Original Research Article

Correlation between Biographic Profile and Compliance to Key Performance Indicator (KPI) for Infection Prevention and Control (IPC) among Healthcare Workers in Saudi Arabia: A Cross-Sectional Study

Abstract

Purpose: We aimed to find out how well Saudi Arabian healthcare workers followed infection control guidelines and determine whether there is a considerable relationship between the biographic profile of healthcare staff and their degree of compliance with infection control Key Performance Indicator (KPI).

Methods: This descriptive-correlation study was conducted on healthcare workers from different Saudi Arabian hospitals. The study used a three-point Likert scale, and the rating scales used were "3" to indicate always, "2" to indicate sometimes, while "1" was used to indicate never.

Results: Of the 180 respondents, 62.8% of the included healthcare workers were young adults, 73.3% were males, 68.3% were doctoral degree holders, 66.1% were licensed medical doctors, and 39.4% were advanced beginners. Saudi healthcare workers have an overall level of "high compliance" (mean=2.29). Most of the study respondents had "high compliance" with the strategies of infection control. Chi-square test of independence (r^2) revealed a statistically significant relationship between compliance to infection control practices and the following variables: age (p=0.0100), sex (p=0.0177), educational attainment (p=0.0001), and profession (p<0.0001).

Conclusions: In Saudi Arabia, healthcare staff generally follow infection control procedures. Moreover, biographic profiles are significantly associated with the degree of infection prevention practice compliance by healthcare staff.

Keywords: compliance; infection control; hand hygiene; Saudi Arabia; healthcare

1. Introduction

The number of incident reports in regard to nosocomial infection is on the increase. According to the World Health Organization, one out of every 10 patients develops an infection when seeking care in a healthcare facility. With an estimated 1.7 million infections and 99,000 deaths each year, healthcare-associated infections (HAIs) continue to be a significant cause of morbidity and mortality (Rutala and Weber, 2019, 2016). Healthcare workers can spread many infections acquired by patients (Russell et al., 2018). Also, they may serve as reservoirs, meaning that they are maybe harboring the microbes for many days (Feliciano, 2020).

The infection-related complications are of the most widely identified medical errors conducted by healthcare workers (Mejia Paulo Carl G. et al., 2020). As a result, particular attention should be considered by health care staff in hospitals because they play a crucial role in transmitting diseases and infections, which remains a significant concern (Alsofayan et al., 2020; West et al., 2018). Cross-infection from healthcare workers' hands has been recognized as a primary source of nosocomial infections, accounting for up to 40% of HAIs. Contamination of healthcare workers' hands may occur due to direct contact with the patient or indirect contact with contaminated surfaces (Rutala and Weber, 2019, 2016). Infection prevention and management are practical and evidence-based solutions to prevent avoidable infections from harming both patients and healthcare staff (Ebada et al., 2020). Moreover, this should be maintained in any healthcare activity and all facets of health care in order to achieve consistent health service delivery, promote the safety of patients, ensure a considerable quality of management, and prevent patients' harmful events (World Health Organization, 2020).

Many infections can be avoided by using evidence-based infection management methods (Russell et al., 2018). According to the NSQHS standards, healthcare staff must follow infection-prevention and control strategies; this can be accomplished by using antimicrobials with caution, following standard precautions, and putting on personal safety equipment (ACSQHC, 2017).

As a result, in this study, we aimed to evaluate if there is a relationship between the biographic profile of healthcare staff and their level of compliance with the Key Performance Indicator (KPI) for infection control.

2. Methods

The present study is descriptive-correlation design which discusses the following: a) Age, sex, citizenship, occupation, educational attainment, duration of service, and hospital assignment demographic profile of healthcare staff; b) the level of conformity of healthcare workers with Key Performance Indicator (KPI) for safety profile variables regarding infection control. We also aimed to assess if there is a significant association between healthcare personnel's biographic profile and their level of conformity with KPI safety profile variables and infection control. The data were collected between December 2019 and January 2020.

Sample size calculation and sampling method

All healthcare staff working in all Saudi Arabian hospitals were the population of interest to be included in the current study. The total sample size used for this study was calculated using G power analysis version 3.2, with an effect size equal 0.5, ∝ err prob of 0.05, and power (1-ß err prob) of 0.80. A total of 180 healthcare workers were calculated to take part in this study. As a result, the current study comprising 180 healthcare staff as respondents (physicians, nurses, surgical laboratory technicians, and hospital administrators). Convenience sampling was used to identify the samples; only those healthcare professionals available and most accessible to the authors at the data collection duration were selected.

Study process

The participants in the study were provided with checklists. Healthcare staff was given 15 to 20 minutes to complete the survey. The Australian Commission on Safety and Quality of Healthcare adapted the compliance to KPI for infection control. The study used a three-point Likert scale, and the rating scales used were "3" to indicate always,

"2" to indicate sometimes, while "1" was used to indicate never. A value ranging between 1.00 and 1.40 was considered as very low compliance, 1.41 to 1.80 was considered as low compliance, 1.81 to 2.20 was considered as moderate compliance, 2.21 to 2.60 was considered as high compliance, and 2.61 to 3.00 was considered as very high compliance. Three experts in the healthcare sector evaluated the research instrument for both content and construct validity. The methods were tested in a pilot project with 20 hospital employees at the hospital of Najran University. The used survey showed a Cronbach alpha reliability score of 0.78, indicating that it was acceptable, with a considerable internal consistency (Denise F. Polit, 2008).

Statistical analysis

The statistical data were computed using an IBM Statistical Package for Social Sciences (SPSS) version 20.0. For continuous data, mean and standard deviation (SD) were used, while dichotomous data were reported as frequencies and percentages. Chi-square test of independence (r^2) was used to test the relationship between the biographic profiles and level of compliance with infection control practices among healthcare workers.

3. Results

Characteristics of the included healthcare workers

A total of 180 respondents were included in our study. 62.8% of the included healthcare workers were young adults (n=113), 73.3% were males (n=132), 68.3% were doctoral degree holders (n=123), 66.1% were licensed medical doctors (n=119), and 39.4% were advance beginners (n=71). The biographic profile of the included respondents is shown in **Table 1.**

Compliance to Key Performance Indicators (KPI)

Our study findings showed that, in terms of infection control practices, Saudi healthcare workers have an overall level of "high compliance" (mean=2.29, SD= 0.69). Specifically, most of the study respondents had "high compliance" to the strategies of infection control in terms of the organization is compliant with a hospital cleanliness audit and infection control recommendation (mean=2.33, SD= 0.77), no reports of accidental needle stick incidents because of recapping (mean=2.38, SD= 0.69) and there are no percutaneous occupational exposures due to non–compliant behavior (mean=2.24, SD= 0.97). Likewise, our study respondents displayed "very high compliance" in terms of hospital infection trends are reviewed and followed up (mean=2.88, SD= 0.40), and the hospital is compliant with audits (mean=2.81, SD= 0.42). Thus, Saudi healthcare workers usually comply with infection control practices, as shown in **Table 2.**

Correlation analysis

Chi-square test of independence (r^2) revealed a statistically significant relationship between compliance to infection control practices and the following variables: age (r^2=13.26, p=0.0100), sex (r^2=8.08, p=0.0177), educational attainment (r^2=29.36,

p=0.0001), and profession (r^2=37.82, *p*=0.0000). We detected no significant relationship between compliance to infection control standards and length of service (r^2=12.55, *p*=0.1146), **Table 3.**

4. Discussion

The majority of the Saudi Arabian healthcare workers included in our study were young male adults. Most of them were licensed medical doctors and had between one and five years of experience in the field, the usual age range for recently graduated healthcare workers who only professionally license and started their careers. These young age groups are more likely to work for long hours, multitask, and operate under stress and pressure; this can significantly affect their career practice in clinical settings. The study findings are in line with the previous literature from other countries. In the Philippines, the findings show that registered healthcare staff are younger than in other countries and are more open to the complexities of infection prevention procedures (Sadang et al., 2019)**.** The majority of healthcare professionals had a doctoral degree as their highest level of qualification. According to Tanner (2004) (Tanner, 2004), higher-degreed healthcare staff is more suited to satisfying diverse healthcare needs, minimizing patient risk, and reducing the mortality rate. As a result, pursuing higher education will strengthen and direct hospital staff's ability to formulate, execute, and evaluate an evidence-based patient treatment that will increase infection prevention. According to a report by Altuntas and Baykal, newly licensed staff joining Turkish healthcare facilities show little involvement; however, they are forced to take complete responsibility for patient care (Altuntas and Baykal, 2010). Additionally, this presents a labor challenge and work annoyance, all of which may significantly impact patient management as well as and organizational commitment.

In terms of infection prevention procedures, Saudi Arabian hospital personnel has a high degree of compliance, indicating that they often use infection-prevention and control measures and primary success indicators for infection prevention outcomes in

patient care. The study's findings align with previous studies from the Philippines, Bangladesh, Saudi Arabia, and Australia (Feliciano, 2020).

According to a survey conducted in Bangladesh, health practitioners' compliance with infection prevention practices has significantly improved (Ara et al., 2019). In Saudi Arabia, a related study found that healthcare workers follow infection control procedures; the most well-practiced domains were traditional precautions, hand hygiene, as well as wearing personal protective measures (Khubrani et al., 2018). Controlling HAIs and adhering to infection prevention protocols is critical. Protecting patients from contracting infections in healthcare settings will mitigate possible damage, comorbidities and improve patient health outcomes (Ebada et al., 2020).

Even though healthcare professionals showed a high level of infection management enforcement, hospital staff showed poor compliance rates regarding: a) handwashing with antibacterial soap and running water which is a crucial way to deter disease-causing microorganisms from spreading, and b) attending infection prevention lectures and workshops (Barnett et al., 2014). Healthcare workers' hands and clothes can easily get infected if they do not follow proper infection-control procedures. As a result, the effectiveness of infection control and prevention services is dependent on a high level of compliance by hospital employees (Cantrell, 2009). Therefore, such compliance is critical to reducing the spread of HAIs (Cantrell et al., 2009; Feliciano et al., 2019; McFarlin et al., 2008).

Our study showed that there is a relationship between infection control policies enforcement and the demographic characteristics of the included respondents. Our results are similar to those studied from other countries. According to a report conducted in New York, age significantly impacts compliance to infection prevention

strategies. Higher compliance rates were documented for senior healthcare workers than for younger hospital staff. Infection prevention compliance was positively and substantially correlated with specific ethnic characteristics (Russell et al., 2018). According to a German study, gender-specific variations are relevant in regards to infection control and prevention in terms of the perceptions, habits of sanitation, cleanliness, as well as disinfection. These Gender-specific knowledge items were commonly used to reduce hygiene deficits (Goerig et al., 2018).

Among Philadelphia healthcare professionals, knowledge of infection control standards was significantly correlated with educational preparation. Both formal and non-formal training services considerably improved monitoring awareness of infection control practices (McGuckin and Rose, 1983). According to a Turkey report, several professional experts agree that healthy infection prevention methods successfully reduce HAIs. Other healthcare professionals' actions have a direct impact on compliance rates. Respondents were oriented that high self-reported infection prevention commitment is favorably correlated with considerable adherence by peers as well as being a role model for proper practices for other healthcare staff (Alp et al., 2011). Therefore, biographic profiles are considerable elements that directly impact compliance levels among healthcare staff regarding infection control strategies.

Conclusion and Recommendation

In Saudi Arabia, healthcare staff generally follow infection control procedures. Furthermore, biographic profiles are linked to the healthcare staff's degree of compliance to infection prevention practices. In future studies, an infection prevention awareness program should be proposed to reinforce healthcare workers' stringent compliance with infection control procedures such as hand washing, the use of personal

protective equipment, as well as direct contact precautions. In each clinical field of assignments, hospital personnel should prioritize, explain, and incorporate comprehensive infection management strategies. As a result, the importance of developing competencies among healthcare professionals in infection prevention procedures should be considered. More analysis is needed to counter the high incidence of non-compliance with hand hygiene measures for certain hospital employees.

DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

Ethical considerations

The current study was granted permission to be conducted in the targeted military, university, government, as well as private hospitals throughout Saudi Arabia's various regions. Moreover, our study received ethical approval from the Najran University Ethical and Technical Committee and was assigned a reference code number. Throughout the study, bioethical principles were observed and implemented in a strict manner. Also, the rights and protection of the study respondents are taken into account during our study process.

Consent

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

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Table 1. Biographic profile of healthcare workers as respondents of the study (n=180)

		Frequency (n)	**Percentage (%)**
Age	21-35 years old (Young adults)	113	62.8
	36-55 years old (Middle-age adults)	49	27.2
	56-65 years old (old adults)	18	10
Sex	Male	132	73.3
	Female	48	26.7
Educational Attainment	Diploma	8	4.4
	Bachelor	38	21.1
	Master	11	6.1
	Doctoral	123	68.3
Profession	Medical Doctor	119	66.1
	Nurses	44	24.4
	Healthcare Administration	7	3.9
	Medical Laboratory	10	5.6
Length of Service	< 1 year (novice)	15	8.3
	1 to 5 years (advance beginner)	71	39.4
	6 to 10 years (competent)	55	30.6
	11 to 20 years (proficient)	31	17.2
	≥20 years (expert)	8	4.4

Table 2. Healthcare workers' level of compliance to KPI for infection control (n=180)

Infection Control Practices Statements	**Mean**	**SD**	**Level of Compliance**
1. The organization is compliant with a hospital cleanliness audit and infection control recommendation.	2.23	0.77	High Compliance
2. Hospital infection trends are reviewed and followed up.	2.88	0.40	Very High Compliance
3. Staffs attend annual infection control training.	1.38	0.72	Very Low Compliance
4. The hospital is compliant with audits.	2.81	0.42	Very High Compliance
5. There are no reports of accidental needle stick incidents because of recapping.	2.38	0.69	High Compliance
6. There are no incidence of body fluid exposures.	2.10	0.83	Moderate Compliance
7. There are no percutaneous occupational exposures due to non – compliant behavior.	2.24	0.97	High Compliance
Overall	2.29	0.69	High Compliance

Table 3. Test of the relationship between healthcare workers' biographic profiles and the level of compliance to compliance to KPI for infection control

Variable (x)	**Variable (y)**	**Chi-square value (r^2)**	***p*-value**	**Interpretation**
Age	Compliance to compliance to KPI for infection control	13.26	0.0100	*Significant**
Sex		8.08	0.0177	*Significant**
Educational Attainment		29.36	0.0001	*Significant**
Profession		37.82	0.0000	*Significant**
Length of Service		12.55	0.1146	Not Significant
***p*-value is significant if *p* < .05**				