

ORIGINAL RESEARCH

PERIOPERATIVE MEDICINE

Knowledge and safety practices on occupational hazards among operating room staff in Mardan Medical Complex, Mardan, Pakistan

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Abstract

Background & Objectives: Healthcare workers (HCWs) are prone to occupational hazards, which may have a significant impact on their health and safety. Inadequate worker training, a lack of appropriate protection measures, and a high workload could worsen the situation, resulting in increased morbidity and mortality among exposed workers. The purpose of this study was to assess the knowledge and safety practices on occupational hazards among operating room (OR) staff of Mardan Medical Complex.

Methodology: From April to September 2021, 109 OR staff participated in this cross-sectional study including the surgeons, the anesthetists, the technologists and the OR nurses. Data regarding the level of knowledge and safety practices among OR staff were recorded on a validated questionnaire. Data were analyzed on SPSS version 19 and presented in the form of tables and graphs. Chi-square test was used to find an association between categorical variables and $P < 0.05$ were considered statistically significant.

Results: Among all participants, 95% of surgeons were aware of the work-related hazards and their types, followed by OR nurses, technologists, and the anesthetists. The majority of OR personnel with less experience were least aware of the occupational hazards. The association with the participants job experience, degree of knowledge, and the safety practices was not statistically significant ($P > 0.05$).

Conclusion: The knowledge of the surgeons regarding occupational hazards and the safety practices was the highest, followed by the anesthetists, technicians/technologists, and the OR nurses in that order. Measures are required to promote safety practices and reinforcement of strategies aimed to minimize exposure to hazards. Routine training of staff on safety practices need to be initiated and made mandatory.

Key words: Healthcare workers; Occupational Hazard; Occupational Health Risk

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1. Introduction

An occupational hazard is a risk to an individual that typically arises from their occupation. It may also apply to a job or a condition that predisposes to or causes workplace injuries or diseases.¹ A hazardous workplace can contribute to a high turnover of employees, leading to loss of revenue in hiring new employees and a loss of skills.

Knowledge of occupational hazards and the safety practices is important for all exposed healthcare workers (HCW) due to higher ratio of morbidity and mortality. Every year, an estimated 100,000 people die because of occupational diseases, with about 400,000 new cases being diagnosed.² Occupational hazards have many types including physical risk related to noise, radiation, and temperature. Mostly laser surgical procedure affects thermal radiation absorption resulting in increased OR temperature. Consequences may include skin burn, eye injuries, and sometime electric shock.³

Staff conversation and noisy equipment are sources of the noise inside OR. According to WHO recommendation the noise should not exceed 45 dBA within the hospital premises.⁴ Hearing loss and tinnitus are the most common consequence of chronic exposure to noise. OR staff working continuously in such environment are likely to suffer from hearing loss due to noise. In OR staff more than 66% of the anesthetist younger than 55 y had abnormal hearing function.⁴ A previous study concluded that about 50 to 55 dBA can be tolerated by the normal adult person at daytime. According to a study conducted in Lahore, Pakistan, all hospitals (private and public) exceed the WHO recommended ratio of 50 dBA at day time, which could cause detrimental effect on human health.^{5,6}

Chemical risks include exposure to various anesthetic gases, fumes and vapors that lead to poor health status of the OR staff. Waste anesthetic gases and halogenated anesthetic agents are contributive factors in polluting the environment. Inhale anesthetic upper limit in the environment is considered to be 25 parts per million (ppm) for nitrous oxide and 2 ppm for the halogenated agent.^{7,8} About 33million people per year operated in OT need million anesthetist which is exposed to volatile anesthetics.⁹ DNA damage, headache and dizziness has been reported due to chronic exposure to the waste anesthetic gases.¹⁰ Keeping in view the alarms raised by such studies, we aimed to determine the knowledge of occupational health hazards and practices among OR staff of Mardan Medical Complex Pakistan.

2. Methodology

A descriptive cross-sectional study was conducted at OR of Mardan Medical Complex, Mardan, from April to

September 2021. This study was conducted after approval from the institutional ethical review board. The data obtained were kept anonymous and confidential by the principal investigator. data regarding level of knowledge and safety practices among or staff i.e. the surgeons, the anesthetists, technologists, and the OR sisters were recorded on predesigned questionnaire.

The questionnaire was designed to record all the positive and negative responses of the participants regarding study variables in close ended form and contained different sections for socio-demographic data, knowledge of theatre workers on occupational hazards and the safety practices on occupational hazards among the OR staff.

Sample size calculation revealed a total of 109 participants using online Raosoft sample size calculator in consideration to the population size, with 5% margin of error, and confidence interval with 95%. Non probability convenient sampling technique was used for recruitment and enrollment of study participant.

Statistical analysis

Statistical significance and analyses were performed using SPSS v-22. Data are presented in the form of tables. Chi-square test was used to determine the association between categorical variable and $P < 0.05$ was considered statistically significant.

3. Results

A total of 109 participants were recruited for participation, including 72 (66%) males and 37 (34%) females. The gender distribution of the participants is shown in Table 1. Categorization of participant staff working in different fields of OR according to the work experience is shown in Table 2.

Regarding Knowledge and safety practices of respondents on occupational hazards among the staff, the surgeons had had the highest knowledge and awareness level, followed by the technician/technologist, OR nurses and the anesthetists respectively. Noise, needle stick injuries and body contamination with patient fluids is an occupational hazard in this hospital and majority of surgeons aware about its hazardous nature followed by the technician/technologist, OR nurses and the anesthetists as shown in (Table 3).

Majority of surgeons were well-trained about occupational hazards and prevention practices followed by technicians/technologists, and the nurses, while the anesthetists were the least trained.

Body fluids and the patient contact is the most likely source of occupational infections and its knowledge is

Table 1: Occupation/gender wise distribution of the participants; Data given as n (%)

Variables	Surgeons	Anesthetists	Theater Nurses	Technicians/Technologists	Total
Male	42 (68.8)	4 (66.6)	5 (26.3)	21 (91.3)	72
Female	19 (31.1)	02 (33.3)	14 (73.6)	02 (8.6)	37
Total	61	06	19	23	109

Table 2: Age group work experience cross tabulation (n)

Age Group	Working Experience				Total
	0-1 Y	2-5 y	6-10 y	10-15 y	
15-25 y	11	7	0	0	18
26-35 y	17	44	11	3	75
36-45 y	0	1	2	1	4
46-55 y	0	0	0	2	2
Total	28	52	13	6	99

Table 3: Knowledge and awareness among different trades; Data given as n (%)

Variables	Occupation				Total	P Value
	Surgeons (n = 61)	Anesthetists (n = 6)	Theater Nurses (n = 19)	Technicians- Technologists (n = 23)		
Do you know about occupational hazard and its Types	58 (95)	06 (100)	18 (94.7)	20 (86.9)	102	.501
Noise, needle stick injuries and body contamination with patient fluid is an occupational hazard in this hospital	52 (85.2)	06 (100)	19 (100)	19 (82.6)	96	.212
Have you been trained on occupational hazards and prevention practices	29 (47.5)	2 33.3	1 5.2	19 (82.6)	36	.002
Body fluids and patient contact is most likely source of occupational infection.	55 (90.1)	06 (100)	19 (100)	22 (95.6)	102	.382
Hand washing is good to prevent occupational cross infection after procedure	61 (100)	06 (100)	19 (100)	23 (100)	109	-----

prevalent among the surgeons, followed by the technicians/technologists, the nurses and the anesthetists. Similar distribution was observed regarding knowledge that hand washing is good to prevent occupational cross infection after procedures (Table 3).

Table 4 shows safety practices followed by different professionals of OR staff. Awareness of safety precautions against occupational hazards was highly prevalent among the surgeons, while the anesthetists were among the least knowledgeable group.

Prophylactic treatment and/or procedure following exposure to infectious agents were similarly more followed by the surgeons followed by the technicians/technologists, nurses and the anesthetists.

Regarding immunization status against infectious disease, surgeons have increased frequency of immunization against various infectious agent as compared to other professionals. Current study reveals surgeons were more aware about different occupational hazards as well as follows more safety practices.

There were statistically insignificant differences regarding occupational hazards and its relationship to

Table 4: Safety Practices among different occupation; Data given as n (%)

Question	Occupation				Total	P
	Surgeons (n = 61)	Anesthetists (n = 6)	Theater Nurses (n = 19)	Technicians- Technologists (n = 23)		
Are you aware of safety precautions against occupational hazards?	60 (98.3)	06 (100)	19 (100)	23 (100)	108	.-
Hand washing with bactericidal agent	61 (100)	06 (100)	19 (100)	23 (100)	109	.-
PPE Use	46 (75.4)	5 (83.3)	10 (52.6)	16 (69.5)	77	249
Gloves, Gowns and Caps	60 (98.3)	6 (100)	19 (100)	23 (100)	108	.851
Safe Disposal of Sharps	58 (95.0)	06 (100)	19 (100)	22 (95.6)	105	.741
Prophylactic treatment And /or procedure following exposure of infectious disease	55 (90.1)	05 (83.3)	19 (100)	17 (73.9)	96	.062
Complete immunization against infectious disease	40 (65.5)	4 (66.6)	4 (21.0)	3 (13.0)	51	.000

Table 4: Knowledge and Awareness with Experience; Data given as n (%)

Variables	Working Experience (Years)				Total	P value
	0-1 (n = 28)	2-5 (n = 52)	6-10 (n =13)	11-15 (n = 6)		
Do you know about occupational hazards and its types?	26 (92.8)	51 (98.0)	12 (92.3)	5 (83.3)	94	.363
Noise, needle stick injuries and body contamination with patient fluid is an occupational hazard in this hospital	21 (75)	46 (88.4)	13 (100)	6 (100)	86	.092
Body fluids and patient contact is MOST likely source of occupational infections?	27 (96.4)	46 (88.4)	13 (100)	6 (100)	92	.315
Have you trained on occupational hazard and preventive practices?	13 (46.4)	19 (33.5)	1 (7.6)	2 (33.2)	35	.226
Hand washing is good to prevent occupational cross infection after procedure?	28 (100)	52 (100)	13 (100)	6 (100)	99	-

work experience. The 2-5 y group was more aware about occupational hazards and its types in comparison to other groups. The work experience with body fluids had no significant association with the knowledge regarding patient contact being the most likely source of occupational infections ($P > 0.05$). Similarly, statistically insignificant findings were observed for variable like hand washing to prevent occupational hazard and

training on occupation hazard with work experience as shown in Table 5.

This study also stratified safety practice followed by participants with different categories of work experience as shown in Table 6. All participant among all categories of work experience were following all safety practices.

Table 5: Safety practices with work experience in years; Data given as n (%)

Variables	Safety Practices with Working Experience (Years)				Total	P Value
	0-1 (n = 28)	2-5 (n = 52)	6-10 (n = 13)	11-15 (n = 6)		
Are you aware of safety precautions against occupational hazards?	28 (100)	52 (100)	13 (100)	6 (100)	99	-
Hand washing with bactericidal agent?	28 (100)	52 (100)	13 (100)	6 (100)	99	-
PPE Use?	19 (67.8)	36 (69.2)	10 (76.9)	4 (66.6)	69	.941
Gloves, Gowns, Caps?	28 (100)	52 (100)	13 (100)	6 (100)	99	-
Safe disposal of sharps?	28 (100)	50 (96.1)	13 (100)	6 (100)	97	.605
Prophylactic treatment and/or procedures following exposures?	23 82.1	47 90.3	12 92.3	6 100	88	.510
Complete immunization against infectious disease?	15 (53.5)	25 (48)	5 (38.4)	1 (16.6)	46	.377

The 11–15 y experience group was taking prophylactic treatment and/or receive remedial measures following exposure to infectious agents followed by 6–10 y group. The findings in the current study were statistically insignificant for association studied. All variable of safety practices among different groups were independent of each other.

4. Discussion

Hazard is a potential risk with undesirable consequences that could arise from any substance or agent. Occupational hazard mostly has been defined as a risk, most often hazards related to the nature of job.¹ An estimated 100,000 individuals die due to occupational diseases, with approximately 400,000 new cases being diagnosed every year.¹¹ Certain hazards could arise from chronic exposure to against inducible agents. Safety practices and related knowledge are important to avoid occupational hazards.

In our study, we found that all anesthetists aware of the noise hazard in comparison to other staff, while most of the technicians had the least knowledge about noise as an occupational hazard. A study done previously showed agreement with our findings regarding increased frequency of participants who were aware about noise as an occupational hazard.^{5,12}

Noise, needle stick injuries and body contamination with patient fluids are widely known an the occupational hazards. Our findings reveal awareness of these three as occupational hazards was more prevalent among some study groups. The Health and Occupation Research Network (THOR) stated needle-stick injuries, musculoskeletal injuries, and noise-induced hearing loss are more prevalent among the HCWs.⁷ It is imperative to follow precautionary measures to prevent injuries related

to routine work. A study conducted by Nicholau et al. assessed preventive strategies and reported 49% of HCWs did not follow proper precautionary measure including gloves, proper recapping, and disposal of syringe after phlebotomy procedure.¹³ Our findings were in disparity with these findings with almost all participants following precautionary measures to prevent occupational hazard. Aluko et al. reported that 89% of the study participants had knowledge of occupational hazards. Another study discussed needle stick injuries, noise and patient body fluid as a high-risk chance for occurrence of occupational diseases.¹⁴ The authors reported 91% participants knew about needle stick injuries and blood borne infection as occupational hazard. Our findings are in similarity with their finding having awareness regarding needle stick injuries.

We studied the distribution of participants in different categories of work experience and different occupations to know about knowledge and awareness level of the occupation hazards. The occupation is insignificantly associated with $P > 0.05$. Same was observed for work experience to knowledge and awareness level of occupation hazards with insignificant findings. Aluko et al. reported similar findings with insignificant association of occupation with participant perception of occupational hazard.¹⁴ In our study most of the participants were well aware (especially the surgeons) to that recapping used needles is a risky practice which predisposes staff to needle-stick injury. Similar findings were reported by Oluwagbemi in their study.¹⁵ OR staff were more exposed to numerous occupational hazards as compared to other occupations because of characteristics specific to their nature of job. We observed prevention strategies to reduce occupational hazard by wearing hand gloves for routine clinical procedures, using PPEs where required, safe disposal of sharps and needles by majority

of the participants related to different backgrounds especially by the surgeons. Similar findings were reported by Aluko et al.¹⁴

Lack of awareness about infectious agents is a concern as it might reflect poor immunization status of OR staff, consequently responsible for low seroprevalence of anti HBs in all staff. In our study all participant included the surgeons, the anesthetists, OR nurses, and the technicians/technologists were well aware about body fluids and patient contact as the most likely source of occupation induced infections. Kim et al.¹⁶ also reported low awareness level among study participants regarding exposure to infectious agents like: hepatitis B, hepatitis C, and HIV in that order.

5. Conclusion

This study highlights awareness regarding knowledge and safety practices of occupational hazard among operational theater staff. We observed only the surgeons to be highly aware about occupational hazards, and followed safety practices. The anesthetists, the technicians/technologists, and the operating room nurses exhibited considerable less knowledge. We emphasize the need of regular training about knowledge and safety practices to prevent occupational hazard in hospitals. Full Immunization against various infectious agents and timely report of all cases upon exposure require prompt reporting and documentation.

6. Data Availability

Data related to this study is available with the primary author.

7. Financial support

No financial grant/support was received from any funding agencies, including public or private sectors.

8. Conflicts of interest

Authors have no conflicts of interest.

9. Author's contribution

All of the authors participated in all the stages of this article.

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