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Association Between Hospital Infection Control Practices And Physician Knowledge And Attitude

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Abstract:

Background: *Almost 1.4 million patients who suffer from Hospital Acquired Infections (HAI) every day. Hospital-acquired infections (HAIs) contribute to increased length of hospital stay, higher mortality and higher healthcare costs. To minimize the risk of healthcare associated infections, it imperative that infection control practices are well in place and being practiced. Prevention and control of HAIs is a critical public health concern.* ***Aim:*** *To determine the association between hospitals infection control practices and physician knowledge and attitude.* ***Methods:*** *A cross-sectional study was done in Makkah, KSA of which 251 medical physicians participated. Data on knowledge, attitude on the Ebola hemorrhagic fever as well as hospital infection control practices was collected using a self-administered questionnaire. Data analysis was done using IBM SPSS version 28 where association between variables was determined using multiple linear regression.* ***Results:*** *Mean scores were; knowledge 33(±4.5), attitude 87(±10) and practices 66(±8)[1]. Practice was positively correlated with attitude ($r = 0.162, p<0.05$) and there was also a significant association between practice and attitude ($b = 0.137$, 95% CI = 0.33-0.24, $p<0.05$).* ***Conclusion and recommendation:*** *Attitude is a significant predictor of hospital infection control practice. The improvement in health personnel attitudes through funding and positive policies can translate into improved practices.*

Keywords: *Practice, Hospital infection control, Predictors, Attitude, Knowledge.*

Introduction

Viral hemorrhagic fevers (VHFs) represent a group of severe systemic febrile illnesses caused by four families of viruses: Arenaviridae, Bunyaviridae, Filoviridae, and Flaviviridae [(2)]. These enveloped viruses are characterized by a myriad of symptoms that range from coagulopathies, hemodynamic instability, altered mental status, and, if severe enough, death. The degree of clinical illness can vary widely with some viruses causing mild illness, while others can be life-threatening. Most of the viruses implicated in these diseases require vectors for transmission to humans, with the majority being arthropod-borne or rodent-borne infections. Given their zoonotic nature, these diseases are generally confined to the endemic areas where their hosts live. However, given increased human migration and further globalization, these diseases are

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no longer limited to their geographic origins [2].

The burden of HAIs is on the rise globally despite advancements in medical care and technologies [3]. According to the World Health Organization (WHO), the prevalence of HAIs ranges between 5.7% and 19.1% in hospital settings globally [4]. Recent studies estimated the prevalence of HAIs in Europe [5] and the USA [6] at 6.5% and 3.2%, respectively. The burden of HAIs is strikingly higher in low-resourced countries compared with high-income countries [7-9]. WHO-led systematic review revealed that the prevalence of HAIs varies between 7.6% and 15.5% in high-income and low and middle income countries, respectively [4]. HAIs contribute to increased length of hospital stay, high mortality, higher health-care costs, and economic burden on families, communities, and countries at large [4, 10]. Hence, prevention and control of HAIs appear as a critical public health concern [11].

The contaminated hands of healthcare workers (HCWs) and healthcare equipment have been identified as the primary sources of HAIs [8, 12]. The pathogens of HAIs are commonly transmitted from one patient to another when HCWs do not perform hand hygiene properly following caring for one patient and contacting another patient [13]. The incidence of HAIs varies in different types of clinical departments. A study in Norway reported that the greatest infection rate is in the intensive care units followed by neonatal and burns units [14]. The WHO reported that improper environmental hygiene and waste disposal procedures, poor infrastructure, inadequate equipment and manpower, overcrowding, limited knowledge and poor practices of basic infection control measures, and lack of national guidelines are the key determinants of HAIs [15]. The Center for Disease Control and Prevention (CDC) developed Standard Precautions describing detailed procedures that need to be followed to prevent the transmission of disease-causing agents and thereby preventing HAIs [16].

Hospital acquired viral diseases like hemorrhagic fevers have a high propensity for human to human transmission and are continuously becoming an increasing global health problem [17]. World Health Organization reported over 83,000 viral infections of nosocomial origin worldwide among health personnel [18]. The prevalence of these diseases has been reported to be on the rise in some parts of Nigeria [17, 19]. This rise in morbidity may be as a result of unfamiliarity with the illness [20], or the effect of decades of poor funding and unfavorable policies [21, 22].

Despite the intervention by non-governmental organizations and the international community in developing countries, local support is vital to effectively contain the threat posed by these pathogens. Young health care trainees tend to be at the receiving end of a bulk of these diseases as they lack experience and expertise yet are equally exposed during medical training [23-25]. Several factors have been reported to be associated with hospital infection control practices [17, 18, 26, and 27]. These findings when consistent and updated can be used to guide stake holders and policy makers in improving the current state of events. This study therefore aims to determine the association between hospitals infection control practices and physician knowledge and attitude.

Methods

A cross-sectional study was conducted from January to February 2022 at Makkah, KSA. This involved 251 medical physicians participated. The response rate was 95.4%. Data on knowledge and attitude about Ebola hemorrhagic fever as well as hospital infection control practices was collected using semi-structured questionnaire adopted from the WHO (WHO, 2008) [28]. Knowledge was assessed based on the responses of yes, no or I do not know where one mark was awarded for the right answer and no marks were awarded for wrong answers. Attitude was assessed using a Likert scale with five levels based on agreement, while hospital infection control practices was assessed using a four point Likert scale based on frequency.

All variables were collated as continuous variables using IBM SPSS version 28 whereby descriptive analysis was first done as means and standard deviations. Knowledge, attitude and practice were then correlated in bivariate analysis using Pearson's correlation. Subsequently multivariate analysis was also done to determine the association between knowledge and attitude with hospital infection control practices using Multiple Linear Regression. Level of significance was set at $\alpha = 0.05$ and 95% confidence interval.

Results

Descriptive Analysis for Knowledge, Attitude and Practice

Table (1) presented the descriptive analysis for knowledge, attitude and practice that the mean knowledge score was 33 (SD ±4.5, 95% CI = 32.76 – 33.87), the minimum score was 19 and maximum score was 42 while the range was 23. For attitude the mean score was 87 (SD ±10, 95% CI = 85.49 – 87.85), the lowest score achieved was 57 and the highest was 107 with a range of 50. In terms of practice, the mean score was 66 (SD ±8, 95% CI = 64.62 – 66.62), minimum practice score was 40 and maximum score 82 making the range 42.

Correlation between Knowledge, Attitude and Practice

Table (2) shows bivariate analysis where knowledge, attitude and practice scores were correlated against each other. There was significant correlation between attitude and practice scores ($r = 0.162$, $p<0.05$). However, there was no significant correlation between knowledge and practice scores ($r = -0.015$, $p>0.05$); as well as attitude and knowledge scores ($r = 0.060$, $p>0.05$).

From **Table (2)** based on the correlation between attitude and practice ($r = 0.162$), the r^2 value can be calculated which is $(0.162)^2 = 0.026$. When we convert this to a percentage by multiplying 100, the r^2 value is 2.62.This is the amount of variance in practice shared by attitude scores.

Multiple Linear Regression

Multiple linear regression analysis was conducted to determine the association between knowledge, attitude and practice of hospital infection control. From the results in **Table (2)**, attitude has a significant linear relationship with practice. And although not significant in this study, a previous research conducted by Janjua et al., (2007) [18] reported an association between knowledge and hospital infection control practice. Putting this into consideration the backward likelihood ratio method was used to determine the ability of knowledge and attitude scores to predict practice of hospital infection control.

Analysis of Goodness of Fit of the Model

Table (3) shows the overall goodness of fit of our regression model. The result shows a significant difference between a model with our predictor variables and that with only the mean ($F = 6.728$, $p<0.05$). Therefore, it is concluded that our model has a good fit. The Durbin Watson test of independent errors statistic was 1.72 which shows there is no autocorrelation between residual errors. Multicollinearity diagnostics show a variance inflation factor of 1.0 and a tolerance of 1.0 which is within acceptable ranges to show lack of collinearity across predictors.

Multiple Linear Regression Model

From the results in **Table (4)**, there was an association between attitude scores and practice of hospital infection control ($b = 0.137$, 95% CI = 0.33-0.24, $p<0.05$). Based on this result the linear regression model for practice can be plotted as Practice = $\alpha + (b_1X_1)$ where Practice is the outcome variable, α is the b value of the constant, b_1 is the b value for attitude and X_1 is the value of attitude used to predict practice.

Table (1): Descriptive analysis for knowledge, attitude and practice (N = 251)

Variable	Mean (±SD)	95% CI	Minimum	Maximum	Range

Knowledge	33 (4.5)	32.76 – 33.87	19	42	23
Attitude	87 (10)	85.49 – 87.85	57	107	50
Practice	66 (8)	64.62 – 66.62	40	82	42

SD, Standard Deviation; CI, Confidence Interval

Table (2): Correlation analysis between knowledge, attitude and practice

		Practice	Knowledge	Attitude
Pearson Correlation (r)	**Practice**	1.000	-0.015	0.162
	Knowledge	-0.015	1.000	0.060
	Attitude	0.162	0.060	1.000
Significance (p)	**Practice**	.	0.406	**0.005***
	Knowledge	0.406	.	0.173
	Attitude	**0.005***	0.173	.

Table (3): ANOVA analysis of goodness of fit

Model		Sum of Squares	Mean Square	F	Sig.
	Regression	425.978	425.978	6.728	**0.010***
	Residual	15765.066	63.314		
	Total	16191.044			

Table (4): Multiple linear regression model

Model	B	SE	Sig	95% CI
(Constant)	53.71	4.619	<0.001	44.61 – 62.80
Attitude	0.137	0.053	0.01*	0.033 – 0.242

Discussion

The findings in this study show attitude of medical to be a predictor of their ability to practice hospital infection control, this was similar to a study done by Al-Hussami et al, (2011) [29]. Bivariate analysis also showed that attitude and practice were positively correlated among our participants. This would mean as one variable increases the other has a tendency to co-vary. This is similar to what was reported from bivariate analysis on medical physicians' attitude and practice scores by Lui et al., (2014) [30]. The variance in practice explained by attitude was quite low in this study; this unexplained variance may be the effect of other factors not included in this research. Nevertheless, the analysis of the models goodness of fit showed the models explained variability of practice to be significantly higher than its unexplained variability. This means that despite high percentage of unexplained variance, attitude scores are still a significant predictor of hospital infection control practice among medical physicians.

Knowledge is essential to develop a positive attitude; therefore, it is a key instigator to bring a positive change in practice [31, 32]. Evidence suggests that knowledge and positive attitudes are associated with improved compliance with infection control standard precautions among HCWs [33]. Gaps in the knowledge of standard precautions among HCWs were also evident in studies conducted in Iran [34] and Nigeria [35]. This gap in knowledge among HCWs necessitates more emphasis on infection control standard precautions in academic and continued professional development training curriculums.

Conclusion and Recommendations

The findings of this study show that if attitude of health care personnel are improved, it has a significant chance of likewise positively translating into better services and patient protection through increased adherence to hospital infection control practices. This can be done through improved funding by stake holders, implementation of sound policies and incentives such as welfare packages and insurance policies. It is most likely that overtime, the ripple effects of these positive changes will be visible on the incidence rates of such highly transmissible nosocomial infections.

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