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KNOWLEDGE, ATTITUDE, AND PRACTICES REGARDING STERILIZATION AND INFECTION CONTROL AMONG HEALTH-CARE STAFF

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Abstract

Objective

This study aims to find the association of age, working status, and training related to sterilization and infection control with their knowledge, attitude and practice categories.

Methodology

A total of 100 participants were conveniently selected. Our inclusion criteria are those health care workers who have working experience in operation theater. Those who did not have operation theatre exposure or were absent on the day of data collection were excluded from the study. Data was analyzed with the help of SPSS- version 25.

Results

Upon correlating age with knowledge, practices, and attitude categories, no statistically significant association has been found with P values 0.676, 0.214 and 0.848 respectively. Working status has association with all three categories with a P value of <0.001 in all categories respectively. Receive training for sterilization and infection control shows association with knowledge (P =0.004). While for others remaining categories results were insignificant with a P value of >0.05.

Conclusion

In conclusion, healthcare professionals have a good level of knowledge about infection control. Further gaps can be filled by regular training sessions and hands on practices workshops. Hospital administration needs to place a high priority on ongoing education programs designed to fulfill specific job roles. Ultimately, patient outcomes, staff health, and healthcare costs will be improved.

INTRODUCTION

The fundamental components of hospital infection control measures are sterilization and disinfection. Every day, a variety of surgical operations are carried out in a number of hospitals. In various healthcare institutions, the number of invasive procedures is increasing day by day. The medical equipment and various surgical tools that come into touch with the patient's tissue or mucus membrane during the various surgical procedures are linked with an elevated risk of pathogen introduction into the patient's body. Furthermore, infection can be transmitted from patient to patient from patient to health care personnel, and vice versa (e.g., hepatitis B virus (HBV)) or from the environment to the patient (e.g., Pseudomonas aeruginosa, Acinetobacter spp.) via improperly sterilized or disinfected devices (1).All microorganisms, including bacterial spores, are completely destroyed or killed during the process of sterilization (2). As disinfection kills most pathogenic microorganisms but not all microbial forms, it is less lethal than sterilization (e.g., bacterial spores). In order to protect human life, appropriate sterilization measures must be followed in the hospital (3). Due to stunning advancements in medicine and surgery, hospital-acquired infection becomes a serious problem (4)e.g. Mycobacterium tuberculosis infected bronchoscopes can transmit tuberculosis. From the previous few years, there has been a growing interest in practicing and coordinating sterilization all over the world (Welch, 1961) (5). To reduce the danger of infection, medical facilities and hospitals must strengthen their sterilization and disinfection procedures. The optimal and safe usage of non-invasive and invasive medical devices can only be achieved if sterilization and disinfection procedures are followed correctly.

Any infection that occurs within 48 hours of admission is considered a hospital-acquired infection, known as a nosocomial infection or hospital-related infections (6). Exogenous (HAIs) can be acquired through the hospital environment, medical procedures, and hospital personnel. Hospital-associated infections of endogenous type, on the other hand, can be caused by organisms found in the patients' natural flora (7). Regardless of the infectious state of the patients, standard preventive precautions should be performed at all times (8). Handle blood or bodily fluids, contaminated objects, or any other infective materials of the patients with clean gloves. If there is a risk of blood and body fluid splashes during medical operations, use a face mask, eye glasses, or a face shield. Confirm that single-use items and sharps are properly discarded and any possible contaminated materials have been decontaminated before usage. After any surgery, remove protective clothes and always wash your hands.

According to the World Health Organization (WHO), these infections affect 7% to 12% of hospitalized patients worldwide, with more than 1.4 million people suffering from infectious complications acquired in the hospital at any given time. Pakistan shows a higher rate of hospital-acquired infection. According to a recent study conducted in 13 hospitals in Punjab, out of 1553 patients taken to a hospital, 130 (8.4%) displayed symptoms of hospital-acquired infection. Nosocomial infection surveillance systems are seldom accessible in low- and middle-income states. However, (HAIs) appear to be a hidden, cross-cutting problem that no organization or healthcare facility can claim to have handled as yet (9). Data suggests that DHCPs have little knowledge, unfavorable attitudes, and poor behaviors when it comes to infection control(10). According to a survey by the World Health Organization (WHO), 8.7% of hospital patients had healthcare-associated illnesses on average (2). Nosocomial infections affect up to 1.4 million people around the world at any given moment (CDC, 2015). Pneumonia, infections of the lower respiratory tract, infections of the surgical site, infections of the urinary tract, and infections of the bloodstream are the most prevalent healthcare-associated infections. In the light of above, this study is a step to check the recent status of knowledge and practices of HCWs regarding sterilization and disinfection in order to keep health care associated diseases at a minimum level.

Materials and methods

Study design

A descriptive observational hospital-based cross-sectional study design is used for the study. The study is completed after the approval of the synopsis and obtaining permission from the ethical review board committee of the hospital.

Study Setting

The study was conducted at Mayo Hospital King Edward Medical University (KEMU) Lahore. A simple random sampling technique is used to collect data.

Sampling Technique

Convenient sampling technique was used in sampling the participant.

Inclusion and Exclusion Criteria

Our inclusion criteria are only those health care workers who had the experience of working in Operation Theater. Those healthcare workers who have no exposure to operation theater, who were absent during the day of data collection and who were not willing to fill consent form were excluded from the study.

Study tools

Data were collected through a well-developed self-administered questionnaire that evaluated knowledge, practices, and attitude regarding sterilization and infection control among health-care staff in Mayo Hospital Lahore. The questionnaire contained questions concerning the knowledge, practices, and attitude regarding sterilization techniques and infection control policies. Questionnaires had covered nurses, lab technicians, sanitary workers, and final-year students of Mayo Hospital. The scale which we used is dichotomous i.e. Participants have to select either yes or no. The questionnaire contains 24 questions out of which 4 four were demographic and the rest of 24 twenty-four were also categorical type. We separately measured the association of age, working status and training for sterilization and infection control with knowledge, attitude and practice categories along with their significance level.

Ethical consideration

Ethical approval was taken from the ethical review board committee of the Mayo hospital Lahore. Informed consent was taken from the patients in both Urdu and English languages and briefly describes the purpose of the study.

Data analysis

Data were entered into IBM SPSS (Statistical Package for the Social Science) version 25. Qualitative variables like age and gender is presented as frequency and percentages. The association between knowledge, practices and attitude is calculated by the fisher exact test. P value < 0.05 will be considered significant.

Results

We selected four demographic variables for our study: age, gender, working status, and years of work experience. (Table 1.1) shows that 44% of respondents are between the ages of 26 to 30, while 4% are over 40. There are more women than men among the respondents 94% are female and 6% are male. (Table 1.1) shows that of those who participated in our sample size, 48% are nurses by profession and 12% are sanitary workers. Of the participants, 4% have more than ten years of experience, and 48% have worked in hospitals for one to five years (Table 1.1). The knowledge, practices and, attitude scores has a mean and standard deviation 76.55 ±20.339, 64.75 ±21.274, and 71.21±23.083 respectively.

Age		
Age Category	**Frequency**	**Percentage**
21-25	32	32.0
26-30	44	44.0
31-35	14	14.0
36-40	6	6.0
>40	4	4.0
Total	**100**	**100.0**

Gender		
	Frequency	Percentage
Female	94	94.0
Male	6	6.0
Total	100	100.0
Working Status		
	Frequency	Percent
Nurse	48	48.0
Lab Technician	18	18.0
Final Year Students	22	22.0
Sanitary Staff	12	12.0
Total	100	100.0
Working in a Hospital Since (Years)		
	Frequency	Percentage
<1 Year	27	27.0
1 To 5 Years	48	48.0
6 To 10 Years	21	21.0
>10 Years	4	4.0
Total	100	100.0
Knowledge Attitude and Practice Mean and Standard Deviation		
	Mean	Standard Deviation
Knowledge Score	76.55	20.339
Practice Score	64.75	21.274
Attitude Score	71.21	23.083

Table 1.1 Distribution of sociodemographic variables and knowledge, practice and attitude, score with its mean and standard deviation.

Age is not associated statistically significant with knowledge, practice and attitude categories with P value of 0.676, 0.214 and 0.848 respectively (Table 1.2).

Age with Knowledge Category Association						
		Poor (<50)	Optimum (50-80)	Excellent (>80)	Total	P Value (Exact 2 Sided)
Age	21-25	1	17	14	32	0.676
	26-30	7	19	18	44	
	31-35	1	7	6	14	
	36-40	0	2	4	6	
	>40	0	3	1	4	
Total		9	48	43	100	
Age with Practice Category Association						
		Poor (<50)	Optimum (50-80)	Excellent (>80)	Total	P Value (Exact 2 Sided)
Age	21-25	14	11	7	32	
	26-30	18	21	5	44	
	31-35	4	4	6	14	0.214

	36-40	1	2	3	6	
	>40	2	1	1	4	
Total		39	39	22	100	
Age with Attitude Category Association						
Age		Poor (<50)	Optimum (50-80)	Excellent (>80)	Total	**P Value (Exact 2 Sided)**
	21-25	6	15	11	32	**0.848**
	26-30	10	15	19	44	
	31-35	2	5	7	14	
	36-40	0	2	4	6	
	>40	1	2	1	4	
Total		19	39	42	100	

Table 1.2 Association of age with knowledge, practice and attitude categories.

Working status is statistically significant with all three categories knowledge, practice and attitude with P value of <0.001, <0.001 and <0.001 respectively (Table 1.3).

Working Status with Knowledge Category Association						
Working Status		Poor (<50)	Optimum (50-80)	Excellent (>80)	Total	**P Value (Exact 2 Sided)**
	Nurses	0	8	40	48	**<0.001**
	Lab Technicians	2	16	0	18	
	Final Year Students	4	16	2	22	
	Sanitary Staff	3	8	1	12	
Total		9	48	43	100	
Working Status with Practice Category Association						
Working Status		Poor (<50)	Optimum (50-80)	Excellent (>80)	Total	**P Value (Exact 2 Sided)**
	Nurses	6	20	22	48	**<0.001**
	Lab Technicians	9	9	0	18	
	Final Year Students	13	9	0	22	
	Sanitary Staff	11	1	0	12	
Total		39	39	22	100	
Working Status with Attitude Category Association						
Working Status		Poor (<50)	Optimum (50-80)	Excellent (>80)	Total	**P Value (Exact 2 Sided)**
	Nurses	1	6	41	48	**<0.001**
	Lab Technicians	5	13	0	18	
	Final Year Students	5	16	1	22	
	Sanitary Staff	8	4	0	12	
Total		19	39	42	100	

Table 1.3 Association of working status with knowledge, practice and attitude categories.

Received any training for Sterilization with Knowledge Category Association						
Received Training for Sterilization and Infection control		Poor (<50)	Optimum (50-80)	Excellent (>80)	Total	**P Value (Exact 2 Sided)**
	No	3	27	10	40	**0.004**
	Yes	6	21	33	60	
Total		9	48	43	100	
Received any training for Sterilization with Practice Category Association						
Received Training for Sterilization and Infection control		Poor (<50)	Optimum (50-80)	Excellent (>80)	Total	**P Value (Exact 2 Sided)**
	No	20	15	5	40	**0.092**
	Yes	19	24	17	60	
Total		39	39	22	100	
Received any training for Sterilization with Attitude Category Association						
Received Training for Sterilization and Infection control		Poor (<50)	Optimum (50-80)	Excellent (>80)	Total	**P Value (Exact 2 Sided)**
	No	9	20	11	40	**0.056**
	Yes	10	19	31	60	
Total		19	39	42	100	

Received training for sterilization and infection control shows positive association with knowledge (P=0.004), while for others remaining categories shows no association with P value of 0.092 and 0.056 respectively. (Table 1.4)

Table 1.4 Association of Received Training for Sterilization and Infection control with knowledge, practice and attitude categories.

Discussion

Sterilization and infection control is a major threat that all healthcare staff as well as the general community face in a hospital setting (11). The aim of sterilization and infection control is to minimize one main threat known as infection. Infection that occurs in healthcare settings is known as healthcare-associated infection. (12). Many healthcare workers develop infection due to a lack or low knowledge and not following standards practices of sterilization and infection control.

This study shows that age is not statistically significant with knowledge, practices and attitude categories with P values 0.676, 0.214, and 0.848 respectively. A study was conducted in Iraq that showed age is not statistically significant with knowledge, practices, and attitude categories with P values of 0.296, 0.594, and 0.982 (13). Another study was conducted in Australia and the outcomes showed there is no statistically significant association between age and practices (14). A study conducted in Northern Cyprus showed age has no association with knowledge, practices and attitude (15). A cross-sectional study was conducted in a Palestine hospital the study revealed that age has no association with knowledge and practices and its P value is 0.083, and 0.220 respectively (16). Another study shows age has no association with knowledge (17). A similar study shows age is not statistically significant in the practice category (P= 0.206) (17). These previous studies match our results.

A comparable study was conducted in Ethiopia that shows age has no association with the knowledge category but practices and attitude have an association (P <0.001)(18). A similar study was conducted in Saudi Arabia that shows age has no association with knowledge category and with attitude category has significant association (P <0.001). Other similar comparable results show an association between age and practices (P =0.003) (19). Another study was conducted in Korea shows statistical significance

between age and practices (20). The results of this study are identical to these studies (21). Another similar study shows age is not associated with attitude (P= 0.613) (22). These studies are not comparable with our results but these deviations are due to the higher educational level of health care staff, low burden of patients on hospital and health care staff, institutional training related to infection control, organization and community-based culture, institutional policies regarding the implementation of infection control guidelines, and having an active infection control team in their health care setup. These factors affect the attitude and influence the staff to use standard practices during patient care. A similar study was conducted in a city of China Wuhan that shows age has statistically significance with knowledge practices and attitude categories (P <0.001) (23). This result is not similar to our study because this study is conducted in a developed country where people have already higher knowledge; their educational status is higher than other countries. There is also a possibility of sample size and sampling technique.

Our study shows working status has statistically significant association with all three categories with a P value of <0.001, <0.001, and <0.001 respectively .These results are consistent with the study that was conducted in the city of China Wuhan that shows working status is statistically significant with knowledge, practices, and attitude (P <0.001) (23). Another comparative study shows working status or profession has association with knowledge and practices (15). Supporting staff has higher knowledge and shows association (15) but that is due to the varied number of sample sizes and sampling techniques that are used for data collection because a similar study revealed supporting staff has a low level of knowledge as compared to nurses and other health care professionals (24). Another study revealed that Nurses have a high level of practice scores (P =0.014), but no association between the nursing profession and the knowledge category (25). A systematic review was published in 2023 that shows the knowledge, and practices of laboratory staff are statistically significant with each other but attitude was not significant (26). A similar study shows working status (medical student) was statistically significant with knowledge but these results were different from some previous studies that show no association. These results are supported by two different studies one from Nigeria (27)and the other one from the state of KSA (28). A study was conducted in Nigeria, that shows nurses have poor attitudes (22). Factors associated with poor attitude were stressed working environment, overcrowding of patients, non-cooperative behavior of patients, false equipments, lack of facilities, and lack of effective communication between staff members. These findings support our research(15).On a counter note, some studies conducted in the southwest, southeast, and Nigeria shows an association with attitudes (29, 30).

Our study results show those respondents who receive training for sterilization and infection control shows an association towards knowledge (P =0.004). While other categories show no association with practice (P=0.092) and attitude (P=0.056). Our findings are consistent with a study conducted in Iraq that shows training for sterilization shows an association with the knowledge(P=0.029) (13). A similar study conducted in Italy that shows receiving training for sterilization in the last five years has an association with the knowledge category (31). Another identical study revealed knowledge is statistically significant (32). A systematic review shows training is statistically significant with knowledge and practices (26). These results are similar to our study and represent the strength of the data and validity of our results. In future research will build up this work and support additional progress in the field.

A study conducted in a Palestine hospital that shows training is not statistically significant with knowledge(P= 0.647) and practice (P=0.129) (16). Another study shows no association is present between training and knowledge(P=0.296) and training with attitude (P= 0.166) while practice is statistically significant with training (P <0.001) (19). This poor knowledge, practices and attitude towards sterilization or infection control are due to low level of education, pressurized working environment, overcrowding of the patients, lack of equipments, lack of required facilities, lack of training courses, and no active hospital infection control team. No checks and balances for feedback and regular monitoring of the staff. Another similar study conducted in Nigeria shows training has statistical significance with the attitude category (P =0.040) (21). Social media platforms, companies and news are important factors

for increasing knowledge and positive attitude (33). A similar study shows training has an association with practices (18). The results of this study are comparable with these results (41). Statistically, these results are not identical to our results due to different sample sizes and study designs. These studies were conducted in the tertiary care hospital where staff has a higher education level, and an infection control team is present that regularly monitors infection control protocols. That's why health care staff has a positive attitude and follows standard practices.

Hospital administration should create a patient and staff-friendly environment in which obeying infection control practices is an integral part of the job description and high-quality patient care. The hospitals should provide continuous support in terms of resources, refreshing programs for old and new employees, providing seminars, hands-on practices, and motivation. Make it compulsory for every staff to get training about sterilization and infection control from accredited councils. This can help to reduce patient mortality and morbidity rates and costs related to medical treatment and hospital stay (34). Hospital administration should regularly monitors and perform clinical audit reports and establishes evidence-based practice guidelines in the hospital. Take constructive feedback from health care staff and make necessary changes in the guidelines to improve sterilization and infection control standards. These strategies are helpful in terms of retention of knowledge, positive attitude, and following standards practices.

Strengths

The questionnaire used closed-ended questions that enhance the data validity and generalizability. This research effectively studies nurses, lab technicians, sanitary workers, and final-year students knowledge, attitude and practice regarding sterilization and infection control.

Limitations

It is a single center study that cannot be generalized to all healthcare facilities. Every institutional staff has a different level of education, knowledge, practices and attitude regarding sterilization and infection control. There is no scale to access volunteer knowledge regarding the questions. Due to self-reporting, there is a chance of biasness. Reporting does not mean that they actually used these methods. The male-to-female ratio is excessively low. The reason for the excessively low ratio is that the consent form is mostly filled out by females because our targeted population females are more in numbers than males.

Recommendations

Conduct a broader study by engaging different staff from ICU, CCU, CSSD, emergency, and trauma centers and check their knowledge, practices and attitude regarding sterilization and infection control. Expand the research by reviewing institutional guidelines about aseptic techniques and how to control HAIs. Check workers confidence about these guidelines and make evidence-based decisions with the help of research to improve knowledge, practices, and positive attitudes. Provides educational training to staff to enhance knowledge about sterilization and infection control. Data collected from different hospitals need to be correlated to get a better understanding of knowledge, practices and attitudes.

Conclusion

Having good knowledge, a positive attitude, and following standards practices of infection control is helpful in controlling the spread of infections in health-care facilities. Our study shows that age has no association with knowledge, attitude and practice categories. So, regardless of age, all healthcare personnel should receive frequent training sessions. Promote engagement in online courses, workshops, and seminars. Encourage staff members to work together and communicate freely as some effective techniques for raising these standards. Working status has significance in all three categories. It is recommended for hospital administration to continuously arrange different training programs and hands-on practices for all healthcare workers according to their job descriptions because these standards must not be compromised in the future. Sterilization and infection control training shows statistically significance with knowledge, and the remaining categories shows no statistical significance. An active hospital infection control team helps to keep up established practices and foster a positive attitude by controlling the workload of the staff. Innovations in knowledge and practices contribute to

better health outcomes for employees, lower rates of infections associated with medical care, as well as a general boost in the government economy.

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