Review Article

NOSOCOMIAL INFECTION AND IMPACT ON HEALTHCARE SYSTEM: A BASIC REVIEW

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ABSTRACT

Hospital acquired infections (HAI) or nosocomial infections (NI) are infections that a patient acquires while staying in a hospital or other therapeutic facility that was not present at the time of admission. The rise of different antibiotic-resistant pathogens, longer hospital stays, higher medical expenses, and worse treatment prospects are all consequences of nosocomial infections. The most common nosocomial infections are those of the respiratory and urinary tract, surgical wounds, skin and connective tissue infections caused by interruptions in their continuity, and generalized infections. The common pathogens that cause nosocomial infections in the neonatal ward are Staphylococcus epidermis, E. coli, Klebsiella sp., and Staphylococcus aureus and Pseudomonas aeruginosa.

Keywords: Nosocomial Infection, hospital acquired infection, Pseudomonas aeruginosa, Intensive care units.

INTRODUCTION

The word "nosocomial" refers to any illness that a patient contract while receiving hospital care. Nosocomial Infection (NI) also known as hospital acquired infection (HAI) that a patient acquires while residing in a hospital or other therapeutic setting that didn't exist when they were admitted. Nosocomial infections may also involve illnesses received by hospital employees or visitors, as well as infections in new-borns that arise from passage through the birth canal during delivery [1]. The concept of "healthcare associated infections" has recently been used to describe the serious risk of infections brought on by extended hospital stays and approximately 75% of the cases of these diseases occur in developing countries [2]. According to the World Health Organization, around 15% of hospitalized patients have these illnesses. A patient's surroundings, medical personnel, and other sick patients can all expose them to pathogens while in the hospital. The populations at risk include new-borns, individuals receiving organ transplants, burn patients, and patients in intensive care units (ICUs) and it is observed from the Extended Prevalence of Infection in Intensive Care study that up to 51% of patients in the intensive care unit are affected [3]. From various studies it is established that Any infection developed within 48 hours after hospitalization and three days following hospital release is considered nosocomial [4]. The most frequent nosocomial infections include respiratory and urinary tract infections, wounds from surgery, infections of the skin and connective tissues brought on by disruptions in their continuity, and generalized infections [5].

BRIEF IDEA OF NOSOCOMIAL INFECTION

Nosocomial infections are much more concerning in the twenty-first century for a number of reasons but the most important factor is the high volume of ill patients with frequently compromised immune systems and, the movement of healthcare providers that can provide pathogen to spread. The importance of nosocomial infection is found in both its economic consequences and its capacity to significantly change morbidity and mortality rates. Nosocomial infection prolongs the duration of hospitalization, increases the cost of health care, the emergence of multiple antibiotics resistance microorganisms and reduces the chances of treatment for others. Nosocomial infections are a major worldwide issue, and hospital settings have been found to be

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conducive to infection transmission because of the favourable pathogen- host-environment [6]. Hospital infections are a reflection of the quality of medical services, according to long-term worldwide policy in this area, and their reduction should require extensive efforts at multiple levels. The most important parts of the policy include:

- careful surveillance and registration of the current epidemiological situation
- accurate microbiological diagnostics
- minimizing the number of antibiotic-resistant microbes
- provide a system of tracking which antibiotics are used in hospital and outpatient care5

PREVALENCE OF NOSOCOMIAL INFECTION

The World Health Organization (WHO) survey of 55 hospitals across 14 countries found that 8.7% of patients in hospitals had nosocomial infections or HAIs, with the Eastern Mediterranean Region having a higher prevalence and the West of the Pacific having a lower prevalence. Some Asian, Latin American, and African nations reported a prevalence rate of about 40% for the HAIs, whereas North America and portions of Europe recorded a prevalence rate of 5%. The frequency of HAIs was close to 2.9%, according to the results of a European investigation. WHO statistics also indicates that the rate of HAIs is 5–15% in developed nations and 25% in developing nations [**7**].

THE ORIGIN OF THE NOSOCOMIAL INFECTION

The microorganisms that because nosocomial infections grow initially in clinics, hospitals, and medical facilities. Direct or indirect contact is one way that hospital-acquired infections can spread [8].

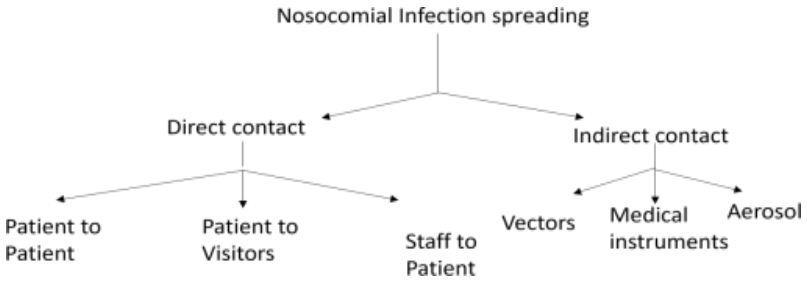

Fig:1.1 Pathway for spreading nosocomial infection or HAIs.

Various pathogens present in the hospital environment spread through direct or indirect modes of spreading. Inanimate objects can harbor infections, and using these items can spread those pathogens. Aerosols produced by patients' coughing and sneezing may include microorganisms that might spread illness. The transmission of nosocomial infections is additionally related to medical equipment and another common cause of nosocomial infections is stethoscopes. The aerosol is the primary means of respiratory tract infection transmission. Another infection may arise due to the admitted patient coming into contact with a new infectious agent. Another potential source of nosocomial infections is contaminated water, contaminated mechanical ventilation, urinary catheters. Patients who are admitted to the intensive care unit (ICU) and have impaired immune systems are more vulnerable to nosocomial infections. According to reports, one patient out of every ten contracts a nosocomial infection, lengthening their hospital stay for treatment [8].

THE CAUSATIVE AGENT OF NOSOCOMIAL INFECTION

Table1: Spreading of different pathogens from patients and staff, contaminated air, and electrical or other devices as a part of HAIs

Patient to staff

Pathogen (airborne)	Associated medical problem	References
MRSA	Pneumonia, surgical site infection, right sided endocarditis	**13**
Neisseria meningitis	Meningitis, Invasive meningococcal disease	**14,15**
Group A streptococcus	Pneumonia, necrotizing fasciitis, toxic syndrome, acute rheumatic fever	**16**

Contaminated aerosols

Pathogen	Associated medical problem	References
Pseudomonas aeruginosa	Pneumonia, Nosocomial Pneumonia	**17**
Acinetobacter baumanni	Necrotizing Fasciitis	**18**

Electrical devices of the medical system

Pathogen	Associated Medical Problem	References
Lagionella	Legionnaires' Disease	**19**
Nocardia sp.	Colitis	**20**
Clostridia	Respiratory Tract Infection, Pericarditis	**21, 22**

According to the Sahni et al.,2015 approximately 10% of the 200 known species of Candida are known to cause nosocomial infections in humans [9]. The common pathogens that cause nosocomial infections in the neonatal ward are Staphylococcus epidermis, E. coli, Klebsiella sp., and Staphylococcus aureus [10]. Nosocomial infections can also result from the time patients spend in intensive care units and the infections that have been identified as the cause of agents include Pseudomonas aeruginosa, Enterobacteriaceae, methicillin resistant (60%) Staphylococcus aureus, and coagulase-negative Fungal and Staphylococci [11]. Sengupta et al. (2000) recovered bacteria from stethoscopes that were susceptible to amikacin, ciprofloxacin and netilmicin including Enterococci, Klebsiella species, and Acinetobacter species, Escherichia coli, coagulase-negative Staphylococcus. Neonatals' recovery is impacted by nosocomial infections in neonatal intensive care units that are caused by methicillin-resistant Staphylococcus aureus (MRSA) and extended-spectrum beta-lactamases (ESBL) generating Klebsiella species. These infections can also result in preterm, low birth weight, and hospitalization. Analysis by Anaissie et al. (2002) found that Pseudomonas aeruginosa related nosocomial infections kill 1400 persons annually in the United States [8].

Microbes produce biofilm, which is vital to the ecology. Infection may result from the presence of harmful microorganisms in the biofilm even in the presence of antibiotics. There are several kinds of medical devices that can support microbial film growth. Implanted devices, like blood vessel studs, are susceptible to microbial development, which, if left untreated, might result in a serious illness. According to the various research, Staphylococcus aureus can cause bloodstream infections linked to pacemakers [12].

DISCUSSION AND CONCLUSION

Nosocomial infection is considered one of the most serious public health problems, HAIs have significant rates of morbidity, death, and expenses. Children, elderly individuals, and immunocompromised patients are particularly vulnerable to nosocomial infections and are encouraged to minimize needless visits or contact with contaminated environments. To keep the climate free of contaminants, regular surveillance of the medical facility should be observed and necessary action should be taken.

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