Research article

Secular trends of antimicrobial resistance of blood isolates in a newly founded Greek hospital

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Abstract

Background: Antimicrobial resistance is one of the most challenging issues in modern medicine.

Methods: We evaluated the secular trends of the relative frequency of blood isolates and of the pattern of their in vitro antimicrobial susceptibility in our hospital during the last four and a half years.

Results: Overall, the data regarding the relative frequency of blood isolates in our newly founded hospital do not differ significantly from those of hospitals that are functioning for a much longer period of time. A noteworthy emerging problem is the increasing antimicrobial resistance of Gram-negative bacteria, mainly *Acinetobacter baumannii* and *Klebsiella pneumoniae* to various classes of antibiotics. *Acinetobacter baumannii* isolates showed an increase of resistance to amikacin (p = 0.019), ciprofloxacin (p = 0.001), imipenem (p < 0.001), and piperacillin/ tazobactam (p = 0.01) between the first and second period of the study.

Conclusion: An alarming increase of the antimicrobial resistance of *Acinetobacter baumannii* isolates has been noted during our study.

Background

Increasing antimicrobial resistance among bloodstream isolates is considered a significant problem worldwide [1,2]. This is especially true in some areas including the countries of Southern Europe where a considerable proportion of pathogens are resistant to antibiotics of several classes [3]. Although antimicrobial resistance is noted in all pathogens, some phenotypes of resistance such as methicillin resistant *Staphylococcus aureus* (MRSA), vancomycin resistant enterococci (VRE), methicillin resistant coagulase negative staphylococci (MRCNS), and carbapenem resistant enterobacteriacae, *Pseudomonas aeruginosa*,

and *Acinetobacter baumannii* are of particular concern. We sought to study the secular trends of the relative frequency and antimicrobial resistance of blood isolates in a newly founded hospital in Greece.

Methods

Patient population

The patient population comprised of patients admitted to Henry Dunant Hospital, Athens, Greece in the period of 01/01/2001–30/06/2005. Henry Dunant Hospital was founded in October 2000. It is a general tertiary hospital with 450 beds covering most medical specialties with the

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exception of pediatrics, obstetrics, and transplant surgery. It has 3 combined medical and surgical intensive care units with a total of 38 beds.

Microbiological studies

Identification of the microorganisms to the species level was performed with the automated system Vitek 2 (Biomérieux) according to the manufacturer's instructions. Not all, but only the first blood isolate per patient was included in the study. The Bactec system (Becton-Dickinson) was used during 2001, 2002, and 2003, and the BacT Alert 3D (Biomérieux) was used during 2004 and 2005. Isolation of bacteria was followed by susceptibility testing that was performed with the Vitek 2 system, applying the criteria suggested by the Clinical and Laboratory Standards Institute (CLSI) [4,5]. The identification and antimicrobial susceptibility of viridans Streptococci was preformed by the use of API (BioMérieux) and the use of the Kirby-Bauer method. Fungi were identified with the use of the specific card for the Vitek 2 system. Susceptibility to colistin was tested by the Vitek method and the Etest. Pulsed field gel electrophoresis and ribotyping were not performed to exclude secondary outbreak strains.

Statistical analysis

Differences in proportions were compared by x^2 test or Fisher's exact test where appropriate. Statistical significance was set for p < 0.05. All statistical analyses were performed using SPSS 11.0 and S-PLUS 6.1 Professional.

Results

The frequency of isolation of bacteria from cultures of blood specimens was 182 per 12,593 admissions during 2001 (14.4 per 1,000 admissions), 507 per 25,865 admissions during 2002 (19.6 per 1,000 admissions), 693 per 30,597 admissions during 2003 (22.6 per 1,000 admissions), 566 per 30,599 admissions during 2004 (18.4 per 1,000 admissions) and 208 per 15,683 admissions during 2005 (13.2 per 1,000 admissions). There was a significant difference in the proportion of isolates identified over the 5year period (p < 0.001). The percentage of positive blood cultures to the total number of blood cultures was 4.84% for the year 2001, 6.46% for 2002, 7.91% for 2003, 6.71% for 2004 and 5.7% for 2005. Regarding the relative frequency of the bacteria isolated from blood specimens, Gram-positive bacteria were more common than Gramnegative bacteria throughout the study period (Table 1). Coagulase negative staphylococci were the commonest blood isolates (52.5 % of total). The relative frequency of other Gram-positive and Gram-negative microorganisms was the following, in descending order: Escherichia coli (8.9 %), Staphylococcus aureus (5.9 %), Pseudomonas aeruginosa (5.2 %), Klebsiella spp (4.8 %), Acinetobacter baumannii (4.1 %), Enterococcus faecalis (2.2 %), and Enterococcus faecium (1.8 %). In Table 2 we summarized

the relative frequency of blood isolates by service, namely wards and intensive care unit.

We compared the antimicrobial resistance of blood isolates of two periods: the first period was 1/1/2002-31/12/ 2003 and the second period 1/1/2004-30/6/2005. The year 2001 was not included in the comparison of the antimicrobial resistance because the in vitro susceptibility data were not readily available. The antimicrobial resistance of Gram-negative bacteria isolated from blood in our hospital showed some interesting trends (Table 3). In Table 4 we present data regarding the in vitro susceptibility patterns and the respective MIC₉₀ of the isolated bacteria. Acinetobacter baumannii isolates showed an increase of resistance to amikacin (p = 0.019), ciprofloxacin (p =(0.001), imipenem (p < 0.001), and piperacillin/tazobactam(p = 0.01) between the first and second period of the study. In addition, we noted the appearance of resistance to polymyxins in one Acinetobacter baumannii isolate. Regarding the secular changes of the antimicrobial resistance of Pseudomonas aeruginosa isolates during our study, there was only one statistically significant association, namely increased resistance to ceftazidime (p = 0.016).

The antimicrobial susceptibility pattern of *Klebsiella pneumoniae* isolates changed significantly during our study. Increased resistance of *Klebsiella pneumoniae* isolates was noted for all beta lactams tested [specifically to piperacillin/tazobactam (p < 0.001), ceftazidime (p = 0.01), cefepime (p < 0.001), ceftoxitin (p < 0.001) and meropenem (p < 0.001)] between the first and second period of the study. There was also increased resistance of *Klebsiella pneumoniae* to ciprofloxacin (p = 0.006) and tobramycin (p < 0.001).

Regarding the antimicrobial susceptibility pattern of Gram-positive bacteria during our study there was a considerable proportion of staphylococci with resistance against oxacillin (Table 1); however, the difference of the proportions of oxacillin resistant staphylococci between the two study periods was not statistically significant (Table 2). We did not isolate any staphylococci with resistance to vancomycin. *Enterococcus faecalis* and *Enterococcus faecium* were generally susceptible to vancomycin although some strains were resistant; however the difference of the proportions of VRE between the two study periods was not statistically significant (Table 2).

Discussion

Patients with bacteremia have remained a challenge to treat. Knowledge of the hospital epidemiology and antimicrobial susceptibility pattern of blood isolates helps physicians to effectively manage blood stream infections. This is because considerable differences of the frequency

	Number of isolates (proportion within the year)										
Microorganism s	2001 (n = 182)	2002 (n = 506)	2003 (n = 693)	2004 (n = 566)	2005* (n = 208)	Total	p-value				
Gram-positive Coagulase- negative staphylococci	84 (46.2)	282 (55.6)	377 (54.4)	297 (52.5)	94 (45.1)	1134 (52.5)	0.03				
Staphylococcus aureus	12 (6.6)	40 (7.9)	42 (6.1)	27 (4.8)	8 (3.8)	129 (5.9)	0.16				
Enterococcus faecalis	2 (1.1)	15 (3.0)	21 (3.0)	6 (1.1)	4 (1.9)	48 (2.2)	0.09				
Enterococcus faecium	4 (2.2)	14 (2.8)	8 (1.2)	(1.9)	2 (0.9)	39 (1.8)	0.25				
Gram negative											
Escherichia coli	15 (8.2)	36 (7.1)	57 (8.2)	54 (9.5)	30 (14.4)	192 (8.9)	0.03				
Pseudomonas aeruginosa	13 (7.1)	29 (5.7)	35 (5.0)	26 (4.6)	11 (5.3)	114 (5.2)	0.72				
Acinetobacter baumannii	10 (5.5)	10 (2.0)	15 (2.2)	38 (6.7)	17 (8.2)	90 (4.1)	<0.001				
Proteus mirabilis	3 (1.7)	I (0.2)	I (0.I)	4 (0.7)	3 (1.4)	12 (0.5)	0.03				
Klebsiella spp.	5 (2.8)	17 (3.4)	39 (5.6)	33 (5.7)	11 (5.3)	105 (4.8)	0.18				
Enterobacter	4 (2.2)	8 (1.6)	24 (3.5)	9 (1.6)	3 (1.4)	48 (2.2)	0.11				
spp.											
Salmonella spp.	2 (1.1)	I (0.2)	4 (0.6)	9 (1.6)	0 (0)	16 (0.7)	0.05				
Others (include other Gram positive and Gram negative)	22 (12)	25 (4.9)	34 (4.9)	26 (4.6)	15 (7.2)	122 (5.6)	0.002				
Fungi	(2.2)	29 (5 7)	24 (F 2)	2(44)	10 (4 9)	107 (4 9)	0.74				
Canalda	6 (3.3)	27 (5.7)	36 (5.2)	26 (4.6)	10 (4.8)	107 (4.9)	0.74				

Table I: Relative frequency of blood isolates in Henry Dunant Hospital, Athens, Greece (01/01/2001-30/6/2005).

of blood isolates are reported even from hospitals of similar size and mixture of patients of the same country [6].

In this study we evaluated the secular trends of the relative frequency and antimicrobial resistance of blood isolates in a newly founded Greek hospital. Gram-positive microorganisms are the most common blood isolates. Among them, coagulase negative staphylococci are the commonest blood isolates. The percentage of coagulase negative staphylococci (%) is higher in our study than that reported in large series (31.6%) [7-9]. It is possible that the proportion of coagulase negative staphylococci that were contaminants was considerable in our study. The interpretation of blood cultures that are positive for coagulase negative staphylococci has inherent difficulties and requires careful reasoning [10]. The observed relative frequency of MRSA was considerable high during the studied period. Data from the WHONET Greece (antimicrobial surveillance system) regarding the period from January 2005 through June 2005 showed that a significant proportion of S. aureus blood isolates are resistant to methicillin (MRSA strains). Specifically, 32.6%, 55.6%, and 69% of S. aureus blood isolates from medical wards, surgical wards, and ICUs respectively were MRSA.

In general, our results about the relative frequency of blood isolates in our newly founded hospital are not substantially different from those of hospitals that are functioning for a much longer period of time. Similar data have been reported in studies performed in hospitals elsewhere in Europe as well as in North America [7-9]. An explanation may be that it is not the microbial ecology of the structure (our newly founded tertiary urban hospital compared to hospitals that are functioning for longer time) but rather the characteristics of the admitted patients like comorbidity, medications, and other host factors that play the most important role in the relative frequency of blood isolates.

It is also noteworthy that the isolation of Candida spp from the blood was not uncommon during the study period. This is in agreement with the reports from all over the world regarding a considerable prevalence of fungemia due to extensive use of antibiotics, aggressive treatment of neoplastic disease, an expanding population of patients with AIDS with prolonged survivors, use of indwelling devices for ICU monitoring, and many other factors that predispose to fungal infections [8,9]. Although our hospital does not have a transplant unit, the observed

	Number of isolates by service/total number of same species isolates within the year												
Microorgani sms	2002		2003		2004		2005*						
<u>Gram-</u> positive	Wards	ICU	Wards	ICU	Wards	ICU	Wards	ICU					
Coagulase- negative staphylococci	158/282	124/282	191/377	186/377	159/297	138/297	49/94	45/94					
Staphylococc us aureus	26/40	14/40	21/42	21/42	17/27	10/27	6/8	2/8					
Enterococcus faecalis	10/15	5/15	13/21	8/21	3/6	3/6	3/4	1/4					
Enterococcus faecium	10/14	4/14	6//8 2/8		8/11	3/11	2/2	0/2					
<u>Gram</u> negative													
Escherichia coli	27/36	9/36	48/57	9/57	49/54	5/54	28/30	2/30					
Pseudomonas aeruginosa	17/29	12/29	18/35	17/35	14/26	12/26	6/11	5/11					
Acinetobacte r baumannii	2/10	8/10	7/15	8/15	9/38	29/38	7/17	10/17					
Klebsiella spp.	12/17	5/17	25/39	14/39	14/33	19/33	4/11	7/11					

Table 2: Relative frequency of blood isolates by service in Henry Dunant Hospital, Athens, Greece (01/01/2001-30/6/2005).

high frequency of Candida isolates is probably explained by the fact that oncology patients and thus neutropenic patients constitute a significant portion of our patients.

We also evaluated in our study the trends of the antimicrobial resistance of the blood bacteria isolates in our newly founded hospital. The antimicrobial resistance of Acinetobacter baumannii showed an alarming increase during the study. Acinetobacter baumannii remained susceptible to colistin during the two periods, although the recovery of one resistant strain is of note [11,12]. Unfortunately, antimicrobial resistance increased also for Klebsiella pneumoniae for all of the 7 antibiotics it was tested for. These results are in concordance with data of the literature about the increasing antimicrobial resistance of Gram-negative bacteria [13-15]. In addition, it is noteworthy that the majority of bloodstream K. pneumoniae strains recovered in 2005 were resistant to meropenem, however this would probably reflect a nosocomial outbreak of a carbapenem-resistant K. pneumoniae clone.

We should acknowledge several limitations of our study. First, the results obtained from the Vitek II were confirmed by the E-test methodology only for colistin. Second, we did not proceed to the interpretation of the results of this study in terms of culture contamination or clinically relevant bloodstream infection. Third, pulsedfield gel electrophoresis was not performed to identify epidemic clones. Since molecular typing was not performed some of the studied isolates with antimicrobial resistance may be clonally related. Fourth, the number of patients visit the outpatient clinic of the hospital was not readily available. However, the number of positive blood cultures in the ambulatory outpatients is relatively small [16].

Conclusion

Our data suggest that the relative frequency and the antimicrobial resistance pattern of the blood isolates in a newly founded hospital is not very different from those data described in the literature from other older hospitals around the world. In addition, an alarming increase of antimicrobial resistance was noted during our study for Gram-negative bacteria, especially *Acinetobacter baumannii* and *Klebsiella pneumoniae*.

Competing interests

The author(s) declare that they have no competing interests.

Authors' contributions

MEF conceived the idea for the study. SKK, PM, GG, DN, and PIF collected the data. MEF and PIF drafted the manuscript. All authors made revisions of the manuscript and approved its final version.

References

I. Biedenbach DJ, Moet GJ, Jones RN: Occurrence and antimicrobial resistance pattern comparisons among bloodstream

Table 3: Trends of antimicrobial resistance of Gram-positive and Gram-negative bacteria.

Microorganism s 2002 2003 2004 2 005 2002/2003 2004/2005 p-value*** Gram-positive Supplyacoccu septamidio Conscillin 171/202 (84.7) 215/261 (82.4) 179/219 (81.2) 75/94 (79.8) 386/443 (83.3%) 254/313 (81.2%) 0.10 Genamicini 144/032 (71.3) 166/261 (84.4) 149/21 (87.5) 312/463 (67.4%) 20231 (87.5) 0.313 (87.5) 0.313 (87.5) 0.313 (87.5) 0.333 (87.5) 0.333 (87.5) 0.19 Gamamicin 2238 (65.5) 0.10 0.225 (0) 0.97 (0) 0.75 (9) 936 (77.5) 2766 (19.7%) 933 (72.7%) 0.22 0.22 Vancomycin 0.14 (0) 2.19 (70.0) 1.225 (9) 0.97 (0) 0.42 (9) 1.72 (46.19 (78.7)) 933 (72.3%) 0.22 0.33 (76.5) 1 0.11 Contaminin 1.93 (54.5%) 0.22 0.76 (9) 0.71 (9) 0.24 (9) 0.23 (6) 0.23 (76.5) 0.23 (76.5) 0.22 (76.6) 0.21 (76.7) 0.22 (76.6) 0.11 (70.7) 0.22 (76.6) 0.11 (77.7) 0.22 (76.6) 0.11 (77.7) 0.23 (76.5)		Number of resistant isolates/total isolates tested (proportion) within the year											
Gram-positive Supplycoccu splaternidia Clipson	Microorganism s	2002	2003	2004	2 005	2002/2003	2004/2005	p-value**					
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Gammanian Hard 2010 Double (0, 10) Diff (1, 10)	Gontamicin	1/1/202 (04.7) 1/1/202 (71.3)	213/261 (62.4) 168/261 (64.4)	1/7/217 (01.2)	73/74 (77.0) 54/94 (57.5)	312/463 (63.3%)	207/313 (01.2%)	0.10					
Stophyliceccu Case (c)	Vancomycin	0/202 (0)	0/261 (0)	0/219 (0)	0/94 (0)	0/463 (0%)	0/313 (0%)	NA					
s <i>airea</i> Oxacillin 25/58 (65.) 21/30 (70) 12/25 (48) 6/6 (75.) 46/68 (67.6%) 18/33 (54.5%) 0.19 Genamicia 23/38 (60.5) 4/30 (13.3) 6/25 (24) 3/8 (37.5) 27/68 (139.7%) 9/33 (27.3%) 0.22 Vancomycin 0/38 (0) 0/30 (0) 0/25 (0) 0/8 (0) 0/68 (0%) 0/33 (0%) 1 <i>Enterococcus</i> <i>faccolis</i> Vancomycin 0/14 (0) 2/19 (10.5) 0/7 (0) 0/4 (0) 2/33 (6.1%) 0/11 (0%) 1 <i>Enterococcus</i> <i>faccolis</i> Vancomycin 1/15 (6.7) 0/8 (0) 3/11 (27.3) 0/2 (0) 1/22 (4.5%) 3/13 (23.1%) 0.13 Carran regative Vancomycin 1/15 (6.7) 0/8 (0) 3/11 (27.3) 0/2 (0) 1/22 (4.5%) 3/13 (23.1%) 0.13 Carran regative Vancomycin 1/15 (6.7) 0/8 (0) 3/11 (27.3) 0/2 (0) 1/22 (4.5%) 5/152 (98.1%) 0.09 Carran regative Vancomycin 6/9 (66.6) 10/15 (66.6) 32/35 (91.4) 15/17 (88.2) 16/24 (66.7%) 47/52 (90.4%) 0.019 Carran regative Vancomycin 6/9 (66.6) 10/15 (66.6) 3/4/35 (97.1) 17/17 (100) 12/12 (87.5%) 5/152 (98.1%) 0.09 Ciperofloxacin 6/9 (66.6) 11/15 (73.3) 3/435 (97.1) 17/17 (100) 12/12 (87.5%) 5/152 (98.1%) 0.09 Ciperofloxacin 4/9 (44.4) 10/15 (00) 0/35 (0) 11/17 (58) 0/24 (0%) 1/52 (98.1%) 0.001 Ciperofloxacin 4/9 (44.4) 10/15 (66.6) 14/35 (45.7) 12/17 (70.5) 14/24 (68.3%) 12/52 (98.1%) 0.001 Piperacillin/ 7/9 (77.7) 12/15 (80) 3/435 (97.1) 17/17 (100) 12/24 (79.3%) 5/152 (98.1%) 0.01 Tazabactam <i>audiation</i> 15/32 (46.9) 15/33 (45.5) 17/25 (68) 4/11 (36.4) 3/0165 (46.2%) 21/36 (58.3%) 0.24 Cartacidime 18/32 (56.3) 19/33 (57.6) 21/25 (68) 5/11 (45.4) 3/465 (54.2%) 21/36 (58.3%) 0.016 Cartacidime 18/32 (26.3) 19/33 (57.6) 21/25 (68) 5/11 (45.4) 3/465 (54.2%) 21/36 (58.3%) 0.016 Cartacidime 0/32 (0) 0/33 (0) 0/25 (0) 0/11 (0) 0/65 (6%) 21/36 (6%) 1 Carbacidime 0/32 (0) 0/33 (0) 0/25 (0) 0/11 (16.4) 13/41 (31.7%) 22/40 (60%) 0.006 Cefoptine 0/7 (0) 11/34 (22.4) 15/29 (51.7) 9/11 (81.8) 13/41 (31.7%) 22/40 (60%) 0.006 Cefoptine 0/7 (0) 11/34 (23.4) 15/29 (51.7) 9/11 (81.8) 13/41 (31.7%) 22/40 (60%) 0.006 Cefoptine 0/7 (0) 11/34 (23.5) 15/29 (51.7) 9/11 (81.8) 13/41 (31.7%) 22/40 (60%) 0.006 Cefoptine 0/7 (0) 11/34 (23.5) 15/29 (51.7) 9/11 (81.8) 13/41 (31.7%) 22/40 (60%) 0.	Stabhylococcu	0/202 (0)	0/201 (0)	0/217 (0)	0/71(0)	0/105 (0/0)	0/313 (0/0)						
Oxacillin 25/38 (65.8) 21/30 (70) 12/25 (48) 6/8 (75) 4/66 (67.6%) 19/33 (64.5%) 0.19 Centamicin 0/38 (0) 0/30 (0) 0/25 (0) 0/8 (0) 0/68 (97.5) 27/66 (39.7%) 9/33 (0%) 0.22 Vancomycin 0/13 (0) 0/30 (0) 0/25 (0) 0/4 (0) 2/33 (6.1%) 0/11 (0%) 1 Enteroscecus Factoria Vancomycin 0/14 (0) 2/19 (10.5) 0/7 (0) 0/4 (0) 2/33 (6.1%) 0/11 (0%) 1 Vancomycin 1/15 (6.7) 0/8 (0) 3/11 (27.3) 0/22 (0) 1/22 (4.5%) 3/13 (23.1%) 0.019 Gradinanegative Actinetobacter Vancomycin 1/15 (6.7) 0/8 (0) 3/11 (27.3) 0/22 (7) 1/17 (100) 1/22 (4.5%) 3/13 (23.1%) 0.019 Cefazidine 6/9 (66.6) 10/15 (66.6) 3/235 (97.1) 17/17 (100) 1/24 (70.8%) 5/152 (98.1%) 0.001 Celarizinin 1/9 (11.1) 0/15 (66.6) 3/35 (97.1) 17/17 (100) 1/224 (79.2%) 5/152 (98.1%)	s aureus												
Gentamicin 23/38 (60.5) 4/30 (13.3) 6/25(24) 3/8 (37.5) 27/68 (37.7) 9/33 (27.3%) 0.22 Ancomycin 0/38 (0) 0/30 (0) 0/25 (0) 0/8 (0) 0/68 (0%) 0/33 (0%) 1 Enterosoccus faecalis Vancomycin 0/14 (0) 2/19 (10.5) 0/7 (0) 0/4 (0) 2/33 (6.1%) 0/11 (0%) 1 Enterosoccus faecalis Vancomycin 1/15 (6.7) 0/8 (0) 3/11 (27.3) 0/2 (0) 1/22 (4.5%) 3/13 (23.1%) 0.13 Gram negative Acinetobacter baumannii Amikacin 6/9 (66.6) 10/15 (66.6) 3/2/35 (91.1) 17/17 (100) 21/24 (65.7%) 5/152 (98.1%) 0.019 Cefrazidine 8/9 (88.8) 13/15 (86.6) 3/4/35 (97.1) 17/17 (100) 17/24 (70.8%) 5/152 (98.1%) 0.09 Ciprofloxacin 6/9 (66.6) 11/15 (66.6) 16/35 (97.1) 17/17 (100) 17/24 (70.8%) 5/152 (98.1%) 0.09 Ciprofloxacin 6/9 (66.6) 11/15 (66.6) 16/35 (97.1) 17/17 (100) 17/24 (70.8%) 5/152 (98.1%) 0.09 Ciprofloxacin 1/9 (11.1) 0/15 (0) 0/35 (0) 11/17 (5.8) 0/24 (87.5%) 2/152 (98.1%) 0.09 Ciprofloxacin 1/9 (14.4) 10/15 (66.6) 16/35 (45.7) 12/17 (100) 12/24 (50.3%) 2/152 (98.1%) 0.001 Colistin 1/9 (14.4) 10/15 (66.6) 16/35 (45.7) 12/17 (100) 12/24 (50.3%) 2/152 (98.1%) 0.001 Tazobactam Peuedomonas eruginos Amikacin 15/32 (46.9) 15/33 (45.5) 17/25 (68) 4/11 (36.4) 30/65 (46.2%) 2/1/36 (58.3%) 0.014 Ciprofloxacin 2/32 (62.5) 14/33 (42.4) 17/25 (68) 5/11 (45.4) 34/65 (52.3%) 2/1/36 (58.3%) 0.014 Ciprofloxacin 1/32 (26.3) 19/33 (57.6) 2/125 (80) 4/11 (26.4) 34/65 (52.3%) 2/1/36 (58.3%) 0.016 Ciprofloxacin 1/32 (26.5) 14/33 (42.4) 15/25 (20) 5/11 (45.4) 34/65 (52.3%) 2/1/36 (58.5%) 0.75 Peuedomonas eruginos Ciprofloxacin 1/7 (14.3) 12/24 (33.3) 16/29 (52.7) 9/11 (81.8) 13/41 (31.7%) 2/4/40 (60%) 0.010 Ciprofloxacin 1/7 (14.3) 12/24 (33.3) 16/29 (52.7) 9/11 (81.8) 13/41 (31.7%) 2/4/40 (60%) 0.010 Ciprofloxacin 1/7 (14.3) 12/24 (33.3) 16/29 (52.7) 9/11 (81.8) 13/41 (31.7%) 2/4/40 (60%) 0.010 Ciprofloxacin 1/7 (14.3) 12/24 (33.3) 16/29 (52.7) 9/11 (81.8) 13/41 (31.7%) 2/4/40 (60%) 0.0010 Ciprofloxacin 1/7 (14.3) 12/4 (33.3) 16/29 (52.7) 9/11 (81.8) 13/41 (31.7%) 2/4/40 (60%) 0.0010 Ciprofloxacin 1/7 (14.3) 2/4 15/29 (51.7) 9/11 (81.8)	Oxacillin	25/38 (65.8)	21/30 (70)	12/25 (48)	6/8 (75)	46/68 (67.6%)	18/33 (54.5%)	0.19					
Vancemycin 0/38 (0) 0/30 (0) 0/25 (0) 0/8 (0) 0/68 (0%) 0/33 (0%) I Entereococus faccula Vancemycin 0/14 (0) 2/19 (10.5) 0/7 (0) 0/4 (0) 2/33 (6.1%) 0/11 (0%) I Entereococus faccum Vancemycin 1/15 (6.7) 0/8 (0) 3/11 (27.3) 0/2 (0) 1/22 (4.5%) 3/13 (23.1%) 0.13 Gran megative Acinetobacter Vancemycin 1/15 (6.6.1 0/15 (66.6) 3/15 (86.6) 3/15 (77.1) 17/17 (100) 17/24 (87.5%) 5/152 (98.1%) 0.09 Celropfoxacin 6/9 (66.6.1 11/15 (7.3) 3/435 (97.1) 17/17 (100) 17/24 (70.8%) 5/152 (98.1%) 0.09 Colprofloxacin 1/9 (14.4) 0/15 (0.6 0/35 (0) 1/17 (70.5) 1/424 (45.83.3) 2/85 (23.8%) 0.71 Impenem 4/9 (44.4) 0/15 (6.6.6) 1/35 (24.67.7) 1/17 (100) 1/224 (70.8%) 5/152 (98.1%) 0.001 Taobatam Pareudomoas arranginas 1/33 (32.1%) 1/31 (32.1%) 0.11 Ceftazidime <td>Gentamicin</td> <td>23/38 (60.5)</td> <td>4/30 (13.3)</td> <td>6/25(24)</td> <td>3/8 (37.5)</td> <td>27/68 (39.7%)</td> <td>9/33 (27.3%)</td> <td>0.22</td>	Gentamicin	23/38 (60.5)	4/30 (13.3)	6/25(24)	3/8 (37.5)	27/68 (39.7%)	9/33 (27.3%)	0.22					
Enterosoccus Vancomycin 0/14 (0) 2/19 (10.5) 0/7 (0) 0/4 (0) 2/33 (6.1%) 0/11 (0%) 1 Enterosoccus facture Staron.negative Acinetobacter baumanni Amilacin 6/9 (66.6) 10/15 (66.6) 32/13 (91.4) 15/17 (88.2) 16/24 (66.7%) 47/52 (90.4%) 0.019 Cefrazidine 8/9 (88.8) 13/15 (86.6) 34/35 (97.1) 17/17 (100) 12/24 (87.5%) 51/52 (98.1%) 0.001 Ciperofloxacin 6/9 (66.6) 10/15 (66.6) 32/35 (97.1) 17/17 (100) 12/24 (87.5%) 51/52 (98.1%) 0.001 Ciperofloxacin 6/9 (66.6) 11/15 (66.6) 16/35 (45.7) 12/17 (70.5) 14/24 (87.3%) 25/52 (98.1%) 0.001 Ciperofloxacin 6/9 (66.6) 11/15 (66.6) 16/35 (45.7) 12/17 (70.5) 14/24 (83.3%) 28/52 (53.8%) 0.71 Imipenem 4/9 (44.4) 10/15 (66.6) 16/35 (45.7) 12/17 (70.5) 14/24 (83.3%) 28/52 (53.8%) 0.71 Imipenem 4/9 (44.4) 10/15 (66.6) 16/35 (45.7) 12/17 (70.5) 14/24 (83.3%) 28/52 (53.8%) 0.71 Imipenem 4/9 (44.4) 10/15 (66.6) 16/35 (45.7) 12/17 (70.5) 14/24 (50.3%) 51/52 (98.1%) 0.001 Pereudomons <i>aeruginosa</i> <i>aeruginosa</i> <i>aeruginosa</i> Cefrazidime 18/32 (56.3) 15/33 (45.5) 17/25 (68) 4/11 (36.4) 30/65 (46.2%) 11/36 (63.3%) 0.24 Cefrazidime 18/32 (56.3) 19/33 (57.5) 12/25 (80) 8/11 (72.7) 37/65 (56.5%) 29/36 (61.6%) 0.16 Ciperofloxacin 02/32 (62.5) 14/33 (42.4) 17/25 (68) 5/11 (45.4) 34/65 (52.3%) 20/36 (61.5%) 0.75 Piperacillin 02/32 (62.5) 14/33 (42.4) 15/25 (60) 5/11 (45.4) 34/65 (52.3%) 20/36 (65.5%) 0.75 Piperacillen 18/32 (56.3) 17/33 (21.2) 18/25 (72) 2/11 (18.2) 10/65 (15.4%) 2/40 (60%) 0.0016 Ciperofloxacin 17/7 (14.3) 12/34 (35.3) 16/29 (57.7) 9/11 (81.8) 13/41 (31.7%) 2/4/0 (60%) 0.0016 Ciperofloxacin 17/7 (14.3) 12/34 (35.3) 16/29 (57.7) 9/11 (81.8) 13/41 (31.7%) 2/4/0 (60%) 0.0016 Ciperofloxacin 17/7 (14.3) 12/34 (32.4) 15/29 (51.7) 9/11 (81.8) 13/41 (31.7%) 2/40 (60%) 0.0016 Ciperofloxacin 17/7 (14.3) 12/34 (35.3) 15/29 (51.7) 9/11 (81.8) 13/41 (31.7%) 2/40 (60%) 0.0016 Ciperofloxacin 17/7 (14.3) 12/34 (35.3) 15/29 (51.7) 9/11 (81.8) 13/41 (31.7%) 2/40 (60%) 0.0016 Ciperofloxacin 0/7 (0) 11/34 (32.4) 15/29 (51.7) 9/11 (81.8) 13/41 (31.7%) 2/40 (60%) 0.0016 Cipero	Vancomycin	0/38 (0)	0/30 (0)	0/25 (0)	0/8 (0)	0/68 (0%)	0/33 (0%)	I					
Vancomycin 0/14 (b) 2/19 (10.5) 0/7 (b) 0/4 (b) 2/33 (6.1%) 0/11 (0%) 1 Enterococcus Faccimons 5 7 6 5 7 5	Enterococcus faecalis												
Enterococcus foreclum Vancomycin I/15 (6.7) 0/8 (0) 3/11 (27.3) 0/2 (0) 1/22 (4.5%) 3/13 (23.1%) 0.13 Gram negative Acinetobacter boundarii Acinetobacter boundarii Acinetobacter boundarii Amilacin 6/9 (66.6) 10/15 (66.6) 32/35 (91.4) 15/17 (88.2) 16/24 (66.7%) 47/52 (90.4%) 0.019 Cefazidime 8/9 (88.8) 13/15 (86.6) 34/35 (97.1) 17/17 (100) 12/24 (75.3%) 51/52 (98.1%) 0.091 Ciprofloxacin 4/9 (41.4) 10/15 (06.6) 16/35 (45.7) 12/17 (70.5) 14/24 (58.3%) 24/52 (53.8%) 0.711 Imipenem 4/9 (41.4) 10/15 (66.6) 16/35 (45.7) 12/17 (70.5) 14/24 (59.%) 15/52 (98.1%) 0.001 Colistin 1/9 (11.1) 0/15 (0) 0/35 (0) 1/17 (18.8) 0/24 (0%) 1/52 (0%) 1/ Gentamicin 4/9 (44.4) 8/15 (53.3) 34/35 (97.1) 17/17 (100) 19/24 (79.2%) 51/52 (98.1%) 0.011 Tazabactam Pseudomonas euroginas Hacian 15/32 (46.9) 15/33 (45.7) 12/17 (70.5) 14/24 (59.%) 51/52 (98.1%) 0.011 Cefazidime 18/32 (56.3) 19/33 (57.6) 21/725 (68) 4/11 (36.4) 30/65 (46.2%) 21/36 (58.3%) 0.24 Cefazidime 18/32 (56.3) 19/33 (57.6) 21/725 (68) 4/11 (36.4) 30/65 (46.2%) 21/36 (80.6%) 0.016 Cefazidime 18/32 (56.3) 19/33 (42.4) 15725 (60) 5/11 (45.4) 34/65 (52.3%) 22/36 (80.6%) 0.03 Cefazidime 0/32 (0) 0/33 (0) 0/25 (0) 0/11 (0) 0/65 (15.4%) 20/36 (55.5%) 0.10 Tazabactam 10/32 (0) 0/33 (0) 0/25 (0) 0/11 (18.8) 13/41 (31.7%) 24/40 (60%) 0.016 Ciprofloxacin 0/32 (0) 0/33 (0) 0/25 (0) 0/11 (18.8) 13/41 (31.7%) 24/40 (60%) 0.006 Meropenem 0/7 (0) 11/34 (32.4) 15/29 (51.7) 9/11 (81.8) 13/41 (31.7%) 24/40 (60%) <0.001 Ciprofloxacin 17/7 (14.3) 12/34 (35.3) 16/29 (55.7) 9/11 (81.8) 13/41 (31.7%) 24/40 (60%) <0.001 Ciprofloxacin 0/7 (0) 13/4 (32.4) 15/29 (51.7) 9/11 (81.8) 13/41 (31.7%) 24/40 (60%) <0.001 Ciprofloxacin 0/7 (0) 13/4 (32.4) 15/29 (51.7) 9/11 (81.8) 13/41 (31.7%) 24/40 (60%) <0.001 Ciprofloxacin 0/7 (0) 13/4 (32.4) 15/29 (51.7) 9/11 (81.8) 13/41 (31.7%) 24/40 (60%) <0.001 Ciprofloxacin 0/7 (0) 13/4 (32.4) 15/29 (51.7) 9/11 (81.8) 13/41 (31.7%) 24/40 (60%) <0.001 Ciprofloxacin 0/7 (0) 13/4 (32.4) 15/29 (51.7) 9/11 (81.8) 8/41 (19.5%) 24/40 (60%) <0.	Vancomycin	0/14 (0)	2/19 (10.5)	0/7 (0)	0/4 (0)	2/33 (6.1%)	0/11 (0%)	I					
Vancomycin 1/15 (6.7) 0/8 (0) 3/11 (27.3) 0/2 (0) 1/22 (4.5%) 3/13 (23.1%) 0.13 Gram negative Acinetobacter bumannii Acinetobacter bumannii A Cefrazidime 8/9 (88.8) 13/15 (86.6) 32/35 (91.4) 15/17 (180.2) 16/24 (66.7%) 47/52 (90.4%) 0.019 Cefrazidime 8/9 (88.8) 13/15 (86.6) 34/35 (97.1) 17/17 (100) 17/24 (70.8%) 51/52 (98.1%) 0.09 Clipstin 1/9 (11.1) 0/15 (05.3) 34/35 (97.1) 17/17 (100) 12/24 (70.8%) 51/52 (98.1%) 0.001 Gentamicin 4/9 (44.4) 8/15 (53.3) 34/35 (97.1) 17/17 (100) 12/24 (50.3%) 2/152 (98.1%) 0.01 Piperacillin/ 7/9 (77.7) 12/15 (80) 34/35 (97.1) 17/17 (100) 12/24 (50.2%) 51/52 (98.1%) 0.01 Piseudomona arroginos arroginos arroginos arroginos 0.17 0.13 3/16 (54.2%) 2/136 (66.1%) 0.24 Cefrazidime 15/32 (46.9) 15/33 (45.5) 17/25	Enterococcus faecium												
Gram negative Acinetobacter Charlen Control Charlen Control Control Control Amikacin 6/9 (66.6) 10/15 (66.6) 32/35 (91.4) 15/17 (88.2) 16/24 (66.7%) 47/52 (90.4%) 0.019 Cefrazdime 8/9 (88.8) 13/15 (86.6) 34/35 (97.1) 17/17 (100) 17/24 (70.8%) 51/52 (98.1%) 0.001 Colstin 1/9 (11.1) 0.15 (0) 0/35 (0) 1/17 (5.8) 0/24 (90%) 1/52 (98.1%) 0.001 Colstin 1/9 (14.4) 10/15 (66.6) 16/35 (45.7) 1/17 (100) 1/2/24 (50.%) 51/52 (98.1%) <0.001	Vancomycin	1/15 (6.7)	0/8 (0)	3/11 (27.3)	0/2 (0)	1/22 (4.5%)	3/13 (23.1%)	0.13					
Amikacin 6/9 (66.6) 10/15 (66.6) 32/35 (91.4) 15/17 (88.2) 16/24 (66.7%) 47/52 (90.4%) 0.019 Ceftazidime 8/9 (88.8) 13/15 (86.6) 34/35 (97.1) 17/17 (100) 17/24 (77.5%) 51/52 (98.1%) 0.091 Colistin 1/9 (11.1) 0/15 (0) 0/35 (0) 1/17 (5.8) 0/24 (0%) 1/52 (0%) 1/ Gentamicin 4/9 (44.4) 10/15 (66.6) 16/33 (45.7) 12/17 (70.5) 14/24 (58.3%) 28/52 (53.8%) 0.71 Imipenem 4/9 (44.4) 80/15 (53.3) 34/35 (97.1) 17/17 (100) 12/24 (70.5%) 51/52 (98.1%) 0.001 Piperacillin/ 7/9 (77.7) 12/15 (80) 34/35 (97.1) 17/17 (100) 12/24 (70.5%) 51/52 (98.1%) 0.001 Tazobactam Pseudomonos arruginosa Amikacin 15/32 (46.9) 15/33 (45.5) 17/25 (68) 4/11 (36.4) 30/65 (46.2%) 21/36 (58.3%) 0.24 Ceftazidime 18/32 (56.3) 19/33 (57.6) 21/25 (68) 4/11 (36.4) 30/65 (46.2%) 21/36 (86.%) 0.016 Ciprofloxacin 20/32 (62.5) 14/33 (42.4) 17/25 (68) 5/11 (45.4) 34/65 (52.3%) 22/36 (80.6%) 0.016 Ciprofloxacin 20/32 (62.5) 14/33 (42.4) 17/25 (68) 5/11 (45.4) 34/65 (52.3%) 22/36 (81.1%) 0.39 Colistin 0/32 (0) 0/33 (0) 0/25 (0) 0/11 (0) 0/65 (0%) 0/36 (0%) I Imipenem 20/32 (62.5) 14/33 (42.4) 15/25 (60) 5/11 (45.4) 34/65 (52.3%) 20/36 (55.5%) 0.75 Piperacillin/ 3/32 (9.4) 7/33 (21.2) 18/25 (72) 2/11 (18.2) 10/65 (15.4%) 20/36 (55.5%) 0.10 Tazobactam Klebsiella pneumonice Ceftazidime 2/7 (28.6) 11/34 (32.4) 15/29 (51.7) 9/11 (81.8) 13/41 (31.7%) 24/40 (60%) 0.010 Ciprofloxacin 1/7 (14.3) 12/34 (53.3) 16/29 (55.2) 4/11 (36.4) 13/41 (31.7%) 24/40 (60%) <0.001 Ciprofloxacin 1/7 (10) 11/34 (23.4) 15/29 (51.7) 9/11 (81.8) 11/41 (24.5%) 24/40 (60%) <0.001 Ceftazidime 2/7 (00) 11/34 (2.9) 18/29 (51.7) 9/11 (81.8) 11/41 (24.5%) 24/40 (60%) <0.001 Ciprofloxacin 1/7 (10) 11/34 (23.5) 15/29 (51.7) 9/11 (81.8) 11/41 (24.5%) 24/40 (60%) <0.001 Ciprofloxacin 1/7 (10) 11/34 (23.5) 15/29 (51.7) 9/11 (81.8) 11/41 (24.5%) 24/40 (60%) <0.001 Ceftazidime 0/35 (0) 0/57 (0) 4/47 (8.5) 9/30 (30) 10/92 (0%) 5/77 (6.5%) 0.005 Ciprofloxacin 7/35 (0.2) 3/57 (5.2) 4/47 (8.5) 9/30 (30) 10/92 (0.5%) 13/77 (16.5%) 0.006 Ciprofloxacin 7/35 (0.2) 3/57 (5.2) 4/47 (8.5) 9/3	<u>Gram negative</u> Acinetobacter baumannii			()			(,						
Ceftzzidime 8/9 (88.8) 13/15 (86.6) 34/35 (97.1) 17/17 (100) 21/24 (87.5%) 51/52 (98.1%) 0.09 Ciprofloxacin 6/9 (66.6) 11115 (73.3) 34/35 (97.1) 17/17 (100) 17/24 (70.8%) 51/52 (98.1%) 0.001 Colistin 1/9 (11.1) 0/15 (00 0/35 (0) 1/17 (5.8) 0/24 (07.8%) 1/52 (0%) 1/17 (100) 1/224 (0%) 51/52 (98.1%) 0.001 Pacedomons Earginos Earginos Earginos 2/136 (56.5%) 2/136 (66.5%) 0.16 0.16 0.17 (1/133 (1/172) 1/152 (68) 5/11 (45.4) 3/465 (52.3%) 2/36 (61.5%) 0.16 Ceftazidine 20/32 (62.5) 1/433 (42.4) 17/25 (68) 5/1/1 (45.4) 3/465 (52.3%)	Amikacin	6/9 (66.6)	10/15 (66.6)	32/35 (91.4)	15/17 (88.2)	6/24 (66.7%)	47/52 (90.4%)	0.019					
Ciprofloxacin 6/9 (66.6) 11/15 (73.3) 34/35 (97.1) 17/17 (100) 17/24 (70.8%) 51/52 (98.1%) 0.001 Colistin 1/9 (11.1) 0/15 (0) 0/35 (0) 1/17 (5.8) 0/24 (0%) 1/52 (0%) 1 Gentamicin 4/9 (44.4) 10/15 (66.6) 16/35 (45.7) 12/17 (70.5) 14/24 (58.3) 28/52 (53.8%) 0.001 Piperacillin/ 7/9 (77.7) 12/15 (80) 34/35 (97.1) 17/17 (100) 19/24 (79.2%) 51/52 (98.1%) 0.001 Tazobactam Pseudomonas aeruginosa -	Ceftazidime	8/9 (88.8)	13/15 (86.6)	34/35 (97.1)	17/17 (100)	21/24 (87.5%)	51/52 (98.1%)	0.09					
Colistin 1/9 (11.1) 0/15 (0) 0/35 (0) 1/17 (5.8) 0/24 (0%) 1/52 (0%) 1 Gentamicin 4/9 (44.4) 10/15 (66.6) 16/35 (45.7) 12/17 (70.5) 14/24 (58.3%) 28/52 (53.8%) 0.71 Piperacillin/ 7/9 (77.7) 12/15 (80) 34/35 (97.1) 17/17 (100) 12/24 (79.2%) 51/52 (98.1%) 0.01 Piperacillin/ 7/9 (77.7) 12/15 (80) 34/35 (97.1) 17/17 (100) 19/24 (79.2%) 51/52 (98.1%) 0.01 Pseudomonas aeruginosa - <td>Ciprofloxacin</td> <td>6/9 (66.6)</td> <td>11/15 (73.3)</td> <td>34/35 (97.I)</td> <td>17/17 (100)</td> <td>17/24 (70.8%)</td> <td>51/52 (98.1%)</td> <td>0.001</td>	Ciprofloxacin	6/9 (66.6)	11/15 (73.3)	34/35 (97.I)	17/17 (100)	17/24 (70.8%)	51/52 (98.1%)	0.001					
Gentamicin 4/9 (44.4) 10/15 (66.6) 16/35 (45.7) 12/17 (70.5) 14/24 (58.3%) 28/52 (53.8%) 0.71 Imipenem 4/9 (44.4) 8/15 (53.3) 34/35 (97.1) 17/17 (100) 19/24 (50.%) 51/52 (98.1%) <0.01	Colistin	1/9 (11.1)	0/15 (0)	0/35 (0)	1/17 (5.8)	0/24 (0%)	1/52 (0%)	I					
Imipenem 4/9 (44.4) 8/15 (53.3) 34/35 (97.1) 17/17 (100) 12/24 (50%) 51/52 (98.1%) <0.01 Piperacillin/ 7/9 (77.7) 12/15 (80) 34/35 (97.1) 17/17 (100) 19/24 (79.2%) 51/52 (98.1%) 0.01 Pseudomonas aeruginosa Amikacin 15/32 (46.9) 15/33 (45.5) 17/25 (68) 4/11 (36.4) 30/65 (46.2%) 21/36 (58.3%) 0.24 Ceftazidime 18/32 (56.3) 19/33 (57.6) 21/25 (68) 5/11 (45.4) 34/65 (52.3%) 22/36 (61.1%) 0.39 Colistin 0/32 (0 0/33 (0) 0/25 (0) 0/11 (0) 0/65 (0%) 0/36 (0%) 1 Imipenem 20/32 (62.5) 14/33 (42.4) 15/25 (60) 5/11 (45.4) 34/65 (52.3%) 20/36 (55.5%) 0.75 Piperacillin/ 3/32 (9.4) 7/33 (21.2) 18/25 (72) 2/11 (18.2) 10/65 (15.4%) 20/36 (55.5%) 0.10 Ceftazidime 2/7 (28.6) 11/34 (32.4) 15/29 (51.7) 9/11 (81.8) 13/41 (31.7%) 24/40 (60%) 0.001 Cieporiboxacin<	Gentamicin	4/9 (44.4)	10/15 (66.6)	16/35 (45.7)	12/17 (70.5)	14/24 (58.3%)	28/52 (53.8%)	0.71					
Piperacillin/ 7/9 (77.7) 12/15 (80) 34/35 (97.1) 17/17 (100) 19/24 (79.2%) 51/52 (98.1%) 0.01 Tazobactam Pseudomonas aeruginosa Amikacin 15/32 (46.9) 15/33 (45.5) 17/25 (68) 4/11 (36.4) 30/65 (46.2%) 21/36 (58.3%) 0.24 Ceftazidime 18/32 (56.3) 19/33 (57.6) 21/25 (84) 8/11 (72.7) 37/65 (56.9%) 29/36 (80.6%) 0.016 Ciprofloxacin 20/32 (62.5) 14/33 (42.4) 17/25 (68) 5/11 (45.4) 34/65 (52.3%) 20/36 (05.5%) 1 Imipenem 20/32 (62.5) 14/33 (42.4) 15/25 (60) 5/11 (45.4) 34/65 (52.3%) 20/36 (55.5%) 0.75 Piperacillin/ 3/32 (9.4) 7/33 (21.2) 18/25 (72) 2/11 (18.2) 10/65 (15.4%) 20/36 (55.5%) 0.10 Tazobactam Klebsiella pneumoniae Ceftazidime 2/7 (28.6) 11/34 (32.4) 15/29 (51.7) 9/11 (81.8) 13/41 (31.7%) 24/40 (60%) 0.010 Ciprofloxacin 1/7 (14.3) 12/34 (35.3) 16/29 (55.2) 4/11 (36.4) 13/41 (31.7%) 24/40 (60%) 0.006 Meropenem 0/7 (0) 11/34 (2.9) 8/29 (27.6) 9/11 (81.8) 11/41 (2.4%) 17/40 (42.5%) <0.001 Cefepime 0/7 (0) 11/34 (32.4) 15/29 (51.7) 9/11 (81.8) 11/41 (2.4%) 17/40 (67.5%) <0.001 Cefepime 0/7 (0) 11/34 (2.9) 8/29 (27.6) 9/11 (81.8) 11/41 (2.4%) 27/40 (67.5%) <0.001 Cefepime 0/7 (0) 11/34 (2.9) 8/29 (27.6) 9/11 (81.8) 11/41 (2.4%) 27/40 (67.5%) <0.001 Cefoxitin 0/7 (0) 8/34 (23.5) 15/29 (51.7) 9/11 (81.8) 10/41 (24.4%) 27/40 (67.5%) <0.001 Tobramycin 0/7 (0) 8/34 (23.5) 15/29 (51.7) 9/11 (81.8) 8/41 (19.5%) 26/40 (65%) <0.001 Tazobactam Escherichia coli Amikacin 0/35 (0) 0/57 (0) 4/47(8.5) 9/30(3) 10/92 (0.9%) 5/77 (6.5%) 0.05 Ciprofloxacin 7/35 (0.2) 3/57 (5.2) 4/47(8.5) 9/30(3) 10/92 (0.9%) 5/77 (6.5%) 0.05 Ciprofloxacin 7/35 (0.2) 3/57 (0) 4/47(8.5) 9/30(3) 10/92 (0.9%) 5/77 (6.5%) 0.05 Ciprofloxacin 7/35 (0.2) 3/57 (0) 4/47(8.5) 9/30(3) 10/92 (0.9%) 5/77 (6.5%) 0.05 Ciprofloxacin 2/35 (5.7) 0/57 (0) 4/47(8.5) 5/30(16.6) 2/92 (2.2%) 9/77 (11.7%) 0.02 Cefoxitin 4/35 (11.4) 1/57 (1.7) 4/47(8.5) 5/30(16.6) 2/92 (2.2%) 9/77 (11.7%) 0.02 Cefoxitin 4/35 (2.8) 0/57 (0) 1/47(2.1) 0/30(0) 1/92 (1.1%) 1/77 (1.3%) 0.52	Imipenem	4/9 (44.4)	8/15 (53.3)	34/35 (97.1)	17/17 (100)	12/24 (50%)	51/52 (98.1%)	<0.001					
1azobactam Pseudomonasi aeruginosa Amikacin 15/32 (46.9) 15/33 (45.5) 17/25 (68) 4/11 (36.4) 30/65 (46.2%) 21/36 (58.3%) 0.24 Ceftazidime 18/32 (56.3) 19/33 (57.6) 21/25 (64) 8/11 (72.7) 37/65 (56.9%) 29/36 (80.6%) 0.016 Ciprofloxacin 20/32 (62.5) 14/33 (42.4) 17/25 (68) 5/11 (45.4) 34/65 (52.3%) 22/36 (61.1%) 0.39 Colistin 0/32 (0) 0/33 (0) 0/25 (0) 0/11 (0) 0/65 (15.4%) 20/36 (55.5%) 0.75 Piperacillin/ 3/32 (9.4) 7/33 (21.2) 18/25 (72) 2/11 (18.4) 13/41 (31.7%) 24/40 (60%) 0.010 Tazobactam Klebsiella pneumoniae 0.10 Ceftazidime 2/7 (28.6) 11/34 (32.4) 15/29 (51.7) 9/11 (81.8) 13/41 (31.7%) 24/40 (60%) 0.010 Ceftazidime 0/7 (0) 1/34 (2.9) 8/29 (52.1) 9/11 (81.8) 11/41 (24.8%) 27/40 (67.5%) 0.001 Ceftazidime 0/7 (0) 1/34 (2.9) 8/29 (52.1) 9/	Piperacillin/	7/9 (77.7)	12/15 (80)	34/35 (97.1)	17/17 (100)	19/24 (79.2%)	51/52 (98.1%)	0.01					
Precuomonas aeruginosa Amikacin 15/32 (46.9) 15/33 (45.5) 17/25 (68) 4/11 (36.4) 30/65 (46.2%) 21/36 (58.3%) 0.24 Ceftazidime 18/32 (56.3) 19/33 (57.6) 21/25 (84) 8/11 (72.7) 37/65 (56.9%) 29/36 (80.6%) 0.016 Ciprofloxacin 20/32 (62.5) 14/33 (42.4) 17/25 (68) 5/11 (45.4) 34/65 (52.3%) 22/36 (61.1%) 0.39 Colistin 0/32 (0) 0/33 (0) 0/25 (0) 0/11 (0) 0/65 (50%) 0/36 (0%) 1 Imipenem 20/32 (62.5) 14/33 (42.4) 15/25 (60) 5/11 (45.4) 34/65 (52.3%) 20/36 (55.5%) 0.10 Tazobactam Tazobactam 1/7 (18.3) 13/41 (31.7%) 20/40 (60%) 0.010 Ciprofloxacin 1/7 (14.3) 12/34 (35.3) 16/29 (55.2) 4/11 (36.4) 13/41 (31.7%) 20/40 (60%) 0.001 Ciprofloxacin 1/7 (14.3) 12/34 (32.4) 15/29 (51.7) 9/11 (81.8) 11/41 (2.4%) 17/40 (42.5%) <0.001	l azobactam												
Amikacin 15/32 (46.9) 15/33 (45.5) 17/25 (68) 4/11 (36.4) 30/65 (46.2%) 21/36 (58.3%) 0.24 Ceftazidime 18/32 (56.3) 19/33 (57.6) 21/25 (84) 8/11 (72.7) 37/65 (56.9%) 29/36 (80.6%) 0.016 Ciprofloxacin 20/32 (62.5) 14/33 (42.4) 17/25 (68) 5/11 (45.4) 34/65 (52.3%) 22/36 (61.1%) 0.39 Colistin 0/32 (00) 0/33 (00 0/25 (0) 0/11 (0) 0/65 (0%) 0/36 (0%) 1 Imipenem 20/32 (62.5) 14/33 (42.4) 15/25 (60) 5/11 (45.4) 34/65 (52.3%) 20/36 (55.5%) 0.75 Piperacillin/ 3/32 (9.4) 7/33 (21.2) 18/25 (72) 2/11 (18.2) 10/65 (15.4%) 20/36 (55.5%) 0.10 Tazobactam Klebsiella Paramoniae 2 11/34 (32.4) 15/29 (51.7) 9/11 (81.8) 13/41 (31.7%) 24/40 (60%) 0.001 Ciprofloxacin 1/7 (0) 1/34 (32.4) 15/29 (51.7) 9/11 (81.8) 1/41 (24.8%) 17/40 (42.5%) <0.001	Pseudomonas aeruginosa												
Ceftazidime 18/32 (56.3) 19/33 (57.6) 21/25 (84) 8/11 (72.7) 37/55 (56.9%) 29/36 (80.6%) 0.016 Ciprofloxacin 20/32 (62.5) 14/33 (42.4) 17/25 (68) 5/11 (45.4) 34/65 (52.3%) 22/36 (61.1%) 0.39 Colistin 0/32 (0) 0/33 (0) 0/25 (0) 0/11 (0) 0/65 (0%) 0/36 (0%) 1 Imipenem 20/32 (62.5) 14/33 (42.4) 15/25 (60) 5/11 (45.4) 34/65 (52.3%) 20/36 (55.5%) 0.75 Piperacillin/ 3/32 (9.4) 7/33 (21.2) 18/25 (72) 2/11 (18.2) 10/65 (15.4%) 20/36 (55.5%) 0.10 Tazobactam Klebsiella 20/34 (55.5%) 0.10 Gefazidime 2/7 (28.6) 11/34 (32.4) 15/29 (51.7) 9/11 (81.8) 13/41 (31.7%) 24/40 (60%) 0.001 Ceftazidime 0/7 (0) 1/34 (32.4) 15/29 (51.7) 9/11 (81.8) 1/41 (24.4%) 17/40 (42.5%) <0.001	Amikacin	15/32 (46.9)	15/33 (45.5)	17/25 (68)	4/11 (36.4)	30/65 (46.2%)	21/36 (58.3%)	0.24					
Ciprofloxacin 20/32 (62.5) 14/33 (42.4) 17/25 (68) 5/11 (45.4) 34/65 (52.3%) 22/36 (61.1%) 0.39 Colistin 0/32 (0) 0/33 (0) 0/25 (0) 0/11 (0) 0/65 (0%) 0/36 (0%) 1 Imipenem 20/32 (62.5) 14/33 (42.4) 15/25 (60) 5/11 (45.4) 34/65 (52.3%) 20/36 (55.5%) 0.75 Piperacillin/ 3/32 (9.4) 7/33 (21.2) 18/25 (72) 2/11 (18.2) 10/65 (15.4%) 20/36 (55.5%) 0.10 Tazobactam 18/25 (72) 2/11 (18.2) 10/65 (15.4%) 20/36 (55.5%) 0.10 Ciprofloxacin 1/7 (14.3) 12/34 (35.3) 16/29 (55.2) 4/11 (31.7%) 24/40 (60%) 0.006 Meropenem 0/7 (0) 1/34 (2.9) 8/29 (27.6) 9/11 (81.8) 1/41 (2.4%) 17/40 (42.5%) <0.001	Ceftazidime	18/32 (56.3)	19/33 (57.6)	21/25 (84)	8/11 (72.7)	37/65 (56.9%)	29/36 (80.6%)	0.016					
Colistin 0/32 (0) 0/33 (0) 0/25 (0) 0/11 (0) 0/65 (0%) 0/36 (0%) 1 Imipenem 20/32 (62.5) 14/33 (42.4) 15/25 (60) 5/11 (45.4) 34/65 (52.3%) 20/36 (55.5%) 0.10 Tazobactam Tazobactam 10/65 (15.4%) 20/36 (55.5%) 0.10 Klebsiella pneumoniae 2/11 (18.2) 10/65 (15.4%) 20/36 (55.5%) 0.10 Ciprofloxacin 1/7 (14.3) 12/34 (35.3) 16/29 (51.7) 9/11 (81.8) 13/41 (31.7%) 24/40 (60%) 0.006 Meropenem 0/7 (0) 1/34 (2.9) 8/29 (27.6) 9/11 (81.8) 1/41 (2.4%) 17/40 (42.5%) <0.001	Ciprofloxacin	20/32 (62.5)	14/33 (42.4)	17/25 (68)	5/11 (45.4)	34/65 (52.3%)	22/36 (61.1%)	0.39					
Imipenem 20/32 (62.5) 14/33 (42.4) 15/25 (60) 5/11 (45.4) 34/65 (52.3%) 20/36 (55.5%) 0.75 Piperacillin/ 3/32 (9.4) 7/33 (21.2) 18/25 (72) 2/11 (18.2) 10/65 (15.4%) 20/36 (55.5%) 0.10 Tazobactam Klebsiella pneumoniae 0/165 (15.4%) 20/36 (55.5%) 0.10 Ceftazidime 2/7 (28.6) 11/34 (32.4) 15/29 (51.7) 9/11 (81.8) 13/41 (31.7%) 24/40 (60%) 0.010 Ciprofloxacin 1/7 (14.3) 12/34 (35.3) 16/29 (55.2) 4/11 (36.4) 13/41 (21.7%) 20/40 (50%) 0.006 Meropenem 0/7 (0) 1/34 (2.4) 15/29 (51.7) 9/11 (81.8) 11/41 (2.4%) 17/40 (42.5%) <0.001	Colistin	0/32 (0)	0/33 (0)	0/25 (0)	0/11 (0)	0/65 (0%)	0/36 (0%)	I					
Piperacillin/ 3/32 (9.4) 7/33 (21.2) 18/25 (72) 2/11 (18.2) 10/65 (15.4%) 20/36 (55.5%) 0.10 Tazobactam Klebsiella pneumoniae 0.10 Ceftazidime 2/7 (28.6) 11/34 (32.4) 15/29 (51.7) 9/11 (81.8) 13/41 (31.7%) 24/40 (60%) 0.010 Ciprofloxacin 1/7 (14.3) 12/34 (35.3) 16/29 (55.2) 4/11 (36.4) 13/41 (31.7%) 20/40 (50%) 0.006 Meropenem 0/7 (0) 1/34 (2.9) 8/29 (27.6) 9/11 (81.8) 11/41 (2.4%) 17/40 (67.5%) <0.001	Imipenem	20/32 (62.5)	14/33 (42.4)	15/25 (60)	5/11 (45.4)	34/65 (52.3%)	20/36 (55.5%)	0.75					
Tazobactam Klebsiella pneumoniae Ceftazidime 2/7 (28.6) 11/34 (32.4) 15/29 (51.7) 9/11 (81.8) 13/41 (31.7%) 24/40 (60%) 0.010 Ciprofloxacin 1/7 (14.3) 12/34 (35.3) 16/29 (55.2) 4/11 (36.4) 13/41 (31.7%) 20/40 (50%) 0.006 Meropenem 0/7 (0) 1/34 (2.9) 8/29 (27.6) 9/11 (81.8) 1/41 (2.4%) 17/40 (42.5%) <0.001	Piperacillin/	3/32 (9.4)	7/33 (21.2)	18/25 (72)	2/11 (18.2)	10/65 (15.4%)	20/36 (55.5%)	0.10					
Rlebsiella pneumoniae Ceftazidime 2/7 (28.6) 11/34 (32.4) 15/29 (51.7) 9/11 (81.8) 13/41 (31.7%) 24/40 (60%) 0.010 Ciprofloxacin 1/7 (14.3) 12/34 (35.3) 16/29 (55.2) 4/11 (36.4) 13/41 (31.7%) 20/40 (50%) 0.006 Meropenem 0/7 (0) 1/34 (2.9) 8/29 (27.6) 9/11 (81.8) 1/41 (2.4%) 17/40 (42.5%) <0.001	Tazobactam												
Ceftazidime 2/7 (28.6) 11/34 (32.4) 15/29 (51.7) 9/11 (81.8) 13/41 (31.7%) 24/40 (60%) 0.010 Ciprofloxacin 1/7 (14.3) 12/34 (35.3) 16/29 (55.2) 4/11 (36.4) 13/41 (31.7%) 20/40 (50%) 0.006 Meropenem 0/7 (0) 1/34 (2.9) 8/29 (27.6) 9/11 (81.8) 1/41 (2.4%) 17/40 (42.5%) <0.001	Klebsiella												
Ciprofloxacin 1/7 (14.3) 12/34 (35.3) 16/29 (55.2) 4/11 (36.4) 13/41 (31.7%) 20/40 (50%) 0.006 Meropenem 0/7 (0) 1/34 (2.9) 8/29 (27.6) 9/11 (81.8) 1/41 (2.4%) 17/40 (42.5%) <0.001	Ceftazidime	2/7 (28.6)	11/34 (32.4)	15/29 (517)	9/11 (81.8)	13/41 (31 7%)	24/40 (60%)	0.010					
Meropenem 0/7 (0) 1/34 (2.9) 8/29 (27.6) 9/11 (81.8) 1/41 (2.4%) 17/40 (42.5%) <0.001	Ciprofloxacin	1/7 (14 3)	12/34 (35.3)	16/29 (55.2)	4/11 (36.4)	13/41 (31.7%)	20/40 (50%)	0.006					
Cefepime 0/7 (0) 11/34 (32.4) 15/29 (51.7) 9/11 (81.8) 11/41 (26.8%) 24/40 (60%) <0.001 Cefoxitin 0/7 (0) 10/34 (29.4) 18/29 (62.1) 9/11 (81.8) 10/41 (24.4%) 27/40 (67.5%) <0.001 Tobramycin 0/7 (0) 8/34 (23.5) 17/29 (58.6) 9/11 (81.8) 10/41 (24.4%) 27/40 (67.5%) <0.001 Piperacillin/ 0/7 (0) 8/34 (23.5) 15/29 (51.7) 9/11 (81.8) 8/41 (19.5%) 26/40 (65%) <0.001 Tazobactam Escherichia 0/75 (0) 4/47 (8.5) 1/30 (0) 0/92 (0%) 5/77 (6.5%) 0.05 Ciprofloxacin 7/35 (0.2) 3/57 (5.2) 4/47 (8.5) 9/30 (30) 10/92 (10.9%) 13/77 (16.9%) 0.006 Piperacillin/ 1/35 (2.8) 1/57 (1.7) 4/47 (8.5) 2/30 (6.6) 2/92 (2.2%) 6/77 (7.8%) 0.37 Tazobactam Ceftazidime 2/35 (5.7) 0/57 (0) 4/47 (8.5) 5/30 (16.6) 2/92 (2.2%) 9/77 (11.7%) 0.02 Ceftazidime 2/35 (5.7) 0/57 (0) 4/47 (8.5) 4/30 (13.3) 5/92 (5.4%) 8/77 (10.4%)	Meropenem	0/7 (0)	1/34 (2.9)	8/29 (27.6)	9/11 (81.8)	1/41 (2.4%)	17/40 (42.5%)	<0.001					
Cefoxitin 0/7 (0) 10/34 (29.4) 18/29 (62.1) 9/11 (81.8) 10/41 (24.4%) 27/40 (67.5%) <0.001 Tobramycin 0/7 (0) 8/34 (23.5) 17/29 (58.6) 9/11 (81.8) 8/41 (19.5%) 26/40 (65%) <0.001	Cefepime	0/7 (0)	11/34 (32.4)	15/29 (51.7)	9/11 (81.8)	11/41 (26.8%)	24/40 (60%)	<0.001					
Tobramycin 0/7 (0) 8/34 (23.5) 17/29 (58.6) 9/11 (81.8) 8/41 (19.5%) 26/40 (65%) <0.001 Piperacillin/ 0/7 (0) 8/34 (23.5) 15/29 (51.7) 9/11 (81.8) 8/41 (19.5%) 26/40 (65%) <0.001	Cefoxitin	0/7 (0)	10/34 (29.4)	18/29 (62.1)	9/11 (81.8)	10/41 (24.4%)	27/40 (67.5%)	<0.001					
Piperacillin/ Tazobactam 0/7 (0) 8/34 (23.5) 15/29 (51.7) 9/11 (81.8) 8/41 (19.5%) 24/40 (60%) <0.001 Escherichia coli Escherichia Coli V V V V 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.06 Piperacillin/ 1/35 (0.2) 3/57 (5.2) 4/47 (8.5) 9/30 (30) 10/92 (10.9%) 13/77 (16.9%) 0.006 Piperacillin/ 1/35 (2.8) 1/57 (1.7) 4/47 (8.5) 2/30 (6.6) 2/92 (2.2%) 6/77 (7.8%) 0.37 Ceftazidime 2/35 (5.7) 0/57 (0) 4/47 (8.5) 5/30 (16.6) 2/92 (2.2%) 9/77 (11.7%) 0.02 Cefoxitin 4/35 (11.4) 1/57 (1.7) 4/47 (8.5) 4/30 (13.3) 5/92 (5.4%) 8/77 (10.4%) 0.18 Meropenem 1/35 (2.8) 0/57 (0) 1/47 (2.1) 0/30 (0) 1/92 (1.1%) 1/77 (1.3%) 0.52	Tobramycin	0/7 (0)	8/34 (23.5)	17/29 (58.6)	9/11 (81.8)	8/41 (19.5%)	26/40 (65%)	<0.001					
Tazobactam Escherichia coli Amikacin 0/35 (0) 0/57 (0) 4/47(8.5) 1/30(0) 0/92 (0%) 5/77 (6.5%) 0.05 Ciprofloxacin 7/35 (0.2) 3/57 (5.2) 4/47(8.5) 9/30(30) 10/92 (10.9%) 13/77 (16.9%) 0.006 Piperacillin/ 1/35 (2.8) 1/57 (1.7) 4/47(8.5) 2/30(6.6) 2/92 (2.2%) 6/77 (7.8%) 0.37 Tazobactam Ceftazidime 2/35 (5.7) 0/57 (0) 4/47(8.5) 5/30(16.6) 2/92 (2.2%) 9/77 (11.7%) 0.02 Cefoxitin 4/35 (11.4) 1/57 (1.7) 4/47(8.5) 4/30(13.3) 5/92 (5.4%) 8/77 (10.4%) 0.18 Meropenem 1/35 (2.8) 0/57 (0) 1/47(2.1) 0/30(0) 1/92 (1.1%) 1/77 (1.3%) 0.52	Piperacillin/	0/7 (0)	8/34 (23.5)	15/29 (51.7)	9/11 (81.8)	8/41 (19.5%)	24/40 (60%)	<0.001					
Amikacin 0/35 (0) 0/57 (0) 4/47(8.5) 1/30(0) 0/92 (0%) 5/77 (6.5%) 0.05 Ciprofloxacin 7/35 (0.2) 3/57 (5.2) 4/47(8.5) 9/30(30) 10/92 (10.9%) 13/77 (16.9%) 0.006 Piperacillin/ 1/35 (2.8) 1/57 (1.7) 4/47(8.5) 2/30(6.6) 2/92 (2.2%) 6/77 (7.8%) 0.37 Tazobactam	Tazobactam Escherichia coli												
Ciprofloxacin 7/35 (0.2) 3/57 (5.2) 4/47(8.5) 9/30(30) 10/92 (10.9%) 13/77 (16.9%) 0.006 Piperacillin/ 1/35 (2.8) 1/57 (1.7) 4/47(8.5) 2/30(6.6) 2/92 (2.2%) 6/77 (7.8%) 0.37 Tazobactam	Amikacin	0/35 (0)	0/57 (0)	4/47(8.5)	[/30(0)	0/92 (0%)	5/77 (6.5%)	0.05					
Piperacillin/ Tazobactam 1/35 (2.8) 1/57 (1.7) 4/47(8.5) 2/30(6.6) 2/92 (2.2%) 6/77 (7.8%) 0.37 Ceftazidime 2/35 (5.7) 0/57 (0) 4/47(8.5) 5/30(16.6) 2/92 (2.2%) 9/77 (11.7%) 0.02 Cefoxitin 4/35 (11.4) 1/57 (1.7) 4/47(8.5) 4/30(13.3) 5/92 (5.4%) 8/77 (10.4%) 0.18 Meropenem 1/35 (2.8) 0/57 (0) 1/47(2.1) 0/30(0) 1/92 (1.1%) 1/77 (1.3%) 0.52	Ciprofloxacin	7/35 (0.2)	3/57 (5.2)	4/47(8.5)	9/30(30)	10/92 (10.9%)	13/77 (16.9%)	0.006					
Ceftazidime 2/35 (5.7) 0/57 (0) 4/47(8.5) 5/30(16.6) 2/92 (2.2%) 9/77 (11.7%) 0.02 Cefoxitin 4/35 (11.4) 1/57 (1.7) 4/47(8.5) 4/30(13.3) 5/92 (5.4%) 8/77 (10.4%) 0.18 Meropenem 1/35 (2.8) 0/57 (0) 1/47(2.1) 0/30(0) 1/92 (1.1%) 1/77 (1.3%) 0.52	Piperacillin/ Tazobactam	1/35 (2.8)	1/57 (1.7)	4/47(8.5)	2/30(6.6)	2/92 (2.2%)	6/77 (7.8%)	0.37					
Cefoxitin 4/35 (11.4) 1/57 (1.7) 4/47(8.5) 4/30(13.3) 5/92 (5.4%) 8/77 (10.4%) 0.18 Meropenem 1/35 (2.8) 0/57 (0) 1/47(2.1) 0/30(0) 1/92 (1.1%) 1/77 (1.3%) 0.52	Ceftazidime	2/35 (5.7)	0/57 (0)	4/47(8.5)	5/30(16.6)	2/92 (2.2%)	9/77 (11.7%)	0.02					
Meropenem 1/35 (2.8) 0/57 (0) 1/47(2.1) 0/30(0) 1/92 (1.1%) 1/77 (1.3%) 0.52	Cefoxitin	4/35 (Ì I.4)	I/57 (Ì.7)	4/47(8.5)	4/30(13.3)	5/92 (5.4%)	8/77 (10.4%)	0.18					
	Meropenem	1/35 (2.8)	0/57 (0)	1/47(2.1)	0/30(0)	1/92 (1.1%)	1/77 (1.3%)	0.52					

* Data for the year 2005 refer to the period from January 2005 through June 2005. ** P-values refer to the comparison of proportions between 2002/2003 and 2004/2005.

Table 4: Data on antimicrobial resistance patterns and respective MIC_{90} of isolated bacteria.

	2002			2003				2004				2005				
Microorganis ms	S*	**	R***	МІС, 0 [#]	S	I	R	МІС, 0	S	I	R	міс, ₀	S	I	R	міс , ₀
<u>Gram-positive</u> Staphylococc us epidermidis																
Oxacillin	31/ 202	0/202	171/ 202	4	46/ 261	0/261	215/ 261	4	36/ 214	0/214	179/ 214	4	15/94	0/94	75/94	4
Gentamicin	58/ 202	18/ 202	l 26/ 202	16	87/ 261	20/ 261	154/ 261	16	71/ 219	0/219	148/ 219	16	40/94	10/94	44/94	16
Vancomycin	202/ 202	0/202	0/202	2	261/ 261	0/261	0/261	2	219/ 219	0/219	0/219	2	94/94	0/94	0/94	4
Staphylococc us aureus																
Oxacillin	13/38	0/38	25/38	4	9/30	0/30	21/30	4	13/25	0/25	12/25	4	2/8	0/8	6/8	4
Gentamicin	16/38	13/38	9/38	8	21/30	5/30	4/30	8	19/25	0/25	6/25	4	5/8	1/8	2/8	0.5
Vancomycin	38/38	0/38	0/38	I	30/30	0/30	0/30	2	25/25	0/25	0/25	I	8/8	0/8	0/8	I
Enterococcus faecalis																
Vancomycin	14/14	0/14	0/14	2	17/19	0/19	2/19	2	6/6	0/6	0/6	2	4/4	0/4	0/4	2
Enterococcus																
faecium	12/14	0/14	1/14		0/0	0/0	0/0		2/2	0/2	0./0	22	2/2	0/0	0/2	
Vancomycin	13/14	0/14	1/14	I	8/8	0/8	0/8	I	2/2	0/2	0/2	32	2/2	0/2	0/2	I
<u>Gram</u>																
negative																
Acinetobacter																
baumannii	2/0		F (0		E /1 E	0/15			2/25	2/25	20/25		2/17	2/17	12/17	
Amikacin	3/9	1/9	5/9	64	5/15	0/15	10/15	64	3/35	2/35	30/35	64	2/17	2/17	13/17	64
Ceftazidime	1/9	2/9	6/9	64	2/15	1/15	12/15	64	1/35	0/35	34/35	64	0/17	0/17	1//1/	64
Ciprofioxacin	3/9	0/9	6/9	4	3/15	0/15	12/15	4	1/35	0/35	34/35	4	0/17	0/17	1//1/	4
Colistin	8/9	0/9	1/9	2	15/15	0/15	0/15	I K	35/35	0/35	0/35	2	16/17	0/17	1/1/	0.5
Gentamicin	5/9	0/9	4/9	16	5/15	5/15	5/15	16	19/35	6/35	10/35	16	5/17	4/17	8/17	16
Imipenem	5/9	2/9	2/9	16	6/15	4/15	5/15	16	1/35	5/35	29/35	16	0/17	4/17	13/17	16
Piperacillin/	2/9	1/9	6/9	128	4/15	1/15	10/15	128	1/35	1/35	33/33	128	0/17	3/17	14/17	128
Providementar																
rseudomonus																
Amikacin	15/29	2/29	12/29	64	18/33	1/33	14/33	64	8/25	0/25	17/25	64	7/11	0/11	4/11	64
Ceftazidime	13/29	2/29	15/29	64	14/33	5/33	14/33	64	4/25	7/25	14/25	64	3/11	1/11	7/11	64
Ciprofloyacin	11/29	0/29	18/29	4	14/33	0/33	19/33	4	8/25	0/25	17/25	4	6/11	0/11	5/11	4
Colistin	29/29	0/29	0/29	2	33/33	0/33	0/33	2	25/25	0/25	0/25	2		0/11	0/11	2
Imipenem	11/29	14/29	4/29	16	19/33	9/33	5/33	16	10/25	6/25	9/25	16	6/11	4/11	1/11	16
Piperacillin/	26/29	0/29	3/29	64	26/33	1/33	6/33	128	7/25	11/25	7/25	128	9/11	0/11	2/11	128
Tazobactam	20/27	0,27	5/27	01	20/33	1/55	0/55	120	1123	11/23	1125	120	2711	0/11	2/11	120
Klebsiella																
pneumoniae																
Ceftazidime	5/7	0/7	2/7	64	23/34	0/34	11/34	64	14/29	1/29	14/29	64	2/11	0/11	9/11	64
Ciprofloxacin	6/7	0/7	1/7	I	22/34	1/34	11/34	4	13/29	0/29	16/29	4	7/11	0/11	4/11	4
Meropenem	7/7	0/7	0/7	0.25	33/34	0/34	1/34	0.5	21/29	4/29	4/29	8	2/11	1/11	8/11	16
Cefepime	7/7	0/7	0/7	2	23/34	1/34	10/34	64	14/29	7/29	8/29	64	2/11	0/11	9/11	64
Cefoxitin	7/7	0/7	0/7	4	24/34	0/34	10/34	64	11/29	0/29	18/29	64	2/11	0/11	9/11	64
Tobramycin	7/7	0/7	0/7	I	26/34	0/34	8/34	16	12/29	1/29	16/29	16	2/11	2/11	7/11	16
Piperacillin/	7/7	0/7	0/7	8	26/34	1/34	7/34	128	14/29	2/29	13/29	128	2/11	0/11	9/11	128
Tazobactam																
Escherichia																
coli																
Amikacin	35/35	0/35	0/35	2	57/57	0/57	0/57	2	43/47	4/47	0/47	4	29/30	0/30	1/30	4
Ciprofloxacin	28/35	0/35	7/35	4	54/57	0/57	3/57	0.5	43/47	0/47	4/47	4	21/30	0/30	9/30	4
Piperacillin/	34/35	0/35	1/35	4	56/57	I/57	0/57	4	43/47	I/47	3/47	8	28/30	1/30	1/30	4
Tazobactam																
Ceftazidime	33/35	0/35	2/35	2	57/57	0/57	0/57	Ι	43/47	3/47	1/47	I	25/30	0/30	5/30	2
Cefoxitin	31/35	1/35	3/35	16	56/57	1/57	0/57	4	43/47	4/47	0/47	4	26/30	1/30	3/30	16
Meropenem	34/35	1/35	0/35	0.25	57/57	0/57	0/57	0.25	46/47	0/47	I/47	0.25	30/30	0/30	0/30	2

Table 4: Data on antimicrobial resistance patterns and respective MIC₉₀ of isolated bacteria. (Continued)

Abbreviations: ***S** = susceptible, ****I** = intermediate, *****R** = resistant, **#MIC**₉₀ = minimum inhibitory concentration for 90% of the corresponding microbial population

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