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Original Article

Prevalence and antibiotic resistance of *Staphylococcus aureus* in wound infections: a hospital study in Hawassa, Ethiopia

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Abstract

Introduction: Wound infections are common nosocomial infections associated with increased morbidity and mortality. *Staphylococcus aureus*, particularly methicillin-resistant *S. aureus* (MRSA), is a major cause of hospital-acquired wound infections. This study aimed to determine the burden and antimicrobial susceptibility pattern of *S. aureus* and MRSA, among patients with wound infections at Hawassa University Comprehensive Specialized Hospital (HUCSH), Hawassa, Ethiopia.

Methodology: A hospital-based cross-sectional study was conducted on 246 admitted patients with wound infections at HUCSH from April to August 2021. Wound swabs were aseptically collected and cultured for bacterial isolation and drug susceptibility testing. Data were analyzed using SPSS version 20, and descriptive statistics were computed.

Results: Among the 246 clinical specimens analyzed, *S. aureus* was isolated from 57 (23.2%), of which 5 (8.8%) were identified as MRSA. All *S. aureus* strains were sensitive to linezolid. The highest resistance was observed for penicillin (52 strains, 91.2%), and 24.6% of *S. aureus* strains were found to be multidrug resistant. All MRSA strains were isolated from patients with no history of past wound infection, and all of them were sensitive to vancomycin.

Conclusions: This study identified *S. aureus* (23.2%) and MRSA (8.8%) along with their antimicrobial resistance among patients with wound infections at HUCSH. A substantial proportion (24.6%) of *S. aureus* exhibited multidrug resistance. However, all MRSA isolates were sensitive to vancomycin. Continuous drug resistance monitoring (drug surveillance) is crucial to manage and prevent resistance spread in the hospital.

Key words: *S. aureus,* wound infection; AMR; MRSA; Ethiopia.

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Introduction

Wound infections are common nosocomial infections associated with increased morbidity and mortality [1]. *Staphylococcus aureus* is a prevalent cause of hospital-acquired wound infections, often exhibiting resistance to aminoglycosides, lincosamides, methicillin, and macrolides [2]. The emergence of drug-resistant pathogens poses a significant challenge for the management of wound infections [3].

Methicillin-resistant *S. aureus* (MRSA), first discovered in the 1960s, has now become a frequent cause of nosocomial infections worldwide [4]. The rising incidences of MRSA infections and widespread bacterial resistance to antibiotics have complicated the management of wound infections [2]. Moreover, MRSA, which was initially associated with hospital settings, has extended its reach into the community as a community-acquired infection [5]. Furthermore, the concern remains significant as MRSA is increasingly becoming resistant to vancomycin, which is one of the main treatment options for MRSA [2].

Antimicrobial resistance (AMR) is a growing and critical global health threat, representing one of the most urgent health issues of our time [6]. The emergence of AMR has rendered many bacterial infections untreatable and escalated the risks associated with essential medical procedures. Every year, approximately 700,000 deaths worldwide are attributed to drug-resistant diseases [7]. Low- and middle-income countries (LMICs), particularly those in Africa (~4.1 million) and Asia (~4.7 million), are expected to bear a disproportionate burden of AMR-related deaths [7]. The World Health Organization (WHO) considers AMR a major challenge to global health and development, as its prevalence continues to rise alarmingly [6]. This crisis is further exacerbated by the development of new resistance mechanisms and the misuse of antibiotics, including their use without prescription, over-prescription by health workers, and overuse by the public. Consequently, various diseases are becoming increasingly difficult to treat [6]. In Ethiopia, AMR poses a significant public health challenge [8].

In Ethiopia, *S. aureus* is among the pathogens demonstrating increasing resistance to antibiotics and is thus prioritized for AMR surveillance [9]. The reported prevalence rates of *S. aureus* and MRSA in Ethiopia vary significantly across different regions. Previous studies have reported that the prevalence of *S. aureus* ranges from 19% in Jimma, located in South West Ethiopia [10], to as high as 49.7% in Arbaminch, situated in the south of Ethiopia [11]. Similarly, the prevalence of MRSA ranges from 28.3% in Dessie [12] to 45.1% in Debre Markos [13], both of which are located in Northern Ethiopia. However, there is currently no data available on the antibiotic susceptibility pattern of *S. aureus* and MRSA in wound infections at the Hawassa University Comprehensive Specialized Hospital (HUCSH) in Hawassa, Ethiopia. Therefore, the primary objective of this study was to determine the burden and antimicrobial susceptibility pattern of *S. aureus* and MRSA among patients with wound infections at HUCSH. The findings from this study have the potential to play a crucial role in updating treatment regimens at the hospital and, possibly, contribute to national treatment guidelines.

Methodology

Study setting and period

A cross-sectional study was conducted among 246 admitted patients with wound infections at HUCSH. The hospital provides various services, with over 400 inpatient beds and serves more than 117,641 outpatients, 20,116 hospitalized patients, and 12,421 emergency cases annually. It is located 275 km south of Addis Ababa in Hawassa city. The study population comprised patients of all age groups with wound infections who were admitted to the emergency (adult and pediatric), orthopedic (inpatient and outpatient), plastic surgery, gynecology, and general surgical units of HUCSH. The inclusion criteria were all age groups with wound infections, and who provided voluntary signed written consent and/or assent. The exclusion criteria included patients on antibiotics, those with severe illness, and unconscious patients. The study was conducted between April and August 2021.

Data collection

Demographic and clinical data were collected using a pretested (validated) structured questionnaire which relied on self-reporting by the patients admitted to the hospital.

Laboratory methods

Specimen collection, transportation and storage

Samples were collected using aseptic techniques. Before collecting samples, the wound was cleansed using sterile normal saline and gently dried with sterile gauze. Sterile swabs were used to collect samples from the wound area of study participants. The swab's tip was rotated over a 1 cm^2 area of viable wound tissue for 5 seconds, applying sufficient pressure to extract fluid from the wound tissue. The collected samples were then placed in sterile test tubes, appropriately labeled [14], and immediately sent to the hospital's microbiology laboratory for prompt processing upon arrival.

Sample processing and culturing

All wound swab samples were inoculated on blood agar and mannitol salt agar (MSA) plates. The inoculated agar plates were then incubated in an aerobic atmosphere at 37 °C for 24 hours. After the overnight incubation period, the plates were carefully examined for bacterial growth.

Bacterial identification

Bacterial isolates were identified using cultural characteristics, Gram staining, and biochemical tests. *Staphylococcus* species were isolated using MSA which is a selective and differential medium. *S. aureus* ferments mannitol, turning the agar yellow, while other *Staphylococci* species like *S. epidermidis* remains red [15]. Gram staining was done on the isolated colonies to check for the Gram-positive cocci. The catalase test was used to differentiate *Staphylococci* (catalase producers) from *Streptococci* (non-catalase producers). Additionally, the coagulase test was used to distinguish *S. aureus* (coagulase positive) from other *Staphylococci* species (coagulase negative) by assessing their ability to coagulate plasma [15].

Antibacterial susceptibility testing

Disc diffusion and minimum inhibitory concentration (E-test strip) methods were employed for antibacterial susceptibility testing of the isolates in accordance with the guidelines provided by the Clinical and Laboratory Standards Institute (CLSI) [16]. Pure culture colonies were gently mixed in 5 mL of nutrient broth to create a homogenous suspension, which was then incubated at 37 °C. The suspension's turbidity was matched against the 0.5 McFarland standard [16]. Using a sterile swab, the suspension was applied to

Muller Hinton agar (MHA) by evenly distributing the bacteria over the entire surface. The inoculated plates were left to dry at room temperature for 3 to 5 minutes to aid adsorption of the surface inoculum.

A set of antibiotic discs, including ciprofloxacin (5 µg), clindamycin (2 µg), co-trimoxazole (25 µg), azithromycin (15 µg), linezolid (30 µg), penicillin (10 units), tetracycline (30 µg), and gentamicin (10 µg), were placed on the inoculated MHA. The plates were then incubated at 35 °C for 16–18 hours, and the drug susceptibility pattern was determined by measuring the zone of inhibition for each drug. Cefoxitin (30 µg) discs were used for MRSA detection and incubated at 35 °C for 16–18 hours. To assess vancomycin susceptibility, MIC was determined using an E-test strip on the inoculated MHA, followed by incubation at 35–37 °C for 16–18 hours [16].

Data management

The data were carefully checked, coded, and double-entered into the SPSS version 20 [17] software for analysis.

Results

Socio-demographic characteristics

A total of 246 patients with wound infections participated in this study, with 50% of them residing in urban areas. The median age was 27.5 years (interquartile range [IQR]: 19–40). Among the participants, more than half (164, 66.7%) were in the age group below 34 years, and the majority were male (175, 71.1%). Regarding education, most participants had attained primary education or above (163, 66.3%), and 55 (22.4%) were students. One hundred and thirty (52.8%) respondents were married (Table 1).

Table 1. Socio-demographic characteristics of patients with wound infection at HUCSH, 2021 (n = 246).

Variables	Frequency	Percentage
Age category (years)		
≤14	41	16.7
15–34	122	49.6
35–44	32	13
45–54	25	10.2
≥ 55	26	10.5
Educational status		
No formal education	63	25.6
Primary school and above	183	74.4
Occupation status		
Government employee	22	8.9
Housewife	39	15.9
Merchant	29	11.8
Farmer	38	15.4
Daily laborer	15	6.1
Student	55	22.4
Unemployed	14	5.7
Others (children)	34	13.8
Place of residence		
Urban	123	50.0
Rural	123	50.0
Marital status		
Married	130	52.8
Single	78	31.7
Divorced	1	0.4
Others (age less than the legal marriage age)	37	15.1

HUCSH: Hawassa University Comprehensive Specialized Hospital, Hawassa, Ethiopia.

Clinical characteristics

Among the 246 patients with wound infections, 40 (16.3%) had a history of previous hospital admission, 26 (10.6%) had co-existing medical conditions, and 27 (11%) had experienced prior wound infections. Eight (3.3%) patients had diabetes as a co-morbidity.

Table 2. Clinical characteristics of patients with wound infection at HUCSH, 2021.

Variables	Frequency	Percentage
Admission in the last 12 months (n = 246)		
Yes	40	16.3
No	206	83.7
Presence of co-morbidity (n = 246)		
Yes	26	10.6
No	220	89.4
Presence of previous wound infection (n = 246)		
Yes	27	11.0
No	219	89.0
Current length of stay at the hospital (n = 246)		
< 48 hours	65	26.4
≥ 48 hours	181	73.6
Use of antibiotics in the last 12 months (n = 246)		
Yes	92	37.4
No	154	62.6
Prescribed by health professional (n = 92)		
Yes	87	94.6
No	5	5.4
Finish the whole dose (n = 92)		
Yes	69	75
No	23	25
Type of wound (n = 246)		
Surgical wound	79	32.1
Non healing ulcer	33	13.4
Burn wound	9	3.6
Trauma	117	47.6
Others	8	3.3
Depth of wound (n = 246)		
Deep wound	161	65.4
Superficial wound	85	34.6
Patient setting in the hospital (n = 246)		
Inpatient	227	92.3
Outpatient	19	7.7
Ward patient is admitted to (n = 246)		
Adult emergency	75	30.5
Gynecology	8	3.2
Orthopedic ward	40	16.3
Orthopedic OPD	15	6.1
Pediatric emergency	24	9.8
Pediatric surgery	5	2.0
Plastic surgery	15	6.1
Surgical ward	64	26.0

HUCSH: Hawassa University Comprehensive Specialized Hospital, Hawassa, Ethiopia.

Table 3. Distribution of *S. aureus* and MRSA across various variables at HUCSH, 2021.

Variables	**Bacterial isolates**	
	***S. aureus* (n = 57)**	**MRSA (n = 5)**
Age category (years)		
< 14	11 (19.3%)	2 (40%)
15–34	31 (54.4%)	1 (20%)
35–44	4 (7.0%)	1 (20%)
45–54	5 (8.8%)	0 (0.0%)
> 55	6 (10.5)	1 (20%)
Gender		
Male	42 (73.7%)	2 (40%)
Female	15 (26.3%)	3 (60%)
Place of residence		
Urban	27 (47.4%)	2 (40%)
Rural	30 (52.6%)	3 (60%)
Education		
No formal education	17 (29.8%)	2 (40%)
Primary school and above	40 (70.2%)	3 (60%)
Occupation		
Government employee	3 (5.3%)	1 (20%)
Housewife	7 (12.3%)	2 (40%)
Student	15 (26.3%)	1 (20%)
Others	32 (56.1%)	1 (20%)
History of hospitalization in the last 12 months		
Yes	14 (24.6%)	1 (20%)
No	43 (75.4%)	4 (80%)
History of wound infection in the last 12 months		
Yes	7 (12.3%)	0
No	50 (87.7%)	5 (100%)
History of antibiotic use in the last 12 months		
Yes	22 (38.6%)	2 (40%)
No	35 (61.4%)	3 (60%)
Co-morbidity		
Yes	6 (10.5%)	1 (20%)
No	51 (89.5%)	4 (80%)
Ward patient is admitted		
Adult emergency	21 (36.8%)	1 (20%)
Orthopedic OPD	7 (12.3%)	1 (20%)
Surgical ward	8 (14%)	1 (20%)
Pediatric emergency	5 (8.8%)	2 (40%)
Orthopedic ward	8 (14%)	0
Pediatric surgery	3 (5.3%)	0
Plastic surgery	5 (8.8%)	0
Length of stay at the hospital		
< 48 hours	17 (29.8%)	1 (20%)
≥ 48 hours	40 (70.2%)	4 (80%)
Type of wound		
Surgical	13 (22.8%)	2 (40%)
Trauma	27 (47.4%)	2 (40%)
Non healing ulcer	12 (21.1%)	1 (20%)
Burn	2 (3.5%)	0
Others	3 (5.2%)	0
Patient setting		
Inpatient	49 (86.0%)	4 (80%)
Outpatient	8 (14%)	1 (20%)
Depth of wound		
Deep	35 (61.4%)	3 (60%)
Superficial	22 (38.6%)	2 (40%)

HUCSH: Hawassa University Comprehensive Specialized Hospital, Hawassa, Ethiopia; MRSA, methicillin-resistant *Staphylococcus aureus*.

The majority of patients (73.6%) had a hospital stay of 48 hours or longer during their current visit. Trauma wounds accounted for 117 (47.6%) of the infections, and 161 (65.4%) of the wounds were categorized as deep wounds. Most of the infected patients (92.3%) were from inpatient wards. Past antibiotic use was reported by 92 (37.4%) participants, with 87 (94.6%) of them prescribed by healthcare professionals. Among those who received antibiotics, 69 (75%) completed the entire prescribed dose (Table 2).

Prevalence of S. aureus and MRSA

Out of the 246 wound swabs analyzed, *S. aureus* was isolated from 57 (23.2%) samples. Male patients (42, 73.7%) accounted for the majority of *S. aureus* infections, and the age group below 34 years had 43 (75.4%) of the infections. Additionally, students (15, 26.3%), rural residents (30, 52.6%), and individuals with primary and above education (35, 61.4%) showed a higher prevalence of *S. aureus* infections. The isolation rate of *S. aureus* was higher among patients without co-morbidities (51, 89.5%) and those with hospital stays of 48 hours or longer (40, 70.2%). Most *S. aureus* isolates were found in patients admitted to the adult emergency (21, 36.8%) and those with trauma wounds (27, 47.4%) (Table 3).

Out of the 57 *S. aureus* isolates, 5 (8.8%) were identified as MRSA. A relatively high number of MRSA cases were found in female patients (3, 60%) and the age group below 34 years (3, 60%). Four (80%) of the patients with MRSA had no co-morbidities and no history of previous admissions. All MRSA strains were isolated from patients with no prior history of wound infections. Furthermore, more than half of the MRSA cases were reported in patients with hospital stays of 48 hours or longer (4, 80%) and those with no history of antibiotic use (3, 60%). MRSA was observed in 2 (40%) patients with surgical and trauma wounds. Among patients with MRSA infections, 3 (60%) had deep wound infections, and 4 (80%) were from inpatient wards (Table 3).

Table 4. Antibiotic susceptibility pattern of *S. aureus* and MRSA isolated from wound infection at HUCSH, 2021.

Antibiotics	*S. aureus* (n = 57)		
	S	I	R
Cefoxitin	52 (91.2%)	0	5 (8.8%)
Ciprofloxacin	54 (94.7%)	0	3 (5.3%)
Clindamycin	46 (80.7%)	1 (1.8%)	10 (17.5%)
Cotrimoxazole	50 (87.7%)	0	7 (12.3%)
Azithromycin	41 (71.9%)	0	16 (28.1%)
Gentamicin	53 (93%)	0	4 (7.0%)
Linezolid	57 (100%)	0	0
Penicillin	5 (8.8%)	0	52 (91.2%)
Tetracycline	34 (59.6%)	10 (17.6%)	13 (22.8%)
Vancomycin (for MRSA only)	5 (100%)		

HUCSH: Hawassa University Comprehensive Specialized Hospital, Hawassa, Ethiopia; MRSA: methicillin-resistant *Staphylococcus aureus;* S: sensitive; I: intermediate; R: resistant.

Antibiotic resistance pattern of S. aureus and MRSA

All *S. aureus* strains were sensitive to linezolid. The highest resistance was against penicillin (91.2%), followed by azithromycin (28.1%). In contrast, the lowest resistance was observed for ciprofloxacin (5.3%), gentamicin (7%), and methicillin (8.5%). Notably, all MRSA strains were sensitive to vancomycin (Table 4).

Multidrug resistance pattern of S. aureus

Among the 57 *S. aureus* isolates, only 3 (5.3%) were found to be sensitive to all antibiotics tested. On the other hand, 14 (24.6%) of the *S. aureus* strains were classified as multidrug resistant, meaning they were resistant to 3 or more classes of antibiotics [18] (Tables 5 and 6).

Discussion

The present study sheds light on the burden of *S. aureus* and MRSA and their AMR in patients with wound infections at HUCSH. All MRSA isolates showed sensitivity to vancomycin; nevertheless, a significant proportion (24.6%) of *S. aureus* exhibited multidrug resistance. This underscores the need for ongoing monitoring of drug resistance patterns (drug

Table 5. Multi drug resistance pattern of *Staphylococcus aureus* isolated from wound infection at HUCSH, 2021.

	R0	R1	R2	R3	R4	R5	R6	R7	MDR
S. aureus	3	28	12	6	5	0	1	2	14

R0: sensitive to all classes of antibiotics; R1: resistance for 1 class of antibiotics; R2: resistance for 2 classes of antibiotics; R3: resistance for 3 classes of antibiotics; R4: resistance for 4 classes of antibiotics; R5: resistance for 5 classes of antibiotics; R6: resistance for 6 classes of antibiotics; R7: resistance for 7 classes of antibiotics. HUCSH: Hawassa University Comprehensive Specialized Hospital, Hawassa, Ethiopia.

Table 6. Comprehensive analysis of multidrug resistance patterns in *Staphylococcus aureus* from wound infections at HUCSH, 2021.

Antibiotics	*S. aureus*
CD + AZM + TE	2
FOX+ PEN + TE	1
CD + AZM + PEN	3
COT + AZM + GEN + PEN	1
COT + AZM + PEN + TE	1
CD + AZM + PEN + TE	3
FOX+ CPR + COT + AZM + GEN+ PEN	1
FOX+ CPR + CD + COT +AZM + GEN + PEN	1
FOX+ CPR + CD + AZM + GEN + PEN + TE	1

HUCSH: Hawassa University Comprehensive Specialized Hospital, Hawassa, Ethiopia; AZM: azithromycin; CD: clindamycin; COT: cotrimoxazole; CPR: ciprofloxacin; FOX: cefoxitin; GEN: gentamicin; PEN: penicillin; TE: tetracycline surveillance) to effectively manage and prevent the spread of drug resistance within the hospital setting.

In the current study, the prevalence of *S. aureus* was found to be 23.2%. This prevalence is lower than what has been reported in other studies conducted in Ethiopia [11,12,18]. However, a comparable prevalence of 23.8% was reported in Nigeria [19]. On the other hand, both lower prevalence rates of 17.5% [20] and 20.4% [21], as well as higher prevalence rates ranging from 28.6% to 63.1%, were reported in different African countries [22,23]. The observed variations in prevalence could be attributed to differences in the methodologies employed in the studies or disparities in the burden of cases in the respective study areas.

In the present study, the prevalence of MRSA was found to be 8.8%, which is markedly lower than rates reported in other regions of Ethiopia, such as 28.3% in Dessie [12], 37.43% in Addis Ababa [18], and 45.1% in Debre Markos [13]. These variations in prevalence could be attributed to differences in infection prevention practices, sample size, or study periods employed in the respective studies. Despite the lower rate in this study, MRSA remains a concerning issue due to its reliance on second-line drugs that are more toxic and costly, potentially leading to further drug resistance [5]. The use of vancomycin to treat MRSA has even resulted in the development of vancomycin-resistant *S. aureus* [2]. Another alarming aspect of MRSA is its ability to cause both hospital-acquired (nosocomial) infections and spread to the community, affecting individuals with no previous contact with the hospital environment [24]. The economic impact of MRSA can be significant, manifesting in extended hospital stays for affected patients [25].

In our study, MRSA strains were predominantly isolated from patients with hospital stays of ≥ 48 hours and those with deep wound infections. This finding aligns with a study conducted in Debre Markos, which also reported that hospital stays of > 72 hours were associated with high prevalence of MRSA [13]. Similarly, patients from the inpatient department had a higher rate of MRSA isolation in our study, consistent with the findings of studies by Tsige *et al.* [12] and Kitara *et al*. [26].

In the present study, all MRSA strains were isolated from patients with no history of past wound infection. However, a study conducted in Northeast Ethiopia [12] reported that MRSA was associated with a previous history of wound infection. These contrasting results might be attributed to differences in patient populations, healthcare practices, or other contributing factors in the respective study settings. Further research is needed to better understand these variations and potential risk factors for MRSA infections.

AMR, a global health challenge impacting people worldwide, presents significant difficulties in disease treatment [6]. In this study, *S. aureus* exhibited high resistance, particularly to penicillin (91.2%). This finding is consistent with the results of studies conducted by Godebo *et al*. [10] and Hasan *et al*. [27]. However, it shows a slightly higher resistance rate compared to the rates reported by Kahsay *et al.* [28] and Tsige *et al.* [12]. In contrast, all *S. aureus* isolates in our study demonstrated a 100% sensitivity rate to linezolid. The high penicillin resistance underscores the necessity for prudent antibiotic use and continuous monitoring of resistance patterns to guide effective treatment. Conversely, the 100% sensitivity of *S. aureus* to linezolid is clinically significant, making it an effective treatment option, especially in antibiotic-resistant cases. This underscores linezolid's potential as a reliable antimicrobial agent, contributing to successful treatment outcomes and improved patient care in *S. aureus* infections. However, it is vital to remain vigilant in preserving the efficacy of linezolid and other antibiotics by promoting appropriate use and implementing infection control measures.

Regarding MRSA, the antimicrobial susceptibility testing revealed that all MRSA isolates were sensitive to vancomycin. This finding aligns with studies conducted in Arbamich [11], Nairobi [29,30], and Nepal [31], which also reported 100% sensitivity to vancomycin. However, in other studies, varying rates of resistance to vancomycin were reported, ranging from 4.1% to 37.9% [10,13,18,27,32]. The reported vancomycin sensitivity in our study is encouraging. However, it is crucial to stay diligent in monitoring MRSA susceptibility patterns to ensure the ongoing effectiveness of this critical antibiotic.

The multidrug resistance status of *S. aureus* in our study was 24.6%. This rate was comparable to the findings in Arbaminch [11] but lower than those reported in Addis Ababa (44.6%) [33] and Nepal (41.7%) [31]. The significant proportion of multidrug resistance observed in our study emphasizes the need for regular monitoring of drug resistance patterns (drug surveillance) to effectively control the spread of drug resistance within the hospital setting. Continuous monitoring will be essential in guiding appropriate treatment strategies and promoting prudent antibiotic use to combat AMR effectively.

Limitations of the study

The study's exclusive focus on wounds is a limitation that might underreport the prevalence of *S. aureus* and MRSA in the study area, impacting generalizability. The restricted scope may limit the representation of overall bacterial prevalence in the broader population. Furthermore, our study did not report on other bacterial pathogens present in wounds, limiting the understanding of the complete microbial profile. This has clinical implications, potentially impacting treatment decisions as clinicians may lack comprehensive information, leading to suboptimal or less targeted therapies. However, individual patients were informed of the isolated bacterium and its drug susceptibility pattern as part of routine clinical management. In order to address the identified gaps, a comprehensive study is needed, including profiling various bacterial pathogens causing wound infections for a complete understanding of the microbial landscape, in addition to *S. aureus*, and MRSA prevalence. Additionally, exploring antibiotic resistance patterns among these pathogens is crucial for guiding antibiotic stewardship and refining treatment strategies.

Conclusions

This study revealed the prevalence of *S. aureus* (23.2%) and MRSA (8.8%) along with their AMR among patients with wound infections at HUCSH. Notably, all MRSA isolates demonstrated sensitivity to vancomycin. However, a significant proportion (24.6%) of the *S. aureus* strains exhibited multidrug resistance. These findings underscore the importance of conducting antibiotic susceptibility testing before prescribing medications to mitigate antibiotic resistance. Moreover, there is a pressing need for continuous monitoring of drug resistance patterns (drug surveillance) to effectively control the spread of drug resistance. Implementing these measures will be crucial in managing and curbing the impact of drug-resistant infections in clinical settings.

Ethical considerations

The study protocol was approved by the Institutional Review Board of Hawassa University College of Medicine and Health Sciences. Additionally, study permission was obtained from HUCSH. In order to ensure ethical compliance, signed written consent and/or assent were obtained from all study participants before their inclusion in the research. Furthermore, the laboratory findings, including culture and drug susceptibility results, were promptly communicated to the clinicians to ensure appropriate and timely management of the patients, adhering to ethical principles of patient care and confidentiality.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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Authors' contributions

BS conceived, designed, and conducted the study; analyzed and interpreted data; and drafted the manuscript. YM contributed to study design, supervised lab and fieldwork, performed data analysis and interpretation, and reviewed the manuscript. Both authors critically reviewed and approved the final manuscript for intellectual content.

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