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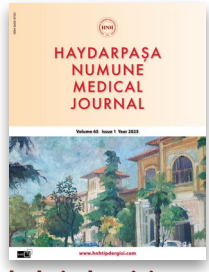

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ORIGINAL ARTICLE

Cumulative Antibiogram Data of Haydarpaşa Numune Training and Research Hospital Intensive Care Unit, Non-intensive Care Services, and Outpatients in 2023

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Abstract

Introduction: We aimed to present the cumulative antibiogram data of bacteria isolated from outpatient, intensive care unit (ICU), and non-ICU service patients between January and December 2023.

Methods: The data were evaluated according to CLSI-M39 criteria.

Results: The three most frequently isolated bacteria in ICU patients were *A. baumannii, P. aeruginosa, and K. pneumoniae*, respectively. No antibiotics were identified as suitable for empirical treatment of these bacteria. Amikacin and carbapenems were found suitable for empirical treatment of *E. coli*. MRSA was detected in 24.2% of isolates, and vancomycin resistance was found in 6.5% of *E. faecium* isolates. Ampicillin was found to be a suitable empirical treatment option for *E. faecalis*. In non-ICU patients, the three most frequently isolated bacteria were *E. coli, K. pneumoniae, and E. faecalis*. No empirical treatment option was found for *K. pneumoniae*, but amikacin and carbapenems could be used for E. coli isolates. Amikacin was also found suitable for empirical therapy for *P. aeruginosa*. MRSA prevalence was 33.6%. Vancomycin resistance was not detected in enterococci. Ampicillin, linezolid, and glycopeptides were considered suitable empirical treatment options for *E. faecalis*. In outpatients, *E. coli, E. faecalis, and K. pneumoniae* were the most frequently isolated agents. Aminoglycosides and carbapenems were suitable empirical treatment options for *E. coli and K. pneumoniae*, while ampicillin was suitable for *E. faecalis*. MRSA was detected in 22.2% of isolates, and no vancomycin resistance was observed in enterococci.

Discussion and Conclusion: It is concerning that there are no antibiotics suitable for empirical treatment of Gram-negative rods other than *E. coli* in ICU patients, and of *E. coli and P. aeruginosa* in non-ICU patients. The MRSA rate was found to be higher in non-ICU patients compared to ICU and outpatient groups. No resistance was observed in *S. aureus* to linezolid or glycopeptides. High susceptibility to ampicillin was noted in *E. faecalis* across all patient groups, making it suitable for empirical treatment. It is recommended to identify the causative bacteria as early as possible without waiting for antibiogram results and to initiate empirical treatment guided by the hospital's cumulative antibiogram data.

Keywords: Cumulative antibiogram; Intensive care unit; Non-intensive care services; Outpatients.

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Antimicrobial resistance is one of the greatest threats to public health on a global scale. According to World Health Organization data, antimicrobial resistance was estimated to have a direct impact on 1.27 million deaths globally in 2019 and a total of 4.95 million deaths, and this number is estimated to increase to 10 million in 2050.[1] Resistance in Gram-negative bacteria is classified as multidrug-resistant, extremely drug-resistant, and pandrug-resistant. While different alternative strategies are being investigated to solve the resistance problem in Gram-positive and Gram-negative bacteria, antimicrobial stewardship programs have been developed to slow the rate of resistance development.[2] One of these policies is the empirical therapy phase based on cumulative antibiogram data.[3] Accordingly, antibiogram data are obtained from each hospital or from hospitals within the same region at regular intervals (usually one year), and in light of these data, empirical therapy is initiated without waiting for the culture and antibiogram results of the patient sample or wasting time in treatment. More resistant strains are detected in bacteria isolated from ICU clinics compared to the outpatient and non-ICU inpatient groups.[4] In this context, we believe that it would be more appropriate to report the cumulative antibiogram separately according to the characteristics of the ward in which the patients are hospitalized (ICU or non-ICU), along with the data of outpatients admitted to the hospital. Therefore, in our study, we aimed to present our cumulative antibiogram data by examining the susceptibility results of patients in intensive care, non-intensive care services, and outpatients, according to the antibiotic sensitivity test results obtained in 2023, in order to provide a guide for the empirical treatment practices of our hospital.

Materials and Methods

Between January 1st and December 31st 2023, various samples were sent from the clinics of Haydarpaşa Numune Training and Research Hospital to our medical microbiology laboratory for culture. Isolated bacteria were identified using Gram staining, conventional biochemical tests, and automated systems (MALDI-TOF MS, Biomerieux-France). Susceptibility tests were performed with an automated system (Vitek-2, Biomerieux, France) according to EUCAST 2023 criteria for bacteria considered to be causative agents.[5]

Antibiogram data obtained during the period covering the year 2023 were evaluated using our hospital's automation system. Data were prepared in accordance with the Clinical and Laboratory Standards Institute (CLSI) M39 recommendations for cumulative antibiogram data.[3] The antibiogram data of the first bacteria isolated as the infectious agent in each patient were included, and only those with a bacterial count ≥30 were incorporated into the study. Samples collected for screening purposes were excluded. Bacteria with a susceptibility rate to antibiotics of ≥90% were considered suitable for empirical therapy. Strains that were susceptible, increased exposure (according to EUCAST criteria), were also included in the scope of susceptibility. In our study, cumulative antibiogram data were prepared separately for the hospital's intensive care unit, non-intensive care service patients, and outpatient groups.

Statistical Analysis

Antibiogram data were evaluated according to predefined criteria, and group-based comparisons were made in line with CLSI and EUCAST guidance, without further statistical testing as the study was descriptive in nature.

Ethical Committee

The approval of the Türkiye Ministry of Health, Haydarpaşa Numune Training and Research Hospital Clinical Research Ethics Board was obtained (HNH-KAEK 2024/71/4358).

The study protocol adhered to the ethical guidelines of the 2013 Helsinki Declaration.

Results

A total of 8255 antibiograms were performed in our medical microbiology laboratory throughout 2023. According to the cumulative antibiogram criteria, the appropriate number of antibiograms was 616 Gram-negative rods and 198 Gram-positive cocci in patients in the intensive care unit, 679 Gram-negative rods and 377 Gram-positive cocci in non-ICU patients, and 2790 Gram-negative rods and 698 Gram-positive cocci in outpatients. Cumulative antibiogram data were performed for a total of 5358 isolates.

For the patient group hospitalized in the ICU, *Acinetobacter baumannii* (*A. baumannii*, n=192), *Pseudomonas aeruginosa* (*P. aeruginosa*, n=191), and *Klebsiella pneumoniae (K. pneumoniae*, n=150) were the three most frequently isolated Gram-negative rods, and no antibiotics have been found suitable for empirical therapy. Amikacin (AK) and carbapenems were found suitable for empirical therapy of the isolated *Escherichia coli* (*E. coli*, n=83). A total of 91 *Staphylococcus aureus* (*S. aureus*) strains were isolated from ICU patients, including 22 (24.2%) methicillin-resistant *S. aureus* (MRSA) and 69 (75.8%) methicillin-susceptible *S. aureus* (MSSA). >90% susceptibility was detected

Table 1. Susceptibility percentages (%S) of Gram-negative and Gram-positive bacteria isolated from intensive care unit patients.

Gram- negative rods	n	Amikacin	AMC	Cefepime	Ceftazidime	Ceftriaxone	Cefuroxime	Ciprofloxacin	Ertapenem	Gentamicin	Imipenem	Meropenem	TZP	SXT
Escherichia coli	83	95.2	44.6	54.2	44.6	48	39.8	51 (37)	98.8	44.6 (48)	100 (39)	100	83	54
Klebsiella pneumoniae	150	62	33	29	25	28	27	31 (48)	52	75 (37)	64 (105)	59	35	45
Pseudomonas aeruginosa	191	59.1		40	40			63.3			35.7 (168)	49.7	37.2	
Acinetobacter baumannii	192	17.2 (186)						3.2 (186)			3.3 (183)	8.5 (188)	1.6 (185)	3.2 (187)
Gram- positive cocci	**n**	**Ampicillin**	**Clindamycin**	**Daptomycin**	**Erythromycin**	**Levofloxacin**	**Linezolid**	**Teicoplanin**	**Tetracycline**	**SXT**	**Vancomycin**			
Enterococcus faecalis	42	97.6				57.1	100	100			100			
Enterococcus faecium	65	4.7 (64)				10.9 (64)	100	93.5			93.5			
Staphylococcus aureus (MRSA)	22 (24.2%)		85	94	75	80	100	100	80 (21)	80	100			
Staphylococcus aureus (MSSA)	69		83	100	82	91	100	100	85	97	100			
Staphylococcus aureus (total)	91		84	98	80	88	100	100	84	93	100			

AMC: amoxycillin+ clavulanate; TZP: piperacillin+ tazobactam; SXT: trimethoprim/ sulfamethoxazole; n: Number of isolates; Note: Numbers in parentheses are the number of strains on which the relevant antibiotic was studied.

in all *S. aureus* strains against daptomycin (DAP), trimethoprim-sulfamethoxazole (SXT), linezolid (LZD), and glycopeptides. Among the enterococci isolated from the same patient group, *Enterococcus faecium (E. faecium*, n=65) and *Enterococcus faecalis (E. faecalis*, n=42) were the most frequently isolated species, and LZD, teicoplanin (TEC), and vancomycin (V) were antibiotics suitable for empirical therapy for these bacteria. *E. faecium* and *E. faecalis* were found to be 4.7% and 97.6% susceptible to ampicillin (AMP), respectively (Table 1).

In the non-ICU patient group, *E. coli* (n=303), *K. pneumoniae* (n=166), and *P. aeruginosa* (n=123) were the three most frequently isolated Gram-negative rods. While amikacin, ertapenem, imipenem, and meropenem were suitable for empirical therapy in *E. coli* and *Enterobacter cloacae* complexes (n=51), >90% sensitivity to ciprofloxacin was detected in the E. cloacae complex in addition to these antibiotics. No antibiotics suitable for empirical therapy were found for *K. pneumoniae*, and among the antibiotics used in the susceptibility testing of *P. aeruginosa*, only the susceptibility rate against AK was >90%. The highest sensitivity of *A. baumannii* strains isolated in this group was found to be 25% against AK. In the same group of patients, *E. faecalis* (n=150) and *E. faecium* (n=120) were the most frequently isolated Gram-positive bacteria. While glycopeptides and LZD were suitable for empirical therapy for these bacteria, the sensitivity rate to AMP for *E. faecalis* was 98.6%. A total of 107 *S. aureus* strains, 36 (33.6%) MRSA and 71 (66.4%) MSSA, were isolated from non-ICU patients. >90% susceptibility was detected in all *S. aureus* strains against DAP, SXT, LZD, and glycopeptide group antibiotics (Table 2).

In the group of outpatients, the three most frequently isolated Gram-negative rods from the *Enterobacterales* group were *E. coli* (n=1945), *K. pneumoniae* (n=447), and *Enterobacter cloacae* complex (n=111). In the *Enterobacterales* group, >90% susceptibility to AK, gentamicin (GN), and carbapenems was detected. In addition to these antibiotics, sensitivity to cefepime was found to be >90% for E. cloacae complex, *K. pneumoniae*, *Proteus mirabilis*, and *Morganella morganii*. A total of 117 *S. aureus* strains were isolated in the outpatient group, 26 (22.2%) of which were MRSA and 91 (77.8%) were MSSA. >90% sensitivity was detected in all *S. aureus* strains against DAP, SXT, LZD, and glycopeptides. *E. faecalis* (n=525) was the most frequently growing enterococci. For *E. faecalis*, AMP, LZD, and glycopeptide-group antibiotics were found to be suitable for empirical therapy (Table 3).

Table 2. Susceptibility percentages (%S) of Gram negative and Gram positive bacteria isolated from non- intensive care unit patients.

Gram- negative bacilli	n	Amikacin	AMC	Cefepime	Ceftazidime	Ceftriaxone	Cefuroxime	Ciprofloxacin	Ertapenem	Gentamicin	İmipenem	Merope	TZP	SXT
Escherichia coli	303	96.6	66	60.4	52.5	52.1	43.9	44 (79)	96.6	82.1 (174)	98.6 (146)	99.1	78.6	61.4
Klebsiella pneumoniae	166	83.6	35	41.7	32	40.3	34.5	50.7 (96)	70.6	76.5 (81)	72.2	72.3	46.2	57.2
Enterobacter cloacae complex	51	100		86.2	62.7	58.9		92.3(13)	80.4		96.9	95.6	56.9	86.3
Pseudomonas aeruginosa	123	90.7		69.2	72			81.3			46.6 (87)	54.5 (99)	70.4	
Acinetobacter baumannii	36	25						5			6	5	0	30
Gram pozitive cocci	**n**	**Ampicillin**	**Clindamycin**	**Daptomycin**	**Erythromycin**	**Levofloxacin**	**Linezoid**	**Teicoplanin**	**Tetracycline**	**SXT**	**Vancomycin**			
Enterococcus faecalis	150	98.6				71.3	100	100			100			
Enterococcus faecium	120	3.6 (110)				13.3	100	100			100			
Staphylococcus aureus (MRSA)	36	(33.6%)	72	94	55	69	100	100	66	91	100			
Staphylococcus aureus (MSSA)	71		87	100	87	91	100	100	90	97	100			
Staphylococcus aureus (Total)	107		81	98	75	83	100	100	81	94	100			

AMC: amoxycillin+ clavulanate, TZP: piperacillin+ tazobactam, SXT: trimethoprim/ sulfamethoxazole; n: Number of isolates; Note: Numbers in parentheses are the number of strains on which the relevant antibiotic was studied.

Discussion

Resistance to antimicrobials creates and will continue to create major problems globally in the treatment of infectious diseases. In order to reduce the rate of progression of this problem, the conscious and correct application of antibiotic management rules is essential. One of the most important pillars of antibiotic management is the selection of the correct antibiotic for empirical treatment in the light of cumulative antibiogram data. In general, the resistance pattern of bacteria that cause infection may differ between outpatients and hospitalized patients. Therefore, in our study, we divided the cumulative antibiogram data for the antibiotics available and used in Türkiye into three different groups: patients hospitalized in outpatients, ICU, and non-ICU services.

According to the study by Campigotto et al.,[6] cumulative antibiogram data may vary in different ICUs. Since there is no other ICU clinic in our hospital apart from the general ICU service, data from a single ICU are presented. >90% susceptibility to amikacin and carbapenems was detected in *E. coli* strains isolated from ICU, and these antibiotics were found to be suitable for empirical treatment. In our cumulative antibiogram study covering the period 2016–2017,[7] prepared only for microorganisms isolated from blood cultures of intensive care unit patients, >90% sensitivity to carbapenems was detected in *E. coli* strains, but the sensitivity rate to amikacin was 72.6%. There has been a pleasing development in that the susceptibility to amikacin in *E. coli* strains has increased over time.

The highest sensitivity rate of *K. pneumoniae* strains isolated in the same patient group was against amikacin (62.0%) and carbapenems (52%–64%). According to cumulative antibiogram data, no antibiotics suitable for empiric treatment were found for *K. pneumoniae* strains. The same situation was seen in our study covering the period 2016–2017, and the sensitivity rates for *K. pneumoniae* strains appeared to be similar.

The highest sensitivity rates for *P. aeruginosa* in the ICU patient group were found for ciprofloxacin (63.3%) and amikacin (59.1%), while the sensitivity rates for other antibiotics, especially the carbapenem group, were <50%. In our study covering the period 2016–2017 for *P. aeruginosa*, no antibiotics were found suitable for empiric treatment, and it was observed that the sensitivity rates of antibiotics decreased over time. In the current study, in the ICU patient group, the rate of susceptibility to aminoglycosides in *A. baumannii* strains decreased compared to the previous period, and <10% susceptibility was observed for other

Table 3. Susceptibility percentages (%S) of Gram negative and Gram positive bacteria isolated from outpatients

Gram negative bacilli	n	Amikacin	AMC	Cefepime	Ceftazidime	Ceftriaxone	Cefuroxime	Ciprofloxacin	Ertapenem	Gentamicin	Imipenem	Meropenem	Nitrofurantoin	TZP	SXT
Escherichia coli	1945	97.9	59.3	82.4	74.7	76.3	66.1	73	98.8	90.2	99.7	99	97.3	89.5	75.8
Klebsiella pneumoniae	447	96.6	61.6	75.1	67.6	71.3	66.2	73.8	91.3	92.5	94.1	95.6	63.7	69.2	79.3
Enterobacter cloacae complex	111	99.1		95.5	87.4	81.8		84.3	94.6	94	100 (39)	99	94.5	86.5	95.5
Klebsiella aerogenes	50	100		90	84	81.6		92.8	96	96		98	77.5	84.4	96
Proteus mirabilis	101	92.1	86	93	92.1	84.2	79.2	62.8	100	70.8		100		100	54.5
Morganella morganii	38	97.3		91.6	71.1	79		60.6	92.1	81.8		100		79.4	60.5
Pseudomonas aeruginosa	95	87.4		85	89			71.6			86 (58)	88		72 (93)	

Gram positive cocci	n	Ampicillin	Clindamycin	Daptomycin	Erythromycin	Levofloxacin	Linezolid	Teicoplanin	Tetracycline	SXT	Vancomycin
Enterococcus faecalis	525	99.6 (521)				79.3	98.3	100			100
Enterococcus faecium	56	16.3				26	97.5	100			100
Staphylococcus aureus (MRSA)	26 (22.2%)		50	100	46	73	100	100	57	76	100
Staphylococcus aureus (MSSA)	91		84	100	82	91	100	100	85	97	100
Staphylococcus aureus (Total)	117		76	100	73	87	100	100	79	93	100

AMC: amoxycillin+ clavulanate, TZP: piperacillin+ tazobactam, SXT: trimethoprim/ sulfamethoxazole; n: Number of isolates; NOTE: Numbers in parentheses are the number of strains on which the relevant antibiotic was studied.

antibiotics. This situation shows the difficulty of choosing antibiotics for empirical treatment of *A. baumannii* isolates originating from ICUs.

The rate of MSSA isolated from intensive care patient samples was approximately three times higher than MRSA. Levofloxacin and SXT were found to be suitable for empirical treatment of MSSA strains, while daptomycin (DAP), linezolid (LZD), and glycopeptides were found to be suitable for empirical treatment of both MRSA and MSSA strains. While the MRSA rate in the ICU patient group in our study was 24.2%, this rate was 27.9% in the 2016–2017 period. The rates of *S. aureus* strains isolated in this group of patients were similar to the data from the previous study.[7] It is seen that the MRSA rate varies from center to center in Türkiye.[8,9] It is pleasing that intermediate resistance and resistance to glycopeptide antibiotics were not detected in our *S. aureus* strains.

The most frequently growing enterococci in our ICU patient group was *E. faecium*. The VRE rate in *E. faecium* strains was 6.5%; it was 9.5% in the 2016–2017 period. We can attribute the fact that our VRE rates are lower than six years ago to the identification of bacteria in a shorter period of time by using MALDI-TOF. In our study, it was observed that the sensitivity rate to ampicillin in *E. faecalis* isolated from our ICU patient group increased from 93.7% to 97.6% compared to the 2016–2017 period. The high sensitivity of *E. faecalis* strains isolated from the ICU patient group to AMP indicates that this antibiotic is a good choice for empirical treatment.

In studies conducted, cumulative antibiogram data may differ in different ICUs. Campigotto et al.,[6] in Canada, in a study covering a five-year period (2010–2014) in different intensive care clinics of the same hospital, presented cumulative antibiogram data for piperacillin+tazobactam and ciprofloxacin against only *E. coli* and *P. aeruginosa* bacteria. They reported that a significant difference was detected. Dakorah et al.,[10] in their study combining inpatient and outpatient group data, found >90% sensitivity only to amikacin in *E. coli* strains, and <90% sensitivity to all antibiotics tested in *K. pneumoniae* and nonfermentative Gram-negative rods.

Negm et al.[11] compared the cumulative antibiogram data of 10 different ICUs in nine different hospitals in Egypt in 2019 and 2020. In this study, *K. pneumoniae* and *P. aeruginosa* were found to be

>90% sensitive to colistin. Since we only performed colistin and ceftazidime+avibactam susceptibility tests for pan-drug-resistant and extremely drug-resistant strains in our routine workflow, we found it appropriate to exclude the data on these antibiotics from our study scope, as it would lead to incorrect evaluation. According to our data obtained in the intensive care unit, no antibiotics suitable for empiric treatment could be found for the most frequently occurring Gram-negative rods.

In our study, in the non-ICU patient group, the most frequently isolated Gram-negative rod was *E. coli*. In this group of patients, >90% sensitivity was detected for amikacin and carbapenems in *E. coli*. The second most frequently growing bacterium within the *Enterobacterales* family was *K. pneumoniae*. No antibiotics were found to be recommended for empirical treatment for this bacterium in this group of patients; while amikacin and gentamicin had the highest sensitivity rates (83.6% and 76.5%, respectively), the sensitivity rates of ertapenem, imipenem, and meropenem were found to be 70.6%, 72.2%, and 72.3%, respectively. The third most frequently isolated bacterium in this patient group was *E. cloacae* complex. While the sensitivity to amikacin, ciprofloxacin, meropenem, and imipenem for this bacterium was >90%, the sensitivity rate for ertapenem was 80.4%. In this case, it seems that ertapenem is not suitable for empirical treatment.

It is thought-provoking that there are few empirical treatment options for enterobacteria isolated from the group of patients hospitalized in the wards. In the group of patients hospitalized in non-intensive care units, the amikacin sensitivity rate for *P. aeruginosa* strains was 90.7%, while the sensitivity rates for other antibiotics were found to be low. Susceptibility to meropenem and imipenem for *K. pneumoniae* was 54.5% and 46.6%, respectively. We think that the difference in the sensitivity rates of these two antibiotics is due to the different number and nature of the strains tested. Susceptibility rates for *A. baumannii* in the non-ICU patient group were found to be very low (0.0%–25.0%). This shows that the susceptibility rate to antibiotics in *A. baumannii* strains is similar between the strains isolated from the ICU and other wards. The high rate of resistance detected in *A. baumannii* strains against the antibiotics that have been tested shows that this bacterium has the potential to develop intrinsic resistance against many antibiotics in the near future. It seems that carbapenems cannot be recommended for empirical treatment for *K. pneumoniae*, *P. aeruginosa*, and *A. baumannii* isolated from patient samples in both ICU and other wards.

Susceptibility rates >90% for glycopeptides and linezolid tested against *E. faecalis* and *E. faecium* were also found in the non-intensive care patient group, and the 98.6% sensitivity of *E. faecalis* to ampicillin indicates that it is suitable for empirical treatment.

It is noteworthy that the rate of MRSA in the patient group in non-intensive care units (33.6%) was found to be higher than the rate of MRSA isolated from the ICU (24.2%). Linezolid, SXT, and glycopeptides susceptibility were found to be >90% in MRSA isolated from non-intensive care units. MRSA strains isolated from non-ICU patients had lower susceptibility rates to clindamycin, erythromycin, levofloxacin, and tetracycline than ICU strains. However, the sensitivity rates of clindamycin and erythromycin in MSSA strains grown in the non-intensive care patient group were higher than in MSSA strains originating from intensive care units, and similar rates were found for other antibiotics tested.

In the outpatient group, seven Gram-negative rods (*E. coli*, *K. pneumoniae*, *E. cloacae* complex, *K. aerogenes*, *P. mirabilis, M. morganii*, and *P. aeruginosa*) were detected in a number suitable for cumulative antibiogram reporting. Although the sensitivity rates of these bacteria vary, the antibiotics with the highest sensitivity rates were amikacin (87.4%–100%) and carbapenems (86.0%–100%). The sensitivity rates of *E. cloacae* complex, the third most frequently growing bacterium in this patient group, to beta-lactams were found to be higher than those of *E. coli* and *K. pneumoniae*. The lowest sensitivity rate in *K. pneumoniae* strains isolated from this group of patients was against beta-lactam antibiotics (61%–71%).

In the outpatient group, *P. aeruginosa* was grown in numbers appropriate to the cumulative antibiogram as a nonfermentative Gram-negative rod. Among the antibiotics tested on this bacterium, the sensitivity rates to meropenem and imipenem were found to be >90%, but it was noteworthy that the sensitivity rates to other antibiotics were <90%.

In the outpatient group, >90% sensitivity to glycopeptides and linezolid was detected for *E. faecalis* and *E. faecium*; in addition, the sensitivity rate to ampicillin for *E. faecalis* was 99.6%. It seems that the same antibiotics can be used in empirical treatment for this bacterium in the ICU, non-ICU, and outpatient groups.

In outpatient groups, MRSA rates were found to be similar to MRSA isolated from intensive care units. In this patient group, the susceptibility rates of MRSA strains to clindamycin, erythromycin (E), tetracycline (TET), and levofloxacin were found to be lower than the susceptibility

rates of MRSA isolated in the inpatient group. In the same group of patients, MSSA susceptibility rates were found to be similar to inpatient groups.

Empirical treatment options based on the type of bacteria isolated as the causative agent of infection in the outpatient group offer more options than in the inpatient group, but identification of the causative bacteria at the species level in this group of patients will be a guide for empirical treatment.

Conclusion

It seems that empirical treatment should be arranged according to the patient's hospitalization or outpatient status. In addition to the clinical condition of the patient, it is critical to identify the bacteria isolated as the causative agent of infection as soon as possible and to determine empirical treatment in the light of cumulative data.

Ethics Committee Approval: The study was approved by Haydarpaşa Numune Training and Research Hospital Clinical Research Ethics Committee (No: HNH-KAEK 2024/71/4358, Date: 13.05.2024).

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