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RESEARCH ARTICLE
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ASSESSMENT AND COMPARISON OF KNOWLEDGE, ATTITUDE AND PRACTICE OF AWARENESS ABOUT PREVENTION AGAINST HEALTHCARE-ASSOCIATED INFECTIONS (HCAIS) AMONG SENIOR MEDICAL AND NURSING STUDENTS OF SHALAMAR INSTITUTE OF HEALTH SCIENCES (SIHS), LAHORE

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Abstract:

Background: Healthcare-associated infections (HCAIs) are one of the common health problems encountered by patients during hospital stay or after discharge from hospital. They also render health care staff at risk of acquiring HCAIs as an occupational hazard. They are associated with increased mortality and morbidity, despite advancement in healthcare system.

Objective: This study was conducted to assess and compare the knowledge, attitude and practice of medical and nursing students of SIHS regarding awareness about prevention against HCAIs.

Methodology: A cross-sectional study was conducted among 270 students. The convenient sampling technique was adopted to collect data through printed questionnaire. The data collected was entered and analyzed using IBM SPSS Statistics version 20.

Results: 169 (59.6%) females and 109 (40.4%) males participated in our study. The age range of participants was 20 to 26 years. All participants had heard about HCAIs. Majority of the participants (61.1%) identified respiratory tract infection as the most common encountered HCAIs. 49.6% students mentioned hand washing as the single most effective method to prevent HCAIs. 71.9% participants use disposable face mask and hand gloves while examining the patients. 57.03% students are vaccinated against Hepatitis B. Hand washing technique was well known to 81.5% students.

Conclusion: The knowledge and practice level of the participants is average but still not adequate, demanding further improvements. The topic of HCAIs should be addressed to enhance awareness

among undergraduate students as well as practicing staff to establish hygienic environment in hospitals.

Keywords: Healthcare-associated infections, Prevention, Hand hygiene, Shalamar Institute of Health Sciences.

INTRODUCTION:

Healthcare-associated infection (HCAI), also referred to as "nosocomial" or "hospital" infection, is an infection occurring in a patient during the process of care in a hospital or other health care facility which was not present or incubating at the time of admission. They can affect patients in any type of setting where they receive care and can also appear after discharge, and also include occupational infections among healthcare staff.[1] Healthcare-associated infections (HCAIs), being part of our occupational hazards, are a major safety concern both for patients and healthcare providers.

Majority of HCAIs are associated with various invasive procedures and devices that are used in healthcare settings to treat the patients. These healthcare-associated infections include central line-associated blood stream infections (CLABSI), catheter-associated urinary tract infections (CAUTI), ventilator-associated pneumonia (VAP) and surgical site infections (SSI).[2] These infections are linked to increased mortality and morbidity and also increase the healthcare cost. According to the US Center for Disease Control and Prevention, about 1.7 million hospitalized patients annually acquire HCAIs during treatment for various health issues and about 98,000 of these patients die due to HCAIs.[3] HCAIs are more prevalent in low- and middle-income (developing) countries than in high-income (developed) countries due to limited adequate resources in healthcare settings and lack of surveillance systems for HCAIs. In low-and middle-income countries, this prevalence varies between 5.7% to 19.1% and in high-income countries it varies between 3.5% to 12%.[4]

According to WHO estimates, on average, about 1 in every 10 patients is affected by HCAIs worldwide. Moreover, in acute care hospitals, out of every 100 patients, about 7 patients in developed countries and 15 patients in developing countries acquire atleast one HCAI.[5] Besides patients, the healthcare staff including medical students are also at increased risk of developing HCAIs. Therefore, it is must for medical students to have adequate knowledge about infection prevention and control (IPC) practices. It is now well established that the risk of transmission of these infections can be prevented by following the basic principles of infection control. These basic principles include hand washing; use of gloves, masks, gowns and eyewear; and also the safe handling of needles.[6] Therefore, in order to improve compliance to these standard precautions and principles, it is necessary to understand the thinking of medical and nursing students about infection prevention practices and this can be done by assessing their teaching and training requirements regarding prevention against HCAIs.

This study was conducted to assess the knowledge, attitude and practice of awareness of medical and nursing students about prevention for healthcare-associated infections (HCAIs).

METHODOLOGY:

This cross-sectional study was conducted from June 2023 to August 2023 among the medical and nursing students of Shalamar Institute of Health Sciences (SIHS) Lahore. The study population consisted of both male and female students of 4th year and 5th year MBBS and 3rd year and 4th year BS Nursing. The sample size was 270 that included 185 students of MBBS (98 from 4th year and 87 from 5th year) and 85 students of BS Nursing (40 from 3rd year and 45 from 4th year). The sample size was deliberately kept limited in view of time constraint. A pre-validated questionnaire, designed by the researchers, was used to collect information regarding awareness about prevention against

healthcare-associated infections (HCAIs). The questionnaire comprised of 17 questions and was divided into four parts: sociodemographic details, knowledge about HCAIs, attitude towards prevention against HCAIs and practice of preventive measures against HCAIs. An informed consent was also displayed on the first page of questionnaire. The study setting was Shalamar Medical and Dental College, Lahore and Shalamar Nursing College, Lahore. The recruitment of study population was done through informed consent. The convenient sampling technique was adopted to select the students for enrollment into the study. The questionnaire was pre-tested and relevant modifications were made regarding the content and language of the questionnaire. The data collected from questionnaires was entered and analyzed using IBM SPSS Statistics version 20. Data analysis was performed in terms of descriptive statistics, and Chi-square test was applied. Ethical approval for this study was obtained from the Institutional Review Board (IRB) of SMDC, prior to the onset of this study.

RESULTS:

A total of 270 students, including 161 females (59.6%) and 109 males (40.4%) participated in our study. The students were further distributed as: 98 (39.3%) 4th year MBBS students, 87 (32.2%) Final year MBBS students, 40 (14.8%) 3rd year BS Nursing students and 45 (16.7%) Final year BS Nursing students. The age range of participants was 20 to 26 years with mean age of 22.1 ± 1.5 years.

The knowledge of the participants was tested through 9 questions. All the participants in the study had heard about HCAIs. Academic textbooks was the source of information of 78.8% (n=213) of students (Figure 1). 61.1% (n=165) participants recognized respiratory tract infections as the most common encountered HCAIs in hospitals (Figure 2). 49.6% (n=134) students mentioned proper hand washing as the single most effective method to prevent HCAIs (Figure 3). Nurses were identified as the most susceptible staff group to HCAIs by 77.03% (n=208) of study participants. Mattress and pillows were identified as the common source of HCAIs by 67.4% (n=182) participants. 59.3% (n=160) students identified Staphylococcus aureus as common organism causing HCAIs. Majority of the participants (n=183 , 67.8%) identified blood as the most infectious body fluid that can transmit infections through occupational exposure. Proper 6-step hand washing technique was well known to 81.5% (n=220) students. Comparison of knowledge between MBBS and BS Nursing students is given in the Table 1. The Knowledge score was calculated out of 9 and cross tabulated in Table 2. A score of 1 to 4 was considered as poor knowledge, while a score of 5 to 6 was considered as average knowledge, and a score greater than 6 was considered as good knowledge. Chi-square test was applied to find out association of MBBS and BS Nursing students to Knowledge about HCAIs and p value was calculated which came out to be 0.244 ($p>0.05$), which was considered statistically insignificant.

Similarly, the practice of students regarding prevention against HCAIs was assessed through various questions. 71.9% (n=194) participants use disposable face mask and hand gloves while examining the patients. Most of the participants (n=127 , 47.03%) wash their white coat weekly. 57.03% students are vaccinated against Hepatitis B. Out of 270 students, only 67 (24.8%) students had sustained needle-stick injury and majority of them went for wound washing & Hepatitis B vaccination. The comparison, between MBBS and BS Nursing students, of practice of preventive methods is given in the Table 3. The practice score was calculated out of 7 and cross tabulated in Table 4. Chi-square test was applied to find out association of MBBS and BS Nursing students to practice of preventive methods of HCAIs and p value was calculated which came out to be 0.023 ($p<0.05$), which was considered statistically significant.

Figure.1

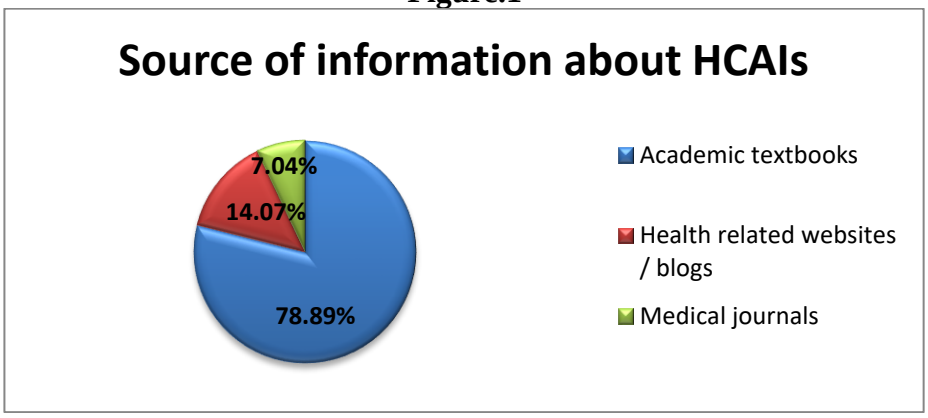

Figure. 2

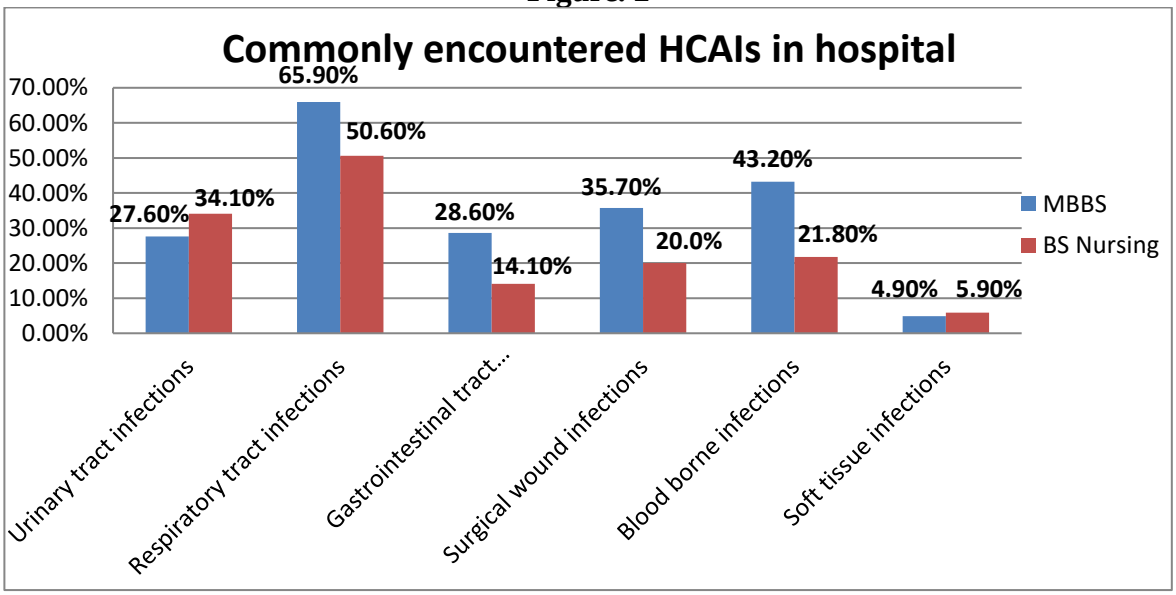

Figure. 3

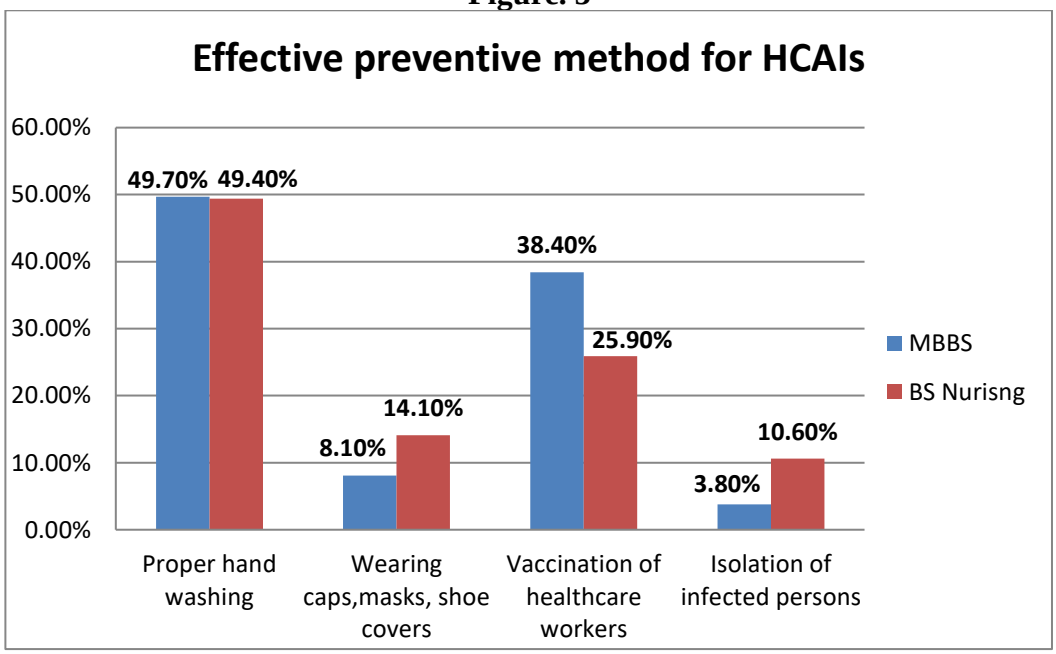

Table. 1: Comparison of knowledge

Comparison of knowledge between MBBS and BS Nursing about HCAIs (n=270)				
Components	**MBBS**		**BS Nursing**	
Know about HCAIs	**Frequency**	**Percentage (%)**	**Frequency**	**Percentage (%)**
Yes	185	100	85	100
No	0	0	0	0
Source of information about HCAIs				
Academic textbooks	183	88.1	50	58.8
Medical journals	3	1.6	16	18.8
Health related websites / blogs	19	10.3	19	22.4
Most effective method to prevent HCAIs				
Proper hand washing	92	49.7	42	49.4
Wearing caps, mask, shoe covers	15	8.1	12	14.1
Vaccination of healthcare workers	71	38.4	22	25.9
Isolations of infected persons	7	3.8	9	10.6
Susceptible hospital staff group to HCAIs				
Nurses	142	76.8	66	77.6
Doctors	118	63.8	26	30.6
OT assistants	63	34.1	15	17.6
Sanitary staff	86	46.5	25	29.4
Attendants	49	26.5	10	11.8
Lab technicians	64	34.6	6	7.1
Commonly encountered HCAIs in hospital				
Urinary tract infections	51	27.6	29	34.1
Respiratory tract infections	122	65.9	43	50.6
Gastrointestinal tract infections	53	28.6	12	14.1
Surgical wound infections	66	35.7	17	20.0
Blood-borne infections	80	43.2	27	31.8
Soft tissue infections	9	4.9	5	5.9
Common source of HCAIs in hospital				
White coat	29	15.7	12	14.1
Thermometer	81	43.8	27	31.8
Stethoscope	38	20.5	14	16.5
Nursing uniform	20	10.8	6	7.1
Mattress and pillows	127	68.6	55	64.7
Common organism for HCAIs				
Escherichia coli	90	48.6	38	44.7
Staphylococcus aureus	119	64.3	41	48.2
Klebsiella pneumonia	48	25.9	11	12.9
Candida albicans	8	4.3	7	8.2
Streptococcus pneumonia	73	39.5	16	18.8
Infectious body fluids causing HCAIs				
Blood	131	70.8	52	61.2
Nasal discharge	66	35.7	13	15.3
Saliva	64	34.6	21	24.7
Vomitus	27	14.6	9	10.6
Urine	23	12.4	13	15.3
Faeces	29	15.7	14	16.5
Know about 6-step hand washing technique				
Yes	137	74.1	83	97.6
No	48	25.9	2	2.4

Table. 2: Comparison of knowledge level

	Level of knowledge			Total	P value
	Poor (1 to 4 score)	Average (5 to 6 score)	Good (greater than 6)		
MBBS	9	91	85	185	0.244
BS Nursing	4	33	48	85	
Total	13	124	133	270	

Table. 3: Comparison of practice

Comparison of practice of preventive methods between MBBS and BS Nursing about HCAIs (n=270)				
Components	**MBBS**		**BS Nursing**	
Use of disposable face masks and hand gloves while examining patients	**Frequency**	**Percentage (%)**	**Frequency**	**Percentage (%)**
Yes	111	60.0	83	97.6
No	74	40.0	2	2.4
Washing of white coat or working uniform				
Weekly	75	40.5	8	9.4
Twice a week	61	33.0	66	77.6
Fortnightly	24	13.0	9	10.6
Monthly	19	10.3	0	0.0
Never	6	3.2	2	2.4
Cleaning stethoscope with antiseptic				
Daily	32	17.3	53	62.4
Weekly	30	16.2	15	17.6
Fortnightly	10	5.4	8	9.4
Monthly	15	8.1	4	4.7
Never	98	53.0	5	5.9
Sustained accidental needle-stick injury				
Yes	24	13.0	43	50.6
No	161	87.0	42	49.4
Response after needle-stick injury (if yes)				
Reported the designated person	4	2.2	8	9.4
Wound washing only	10	5.4	15	17.6
Wound washing & Hepatitis B vaccination	10	5.4	19	22.4
Vaccinated against Hepatitis B				
Yes	111	60.0	43	50.6
No	74	40.0	42	49.4

Table. 4: Comparison of practice level

	Practice Level			Total	P value
	Poor (1 to 2 score)	Average (3 to 4 score)	Good (greater than 4)		
MBBS	23	82	80	185	0.023
BS Nursing	4	29	52	85	
Total	13	124	133	270	

DISCUSSION:

HCAIs are still one of the most serious and complex health problem worldwide. The data from this study showed quite interesting results. Majority of students of BS Nursing had good knowledge level as compared to MBBS students who had average knowledge level in majority. Similarly, the practice level is good among majority of students of BS Nursing, whereas MBBS students have average practice level as majority. Female participants were more (59.6%) as compared to male participants (49.4%).

In our study, majority of participants (78.89%) mentioned academic textbooks as their source of information regarding HCAIs followed by health related websites / blogs (14.07%) and medical journals (7.09%). This is quite satisfying because academic textbooks and medical journals both are authentic sources for knowledge as compared to most of the internet websites. In this modern era, the use of internet is also vital for having information about health related issues. Therefore, the students must be provided with only the genuine websites / blogs that include correct and authentic information, because now a days, self-learning is also one of the major source of information besides teaching curriculum.[7]

About 67.8% participants identified blood as the most infectious body fluid for HCAIs. The majority of the participants (77.03%) felt that nurses are the most susceptible group to HCAIs through occupational exposure, and doctors are second to them (53.3.%). This is similar to the study conducted by Hsieh et al. , in which nurses were identified as the most common susceptible staff group (60%) to HCAIs through occupational exposure to blood and other infectious body fluids, followed by physicians, interns, sanitary staff, and lab technicians were among the least susceptible staff group.[8]

It was surprising to note that majority of the participants (61.1%) recognized respiratory tract infections as the most common HCAIs being encountered in hospitals. This shows that the participants are not aware of the current statistics regarding HCAIs which says that in developed countries, the catheter-associated urinary tract infections are the most common HCAIs accounting for 35% to 40% of HCAIs followed by surgical site infections (20%), central line-associated blood stream infections (15%) and ventilator-associated pneumonia (10% to 15%), whereas in the developing countries, surgical site infections are more common accounting for 30% to 40% of HCAIs followed by blood stream infections and ventilator associated pneumonia with almost 19 times higher incidence rate.[9] This implies that there is a need for improvement in the knowledge of the participants regarding the current statistics about HCAIs.

Regarding the recognized sources of HCAIs, 67.4% participants identified mattress and pillows followed by thermometer (40%), stethoscope (19.3%), white coat (15.2%) and nursing uniform (37.1%). Except for mattress and pillows, there was contrast among other sources in our study as compared to a study conducted by Kaushik Nag et al., in which mattress and pillows was also recognized as the common recognized source of HCAIs by 39.5% participants, followed by white coat (24%), nursing uniform (22%), thermometer (16.2%) and stethoscope (7.2%).[10] So there is also a need of improvement among students regarding knowledge about the common recognized sources pf HCAIs.

Most common organism causing HCAIs identified by 59.3% of the participants was staphylococcus aureus, followed by Escherichia coli (47.4%), Streptococcus pneumoniae (33%), Klebsiella pneumoniae (21.9%) and candida albicans (5.6%). This is similar to the study conducted by Mulu W et al. , in which Staphylococcus aureus was the most common bacteria (26%) isolated from the patients, followed by Escherichia coli (21%), Klebsiella pneumoniae (5%) and other bacteria.[11]

Regarding hand hygiene and hand washing technique, 81.5% participants had knowledge about hand washing technique while 18.5% do not. This knowledge was higher among the BS Nursing students (97.6%) as compared to MBBS students (74.1%). According to WHO, hand hygiene maintenance is the simplest effective method to prevent HCAIs. About 50% of HCAIs are reduced just by maintaining proper hand hygiene.[12] On the other hand, non-adherence to hand hygiene is observed in healthcare settings due to lack of knowledge, having a doctor status, working in ICU, inaccessible hang hygiene supplies and many other factors.[13] This non-adherence to hand hygiene can be improved by providing alcohol based hand-rubs, because they are more simple to use and do not cause skin irritation. Similarly, education regarding hand hygiene and routine observation and feedback can also help in improving compliance to hand hygiene.[14]

The use of hand gloves and disposable face mask while examining the patients was done by 71.9% participants. This is important because use of hand gloves protects the hand from being contaminated with microorganism and other organic matter, and also reduces the risk of transmission of microorganisms to the healthcare staff and the patients.[15] Similarly, the use of face mask reduces the risk of respiratory tract infections up to 70%.[16]

The cleaning or washing of white coat is necessary to prevent HCAIs. In this study, 97.03% participants wash their white coat either weekly, twice a week or monthly. A study conducted by Asima et al. showed that white coats act as source of transmission of infectious agents, and the most common bacteria isolated was staphylococcus aureus. Therefore, students must have at least two or three white coats besides washing the white coat.[17] Similarly, stethoscopes also harbor microorganisms at their bells and diaphragm which can then act as potential source of HCAIs. This can be prevented by cleaning the stethoscopes with an antiseptic or with alcohol based disinfectant.[18] In our study, 61.9% participants clean their stethoscopes with antiseptic either weekly, twice a week or monthly. This practice was higher (94.1%) among BS Nursing students as compared to MBBS students (47.02%), whereas 38.1% do not clean their stethoscope and majority of them are MBBS students (52.9%) than BS Nursing students (5.9%).
In this study, majority of participants (57.03%) were vaccinated against Hepatitis B. Regarding needle stick injury, 24.8% participants had sustained needle-stick injury, and majority of them went for wound washing alongwith Hepatitis B vaccination. According to WHO, about 2 million healthcare workers, out of 35 million, experience percutaneous exposure to blood-borne pathogens through needle-stick injuries. As a result, 37% cases of Hepatitis B, 39% cases of Hepatitis C and 4% to 5% cases of HIV/AIDS have been reported among healthcare workers.[19] Such injuries can be prevented by safe handling of needles, Hepatitis B vaccination and some other measures.[20]

The majority of participants felt that there is a need for further improvement in the infection prevention practices. Various improvement measures for infection prevention were given by the participants: Presence of hand sanitizers at every corner of hospital (41.5%), seminars and workshops for self-awareness (22.2%) and free of cost vaccination programme (13.7%).

CONCLUSION:

The knowledge and practice level of the participants is average, but still not adequate which indicates that there needs an improvement in this regard. The topic of HCAIs must be incorporated as a separate entity in the teaching curriculum and seminars should be conducted in order to have much better awareness about HCAIs and their prevention. Further research needs to be conducted to identify other important aspects of infection prevention to reduce HCAIs.

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