

# Knowledge and Infection Control practices Regarding Healthcare-Associated Infection among Healthcare Workers

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## ABSTRACT

**Aims:** To determine the knowledge and practices regarding healthcare-associated infection among healthcare workers and to make recommendations based on results to prevent healthcare-associated infection.

**Methodology:** A descriptive correctional study was conducted in Burn and Trauma Center Peshawar, Pakistan. Data were collected from 162 healthcare workers through a questionnaire. Data was collected through a universal sampling technique. This study was permitted by the Ethical Review Board of Hayatabad Medical Complex Peshawar, Pakistan. This study was also granted by the Institute of Management Sciences (IM Sciences) Institutional Ethical Review Board (IRB) in Peshawar Pakistan. Knowledge and infection control practices regarding healthcare-associated infection were determined through frequency and percentage methods. To calculate the association between knowledge and profession, gender and knowledge, and profession and knowledge Chi-Square test was applied. Data were analyzed through SPSS 26 version.

**Result:** The age of the participants was divided into three groups from 20-30 years 117 participants, 31-40 39 participants, and 41-50 are 6 participants. The majority of the participants are Female 101(62.3%) and 61 males (37.7%). The majority are Nurses 83(51.2%) Doctors 39(24.1%) Paramedics 40(24.7%). The knowledge of doctors was good regarding healthcare-associated infection as compared to Nurses and Paramedics, but the practices of overall healthcare workers were good. The results of the study show that Doctors have good knowledge compared to Nurses, and Nurses have good knowledge compared to Paramedics regarding HealthCare-associated infection.

**Conclusion:** The finding of the study showed that doctors have good knowledge than Nurses and Paramedics. The practices of overall healthcare workers were good.

**Keywords:** Healthcare-associated infection, Healthcare worker, Knowledge, Practices

## INTRODUCTION

Healthcare-associated infection is a type of infection occurring during healthcare to a patient in a healthcare facility or hospital, this type of infection is not present at the time of admission<sup>1</sup>. World health organization states that a "patient who is admitted in the hospital always acquired infection" but this kind of infection always appears after discharge from the hospital. Nosocomial infection always diagnoses in a patient after 48 hours in patients discharged from the hospital or within 30 days of discharge from the hospital<sup>2</sup>. There is much evidence that healthcare-associated infection increases the stay of a patient in the hospital and also increases distress. It is a common problem worldwide mainly the problem of middle-income and developing countries, developed countries are also affected sometimes by this kind of infection. Common types of healthcare-associated infection are surgical site infection (21.8%), pneumonia (21.8%), systemic infections (0.2%),gastrointestinal infections (17.1 reproductive tract infection (0.6%),cardiovascular infections (1.2%), CNS infections (0.8%), skin and soft tissue infections (3.2%), bone and joint infections (1.0%), mouth infections (5.6%), lower respiratory tract infections (4.0%), primary bloodstream infections (9.9%), eye, ear, nose, throat, UTI (12.9%)<sup>3,4</sup>.

In Europe, it is estimated that 6.5% of patients have a healthcare-associated infection in acute care hospitals at the time of treatment<sup>5</sup>. WHO fact sheet explained at a specific time, healthcare-associated infection prevalence in developed countries distinct between 3.5% and 12%. At a particular given time, healthcare-associated infection prevalence in low- and middle-income countries is distinct between 5.7% and 19.1%. Average prevalence is significantly higher in high than in low-quality studies (15.5% vs. 8.5%, respectively)<sup>6</sup>. The prevalence in Europe, of

(HCAI) "healthcare-associated infection rate is 5.7%-7.1%, and 4.5% in the US". The rate of prevalence rate varies from one country to country, it depends upon prevention and control and also depends upon the possibilities of occurrence. It is expected that 12% to 32% of (HCAI) infections related to blood lead to death in Europe and North America<sup>7</sup>. The common source of healthcare-associated infection is an infectious agent described in a scientific review 1002 outbreak investigation<sup>8</sup>. In South Asia and the east Mediterranean a greater incidence of healthcare-associated infection. A high rate of healthcare-associated infection indicates the poor standard of healthcare system establishment. Infections acquire during the hospital stay increase the rate of morbidity among the admitted outpatient<sup>9</sup>.

A study shown from the "Centers for Disease Control and Prevention (CDC)" estimated that healthcare-associated infection (HCAI) every year incremental cost in the US hospital is 28\$ to 45\$ Billion for the inpatient department, the average infection increases incrementally and the cost per index will be 16,303\$ to 25,903\$ per hospitalization<sup>10</sup>. The healthcare-associated infection affects patients, healthcare workers, students of healthcare professionals, and trainees of healthcare professionals especially, Nurses are more prone to healthcare-associated infection<sup>11</sup>. Infection requires a medium for transmission Nurse caregivers affected themselves and serve as a source of spread of infection when giving care to a patient without using standard precaution<sup>12</sup>.

This study was carried out at Burn and Plastic Surgery Center in Peshawar, Pakistan. The study aimed to analyze the knowledge and infection control practices of healthcare workers working in the Burn and Plastic Surgery Center Peshawar regarding healthcare-associated infection.

## MATERIALS AND METHOD

This research study was carried out from September 2020 to February 2021. Data were collected in two months. The data was

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collected from Doctors, Nurses, and Paramedics working in Burn and Trauma Centre in Peshawar, Pakistan.

**Design of the Study:** The study design was a descriptive cross-sectional quantitative design.

**Site of the Study:** This research study was carried out in Burn and Trauma Center Peshawar, Pakistan.

**The setting of the Research Study:** Data had been collected from the healthcare workers working in Burn and Center in Peshawar, Pakistan.

**Sample Size of Research Data:** The sample size of this research study was calculated Calculator (OpenEpi Calculator). During calculation and data analysis confidence interval was kept at 95% and the margin error was 5%. The sample size of this research study was 162 participants. The whole sample size was collected from one hospital. The percentage of the participant was 98%.

**Sample Collection Technique:** The total sample was selected from one hospital. Therefore, during data collection, a simple convenience sampling technique was used in the current research study. The participant who fulfilled the requirement of the selection were included in the current research study.

**Tool for Data Collection:** The primary research data was collected through a pre-structured research questionnaire. This study used a pre-structured questionnaire. The questionnaire consists of only close-ended questions. The author of the questionnaire was contacted through email and he was permitted to use the questionnaire(1). The pre-structured questionnaire was in the English language.

**Data Collection Plan:** The questionnaire was distributed among the healthcare workers to assess the knowledge and practices regarding healthcare-associated infection in Burn and Plastic Surgery Center Peshawar, Pakistan.

**Analysis of the Research Data:** The research data of this study had been analyzed through SPSS version 26. For categorical variables frequencies and percentages were calculated through SPSS. Similarly, for all continuous variables standard deviation, mean, and the mode was calculated during research data analysis.

**Ethical Board Permission for this Research Study:** Initially, the proposal for this research was presented and approved by the Research Ethical Board of Hayatabad Medical Complex (HMC MTI) Peshawar, Pakistan. Before the collection of the data written permission was also granted by the Director of Burn and Trauma Center Peshawar, Pakistan. Healthcare workers in the concerned hospital were recruited for the research study. Similarly, written consent was also taken from every participant before filling out the questionnaire. Before the data collection questionnaire was explained to the principal investigator. Data was collected in a separate room to ensure confidentiality. The respondent was assured that data will never be shared with anyone else except the supervisor. Respondent was also assured that data will be published in a research journal for effective clinical purposes. It was assured to all the respondents that once all the research was gathered, entered into a password-protected SPSS or Microsoft Excel.

## RESULTS

The total number of participants was 162, Male was 61(37.7%) and female were 101(62.3%). Data was collected from 39(24.1%) doctors, 83(51.2%) Nurses, and 40(24.7%) paramedics. According to age 117(72.2%) participants from age 20 to 30 years, 39(24.1%) are in the range of 31 to 40 years, and 6 (3.7%) from age 41 years to 50 years. Based on experience 96(59.3%) have 1 to 2 years of experience, 58 (35.8%) have 3 to 5 years of experience, 6 (3.7%) participants have 6 to 8 years of experience, 1(0.6%) participant has 9 to 10 years of experience and 1 (0.6%) has 11 to 12 years of clinical experience (Table-1).

117(72.2%) of the participants have good knowledge, 41(25.3%) have average knowledge and 4(2.5%) have poor knowledge regarding healthcare-associated infection (Table 2).

153(94.9%) of the participants have satisfactory practices and 9(5.6%) of the participants have unsatisfactory practices regarding healthcare-associated infection have shown in (Table-3).

Table 1: Demographic and experience of the healthcare workers

	Variable frequency	%age	Valid%	Cumulative%
<b>Age</b>				
20 -30 Years	117	72.2%	72.2%	72.2%
31-40 Years	39	24.1%	24.1%	96.3%
41-50 Years	6	3.7%	3.7%	100.0%
Total	162	100%	100%	
<b>Gender</b>				
Male	61	37.7	37.7%	37.7%
Female	101	62.3%	62.3%	100%
Total	162	100%	100%	
<b>Profession</b>				
Doctor	39	24.1%	24.1%	24.1%
Nurse	83	51.2%	51.2%	75.3%
Paramedics	40	24.7%	24.7%	100.0%
Total	162	100.0%	100.0%	
<b>Experience</b>				
1-2 Years	96	59.3%	59.3%	59.3%
3-5 Years	58	35.8%	35.8%	95.1%
6-8 Years	6	3.7%	3.7%	98.8%
9-10 Years	1	0.6%	0.6%	99.4%
11-12 Years	1	0.6%	0.6%	100.0%
Total	162	100.0%	100.0%	

Table 2: Knowledge of the participants regarding healthcare-associated infection

Profession * Knowledge of the Participant's Cross Tabulation				
Profession	Good Knowledge	Average Knowledge	Poor Knowledge	Total
Doctors	39	0	0	39
Nurses	51	29	3	83
Paramedics	27	12	1	40
Total	117	41	4	162

P value 0.001

Table 3: Practices of the participants regarding healthcare-associated infection

Practices of the Participants				
	Variables frequency	%age	Valid%	Cumulative%
Satisfactory Practices	153.0	94.40%	94.40%	94.40%
Unsatisfactory Practices	9.0	5.60%	5.60%	100%
Total	162.0	100%	100%	

Table 4: Knowledge of the participants based on profession and association between profession and Knowledge

Knowledge of the Participants				
	Variables frequency	%age	Valid%	Cumulative%
Good knowledge	117	72.2%	72.2%	72.2%
Average knowledge	41	25.3%	25.3%	97.5%
Poor knowledge	4	2.5%	2.5%	100.0%
Total	162	100.0%	100.0%	

Knowledge was calculated based on the profession after the computational of knowledge variables. Among 39 (24.07%) doctors all have good knowledge, among 83(51.23%) Nurses 51(31.4%) have good knowledge, 29(17.9%) have average knowledge, 3(1.85%) have poor knowledge, and among 40(24.9%) paramedics 27(66.6%) of paramedics have good knowledge similarly, 12(7.40%) have average knowledge and 1(0.6%) have poor knowledge regarding healthcare-associated infection. The chi-square test was run to determine the association between knowledge and profession. Analysis has shown a significant association between profession and knowledge( $\chi^2$  (2, n=162) 20.289, P= 0.0001) (Table 4).

Table 1: Association between Gender and Knowledge  
Gender \* Knowledge of the Participants Cross Tabulation

Gender	Good Knowledge	Average Knowledge	Poor Knowledge	Total
Male	53	7	1	61
Female	64	34	3	101
Total	117	41	4	162

P value 0.005

The chi-square test was also run to determine the association between gender and knowledge. Analysis shows a significant association ( $\chi^2 (2, n=162) 10.583, P = 0.005$ ). The result of the Chi-square test shows that males have more knowledge as compared to females Table 5).

Table 6: Association between Profession and Practices  
Profession \* Practices of the Participants Cross Tabulation

Gender	Practices of the participants		Total
	Satisfactory Practices	Unsatisfactory Practices	
Doctors	38	1	39
Nurses	78	5	83
Paramedics	37	3	40
Total	153	9	162

P value 0.610

Chi-square was run between professions and practices. The result of the Chi-square test revealed that there was no significant association between profession and infection control practices ( $\chi^2 (2, n=162) .988, P = 0.6100$ ) shown in Table 6.

Table 7: Association between Gender and Practices  
Gender \* Practices of the participants Cross tabulation

Gender	Practices of the participants		Total
	Satisfactory Practices	Unsatisfactory Practices	
Male	59	2	61
Female	94	7	101
Total	153	9	162

P value 0.272

Chi-square was run between gender and practices, the result showed there is no significant ( $\chi^2 (1, N=162) .967, P = 0.272$ ) association between gender and practices. Majority of the male have more satisfactory practices the female healthcare workers regarding healthcare-associated infection.

The Centers for disease control (CDC) published that annually 1.7 Million patients acquire healthcare-associated infection<sup>1</sup>, and annually more than 98,000 patients die<sup>13</sup>. The suspected number of healthcare-associated infected patients might be greater documented in the study in Peshawar because of not applying the infection control policies<sup>14</sup>. This study reports the gap of knowledge among healthcare professionals that doctors have more knowledge than Nurses and Paramedics this knowledge gap had not been reported in Nigeria and Ethiopia<sup>15,16</sup>.

Nurses and paramedics are more engaged with patients as compared to knowledge-related workshops or classes. Previous Nurses and Paramedics just qualified for diplomas as compared to a degree<sup>17</sup>. This study also describes that females have less knowledge as compared to males these results supported the study Tygerberg Hospital, Cape Town<sup>18</sup>. Our study results also showed that Nurses have more knowledge as compared to Paramedics. These results supported the study in Islamabad<sup>19</sup>. The results of this research study supported a research study done in Sudan that knowledge is different among healthcare professionals based on gender, profession, race, and ethnicsRomania<sup>20</sup>. The results of this study show that there is no significant difference in the practices of Nurses, Doctors, and Paramedics supported studies in Italy, Northwestern Nigeria<sup>21,15,22</sup>. The results of this study not found major variability of practices among the Doctors, Nurses, and Paramedics these results support different studies' results<sup>23,24</sup>.

The results of our study show that males have more knowledge as compared to females these results agreed with a study in Palestinian Hospitals<sup>25</sup>. In contrast, in a study conducted at the University of Lahore hospital regarding nosocomial infection but here the participant was students Nurses, and Lady health workers 23.9% have excellent knowledge, 46.5% have good knowledge and 29.6% have poor knowledge it opposes our study in our study most of the participants have good knowledge<sup>26</sup>. Similarly, another study was conducted regarding knowledge and practices in the prevention of infection among nurses. This study revealed that knowledge and practices were poor in the pre-intervention group but were good in the post-intervention group. The results of this research study support the results of our study<sup>27</sup>. Another study conducted in Lahore supports the result of our study. This study shows that 34.5% have good knowledge regarding infection prevention and 9.0% have excellent knowledge. The majority 76.5% have good practices regarding the prevention of infection<sup>28</sup>.

Another study was conducted in India regarding knowledge and practices regarding infection prevention but in this study, the participants were only medical and nursing students. The majority belong to medical and nursing students who have good knowledge and practices regarding infection prevention<sup>29</sup>. Another same study was conducted in Yemen in a private hospital, with knowledge and practices regarding nosocomial infection among Nurses. This study shows that the majority of Nurses have good knowledge regarding nosocomial infection but the majority of Nurses have fair practices regarding nosocomial infection<sup>30</sup>.

## CONCLUSION

On the basis results of this study knowledge and practices regarding healthcare-associated infection need improvement. However, Nurses and Paramedics have needs special training and workshop regarding healthcare-associated infection knowledge and practices.

**Conflict of interest:** In this research study, there was no conflict of interest.

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**Author Contribution:** Ikramullah (IU) Anwar Shah (AS) Danish Mehmood conceived the presented idea and data collection. Ikramullah (IU) contributed to the interpretation of results and analysis of data. Sardar Alam, Akber Alam, Barkat Ullah, and Waqar Ali encourage IU to investigate the association between healthcare-associated infection and the Profession and supervise the finding of this work. All the authors discussed the results and contributed to the final manuscript.

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