

Awareness of sterilization and disinfection among medical students and healthcare workers

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Abstract

Background: Awareness and proper practice of sterilization and disinfection protocols can significantly reduce the risk of infection transmission associated with the use of invasive and noninvasive medical and surgical devices. Lack of knowledge and failure to comply with scientifically based guidelines has led to numerous outbreaks of lethal diseases like HIV, Hepatitis B and C as well as transmission of various bacterial infections.

Material and Methods: A descriptive cross sectional study conducted among medical students and healthcare workers using a self administered questionnaire which was designed to assess the awareness of sterilization and disinfection among medical students, paramedical staff and doctors in a public sector hospital in Karachi.

Results: The sample size and response rate were 356 and 100% respectively. The respondents included 66 doctors, 122 paramedics and 168 medical students. About 58.3% medical students and 62.1% doctors knew the difference between sterilization and disinfection but only 37.7% paramedics were aware of the difference. 79.8% medical students, 69.7% doctors and 60.7% paramedics had received the complete regimen of any vaccine. Overall, the awareness proportion of paramedical staff was significantly lower than doctors and medical students.

Conclusion: Our results show that awareness of healthcare workers regarding sterilization and disinfection is not up to the mark. Many of them have not received the complete regimen of HBV vaccine. There is therefore substantial need for the education and training programs to equip the healthcare workers with awareness and knowledge regarding sterilization and disinfection protocols.

Keywords: Sterilization, disinfection, healthcare associated infections, HBV Vaccine, Hepatitis B

Introduction:

Sterilization is a process by which complete destruction or killing of all micro-organisms including bacterial spores is achieved. Disinfection is thermal or chemical destruction of pathogenic and other types of micro-organisms. It is less lethal than sterilization because it destroys most recognized pathogenic micro-organisms but not necessarily all microbial forms (e.g. bacterial spores).¹ Prevention of infection and control is an important part of safe patient care. Concerns about the possible spread of blood born diseases and the impact of emerging, highly contagious respiratory and other illnesses requires practi-

tioners to establish, evaluate, continually update and monitor their infection prevention, control strategies and protocols.²⁻⁵ Health care professionals are at an increased risk of cross infection and its transmission while treating the patients. They have to work in an environment which is often contaminated because of exposure to infected blood, saliva and aerosols. Various blood borne diseases like Hepatitis B, AIDS can spread through the use of un sterilized instruments.²⁻⁷ Medical students during their budding stages are very enthusiastic and careless and therefore are at increased risk of cross infection. They must imbibe complete clinical knowledge re-

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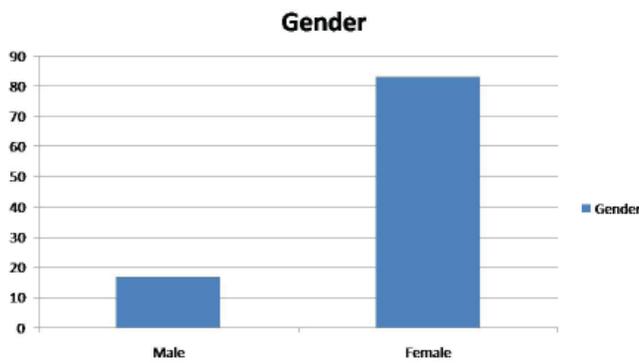


Figure 1: Gender distribution of study participants

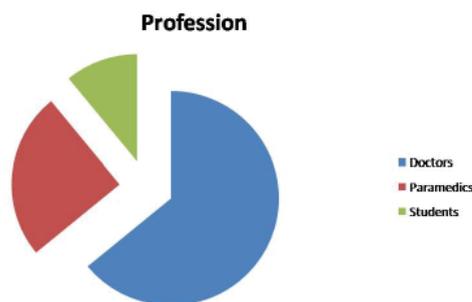


Figure 2: Distribution of profession in study

garding infection control before entering the clinical environment.⁵

Healthcare associated infections (HAIs) are a serious problem in healthcare services as they are a common cause of morbidity and mortality among hospitalized patients. In the developed world HAIs occur in 5-10% patients admitted to hospitals, while in developing countries this rate can be 25% or more. In the developed world it is likely that at least 20% of all HAIs can be prevented by effective infection control practices. It is portable that even greater percentage of HAIs could be prevented in the developing world.⁸

Several studies had evaluated awareness, knowledge, attitude and practice of sterilization and infection control among different health care workers.^{2-13,15} These studies indicate that there are gaps in the knowledge of some healthcare workers regarding modes of transmission of infectious diseases, however similar data available in Pakistan is not adequate to assess whether

medical professionals are prepared to assume their responsibilities in decreasing the incidence of communicable diseases. Consequently, the purpose of this study was to evaluate the level of awareness of sterilization and disinfection among medical students and healthcare workers in a public sector hospital in Karachi.

Material and Methods:

A descriptive cross sectional study was conducted from 1-03-2016 to 1-09-2018, at a Public sector hospital in Karachi, using a self administered questionnaire. Healthcare professionals with direct contact with hospitalized patients were recruited to participate in the study. This included resident physicians, house officers, paramedical staff and medical students in the third year, fourth year and final year. Participants were selected via convenient sampling and an informed consent to participate in the study was obtained from all participants. Their confidentiality and anonymity was ensured. The participants were approached during regular work days at the hospital. The study sample consisted of 356 subjects. The sample size was calculated using open Epi software version 3.01 (using reference article 10) with 63.4 anticipated frequency at confirmed level of 95% and 5% confidence limit.

The questioner consisted of 20 questions, designed based on the study objectives taking help from previous literature and studies available on the topic. It had closed ended questions in relation to sterilization and dis-infection protocols and the awareness of the same among the medical students and healthcare workers. The demographic details of the participants including gender and area of profession were also included.

Data analysis was done by using SPSS version 16.0

Results:

In our study, 356 participants took part, among them 83.1% were females while rest were males as shown in figure 1.

The participants included 66 doctors (18.5%), 122 paramedics (34.3%) and 168 medical stu-

Table 1: Association of awareness of sterilization and disinfection between professional medical students and healthcare workers

Professional	Doctor		Paramedic		Student		P-value
	n	%	n	%	n	%	
Have you ever received a training regarding sterilization and disinfection?							0.538
Yes	11	16.7%	12	9.8%	24	14.3%	
No	55	83.3%	109	89.3%	142	84.5%	
Don't know	0	.0%	1	.8%	2	1.2%	
Does disinfection kill germs as well as spores?							0.003
Yes	17	25.8%	52	42.6%	44	26.2%	
No	41	62.1%	46	37.7%	98	58.3%	
Don't know	8	12.1%	24	19.7%	26	15.5%	
Are there any means of sterilization of instruments other than autoclaving?							0.002
Yes	48	72.7%	62	50.8%	116	69.0%	
No	8	12.1%	21	17.2%	11	6.5%	
Don't know	10	15.2%	39	32.0%	41	24.4%	
Is there proper availability of sterilization equipment in the wards?							<0.001
Yes	18	27.3%	43	35.2%	38	22.6%	
No	44	66.7%	76	62.3%	100	59.5%	
Don't know	4	6.1%	3	2.5%	30	17.9%	
Are healthcare workers, in your opinion, concerned about proper sterilization?							0.004
Yes	28	42.4%	59	48.4%	63	37.5%	
No	36	54.5%	63	51.6%	89	53.0%	
Don't know	2	3.0%	0	.0%	16	9.5%	
Should measures be taken regarding sterilization of non-critical items? (E.g. stethoscope, patient furniture etc.)							0.001
Yes	42	63.6%	100	82.0%	110	65.5%	
No	22	33.3%	17	13.9%	38	22.6%	
Don't know	2	3.0%	5	4.1%	20	11.9%	
Does swabbing the skin prior to invasive procedures reduce the risk of infection transmission?							0.196
Yes	64	97.0%	114	93.4%	160	95.2%	
No	1	1.5%	7	5.7%	3	1.8%	
Don't know	1	1.5%	1	.8%	5	3.0%	
In your opinion, can syringes be reutilized after changing the needles?							0.013
Yes	4	6.1%	15	12.3%	6	3.6%	
No	62	93.9%	107	87.7%	158	94.0%	
Don't know	0	.0%	0	.0%	4	2.4%	
Are the trash bins being used properly?							<0.001
Yes	19	28.8%	60	49.2%	32	19.0%	
No	43	65.2%	58	47.5%	122	72.6%	
Don't know	4	6.1%	4	3.3%	14	8.3%	
Are you aware of the proper hand washing technique?							0.186
Yes	60	90.9%	107	87.7%	160	95.2%	
No	6	9.1%	14	11.5%	7	4.2%	
Don't know	0	.0%	1	.8%	1	.6%	

dents (47.2%) as shown in figure 2.

A comparison among male and female respondents regarding the awareness of sterilization and disinfection showed no significant difference except that 95% (57) of the male workers believed in the fact that 4 out of 5 germs that cause illness are spread by hands whereas only 76% (225) of the female participants believed so (p=0.004) and 97.3% (288) female responders knew that it was important for the healthcare professionals to get themselves immunized but only 91.7% (55) male responders were aware of the fact (p=0.034). There was also significant difference in the proportion of male and female workers who had received the complete regimen of any vaccine, the percentage being higher in female responders, 74% (219), (p=0.032).

We also compared the level of awareness between the doctors, paramedics and medical students and a significant difference was found in many areas. Only 37.7% (47) paramedics were aware of the difference between sterilization and disinfection and knew that disinfection do not kill spores. The proportion was comparatively better among medical students 58.3% (98), being highest for doctors 62.1% (41) (p=0.003). Also 72.7% (48) of the doctor participants knew of some other means of sterilization than autoclaving. 69% (116) medical students were aware of such methods but only 50.8% (62) paramedics knew that (p=0.002).

66.7% (44) doctors, 62.37% (76) paramedics and 59.5% (100) medical students were of the view that the availability of sterilization equipment was not proper in the wards and only 42.4% (28) doctors, 48.4% (59) paramedics and 37.5% (63) medical students thought that healthcare workers were actually concerned about sterilization, majority of the respondents opined that healthcare workers were not concerned.

82% (100) paramedics thought that measures should be taken regarding sterilization of non critical items, the proportion of doctors and medical students who thought so was 63.6%

Professional	Doctor		Paramedic		Student		P-value
	n	%	n	%	n	%	
Do you believe in the fact four out of five germs that cause illness are spread by hands?							0.005
Yes	58	87.9%	105	86.1%	119	70.8%	
No	5	7.6%	6	4.9%	18	10.7%	
Don't know	3	4.5%	11	9.0%	31	18.5%	
Is it appropriate to wear the scrubs (OT dresses) outside the OT?							0.158
Yes	4	6.1%	16	13.1%	14	8.3%	
No	61	92.4%	106	86.9%	149	88.7%	
Don't know	1	1.5%	0	.0%	5	3.0%	
Does changing gloves between the patients decrease the chances of infection transmission?							0.549
Yes	59	89.4%	107	87.7%	151	89.9%	
No	7	10.6%	15	12.3%	15	8.9%	
Don't know	0	.0%	0	.0%	2	1.2%	
Is disinfection of floors and walls in the hospital necessary?							0.027
Yes	63	95.5%	111	91.0%	158	94.0%	
No	1	1.5%	11	9.0%	5	3.0%	
Don't know	2	3.0%	0	.0%	5	3.0%	
Is it appropriate to use the same oxygen mask between the patients without disinfection?							0.058
Yes	6	9.1%	23	18.9%	20	11.9%	
No	60	90.9%	95	77.9%	138	82.1%	
Don't know	0	.0%	4	3.3%	10	6.0%	
Is it important for the healthcare professionals to get themselves immunized?							0.478
Yes	63	95.5%	116	95.1%	164	97.6%	
No	3	4.5%	6	4.9%	4	2.4%	
Don't know							
Have you received the complete regimen of any vaccine?							<0.001
Yes	46	69.7%	74	60.7%	134	79.8%	
No	17	25.8%	48	39.3%	24	14.3%	
Don't know	3	4.5%	0	.0%	10	6.0%	
Should HBV vaccination be made mandatory for all healthcare professionals?							0.499
Yes	63	95.5%	109	89.3%	157	93.5%	
No	2	3.0%	10	8.2%	7	4.2%	
Don't know	1	1.5%	3	2.5%	4	2.4%	
Do you know about any organization that provides adequate information regarding sterilization?							0.347
Yes	3	4.5%	12	9.8%	14	8.3%	
No	52	78.8%	80	65.6%	123	73.2%	
Don't know	11	16.7%	30	24.6%	31	18.5%	
Awareness and training programs are required to be started to improve the quality of practice of sterilization protocols?							
Yes	66	100	122	100	168	100	
No							
Don't know							

(42) and 65.5% (110) respectively.

Only 87.7% (107) paramedics were aware of the fact that syringes should not be reutilized even after changing the needles, whereas the scores were higher for doctors and medical students being 93.9% (62), and 94% (158) respectively.

There was a discrepancy in the opinions of doctors, paramedics and medical students regarding the usage of trash bins in the hospital setting. 49.2% (32) paramedics thought that trash bins were being used properly in the hospital whereas only 28.8% (19) doctors and 19% (32) medical students agreed to the statement. 94% (158) medical students and 95.5% (63) doctors believed that disinfection of floors and walls in hospitals was necessary, the proportion of paramedics who believed so was 91% (111).

Only 60.7% (74) paramedics and 69.7% paramedics had received the complete regime of any vaccine, the proportion was comparatively higher among the medical students and doctors, 78.8% (134) and 69.7% (46) respectively.

Overall the awareness proportion regarding sterilization and disinfection was significantly lower for paramedics which can be attributed to lack of proper training and awareness programs. Awareness level was comparatively better for doctors and medical students. Detailed information on awareness of medical students and healthcare workers about sterilization and disinfection is presented in table 1.

Discussion:

The need for awareness and proper practice of sterilization and disinfection protocol is well documented in literature, since failure to employ correct practices has been responsible for nosocomial infections occupational risks among healthcare professionals.^{15,22}

This study was designed to assess the awareness and knowledge of healthcare professionals and medical students regarding sterilization and disinfection protocols, however it was observed that the awareness and knowledge was not up

to the mark. Only 185 (27.7%) respondents, 62.1% doctors, 58.3% medical students, 37.7% paramedics, knew the difference between sterilization and disinfection, which is much lower than in previous studies which showed that more than 50% of the participants were aware of sterilization, disinfection and asepsis. 89.2% (5), 67.3% (15), 65% (10), 82.3% (2), 95% (12).

In this study only 13.2% (47) respondents had received any training regarding sterilization and disinfection compared to 67%¹⁰ and 40.6%². According to studies 72.4%⁵ and 68.5%² participants respectively were aware of different sterilization methods where as in this study 63.4% participants were aware of other methods of sterilization than autoclaving. Non critical items such as stethoscope, patient furniture etc are the objects that can become colonized by pathogenic organisms and serve as vectors in their transmission.¹⁶⁻¹⁹ 70.8% (252) participants 63.6% doctors, 65.5% medical students and 82% paramedics were of the view that measures should be taken to sterilize such items, a similar study¹³ showed that 72.8% of the participants identified stethoscopes as capable of serving as a vector in transmission of pathogens and 60.6% of them took measures to sanitize them.

In our study the awareness proportion of healthcare professionals regarding risk of infection transmission by reuse of syringes (95%) was higher than reported as 87.5%⁵ and 67%¹² in the studies.

Occupational exposure to blood or other body fluids in healthcare settings constitutes a small but significant risk of transmission of blood borne viruses.^{14,20,21} Although 96.3% participants knew that it was important for the healthcare workers to get themselves immunized, only 71.3% participants, 69.7% doctors, 79.8% medical students, 60.7% paramedics, had received complete regime of any vaccine, which is however higher than the proportion reported in most of the previous studies in Pakistan 56.2%, 37.2% (4, 25), India 67.7%,² 68.5%,⁵ 68.9%²⁴ KSA 65%,¹⁰ Libya 78.1%.²³

All of the participants agreed that awareness and training programs need to be started to improve the quality of practice of sterilization and disinfection protocols. Considering the extreme importance of sterilization and disinfection protocols in preventing the spread of infections in hospital settings, we strongly urge that every institute must ensure the strict implementation of these protocols and it should be made mandatory for healthcare professionals to get themselves trained from accredited training centers. We also recommend that immunization against Hepatitis B should be made compulsory for all the healthcare professionals including the medical students.

Conclusion:

The study reveals the substantial need for awareness and training programs to fill the gaps in knowledge of healthcare professionals regarding sterilization and disinfection protocols which is crucial for proper application of infection control practices by all tiers of healthcare system and medical professionals.

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Role and contribution of authors:

Javaria Muneer, did data collection and initial draft writing.

Maria Azhar, did data collection and initial draft writing.

Dr Lubna Ali, did data collection and questionnaire development and validation.

Dr Fauzia Imtiaz, did data analyzed and finalized the manuscript.

Dr Mukkarum Ali, supervised this research, saw the manuscript and made final changes.

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