SHORT COMMUNICATION

Frequently Isolated Bacteria and Their Culture and Sensitivity Pattern in a Medical ICU

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ABSTRACT

Empirical antibiotic therapy in seriously ill patients requires careful selection of antibiotics. This study was planned to determine the pattern of bacterial infections and culture sensitivities in patients admitted to a medical intensive care unit (ICU). Patients with positive bacterial cultures from specimens of blood, urine, endo-tracheal tube, suction catheter, and tracheal aspirates were included. Data regarding microbial isolates and their culture sensitivities was collected. *Escherichia coli (E. coli*), *Pseudomonas aerogenosa (PA)*, *Klebsiella pneumonea (KP)*, *Staphylococcus aureus (SA)* and methicillin resistant *Staphylococcus aureus* (MRSA) were the most frequently isolated bacteria. *E coli* showed 100% sensitivity to sulbactam potentiated sulfoperazone, and meropenam. *PA* were sensitive to gentamycin, imepenam, and sparfloxacin in > 70% cases. All *KP* isolates were sensitive to amikacin, imepenam and sparfloxacin. *SA* were 100% sensitive to amikacin. *MRSA* were 100% sensitive to vancomycine and linezolid. Based on these results, sulbactam potentiated cefoperazone in combination with amikacin seems the best empirical antibiotic regimen. Imipenam usage can be an alternative.

Key Words: *Bacterial infections. Intensive care unit. Microbial sensitivity tests. Antibiotics.*

Patients with life threatening but potentially recoverable diseases are managed in intensive care units (ICUs). Infections are frequently encountered problem in ICU settings. Infections in ICU patients are associated with considerable morbidity, mortality and high cost.[1] Infection and related sepsis are leading cause of death in non-cardiac ICUs, with upto 60% mortality rates, and account for approximately 40% of total ICU expenditures.[1] Infections in ICU patients can be community acquired and reason for ICU admission, or nosocomial. Chances of getting nosocomial infection in an ICU are 5 – 10 times more as compared to the general ward of a hospital. It is because intubation, mechanical ventilation, urinary catheterization, and central venous cannulation are frequently done in treatment of ICU patients.

Microbial isolates and their culture sensitivities in different ICUs are variable. Infections with gram negative bacteria are increasingly recognized in ICU patients.[2] Knowledge about local bacterial pathogens and their resistance pattern helps in better management of ICU patients.[3]

The objective of this study was to determine pattern of bacterial infections and their culture sensitivities in patients admitted to the Medical ICU of Holy Family Hospital, Rawalpindi.

This cross-sectional, observational study was conducted from January to October 2011 after scrutiny by Departmental Ethical Committee. All patients admitted in Medical ICU who had positive bacterial culture from specimens of blood, urine, endo-tracheal tub (ETT), suction catheter, and tracheal aspirates collected in standard way were included. Data regarding age, gender, and main diagnosis of each patient was noted along with microbial isolates and their culture sensitivities. Obtained data was analyzed using statistical program Statistical Package for Social Sciences (SPSS) version 15. Mean ± standard deviation were calculated for age. Frequency and percentage were calculated for gender, primary diagnosis, outcome, bacterial isolates and their culture sensitivities.

Eighty-six (86) patients were included; 46 (53.5%) of these were male and 40 (46.5%) female. Mean age was 37.74 ± 17.71 years. Chronic obstructive pulmonary disease, eclampsia/pre-eclampsia, pneumonia, stroke, and electric shock were most frequently noted main diagnosis. Microbial isolates were most frequently cultured from suction catheter tip (n = 25, 29.1%), endotracheal tube tip (n = 26, 30.2%), Foley's catheter tip (n = 16, 18.6%), central venous line tip (n = 5, 5.8%) and tracheostomy tip or endobrochial secretions obtained by fibre-optic bronchoscopy (n = 3, 3.5% each).

Escherichia coli (E. coli), Pseudomonas aerogenosa (PA), Klebsiella pneumonae (KP), methicillin resistant Staphylococcus aureus (MRSA) and *Staphylococcus aureus (SA)* were the most frequently isolated organisms.

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Table I: Medication sensitivity pattern of commonly isolated bacteria.

Medication	Organism				
	*E. coli**	*Psudomonas*	*KP***	*SA****	*MRSA*****
Amikacin	80.95%	44.44%	100%	100%	--
Gentamicyn	60%	80%	--	--	--
Ampicillin	--	--	--	--	0%
Co-Amoxiclav	25%	0%	0%	--	--
Cephradine	0%	--	--	--	0%
Cephaclor	--	--	--	66.66%	0%
Cefotaxime	6.66%	25%	28.57%	--	--
Ceftriaxone	20%	0%	25%	--	--
Ceftazidime	30.76%	33.33%	50%	--	--
Sl/Cefop******	100%	66.66%	85.7%	--	--
Tazobactam	--	50%	--	--	--
Imipenam	84.61%	71.42%	100%	--	50%
Meropenam	100%	66.66%	--	--	--
Vancomycine	--	--	--	66.66%	100%
Linezolid	--	--	--	--	100%
Ofloxacin	--	0%	--	--	--
Ciprofloxacin	30.76%	50%	50%	--	--
Levofloxacin	42%	63.63%	50%	--	--
Moxifloxacin	--	--	--	--	75%
Sparfloxacin	62.5%	75%	100%	--	--
Norfloxacin	33.33%	--	--	--	--
Nitrofurantoin	66.66%	--	--	--	--
Fosphomycine	83.33%	20%	--	--	--

**E coli = Escherichia coli; **KP = Klebsiella pneumonia; ***MRSA = Methicillin resistant Staphylococcus aureus; ****SA = Staphylococcus aureus (SA); *****Sl / Cefop = Sulbactam potentiated sulfoperazone.*

In some cases more than one pathogen was isolated. Culture sensitivities of these bacteria are given in Table I.

Microbial flora isolated from an ICU is generally distinct and depends on standard operating procedures for infection control.[3] Gram negative organisms were more frequently isolated from this patients. Results similar to us have been reported in local and international studies.[2] Gram negative isolates indicate either a primary gram negative infection or poor infection control practices.

In developing countries like ours, microorganisms are becoming increasingly resistant to many of the commonly used antibiotics. Over the counter and indiscriminate use of antibiotics are considered important reasons for this. Primary illness, invasive procedures depressed immunity and cross-infection are few of the reasons for infections in ICU settings. *E. coli*, *Klebsiella, Candida, SA, Acinobacter baumannii* and MRSA are frequently noted microbes in ICU patients. Present results are similar in this regard.

E. coli are one of the main ICU pathogens.[4] *E. coli* were most frequently isolated organism in these patients. *E. coli* were markedly resistant to third generation cephalosporins in this study, which is suggestive of extended spectrum beta lactamase (ESBL) production.[5] *Pseudomonas* isolates in this study were most frequently sensitive to gentamycin and sparfloxacin. Resistance against carbapenam, sulbactam potentiated sulfoperazone and tazobactam was noted in ≥ 33% *PA* isolates. The *SA* isolates were 100% sensitive to amikacin. Similarly, MRSA isolates were sensitive to vancomycine and linezolid. *Klebsiella* isolated in this study were also ESBL producing. These were 100% sensitive to amikacin, imipenam, and sparfloxacin.

Empirical therapy for serious infections requires information about local data, as it may differ at different places. Starting suitable therapy before culture sensitivity results are available may help in saving lives. Based on these results, depending on clinical scenario, sulbactam potentiated cefoperazone in combination with amikacin seems best guess antibiotic regimen. Gentamycin is similarly treatment of choice when there is suspicion of *PA* infection. Imipenam usage can be an alternative in this regard.

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