

Healthcare Associated Infections: Epidemiology, Contributing Factors and Control Measure in a Developing Country

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ABSTRACT

Nosocomial infection or Healthcare Associated Infection (HCAI) is a type of infection that occurs in a patient while receiving care in a hospital or other health care facility, and which was not present during admission. Epidemiological data suggests such infections to be the primary adverse event in a healthcare institute, with a greater risk of occurring in developing countries like Nepal. This article intends to suggest the various factors contributing to and the methods that the healthcare workers and other stakeholders could adopt to prevent and control the infectious diseases in order to reduce the HCAI-related morbidity and mortality in developing countries such as Nepal.

Keywords: Hand Hygiene, Healthcare Associated Infection (HCAI), Nepal, Nosocomial infection, Patient safety

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INTRODUCTION

The Oxford Textbook of Medicine defines nosocomial infection as the infection occurring within 48 hours of hospital admission, 3 days of discharge or 30 days of operation. It affects 1 in 10 patients admitted to hospitals around the globe. It is also known as healthcare-associated infections (HCAI), it is becoming a grave health concern

worldwide for¹ the safety of patients and healthcare professionals.² The Centres for Disease Control and Prevention (CDC) and National Healthcare Safety Network have defined HCAs as those infections that patients acquire while receiving health care services and not present or incubating upon admission to the healthcare institute.^{3,4} HCAs represent the most

frequently encountered adverse health event faced by patients in healthcare institutions.⁵ In addition to this, the problem is exacerbated by the emergence of multidrug-resistant (MDR) and extremely drug-resistant (XDR) organisms, causing such infections. MDR organisms are non-susceptible to one or more antibiotics in more than two antimicrobial categories and XDR organism are susceptible to antibiotics in only less than three antimicrobial categories.⁶

Epidemiology of HCAIS

According to the WHO, about 1.4 million people suffer from HCAIs at any given moment.⁷ The risk of developing HCAIs is up to 20 times higher in developing nations compared to developed countries.^{2,8} In resource-limited countries, surgical site infection is the most common infection affecting at least one-third of the operated patients in hospital settings.^{2,8}

In context of Nepal, infectious diseases are the leading causes of deaths with almost 70% of all the health-related problems and mortality associated with infectious diseases.⁹ Diarrhea and lower respiratory tract infections are the top two causes for high morbidity among the top ten causes of morbidity in adult population in Nepal.¹⁰ Furthermore, umbilical cord infection is the most common HCAI among neonates in both the hospital setting and the community setting in Nepal. The risk of umbilical cord infection is still more common among the neonates born at home or hospital where infection prevention and control (IPC) is compromised.¹¹

Research has shown that Nepal lacks a national system of surveillance of HCAIs.¹²⁻¹⁵ Studies conducted at ICU of different hospitals in Nepal reported the rates of ventilator-associated pneumonia (VAP), central line-associated bloodstream infection (CLABSI) and catheter-associated urinary tract infection (CAUTI) almost double since last 5 years.¹³⁻¹⁴ A study carried out at a trauma center reported an HCAI prevalence of 11.83%.¹⁵ There is a high prevalence of MDR and XDR pathogens causing such HCAIs primarily among genera such as *Acinetobacter*, *Klebsiella pneumonia*

and *E. coli* with a high prevalence of carbapenem-resistant isolates and beta-lactamase producers.^{14,16} The study conducted by Parajuli et al reported that 96% of all isolates causing HCAI in ICU setting were MDR while 43.3% of all isolates in the same study were found to be XDR.¹⁶

Contributing Factors for HCAIS

The practice of infection prevention and control (IPC) is poor in Nepal, primarily in critical care settings such as the ICU.¹⁶ Various factors such as economic, social and cultural, etc are associated with the development of HCAIs in resource-limited countries.¹⁷ The cost related to IPC measures is an important factor.¹⁸ Another factor is a lack of satisfactory knowledge regarding IPC among healthcare workers, especially the IPC measures to be taken for critically ill patients or while dealing with invasive devices, and use of antibiotics.^{12,18} Similarly, there is a lack of knowledge regarding IPC measures to be taken in case of highly infectious diseases such as tuberculosis.¹⁹ Also, not many hospitals have a system of in-house training on infection control targeting all healthcare workers.¹⁸ Other important contributing factors include:

- i. Lack of well-organized IPC committees and teams in hospitals¹⁸
- ii. Inadequate and irregular supply of materials for cleaning, sterilization and disinfection^{18,20}
- iii. Poor supply of personal protective equipment primarily goggles and respirators^{18,20}
- iv. Shortage of trained and dedicated human resource for IPC^{17,18}
- v. Inadequate application of fundamental procedures^{12,18}
- vi. Lack of organized surveillance systems^{12,18}

Prevention and Control Measures

Prevention of HCAIs is critical to creating an environment of safety for both the patients and the healthcare professionals. Effective IPC measures should be established to reduce the rate of HAIs. IPC interventions include various steps and procedures, which can be implemented, monitored and improved

via the use of “Plan, Do, Check, Act” (PDCA) cycle, with the cycle implemented for all the individual components of IPC.²¹ The PDCA cycle, also known as the PDSA (Plan, Do, Study, Act) cycle, is one of the most effective tools that provide a framework for effective implementation of measures for quality improvement.²² One of the primary factors needed for improvement in IPC is a commitment from the top-level hospital management in recognizing HCAs as a tangible threat and thus, investing in IPC measures.²³ Another equally important step is the establishment of multidisciplinary IPC teams.²⁴

Hand hygiene is a crucial measure for effective IPC program and it is the simplest means of preventing infections.^{2,7} Appropriate hand hygiene measures significantly lower the risk of morbidity and mortality related to infections.²⁵ The WHO multimodal strategy can be used to improve hand hygiene in healthcare institutes.²⁶ WHO suggests five multimodal improvement strategies such as 1) system change, 2) training and education, 3) monitoring and feedback, 4) reminders and communications and 5) a culture of safety.²⁶ Regular in-house training of healthcare workers regarding IPC is indispensable for reducing the rates of HCAI.^{12,18,23} Healthcare institutions should develop a system of regular surveillance of HCAs and reports of such surveillance should be communicated to all concerned healthcare workers.¹⁸ Healthcare institutions should recruit and assign specific tasks to infection control staff such as infection control nurse, Microbiologists, and Epidemiologists. Regular feedback to the staff regarding IPC behaviors along with a system of motivation and active participation should be established.²⁷ Better engineering controls such as the provision of hand rubs, location of handwashing sinks, etc are also very important.²⁸ The use of local resources and optimization of present resources can help implement these controls in resource-limited settings.²⁹⁻³⁰ For example, the use of hand rubs is found to be a highly effective practice in reducing HCAI rates in settings where sinks may not be adequately provisioned.²⁸

CONCLUSION

Healthcare associated or nosocomial is one of the prevalent health concerns which poses a serious threat to the patient, and health care professionals. Therefore, there is an immediate need of initiating and implementing various IPC measures in every hospital setting via PDCA (Plan, Do, Check & Act) cycle. Leadership commitment, provision of quality human resources for effective IPC along with effective surveillance systems, and feedback to healthcare professionals are some important strategies that must be implemented to improve IPC in developing countries.

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