



HEALTHCARE ASSOCIATED INFECTIONS IN PUBLIC HEALTH INSTITUTION

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ABSTRACT The article highlights the importance of strengthening of public health systems and the need for rapid scaling up of access to knowledge of more hospital acquired infection, to have robust national initiative and public health policy in place to look after and comply with it. The paper draws lessons from the infections burden due to man handling of antibiotics and proper intervention of hospital committees and policy layouts can help to avoid HAI at great lengths and help in better experience and validates that proper intervention and policies can help in avoiding in public health emergencies. The paper draws lessons from the infections burden due to improper handling of antibiotics. Proper intervention of hospital committees and policy layouts can help to avoid HAI at great lengths, can help in better experience. This paper validates that proper intervention and policies can help in avoiding public health emergencies.

KEYWORDS : Hospital Acquired Infection, Infection prevention and control program (IPCP), Urinary Tract Associated Infections (UTI), Surgical Site Associated Infection (SSI), Ventilator Associated Pneumonia (VAP), and Antimicrobial Resistance.

1. INTRODUCTION

Hospital-acquired infections, also known as healthcare-associated infections (HAI), are nosocomial infections that are typically not present or might be incubating at the time of admission. These infections are usually acquired after hospitalization and manifest 48 hours after admission to the hospital (WHO 2002). The infections are monitored and surveilled closely by agencies such as the National Healthcare Safety Network (NHSN) of the Center for Disease Control and Prevention (CDC) to improve patient safety [1].

These HAI'S can be caused by viral, fungi and bacterial pathogens

- Out of every 100 hospitalized patients, at any given time, seven in high income countries and 10 in low- and middle-income countries will acquire one or more HAIs. WHO reports that at any given time over 1.4 million globally suffer from HAI?
- Up to 7% patients in developed countries and 10% patients in developing countries catch hospital acquired infections

In a country like India with an exploding population of 1.3 billion people, COVID19 had been particularly brutal to admitted patients in ICU. With a Google search of 13.60 crores, "COVID19 and Hospital acquired infection "Mucormycosis" has become one of the most important topics in the digital space which needs examination.

Global pandemics like SARS, influenza, and Ebola has brought into light the role that Health Care Facilities play as an epicenter of outbreaks. During the Nipah Virus outbreak in Kerala 2018, a nurse died taking care of an infected patient. This has led to more focus on IPC within the hospital settings. An important part of Infection prevention and control is to assess the Health care associated infection.

For the last few decades, hospitals have taken the hospital-acquired infections seriously. Several hospitals have established infection tracking and surveillance systems in place, along with robust prevention strategies to reduce the rate of hospital-acquired infections. [2] The impact of hospital-acquired infections is seen not just at an individual patient level, but also at the community level as they have been linked to multidrug-resistant infections. Based on the guidelines from both the Infectious Disease Society of America (IDSA) and the American Thoracic Society (ATS), the definitions of Pneumonia have been changed to better identify patients at risk for multidrug-resistant (MDR) pathogens. This, in turn, is aimed at avoiding the overuse of antibiotics.

2. OBJECTIVES:

1. To understand Important Interventions under IPC.
2. To understand common types of Hospital acquired infection.
3. To understand infection prevention and control program (IPC).

3. METHODOLOGY:

Exploratory research based on secondary data was done to explore the intricate details linked with hospital acquired infection. The secondary data was collected from research papers, newspaper articles, international journals and books for the study. The said data had played a crucial role in the research study and in covering the nuances of the study in an efficient manner.

4. THE TRUTH BEHIND HAI

The current pandemic has exacerbated the problem of HAIs by heightening the risk not only for healthcare workers (HCWs) but also for the family and friends of admitted patients, as well as those visiting the hospital. In addition, Americans and Europeans are millions of Americans are avoiding hospital care, even in medical emergencies, for fear of contracting COVID-19. The story is no different in India, with several reports confirming similar trends.

According to the WHO, for every 100 hospitalised patients, seven in high-income and 10 in middle-income countries develop HAIs. And the ICU-acquired infection rate is at least 2-3-times higher in middle-income countries than that in high-income countries, where it's about 30%. Dr Soumya Swaminathan, the chief of the Indian Council of Medical Research (ICMR) in 2017, and now chief scientist at the WHO, admitted in the British Medical Journal that year that India does not have accurate estimates of the burden of HAIs.

The Indian Medical Association (IMA) has cited government data that 87,000 HCWs have been infected and 573 of them have died due to COVID-19. IMA's own data accounts for 307 deaths among HCWs. A recent study in the UK and the US, published in The Lancet, showed that HCWs have a threefold greater risk of testing positive for COVID-19 compared to the general population. An ICMR study has suggested that 5% of front line healthcare workers may be getting infected with COVID-19 and for patients with worldwide in terms of excess costs, prolonged hospital stays, mortality and disability. Today, HAIs have become more challenging to handle, together with the fact that we don't have proper data nor surveillance protocols.

The International Nosocomial Infection Control Consortium's chairman Victor D. Rosenthal has discussed higher rates of HAIs in India, following a decade-long study, and advocated for prevention. He also cautioned against overusing antibiotics, doing which could lead to antimicrobial resistance. Dr Swaminathan had urged in 2017 that IPC and surveillance systems would have to be strengthened. The ICMR also published some details in a manual entitled "Hospital Infection Control Guidelines.

The Way Ahead

WHO has acknowledged the role of defective IPC practices during every day healthcare delivery, lest we forget, HAIs is not a product of the COVID-19 pandemic; the pandemic only exacerbated HAIs and their consequences. Nearly a decade ago, The Lancet published a systemic review and meta-analysis of 220 articles to assess the burden of HAIs in developing countries. High burdens due to weak rural health system, villagers flock to city and overloading of patients were attributed to unsafe patient care, and the authors recommended better surveillance and infection control practices. Now, a decade later, where do we stand?

5. The common types of Hospital Acquired Infection.

1. Central Line Associated Bloodstream Infection (CLABSI): These infections are caused when usually bacteria enter into the bloodstream. This is basically related to the catheter that doctors often place in a larger vein in the neck, chest or groin to give medication or

fluids or to collect blood. These infections are serious.

2. Urinary Tract Associated Infections (UTI): This type of infection is associated with any part of the urinary tract which includes urethra, kidneys, bladder or ureters. This is the most common amongst the HAI's and account for almost 75 % of the HAI'S.

3. Surgical Site Associated Infection (SSI): This occurs after the surgery is performed and occurs on the body part where the surgery was carried out. Depending on the type of surgery, these can be superficial or deep.

4. Ventilator Associated Pneumonia (VAP): This is the device associated infection which happens in the ICU patients due to the ventilators. This type of pneumonia is the most prevalent infection and also has case fatality rate.

5. Antimicrobial Resistance: Antimicrobial Resistance (AMR) is directly linked to HAI'S, and is caused by irrational use of antibiotics. It is one of the most serious public health threats that the entire world is facing, the effects are more serious in India and developing countries. It thus becomes very important to know that in 2010 India was the largest consumer of antibiotics which aggravates the problem further. A few examples of AMR are:

a) Resistance in *Klebsiella pneumoniae* – common intestinal bacteria that can cause life-threatening infections – to a last resort treatment (carbapenem antibiotics) has spread to all regions of the world with infections such as pneumonia, bloodstream infections, and infections in new-born and intensive-care unit patients.

b) Multidrug resistance in *E. coli* is a grave public health crisis. *E. coli* is one of the most widely used medicines for the treatment of urinary tract infections (fluoroquinolone antibiotics). Fluoroquinolone antibiotic is one of the most widely used medicine for treatment in UTI due to *E. coli*.

c) Methicillin Resistant *Staphylococcus Aureus* (MRSA) which causes infections in different body parts. It is tougher to treat than other strains. It is dangerous because it spreads by simple touch.

7. Impact of HAI on Healthcare Facilities and Patients

1. For Patients: HAI cause economic and emotional distress to people due to increase in stay in hospital which leads to disputes.

2. For Hospitals: They have to invest on more staff and care to the patients on creating an environment wherein these infections will not prevail, reducing the revenue for the hospitals because, 13-18 days are the best hospitalization days after that it leads to negative utility for them.

1. Poor Hospital Management

a. Lack of Human Resources – The healthcare worker to patient ratio in India is quite low which results in issues with regards to maintenance of hygiene. Considering the lack of resources NABH standards of 1:1 nurse to patient ratio in ICUs depict lack of evidence-based policy.

b. Under-funding – Under funding is also a factor that contributes to poor hospital management. The governments have historically neglected their role in investing in infrastructure of hospitals. This results in non-availability of preventive supplies such as masks, aprons, gloves, gowns, PPE kits, which are essential to maintain hygiene and prevent infection.

2. Inadequate Policy Framework

a. Lack of Surveillance – India currently lacks a comprehensive national network for surveillance. This results in absence of routine and standards data which is crucial to gauge the magnitude of the problem and make evidence-based policies. The absence of uniform national surveillance network also results in fragmented institutional level data that is not comparable and thus redundant.

b. Problem with accreditation – A national accreditation is an incentive to improve the capacity of national hospitals to provide quality of care whether public or private, play their expected roles in the national health system. The problem with India is that accreditation is non-mandatory. While independent boards such as NABH and NAQS exist, their penetration is significantly low.

c. AMR policy – The lack of regulation and adherence to AMR policies despite having an AMR action plan in place since 2017 further exacerbates the HAI problem in India.

8. Infection Prevention and Control Program (IPC)

IPC guidelines are issued by the **National Centre for Disease Control (NCDC)**, to maintain the standard of healthcare in hospitals. The structure of IPC comprises of three integral parts –

1. Hospital Infection Control Committee (HICC): HICC is a committee that is supposed to be constituted in every hospital and health care facility. It is chaired by the head of institute and the members include secretary and infection control officers that belong to different departments of the hospital to ensure maximum representation. The committee has the infection control nurse who is

the fundamental unit of the committee and is responsible for the ground level monitoring of standards and implementation of SOPs.

2. Infection Control Team: Infection control team is developed by the HICC to smoothen the implementation of prevention control programs. These teams are responsible for collection of surveillance data and in monitoring of standards.

3. Infection Control Manual: HICC reviews guidelines and formulated the Infection Control Manual. This manual includes SOPs, guidelines, and recommendations that need to be followed in order to ensure infection prevention and control.

Role of HICC:

- 1. Development of Action Plan and Hospital Policies for HAI surveillance and management.
- 2. Analysis of surveillance data; Monitoring trends; predicting outbreaks and resistance patterns.
- 3. Development of Antibacterial Policy and Antimicrobial stewardship program.
- 4. Appointment of Infection Control Team for day-to-day activities.
- 5. Monitoring and evaluation of IPC Program.
- 6. Budgeting and organization of periodic meetings.
- 7. Review of guidelines and formulation of hospital policy, SOPs, and Infection Control Manual.
- 8. Staff training
- Preventive Activity
- Hand washing techniques
- Handling of contaminated material and waste disposal
- Barrier protection
- Patient protection
- Environment control

While HICC are important structures to ensure IPC guidelines are followed, they are not legally mandated and no overarching regulating body that monitors their performance and relevance. This contributed to a major flaw in the HAI prevention and control program.

9. Important Interventions under IPC

1. Surveillance of HAI – Surveillance of HAI is necessary to estimate the burden of disease, and to have a reliable and routine source of standardized data. It is also necessary to detect potential outbreaks, emerging pathogen and patterns of resistance, and to monitor the quality of IPC measure strategies. As a response to this, National HAI surveillance Network is launched under the collaboration of AIIMS, ICMR, and CDC. This network of hospitals comprises of 24 plus ICMR centers and over 184 surveillance units. However, this is only available in tertiary and super specialty private hospitals.

2. Care bundles Approach - Care “bundles” are simple sets of evidence-based practices that, when implemented collectively, improve the reliability of their delivery and improve patient outcomes. The approach involves a checklist and set of procedures that are followed rigorously and are designed keeping in mind patient susceptibility and environmental factors of the hospital. A number of specific bundles that can be implemented at health care facilities in resource-limited settings. These packages of care contribute to infection prevention, reduce unnecessary antibiotic prescribing, and may limit the development of antibiotic resistance in health care facilities. These care bundles are designed to curb CABS, CAUTI, and VAP&SSI.

3. Antibiotic stewardship program and Rotational therapy - Antimicrobial resistance has now become one of the major public health problems. The number of superbugs is increasing at a very alarming rate owing to the over prescription of Antibiotics. To tackle this problem many hospitals have established their own antimicrobial stewardship programme (AMSP). The AMSP involves:

- Formulation of a standardized guidelines which is to coincide with the antibiotic policy of the hospital.
- Restrict the use of selected antibiotics
- Do a careful assessment of antibiotic prescription taking place in the hospital
- Develop an efficient training and education programme for the health care staff regarding appropriate antibiotic use, so that a culture of rational antibiotic prescription is adopted
- The most important is to monitor and do surveillance of AMR and prevent the development of Multidrug Resistant Organisms (MRDO)

4. Rotational Antibiotic therapy - It is a new measure which is introduced to reduce the antibiotic resistance amongst the populations. Rotational antibiotic therapy involves withdrawal of a certain class of antibiotics, from the intensive care unit for a short period to reduce and stabilize the resistance level. It works on the principle of selective pressure. It offers greater flexibility than restrictive antibiotic practices as the prescriber has to give written justification for deviation from the hospital policies. The Rotational therapy has proven to decrease the

incidence of Nosocomial pneumonia in a large ICU.

10. National Initiatives and Private Sector Initiatives

1. Kayakalp Scheme (2015) - It is an award scheme under the Swachh Bharat mission aimed at changing the image of the public health care hospitals offering certification and monetary benefits adhering to government sanctioned guidelines for improving the cleanliness, and maintaining proper hygiene.

2. National Guidelines on Clean Hospitals -The image of public hospitals is not very pleasant with lack of proper sanitation facilities, open drainage systems and lack of waste management systems. These guidelines promote Swatch Hospital Abhiyan

- Launching cleanliness drives with focus on swatch hospital week where the entire week is dedicated to cleaning the hospitals.
- Furthermore, it involves conducting internal meetings with the entire staff setting up aims and key activities which must be followed to improve the cleanliness levels within the facility and periodic review is equally important to maintain the success of this Abhiyan.

3. Global Health Security Agenda (2015) – ICMR and AIIMS in collaboration with Centre for Disease control and prevention (CDC) came together to strengthen the AMR surveillance within the country to achieve global health security.

4. Heal O Nomics - The International Nosocomial Infection Control Consortium (INICC) is a non- profit international research Centre that coordinates and Healthcare acquired Infection and AMR surveillance network which focus on.

- Improving surveillance data quality.
- Introducing new and updated guidelines for infection control program.
- Developing a cost- effective method to implement quality ICP with limited resource setting.

11. DISCUSSION

HAIs emerged in healthcare settings where patients were hospitalized for reasons unrelated to infections or were not previously infected prior to the admission [3]. Although the number of HAIs has increased dramatically over the past 30 years, a proportion of HAIs can be considered preventable with an accurate public health surveillance system, infection control, best practices, and prevention [4]. HAIs occurred in four main localizations and represent the majority of all infections: respiratory, urinary tract (UTI), surgical wounds, and systemic infections [5,6]. At present, antibiotic resistance represents a major concern with regard to HAIs [7]. In addition to bacteria and fungi, viruses are also a cause of HAIs. Generally, hospital virus infections can be transmitted through the respiratory route, hand–mouth contact, and fecal–oral contact route. However, a part of HAIs would still remain unpreventable due to external factors (relating to the patient or medical treatment itself). Infectious complications related to medical care will have an impact on economic costs; therefore, HAIs represent an important factor of increased healthcare costs [8] due to multiple aspects.

From a medico-legal point of view, COVID-19 has brought significant repercussions and implications. Cases of hospital-acquired COVID-19 should be considered unexpected events that require a thorough analysis of medical records in order to determine what the miscalculations were [8,9].

Given the complicated situation, a hospital-acquired infection should not be considered grounds for "malpractice". However, if containment measures are not respected due to an "error", then a hospital infection could be considered "malpractice". Failure to follow infection control standard precautions would be sufficient proof of professional liability. Hospital-acquired COVID-19 cases require a complete analysis of medical record documentation.

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