

The Prevalence and Profile of Extended Spectrum B-Lactamase (ESBL) Producing Enterobacteriaceae Species in the Intensive Care Unit (ICU) Setting of a Tertiary Care Hospital of North India

Authors : Harmeet Pal Singh Dhooria, Deepinder Chinna, UPS Sidhu, Alok Jain

Abstract : Serious infections caused by gram-negative bacteria are a significant cause of mortality and morbidity in the hospital setting. In acute care facilities like in intensive care units (ICUs), the intensity of antimicrobial use together with a population highly susceptible to infection, creates an environment, which facilitates both emergence and transmission of Extended Spectrum β -lactamase (ESBL) producing Enterobacteriaceae species. The study was conducted in the Medical Intensive Care Unit (MICU) and the Pulmonary Critical Care Unit (PCCU) of the Department of Medicine, Dayanand Medical College and Hospital, Ludhiana, Punjab, India. Out of a total of 1108 samples of urine, blood and respiratory tract secretions received for culture and sensitivity analysis from Medical Intensive Care Unit and Pulmonary Critical Care Unit, a total of 170 isolates of Enterobacteriaceae species were obtained which were then included in our study. Out of these 170 isolates, confirmed ESBL production was seen in 116 (68.24%) cases. E.coli was the most common species isolated (56.47%) followed by Klebsiella (32.94%), Enterobacter (5.88%), Citrobacter (3.53%), Enterobacter (0.59%) and Morganella (0.59%) among the total isolates. The rate of ESBL production was more in Klebsiella (78.57%) as compared to E.coli (60.42%). ESBL producers were found to be significantly more common in patients with prior history of hospitalization, antibiotic use, and prolonged ICU stay. Also significantly increased the prevalence of ESBL related infections was observed in patients with a history of catheterization or central line insertion but not in patients with the history of intubation. Patients who had an underlying malignancy had significantly higher prevalence of ESBL related infections as compared to other co-morbid illnesses. A slightly significant difference in the rate of mortality/LAMA was observed in the ESBL producer versus the non-ESBL producer group. The rate of mortality/LAMA was significantly higher in the ESBL related UTI but not in the ESBL related respiratory tract and bloodstream infections. ESBL producing isolates had significantly higher rates of resistance to Cefepime and Piperacillin/Tazobactam, and to non β -lactam antibiotics like Amikacin and Ciprofloxacin. The level of resistance to Imipenem was lower as compared to other antibiotics. However, it was noted that ESBL producing isolates had higher levels of resistance to Imipenem as compared to non-ESBL producing isolates. Conclusion- The prevalence of ESBL producing organisms was found to be very high (68.24%) among Enterobacteriaceae isolates in our ICU setting as among other ICU care settings around the world.

Keywords : enterobacteriaceae, extended spectrum B-lactamase (ESBL), ICU, antibiotic resistance

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