

Perception and Barriers Regarding Infection Control Measures Among Healthcare Workers in Minia City, Egypt

Abstract

Background: This study aimed to assess perception of healthcare workers (HCWs) toward infection control measures and to identify the major barriers that may hinder the proper infection control practice and to compare perception of HCWs toward infection control measures between Minia University Hospital and Minia General Hospital. The study was a descriptive cross-sectional study. **Methods:** The study conducted on 350 HCWs (187 from Minia University Hospital, 163 from Minia General Hospital); data were collected using a structured questionnaire. The questionnaire was designed to assess perception toward infection control measures and to identify the major barriers that may hinder the proper infection control practice. **Statistical Analysis Used:** Data were gathered and entered into Statistical Package of Social Science (SPSS), version 22. **Results:** About 85% of HCWs in Minia University Hospital compared with 82% in Minia General Hospital had a positive perception toward Standard precautions (SPs). Knowledge score was the only significant predictors of perception of HCWs toward infection control. One-point increment in knowledge score is associated with significantly 13% lower odds to have negative perception; the multivariable-adjusted odds ratio (95% confidence intervals) was 0.87 (0.81–0.95). The most frequent barrier of practice of SPs was absence of enough gloves and gowns. **Conclusions:** HCWs demonstrated positive perception toward infection control and SPs measures. The most frequent reported barrier against practice of SPs was absence of enough gloves and gowns. The significant predictor that hindered the practice of SPs was that “Following SPs makes work harder.”

Keywords: Barriers, infection control, perceptions, standard precautions

Introduction

Infection in healthcare facilities is a major public health problem in most developing countries. Currently, the overall incidence of healthcare-associated infection has been increased and the burden of these infections is staggering.^[1]

The prevalence of healthcare-associated infections (HCAI) varies widely worldwide. The prevalence of HCAI in developing countries can become as high as 30%–50%. Many of these pathogens in HCAI are multidrug resistant and are able to survive in the environment for a long period of time.^[2]

Healthcare workers (HCWs) are at risk of occupational hazards because they perform their clinical activities in hospitals where they are exposed to blood and body fluids.^[3–5]

All activities or actions used to minimize the risk of the spread of infection are referred as infection control measures.

They are based on how an infectious agent is transmitted and include standard, contact, droplet, and airborne precautions.^[1] Infection control measures can be grouped into two categories: Standard precautions (SPs) and additional (transmission based) precautions.^[6] The SPs policy is regarded as the effective means of protecting HCWs, patients, and the public, thus reducing hospital acquired infections. They are designed to protect HCWs from being exposed to potentially infected blood and body fluids by applying fundamental principles of infection prevention.^[7–10]

Some HCWs believe that when they do not adhere to SPs, this would place the patient's life in danger. Others feel that there is no need for SPs in some circumstances, for example, one of the responses was that this person frequently recaps needles because he or she was pricked by a needle that was not covered.^[11,12] A previous study in Nigeria reported that most of HCW (90.8%) had a positive attitude about SPs and wanted to

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practice it, but inadequate fund and equipment hindered them from practicing it.^[13]

The available data from developing countries show that adherence to the “standard precaution” and adequate documentation of occupational exposures is suboptimal.^[14] Lack of resources and a lack of appropriate legislation and control are the main barriers for infection control in developing countries.^[15] This study was done to assess the perception of HCWs toward infection control measures and to identify the major barriers that may hinder the proper infection control practice.

Methods

A descriptive cross-sectional study carried out among 350 HCWs in Minia University Hospital and Minia General Hospital (the biggest two hospitals in Minia city) from December 2016 to June 2017. Both hospitals have infection control guidelines determined by separate infection control committees, but adherence to these guidelines is not regularly assessed.

The study included HCWs (doctors, nurses, and lab technicians) in the aforementioned hospitals who were with regular contact with patients and/or specimens and chemicals during their routine clinical duties, and who agreed to participate in the study. Sanitation workers, dentists, and pharmacists were excluded from the study as the nature of questionnaire was not suitable for them.

Total number of HCWs (doctors, nurses, and lab technicians) in Minia University Hospital and Minia General Hospital obtained from registers in December 2016 was 1,000 HCWs. The required sample size was estimated based on the following formula:^[16,17]

$$n = Z^2 \frac{P(1-P)}{e^2}$$

where n is the desired sample.

Value of Z : obtained from statistical tables corresponding to 95% confidence interval = 1.96, e = degree of precision usually set at 0.05

P is the expected prevalence of noncompliance with SPs

Assuming it to be 50%.^[18]

$$N = \frac{(1.96)^2 \times 0.5 (0.5)}{0.0025} = 384$$

Accordingly, the sample size needed was (384).

After using the finite correction formula as the total number of HCWs was 1,000, which is <10 times the estimated sample size^[19,20]:

$$NF = \frac{n}{1 + (n-1/N)}$$

where NF is desired sample after correction;

n is calculated sample size before correction;

N is estimate of the population size = 1,000.

In addition, 20% of the sample was added to guard against nonrespondent’s rate, so the final sample is (332), so the minimum required sample size was 332.

Total number of HCWs included in the study was 350.

Simple random sampling was applied to obtain eligible participants from both hospitals. Every department was included in the study. All the eligible participants who consented to participate were recruited into the study until the required sample size (350) was achieved.

Data were collected by interviewing HCWs using a structured questionnaire. The questionnaire was designed to assess the perception of HCWs toward SPs of infection control.^[4,10,21] It included sociodemographic and job-related data of the participants, questions about HCWs background, and general concepts about SPs of infection control, questions assessing the attitude toward hand hygiene, sharp injuries, blood-borne diseases, and about personal protective equipment and barriers of practice of SPs. The content validity of the questionnaire was assessed by experts having expertise in infection control. The reliability was assessed by using Cronbach’s alpha that yielded to 89% reliability rate.

The questionnaire included the following:

1. Sociodemographic and job-related data of the participants
2. Questions about HCWs background and general concepts about SPs of infection control
3. Questions assessing (knowledge and perception) about hand hygiene
4. Questions about sharp injuries and blood-borne diseases (knowledge and perception)
5. Questions about personal protective equipment (knowledge and perception)
6. Barriers of practice of SPs.

The Sociodemographic and Job related data

It included questions such as participant’s age, gender, level of education, occupation, hospital, department of work, healthcare work experience, if they previously received training about infection control and SPs, also duration of this training, and number of training days.

Knowledge about SPs

Knowledge was assessed via (37) questions that covered the background of HCWs about SPs, hand hygiene knowledge, knowledge about sharp injuries, personal protective equipment’s knowledge, and environmental sanitation knowledge. The questions were in the form of closed ended questions and the interviewees were asked to choose an answer from three (true or false or don’t know) questions.

Scoring for knowledge

Each question rated zero for wrong answer or don't know and one for correct answer. Total knowledge score was calculated for each participant by summing the scores of all knowledge statements. The overall knowledge score was from 0 to 37.

Perception toward SPs

Regarding attitude, 17 statements were used to assess the HCWs' attitude toward hand hygiene, sharp injuries and personal protective equipment. HCWs had to answer by agree or don't agree.

Scoring for attitude

Positive attitude statements were given score one for agree and zero for disagree. The opposite of this scoring was used for negative statements. Accordingly, attitude score was calculated for each participant, total attitude score ranged from 0 to 17.

Barriers of practice of SPs

HCWs were asked about barriers that hinder their practice of SPs. There were 12 barriers. The answers were agree or don't agree.

Using the scoring system applied in similar previous study in Fayaz *et al.* (2014), total scores were classified as follows:

- Adequate knowledge, positive attitude, and good practice were obtained when achieving $\geq 60\%$ of total score.
- Inadequate knowledge, negative attitude, and poor practice were obtained if the score was $< 60\%$.

Ethical consideration

The study was approved by ethical committee of faculty of Medicine, Minia University. Approvals from MOHP,

from the managers of both hospitals were obtained. Prior to data collection, verbal consents were obtained from each participant after supplying comprehensive information about the nature of the study.

Statistical analysis

Data were analyzed by using SPSS version 22. Quantitative data were presented by mean and standard deviation, whereas qualitative data were presented by number and percentages. Chi-square and Fisher's exact tests were used. Z-score was used to compare proportions. Student's *t*-test was used to compare two means. Correlation test was used to study association between quantitative variables. Multivariable Binary logistic regression analysis and linear model were used to show the combined effect of different independent variables on the target (dependent variable). The probability of < 0.05 was used as a cut-off point for all significant tests. Figures were done by Excel office 2010.

Results

Among a total of 350 HCWs participated in the study, 187 (53.4%) were from Minia University Hospital and 163 (46.6%) were from Minia General Hospital, comprising 158 males (45.1%) and 192 females (54.9%). About two-thirds of participants (62%) were doctors, 34.9% were nurses, and 3.1% were lab technicians. The mean age of all the participants was 29.4 ± 6.9 ; it was also found that 66% of participants have spent < 5 years in their current job. Mean working hours per week in Minia University Hospital was higher than that of Minia general hospital (67.52 ± 30.2 ; 43.49 ± 14.8 , respectively). The distribution of HCWs by departments was shown; 26.9% and 23.7% of the studied group were working in surgical and medical wards, respectively [Table 1].

Table 1: Distribution of the studied healthcare workers according to sociodemographic characteristics, 2017

Sociodemographic characteristics	Minia University Hospital (n=187)	Minia General Hospital (n=163)	All participants (n=350)
Age [#]	27.9±5.9	31.3±7.6	29.4±6.9
Gender [†]			
Male	88 (47.1)	70 (42.9)	158 (45.1)
Female	99 (52.9)	93 (57.1)	192 (54.9)
Job [†]			
Doctors	113 (60.4)	104 (63.8)	217 (62.0)
Nurses	71 (38.0)	51 (31.3)	122 (34.9)
lab technicians	3 (1.6)	8 (4.9)	11 (3.1)
Scientific degree [†]			
Technical diploma	26 (13.9)	25 (15.3)	51 (14.6)
Health institute	28 (15.0)	27 (16.6)	55 (15.7)
Nursing college	19 (10.2)	6 (3.7)	25 (7.1)
MBBCH	85 (45.4)	81 (49.7)	166 (47.4)
Master degree	27 (14.4)	23 (14.1)	50 (14.3)
MD	2 (1.1)	1 (0.6)	3 (0.9)
Total	187 (100%)	163 (100%)	350 (100%)

[#]Quantitative data represented by means±SD [†]Qualitative data represented as No. (%)

Table 2 showed that barriers of SPs practice were more evident in Minia University Hospital than Minia General Hospital. The majority in Minia University Hospital (88.2%) compared with 71.8% in Minia General Hospital stated that there were no enough gloves; there was a statistically significant difference between both hospitals (P -value <0.001). There was also a statistically significant difference regarding availability of hand washing facilities (P -value <0.001), where 66.8% in Minia University Hospitals versus 36.2% in Minia General Hospital said that there was no enough soap and water. Regarding the availability of hepatitis B vaccine more than half HCWs in Minia University Hospital (54%) compared with 30.1% in Minia General Hospital reported that hepatitis B vaccine was unavailable. There was a statistically significant difference about unavailability of hepatitis B vaccine where P value was <0.001 .

Table 3 showed the factors associated with negative perception. Knowledge score was the only significant predictors of perception of HCWs toward infection control. One-point increment in knowledge score is associated with significantly 13% lower odds to have negative perception, the multivariable-adjusted odds ratio (95% confidence intervals) was 0.87 (0.81–0.95).

Discussion

Healthcare-associated infections (HAIs) have been reported to be a serious problem in the healthcare services as they are common causes of illness and mortality among hospitalized patients also among HCWs.^[5,22,23]

Likewise, findings from most studies, our study showed that the majority of HCWs (84.3%) demonstrated positive perception toward infection control and SP measures.^[1,24,25-28] This finding was not in agreement with a previous study in United Kingdom found that the perception of doctors and many qualified nurses was negatively associated with the knowledge; this can be

explained as infection prevention and control was seen as time wasting and inconvenient.^[29]

Majority of HCWs in Minia University Hospital and Minia General Hospital agreed that gloves were necessary for all caring procedures for HIV patients; this was in concordance with a study in Afghanistan where 87.2% of HCWs stated that.^[15]

When studying factors associated with negative perception, it was found that Knowledge score was the only significant predictor of practice of HCWs toward infection control.

In this study, the most frequent barriers of practice of SPs were absence of enough gloves and gowns; many HCWs said that other people around them did not follow SPs; this did not encourage them to follow it. Different barriers can affect practice of SPs. Many studies stated that nonavailability of infection prevention supplies and equipment, i.e., masks, goggles, alcohol-based hand rub, delivery packs, and linen were reported as obstacles for implementing SPs;^[30-33] also Ghanaian study that identified a lack of facilities as a main factor in failure to follow hand hygiene practices^[34] as irregular availability of water and soap the same was also found in a study in Nigeria.^[10]

A study in Indonesia showed that it was difficult to follow guidelines for safe handling of sharps as it costs too much time, interferes with patient care, no enough sharp containers, and no enough equipment.^[21] Eskander study attributed lack of adherence to infection control SPs to shortage of nursing staff as compared with workload and inability to wash hand after each intervention. This finding is in agreement with that of another study in Egypt.^[35]

In a study in India, the most common reason reported for noncompliance toward the practice of SPs was giving priority to the patient's needs in emergency conditions^[18] and the belief that applying SP may interfere with patient care.^[36]

Table 2: Barriers of practice of standard precautions of infection controlling Minia University Hospital and Minia General Hospital, 2017

Barriers	Minia University Hospital No (%) o (%)	Minia General Hospital No. (%)	All HCWs No. (%)	Z-score P
There is no enough glove	165 (88.2)	117 (71.8)	282 (80.6)	Z=3.89 0.001*
Others don't follow SPs measures	152 (81.3)	120 (73.6)	272 (77.7)	Z=1.7 0.09
There is no enough gowns	146 (78.1)	113 (69.3)	259 (74)	Z=1.9 0.06
Guidelines of SPs are vague	108 (57.8)	84 (51.5)	192 (54.9)	Z=1.17 0.2
There is no enough hand washing facilities	125 (66.8)	59 (36.2)	184 (52.6)	Z=5.7 0.001*
Requirements of SPs are costly	98 (52.4)	82 (50.3)	180 (51.4)	Z=0.39 0.7
Gloves cause skin irritation	95 (50.8)	84 (51.5)	179 (51.1)	Z=0.14-0.9
Virus B vaccine is unavailable	101 (54)	49 (30.1)	150 (42.9)	Z=4.5 0.001*
Following SPs takes long time	78 (41.7)	65 (39.9)	143 (40.9)	Z=0.35 0.7
PPE are uncomfortable with use	71 (38)	54 (33.1)	125 (35.7)	Z=0.94 0.4
It is unimportant to follow SPs guidelines	66 (35.3)	45 (27.6)	111 (31.7)	Z=1.54 0.1
Following SPs makes work harder	57 (30.5)	52 (31.9)	109 (31.1)	Z=0.29-0.8
Total	187 (100)	163 (100)	350 (100)	

*Significant

Table 3: Multivariable binary logistic regressions for factors associated with negative attitude among studied HCWs

Variables	Negative Attitude		
	<i>n</i>	Adjusted OR (95% CI)	<i>P</i>
Age	55	1.04 (0.97-1.12)	0.2
Gender			
Female	32	Ref	0.3
Male	23	0.73 (0.37-1.44)	
Job title			
Doctor	129	Ref	0.8
Nurse	50	0.91 (0.41-2.04)	0.2
Lab tech	8	3.02 (0.21-43.3)	
Years of experience (year)			
>10	11	Ref	0.7
5-10	7	1.27 (0.27-6.06)	0.6
<5	37	0.73 (0.16-3.22)	
Working hours/week	55	0.99 (0.98-1.00)	0.7
Departments			
Others	3	Ref	0.2
Surgical wards	17	3.37 (0.38-29.25)	0.7
Medical wards	8	1.5 (0.16-13.71)	0.1
Pediatrics	12	4.25 (0.48-37.71)	0.4
Gynecology and Obstetric	9	2.24 (0.25-20.24)	0.3
ICU and emergency	6	2.84 (0.29-27.48)	
Attend infection control training program			0.5
Yes	24	Ref	
No	31	1.22 (0.61-2.41)	
Work place			
Minia University Hospital	27	Ref	0.4
Minia General Hospital	28	1.32 (0.63-2.75)	
Knowledge score	55	0.87 (0.81-0.95)	0.003*

OR=odds ratio, HCW=healthcare worker*Significant

Many studies revealed that excessive patient care responsibilities did not give HCWs sufficient time to follow SPs when indicated; also excessive workload was a major factor that prevents HCWs at the primary level from following SPs.^[4,37-40]

Another barrier was found in previous researches was that feeling uncomfortable with the use of SPs. The nurses thought that gloves would make nursing care to the patient difficult.^[12]

In addition to the negative influence on the professional serving as role model, some investigators stated that “the source of the low compliance, especially that linked to hand hygiene, lies in the academic training.” In a previous study in Alexandria, none of the nurses received training about SPs.^[41]

This study was limited by the self-report method of assessment of infection control measures because the level

of compliance might have been more properly assessed by observation. Hence, studies directly observing infection control practices among HCW in Egypt are recommended.

Conclusions

In conclusion, infection in healthcare facilities is a major public health problem in most developing countries. The majority of HCWs demonstrated positive perception toward infection control and SP measures. Knowledge score was the only significant predictors of negative perception of HCWs toward infection control. The most frequent reported barriers against practice of SPs were absence of enough gloves and gowns; in addition, many HCWs said that other people around them did not follow SPs. “Following SPs makes work harder” was the significant predictor that hindered the practice of SPs.

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Conflicts of interest

There are no conflicts of interest.

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