



APPROACHED STRATEGIES OF PREVENTION AND CONTROL OF HEALTHCARE-ASSOCIATED INFECTIONS

Dr. Majed Ahmed Almogbel^{1*}, Ahmad Khalid Ahmad Alghamdi², Abdulrahman Hussain Salman Abdali³, Turki Abdullah Mohammed Hothan⁴, Abdulrhman Mohammed Alqarni⁵, Mohammed Ali Attiah Alharbi⁶, Fahad Ibrahim Jobran Rajhi⁷, Shabib Abdulrahman Hamoud Alsubaie⁸, Yaseen Mohammed Ghazzawi⁹, Rabie Hashim Alshimrani¹⁰

Abstract:

Healthcare-associated infections (HAIs) persist as a persistent problem for patients in acute hospital settings. To effectively prevent and manage Healthcare-Associated Infections (HAIs), it is necessary to adopt a collaborative approach that motivates all healthcare personnel to assume responsibilities and actively participate. Medical professionals, including doctors and nurses, will be educated on the most effective way to execute the essential elements of Infection Prevention and Control. These recommendations are based on the thorough examination of evidence by a panel of experts in this field. This document presents a practical set of requirements for organizations, structures, and professionals to improve the quality and safety of care in relation to infectious risk. These requirements are based on independent suggestions, clinical experiences, evidence-based practices, and literature review. The aim is to protect the patient, facilities, and healthcare providers by using various strategies.

^{1*} Family Medicine Specialist, Management of the Health Control Center at King Abdulaziz International Airport in Jeddah, Health Care Department

²PUBLIC HEALTH SPECIALIST, Management of the Health Control Center at King Abdulaziz International Airport in Jeddah, Health requirements Department

³Public health technician, Management of the Health Control Center at King Abdulaziz International Airport in Jeddah, Health requirements Department

⁴Public health technician, The Second Jeddah Health Cluster Management of the Health Control Center at King Abdulaziz International Airport in Jeddah, Health requirements Department

⁵Epidemiology Specialist, Management of the Health Control Center at King Abdulaziz International Airport in Jeddah, Health requirements Department

⁶PUBLIC HEALTH SPECIALIST, Management of the Health Control Center at King Abdulaziz International Airport in Jeddah, Health requirements Department

⁷Nursing technician, Management of the Health Control Center at King Abdulaziz International Airport in Jeddah, Health requirements Department

⁸Epidemiology Specialist, Management of the Health Control Center at King Abdulaziz International Airport in Jeddah, Statistics Department

⁹Radiological Technology, X RAY, Prince ahmed primary health care centre

¹⁰Laboratory specialist, Inventory Control Department of Public Health

***Corresponding Author:** Dr. Majed Ahmed Almogbel

*Family Medicine Management of the Health Control Center at King Abdulaziz International Airport in Jeddah, Health Care Department

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Introduction:

Global concern revolves around infectious and contagious illnesses, which rank as the second leading cause of mortality in both plants and animals. Throughout history, humans have faced and been affected by communicable infectious diseases. These diseases have posed a threat and presented challenges to humanity. Observers have documented the occurrence of epidemics resulting from diseases that spread among animals, known as epizootic diseases. Prior to the identification of infectious diseases, infections were frequently ascribed to a range of factors such as celestial events, alterations in the environment, divine intervention, or spiritual causes [1,2]. The concepts of transmissible and spreadable diseases were initially introduced, whereas the concepts of contagious and infectious diseases were introduced at a later stage. The significant increase in life expectancy throughout the 20th Century can be attributed mostly to public health interventions, such as improved sanitation and the administration of antibiotics to combat infections [3]. Despite previous beliefs that infectious diseases could be completely managed, they continue to pose a significant public health issue globally. As they remain the leading cause of death and disability, the expenses associated with their treatment are large and on the rise [4]. Over the past 35 years, a minimum of 30 new infectious and transmissible diseases have emerged, with the majority being of zoonotic nature. In recent years, the global population has been significantly impacted by infectious diseases in terms of their socioeconomic, environmental, and ecological consequences. This population, which is highly mobile, is facing the challenges of both emerging infections like COVID-19 and the global epidemic of existing infectious diseases that are resistant to multiple drugs. At now, nearly all disease-causing microbes have acquired some level of resistance to antimicrobial drugs, whereas only a limited number of novel antimicrobials are being created and made available for use [5]. Preventing these infections is a top concern for the nation, with efforts spearheaded by healthcare organizations, professional associations, government and accrediting bodies, legislators, regulators, payers, and consumer advocacy groups.

Review:

Healthcare-associated infections (HCAIs) are a significant contributor to illness and death, ranking as the second leading cause of mortality worldwide. According to the World Health Organization (WHO) and other researchers, 7% of patients in high-income economies and 10% in emerging and

developing economies contract at least one type of Healthcare-Associated Infections (HCAIs), and out of these patients, 10% die [5]. For instance, in the United States, around 1.7 million individuals contract Healthcare-Associated Infections (HCAIs) each year, resulting in a prevalence rate of 4.5%. These infections lead to the death of roughly 90,000 to 99,000 people [6]. A separate investigation revealed an annual occurrence of 2,609,911 fresh instances of Healthcare-Associated Infections (HCAIs) within the European Economic Area. These infections resulted in 2,506,091 Disability-Adjusted Life Years (DALYs) per year, equivalent to 501 DALYs per 100,000 individuals. The incidence rate of Healthcare-Associated Infections (HCAIs) in Lower- and Middle-Income Countries (LMICs) has been documented to range from 5.7% to 19.1%. Nevertheless, information regarding healthcare-associated infections (HCAIs) is incomplete, especially from low- and middle-income countries (LMICs) due to insufficient infrastructure, such as deficient data record-keeping, and limited resources. A multicenter study undertaken by the World Health Organization (WHO) estimated the prevalence of Healthcare-Associated Infections (HCAIs) in Intensive Care Units (ICUs). The study found that 51% of patients admitted to ICUs got HCAIs, which resulted in longer hospital stays and raised the likelihood of additional infections and other health complications [6,7]. Each year, infectious diseases result approximately 15 million fatalities, with 95% of them occurring in developing countries. The primary causes of these deaths are acute respiratory infections, diarrheal diseases, measles, AIDS, malaria, and tuberculosis. Moreover, it has been approximated that there are over 1.4 million individuals worldwide who currently have Healthcare-Associated Infections (HCAIs) in both developed and developing nations. This imposes a significant economic strain on individuals, communities, and the public as a whole. However, a significant number of healthcare-associated infections (HCAIs) can be prevented by implementing effective infection prevention and control (IPC) policies and strategies [8].

Hospital-acquired infections (HCAIs) and the measures taken to prevent and control them are a major public health issue worldwide. Concerns about HCAIs have been expressed by all healthcare stakeholders, including health professionals, patients, and the general public [9]. Their influence has significantly amplified due to the emergence of multidrug-resistant pathogenic bacteria. Presently, the majority of existing antimicrobials exhibit resistance, while only a limited number of

antimicrobials are being developed for extensive utilization. *Klebsiella pneumoniae* is the predominant drug-resistant bacteria, particularly in intensive care unit (ICU) environments, and is a major cause for worry. Preventing and controlling healthcare-associated infections (HCAIs) is a complex task that necessitates a comprehensive and multifaceted approach. Various techniques are needed to effectively tackle this important public health issue [10].

Over the course of the next century, a substantial amount of evidence accumulated indicating that disease-causing germs were frequently spread through the hands of healthcare workers (HCWs). Semmelweis is recognized as the pioneering physician who first recognized the significance of hand hygiene (HH) in treating dangerous infectious diseases. Florence Nightingale, who is regarded as the pioneer of contemporary nursing, emphasized the importance of frequent handwashing with soap and gentle water for nurses. She introduced this practice, along with other hygiene measures, in the war hospitals during the Crimean War (1853-1856) [11]. The adoption of HH methods was initially sluggish to spread widely. It was not until the foodborne illnesses outbreak in the US in the 1980s that the Center for Disease Control and Prevention (CDC) officially acknowledged HH as a crucial approach for preventing the rapid spread of infection. Following that, the CDC created and advocated for guidelines on handwashing practices in hospitals, primarily emphasizing the use of non-antimicrobial soaps before and after performing procedures that could potentially spread pathogens. This is particularly important for high-risk patients, as the rapid spread of these pathogens could lead to fatal consequences [12]. Alcohol-based remedies were recommended solely when a wash-hand basin was unavailable.

Patient safety in hospitals and other healthcare facilities is a significant global public health issue, with healthcare-associated infections (HCAIs) being the most frequent adverse events in any healthcare system, regardless of financial level. Annually, a significant number of hospitalized patients, amounting to hundreds of millions, experience Healthcare-Associated Infections (HCAIs), resulting in considerable morbidity, mortality, and cost burdens for individuals, communities, and the public healthcare budget. Hand hygiene (HH) has been recognized as the most crucial individual behavior modification that healthcare workers may adopt to prevent and control healthcare-associated infections (HCAIs) [12]. For instance, the rigorous implementation of Hand Hygiene (HH) has been documented to

decrease nosocomial infections by a range of 40% to 70%. However, it has been noted that the hand washing protocols in hospitals are not effective, as several research studies have found that globally, in many hospital wards, healthcare personnel frequently fail to comply with routine hand hygiene, with rates often below 40%. Failure to adhere to the guiding principles of HH is a worldwide public health problem that necessitates the implementation of standardized rules, consistent monitoring and surveillance, and more research [13].

The Joint Commission Journal on Quality and Patient Safety presents a list of 24 reasons that healthcare workers (HCWs) provided for their failure to comply with appropriate hand hygiene (HH) practices. The reasons often mentioned are a lack of education or training regarding the importance of strict hand hygiene, resulting in inadequate implementation and promotion of hand hygiene as a top priority. Additionally, there is a lack of comprehension of how to effectively preserve personal and patient safety. For instance, several healthcare workers had the belief that using sterile gloves eliminated the need for hand hygiene or that their hospital's guidelines for hand hygiene were excessively stringent. This perspective was exacerbated by a paucity of data and evidence in many hospitals on the influence of hand hygiene on infection rates. The primary reason mentioned was the excessive workload, which led to healthcare workers (HCWs) feeling overwhelmed and exhausted. Consequently, they reported a perceived shortage of time to adequately wash their hands or change their gloves when moving between rooms or attending to different patients. Healthcare workers (HCWs) also expressed the belief that in certain clinical scenarios, such as emergencies, proper hand hygiene (HH) could not be effectively performed. Additionally, HCWs highlighted specific concerns regarding the use of gloves and gowns in isolation areas. The non-compliance was influenced by logistics and room design. For instance, issues such as the improper or inconvenient placement of a hand rub dispenser or basin, broken hand washing facilities, and the absence of hand rub or cleanser, or the use of a cleansing chemical that caused irritation or allergy. Logistical issues such as the mobility of colleagues and relatives between rooms, sharing of equipment, and insufficient workspace and storage for equipment and documents were identified as factors contributing to non-compliance with routine hand washing to prevent the spread of cross-infection [14].

Conclusion:

Adhering to the WHO recommendations on the essential elements of Infection Prevention and Control (IPC) is crucial for developing operational programs that effectively decrease Healthcare-Associated Infections (HAIs). This expert opinion statement was established to address the fundamental components of the WHO IPC programs, which are divided into three separate aspects. (1) The establishment of organizational and structural systems to effectively execute Infection Prevention and Control (IPC) programs, which include well-defined goals, functions, and activities aimed at preventing Healthcare-Associated Infections (HAIs) through the implementation of good IPC practices. (2) The identification of specific goals and approaches for HAI surveillance, monitoring, outbreak management, and the role of feedback in these processes. (3) The examination of various methods and the impact of healthcare workers' education and training on IPC practices. Italian hospitals have achieved a more appropriate use of antibiotics, resulting in a decrease in the use of fluoroquinolones and carbapenems within the hospital. Additionally, there has been an increase in the practice of hand hygiene, with an overall compliance rate of over 80%. Furthermore, a specific protocol for laboratory-based surveillance of multi-drug resistant (MDR) alert organisms has been developed, leading to improved management of MDR carriers. Hand hygiene programs should aim to establish a safety-oriented culture in which all healthcare professionals work together to safeguard patients or residents. Engaging healthcare professionals in interprofessional discourse and creating safe learning environments to discuss hand hygiene fosters motivation and active participation. The World Health Organization (WHO) has recommended and provided detailed guidance on various strategies to implement multimodal hand hygiene improvement programs. These strategies include making changes to the system and infrastructure, providing education, conducting evaluations and giving feedback, using reminders such as posters, and creating an institutional safety climate with administrative support. The WHO's recommendations can be found in their 2009 publication titled "A Guide to the Implementation of the WHO Multimodal Hand Hygiene Improvement Strategy."

References:

1. Ahmad T, Haroon DK, Dhama K, et al. Biosafety and biosecurity approaches to restrain/contain and counter SARS-CoV-

- 2/COVID-19 pandemic: a rapid-review. *Turk J Biol.* 2020;44(3):132–145. doi: 10.3906/biy-2005-63
2. Haque M. The COVID-19 pandemic - a global public health crisis: a brief overview regarding pharmacological interventions. *Pesqui Bras Odontopediatria Clin Integr.* 2020;20(supp1):e0146. doi: 10.1590/pboci.2020.137
3. Haque M. Handwashing in averting infectious diseases: relevance to COVID-19. *J Popul Ther Clin Pharmacol.* 2020;27(SPt 1):e37–e52.
4. Haque M, Islam S, Iqbal S, et al. Availability and price changes of potential medicines and equipment for the prevention and treatment of COVID-19 among pharmacy and drug stores in Bangladesh; findings and implications. *Bang J Med Sci.* 2020;19(S):S36–S50.
5. Haque M. Combating COVID-19: a coordinated efforts of healthcare providers and policy makers with global participation are needed to achieve the desired goals. *Bang J Med Sci.* 2020;19(S):S01–S05.
6. Habas K, Nganwuchu C, Shahzad F, et al. Resolution of coronavirus disease 2019 (COVID-19). *Expert Rev Anti Infect Ther.* 2020. doi: 10.1080/14787210.2020.1797487
7. Danasekaran R, Mani G, Annadurai K. Prevention of healthcare-associated infections: protecting patients, saving lives. *Int J Commun Med Public Health.* 2014;1(1):67–68. doi: 10.5455/2394-6040.ijcmph20141114
8. Sganga G, Tascini C, Sozio E, Colizza S. Early recognition of methicillin-resistant *Staphylococcus aureus* surgical site infections using risk and protective factors identified by a group of Italian surgeons through Delphi method. *World J Emerg Surg.* 2017;12:25.
9. Sganga G, Tascini C, Sozio E, Carlini M, Chirletti P, Cortese F, et al. Focus on the prophylaxis, epidemiology and therapy of methicillin-resistant *Staphylococcus aureus* surgical site infections and a position paper on associated risk factors: the perspective of an Italian group of surgeons. *World J Emerg Surg.* 2016;11:26.
10. Berríos-Torres SI, Umscheid CA, Bratzler DW, Leas B, Stone EC, Kelz RR, et al. Centers for disease control and prevention guideline for the prevention of surgical site infection, 2017. *JAMA Surg.* 2017;152(8):784–791.
11. O'Hara LM, Thom KA, Preas MA. Update to the centers for disease control and prevention and the healthcare infection control practices advisory committee guideline for the prevention of surgical site infection (2017): a summary,

- review, and strategies for implementation. *Am J Infect Control*. 2018;46(6):602–609.
12. O'Grady NP, Alexander M, Burns LA, Dellinger EP, Garland J, Heard SO, et al. Guidelines for the prevention of intravascular catheter-related infections. *Clin Infect Dis*. 2011;52(9):e162–e193.
13. Marschall J, Mermel LA, Fakih M, Hadaway L, Kallen A, O'Grady NP, et al. Strategies to prevent central line-associated bloodstream infections in acute care hospitals: 2014 update. *Infect Control Hosp Epidemiol*. 2014;35(7):753–771.
14. Dryden MS. Skin and soft tissue infection: microbiology and epidemiology. *Int J Antimicrob Agents*. 2009;34(Suppl 1):S2–7.