

Bacterial Profile of Nosocomial Infections in a Tertiary Care Hospital

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Abstract

Background: Nosocomial infections, may appear either during the hospital stay of the patient or after discharge.

Objective: To find out the bacterial profile of nosocomial infections in a tertiary care hospital.

Methodology: This cross-sectional study was based on the records of the patients admitted in Ghurki Trust Teaching hospital during the period of 1st January 2016 to 3rd December 2017, who developed infections after their hospital admission, and their record was available in the Microbiology section of the Department of Pathology. A total of 1000 complete records of the patients were retrieved. Bacterial culture tests from clinical samples of these patients were performed in the clinical microbiology Laboratory of Lahore Medical and Dental College. Specimens included in this study were urine samples, pus samples from wound discharge, infected implants, and dead necrotic tissue. Data were analyzed using SPSS version 26.

Results: Out of 1000 samples, 150 (15%) samples showed positive growth, and among 150 83 (55%) were from females patients. The bacterial profile of these 150 positive samples showed that the most frequently isolated bacteria were Staphylococcus Aureus 45 (30%), MRSA 45 (30%) followed by Klebsiella, 21 (14%), Pseudomonas 15 (10%), E. Coli 12 (8%), Acinetobacter 9 (6%), and Proteus 3 (2%).

Conclusion: Staph. Aureus, MRSA, Pseudomonas, Acinetobacter, Klebsiella, E.Coli and Proteus are frequently isolated bacteria from nosocomial infections in our study. Such studies should be done frequently to keep track of bacteria that are prevalent in hospital-acquired infections.

Keywords: Nosocomial infection, Frequency, Bacterial profile

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Introduction

Nosocomial infections, also known as hospital-acquired infections are those infections that develop in a patient during the stay in a hospital and these infections were not present in the patient at the time of admission into the hospital.¹ These infections may appear either during the hospital stay of the patient or after discharge and there is enough clinical and laboratory-based prove that patients get this infection from the hospital environment.² Pathogens that cause such infections are called nosocomial pathogens. These bacteria are also sometimes very resistant and when a hospitalized patient who was admitted due to any clinical condition, gets infected with these pathogens in the hospital, it aggravates the patient's condition further and sometimes also becomes the cause of death of the patient.³ Either the patient is in the general wards or emergency wards or in ICU, chances of getting nosocomial infections are always there.⁴ literature has shown that 1 in 10 patients acquire an

infection while admitted in the hospital. Cross-infection and self-infection remain the mode of transmission. Patients in Intensive Care Units (ICUs) are at greater risk for acquiring nosocomial infections because of the severity of the diseases or impaired immunity. A patient with HAI, on average, spends 2.5 times longer duration in hospital resulting in additional expenditure. The most frequent nosocomial infections are urinary tract infections, hospital-acquired (nosocomial) or ventilator-associated pneumonia,⁵ wound infections, post-operative infections, and septicemia.⁶ Mostly the nosocomial infections are caused by bacteria. Among the gram-positive bacteria the cause nosocomial infections, the most common one is Staphylococcus Aureus and Methicillin-Resistant Staph. Aureus (MRSA). Other common bacteria that cause these infections are mostly gram-negative bacteria, for example, Pseudomonas, Acinetobacter, E.coli, Proteus, and Klebsiella.⁷ Based on the data presented in various studies across the world the above-mentioned bacteria are the most frequently

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isolated bacteria in nosocomial infections.⁸ The objective of this study was to find out the bacterial profile of nosocomial infections in a tertiary care hospital.

Methodology

This descriptive cross-sectional study was conducted at the Microbiology Laboratory of Lahore Medical and Dental College, Lahore, Pakistan. Clinical samples were received in the laboratory from Ghurki Trust and Teaching Hospital (GTTH), which is a tertiary care hospital affiliated with Lahore Medical and Dental College (LMDC).

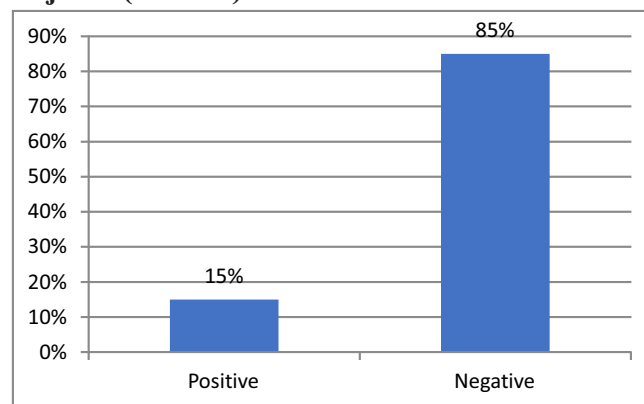
The study included all the 1000 patients whose complete records were retrieved from the Microbiology section of the Department of Pathology, and these patients were admitted to Ghurki Trust and Teaching Hospital (GTTH) during a period of two years from January 2016 to December 2017, the frequency of the those who developed nosocomial infections and their specimens showed positive growth were noted. Specimens included in this study were urine samples, pus samples from wound discharge, infected implants, and dead necrotic tissue. The microorganisms included were Staph. Aureus, MRSA, Pseudomonas, Acinetobacter, Klebsiella, E. coli and Proteus. Out of 1000 patients, a total of 150 positives samples were further analyzed to find out the bacterial profile in these clinical samples. All the samples were inoculated on Blood agar, MacConkey agar, and CLED. Biochemical tests were done to confirm the species of bacteria. Various biochemical tests that were performed to confirm the diagnosis were the catalase test, coagulase test, urease test, citrate test, and triple sugar iron media test. Data was collected and analyzed using SPSS version 26. Ethical approval was sought from the ethical committee of the hospital.

Results

This descriptive study was carried to assess the bacterial profile of nosocomial infections among patients who were admitted in a tertiary care hospital, and their record was retrieved from the Microbiology section of the Pathology department. Out of a total of 1000 samples, 150 (15%) samples were reported as positive for bacterial growth. (Figure-I) Among the 150

positive samples, 83 (55.33%) were females and 67 (44.67%) were male. Specialty wise among 150 samples, 74 (49.33%) was from Medicine, 23 (15.33%) from Surgery, 51 (34%) from Ortho, and 2 (1.33%) were from ICU.

Figure-I: Nosocomial Infection among study subjects. (n=1000)



The most prevalent organisms were Staphylococcus Aureus 45 (30%), MRSA 45 (30%) followed by Klebsiella, 21 (14%), Pseudomonas 15 (10%), E. Coli 12 (8%), Acinetobacter 9 (6%), and Proteus 3 (2%). (Table-I)

Table-I: Frequency microorganisms among patients

Organisms	Number (n=150)	Percentage
Staphylococcus Aureus	45	30%
MRSA	45	30%
Klebsiella	21	14%
Pseudomonas	15	10%
E. Coli	12	8%
Acinetobacter	9	6%
Proteus	3	2%

Discussion

Our study aimed to find out the bacterial profile of nosocomial infection. We included in this study only those clinical samples which were from patients who

developed clinical infections after admission into the hospital. Hospital-acquired nosocomial infections not only increase the time of patient stay in the hospital but also cause huge economical burdens.² In our study the most prevalent bacteria to cause hospital-acquired infection in patients who were admitted to GTTH was Staph. Aureus followed by Methicillin-resistant Staph. Aureus (MRSA). Similar results have been reported in many other studies too.⁸ It has been largely published in clinical research articles across the globe that Staph. Aureus is the most common bacteria that cause nosocomial infections.⁹ Staph. Aureus is a gram-positive bacteria that is a common colonizer on the hands and in the anterior nares of hospital personnel¹⁰ and sometimes these hospital personnel are also a source of transmitting the infection to the patients. In our study 50% Of the isolated Staph. Aureus turned out to be Methicillin-Resistant Staph. Aureus (MRSA). MRSA is widespread in nosocomial bacterial infections and there are very few treatment options for it which are vancomycin and Linezolid.¹¹ Even some MRSA also showing now resistance to vancomycin according to some studies. Proper sterilization and disinfection measures are taken in hospitals to minimize the risks of MRSA related nosocomial infections.^{12,13}

The other bacteria that caused the most infections in our study are Klebsiella, Pseudomonas, E.coli, Acinetobacter, and Proteus. These gram-negative bacteria are also the leading cause of nosocomial infections across the world in hospitalized patients. These results of our study are also similar to many other studies that have been done on the bacterial profile of nosocomial infections.¹⁴ Pseudomonas is such a hardy organism that it can even survive in water sinks of hospitals and is a frequent cause of wound infections and pneumonia. It is also associated with significant mortality and morbidity in hospitals.¹⁵ E.coli is also frequently involved in nosocomial infection and also Klebsiella and Proteus.¹⁶ Acinetobacter is a gram variable bacteria that is also frequently isolated from the various clinical samples of hospitalized patients and is becoming resistant to many available antibiotics.¹⁷

This study endorses real yet avoidable and generally overlooked nosocomial infections in Pakistan. Abuse and irrational use of antibiotics

has created widespread resistance, for example, MRSA, and these results in inconveniences of patients, which extend their hospital stay and adding to treatment costs. There is no policy in place which helps to administratively control nosocomial infections. This paper intends to sensitize the policy maker's clinical staff, microbiologists, and different specialists to think about the danger of nosocomial infections. This is for the wellbeing of the community to effectively engage the stakeholders for an organized and rational way to deal with the issue. There is a pressing requirement for "dynamic administration" of antibiotic use.

A previous study conducted in hospitals of Islamabad¹⁸ showed that knowledge of the HCWs was adequate, whereas practices were lacking. These findings along with the results of the current study which shows a high frequency of antimicrobial resistance among samples signifies the need for quick action. That study highlighted the need for conducting training on infection prevention as well. In that study, the gaps in knowledge and practices of the health care workers (HCW) regarding Health care-associated infections (HCAIs) were evaluated. That study was conducted in well-reputed hospitals of the country and still, there were significant gaps in knowledge and practice regarding nosocomial infections.

A study¹⁹ showed that non-medical objects known as fomites have a role in their genesis, and it investigated the significance of writing pens and spectacles as fomites. That study was conducted at Aga Khan University Hospital, Karachi, from July 2013 to September 2013. Cultures were taken from pens and/or spectacles of resident nurses, doctors, and nursing assistants in the intensive care unit (ICU). Seven rounds of sampling over 3 weeks led to 55 pen and 5 spectacle samples. Growth was seen in 3(5.5%) pen samples and 1(20%) spectacle sample. Two (3.6%) pen cultures grew acinetobacter, 1one1.8%) grew candida and acinetobacter, and one spectacle culture grew vancomycin-resistant enterococcus faecium (VRE). Two out of the 4 (50%) personnel managing all ICU beds had growth. During the study, one or more ICU patients had infections with the same organisms.

Conclusion

Staph. Aureus, MRSA, Pseudomonas, Acinetobacter, Klebsiella, E.coli and Proteus are frequently isolated bacteria from nosocomial infections in our study. Such studies should be done frequently to keep track of bacteria that are prevalent in hospital-acquired infections.

Authors Contribution: **AG:** Conception of work and Drafting. **SC:** Conception of work Interpretation of data and revising. **AG:** design of work and revising.

All authors critically revised and approve its final version.

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