

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Impact and Effect of Nosocomial Infections: A Review.

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ABSTRACT

Nosocomial infection is one of the leading causes of death. At any time 1.4 million people suffer from hospital acquired infection and its complications. Blood stream infection, Lower respiratory tract infection, Urinary tract infection, surgical site infection, gastroenteritis, other soft tissue infections are the common sites of nosocomial infections. Catheter and ventilators are the common procedure related to nosocomial infections. Development of multi – resistance organisms and Socio– economic burden due to direct medical costs and indirect medical costs related to diminished quality of life are the serious consequences of nosocomial infections. Absence of policies or guidelines at national or state level, Lack of Infection control committee organised in all the hospitals, Quality of treatment is poor in hygiene are some of the gap in reducing it. The recommendation includes development of National hospital infection cell, recording nosocomial infection rates in all government hospitals and providing awareness among healthcare professionals

Keywords: Nosocomial, Infections, Multi-resistance, hospital acquired.

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INTRODUCTION

World Health Organization defines nosocomial infection or hospital acquired infection as “An infection acquired in hospital by a patient who was admitted for a reason other than that infection. An infection occurring in a patient in a hospital or other health care facility, in whom the infection was not present or incubating at the time of admission. This includes infections acquired in the hospitals but appearing after discharge and also occupational infection among staff of the facility [1, 2, 3]. An infection occurring after 48 hours of admission is considered as nosocomial infection [4]. High frequency of nosocomial infection reveals a poor quality of health care system. HAI appears to be a hidden, cross-cutting problems that no hospital or country can claim to have solved yet [5].

Public health importance

Nosocomial infection is one of the leading causes of death [3]. At any time 1.4 million people suffer from hospital acquired infection and its complications. The prevalence of hospital acquired infection is roughly 5 – 10% in developed countries and upto 10 – 30% in developing countries which varies between countries, states and districts. This is 2 - 20 times higher than developed countries [2]. A recent review show that HAI in high income countries is 7.5% and low and middle income countries is 10.1% [6].

Epidemiology

MICROBIAL AGENTS

It can be caused by any bacteria, virus, fungi and parasites. But commonly occurring strains are MRSA, coagulase negative staphylococci, enterococci. Usually these are antimicrobial resistant strains. Infectivity is mainly due to intrinsic virulence and the amount of infective material. The organisms may be endogenous [commensal bacteria] or exogenous [environmental infection and cross-infection] in origin [3, 7]. Vancomycin resistant enterococcus is the dangerous hospital infection which is 5 times higher prevalence in India than other countries in the world [8].

ENVIRONMENTAL FACTORS

Environment includes the hygiene of equipments, surroundings, healthcare workers, etc. Health care settings are with both infected and susceptible individuals. Contamination of devices, objects, materials getting into direct contact of host may end up with infection [3].

HOST SUSCEPTIBILITY

The risk of developing HAI are Age - in extremities, Chronic diseases like malignant tumour, diabetes mellitus, renal failure, etc., Low Immune status – AIDS, leukaemia, etc by opportunistic pathogens and Diagnostic and therapeutic procedures – biopsies, endoscopic examinations, catheterisations, intubation, ventilation, suction, surgical procedures[3,6].

Routes of Transmission [9]

- Direct contact route.
- Air borne route.
- Vehicle – borne route

Commonly occurring major HAI sites:

This includes Blood stream infection, Lower respiratory tract infection, Urinary tract infection, surgical site infection, gastroenteritis, other soft tissue infections, etc [3, 10]. Common procedures causing HAI are catheter related blood stream infection, ventilator associated pneumonia, and catheter related UTI [4].

High risk areas causing HAI

The high risk areas include intensive care units, operation theatres, dialysis unit, burns unit, transfusion service unit, food handlers, drinking water, etc. ^[11], Infection rates are commonly increased in acute surgical wards, Orthopaedic wards and general wards.

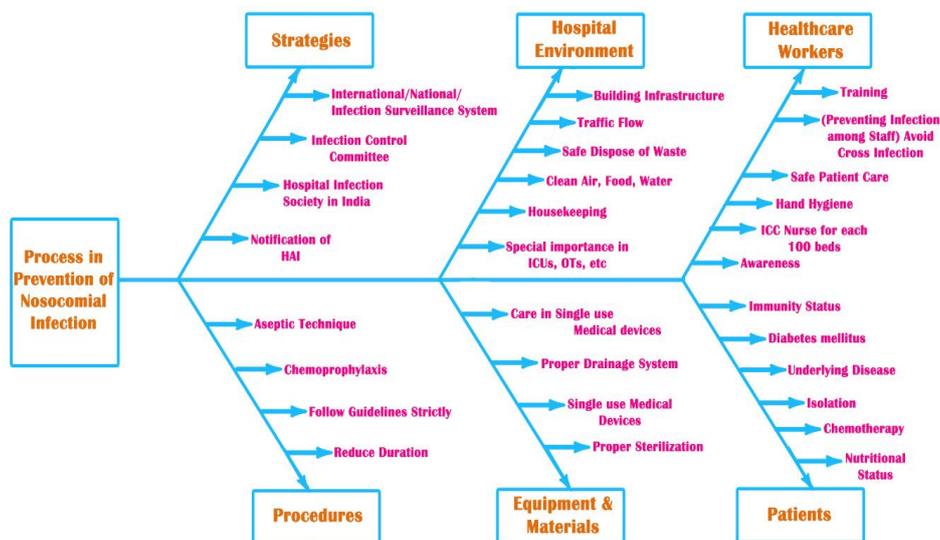
Consequences of HAI

- There is a chance of development of multi – resistance organisms which may be endemic in the hospital and epidemic in community due to spread causing a serious issue.
- Socio – economic burden [3, 12,13] - due to direct medical costs and indirect medical costs related to diminished quality of life.
 - Extra cost for hospital stays due to bed occupancy.
 - ICU prolonged stay.
 - Haematological, biochemical, microbiological and radiological tests. iv. Antibiotics and other drugs.
 - Extra surgical procedures.
 - Funds allotted for hospital by government being diverted by HAI.
- 3. Extra – duration of stay in hospital.
- 4. Additional morbidity and mortality rates due to HAI.
- 5. Physical and psychological sufferings to the patient.

Prevention and control: [2, 11, 14]

This requires an integrated, monitored, programme which includes the following key components:

- Limiting transmission of organisms between patients in direct patient care through adequate hand washing, gloves use, appropriate aseptic practice, isolation strategies, sterilization, disinfection practices and laundry.
- Controlling environmental risk for infection.
- Protecting patients with appropriate use of prophylactic antimicrobials, nutrition and vaccines
- Limiting the risk of endogenous infection by minimizing invasive procedures.
- Surveillance of infection. Identifying and controlling outbreaks.
- Prevention of infection in staff members.
- Infection control responsibilities in health care professionals.



Fish bone type of diagrammatic representation for prevention and control of nosocomial infection

Multidisciplinary approach by an infection control committee:

Team of members are hospital management, physician, microbiologist, pharmacist, nursing staff, central sterilization service, laundry, housekeeping, maintenance and food service [3].

Role and functions of Infection control committee:

- To implement basic hygiene in hospital and among staff.
- To gather data about micro flora pattern from high risk areas ICUs, diagnostic centres and oncology services.
- To identify outbreaks by the hospital laboratories.
- Surveillance on – i. Infection leading to high level of morbidity. ii. Cost of treatment. iii. Treatment difficulty. iv. Potentially preventable infections.

Programme or actions available in prevention and control of HAI:**In other countries:**

- National nosocomial infection surveillance: In U.S. to estimate the magnitude and burden of HAI, central for disease control and prevention [CDC] followed National nosocomial infection surveillance [NNIS]. This showed the actual status of HAI in U.S. [9]
- Central for disease control and prevention [CDC]: SENIC [study of efficacy of nosocomial infection control] project was started in 1970s by U.S., involved 638 hospitals national wide^[10]. After a decade it showed 33% reduction in nosocomial infection in hospitals with infection control committee. One hospital having effective programme showed 2 million dollars savings out of reduction in HAI [15,16].
- International Nosocomial Infection Control Consortium [INICC] started in late 90s. On one hand, there were data sources available for nosocomial infections in U.S. and other developed countries, whereas on other hand in developing countries it was unknown. For this reason INICC since 2002 is measuring the health care - associated infections in 46 developing countries including India, Sri Lanka, Pakistan, etc., [6]
- Reduce infection disease [RID] committee was founded in 2003 and it empowers patients to reduce the risk of infection [17].

In India:

Hospital infection society [HIS]: The Hospital Infection Society - India is an association of medical professionals with a special interest in the prevention and control of hospital infection. It is registered with Registrar of Societies at Delhi. Founded in 1991, the society presently has more than 700 members. Hospital Infection Society India [HISI] provides the essential tools, education materials & communication that unite HISI members and foster development of Hospital Infection Control programmes based on evidence based medicine [8].

Gap in reducing hospital acquired infections [1, 3, 5, 9]:

- Absence of policies or guidelines at national or state level.
- Lack of Infection control committee organised in all the hospitals.
- Quality of treatment is poor in hygiene, misuse of antibiotics, inappropriate therapeutic or diagnostic procedures leading to HAI.
- Lack of knowledge among health professionals.
- Lack of trained health professionals.
- Lack of national wise data source to know the actual status about HAI.
- Inadequate hospital infrastructure with lack of maintenance in hospital environment.

Recommendations/ strategies for HAI:**National level:**

- National hospital surveillance system should be implemented.
- National hospital infection control programme, which should include:
 - One infection control practitioner for every major health facility.
 - A trained hospital epidemiologist.
 - A system of reporting feedbacks on HAI to concerned practitioner.
 - Continuing education of medical staff.
 - Control of infectious disease outbreak.
 - Protection of employees from infection.
 - Advice and training on new procedures.
 - Instructions on all necessary control measures.
- National hospital infection cell which can be organised with specialised people in nosocomial infection, who will plan, implement, analyse the actions carried out by national hospital infection preventive and control programme.

State level

- Focusing on the highly prevalent districts, especially major health facilities.
- By conducting training and awareness programmes among health professionals.
- Preparing annual report every year to know the status of HAI after implementations of programme activities.
- Recording HAI rates in all government hospitals.
- Should develop standardised laboratories to find outbreaks in hospitals.

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