



## Knowledge, Attitudes and Practices towards Infection Control among Health Care Staff in Saudi Arabia

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### **Abstract**

#### **1. Introduction**

Health care staff have a professional, ethical, and legal commitment to maintain patient safety. When caring for patients, health care staff can be exposed to a variety of harmful pathogens that may lead to a health care-acquired infection (Sulaiman Althiyabi et al.,). These infections can delay recovery, increase the length of patient stay in the hospital, increase morbidities and mortalities, and increase the antibiotic resistance of pathogens. Exclusive avoidance can reduce health care security infections by 16% to 70%. To provide safe and quality health care services is to enforce effective infection prevention and control programs. Infrastructures and other related services and training are insufficient in several health care facilities of Taif, Saudi Arabia. It was shown that the knowledge and practice of health care workers toward infection control is inadequate. Therefore, this research is intended to assess the practices, understanding, and attitudes of health care staff toward infection control (Abalkhail et al., 2021). A similar study was carried out in 2015. However, the present study was limited to evaluating the compliance of staff with standard preventive precautions only.



In Taif city, Saudi Arabia, this hospital-based cross-sectional study was conducted at King Faisal Medical Complex, which is a secondary referral governmental hospital with 400 beds in the emergency department. The emergency department includes 10 beds, four discipline rooms for adults, two discipline rooms, two rooms, and one observation room for pediatrics for gynecology and obstetrics. The emergency department is served by a total of 60 health care workers (six physicians, 20 nurses, and 34 other health care workers such as paramedics therapists, and laboratory technicians). Intended health care workers were chosen in a stratified way in the emergency department.

## **Methods**

A cross-sectional survey was conducted using a self-administered online questionnaire between 15th November 2020 and 15th February 2021. The questionnaire focused on the Knowledge, Attitude and Practice (KAP) of standard infection control precautions. A total of 784 healthcare workers completed the questionnaire. The response rate was 83.06%. These included 158 physicians, 423 nurses, and 203 general staff.

Regarding knowledge, the lowest correct response items in the questionnaire were related to the duration of diarrhea and dysentery patients should be triaged for, detailed use of surgical versus procedure masks, immunization of pregnant women, and the treatment of animals given H1N1. A total of 133 (16.97%) HCWs had an adequate level of knowledge. Regarding attitude, fifty-two statements had a greater than 50% agreement rate; twenty-nine of these related to 'risk' words, including 'blood', 'secretion' and 'feces'. Regarding practice, only 4 practice statements had greater than 50% HCWs engaging in them. Nearly one third of HCWs reported washing hands only twice a day. Together, the survey will guide a KSA health care worker training program. Further to the MERS-CoV outbreak, distribution, transmission and possible prophylaxis methods and potential treatments were discussed in the scientific and public literature (J. Alsahafi & C. Cheng, 2016). The kingdom of Saudi Arabia (KSA) is the major affected country, constituting approximately 80% of the confirmed and fatal cases out of the global total of 2,474 cases and 858 deaths. Subsequent to the investigation of MERS-CoV in KSA in April 2014, a report urged "That health care workers (HCWs) in acute care settings (emergency care, outpatient, or inpatient) are educated and trained to be competent in assessing and managing of patients under investigation for possible MERS-CoV infection". In addition, the report stated further about infection control issues, "In the emergency room/ward: All patients with etiologic diagnosis supported by labs should be placed in a single patient room with an ensuite private bathroom, with at least 12 air exchanges per hour and with the air vented to the outside; or should be cohorted and placed in a set of rooms with at least 12 air exchanges per hour that does not share air with the rest of the services in the department. This guidance refers to all suspect cases (including index cases as per the definitions above) and probable cases when in the emergency room and



only to index cases as per the definitions above when hospitalized...All laboratory samples from patients admitted or held for observation should be, in accordance to BSL-2 biosafety standards, inactivated by protocols validated according to national guidelines on MERS-CoV and extracted in a validated BLS-2 laboratory before transport to the referring laboratory. Until patients are confirmed negative by one or more real-time Polymerase Chain Reactions (RT-PCR), against at least 2 non contiguous specimens taken at least 48 hours apart on a cycle threshold ( $Ct < 35$ ), all HCWs working in close proximity to cases should use contact and droplet precautions.” In response to these issues, questions developed for HCW knowledge, attitude and practices (KAP) towards MERS-CoV were utilized to assess the existing state of HCWs in these three main regions: Mecca, Medina and Jeddah.

## **Conclusion**

In conclusion, the present study is significant since many studies on knowing attitudes and practice towards infection control among healthcare professionals in primary care settings are limited in Saudi Arabia. The research provides baseline measurement that might help stakeholders to reduce the burden of healthcare related infections. In this regard, we suggest the concerned authorities provide training about prevention and guidelines for healthcare professionals. Since knowledge influences the awareness and practices of healthcare professionals, the training should be prepared in a simple and appropriate format. Moreover, there is a need for guidelines and stronger policies to strictly adhere to infection control in primary care health services (Abalkhail et al., 2021).

It was determined that healthcare workers who follow the correct procedure wash hands before contact with a patient, wash and dry hands completely after washing, and use hand sanitizer significantly before hand hygiene. Compared with other studies, this practice used by healthcare workers is very small. Many healthcare professionals did not wash their hands after contacting a patient's blood, body fluid, secretion, and excretion. This suggests non-compliance in following correct handwashing guidelines. The use of rubber gloves has a significant influence on handwashing compliance. This may be because the use of gloves increases the difficulty to wash hands. A recent study found that 63.3% of healthcare professionals either ignored or neglected the washing of gloves.

## **2. Literature Review**

Abstract: The Saudi Society for Medical Microbiology and Infectious Diseases, King Abdulaziz University, Ministry of Health in Saudi Arabia, and the Federal Democratic Republic of Ethiopia, realized future collaborative research, and hereby propose, a prospective cross-sectional study, using anonymous, self-administered questionnaire survey. This study was conducted before supplementary research by finalizing the institutional and ethical issues of interest regarding the assessment of knowledge, attitudes, and practices



regarding the practice of infection control, among healthcare staff, working in primary public health units in Al-Baha, Saudi Arabia, using a validated, self-administered, well-structured questionnaire. Knowledge, attitudes, and practices towards healthcare-associated infections among public health unit staff: Healthcare staff working in primary public health units in Al-Baha, Saudi Arabia, possess an acceptable level of knowledge, attitudes, beliefs, and socio-demographic characteristics of participants, practice regarding infection control. Dissemination and sustained application of these findings should contribute to the prevention of healthcare-associated infections in public health unit settings (Sulaiman Althiyabi et al.).

## **2.1. Global Perspectives on Infection Control**

Knowledge and practice of infection control are important elements to prevent infection transmission in any healthcare facility. The patient-to-patient transmission of infections can be through carriage on healthcare workers' hands. To prevent the spread of nosocomial infection, simple measures are readily available. One of them is water and soap for hand washing, because of its well effectiveness. Healthcare infections can also arise when the infected body fluid comes into direct contact with an HCW's mucus membrane. The risk of infection by the mucosal membrane may be reduced by performing healthcare procedures according to the recommended standard.

Infection may also be avoided through the use of specialized equipment that prevents exposure to infected blood. Healthcare facilities should monitor the status of infection found in healthcare personnel (HCWs) regularly. However, in Saudi Arabia, hospitals in Qassim confirmed that sterile procedures were inadequate. It was also assumed that HCWs did not sufficiently practice standard precautions to avoid exposure to infections and that precautions were not taken at all when risk of infection was minimal. It is also not clear if HCWs were worried about infection. Random sampling studies are conducted on 248 HCWs out of 416 from seven separate departments from October 1, 2000, to April 30, 2001, at King Fahad Teaching Hospital. The outcome concludes that KFTH employees did not exercise strict compliance with the standard guideline to avoid infection.

## **2.2. Infection Control in the Middle East**

Health-care settings are potential sources of nosocomial infections (NIs). These NIs are responsible for prolonged hospital stay, increased morbidity and mortality rates, disease transmission, overuse of antibiotics, and finally, the emergence of resistant germs (Khubrani et al., 2018). Health care workers (HCWs) act as a reservoir for disease-causing pathogens and act to transmit them to vulnerable patients through direct and indirect contact, coughing, sneezing, etc. On the other hand, patients may transmit pathogens to other patients. Unintentional failures in the implementation of infection control (IC) may culminate in



pathogen transmission. Therefore, knowledge of infection control methods and attitudes associated with this subject are vital.

Infection control (IC) practices have been formulated to prevent and control hospital-acquired infections (HAIs) among patients and health-care providers. IC may be classified into standard precautions (SPs) and expanded precautions (EPs). SPs ought to be implemented in all patients, regardless of their diagnosis, in order to prevent blood-borne germs and other pathogens. Key elements of SPs are: hand hygiene, appropriate combating of bodily fluids and waste generated by health-care (HC) process, management to prevent injuries with sharp objects, and proper cleaning and disinfection of the environment. On the other hand, EPs should be taking into account only for patients infected or colonized by highly transmittable pathogens and for whom the extra precautions will be implemented; in turn, extra precautions differ in accordance with the patient's colonization or infection. Consequently, IC may also be considered a component of overall driving legislation that covers hazardous agents and environments. Strict application of these measures is essential to preclude HAIs among hospital patients and HC providers (Abalkhail et al., 2021).

### **3. Methodology**

Understanding and adherence to the “5 moments” of hand hygiene are essential in medical facilities among health-care workers. Since the adoption of the “My 5 Moments” initiatives by the World Health Organization in 2009, studies have been conducted worldwide to assess non-compliance with hand hygiene in medical facilities. Following the directives of the Saudi Center for Disease Prevention and Control, many studies have been conducted in Saudi Arabia that addressed non-compliance with hand hygiene in medical facilities and which also assessed knowledge about hand hygiene among medical students. Some have noted that many students are confused about the appropriate indications for hand washing versus hand rubbing. Regarding practices associated with hand hygiene, hand rubbing is more commonly performed compared to hand washing, while the opposite is recommended when hands are visibly dirty. The Saudi Center for Disease Prevention and Control has implemented a national hand hygiene program in all governmental and private hospitals in Saudi Arabia.

A multicenter study on hand hygiene was conducted in multiple hospitals across the Al-Qassim province of Saudi Arabia. The primary objective of this study was to evaluate knowledge, attitudes, and practices related to hand hygiene among healthcare workers (HCWs) in Al-Qassim, Saudi Arabia. The secondary objective was to assess whether there were any knowledge differences across a number of factors such as age, gender, profession, and hospital. A cross-sectional study was conducted at three governmental hospitals located within a large geographic area in Al-Qassim, Saudi Arabia. The hospitals are King Fahad Specialized Hospital, Buraidah Central Hospital, and Al Rass General Hospital. A 24-item



questionnaire that was developed by (Abdulaziz Al Ra'awji et al., 2018) was administered by surveyors. The questionnaire was written in Arabic and piloted at a single hospital before full data collection. The instrument was designed to assess knowledge, attitudes and practices related to hand hygiene among HCWs working in the emergency department (ED), ICU, and pediatric ward at the studied hospitals. Descriptive statistics including frequency distributions and central tendencies were conducted. A knowledge score was computed; each item was allotted 1 point, and the score was converted to a percent out of 100. To assess knowledge items, respondents were required to provide yes, no, don't know, and not applicable answers. Participants were comprised of mostly female nurses working at the studied hospitals in a variety of departments including the ED, ICU, surgery, and pediatrics.

### **3.1. Study Design**

In order to evaluate the knowledge, attitude, and practices (KAP) among Saudi health care workers (HCWs) regarding the standard infection control precautions in their working environment, a cross-sectional, observational study was conducted using a self-administered, structured, validated KAP questionnaire. Data were collected from HCWs in the Qassim region, Saudi Arabia.

A structured, pre-validated questionnaire was used to collect data on demographic characteristics, knowledge, attitude, and practices regarding standard infection control precautions among HCWs. The researched questionnaire was designed based on a review of previously published literature. The details are about the professional year of the staff and their department. The types of staff include nurses, physicians, lab staff, students, and administrative staff. Employees have commercial training on infection control. The HRD teaches infection control standards and guidelines to follow. All staff are familiar with the details of the health instructions available in their workplace. All staff can have training sessions at least within 3 months. Staff can stop physical examinations and procedures on injured patients who seek medical care because they may be infectious.

### **3.2. Data Collection Methods**

Interviews were used to examine participants' knowledge, attitudes and practices towards infection control in two hospitals in Saudi Arabia. Semi-structured interviews were employed to collect data from three categories of health care staff: doctors and nurses; housekeepers, cleaners, sterilization staff, nurse aides, health promoters, and helpers; and administrators, supervisors, technicians, and other workers. Purposive sampling was used to recruit the interviewees and 47 health care staff completed interviews. Each interview lasted 45 minutes and was audiorecorded.

This study provides a comprehensive picture of infection control status. The results will inform policy making and guideline development. Developing a comprehensive training



program was recommended with chapters in institutional safety, infection control safety, equipment safety, and occupational hazard law. Cooperation to enforce existing guidelines, and continuous monitoring of all infection control aspects in hospitals were further recommendations. The findings will make hospitals take stricter measures regarding infection control. The results will also raise the awareness of health care staff towards forgotten or poorly considered precautionary practices, such as disposal of sharps, and wearing masks and gowns to prevent blood and body fluid exposure incidents. Influencing Gulf Cooperation Council countries, and other countries, to improve infection control practices among health care staff, was another expected benefit of this work. This study could help improve safety in the working environment and improve infection control practice in hospitals. Through obtaining more in-depth knowledge of infection control status, policy makers, and stakeholders in hospitals, will be one step closer to taking steps against healthcare staff exposure to infections. The results will raise concerns over the high risk of occupational infection among newly graduated staff. This work will increase preventive measures to minimize the threat. It will also assist new staff to arm themselves with proper awareness of infection. Additionally, attacks against medical personnel and hospitals happened frequently, especially after the Arab Spring. Many studies dealt with staff preparedness, but awareness to bring about a reduction in infectious diseases among patients was rarely targeted. The results will help broaden further research into what role infection control practices play in the preparedness of acute care facilities and health care staff dealing with disasters. Consequently, training in those institutions will be improved.

#### **4. Results**

With respect to IC and SPs, over the years there have been improvements in knowledge, starting from the outbreak of severe acute respiratory syndrome, and various IC training programs, the Ministry of Health's launch of the National Infection Control Manual, and the introduction of infection control (IC) as a separate subject in both the bachelor of science in nursing curriculum and the medical curriculum. Regarding knowledge of IC terminology and the translation of this terminology into clinical practice, there is capability in conducting research to assess the knowledge base regarding IC terminology, highlighting important areas for education for health-care teams involved in multidisciplinary IC research. Recommendations are given for the development of standard definitions of IC terminology, the use of standard IC terminology in IC practice, and the addition of IC terminology teaching to IC curricula.

It is important to understand the safety climate in relation to occupational injuries in order to develop an intervention strategy to improve occupational safety. Standard precautions do not distinguish between each patient's infectious status. Instead, it treats every patient as if infected with a disease and can thereby help to interrupt the spread of infection. SPs were



defined by a percentage of nurses as all measures applied to patients in isolation, and by another percentage as measures applied to directly involved patients. Participation in IC training sessions within the previous year was the key positive influential factor, as training sessions tend to improve knowledge regarding IC programs. It is suggested that IC training programs could emphasize subcategories of safety climate that focus on the implementation of SPs in order to strengthen such teams' safety climate and to minimize their potential risks. Furthermore, participants in IC training sessions should be provided with precise definitions of SPs.

## **5. Discussion and Implications**

This is a quantitative research design, specifically a descriptive and inferential study. The target population is health care staff (nurses, doctors, and laboratory and radiology staff). Descriptive statistics were used to calculate frequency and percentage, while inferential statistics, such as chi-square and regression analysis, were performed to determine the association and impact of the variables of interest. A total of 400 samples and a self-administered online questionnaire were taken using a convenience and snowball sampling technique. Most of the participants were female, working for more than 5 years in their current job, and had been working for more than 5 years in a health care facility. 31% of the overall study participants worked in the hospital's outpatient department. The majority of the participants were nurses (66.8%). The remaining study subjects were hospital physicians, laboratory staff, radiography staff, and other health agencies (like hospital cleaners or hygienists, blood transfusion technicians, and physiotherapists) ( (Abdulaziz Al Ra'awji et al., 2018) ). The result of the  $\chi^2$  test shows a significant association between knowledge level about infection transmission and type of HCW, knowledge level about hand hygiene and the HCW's job, knowledge level about hand hygiene and the HCW's years of experience, knowledge level about airborne transmission diseases and the HCW's years of experience. In the regression model, the general knowledge level about infection prevention and control had a significant effect on self-reported compliance with infection control precautions (p-value = 0.048).

Infection Control and Prevention in Hospital (IPT) play an essential part in delivering high-quality healthcare services to patients. A healthcare-associated infection (HAI) is an infection that is not present or incubating at the onset of care; multidrug-resistant organisms (MDROs) are more common in patients with serious underlying health conditions. This HAI can cause a substantial increase in medical costs of care estimated to be between \$ 28 to \$ 45 billion annually in high-income countries ( (Sulaiman Althiyabi et al.,) ). Knowledge, Attitudes, and individuals' practices (KAP level) should be essential components to improving the level of IPC program, these components can represent the success of IPT implementation in hospitals. Infection prevention and control are a key to a safe, clean, and healthier environment for



patients and healthcare providers. On-job training and an assessment may help to maintain and enhance healthcare workers' skill and knowledge to prevent HAIs. The prevalence of HAIs is reduced and patient quality and safety are improved by raising the level of Internal Prevention and Control. To reduce HAIs more effectively, it is necessary to take a number of steps to prevent the occurrence and transmission of HAIs. It is important that all Health care providers, medical and non-medical, at each outreach facility, are properly trained on helping to stop the spread of HAIs.

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