



An Overview Of Critically Important Concepts In Infection Controls

Menwer Mohsen Mubarak Alfahmi^{1*}, Saad Saud Alyazidi², Abdulkarim Jamaan Albijali³, Abdallah Ebrahim Ateeh Allah Alzahrani⁴, Mohammed Hamid Ali Sulaimani⁵, Waleed Mohammed Dakhilallah Almalki⁶, Abdulaziz Ali Mahdi Alnuayri⁷, Ahmed Mohammed Bin Khidhr Almathami⁸, Talal Oliyan Ali Alfahmi⁹, Abdulrahman Ahmed Abdulaziz Almhawi¹⁰

^{1*}Public Health Specialist, Public Health, Makkah Al-Mukarramah Health Complex

²Public Health Specialist, School Health, Jeddah First Health Cluster - Al Laith General Hospital

³Executive Public Health, Administration, Specialist Public Health

⁴Physiotherapist, Physical Therapy, Jeddah First Health Cluster - Al Laith General Hospital

⁵Physiotherapist, Physical Therapy, Jeddah First Health Cluster - Al Laith General Hospital

⁶Optical Lab Technician, Optics, Jeddah First Health Cluster - Al Laith General Hospital

⁷Laboratory Technician, Laboratory, Jeddah First Health Cluster - Al Laith General Hospital

⁸Assistant Pharmacist Pharmacy, Jeddah First Health Cluster - Al Laith General Hospital

⁹Social Specialist Social Work Department, Jeddah First Health Cluster - Al Laith General Hospital

¹⁰Assistant Pharmacist, Pharmacy, Jeddah First Health Cluster - Al Laith General Hospital

Corresponding Author: - Menwer Mohsen Mubarak Alfahmi

*Public Health Specialist, Public Health, Makkah Al-Mukarramah Health Complex

Abstract:

There is a significant need for the prevention and control of healthcare-associated infections (HCAI) both inside Europe and outside its borders. On the other hand, it is not quite obvious which aspects are seen as being significant by specialists in the field of HCAI prevention and control. The priorities in the prevention and control of healthcare-associated infections (HCAI) are evaluated in this study based on the experts' opinions. It is possible that the future of hospital infection control may feature a greater integration of environmental monitoring, antimicrobial stewardship, and patient involvement, all while maximizing collaboration among healthcare institutions.

Introduction:

Programs for infection control (IC) that are well-designed and meticulously carried out minimize the incidence of disease, avert deaths, and prevent financial losses. However, there has been a lack of widespread adoption of established therapies in resource-limited settings (RLS), and there is significantly varying standards of intervention [1]. In order to reduce the number of infections that are linked with health care, it has been demonstrated that monitoring efforts, the prevention of infections in health care workers (HCW), particular regulations addressing hand and respiratory hygiene, safe injection techniques, and continual education of IC practitioners are all significant. It is not customary for the international RLS to have well-established IC committees that are also responsible for regulatory monitoring, and there are not many resources that are applied to this field. The number of educational opportunities available to practitioners of IC is restricted, and regulatory agencies that evaluate and monitor the effects of IC are exceptionally rare [2]. Health-care-associated infections, often known as HAIs, are a major contributor to morbidity and death rates in economies that have grown themselves. Patients who are hospitalized to acute care hospitals are expected to develop one or more infections at a rate that ranges between five percent and ten percent. The Division of Healthcare Quality Promotion of the Centers for Disease Control and Prevention (CDC) estimated that the number of healthcare-associated infections (HAIs) that occurred in hospitals in the United States in the year 2002 was about 1.7 million [3]. This estimate was based on a multistep process and three different data sources.

The term "infection control" refers to the policies and procedures that are put into place in hospitals and other healthcare settings with the primary objective of lowering infection rates. An infection control program is designed to control and reduce the spread of illnesses. It is absolutely necessary for the infection control program to collaborate closely with the health treatment services for employees. Both teams need to address important topics related to the well-being of employees and infection prevention, including management of exposure to bloodborne communicable diseases and other communicable infections [4]. Generally, all new employees undergo a screening by the employee health service to ensure that they are up-to-date with their vaccinations and have adequate immunity against some of the common communicable infections such as hepatitis B, rubella, mumps, measles, tetanus, pertussis, and varicella. Additionally, it is imperative that professionals working in healthcare are consistently urged to have the yearly influenza vaccination. Additionally, it is recommended that periodic tests for latent TB be carried out in order to evaluate any new exposure. To encourage employees to take responsibility for their own health and to reduce the risk of infection, the employer health service should design preventative campaigns and policies [5].

Review:

It is imperative that healthcare systems and organizations make the prevention of healthcare-associated infections (HAIs) a primary priority since HAIs pose a significant threat to the safety of both patients and healthcare workers (HCWs) [6]. In hospitalized patients, the frequency of healthcare-associated infections (HAIs) varies from 5 to 15%, and they can impact 9–37% of those who are admitted to intensive care units (ICUs). One healthcare-associated infection (HAI) affects one out of every twenty-five hospitalized patients in the United States (US) at any given moment [6]. HAIs can lead to a decrease in the quality of life of the infected individual, or possibly a reduction in the life expectancy of the individual, in addition to incurring significant expenses over the course of time [6].

Healthcare-associated infections (HCAI) are becoming an increasingly major public health issue, and these illnesses are a source of worry for healthcare professionals, patients, and the general public. The World Health Organization (WHO) estimates that the prevalence of healthcare-associated infections (HCAI) in industrialized countries is somewhere in the range of 3.5% to 12.0% [7]. One in three patients got an antimicrobial agent on any given day, according to a survey conducted in 2011–2012 that included over one thousand hospitals in thirteen different countries. The percentage of patients in European hospitals who had a healthcare-associated infection (HCAI) increased by a factor of four to reach 19.5% of patients in critical care units. Despite the fact that healthcare-associated infections (HCAIs) are caused by a number of factors, including the underlying complexity of the patient's condition, such as cancer, it is widely understood that a considerable number of HCAIs may be avoided, and that significant cost savings might be achieved by the more stringent implementation of existing best practices.

There is a growing worry about multidrug-resistant bacteria and the lack of alternatives to the drugs that are now accessible, in addition to the necessity of preventing healthcare-associated infections (HCAI). There has been a suggestion that there should be a greater degree of international collaboration in order to facilitate the development, evaluation, and introduction of innovative antimicrobial medications and technologies, as well as infection prevention and control measures [5, 6]. There is worldwide transmission of resistant Gram-negative bacilli between nations, which presents numerous obstacles in terms of prevention and control due to the many resistance mechanisms and the many possible reservoirs [7, 8]. This is one of the most demanding issues that we face.

In order to construct an infection control program that is both well-structured and well implemented, hospitals need to hire hospital epidemiologists, infection preventionists, and an infection control committee. It is necessary for the hospital epidemiologist to interact with a significant number of the hospital's departments and administrators in order to debate their respective roles, expectations, and the resources that are at their disposal. In most circumstances, the epidemiologist is in charge of supervising the program for the prevention of infections, and in certain instances, the program for quality improvement. In most cases, the job is filled by a physician who specializes in infectious disease [6]. With a background in clinical practice, epidemiology, and fundamental microbiology, an infection preventionist is often a registered nurse who holds the designation of infection preventionist. According to the recommendations of the Centers for Disease Control and Prevention (CDC), hospitals may have numerous infection preventionists based on the number of beds that are available, the patients who are being treated, and the mix of patients. The final component of an infection control program that is effective is the infection control committee. This committee is comprised of a multidisciplinary group of professionals, including clinicians, nurses, administrators, epidemiologists, infection preventionists, and other representatives from the laboratory, pharmacy, operating rooms, and central services. Policies pertaining to infection control are the responsibility of this committee, which is responsible for generating, implementing, and maintaining these policies [7].

Among the typical measures are the prohibition of artificial nails and the practice of practicing proper hand hygiene. Specifically, this is due to the fact that the majority of infections that occur in the healthcare setting are spread via direct contact with the hands of healthcare workers who are infected. Guidelines for proper hand hygiene were released by the Centers for Disease Control and Prevention in the year 2002 [9]. The major approach that will be utilized for the purpose of decontaminating hands will be goods that contain alcohol whenever it is feasible and accessible. When it comes to lowering the number of microorganisms that are present on the skin, alcohol-based products are more efficient than soap or antimicrobial soaps and water. If the hands are not obviously filthy, the normal approach for decontaminating the hands should be using alcohol-based products. It is recommended that hands that are visibly filthy be washed with soap or antimicrobial soap and water for fifteen seconds [10].

Staff members who have any kind of direct contact with patients, as well as those who work with patient supplies, equipment, or food, are not allowed to wear artificial nails. The likelihood of germs that cause health-care acquired illnesses being harbored by long fingernails, whether they are artificial or natural, is higher than the likelihood of short natural nails harboring such bacteria, according to studies. The natural nails of those who work in the health care industry are required to be maintained perfectly trimmed and should not touch the fingertips more than five millimeters. Other types of nail improvements, in addition to artificial nails, are not permitted to be worn. Among the products that fall under this category are, but are not limited to, tips, wraps, appliqués, acrylics, gels, and any other materials that are applied to

the surface of the nail. When it comes to short natural nails, the only augmentation that should be allowed is nail lacquer, provided that it is not chipped [11].

Before any direct patient contact and between patients, between tasks or procedures on the same patient to prevent cross-contamination of body sites, before donning gloves and performing an invasive procedure, after contact with patient's intact skin (for example, taking a pulse, blood pressure, or lifting a patient), after removing gloves or other personal protective equipment (PPE), after contact with body substances or articles or surfaces contaminated with body substances, and before preparing or eating food, individuals are required to wash their hands and perform antisepsis on their hands. It is recommended that after seven to ten applications of an alcohol-based solution, one should wash their hands with soap and water [11].

It is essential for successful IPC to have sufficient knowledge of HCWs. Barriers to IPC compliance include a lack of understanding of recommendations for infection prevention and control (IPC), as well as an ignorance of preventative indications during everyday patient care and the potential dangers of microorganism transfer to patients. Poor compliance is determined by a lack of understanding regarding the suitability, efficacy, and utilization of integrated pest control strategies. Education and training are the pillars of development in IPC practices, and they are essential resources for overcoming these obstacles. That information is power is something that healthcare workers ought to be aware of. After receiving education and training, it has been demonstrated on several occasions that there is a lack of awareness regarding IPC measures [11]. Issues concerning hand hygiene, the use of personal protective equipment (PPE), immunization for the prevention of communicable diseases, modes of infection transmission, the evaluation of patients for infection, medical instrument decontamination, healthcare waste handling, and needle stick and sharp safety policy should be included in the awareness of healthcare workers (HCWs). More significantly, healthcare workers should comply with these IPC precautions, procedures, and tactics in order to guarantee a reduction in the number of healthcare-associated infections (HAIs) in healthcare settings [12].

There is a broad range of compliance with IPC practices among healthcare workers (HCWs), including hand cleanliness and the use of personal protective equipment (PPE). This compliance is likely impacted by an individual's knowledge about infection risk and behaviors [12]. To be sure, having a solid knowledge does not automatically guarantee having a good IPC practice. Even though there are well-established standards for the prevention of healthcare-associated infections (HAIs), it has been discovered that healthcare workers (HCWs) display low compliance with hand hygiene procedures [12].

Conclusion:

Infection prevention and control is a field of study that employs epidemiological and statistical concepts in order to prevent or regulate the occurrence of infections and the prevalence of infections. The fundamental objective of an infection prevention and control program, also known as an IPCP, is to lessen the likelihood of acquiring a hospital-acquired illness. This is important because it safeguards both patients and staff members against unfavorable outcomes that are associated with infections. The required infrastructure and institutional support, both material and administrative, must be made available to hospital epidemiology personnel in order to guarantee the success of an infection control program. This is necessary in order to ensure that the program works effectively.

The prevention of healthcare-associated infections (HAI) is critical for the protection of patients, healthcare workers, and the general public. The complex web of issues, which includes a high patient turnover rate as well as a wide range of medical diseases, highlights the importance of maintaining effective tactics. Best practices such as stringent hand hygiene, personal protective equipment (PPE), environmental cleaning, surveillance, and novel technology such as artificial intelligence and ultraviolet disinfection systems are included in these programs. In order to overcome obstacles, it is necessary to allocate resources, communicate effectively, get continual training, and involve patients. The use of cutting-edge technology, the incorporation of infection control into patient safety programs, the encouragement of collaborative efforts, and the empowerment of patients are the four pillars that will shape the future of infection control. In the end, a culture of infection prevention may be created by actively involving patients in their own care, as well as by increasing education and awareness. This will ultimately result in a safer healthcare environment for everyone. These trends and possibilities will influence the landscape of infection control as hospitals continue to change, with an emphasis on the proactive pursuit of patient safety and well-being and the importance of infection control.

References:

1. Implementation of an automated cluster alert system into the routine work of infection control and hospital epidemiology: experiences from a tertiary care university hospital. Aghdassi SJ, Kohlmorgen B, Schröder C, et al. *BMC Infect Dis.* 2021;21:1075.
2. The role of the hospital environment in the healthcare-associated infections: a general review of the literature. Facciola A, Pellicanò GF, Visalli G, et al. *Eur Rev Med Pharmacol Sci.* 2019;23:1266–1278.
3. Hospital epidemiology and infection control in acute-care settings. Sydnor ER, Perl TM. *Clin Microbiol Rev.* 2011;24:141–173.
4. The national strategies for and challenges in infection prevention and control of the healthcare system in the Kingdom of Saudi Arabia (review study) Alslamah T, Abalkhail A. *Vaccines (Basel)* 2022;10:1302.

5. Infection prevention and control competencies for hospital-based health care personnel. Carrico RM, Rebmann T, English JF, Mackey J, Cronin SN. *Am J Infect Control*. 2008;36:691–701.
6. Infection prevention and control situation in public hospitals of Islamabad. Savul S, Lalani FK, Ikram A, Khan MA, Khan MA, Ansari J. *J Infect Dev Ctries*. 2020;14:1040–1046.
7. A review of infection control in community healthcare: new challenges but old foes. Mackay WG, Smith K, Williams C, Chalmers C, Masterton R. *Eur J Clin Microbiol Infect Dis*. 2014;33:2121–2130.
8. Kelley ET, Arispe I, Holmes J. Beyond the initial indicators: lessons from the OECD Health Care Quality Indicators Project and the US National Healthcare Quality Report. *International journal for quality in health care : journal of the International Society for Quality in Health Care/ISQua*. 2006 Sep;18(Suppl 1):45–51.
9. Corbett EL, Muzangwa J, Chaka K, et al. Nursing and community rates of Mycobacterium tuberculosis infection among students in Harare, Zimbabwe. *Clin Infect Dis*. 2007 Feb 1;44(3):317–323.
10. Santin M, Munoz L, Rigau D. Interferon-gamma release assays for the diagnosis of tuberculosis and tuberculosis infection in HIV-infected adults: a systematic review and meta-analysis. *PLoS ONE*. 2012;7(3):e32482.
11. Zwerling A, van den Hof S, Scholten J, Cobelens F, Menzies D, Pai M. Interferon-gamma release assays for tuberculosis screening of healthcare workers: a systematic review. *Thorax*. 2012 Jan;67(1):62–70.
12. Emine Alp FC, Gökahmetoglu Selma, Demiraslan Hayati, Doganay Mehmet. Pre vaccination screening of health-care workers for immunity to measles, rubella, mumps, and varicella in a developing country: What do we save? *Journal of infection and public health*. 2012 Apr 1;5(2):127–132.