

## ORIGINAL ARTICLE

# HEALTH CARE WASTE MANAGEMENT AND HEALTH CARE PROVIDERS IN PRIVATE HOSPITALS

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## ABSTRACT

**Objectives:** To assess the knowledge and awareness and practices among health care providers in private hospitals of Khyber pakhtunkhwa about health care waste management.

**Material and Methods:** A descriptive cross sectional study using a self administered structured questionnaire was conducted from Feb 2019 to April 2019. Simple random sampling technique was used. The sample included all the doctors, nurses, lab technicians' employees of Muthahir clinic, hospitals who were present at the time of data collection those working in administration were excluded. The data were entered and analyzed in Microsoft Excel.

**Results:** The results showed that 18(51.6%) doctors were aware 21 (39.8%) nurses had an extremely poor knowledge of health care waste generation and legislation and just 1 (6.5%) lab technicians had a good awareness of health care waste management practice. Only 21 (58.3%) doctors knew about management practices of health care waste. So was true in 21 (39.8%) of nurses' and 12 (71%) in lab technicians.

**Keywords:** Health care waste, Health service providers, knowledge, awareness.

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## INTRODUCTION

Waste generated by activities in health care facilities includes a broad range of materials, from used needles and syringes to soiled dressings, body parts, diagnostic samples, blood, chemicals, pharmaceuticals, medical devices and radioactive materials<sup>1</sup>. Health care waste management means using such procedures that will not let disease to spread. During the recent past, effective and efficient stepwise health care waste management has emerged as a critical component in control of healthcare associated infections<sup>1</sup>. Hospital waste comprises of hazardous and non-hazardous waste. First category includes pathological waste, infectious waste, sharps, pharmaceuticals, and geno-

toxic, chemical and radioactive waste. This category makes 10 to 25% of total hospital waste and is risky for health so needs proper disposal. About 75% to 90% is non-hazardous general health care waste comparable to domestic waste<sup>1,2</sup>.

Globally waste production of developed countries is 1 to 5 kg/bed/day<sup>3</sup>. Hospital waste generation rate in U.S, UK and Taiwan is approximately 7 kg/bed/day, 1.67kg/bed/day and 2/5 kg/bed/day respectively<sup>[1]</sup>. Waste generation figure of Pakistan is 2 kg/bed/day out of which 0.1 to 0.5 comes under risk waste category. About 250000 tons of medical waste is produced from all sorts of health care facilities in Pakistan<sup>4,5</sup>.

To address the problem of hospital waste management in Pakistan a multi-prong approach is need to be adopted on priority basis followed by awareness campaign and trainings to provide basic protection and measures to those who are responsible for handling and disposing healthcare waste<sup>5</sup>. In developed countries, the situation is mitigated by strict application of legal frame work and other inputs<sup>6,7</sup>. As in poor and developing countries, studies based on observation

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and interviews highlighted some factors as reasons of fraught and inadequacy in HCW<sup>6, 8, 9-12</sup>. These reasons include-want of stringent application of rules, lack of adequate knowledge, awareness and motivation, dearth of appropriate technological interventions, improper management-strategies, inadequate funds or a mix of all<sup>10,11,12</sup>. A study conducted by WHO, revealed that two third of all the medical facilities, in 20 different countries, were not following the proper waste management practices. For proper waste management, it is essential that all medical waste materials are segregated at the point of generation<sup>13</sup> appropriately treated and disposed of safely. HC waste safe delivery plays an important part in hospital safety and sanitation. In Pakistan, studies regarding hospital waste disposal practice have been done in a number of hospitals in different cities but local data regarding this practice in our district is scanty. This study was conducted to get first hand information about KAP of health care workers regarding HC waste management in small local private set ups and draws recommendation in the light of our findings.

## MATERIAL AND METHODS

A descriptive cross sectional study was conducted in the 3 small private hospitals of KPK with bed capacity of 20-30, from Feb 2019 to April 2019. The total sample size with 75% power, alpha error of 0.05, at the difference of 0.2 and 0.5, it was 148 which are rounded to 150 for convenience. Of which doctors, nurses, and laboratory technicians each were selected by convenience sampling technique. Those health care workers who were working in the hospitals for more than one year and were willing to participate in the study population were included and those who were in administration were excluded from the study.

Ethical approval was taken from the ethical review committee of the institute authorities. Structured self administered questionnaire was implemented in order to ensure confidentiality each person was given a unique code. The completed forms were collected in sealed envelope after two days. This questionnaire consisted of 24 questions designed to obtain information about knowledge and awareness about health care waste management practices. Questions were grouped under two headings.

Knowledge of health care waste generation, hazards and legislation.

Level of awareness on health care waste management practices.

The responses were graded as Excellent (6 cor-

rect answers out of 8), good to average ( 3-5 correct answers out of 8), poor(<3 correct answers out of 8). The data was entered in Microsoft excel 2007 edition and presented in the form of graphs, tables and text form.

## RESULTS

The study was conducted in private hospitals of kpk; Peshawar, Pakistan. About 150 questionnaires were given to health care workers and graded with answer in response rate of about 72%. In our study, out of 108, 39 (36.1%) were males and 69 (63.8%) were females; 36 (33.3%) were doctors and 54(50%) were nurses, and 18 (16.7%) were lab technicians. Of 108 participants, 69(63.3%) knew about HCW, of whom 32 (91%) were doctors, 36 (67.3%) nurses, 6 (32.6%) were technicians. For the assessment of level of knowledge about HCW generation and hazards and legislation, doctors scored high i.e. 32 (91%), followed by nurses with a response rate 36(67.3%), of lab technicians scored very low i.e 6 (32.6%) as shown in Table 1.

The need for the separate permit was felt by 34(94.4%) of doctors. But surprisingly only 22 (41.6%) of nurses voted for it. Lab technicians didn't get the idea behind it 9 (50%) was the response rates. High level of awareness was seen in nurses 32 (88.8%), about health care waste storage and management while 49 (80.5%) of doctors were clear about it 13 (72.3%) of lab technician had no clear idea about it. When it comes to attitude, Doctors were well aware of Importance of HCW management, with 35(96.8%) of score, nurses scored 49 (90.6%) and for lab technician, the response rate was 12(68.4%).

Almost all doctors 36(100%) considered waste management as a team work. Percentage of nurses and lab technicians were 45 (83.3%) and 15(83.3%) respectively. Twenty nine i.e. (16%) nurses said that its job of a single person and not team work. The doctors 34 (94.4%) gave importance to safe management of health care waste while majority of lab technicians 24(66.6%) also gave importance to it. Nurses response was 45(83.3 %) that gave importance to safe management of hospital waste.

Practically, doctors were found more sound with 32(91.3%) of share on the whole. Interestingly, nurses have had more awareness and practicing of color coding 52 (97.2%) than doctors but also involved in practicing recapping 51 (94.4) more as compared to doctors. Thirty four (94.4%) of doctors were vaccinated against hepatitis B. Twenty three (44.45) of nurses got vaccinated while 2(11%) of lab technician were inocu-

lated with vaccine.

Regarding reporting injuries related to HCW Management, majority doctors' i.e.34 (94.4%) said that it is important. Nurses' response rate was 43(80.5%) and Lab technicians were 11(58.3%). Uses of personnel protective care equipments were same in doctors and nurses' i.e.(94.4%) 34 and 51 respectively. Only 9 of lab technician out of 18 were practicing personnel protective equipments i.e. (52.7%)

Over all doctors are high scorer, then come the nurses and in the last the lab technicians, making them vulnerable to work on them. Doctors have better Knowledge and attitude than practices. While nurses scored

high in practicing health care waste management practices. Doctors mostly gave importance to hospital waste management 29 (81.4%) as compared to nurses 18 (32.5%). lab technicians gave less importance to hospital waste management 12 (67.5%). The Above table Showed that 35 ( 98.1%) Doctors were aware of HC Waste Management But 12(71%) Of Lab Technician were not aware.

The above table made it clear that among health personnel doctors are the high scorer with 20 (56.4%) response rate in excellent category, followed by nurses with 15 ( 28.7%) response rate. In the last came the lab technicians with 2 (13%) score. While Lab technicians were at the top in poor category with 8 (45.4%) poor

**Table 1: Knowledge attitude and practice of the health care personnel's regarding HCW management.**

Knowledge	Doctors n=36	Nurses n=54	Technician n=18
HCW Definition	36(100%)	42(77.8%)	6(33.3%)
Existing HCW management rules	30(83.3%)	31(58.3%)	7(38%)
To know about HCWM is important?	33(91.6%)	36(66.6%)	2(11%)
Storage time for HCW	29(80.5%)	49(88.8%)	5(27.7%)
Various methods of disposal of HCW	32(88.8%)	51(94.4%)	7(38%)
Health problems caused by HCW	36(100%)	33(61.1%)	8(44.6%)
Importance of separate permit for HCW.	34(94.4%)	22(41.6%)	9(50%)
Regulating Agency for HCW.	32(88.8%)	27(50%)	5(27.7%)
Total of knowledge	32(91%)	36(67.3%)	6(32.6%)
<b>Attitude</b>			
HCW is an issue?	36(100%)	54(100%)	16(94.4%)
Safe HCWM is a team work?	36(100%)	45(83.3%)	15(83.3%)
Safe management an extra work on hospital?	34(94.4%)	45(83.3%)	12(66.6%)
Labeling container is of any significance?	36(100%)	49(90.6%)	14(77.7%)
Color coding of HCW.	36(100%)	52(97.2%)	6(33.4%)
Medical injury related to HCW.	36(100%)	54(100)	16 (86.1%)
Waste segregation at the source of production.	33(91.6%)	51(94.4%)	5(55.5%)
Proper disposal practices implemented or not.	32(88.8%)	42(77.8%)	9(50%)
Total of attitude	35(96.8%)	49(90.6%)	12(68.4%)
<b>Practice</b>			
Hazard of medical injury related to HCW.	36(100%)	54(100%)	17(94.4%)
Importance of reporting any medical injury Related to HCW	34(94.4%)	43(80.5%)	11(58.3%)
Follow color coding for HCW disposal.	32(89%)	52(97.2%)	13(72%)
Recapping of used needle.	31(86.1%)	51(94.4%)	14(80.6%)
Vaccination against Hepatitis B	34(94.4%)	23(44.4%)	2(11%)
Dispose HCW in designated color containers	30(83.3%)	49(91.6%)	12(64%)
How infected sharps are disposed of?	32(89%)	51(94.4%)	4(19.2%)
Use of personnel protective equipment	34(94.4%)	51(94.4%)	9((52.7%)
Total of practice			

**Table 2: knowledge level of Health care waste generation, hazards and legislation among health care personals.**

Health Care Personnel	Scoring criteria		
	Excellent	Good	Poor
Doctors	51.6%	39.8%	18.6%
Nurses	17.5%	50%	32.5%
Lab technicians	6.5%	26%	67.5%
Total	65.6	115.8	118.

**Table 3: Awareness level of health care waste management among Health care personals.**

Health Care Personnel	Scoring criteria		
	Excellent	Good	Poor
Doctors	58.3%	39.8%	1.8%
Nurses	39.8%	54%	6.2%
Lab Technicians	20.3%	47.2%	32.4%
Total	118.4	141	40.4

**Table 4: Level of practices of health care waste management.**

Health Care Personnel	Scoring criteria		
	Excellent	Good	Poor
Doctors	56.4%	34.2%	9.3%
Nurses	28.7%	57.4%	13.9%
Lab Technicians	13%	41.6%	45.4%
Total	98.1%	133.2%	68.6%

practice rate.

## DISCUSSION

Health care waste management is a team work, consisting of chain of people responsible for the task to carry out in sophisticated way. The most important step is segregation of the waste at the site of generation and at this step doctors and nurses are the key players<sup>14,16</sup>. From our study, lab technicians and nurses were found to have scored low in this questionnaire and the reason was obvious; lack of awareness and technical training and stringent application of rules and regulations i.e. WHO recommendation and hospital waste management guidelines 2005 pakistan. It is imperative that waste segregation and disposing should be done in a safe manner to protect the environment as well as human health. And this is only possible by regular monitoring and training at all levels. Thus intensive training

programs and monitoring at regular time intervals are needed for all staff, with special emphasis on junior trainee doctor, trainee's nurses and lab technicians.

This study was aimed to determine various factors that could potentially influence the KAP of health care worker toward health care waste in a health care facility and based upon these finding a solution may be recommended for appropriate handling of hospital waste, prevention of disorganized waste disposal and related health hazards. After data collection and analysis, it was found that amongst health care providers comparatively doctors' knowledge and awareness about health care waste, their legislation and management was better than other health care personals. This can be attributed to their level of qualification and interest to attend seminars regarding HC waste management.

Doctors not only defined HCW with 100% response rate but also scored high when it come to know about importance of HCW, or either testing of knowledge about various methods of disposal 32 (88.8%), health problems caused by the HCW 36(100%) and regulating agency 32 (88.8%) for hospital waste. Nurses' knowledge as compared to lab technician was also good scoring highest of all when it comes to know the storage time of HCW 49 (88.8%) or various methods of disposal of waste 51 (94.4%). But when asked about a need for separate permit they lagged behind with 22 (41.6%) response rate. This point should be dug deep to know the exact cause for this low response on nurses behalf. Similarly lab technicians were not aware of importance of health care waste management with 2 (11%) response rate i.e. lowest of all questions responses, asked about HCW knowledge. They also scored low in other questions so are the target group for further work up regarding HCWM. Similar findings were observed in studies<sup>17,19</sup>, where doctors showed better KAP in comparison to nurses and sanitation staff. They attributed these finding to their level of knowledge and education.

This study also revealed the poor level of knowledge and awareness about HC waste generation hazards, legislation and management among health care providers except doctors. These finding were also supported by similar observation in a study<sup>19</sup> from the region out side, where level of knowledge and awareness about health care management were satisfactory in doctors than nurses and sanitary staff.

In Attitude part of the study, (where misconceptions and misunderstandings are revealed) showed doctors on the top with a view considering HCW as an issue 36(100%), with a need to work as team 36 (100%), considering it important to label the containers 36 (100%) and knew well about different color coding for different types of waste 36 (100%). They also show interest in segregating waste at the site of production 33 (91.6%) response rate. Satisfaction rates 32 (88.8%) about proper implementation of waste disposal practices were also noted. Nurses were led by doctors in every question related to attitude about HCWM but when waste segregating at site of production is asked nurses' response rate was superior and with 42 (77.7%) satisfaction response rate about proper implementation of disposal practices it is considered that they must be further evaluated about it.

During the study, levels of health care waste management practices were found extremely poor in lab technicians. Although doctors were fully aware of medical injuries 36(100%) and importance of its reporting 34(94.4%). Surprisingly only 43(80.5%) of nurses gave it importance to report such injuries as they are more prone to these types of injuries during their duties due to nature of their jobs. Nurses follow color coding well 52 (97.2%) response rate, which is again a superior response rate regarding this question related to practices of HCWM, 32(89%) rate is obtained from doctors and 18 (72%) response rate is seen in lab technician. Superior vaccination rate is seen in doctors 34 (94.4%) with 23 (44.4%) in nurses and 2(11%) in lab Technician. The reason for high vaccination in doctors is due to their knowledge related to personnel protection measures. But here it is also important to increase the vaccination rate of other health care personnel's, by providing them with vaccination free of cost or at a very low cost and also provided them with proper health education. Over all doctors response rate was 32(91.3%), nurses response rate was 46 (87.1%) and lab technicians 11 (55.5%). In excellent category doctors were scoring 20(56.4%). In nurses were scoring 15 (28.7%) and 2 (13%) of lab technicians only scored in excellent category.

Comparatively knowledge of doctors was better regarding health care waste, legislation and the policies but when it comes to color coding nurses were considered best. A subsequent literature review suggests that

this is a common problem in many other health care institutions in Pakistan and other developing countries [8, 9, 12]. This may be because of most of our study female participants were nurses who show less awareness than practices in comparison to physician and who were involved in direct patient care and could be reason for spread of infection in hospitals and prolonged stay in hospitals wards. This may also be a reason for good level of knowledge in males in comparison to females and good level of practices regarding HCWM in female in comparison to male.

Our study found that 16(90%) of total lab tech has poor knowledge about health care waste generation and legislation. Beside this, they were also found ignorant of practicing HC waste management, making them one of the groups to work upon. These findings were consistent to some studies<sup>20,21</sup> where nurses had better KAP in comparison to sanitary staff and lab technicians.

Overall levels of health care waste management practices were found extremely poor. Only 10( 30%) doctors were found observing the rules and regulations of health care waste generation. On the other hand only 8(16%) of nurses and 2(7%) of lab technician were practicing rules and regulations laid down for waste generation, the reason may be the poor awareness and minimum supervision of HC waste management and guidance. This study finding was consistent to a study done in Karachi<sup>22</sup> where hospital staff was not aware of HCW management practices. Similar findings in neighboring countries<sup>23,24</sup> also suggested that mainly it was the lack of awareness and attitude of staff responsible for poor HCWM practices in different hospitals.

### **Limitations**

Sample size was small. Non cooperative behavior of participants. Limited resources. Limited time to conduct the study on larger scale

### **CONCLUSION**

The level of awareness and waste management practicing of doctors were much better as compared to other health care personnel's. It also identified gaps where lower qualified staff is ignored during training alternatively increasing their risk of being infected by underestimating the potential danger they are exposed to.

### **RECOMMENDATIONS**

This study suggested a need to formulate a ded-

icated committee on HCWM with emphasis on regular meeting at faculty level. Mandatory training from accredited centers for all health care workers and continuous monitoring and supervision mechanisms should be effectively implemented. As per need of hospitals PPE and HCWM consumables should be provided. Proper catchment area should be declared with proper waste transportation and disposal mechanism and segregation before incineration.

In case of accidental injury during waste handling, there should be an immediate reporting system and protective treatment available. In order to avoid potential hazards related to HC waste management, awareness and capacity building exercises should be done adequately and regularly.

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#### **AUTHOR'S CONTRIBUTION**

Following authors have made substantial contributions to the manuscript as under:

- Noreen S:** Intro discussion.  
**Gul R:** Research conception, Design, Final Approval.  
**Rehman R:** Data Analysis, Interpretation, Results.  
**Afridi SK:** Data Analysis.  
**Musa N:** Data Acquisition Methodology.  
**Alam Z:** Data Acquisition.  
**Khan SZ:** Data Acquisition.  
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Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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