included between May and June 2023. Of these, 20 had undergone surgical procedures, while 2 were outpatients. The study population comprised 7 males (31.8%) and 15 females (68.1%). The most predominant bacterial isolate was Staphylococcus spp. (10 isolates, 62.5%), followed by Pseudomonas spp. (4 isolates, 25%) and Klebsiella spp. (2 isolates, 12.5%). Six samples showed no bacterial growth. The overall rate of wound infection was high among the patients studied, with Staphylococcus spp. representing the most frequent Gram-positive isolate and Pseudomonas spp. the most frequent Gram-negative isolate.
Keywords. Post-Operative Wound Infection, Bacteria, Patients, Predominant, Libya, Staphylococcus.

Introduction

Hospital-acquired infections are one of the major infectious diseases that have significant side effects of hospitalization and contribute significantly to mortality and the cost of care. surgical site infections are the second most common cause of hospital-acquired infections, accounting for about 24% of all hospital-acquired infections [1-3]. Wound infections are the most common nosocomial infection in patients undergoing surgery [4]. Wound infection is one of the main barriers to the onset of inflammation by bacterial pathogens in internal tissues, which delays healing and may cause the wound to collapse, Wound herniation, and full wound herniation [5]. Infection occurs when one or more contaminants evade the cleansing effect of the host's defenses, multiply in large numbers, and attack and damage the host's tissues [6]. One of the most prevalent and destructive types of trauma is burns. Burn injuries can be caused by an industrial or work-related accident, as well as by assault, suicide attempts, and unintended injuries brought on by drug or alcohol abuse [7, 8]. Patients with burns had the highest rates of urinary tract infections, the second-highest rates of ventilator-associated pneumonia, and the highest rates of bloodstream infections linked to central venous catheters [trauma units had the highest rates].

Infection is still a major cause of morbidity and mortality in burn patients [8]. These infections raise the risk of death, readmission frequency, length of hospital stay, and intensive care unit hospitalization [4]. Clinical interventions, the physical setting in which surgery is performed, and the health status of the patient all affect the rate of infection. Infections of wounds and other soft tissues can contain both aerobic and anaerobic bacterial species, either alone or in combination. Certain infections, particularly mixed infections, can result in severe synergistic infections that require immediate antibiotic therapy, while other infections resolve on their own [9]. This study aimed to isolate and identify bacteria that cause post-operative wound infection in patients attending Sabratha teaching hospital.

Methods

Patients and specimen collection

Twenty-two post-operative wound and burn samples were collected from patients admitted to Sabratha Teaching Hospital, Libya, during the period from May to June 2023. Twenty-two samples were obtained within three days of surgery using sterile cotton wool swabs. Twenty swabs were collected from patients with suspected post-operative wound infection in the surgical wards, while two swabs were collected from patients attending the outpatient department.

Cultural methods

All samples were inoculated on blood agar and MacConkey's agar under aseptic conditions, and plates were incubated at optimum temperature 37°C for overnight [18-24 h].

Received: *01-11-2025* - ***Accepted***: *26-12-2025* - ***Published***: *05-01-2026*

Examination of cultures and identification of isolates

All cultures were examined with the naked eye for growth and colonial morphology, as well as any changes in the media. Plates, which showed visible growth, were subjected to subsequent bacteriological tests like Catalase test, Coagulase test, Oxidase test, Urease test, and Citrate utilization test. Those that did not show visible growth were re-incubated and examined daily for up to 7 days. Colonies were identified by Gram stain and Standard bacteriological identification for Gram-positive and Gram-negative.

Data analysis

The total number of bacterial isolates was analyzed using Microsoft Excel 2016.

Results

A total of 22 patients were included in this study during the period from May to June 2023. Of these, 20 patients had undergone different surgical operations, while 2 were outpatients. Among the study population, 7 were male (31.8%) and 15 were female (68.1%).

Table 1. Distribution of patients by type of wound and sex

Type of wound	Number of patients	Females	Males
Postoperative wound	20	14	6
Outpatient wound	2	1	1

The microbiological analysis revealed that the most predominant bacterial isolate was Staphylococcus spp., identified in 10 samples (62.5%). This was followed by Pseudomonas spp. in 4 samples (25%) and Klebsiella spp. in 2 samples (12.5%). Six samples showed no bacterial growth.

Table 2. Distribution of bacterial isolates

Type of bacteria	Number of isolates (%)
Staphylococcus spp.	10 (62.5%)
Pseudomonas spp.	4 (25%)
Klebsiella spp.	2 (12.5%)
No growth	6

Discussion

Hospital-acquired infections (HAIs) remain a major clinical challenge despite advances in infection control and prevention strategies. Post-operative wound infections are recognized as the second most common type of HAI [10], contributing substantially to patient readmission rates and increasing the risk of mortality [11]. In our study, the prevalence of post-operative wound infection at Sabratha Teaching Hospital was 72.7%, which is considerably higher than rates reported in similar regional and international studies. For instance, Hamid Nasser reported a prevalence of 40% among post-operative wound infections at Sabha Medical Center in South Libya [9], while Mohamed Issa documented a rate of 25.2% in Eastern Sudan [10]. Other studies have reported even lower rates: Lilani et al. found 8.95% [14], Abubaker et al. reported 9%, and Azzam et al. documented 6.8% [15,16]. Similarly, Azzam and Dramaix in Lebanon reported a prevalence of 6.8% [16]. These discrepancies may be explained by differences in sample size, patient populations, infection control practices, and geographical distribution.

Post-operative wounds can be infected by a wide range of microorganisms, including bacteria, fungi, and parasites [17]. Common Gram-positive organisms include β-hemolytic Streptococcus pyogenes and Staphylococcus aureus, while Gram-negative aerobic rods such as Pseudomonas aeruginosa are frequently implicated. Facultative anaerobes such as Enterobacter spp., Escherichia coli, Klebsiella spp., and Proteus spp. are also common pathogens [18].

Our findings revealed that Staphylococcus spp. were the predominant isolates, accounting for 62.5% of cases. Gram-negative bacteria were also identified, with Pseudomonas spp. representing 25% and Klebsiella spp. 12.5%. These results are consistent with those of Abadi and colleagues, who reported S. aureus as the most common Gram-positive isolate and P. aeruginosa and Klebsiella spp. as the leading Gram-negative pathogens [19]. However, our findings differ from those of Oguachuba, who reported Proteus spp. as the most frequently isolated coliforms in wound infections [20].

The predominance of Staphylococcus aureus in our study aligns with global surveillance data, including reports from the National Nosocomial Infections Surveillance (NNIS) System, which consistently identify S. aureus as a leading cause of surgical site infections and ventilator-associated pneumonia [16]. The high prevalence of Pseudomonas aeruginosa among Gram-negative isolates further underscores its clinical importance, particularly in hospital settings where it is associated with multidrug resistance and poor patient outcomes.

Received*: 01-11-2025 -* ***Accepted****: 26-12-2025 -* ***Published****: 05-01-2026*

Conclusion

The high rate of hospital-acquired infections observed in this study highlights the urgent need for further investigation into risk factors and preventive strategies in Libyan healthcare settings. Strengthening infection control measures, conducting regular surveillance, and implementing evidence-based interventions are essential to reduce the burden of HAIs. The Libyan national health authority should prioritize the development of standardized national guidelines for infection prevention and control, alongside improvements in microbiological diagnostics and antibiotic susceptibility testing. Such measures will not only enhance patient safety but also optimize therapeutic outcomes and reduce healthcare costs associated with nosocomial infections.

Acknowledgment

The authors are extremely thankful to the Principal of Medical Laboratory in Sabratha Teaching Hospital and to the all family of the Department of Medical Laboratory for providing the facility to complete this research work.

Conflict of interest. Nil

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Received: *01-11-2025* - ***Accepted***: *26-12-2025* - ***Published***: *05-01-2026*