Surveillance of multidrug-resistant organisms in a tertiary care hospital in Pakistan

Saira Ibrahim

Shifa international hospital h8/4 Islamabad Pakistan

Abstract

Objective
To describe different trends of multi-drug resistant infections in a specialized consultative care hospital in Islamabad, Pakistan

Study design
Descriptive study was performed at Shifa International Hospital, during January 2015 till June 2015

Methods
Patient's history, culture reports, and medical records were reviewed during ID consultations and data analysis was done with SPSS17

Results
A total of 300 cases in six-month period were analyzed. Eighty percent were monomicrobial. The highest percentage of infections were caused by organisms like ESBL *E. Coli* (23.3%). *Methicillin resistant staphylococcus aureus* (15.7%), *Klebsiella* (13.3%), *Acinetobacter* (13%), *Enterobacter* species (10.0), *Pseudomonas* (9.7%), Vancomycin resistant enterococci (5.3%). MSSA (3.3%) Candida species (4.7 %), and *Serratia* (1.7%)

Conclusion
In this study we found a large proportion of drug resistant infections in Pakistan

Introduction
Close observation of resistant organisms in a hospital is important to optimize treatment outcome. Whenever a clinical facility is colonized with pathogens it's difficult to eradicate the species. With Increasing frequency of MDROs there is a need for continuous vigilance specially in developing countries like Pakistan. Once a bacterium is introduced in a healthcare facility its pervasiveness and spread is determined by susceptible patients, antibiotic use, and large population of affected patients ("Colonization pressure"). The patients who are immunocompromised due to underlying severe disease, surgeries or with catheters and tubes in intensive care settings are more vulnerable than patients in outpatient and day care setting. The prevention of infections will not only diminish the load of MDROs in a hospital but also decrease antimicrobial resistance and financial implications associated with these infections. There are pertinent practices that should be integrated in patient care that consists of appropriate catheter management, following sterilization techniques during procedure, meticulous diagnosis and sensible use of antibiotic will help to in control of these pathogens

Corresponding Author: Saira Ibrahim,
Shifa International Hospital H-8/4,
Islamabad, Pakistan.
Email: sairaikhan74@gmail.com

Methods
Study setting and period: The study period was from January to June 2015. Patients' hospital records were reviewed during infectious disease consultations at Shifa International, a tertiary care teaching hospital. There was a total of 300 infections, 140 patients admitted in internal medicine services, 70 in general surgery, 50 in neurosurgery, 28 in intensive care and 12 in liver transplant patients. Culture and sensitivity data from blood, pus, tracheal secretions and urine was collected from Microbiology lab.

SPSS Software version 17.0 was used to analyze the data. Mean and median age of participants was calculated. While frequencies and percentages of MRSA, Acinetobacter, *Klebsiella* spp *Enterobacter* species, Pseudomonas, *Serratia marcescens*, VRE, MSSA and Candida species were calculated in Medicine, Surgery, ICU, Neurosurgery and Liver Transplant.

Results
The highest percentage of ESBL *E. Coli* was recorded in internal medicine. 140 patients were admitted with underlying Cardiac, gastrointestinal and Renal conditions. Out of these (28%), patients had ESBL *E. Coli* in their cultures. (13%) had Methicillin Resistant *Staphylococcus aureus*. Followed by *Enterobacter* species (12%), *Klebsiella* (12%), *Acinetobacter* (12%) Pseudomonas (10%) and MSSA (8%) Lowest percentage in medicine department was of VRE (3%) Serratia (1%) and Candida (1%).

28 intensive care patients had Klebsiella (25%), *Acinetobacter* (22%), ESBL *E. Coli* (22%) Pseudomonas (12%) Methicillin *resistant staphylococcus aureus* (7%) *Enterobacter* species (3%), and VRE (7%). 50 Neurosurgery patients had *Klebsiella* (20%) ESBL E. Coli (18%) Candida (17%), *Acinetobacter* (17%), Pseudomonas (12%) Methicillin resistant *Staphylococcus aureus* (11%) *Enterobacter* species (7%) and Serratia (3%).

During the six month study period, 300 consultations were done when stratified by clinical service the most common organisms for all specialties were *ESBL E. coli*, Staphylococcus *aureus* (MRSA), *Acinetobacter* and *Klebsiella*.

Most of the infections were monomicrobial (80 %). Gram-negative organisms caused 76.3 % Gram-positive organisms caused 19% and Fungi caused 4.7 % of the cases. ESBL *E. Coli* (23.3%). Methicillin resistant *Staphylococcus aureus* (15.7%), *Enterobacter* species (10.0), *Klebsiella* (13.3%), *Acinetobacter* (13%), Pseudomonas (9.7%), MSSA (3.3%), vancomycin-resistant Enterococci (5.3%), Candida species (4.7 %) Serratia (1.7%),

Significant relationships were observed among certain specialties and infections in patients. Methicillin resistant Staphylococcus aureus was highest among general surgery patients, ESBL *E. coli* in medicine, VRE in Liver transplant, *Klebsiella* in Neurosurgery and intensive care units.

Discussion

ESBL Enterobacteriaceae is emerging problem in community as well as the patients admitted in hospitals.[1] Asia is the region in the world where ESBLS appeared de novo and frequencies of these organisms is rising every year.[2] MRSA has exceptional potential of causing outbreaks frequently in number of hospitals over many years. Different researches have shown that almost 33 Percent people have staph colonization in their nose.

MRSA is transmitted through direct contact and hence poor hand hygiene can lead to outbreaks. A simple measure of washing hands before each patient encounter can save many lethal infections caused by MRSA and save lives.[3]

Prolong stay in hospital with severe illnesses, extensive antimicrobial use and procedures are well known risk factors for Acinetobacter colonization. the mortality rate is high and now strains resistant to polymyxins are being reported, making these infections almost incurable in future.

In recent years, it's becoming common to use broad spectrum antibiotics. The antibiotic use, lack of following infection control guidelines is a risk factor for VRE infections, chemotherapy induced neutropenia, and post-transplant neutropenia is independently linked to VRE infection. In Pakistan, the first VRE was reported in 2002, about 10 vancomycin -resistant e. faecalis isolates were reported in Agha khan university hospital Karachi.[4]

Surveillance programs are important to determine resistance patterns. Rotation of antibiotics is an approach that will reduce resistance by withdrawing an antibiotic from intensive care for short period of time. These regimens will cut down this selective pressure. Awareness about emerging species and their sensitivity is crucial for management of nosocomial infections.[5]

We have a limited antimicrobial resource. The more frequent use today, the less potent they will be in future. Therefore, physicians and healthcare professionals around the world are following antibiotic stewardship. It's a promise to use the antibiotics when its needed, to select the right drug and administer with proper method. This way patients will get the therapeutic benefits, avoids un necessary harm and secure the lifesaving quality of these drugs.

Conclusion

Primarily we must prevent infections with excellent infection control practices, keep a track of emerging resistance. And we must develop new antibiotics for resistant strains.

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