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Original Article

Bacteriological Profile and Drug Resistance Pattern of Isolates of ICU Patients In Hospital Of Peshawar

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ABSTRACT

Multidrug-resistant infectious diseases are one of the top causes of death and morbidity among hospitalized patients worldwide. **Objective:** This study's aim was to assess the frequency of common bacterial pathogens, as well as their antibiotic sensitivity & resistance, in various Intensive care unit tertiary care hospitals. **Methods:** The current investigation was conducted from February to May 2021 in multiple ICU at a primary care hospital in Peshawar. Patients who were admitted to any of the hospital's four intensive care units (ICUs) and patients medically speculated of having an infection within 48 hours of arrival were included. Patients' laboratory samples were selected based on clinical suspicion. Antibiotic sensitivity testing was performed on the samples. **Result:** E. coli 33(26) was the most commonly isolated bacteria across all samples. "In NICU, CONS 17(67.78), in 7(28.28), in MICU, PICU E. coli, E. coli, Pseudomonas spp and Acinetobacter spp.11(22.39), and in E. coli, SICU 17(46.82) were predominantly isolated" "Amikacin 29(88.6), Cefuroxime 21(65), Klebsiella sp. to Cefoperazone+Salbactum 15(79), Pseudomonas to Tazobactum+Piperacillin 12(66), and Acinetobacter sp. to Sulbactum+Cefoperazone 12(66) are commonly used antibiotics against E. coli 12(56)". Citrobacter spp. (67.8) was observed more followed by Proteus spp. (34.4) and Enterococcus (34.4). **Conclusion:** In the ICUs, infectious diseases and antimicrobial resistance are key barriers to patient outcome multidrug-resistant as well as expenditure. All intensive care units throughout the world face the issue of lowering the same.

INTRODUCTION

Multidrug-resistant infectious diseases are major reasons of mortality and morbidity worldwide, putting a significant strain on patients and the healthcare structure of countries [1,2]. Patients in the ICU who are critically unwell are at the highest risk of getting these infections [3,4]. An ICU patient has a 5 to a 7percent greater risk of nosocomial pathogens than the usual patient, and ICU infections account for 20% - 25% of all nosocomial pathogens in a hospital [5]. Factors such as the increased use of invasive equipment and immunosuppressive drugs. All of these factors, as well as the inappropriate use of antibiotic treatment in ICUs, are leading to the same outcome [6,7]. Resistance to antibiotics among surgery center organisms is spread by antibiotic abuse, overuse, and illogical and fraudulent pharmaceutical market company as well as irregular intake brought on by either a bad medication or

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poor compliance [8]. Infection-causing organisms and their antibiotic-resistant- resistant patterns differ greatly from one country to the next, various ICUs within the same hospital as well as between different hospitals. 4 Irrational antibiotic use in ICUs, as well as medications and status, are now all leading to the same problem [9-11]. This study aimed to determine incidence of mostly identified bacterial pathogens and resistance patterns face in treatment among patients. So, Patients were included admitted to various Intensive care units(ICU)in Peshawar, Pakistan.

METHODS

A tertiary medical hospital in Peshawar's ICUs provided the data for this investigation. This Hospital has four Main ICUs i.e. Surgical ICU (SICU), Medical ICU (MICU), Neonatal ICU (NICU) and Pediatric ICU (PICU). Data was collected from the patients admitted to the ICU from February 2021 to May 2021. ICU-related infections are those that arise within 48 hrs. of admission to the hospital or within 48 hrs. of Hospital discharge, according to the Control and Prevention (CDC). During the three-month study period, patients hospitalized in ICUs of these four hospitals patients clinically speculated for infection after 48 hours of admittance were part of this study. Patients with clinical symptoms of infection diagnosed at the time of admission were not included in this study. "Clinical signs and symptoms of infections are described I.e. Leukocytosis >10000/mm3, plained fever >38°C, Dysuria,New infiltrates on chest X-ray, persistent Tracheal aspirates/secretions, Suprapubic tenderness, Turbid urine, Thrombophlebitis, Burning micturition, Abdominal pain or tenderness, Cloudy effluent containing more than 100 Polymorphonuclear cells/mm3, and Microorganisms in peritoneal dialysis fluid" To test samples i.e.sputum, urine, pus, swabs, body fluids (ex Cerebro - spinal fluid, " Pleural fluid, Ascitic fluid,), feces and blood" were obtained from the patients based on clinical suspicion. In this investigation, only bacteria hospital-acquired infections were examined in depth. Candida sp. was also found on gram stain. Antibiotic sensitivity testing was performed on the samples. The following antibiotics were tested for sensitivity "Gatifloxacin, Cefazolin, Imipenam, Cefuroxime, Gentamycin, Cefotaxime, Amikacin, Ampicillin, Ampicillin+Sulbactum, Cefoperazone+Sulbactum, Piperacillin+Tazobactum, Imipenam, Gatifloxacin, Cefazolin, Cefuroxime, Cefotaxime, Gentamycin,". Furthermore, patients' details, such as gender, age, and admission day, were obtained from their medical records.

RESULTS

Table 1 shows the gender and age profiles of the patients in the research.

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ICU	Neonate less than 28 years		Post neonate 1 year		Preschool 1-5 years		School 6-12 years		Adolescent 20-19 years		Adult 20-60 years		Elderly Greater than 60 years		Total 324 participants
NICU	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	
PICU	78	74			12	14	8	10	3	10					152
SICU			6	5											70
MICU							1	2	2	2	12	22	11	5	58
					1	3					20	15	15	3	44

Table 1: The gender and age characteristics of patients

Blood 198 (66.77), swab 40 (13.77), bodily fluids 28 (10), pus 12 (4.77), urine 21 (7.7), and sputum 8 (3.44) were among the 324 patient samples examined (Table 2).

Sample collection	Total amount of samples n= 324 %	Yield growth organism samples n =100 %
Urine	21 (7)	12 (56)
Blood	198 (66.77)	31 (16.33)
Sputum	08 (3.44)	7 (86.62)
Swab	39 (13.77)	35 (90.58)
Pus	12 (4.77)	9 (73.83)
Fluids	28(9)	7(19.92)

Table 2: Sample profile and culture rate obtained from different samples

A total of 100 (32.44) samples were found to be positive for organism growth, yielding a total of 129(43.77) distinct isolates. In table 3 there were 96(75.32) gram-negative bacteria, 28(22.10) gram-positive and gram bacteria, and 7(5.79) Candida sp. bacteria. Out the of 100 samples, 76 (80.79) revealed single isolates, while 20 (21.42) revealed multiple isolates (maximum to 3). E. coli 33 (26) was the most commonly isolated bacterium from all samples, followed with Acinetobacter species, 21 (16.73), Coagulase Negative Staphylococci (CONS) 22 (17.51), Klebsiella sp. 19 (15.17), Pseudomonas sp. 18 (14.39), Candida sp. 7 (5.79).

Microbe	Blood (n=) (%)	Urine (n=) (%)	Sputum (n=) (%)	Swab (n=) (%)	Pus (n=) (%)	Fluid (n=) (%)	Total (n=) (%)
E Coli	3(7,7)	5(29.6)	3(19.2)	15(26.5)	7(57.)	5(9)	37(26)
Acineto bacteria so	4(11)			17(30.08)	2(8.88)		23 (16.73)
CONS	19 (71)	2(8.25)		3(4.75)			24(17.5)
PSEUDOMONAS SP		2(8.25)	4(28.28)	12 (21)	3 (16.49)		21(15.17)
CANDIDA		4 (22.54)	2 (10.10)	2 (2.93)	2. (878)		10 (5.79)
KLEBSIELLA	4 (11)	4(22.54)	4(28.28)	9 (15.66)		2(2)	23 (15.17)
CITO BACTER SP	2(4.44)	2(8.25)		2 (93)			6(3.45)
STAPH AUREUS	2(4.44)			2 (93)	2 (8.78)		6(3.45)
PROTEUS	2(4.44)		2(29.29)				6(3.45)
ENTERO COCCUS	2(4.44)	2(8.25)		2 (93)	2 (8.78)		6(3.45)
ENTERO BACTER SP				2(2.93)	2(2.93)		4(2.657)

Table 3: Types of organisms secluded from different samples

Table 4 illustrates the distribution of strains isolated from various ICU.The majority of CONS 17(77.78) was identified in the NICU, closely by Klebsiella sp. 5 (17.78). The most common bacteria found in PICU were E. coli 7(28.28), Acinetobacter spp., Klebsiella spp., and Candida spp (12.75).

Microbe	NICU (%)	PICU (N=)(%)	SICU (N=)(%)	MICU (N=)(%)	Total (%)
E Coli		7(28.28)	17(46.72)	11(22.28)	36(26)
Acineto bacteria so	2 (5.8)	2 (14.75)	7(18.28)	11(22.39)	22(16.73)
CONS	17(77.78)	3(10.10)	2(3.36)	3(4.36)	25(17.5.28)
PSEUDOMONAS SP		2(10.10)	6(15.39)	11(22.39)	3 (16.49)
CANDIDA		4 (14.75)		4 (7.49)	8. (5.79)
KLEBSIELLA	5 (17.78)	4(14.75)	4(9.68)	9 (18.13)	22 (15.17)
CITO BACTER SP	2(4.28)		2(3.97)	2 (93)	6 (3.97)
STAPH AUREUS	2(4.28)	2(5.65)	2(3.97)	2 (93)	6 (3.97)
PROTEUS			2(3.97)	4 (5.56)	6 (3.97)
ENTERO COCCUS	2(4.28)	2(5.65)			6 (3.97)
ENTERO BACTER SP		2(5.65)	2(3.97)	2 (93)	4 (2.67)
Total	29 (19. 86)	28 (18. 20)	44(28.45)	58 (37.83)	159 (100)

Table 4: Microbes Patterns isolated from various Intensive Care Units

Table 5 shows the antibiotic sensitivity trend of the major five isolates in MICU. E. coli is most usually sensitive to Amikacin 29(88.6), Cefotaxime 21(96), Klebsiella sp. is most frequently resistant to Cefoperazone+Salbactum 15(79), E coli, Pseudomonas spp, and Acinetobacter spp. were most usually secluded in 11(22.29), followed by E. coli 17(46.82) Klebsiella. 9 (18.03). was the most commonly isolated organism in SICU, followed by Acinetobacter spp. 7(18.15), and Pseudomonas spp. 6 (15.39). Piperacillin+Tazobactum 12(66) was usually sensitive to Pseudomonas, and Cefoperazone+Sulbactum 12(66) was commonly sensitive to Acinetobacter sp 12(66).

Antibiotic	E Coli	CONS (n=)(%)	KLEBSIELLA (n=)(%)	PSEUDOMONAS SP (n=)(%)	Acineto bacteria (%)
Amikacin	29 (88.6)	7(39)	12(62)	9(48)	2(6)
Cefo perezone +sulbaxtum	27 (82)	27 (49)	15 (79)	10(54)	12(56)
Amphicillin	3(7.36)	18(82)		2(7)	4(16)
Amphicillin +sulbactum	3 (7.36)	6(25)		2(7)	4(16)
Piperacillin +tazobactum	27 (82)	12 (53)	10(51)	12 (66)	
Gatifloxan	10(29.2)	9(39)	9(45)	4 (19)	2 (6)
Cefzoline	2(4.2)	9(39)		2(7)	
Imipenem	3 (7.36)	18(82)		2(7)	
Cefuroxime	4 (10.4)	15 (68)			
Gentamycin	12 (35.4)	13 (58)	3(12)	4 (19)	2 (6)
Cefotaxime	5 (13.6)	21(96)			
Cipro floxacin	6 (15.6)	18 (82)		7 (4)	3 (11)

Table 5: Antibiotic sensitivity pattern

Table 6 shows the percentage of different organisms that are completely resistant to all drugs studied. Citrobacter spp. (77.8%), Proteus spp. (44.4), and Enterococcus spp. (44.4) were the most prevalent multidrug resistant species (44.4).

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Microorganisms	Antibiotic-resistant to all n-18 (%)
Klebsiella	5 (23.23)
Acinetobacter sp.	3 (11)
Citrobacter sp.	3 (67.68)
Proteus sp.	2 (34.34)
Pseudomonas sp.	2 (6.90)
Enterococcus	2 (34.34)

Table 6: Multidrug-Resistant Organisms' Frequency

DISCUSSION

findings of this study showed that rate of infection in patients admitted in ICU due to microbes was 32.44 percent. The percentage of E. coli was identified 26 (33 cases), following Acinetobacter sp. 16.73% (21 cases). Furthermore, the percentage of Coagulase-negative staphylococci was found 17.51% (22cases), Klebsiella sp. 15.17% (19 cases), Pseudomonas sp. in 14.29% (18cases), and Candida sp. 5.79% (7 cases). E. coli isolates were 14 percent in one study published in the Eastern Mediterranean Health Journal [12]. Pseudomonas aeruginosa was found most common isolates (26.5%) in the ICUof hospitals in Pakistan from from January 2010 to March 2011., Klebsiella pneumonia (15.3), and Staphylococcus epidermidis were the most common isolates in the ICU of hospitals in Pakistan (14.9) [12].In the same study Another study found percentage of Pseudomonas spp. 29.1%, Acinetobacter spp. Percentage with 27, Candida spp. Percentage 12.8%, Escherichia coli percentage 10.3, and Klebsiella spp. Percentage 9.7 as were Staphylococcus aureus, Enterobacter spp., Citrobacter spp., Enterococcus spp., Providentia (10.7%) [13].However, in a European Intensive care unit, one of the most frequently identified organisms were Staphylococcus aureus with the percentage of 30.1, Pseudomonas aeruginosa percentage 28.7%, Coagulase-negative staphylococcus percentage 19%, and yeast percentage with 17.1% [14]. A study conducted in the hospital of Jordan University and found the following percentage e.g., Acinetobacter spp. 28%, Staphylococcus aureus 40, Pseudomonas spp.23, Coagulase-negative staphylococcus 19, Enterobacter spp. 20, Candida spp. 19, Escherichia coli 15, Klebsiella spp. 17 and Enterococcus11[15]. In the ICUs, nosocomial infections and antibiotic resistance are a major impediment to patient outcomes, lengthening patient stays and raising costs. Most intensive care units throughout the world face the issue of implementation of such measures that can control infections for example safeguards measures and strictly adhering to wash hand practice [16,17]. antibiotic plan; surveillance deeds, [18]. and employment of experts to control infections, [19-20] may be essential, for that more study is recommended.

CONCLUSION

E. coli was found to be the most frequent in all samples. Acinetobacter spp. and Pseudomonas sp. were the most frequently isolated bacteria in PICU E. coli, NICU CONS, SICU E. coli and MICU E. coli. Furthermore, E. coli was the highest susceptible to CONS to Cefotaxime, Amikacin, Pseudomonas to Tazobactum+Piperacillin, Klebsiella sp. to Cefoperazone+Salbactum, & Acinebacter sp. to Sulbactum+Cefoperazone and Acinetobacter sp. from Cefoperazone+Sulbactum. Citrobacter sp., Proteus sp., and Enterococcus sp. were the most prevalent multidrug-resistant species.

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