



RESISTANCE RATES OF *STAPHYLOCOCCUS AUREUS* ISOLATES FROM CLINICAL SPECIMENS TO METHICILLIN AND VARIOUS ANTIBIOTICS

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Abstract

Objective: *Staphylococcus aureus* (*S. aureus*) continues to be a significant health problem due to its widespread methicillin resistance, causing both community- and hospital-acquired infections. The aim of this study was to evaluate the resistance profiles of *S. aureus* strains isolated from various clinical specimens obtained from our hospital's intensive care units and wards to methicillin and other antibiotics.

Methods: The study included *S. aureus* strains isolated from various clinical samples and studied for methicillin susceptibility at the Medical Microbiology Laboratory of Yalova Training and Research Hospital between January 2019 and December 2023. Bacterial identification was performed using conventional methods and automated systems, and antibiotic susceptibility testing was evaluated according to the current European Committee on Antimicrobial Susceptibility Testing (EUCAST) guidelines by year.

Results: In our study, the rate of methicillin-resistant *S. aureus* (MRSA) was determined to be 33.3%. When the distribution of MRSA strains was examined, intensive care units (62.9%) were the most commonly isolated units, and the most frequently isolated clinical sample was sputum (58.1%). While no resistance to tigecycline was detected in MRSA and methicillin-susceptible *S. aureus* (MSSA) strains, the highest resistance rates in MRSA and MSSA strains were found to be against penicillin (100% and 80.0%, respectively). Overall, MRSA isolates showed higher resistance rates to most of the evaluated antibiotics than MSSA isolates.

Conclusion: In our study, it was determined that MRSA strains were commonly isolated from intensive care units and sputum samples; MRSA had higher resistance rates to most of the evaluated antibiotics compared to MSSA. Monitoring antibiotic resistance rates, implementing antibiotic stewardship programs, and adhering to infection control measures will contribute to controlling and reducing antibiotic resistance rates.

Keywords: Antibiotic resistance, *Staphylococcus aureus*, MRSA, MSSA.

Introduction

Despite advances in antimicrobial therapy, *Staphylococcus aureus* (*S. aureus*) remains a major cause of both community- and healthcare-associated infections worldwide. As a member of the normal human flora, it can act as an opportunistic pathogen and is implicated in a wide range of infections, including pneumonia, bloodstream infections, urinary system infections, soft tissue infections, and surgical site infections.^{1–5} Its clinical importance is further increased by its ability to develop resistance to multiple antimicrobial agents.^{1,7}

S. aureus infections are broadly classified as methicillin-susceptible (MSSA) and methicillin-resistant (MRSA).⁶ MRSA is resistant to β -lactam antibiotics, including methicillin and other penicillinase-resistant penicillins, which limits treatment options and poses a significant clinical challenge.⁸ It is a major cause of healthcare-associated infections, particularly among hospitalized patients, and is associated with prolonged hospital stays, increased healthcare costs, and more severe clinical outcomes compared to MSSA infections.^{5,9}

Antimicrobial resistance patterns of *S. aureus*, particularly MRSA, vary across geographical regions and even among hospitals within the same country. Studies conducted in Türkiye have demonstrated regional differences in MRSA prevalence and susceptibility profiles.^{10–12} For instance, no vancomycin-resistant or intermediate *S. aureus* strains were detected in certain cohorts, while high susceptibility rates to teicoplanin, linezolid, and other alternative agents have been reported.¹⁰ Additionally, MRSA carriage rates and prevalence in bloodstream infections have been shown to vary among different patient populations.^{11,12} These findings underscore the importance of continuous, region-specific surveillance. Although previous studies have provided valuable data, local and up-to-date resistance profiles remain essential for guiding empirical treatment and infection control strategies. Therefore, this study aimed to evaluate the methicillin resistance and antibiotic susceptibility profiles of *S. aureus* strains isolated from various clinical samples obtained from intensive care units and hospital wards in our institution, and to contribute current local data to the existing literature.

Methods

The study was designed retrospectively using archived laboratory data. Ethics committee approval was obtained from the Yalova University Ethics Committees Coordination Office, Health Sciences Non-Interventional Clinical Research Ethics Committee (protocol no. 2024/114, dated July 12, 2024), and the study was conducted in accordance with the principles of the Declaration of Helsinki.

S. aureus strains isolated from various clinical samples of patients hospitalized at the Medical Microbiology Laboratory of Yalova Training and Research Hospital between January 2019 and December 2023 and subjected to methicillin testing were included in the study. In cases of multiple isolates from the same patient, only the first isolate was evaluated.

Blood and sterile body fluids (e.g., cerebrospinal fluid, pleural fluid, and peritoneal fluid) were collected in blood culture bottles, sent to the laboratory, and incubated for 7 days in a Render BC64 (Render Biotech Co. Ltd., China) automated blood culture system. Non-sterile clinical samples, including respiratory tract specimens (e.g., sputum) and wound samples, were directly inoculated onto 5% sheep

blood agar and eosin methylene blue (EMB) agar (RTA, Türkiye) and incubated at 35–37°C for 24–48 hours.

Blood culture bottles showing signs of bacterial growth were subcultured onto the same media under the same incubation conditions. Preliminary identification of isolates was performed using conventional phenotypic methods, including Gram staining (Gram-positive cocci in clusters), catalase positivity, coagulase positivity (slide and/or tube coagulase tests), and evaluation of hemolysis patterns on 5% sheep blood agar. Definitive identification was confirmed using the VITEK® 2 Compact system (bioMérieux, France) with Gram Positive (GP) identification cards.

Antimicrobial susceptibility testing was performed using VITEK® 2 AST 641 cards according to the manufacturer's instructions. Methicillin resistance in *S. aureus* isolates was determined using the cefoxitin (30 µg) disk diffusion method (Oxoid, UK) in accordance with EUCAST recommendations. Cefoxitin disk diffusion was applied to all *S. aureus* isolates as the primary reference method for MRSA classification. VITEK® 2 results were used for routine antimicrobial susceptibility profiling. For glycopeptides and other critical antibiotics, unusual or clinically significant resistance patterns (including possible vancomycin resistance) were not accepted solely based on automated system output and were re-evaluated using repeat testing from stored isolates when necessary. Although confirmatory methods such as E-test or broth microdilution were not routinely performed, discrepant or unexpected results were retested to ensure reliability. Antimicrobial susceptibility tests were performed once for each isolate as part of routine laboratory procedures. Isolates showing unexpected or clinically significant resistance patterns were retested for confirmation. Antibiotic susceptibility results were evaluated according to the current European Committee on Antimicrobial Susceptibility Testing (EUCAST, v9-v13.1) criteria.

Data analysis was performed using SPSS version 22.0 for Windows (IBM Corp., Armonk, NY, USA). Categorical variables were expressed as frequencies and percentages. Comparisons between groups were performed using Fisher's exact test, as several expected cell counts were below the acceptable threshold for Pearson's chi-square test assumptions. Differences in MRSA rates across study years were assessed using the Fisher–Freeman–Halton exact test because of the small cell counts. All statistical analyses were two-tailed, and a *p* value <0.05 was considered statistically significant.

Results

Methicillin resistance was found to be 33.3% (n: 62) among *S. aureus* strains evaluated during the study period (n: 186). When MRSA rates were examined by unit, the highest rate was found in intensive care units (62.9%), followed by internal medicine wards (22.6%) and surgical wards (14.5%) (Table 1).

When the distribution of MRSA isolates by clinical specimen was examined, the three most common clinical specimens from which MRSA was isolated were sputum (58.1%), wound (22.6%), and blood (11.3%), respectively (Table 2). MRSA rates by year were 36.2%, 50.0%, 26.3%, 23.1%, and 27.0%, respectively, with no statistically significant differences observed between years (Fisher–Freeman–Halton exact test, *p*=0.120) (Figure 1).

Table 1. Distribution of MRSA and MSSA isolates by hospital units.

Services	MRSA* n (%)	MSSA** n (%)	Total n (%)
Intensive Care Units	39 (62.9)	97 (78.2)	136 (73.1)
Internal wards	14 (22.6)	21 (16.9)	35 (18.8)
Surgical wards	9 (14.5)	6 (4.8)	15 (8.1)
Total	62 (33.3)	124 (66.7)	186 (100)

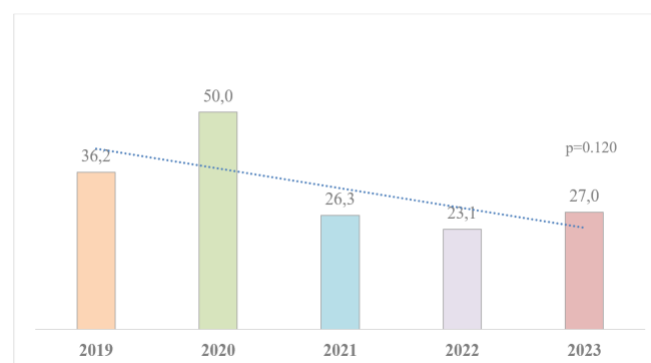
MRSA*: Methicillin resistant *Staphylococcus aureus*, MSSA**: Methicillin-susceptible *Staphylococcus aureus*

When resistance rates to other antibiotics were evaluated, no resistance was detected to tigecycline in MRSA and MSSA strains, nor to teicoplanin, vancomycin, or linezolid in MSSA strains. However, the highest resistance rate was observed against penicillin in both strains, with 100% in MRSA strains and 80.0% in MSSA strains (Table 3).

Table 2. Distribution of MRSA and MSSA isolates according to clinical samples (n=186).

Clinical sample type	MRSA* (n=62) n (%)	MSSA** (n=124) n (%)	Total (n=186) n (%)
Sputum	36 (58.1)	57 (46.0)	93 (50.0)
Wound	14 (22.6)	41 (33.1)	55 (29.6)
Blood	7 (11.3)	10 (8.1)	17 (9.1)
Urine	4 (6.5)	13 (10.5)	17 (9.1)
Abscess	1 (1.6)	3 (2.4)	4 (2.2)
Total	62 (100.0)	124 (100.0)	186 (100.0)

MRSA*: Methicillin resistant *Staphylococcus aureus*, MSSA**: Methicillin-susceptible *Staphylococcus aureus*.

**Figure 1.** Methicillin-resistant *Staphylococcus aureus* rates by year (%) among isolates obtained from various clinical samples in our hospital (p=0.120).

Overall, MRSA isolates showed higher resistance rates to most of the evaluated antibiotics than MSSA isolates (Table 3). A comparative summary of tetracycline resistance rates in MRSA and MSSA isolates across previous studies and the present study is presented in Table 4.

Table 3. Antibiotic resistance in methicillin-resistant and susceptible *Staphylococcus aureus* isolates.

Antibiotic	MRSA* Resistant / Tested (%)	MSSA** Resistant / Tested (%)	p value (Fisher's Exact Test)
Fosfomycin	14/26 (53.8)	1/19 (5.3)	0.001
Levofloxacin	32/54 (59.3)	48/78 (61.5)	0.857
Gentamicin	13/31 (41.9)	3/73 (4.1)	0.001
Ciprofloxacin	38/49 (77.6)	11/40 (27.5)	0.001
Trimethoprim- sulfamethoxazole	10/62 (16.1)	1/122 (0.8)	0.001
Clindamycin	35/58 (60.3)	14/117 (12.0)	0.001
Daptomycin	3/33 (9.1)	1/16 (6.3)	>0.05
Erythromycin	27/48 (56.3)	16/108 (14.8)	0.001
Fusidic acid	18/37 (48.6)	1/38 (2.6)	0.001
Teicoplanin	12/40 (30.0)	0/11 (0.0)	0.048
Tetracycline	37/54 (68.5)	3/24 (12.5)	0.001
Penicillin	25/25 (100)	44/55 (80.0)	0.014
Linezolid	1/29 (3.4)	0/17 (0.0)	>0.05
Tigecycline	0/28 (0.0)	0/12 (0.0)	>0.05
Vancomycin	0/62 (0.0)	0/46 (0.0)	>0.05

MRSA*: Methicillin resistant *Staphylococcus aureus*, MSSA**: Methicillin-susceptible *Staphylococcus aureus*. Data are presented as number of resistant isolates/total number tested (%). Comparisons between MRSA and MSSA isolates were performed using Fisher's Exact Test. A p value <0.05 was considered statistically significant.

Table 4. Comparative tetracycline resistance rates of *Staphylococcus aureus* isolates (MRSA and MSSA) across published studies and the present study.

Study	Country	MRSA (%)	MSSA (%)
Tălăpan et al., 2023	Romania	76.5	29.6
An et al., 2024	Vietnam	72.3	47.9
Arabacı et al., 2021	Türkiye	65.0	11.0
Özel et al., 2017	Türkiye	44.4	14.5
Tanrıverdi et al., 2020	Türkiye	38.2	6.0
Varış-Karakaş et al., 2024	Türkiye	39.2	10.1
Duran et al., 2021	Türkiye	33.7	0.0
This study	Türkiye	68.5	12.5

Discussion

S. aureus, especially MRSA, are among the important hospital- and community-acquired pathogens both in our country and worldwide.¹³ In addition to skin and soft tissue infections, it can also cause serious, life-threatening systemic infections such as pneumonia, endocarditis, and sepsis. Increasing rates of antibiotic resistance are limiting current treatment options and posing a growing public health problem.^{9,14} In our study, methicillin resistance was found to be 33.3% in *S. aureus* strains. Studies conducted abroad in the literature have reported methicillin resistance in *S. aureus* strains ranging from 21% to 77.2%.^{3,15} In studies conducted in our country, these rates are seen to be between 17.9% and 49%.^{9,13,16-20} The MRSA rate obtained in our study was found to be similar to both international and domestic studies.

The prevalence of MRSA infections may vary among countries and hospitals, as well as among different units of the same hospital.¹³ In a study conducted in Bac Ninh Provincial General Hospital, Vietnam, it was determined that the most common isolated MRSA strains were from surgery (50%), while the other isolates were from internal medicine

(38.5%), infectious diseases (2.8%) and intensive care (8.7%) wards.¹⁵ In the study conducted by Arabacı et al., 40.0% of MRSA were isolated from intensive care units, 33.3% from internal medicine clinics, and 26.6% from surgical clinics.² Our study found the highest rate of MRSA isolates in intensive care units (62.9%), followed by internal medicine wards (22.6%) and surgical wards (14.5%). These data suggest that MRSA strains can vary among hospital units. In our study, the three clinical samples from which MRSA isolates were most commonly recovered were sputum (58.1%), wound (22.6%), and blood (11.3%). A study conducted in Vietnam reported that MRSA isolates were most frequently recovered from wound (64.6%), respiratory (17.7%), and blood (17.7%) samples.¹⁵ In a study conducted between 2019 and 2023 at Hawassa University Comprehensive Specialized Hospital in Ethiopia, which evaluated methicillin resistance among *S. aureus* isolates, MRSA was most frequently isolated from purulent (pus) specimens, followed by abscess and blood samples.³⁰ In the study conducted by Arabacı et al., evaluating the antimicrobial susceptibility of *S. aureus* isolates, MRSA strains were most frequently isolated from tissue-abscess specimens (40%), followed by blood (37%) and sterile body fluids (10%).² In the study of Tanrıverdi et al., MRSA isolates were found mostly in wounds (37.5%), sputum (17.0%) and blood (17.0%).⁹ Other studies have also shown that MRSA is most common isolated from wound, blood, and respiratory tract samples.^{16,17,21} The findings of our study are consistent with those reported in the literature.

In the present study, MRSA rates demonstrated temporal variation throughout the study period, ranging from 23.1% to 50.0%, with the highest rate observed in 2020 (50.0%) and the lowest in 2022 (23.1%); however, these differences were not statistically significant ($p=0.120$). This finding suggests that, despite observable numerical fluctuations, the overall burden of MRSA remained relatively stable over time. A similar pattern has been reported in previous studies. For example, Tsige et al. reported that MRSA prevalence in Ethiopia varied across years, peaking in 2023 and reaching its lowest level in 2021, without showing a consistent linear trend. This variability was attributed to differences in infection control practices, antibiotic consumption patterns, and periodic changes in healthcare-associated transmission dynamics.³⁰ Likewise, a large hospital-based surveillance study from Taiwan also demonstrated year-to-year variability in MRSA rates between 2022 and 2024 (48.9%, 42.3%, and 48.5%, respectively), with no sustained increasing or decreasing trend over time.³¹ This fluctuation was similarly associated with variations in infection prevention strategies, antimicrobial stewardship interventions, and local epidemiological pressures rather than a true long-term directional shift.

While *Staphylococcus* species were initially sensitive to the first antibiotic, penicillin, they quickly developed resistance to this antibiotic over time as a result of the production of beta-lactamase enzyme.¹⁶ In a study conducted in Romania, penicillin resistance was reported as 100% in MRSA strains and 79.37% in MSSA strains.³ In studies conducted in our country, penicillin resistance in MRSA isolates was found to vary between 98% and 100%, and in MSSA isolates it varied between 78.2% and 89.6%.^{9,16,18,19,22} In our study, penicillin resistance was determined as 100% in MRSA strains and 80% in MSSA strains, and the results were consistent with those reported in the literature.

In the present study, tetracycline resistance was detected as 68.5% in MRSA isolates and 12.5% in MSSA isolates.

Reported tetracycline resistance rates in the literature, together with the findings of the current study, are summarized in Table 4. Overall, the tetracycline resistance rates observed in this study were lower than those reported in international studies, whereas they were higher than those reported in several studies conducted in our country (Table 4).

Quinolones have a wide range of use due to their broad antibacterial spectrum, good absorption from the gastrointestinal tract, and effective distribution into tissues.²⁹ A study conducted in Vietnam reported that ciprofloxacin and levofloxacin resistance in MRSA strains was 27.6% and 27.3%, respectively, and 33.3% and 36.1% in MSSA strains.¹⁵ A study conducted in Romania found ciprofloxacin resistance to 16.72% in MRSA and 5.3% in MSSA.³ Studies conducted in our country reported that ciprofloxacin resistance in MRSA strains ranged from 3% to 66% and in MSSA strains from 3% to 61%, while levofloxacin resistance was reported to be between 24.3% and 57% in MRSA strains and 1.5% to 67% in MSSA strains.^{2,9,16,17} In our study, ciprofloxacin and levofloxacin resistance rates were 77.6% and 59.3%, respectively, among MRSA isolates, and 27.5% and 61.5%, respectively, among MSSA isolates. Our findings indicate relatively high quinolone resistance among MRSA isolates, whereas resistance rates among MSSA isolates were within the ranges reported in the literature.

In our study, gentamicin resistance was detected at a rate of 41.9% in MRSA strains and 4.1% in MSSA strains. In a study investigating the antimicrobial resistance of *Staphylococcus aureus* isolates obtained from infections in a tertiary care hospital in Romania between 2017 and 2022, gentamicin resistance was reported as 12.48% in MRSA isolates and 1.82% in MSSA isolates.³ In a study conducted at Bac Ninh Provincial General Hospital in Vietnam, which evaluated the antimicrobial susceptibility profiles of *Staphylococcus aureus* isolates obtained from clinical specimens, gentamicin resistance was reported as 33.1% in MRSA isolates and 48.4% in MSSA isolates.¹⁵ While some studies conducted in our country did not find gentamicin resistance in MSSA strains,^{16,17,24} other studies reported resistance rates between 8.3% and 13%.^{2,9,18,19} Gentamicin resistance in MRSA strains has been reported to range between 7% and 54%.^{2,9,16-19} In our study, gentamicin resistance in MSSA isolates was consistent with the literature. Resistance rates in MRSA isolates were higher compared to international studies, yet comparable to those reported in previous studies conducted within our country.

In studies conducted in our country on erythromycin resistance in strains, resistance rates have been reported to vary between 6.4% and 16.4%, and these rates are similar to the 14.8% resistance rate found in our study.^{2,9,16-19} Studies conducted with MRSA strains have reported erythromycin resistance rates ranging from 38.4% to 60%.^{2,9,16-19} These results are comparable to the 56.3% erythromycin resistance rate observed in MRSA isolates in our study.

A study conducted in Vietnam reported clindamycin resistance in MSSA strains as 54.4% and a study conducted in Romania as 1.21%. The same studies reported clindamycin resistance in MRSA strains as 7.06% and 76.8%, respectively.^{3,15} Studies conducted in our country have reported clindamycin resistance in MSSA strains ranging from 3% to 12.7% and 14.9% to 43.5% in MRSA strains.^{2,9,16-19} In our study, clindamycin resistance in MRSA isolates was determined as 60.3%, which was higher than studies conducted in our country; resistance in MSSA isolates was found as 12.0%, which is consistent with the literature.

High resistance rates to clindamycin, daptomycin, and quinolones observed in our center may be associated with local antibiotic consumption patterns and prescribing practices. The frequent empirical use of clindamycin and quinolones due to their broad spectrum and oral availability may result in sustained selective pressure, particularly among MRSA strains, while the use of daptomycin in complicated Gram-positive infections and possible dose adjustments may contribute to reduced susceptibility. These findings emphasize the necessity of implementing structured antimicrobial stewardship programs in healthcare institutions, including regular monitoring of antibiotic consumption and prescribing patterns, as well as audit and feedback mechanisms, to optimize antimicrobial use and prevent the emergence and spread of antimicrobial resistance. With the widespread prevalence of methicillin resistance, vancomycin has become the antibiotic of choice for the treatment of invasive MRSA infections.¹³ In our study, no vancomycin resistance was detected in either MRSA or MSSA isolates. Similarly, Tălăpan et al. and An et al. reported full susceptibility of both MRSA and MSSA isolates to vancomycin, indicating that vancomycin maintains a consistently high level of in vitro effectiveness across different geographic regions and clinical settings.^{3,15} Likewise, studies conducted in our country have also reported complete susceptibility of *S. aureus* isolates to vancomycin, supporting its continued therapeutic reliability.^{2,9,16–19} Overall, these findings support the preserved in vitro activity of vancomycin against *S. aureus* isolates in the studies evaluated. The absence of vancomycin resistance in our study may be associated with the rational and restricted use of glycopeptide antibiotics, particularly under infectious disease specialist supervision. Furthermore, the predominance of respiratory and wound samples, which are less frequently associated with systemic glycopeptide exposure, may have contributed to the observed susceptibility pattern. However, given the increasing burden of hospital-acquired infections, continued surveillance of vancomycin susceptibility remains essential.

Tigecycline has been widely reported to exhibit potent antibacterial activity against a broad spectrum of both Gram-positive and Gram-negative pathogens.^{25,26} In line with our findings, several studies have reported no detectable tigecycline resistance among MRSA and MSSA isolates.^{16,17} However, other investigations have documented the emergence of tigecycline resistance in MRSA isolates, with reported rates ranging from 2% to 9%.^{27,28} These discrepancies may reflect geographical variation, differences in antimicrobial usage patterns, and local epidemiological dynamics.

Linezolid remains a key therapeutic option for the treatment of multidrug-resistant Gram-positive bacterial infections, including MRSA, due to its sustained in vitro activity and favorable clinical efficacy profile reported in various surveillance studies.²³ In our study, linezolid resistance was detected at a low rate (3.4%) in MRSA isolates, while no resistance was detected in MSSA strains. Studies conducted in our country have reported that linezolid resistance was not found in both MRSA and MSSA strains.^{2,9,16–18} Although the absence of resistance in MSSA strains is consistent with the literature, the detection of low-level linezolid resistance in MRSA isolates differs from previous reports. This discrepancy may be explained by several factors. Linezolid resistance in *S. aureus* is known to emerge mainly through chromosomal mutations in the 23S rRNA gene or acquisition of the *cfr* gene, and it is generally associated with prolonged

antibiotic exposure and selective pressure in hospital settings, particularly in intensive care units and patients with recurrent or prolonged antibiotic use. In addition, clonal spread of resistant MRSA strains within healthcare institutions may contribute to localized increases in resistance rates. Differences in antimicrobial stewardship practices, patient populations, and infection control measures between centers may also account for variability in reported resistance rates. Daptomycin is a cyclic lipopeptide antibiotic that is active against Gram-positive bacteria in both the logarithmic and stationary phases.² In our study, daptomycin resistance was found to be 9.1% in MRSA strains and 6.3% in MSSA strains. Previous studies from our country have generally reported no daptomycin resistance in MRSA and MSSA isolates,^{2,16–18} while others have documented very low resistance rates, ranging from 0.03% to 3% in MRSA strains.^{2,18,22} Compared to these findings, the resistance rates observed in our study are relatively higher.

Our study has several limitations. First, it was conducted at a single center and had a retrospective design, which may limit the generalizability of the findings. Second, methicillin resistance was assessed using phenotypic methods, and molecular confirmatory testing, such as detection of the *mecA* gene, was not performed. In addition, antimicrobial susceptibility testing was not performed uniformly for all antibiotics across all isolates, resulting in variable numbers of isolates tested for individual antimicrobial agents. Therefore, resistance rates for antibiotics evaluated in smaller subsets should be interpreted with caution. Future multicenter, prospective studies incorporating molecular methods, including *mecA* and other relevant resistance gene analyses, are warranted to provide more robust and comprehensive data on antimicrobial resistance patterns.

Conclusion

In conclusion, our study determined that methicillin resistance was 33.3% among *S. aureus* isolates, with the highest frequency of MRSA strains isolated in intensive care units and most commonly recovered from sputum, wound, and blood samples. Resistance rates to most of the evaluated antibiotics were higher in MRSA isolates than in MSSA isolates, and resistance rates to commonly used antibiotics such as penicillin, tetracycline, gentamicin, clindamycin, and quinolones were notable. Our findings may contribute to the development of more targeted empirical treatment strategies and antimicrobial stewardship programs based on local MRSA and MSSA resistance profiles. In addition, our study provides five-year regional surveillance data from isolates obtained from different clinical specimens, contributing to the literature on *S. aureus* resistance profiles in Türkiye. Furthermore, our results demonstrate the substantial burden of MRSA in the hospital setting. In the fight against MRSA, meticulous implementation of infection control measures, regular monitoring of hospital resistance profiles, updating treatment options, and strict implementation of restricted antibiotic use policies are crucial.

Ethics Committee Approval

The study was conducted in accordance with the Declaration of Helsinki, and all procedures were approved by the Yalova University Ethics Committees Coordination Office, Health Sciences Non-Interventional Clinical Research Ethics Committee (protocol no. 2024/114, dated July 12, 2024).

Informed Consent

Informed consent was waived due to the retrospective nature of the study. The study was conducted in accordance with the principles of the Declaration of Helsinki.

Conflict of Interest

The authors declare that there is no conflict of interest.

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Peer Review Process

This manuscript was subject to external peer review.

Author Contributions

G.K., M.O., S.S., Z.E., H.E.: Concept; Supervision; Writing; Critical review; G.K., M.O., S.S., Z.E., H.E.: Design; Literature search; Analysis and/or interpretation; G.K., M.O., S.S.: Data collection &/or processing.

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