Original Article

Knowledge of standard precautions among healthcare professionals at a Teaching Hospital in Karachi, Pakistan

Naseem Amin Dhedhi[1], Hiba Ashraf[2], Ahsun Jiwani[3]

[1]Family physician, Indus Health Network, [2]Head of Department, Family Medicine, Indus Health Network, [3]Junior Epidemiologist, Indus Health Network, Sindh, Pakistan

Abstract

Background and Aim: Hospital-acquired infections (HAIs) are infections acquired by patients during their hospital stay which they did not have previously. This also includes infections acquired by healthcare professionals while managing infected patients. Since both healthcare professionals and patients can be a source of spreading infections across there is a need of practicing standard precautions religiously, to minimize this risk. This study aimed to assess the knowledge of healthcare professionals working at The Indus Hospital, a tertiary care hospital of Karachi, Pakistan. **Material and Methods:** This cross-sectional study was conducted between March 2017 and July 2018. 205 employees working at The Indus Hospital, Karachi were recruited in this study. A self-made questionnaire based on CDC guidelines was administered to the participants and their responses were recorded. **Results:** Among all participants, nearly two-thirds (70%) had a very good knowledge of the use of standard precautions, 19.5% had good knowledge, and 12.2% had average/below average knowledge. Of those having very good knowledge, most of them were doctors (60%). Older age groups had more knowledge than the younger age groups. **Conclusion:** Our study concluded that among different healthcare workers, the nurses had less knowledge as compared to doctors. There was a significant association found between the age of the healthcare professionals and the information he/she has on the standard precautions. Improving the knowledge of doctors and nurses would help in breaking the chain of nosocomial infections and will decrease the burden of infectious diseases on our society.

Keywords: Healthcare professionals, hospital-acquired infections, knowledge, standard precautions.

Introduction

Hospital-acquired infections (HAIs) as specified by the World Health Organization (WHO) are new infections acquired by the patient during their hospital stay.[1] This also includes the infections whose symptoms start appearing after discharge and the infections acquired by the healthcare professionals (HCP) from the infected patients.[2] According to the WHO, over 1.4 million individuals suffer from HAIs worldwide.[2] Commonly acquired blood-borne infections include viral pathogens such as hepatitis B (HBV), hepatitis C (HCV), and HIV.[2,3] HCPs, especially surgeons, are at high risk of acquiring such infections.[4] While healthcare workers themselves may not develop diseases, they might become a source of infection for other patients who may be immunocompromised or have open wounds, as well as other HCP.[5] Likewise, if they do not observe standard protocol while treating asymptomatic patients who may be infected, HCPs would be at risk of developing these infections. Recapping of needles and not wearing personal protective equipment (PPE) are significant contributing factors toward needle stick injuries and hence HAIs.[6,7] HCPs have a 1.2–10% estimated risk of acquiring HCV infection after getting pricked by HCV positive patient.[8] Furthermore, many of the blood-borne infections do not have vaccines available for prevention; thus, the Centers for Disease Control and Prevention (CDC) recommends that standard measures be taken to prevent HCP from contracting these infections.[9]

Address for correspondence: Dr. Naseem Amin Dhedhi, T2, C 10, Dada Bhoy Town, Abdullah Bilal Rd, Karachi, 75350, Pakistan.
E-mail: nasimdhedhi@hotmail.com

Received: 10-08-2020 **Revised:** 16-09-2020
Accepted: 19-09-2020 **Published:** 30-01-2021

Access this article online

Quick Response Code:

Website: www.jfmpc.com

DOI: 10.4103/jfmpc.jfmpc_1622_20

How to cite this article: Dhedhi NA, Ashraf H, Jiwani A. Knowledge of standard precautions among healthcare professionals at a Teaching Hospital in Karachi, Pakistan. J Family Med Prim Care 2021;10:249-53.

Standard precautions (SP) are a set of infection control protocols that helps in preventing the spread of infections that can be acquired by body fluids contact, mucous membranes, and non-intact skin (including rashes). These practices include the use of gloves, mask, gown, eye protection, or face shield, depending on expected exposure, hand hygiene, and safe injection practices.[1,10] The importance of wearing a mask in the prevention of droplet infection as seen in the current severe acute respiratory syndrome coronavirus disease (SARS-COVID-19) pandemic situation cannot be ignored. Coronavirus surveys conducted in Italy showed that both healthcare workers and non-healthcare workers have adequate knowledge regarding the spread of coronavirus and the role of PPE in prevention.[11]

The practices of SPs cannot improve unless HCPs have a good knowledge background. Studies have shown that training and education of SPs bring marked improvement in the practices of HCP which, in turn, minimizes the spread of infections.[4,12,13] As HAIs pose a threat to the health of both patients and HCPs and can be easily prevented using standard infection control practices, all healthcare centers, especially the primary HCPs being the front liners need to take the responsibility. Hence, this study aimed to assess the current knowledge of SPs amongst the medical and allied HCPs working at The Indus Hospital (TIH), Karachi. The baseline data obtained from this study is the first step in planning the interventions to improve the knowledge and implementation of the infection control practices among the HCP if needed.

Methodology

This cross-sectional study was carried out at TIH, Karachi, and the data collection was done from March 2017–July 2018. Through simple random sampling, all the medical and allied HCPs working at TIH were recruited after approval from the Institutional Review Board (IRB). Employees who were on leaves or had resigned, those from the Department of Infectious disease, and those who refused to consent were excluded from the study.

The sample size was calculated via the Open Epi sample size calculator version 3.0. With the number of healthcare personnel working at TIH to be 437, confidence interval = 95% with a margin of error = 5%, the estimated sample size came out to be 205 medical and allied health professionals.

The study protocol was approved by the institutional ethics review committee. Standard measures were taken to ensure the confidentiality of participants. The study participants were provided with a consent form in Urdu, detailing the aims of the study, methods, the anticipated benefits, the right to refuse, voluntary participation, and the right to withdraw without any effect on the clinical care. The participants were contacted via email with the description of the study and the consent form. Those who consented were later approached in person at TIH by the study team during their working hours in their respective departments. Each participant was given 25–30 min to fill in the questionnaire.

The questionnaire was developed using the CDC and the Wiscons in health department guidelines on infection control.[14,15] The questionnaire had two parts. The first part contained questions on sociodemographic information of participants and their clinical experience. The second part applied to the content, behavioral criteria, and the basic principles of the SPs, covering 40 items, with potential "agree," "disagree," or "do not know" answers. A score of 1 point was given to every correct answer, and a score of 0 points was given to every wrong answer. Knowledge scores were rated as below average with a percentage of ≤59%; ≥60–69% acceptable information, ≥70–79% good knowledge, and ≥ 80–100% very good knowledge.[16]

Confidentiality of participants was maintained by using ID numbers instead of their names and informed consent was taken from the study participants by the study investigator who ensured that the filled study questionnaires were carefully kept in a secure place (safe locker) with access provided only to the principal investigator (PI), supervisor, and International Healthcare Research Center (IHRC). The data was not shared with the human resource department.

Questionnaires were checked by the PI and co-PI on regular intervals for any inconsistencies. Data was entered weekly by trained IHRC data entry operators and verified for mistakes. Corrections were made as required. Data was entered and analyzed using Statistical Package for the Social Sciences (SPSS) version 21.0. Mean ± SD were computed for age, working life, and knowledge scores. Frequency and percentage were computed for all the qualitative variables like gender, knowledge score categories, and various categorical variables. An independent sample *t*-test was applied to assess the significant difference in mean knowledge scores between both genders. Analysis of variance (ANOVA) was applied to assess the significant association between position and departments. A Chi-square test was applied to assess the significant association of gender, working position, and department with knowledge score categories. P value < 0.05 was considered significant.

Results

A total of 205 employees participated in this survey. The median age of the participants was 28 years (interquartile range [IQR]:25–32 years) and more than half (62%) had a graduate or higher level of education. Most of the participants were from the nursing department (45%, n = 93), followed by medicine and allied specialties (28.7%, n = 59). The allied health staff comprising of employees from the operating room, physiotherapy, laboratory, and nutrition services were 10% of the respondents. The median work experience was 4 years (IQR = 2–8 years) [Table 1]. The median knowledge score was 83% (IQR = 75-88%) with a minimum score of 45% and a maximum of 98% [Table 1].

Among all participants, nearly two-thirds (70%, n = 115) had a very good knowledge of the use of SPs, 19.5% (n = 33) had good knowledge, and 12.2% (n = 25) had average/below average

Table 1: Descriptive information

Variables	n
Age (years)	
Median (IQR)	28 (25-32)
Min-Max	18-62
Score of knowledge	
Median (IQR)	33 (30-35)
Min-Max	18-39
Score of knowledge (%)	
Median (IQR)	83 (75-88)
Min-Max	45-98
Years of Work Experience	
Median (IQR)	04 (02-08)
Min-Max	0.08-30
Department	
Medicine and Allied	59 (29%)
Surgery and Allied	31 (15%)
Nursing	93 (45%)
Others (Physiotherapy, Operating room, Nutrition, Laboratory)	22 (10%)
Education	
Intermediate or Below	38%
Graduate	37%
Post-graduate or Above	25%

knowledge [Table 2]. Of those having very good knowledge, most of them were doctors (60%, $n = 74$). Significantly fewer nurses (57%; P value < 0.001) had very good knowledge as compared to doctors. Doctors associated with the medicine department did better on their knowledge scores as compared to surgeons [P-value < 0.001; Table 3]. A significant trend was observed between age and knowledge levels; participants who belonged to older age groups had more knowledge than the younger participants [P-value < 0.001, Tables 2]. All participants older than 40 years had very good knowledge ($n = 19$). 73% ($n = 54$) of those between 29 and 39 years of age and 60% ($n = 57$) of those below 28 years of age were also found to have a very good knowledge regarding the use of SPs. The increasing trend of very good knowledge with years of working experience was not statistically significant though [Table 3]. Among the various disciplines, medical doctors were found to have better knowledge than nurses; around 80% of doctors in all categories including consultant ($n = 26$), postgraduate trainees ($n = 25$), and medical officers ($n = 23$) scored highest i.e., 80% or above in their knowledge scores (very good category) as compared to 57% ($n = 53$) of the nurses [$P < 0.001$, Table 2]. Though all the departments were found to have a good knowledge regarding the SPs, among them the nursing department had significantly less knowledge as compared to the other departments [$P < 0.001$, Table 2].

Discussion

HAIs are a matter of concern in healthcare that needs to be timely addressed as the burden of communicable diseases in Pakistan is more than 40%.[17] In studies that have been conducted so far, few have tried to investigate only a part of the SPs, while our study has covered all the components of SPs i.e., PPE, disinfection of surroundings, disinfection of clinical waste, and hand hygiene.

Unfortunately, many studies worldwide have shown average and below-average levels of knowledge of SP among HCPs which is explaining the spread of HAIs in such countries.[7,12,18,19] A study conducted in India concluded that 40% of the ICU nurses had an average (70–80% correct responses) and 18% had below-average knowledge (<70% correct responses) regarding infection control practices, respectively.[20] A study in Nigeria concluded that half of the participants had inadequate knowledge of the SPs.[21] Similarly, a study done on the doctors of a public sector hospital in Karachi concluded that the majority of the doctors (52.5%) had no idea about CDC guidelines related to the SPs.[22]

Our study concluded that there was a significant difference in the knowledge of SPs among different professions e.g., consultants, nurses, postgraduate trainees, medical officers ($P < 0.001$) with nurses having less knowledge about SPs than the medical doctors. Similar results have been reported by a study conducted in Karachi where nurses had a lower mean knowledge score (6.10) than the doctors (7.40).[23] The reason for having this disparity in knowledge scores among different professions could be due to the difference in the level and quality of education. The medical doctors undergo comprehensive learning and training as compared to the nurses. Our study shows that most nurses have not taken SP training earlier in their careers, which might explain the average knowledge status of nurses as compared to doctors. Doctors, on the other hand, have shown good knowledge levels regardless of prior training sessions attended. This might be attributable to the strong undergraduate medical education system and curriculum they have been through. Further studies are required to identify possible reasons behind this strength.

In our study, participants who belonged to older age groups were found to have more knowledge than the younger participants. A study conducted in Karachi; Pakistan found similar results and concluded that the mean knowledge scores increased with increasing age.[23] The reason for this association could be that with the increase in age of the healthcare worker, we assume that the professional experience also increases. There is substantial evidence of an association between the professional work experience and the knowledge regarding the SPs,[20,21,23] stating that as the professional experience increases, the knowledge related to the SPs also increases simultaneously. However, our study did not show a statistically significant relationship among different study groups [Table 3].

This study was a single-center study that limits its generalizability to only the HCPs of TIH. The results do not speak for the SPs practices at other tertiary care hospitals of Karachi, Pakistan as they might be different due to the different infection control practices. Another limitation could be that this study did not include housekeeping staff who may also be a source of transmitting HAIs. Thirdly, as the questionnaire was the

Table 2: Association of designation, department, age groups, and professional experience between knowledge of standard precaution

	Average	Good	Very Good	Total	*P*
Designation					
Consultant	1 (3.1)	5 (15.6)	26 (81.3)	32 (100)	0.000**ǂ
Post graduate trainee	-	6 (19.4)	25 (80.6)	31 (100)	
Nurse	22 (23.7)	18 (19.4)	53 (57)	93 (100)	
Medical officer	2 (6.9)	4 (13.8)	23 (79.3)	29 (100)	
Other	-	7 (35)	13 (65)	20 (100)	
Total	25 (12.2)	40 (19.5)	140 (68.3)	205 (100)	
Department					
Medicine and allied	2 (3.4)	8 (13.6)	49 (83.1)	59 (100)	0.000**ǂ
Surgery and allied	1 (3.2)	6 (19.4)	24 (77.4)	31 (100)	
Nursing	22 (23.7)	18 (19.4)	53 (57)	93 (100)	
Other	-	8 (36.4)	14 (63.6)	22 (100)	
Total	25 (12.2)	40 (19.5)	140 (68.3)	205 (100)	
Age groups (years)					
≤28	15 (15.6)	24 (25.0)	57 (59.4)	96 (100)	0.001*¥
29-39	8 (10.8)	12 (16.2)	54 (73.0)	74 (100)	
≥40	-	-	19 (100)	19 (100)	
Total	23 (12.2)	36 (19.0)	130 (68.8)	189 (100)	
Professional experience (years)					
≤2	6 (12.5)	11 (22.9)	31 (64.6)	48 (100)	0.813ǂ
>2-5	7 (12.1)	12 (20.7)	39 (67.2)	58 (100)	
>5	5 (8.3)	10 (16.7)	45 (75.0)	60 (100)	
Total	18 (10.8)	33 (19.9)	115 (69.3)	166 (100)	

*P<0.05, **P<0.001, †Pearson's Chi-square test, ǂLikelihood test, ǂFisher's exact test, ¥Linear by linear association

Table 3: Median differences of age and professional experience between the knowledge of standard precaution groups

	Age				*P*
	n	Mean±SD	Min - Max	Median (IQR)	
Knowledge of standard precaution					
Average	23	27.3±4.7	19-37	27 (24-30)	0.018†,
Good	36	27.4±5.0	18-39	26.5 (24-30.8)	0.006*ǂ
Very good	130	31.2±8.1	20-62	29 (26-34)	
Professional experience					
Average	18	4.1±3.2	1-10	3 (1.8-6.3)	0.279ǂ
Good	33	4.7±3.4	0.6-12	4.5 (2-6)	
Very good	115	7.2±7.4	0.1-30	4 (2-10)	

*P<0.05, **P<0.001, ǂKruskal-Wallis test, †Median test

self-reported measure, it might have an element of the social desirability bias which represents the tendency of research subjects to provide socially acceptable answers rather than to choose responses that represent their true Perception.[20] Lastly, we could not assess the relationship between the years of professional work experience and the knowledge scores due to the missing information. It might be a very important variable on which the information should be collected and analyzed.

We recommend that special attention should be given to training nurses about the use of SPs as they are the ones who have the most frequent and the longest exposure with the infected patients.

We would also recommend conducting a study that assesses the knowledge and practices of the HCPs before and after the training sessions in the form of a pre and posttest. We also recommend conducting further studies to evaluate the attitude and practices of SP.

Conclusion

Our study concluded that there was a good knowledge of SP among HCPs of a tertiary care hospital in Karachi. Overall results showed sound knowledge of SP among different healthcare workers though nurses had less knowledge as compared to doctors. We also concluded that there was a significant association between the age of the HCPs and the information he/she has on the SPs. The compliance to SPs depends on the background knowledge the HCPs have. Increasing the knowledge of doctors and nurses would, in turn, make their practices better. Further studies are required to evaluate the status of knowledge of

HCPs in other healthcare centers of the city so that measures to improve the quality of care can be taken in time. This will help in breaking the chain of nosocomial infections and will decrease the burden of infectious diseases on our society.

Ethical statement

Interactive Research Development- Institute Review Board (IRD-IRB) reviewed the protocol for human subjects and issued approval to the study ID # IRD_IRB_2017_03_014. date of approval: 5 -9-17.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Batran A, Ayed A, Salameh B, Ayoub M, Fasfous A. Are standard precautions for hospital-acquired infection among nurses in public sector satisfactory? Arch Med Health Sci 2018;6:223.
2. World Health Organization. Prevention of Hospital-Acquired Infections: A Practical Guide. Geneva, Switzerland: World Health Organization; 2002.
3. Quan M, Wang X, Wu H, Yuan X, Lei D, Jiang Z, *et al.* Influencing factors on use of standard precautions against occupational exposures to blood and body fluids among nurses in China. Int J Clin Exp Med 2015;8:22450.
4. Askarian M, McLaws M-L, Meylan M. Knowledge, attitude, and practices related to standard precautions of surgeons and physicians in university-affiliated hospitals of Shiraz, Iran. Int J Infect Dis 2007;11:213-9.
5. Zhu S, Kahsay KM, Gui L. Knowledge, attitudes and practices related to standard precautions among nurses: A comparative study. J Clin Nurs 2019;28:3538-46.
6. Hanafi M, Mohamed A, Kassem M, Shawki M. Needlestick injuries among health care workers of University of Alexandria Hospitals. East Mediterr Health J 2011;1726-35.
7. Assessment of Standard Precautions' Practices among Health Care Workers in a Rural Area of South-South Nigeria. 2020.
8. Mizuno Y, Suzuki K, Mori M, Hayashi K, Owaki T, Hayashi H, *et al.* Study of needlestick accidents and hepatitis C virus infection in healthcare workers by molecular evolutionary analysis. J Hosp Infect 1997;35:149-54.
9. Sreedharan J, Muttappillymyalil J, Venkotramana M. Knowledge about standard precautions among university hospital nurses in the United Arab Emirates. East Mediterr Health J 2011;17:331-4.
10. Ghadmgahi F, Zighaimat F, Ebadi A, Houshmand A. Knowledge, attitude and self-efficacy of nursing staffs in hospital infections control. J Mil Med 2011;13:167-72.
11. Moro M, Vigezzi GP, Capraro M, Biancardi A, Nizzero P, Signorelli C, *et al.* 2019-novel coronavirus survey: Knowledge and attitudes of hospital staff of a large Italian teaching hospital. Acta Biomedica 2020;91:29-34.
12. Luo Y, He G-P, Zhou J-W, Luo Y. Factors impacting compliance with standard precautions in nursing, China. Int J Infect Dis 2010;14:e1106-14.
13. Morioka S, Tajima T, Sugiki Y, Hayakawa K, Ohmagari N. Adherence to personal protective equipment use among nurses in Japanese tertiary care hospitals: What determines variability? J Hosp Infect 2020;104:344-9.
14. CDC. Injection Safety 2012. Available from: https://www.cdc.gov/injectionsafety/.
15. Services WDoH. Infection Control and Prevention-Standard Precautions 2018. Available from: https://www.dhs.wisconsin.gov/ic/precautions.htm.
16. Gawad A. Assessment of knowledge about standard precautions and nosocomial infection among nurses working in hospitals of Sana'a city, Yemen. Int J Caring Sci 2017;10:169-75.
17. Anwar M, Majeed A, Saleem RM, Manzoor F, Sharif S. Assessment of infection control practices in teaching hospitals of Quetta. JPMA J Pak Med Assoc 2016;66:947-51.
18. Eljedi A, Dalo S. Compliance with the national palestinian infection prevention and control protocol at governmental paediatric hospitals in gaza governorates. Sultan Qaboos Univ Med J 2014;14:e375.
19. Jarvis WR, editor Controlling Healthcare-Associated Infections: The Role of Infection Control and Antimicrobial Use Practices. Seminars in pediatric infectious diseases: Elsevier; 2004.
20. Sodhi K, Shrivastava A, Arya M, Kumar M. Knowledge of infection control practices among intensive care nurses in a tertiary care hospital. J Infect Public Health 2013;6:269-75.
21. Abdulraheem I, Amodu M, Saka M, Bolarinwa O, Uthman M. Knowledge, awareness and compliance with standard precautions among health workers in north eastearn Nigeria. J Community Med Health Edu 2012;2:1-5.
22. Jawaid M, Iqbal M, Shahbaz S. Compliance with standard precautions: A long way ahead. Iran J Public Health 2009;38:85-8.
23. Janjua NZ, Razaq M, Chandir S, Rozi S, Mahmood B. Poor knowledge–predictor of nonadherence to universal precautions for blood borne pathogens at first level care facilities in Pakistan. BMC Infect Dis 2007;7:81.