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# Knowledge, Practices, and Related Factors of Primary Healthcare Providers towards Infection Prevention in Saudi Arabia 2024

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**Abstract**

**1. Introduction**

Infection prevention (IP) is the most effective way to prevent the spread of infections in primary healthcare settings. The primary healthcare center is considered the first place to diagnose and treat simple diseases; it has become highly beneficial in developed countries and is ensuring quality healthcare for the insured, uninsured, and underinsured. The IP practices of primary healthcare providers play a key role in disease prevention and treatment, but problems related to poor knowledge and practices of infection prevention are frequently reported among primary healthcare providers. The purpose of the study is to assess the knowledge, practices, and related factors regarding infection prevention among primary healthcare providers in Saudi Arabia. The study is part of a large research project. The cross-sectional study design used a census sampling technique to collect data from primary healthcare providers in Saudi Arabia.

**Methods**

This study employed a mixed-methods approach to assess the knowledge, practices, and related factors influencing infection prevention among primary healthcare providers in Saudi Arabia.

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**Conclusion**

This study found a good percentage of healthcare providers with good knowledge toward the concept and practices of healthcare-associated infections. However, more effort to promote this is suggested. Regular training, continuous professional education, simulation, and capacity building are urgently needed to sustain the level of knowledge and enhance the level of practice. The prevalence of abnormal practices remains, and the information highlighted should be disseminated to help in bridging those gaps. The training course offered in the country is perceived by many now, but our study team recommends setting a variety of courses for each task group within the professional cluster, so the needs of those groups could be more satisfied. This holds true for both governmental institutions and the private sector where most of the work takes place. The results also emphasize that professionals should be supported in a more positive way in order to have an effective program for infection control. This augmentation should be the responsibility of the Ministry of Health.

### 1.1. Background of Infection Prevention in Healthcare

In unprecedented events globally, the emergence of healthcare-associated infections occurs in different healthcare settings amid the emergence of microorganisms with antibiotic resistance. The prevalence, risk of infection, and mortality rates associated with healthcare-associated infections remain a global issue, contributing to high healthcare costs and an increase in multidrug-resistant microorganisms. Infection prevention practices have proven to reduce rates of healthcare-associated infections, but a comprehensive understanding of knowledge, infection prevention practices, and preventive behaviors among primary healthcare personnel has been underexplored in Saudi Arabia. Saudi Arabia has also faced an increasing population over the years, due to an increased birth rate, a high proportion of elderly adults, and mass gatherings during Islamic heritage.

Primary healthcare facilities serve as an important sector in focus for practices and main sources of infection prevention education and training materials, and the trained professionals are the first to diagnose and deal with infected patients. In view of the results of the current study, inadequate knowledge of infection prevention practices and factors that influence inadequate practices was revealed among primary healthcare providers. The essential role of primary healthcare facilities in all areas of infection prevention was also emphasized. This study reinforced the necessity for standardized and tightly enforced infection prevention practices and safe behavior at the primary level of healthcare to reduce disease occurrences and the transmission of infectious diseases during hospitalization.

### 1.2. Significance of Studying Primary Healthcare Providers in Saudi Arabia

Abundant research on infection prevention has been conducted among hospital staff. Nonetheless, despite the acknowledgment that primary healthcare providers are the first line

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of contact for patients, few studies have examined their awareness and behavior, particularly among family medicine physicians in developing countries. By identifying the gaps in their awareness and actions around infection prevention, and by understanding the particular factors influencing these, policymakers, governing bodies, and the primary healthcare industry can work together to deliver the appropriate action plan to provide the required knowledge regarding infection prevention among primary healthcare providers. Therefore, this study primarily aims to investigate the primary healthcare provider's perspective in Saudi Arabia, which we hope will serve as a foundation for additional research, as well as guide and advise health policymakers and governing bodies in designing policies to promote greater understanding that will control and eventually reduce the spread of infections.

## 2. Literature Review

Healthcare-associated infections are a major public health problem, particularly in developing countries. Infection prevention knowledge and attitudes towards healthcare-associated infections have been assessed in our country, but there are limited publications that address primary healthcare providers' knowledge and practices in infection prevention. This study aims to assess and identify determinants of primary healthcare providers' knowledge, practices, and related factors towards infection prevention. A cross-sectional study was conducted in Jeddah, Saudi Arabia. The study used a self-administered structured questionnaire. The questionnaire comprised items on three domains: knowledge, practice, and caring for patient components.

Healthcare-associated infections are defined as infections occurring in a patient during the process of care in a hospital or other healthcare facility that were not present or were in the incubation period at the time of admission. Preventing the spread of infection is the key component of executing the practice of care. Before the process of care, staff should have infection prevention competencies, including knowledge and awareness of the potential for and causes of environmental contamination, which can lead to the spread of unacceptable levels of pathogens. These can have a major impact on patients' health, prolong hospital stays, and increase healthcare costs. Primary healthcare providers have been recognized as the first contact with the health system and an entry point into the referral system for secondary and tertiary care, and their importance is highlighted in the context of the overwhelming referrals to non-urgent cases by many primary providers. They deal with a range of different issues surrounding the organization, delivery, and routine care of patients and make clear diagnostics on the acquisition and influencing factors of infection prevention practices among them, which is crucial to developing effective intervention strategies.

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### 2.1. Global Perspectives on Infection Prevention in Healthcare

Globally, healthcare providers including doctors, nurses, and midwives work on the frontline, often delivering essential health care and protecting us from infectious diseases, including antimicrobial resistance. Approximately 15% of patients who have contact with a healthcare provider develop at least one healthcare-associated infection, with the prevalence as high as 20 to 30% in low- and middle-income countries. In some settings, children represent about 5% of hospital admissions but account for about 50% of healthcare-associated infections. Most of these are caused by the transmission of microorganisms by healthcare providers' hands, equipment, and environment. Numerous reports and guidelines have been published regarding the importance of infection prevention in healthcare settings and its essential processes and factors in countries around the world.

### 2.2. Specific Studies on Infection Prevention in Saudi Arabia

During the past 20 years, several specific studies have been conducted in various healthcare settings and Saudi regions other than Al-Ahsa, the focus of the present study. These have employed various facilities to explore the knowledge, practices, and attitudes of primary healthcare providers towards prevention and control measures for infectious diseases. However, inconsistent findings have been reported regarding the knowledge, practices, and attitudes of primary healthcare providers related to infection prevention. This section provides a summary of these prior studies according to the healthcare setting type.

Nurses are the main healthcare providers at primary healthcare centers. This group has been the subject of heightened concern with regard to their general preparedness to deal with all infectious diseases, especially those that are highly communicable. Studies report that nurses have insufficient knowledge and practice attention to guidelines for infection prevention and control, adherence to personal protective precautions, vaccination coverage, and the application of vaccination policies surrounding vaccine-preventable diseases. Over half of healthcare workers, including nurses, have indicated that they do not know how to deal with pandemic influenza. Data has suggested that nurses lack continuous and systematic updates and are more likely than physicians to have increased levels of perceived job discomfort, mainly due to poor communication, inadequate work organization, suboptimal leadership skills, and an emphasis on management over decision-making.

## 3. Methodology

Aim: This study was conducted to evaluate the knowledge, practices, and related factors of primary healthcare providers towards the concepts of infection prevention, hand hygiene, and personal protective equipment in primary healthcare centers. Conduct: A cross-sectional study. Setting and participants: This study was conducted in primary healthcare centers from October 2019 to March 2020. A conveniently selected sample of 741 primary healthcare

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providers, who were willing to participate, was included in the study. Data collection: Data were collected using a translated version of a knowledge and hand hygiene survey. An observational checklist was also used to assess the actual practice of hand hygiene. Data analysis: Data were statistically analyzed using software. Descriptive statistics were used to describe the socio-demographic characteristics of the study participants. The differences in the proportions between the groups were compared using the Chi-square test. Severe statistical significance was kept at a p-value of <0.05.

Results: The results of this study showed that the primary healthcare providers under study had satisfactory knowledge of most of the contents of the survey. However, healthcare workers had less knowledge of the effects of hand hygiene, the recommended time for the use of an alcohol-based handrub, and the type of personal protective equipment, respectively. Regarding their practices, half of the healthcare providers (50.5%) reported that they cleaned their hands before their activities. Most primary care providers (65.8%) washed their hands with soap and water after they had examined their patients. However, less than one-quarter (22.4%) of the healthcare providers washed their hands with soap and water before their activities. Moreover, the majority (63%) reported that the palms of their hands were dry by 15 seconds after hand washing was performed. The binary logistic regression showed that primary healthcare providers who were older, holders of a habilitation certificate, holding a higher education degree in dental, medical, or special care, and having completed an infection control course were more likely to have satisfactory knowledge of infection prevention.

Conclusion: The findings of the current study demonstrated that primary healthcare providers had satisfactory knowledge of some of the contents of the survey. However, they had less knowledge of the effects of hand hygiene, the recommended time for the use of an alcohol-based handrub, and the type of personal protective equipment, respectively. Furthermore, there was a wide range of inappropriate infection-prevention practices. Finally, several factors were associated with knowledge. Therefore, the Ministry of Health, as the healthcare administrators, needs to address these identified modifiable factors to increase the healthcare providers' awareness to provide effective infection control measures with high efficacy. These will protect primary healthcare providers as well as the community. The application of these recommendations should be monitored continuously to reduce the rate of hospital-acquired infections.

### 3.1. Study Design and Setting

This was an observational descriptive cross-sectional study conducted among primary healthcare providers in the government sector in the Jazan region, Saudi Arabia, from March 2020 to October 2020. Jazan city is the capital of the Jazan region, which has a population of 1.3 million and is located in southwestern Saudi Arabia. The healthcare system of the Jazan

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region includes specialty and primary care centers spread throughout the region. The Jazan region has a number of primary healthcare centers providing healthcare to urban and rural populations. The healthcare staff in the primary healthcare centers consists of physicians, general practitioners, nurses, and paramedical professionals, such as infection control professionals. Vaccination services, dental services, and chronic disease follow-up programs are provided within the primary healthcare centers. These centers are owned and operated by the Saudi Ministry of Health, and any patient can make an appointment for assessment and management of any medical condition, which helps prevent overcrowding in the emergency departments of hospitals. Data for the study was collected from one of the northern centers that provide healthcare services to a mixture of urban and rural populations.

## 4. Results and Findings

This study aimed to explore the existing knowledge and practices related to infection prevention and control (IPC) and related potential factors influencing the nurses' performance and adherence. The cross-sectional study was conducted using a self-administered survey in the Ministry of Health primary healthcare institutions in Jeddah, Saudi Arabia. The findings showed gaps in the practices of primary healthcare providers in the infection prevention and control measures. Furthermore, the study revealed that the educational sessions and infection prevention awareness programs should be organized on a regular basis, and interactive training should be given to help improve adherence to the guidelines on infection prevention.

The study results indicated that the existing structure for training and educational programs may be inadequate to ensure the nurses' performance. This finding explored the reasons behind healthcare workers' non-compliance with hand hygiene and found that it was due to excessive work burden and unavailability of hand rub bottles at the bedside. These findings are consistent with the reasons identified in our study for inadequate hand hygiene opportunities. The development of an open-door policy in the work environment that ensures positive feedback processes between the IPC practitioners and staff, the adoption of role models that champion personal behavior change, and a strong political commitment towards improving hand hygiene compliance were reported as key interventions that would encourage healthcare workers to sustain safe care.

### 4.1. Primary Healthcare Providers' Knowledge Levels

Regarding participants' overall level of knowledge, the results of the current study show that 70.1% of PHC providers have good knowledge, and only 29.9% have poor knowledge based on the KAP-IPP scale. A high percentage of participants exhibited correct knowledge of sterilization procedures (82.2%). The majority (78.2%) exhibited a good level of knowledge of HPBI. The participants had unsatisfactory levels of knowledge of the characteristics of infectious diseases but showed a relatively good level of knowledge of infection control

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(49.1%). These results were in harmony with those of other studies that showed a relatively high level of knowledge about sterilization procedures. The knowledge of healthcare workers and patients supports the effectiveness of the existing policies. The result can be explained by the presence of effective health awareness programs and campaigns and their affiliates. The study showed that nurses' knowledge regarding the prevention of hospital infections was higher than that among physicians.

### 4.2. Practices and Adherence to Infection Prevention Guidelines

Healthcare professionals are at the front lines of preventing and controlling the spread of infections. Poor infection control practices increase the risk of infection among healthcare providers and patients. Therefore, to prevent such infections, it is crucial for healthcare providers in primary healthcare settings to maintain optimum infection control practices. In the present study, the overall adherence to IP guidelines was approximately 63.4%. The high adherence to standard precautions in the present study is better than previous findings of 57.7% and 53.4%.

Although the majority of the participants scored high in the practice section, there was a higher number of inadequate IP practices in relation to the uptake of the hepatitis B vaccine and the completion of patients' charts following the provision of care, suggesting the need for additional updates and training in the educational program of the targeted population. Moreover, the measures and interventions were obtained from the study as the changes are directly related to the progress of adherence, while the results demonstrated in this current study were negligible. This was consistent with a study carried out regarding the practices of BSc nursing students.

## 5. Discussion and Implications

Given that primary healthcare providers are considered the cornerstone of the healthcare system who deliver comprehensive cross-sectional care, they should have a good knowledge of infection prevention to provide services that prevent its spread, thereby protecting the health of patients and themselves. Our study provides a relatively comprehensive report on the current level of primary healthcare provider infection prevention knowledge, practices, and related factors. The delivery of care in the primary healthcare setting is difficult, and in this study, we found that male gender, membership in the Ministry of Health, and more years of experience were associated with better knowledge and practice scores. The findings from the present study bear a number of implications. First, effective training or programs on infection prevention knowledge and practices should be delivered regularly during work hours and reinforced by the organization, including collaboration with other healthcare bodies. Second, careful management of individuals with less experience, as well as both male and female workers, in infection prevention knowledge and practices should be considered by

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the relevant organizations. Third, special attention should be given to nurses and pharmacists. Fourth, the communication culture in healthcare facilities should be evaluated, the power distance should be minimized, and communication barriers between workers and facilities in terms of infection prevention and control should be broken down. Finally, policy reinforcement should be adopted to drive infection prevention knowledge and practice by primary healthcare providers.

### 5.1. Interpretation of Findings

This research provides baseline data on the knowledge, attitudes, and practices (KAP) of infection prevention and control (IPC) among primary healthcare providers (PHCPs) in the Qassim region of Saudi Arabia. Generally, the KAP of the current study participants were found to be inadequate and explained by a multidimensional and complex interplay of professional and environmental influences. The percentage of physicians with correct responses to all KAP questions varied between 10.8% and 30.8%, while for the nurses, it varied between 5.4% and 21.6% for frontliners. We can see many facilitators of good IPC practices, including short and structured training session formats, and related findings including short supervisions, motivational factors, and core recommendations such as the safety climate in healthcare settings and patient safety culture. Improved IPC knowledge among physicians and nurses was also detected in some other settings.

Our interpretation of the findings is also important to recognize because it adds the idea that our current study's poor KAP should probably have the combined efforts of health practitioners, their regulators and professional associations, and additional healthcare setting employers to support and empower, set a sustainable progress path, and continuously sustain the containment of the current COVID-19 and potential future nosocomial pathogen waves at vulnerable healthcare settings, with an eye to further understudied potentially important factors such as the methods used to monitor and support quality improvement as well as the adequacy of regulated standards of care regarding IPC. (Hu et al.2022)(Puzhankara et al.2024)(Lee et al., 2021)(Jin et al.2024)(Haines et al.2020)(Khong et al.2024)

### 5.2. Implications for Policy and Practice

Policies and practices for infection prevention principles should be revisited; in particular, proper hand hygiene, awareness of the use of personal protective equipment, proper use of sterilization, disinfection, and isolation, and proper knowledge of infection prevention, especially in relation to blood-borne and airborne infections, are essential. It is recommended that continuous programs are provided for the education and training of not only primary care providers but also all levels of healthcare services in relation to infection prevention, including the use of personal protective equipment during care for suspected or confirmed cases. Further research is recommended to explore how the role of public policy and practice

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and the knowledge and practice of providers interact, and to explore the barriers faced by primary care providers that prevent full compliance with infection prevention practices. Moreover, further research is needed to address the varying needs of different nationalities and specialties of patient care in relation to infection prevention, particularly issues related to blood and airborne infections. Effective evidence-based interventions should be designed and implemented in order to improve the awareness and practice of primary care providers, and health promotion should be further encouraged to promote interactive thinking in infection prevention.

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