Original Research Article

ASSESSING KNOWLEDGE, ATTITUDE, AND PRACTICE OF HEALTHCARE WORKERS REGARDING MEDICAL WASTE MANAGEMENT AT DISTRICT JAMSHORO, SINDH

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Abstract: *This study aimed to evaluate the waste management knowledge, attitudes, and practices of three groups of healthcare workers: doctors, nurses, and paramedical staff. A cross-sectional study involved doctors, nurses, and technicians at the National Institute of Cardiovascular Disease (NICVD) and the Syed Abdullah Shah Institute of Medical and Health Science (SASIMS) in Shahwan Sharif, District Jamshoro, Sindh. A convenient non-probability sampling technique was used to select the study participants. A total of 370 healthcare workers consented to be part of the study. The data was obtained through the administration of questionnaires. Data were collected and compiled using Microsoft Excel and analyzed using SPSS version 22.0. This study had 39 (63.2%) males and 34 (36.8 %%) females. The median age of participants was 30.5 years, with a mean of 33.12 ± 8.2 years. The majority of the participants were paramedics (42.7%). They were followed by doctors (34.3%) and nurses (23%). The knowledge of healthcare workers indicated that there was a significant association between the waste categories (p = 0.02), type of waste (p = 0.00), color coding differentiation (p = 0.01), hospital policies (p = 0.00), infection control department (p = 0.03), risk toward healthcare workers (p = 0.00), human anatomical waste (p = 0.01), color-coding container used for wasted sharps and infectious solid waste (p = 0.00), and type of color-coding container (p = 0.00) This study highlights the discrepancies and inadequacies of knowledge and practice of proper healthcare waste management among healthcare workers. Healthcare workers with adequate knowledge were paramedics, doctors, and nurses. All healthcare personnel should have medical waste management guidelines ready and easily accessible.*

Keywords: Medical Waste Management, Health Care Workers, Knowledge Attitude and Practice

Introduction

Healthcare workers and management have reportedly handled and managed hospital trash improperly, which has negatively affected the environment and public health inside and outside hospitals (Musa et al., 2023). Healthcare waste encompasses any waste generated during patient handling, especially in multi-department medical facilities. Among the wastes related to healthcare are needles, live immunizations, body parts, bodily fluid waste, lancets, sharp needles, and cultures. However, only 10–25% of infectious waste is generated; poorly managed health waste contaminates non-infectious waste, increasing the quantity of infectious waste generated (Kumar et al., 2018). The medical community and the general public are concerned about medical waste management (MWM). A sufficient understanding of healthcare waste management is a crucial precondition for healthcare workers (HCWs) to develop acceptable attitudes and behaviors for managing and disposing of medical waste (Mugabi et al., 2018). An estimated 7–10 billion tons of garbage are produced annually worldwide; only 2 billion tons are classified as municipal solid waste, with medical waste making up a minor portion of this total (Singh et al., 2007). According to estimates, 10%–25% of biomedical waste is toxic, whereas 75%–95% is non-hazardous(Sarker et al., 2014). Nevertheless, if the two categories of medical waste are combined, all of the medical waste might endanger people, animals, and the environment. However, data indicates that about 80% of medical waste, especially in poorer nations, is combined with regular garbage(Singh et al., 2007). Waste that is not managed correctly can significantly harm the environment (Tabasi and Marthandan, 2013) and have significant health effects on humans and animals(Singh et al., 2007). MWM is not adequately implemented in many developing nations, and there is also a shortage of operating standards and unclear rules (Muluken et al., 2013; Sawalem et al., 2009).HCW, the world's second most hazardous material, must be disposed of properly by licensed medical professionals(Kumar et al., 2013a). Medical personnel safety procedures and knowledge are crucial for handling this material. Reusing and recycling needles is a significant public health issue that has been documented worldwide, raising the possibility of risks to the general population(Kumar et al., 2013b). Needle prick injuries provide the most trouble, particularly for healthcare personnel processing the waste. According to reports, the rate at which global healthcare waste is generated varies from 0.5 to 2.0 kg per bed daily (Kumar et al., 2013b).

A cross-sectional study was conducted at a Pakistani metropolitan city's tertiary care government hospital. 82% of doctors and 54% of nurses were reported to be aware of hospital waste management regulations, compared to 83%

of paramedics who were not. A little over 86% of both were familiar with trash color coding and waste segregation, except paramedics, who only made up 42% (Kumar et al., 2013a).

An observational study measured the type and quantity of infectious and non-infectious hospital waste in a tertiary care hospital at Rawalpindi. The hospital staff's standard waste management procedures were noted. It was discovered that the average rate of trash creation across all wards was 1.35 kg/bed/day. Surgical wards were producing the most infectious trash(Mahmood et al., 2001). The correct segregation, transportation, and scientific disposal of the waste posed significant threats to hospital patients, personnel, and the general public.

Pakistan had over 92,000 hospital beds, each producing about 2 kg of garbage per day. Approximately 0.8 million tons of waste are made daily, and over two hundred fifty thousand tons are generated annually (Kumar et al., 2013b). The quantity of infectious hospital waste generated in Pakistan is by worldwide figures. Therefore, proper periodic training is necessary to improve the knowledge, attitude, and behaviors of health workers who often manage rubbish. Scavengers and trash collectors from lower socioeconomic groups recycle used syringes more frequently and experience more needle stick injuries in developing countries.

Few studies have been done to evaluate the knowledge of nurses merely within healthcare settings; however, no one has studied the attitude, practices, and knowledge of all of these healthcare professionals who play a significant role in HCW management. The purpose of this study was to evaluate the waste management knowledge, attitudes, and practices of three groups of healthcare workers: doctors, nurses, and paramedical staff employed at the National Institute of Cardiovascular Disease and the Sayed Abdullah Shah Institute of Medical and Health Science in Shahwan, Sharif.

Methodology

A cross-sectional research was carried out at the National Institute of Cardiovascular Disease and Sayed Abdullah Shah Institute of Medical and Health Science in Sehwan, Sharif District Jamshoro, Sindh, to evaluate healthcare workers' knowledge, attitude, and practice about medical waste management. This study was done from January 2023 to October 2023. Healthcare workers, including nurses, paramedics, and doctors, were chosen for the study based on their availability and willingness to participate using non-probability convenient sampling. An already constructed, semi-structured questionnaire assessed research participants' knowledge, attitudes, and behaviors about medical waste management. A total of 370 healthcare workers participated in the study. The majority of the participants were male, 63.2%, and female, 36.8%; in the categories of healthcare workers, the majority were paramedics, followed by doctors and nurses. The formula for determining the sample size for cross-sectional descriptive studies was used to calculate the sample size for this investigation.

$$n = z^2 p (1-p)/e^2$$
"Where n= sample size"
"z= degree of accuracy/level of confidence 95% (1.96)"

"p= 0.6"
e= 0.05

$$n = \frac{1.96^2 \times 0.6 (1- 0.6)}{(0.05)^2}$$

$$n = \frac{3.84 \times 0.6 (0.4)}{0.0025}$$

$$n = \frac{0.9216}{0.0025}$$

$$n = 368$$

To avoid discrepancies, 370 was taken as a sample

The pre-structured questionnaire was divided into four sections. The first component included the socio-demographic data of the research participants, including age, gender, and occupation. Section two consists of 10 questions regarding knowledge such as medical waste, type of medical waste, color coding, needle stick injuries, infection control department, risk for healthcare workers, knowledge regarding color coding container usage, municipal waste, wasted sharps, and infectious solid waste, and discarding medication. Section three consists of 8 questions regarding attitude, and the questions regarding waste management practice have nine questions, respectively. The attitude tools consist of a five-point Likert scale (strongly agree, agree, neutral, disagree, strongly disagree) of five questions, of which one was the correct response. The practice questions' responses were recorded as yes or no, some always never, and some times. The head of the relevant department at the Abdullah Shah Institute of Medical and Health Science and National Cardiovascular Disease, Sehwan Sharif, approved institutional approval. We acquired informed permission from every research participant. The identical research subjects' information was kept private and confidential. Participants who did not provide consent or were not employed by NICVD or SASIMS were not allowed to continue the research. The data were checked for consistency and correctness before being entered into a computer and kept in Excel datasheets. For data analysis, SPSS version 22.0 (SPSS) was utilized. The T-test was used for quantitative data, whereas the Chi-square test was used for qualitative data and relationships. A p-value of less than 0.05 is considered statistically significant. For the investigation, a 95% confidence level would be applied.

Results

The participants' socio-demographic information revealed that, of the 370 HCWs included in the analysis, 234 (63.2%) were male. The median age of participants was 30.5 years, with a mean of 33.12 ± 8.2 years. The participants were in the range of 18 to 62 years of age. The study revealed good knowledge of waste management amongst paramedics (42.7%), doctors (34.3%), and nurses (23%).

Table 1 illustrates the Knowledge of Health Care Workers regarding Medical Waste Management. The study's findings showed that the three groups of HCWs at the hospital under investigation differed in their understanding, attitudes, and practices regarding waste management. There were deficiencies in the waste management knowledge of each category of healthcare workers in this study. In terms of waste management knowledge, the majority of healthcare workers scored highly in understanding the essentials of MWM and handling elements, such as the categorization of

different types of waste, policies on needle-stick injury, the existence of an infection control department within the hospital, and differentiating containers based on color coding.

Table 1: Knowledge of Health Care Workers regarding Medical Waste Management (n = 370)

	Questions	Yes	No	Don't know/no answer
			F (%)	
1	"Do you know the category of waste that is called medical waste?"	343 (92.7)	24 (6.5)	3 (0.8)
2	Have you been trained about waste differentiation put into color-coding containers?	293 (79.2)	73 (19.7)	4 (1)
3	"Do you know about the policies in this hospital about reporting needle stick injuries?"	273 (73.8)	95 (25.7)	2 (0.5)
4	"Is there an infection control department in this hospital that deals with waste management?"	325 (87.8)	37 (10)	8 (2.2)
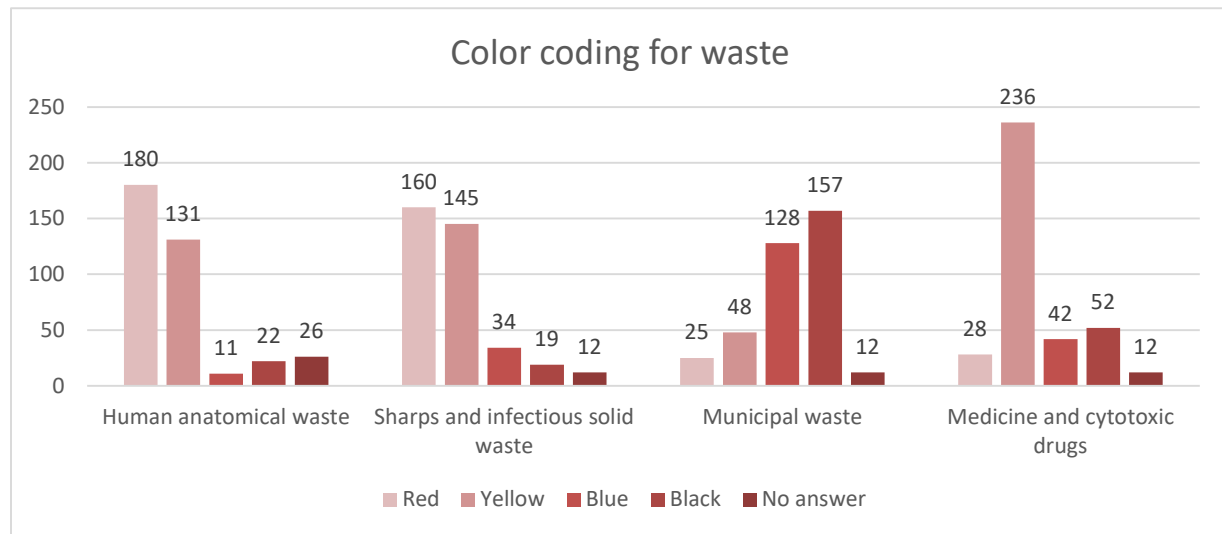
Figure 1: Color coding for waste management in the study population:

The HCWs were asked about their knowledge of color coding for waste disposal. The most common human anatomical waste disposal answer was a red-colored bin (n = 180). Sharps and infectious solid waste were mostly answered as red (n = 160). Municipal waste was responded to by 157 as black, and 236 picked a yellow bin for medicine and cytotoxic drug disposal (Figure 1).

Our results regarding the knowledge of healthcare workers indicated that there was a significant association between the waste categories (p = 0.02), type of waste (p = 0.00), color coding differentiation (p = 0.01), hospital policies (p = 0.00), infection control department (p = 0.03), risk toward healthcare workers (p = 0.00), human anatomical waste (p = 0.01), color-coding container used for wasted sharps and infectious solid waste (p = 0.00), and type of color-coding container (p = 0.00). Among the healthcare workers, 343 (92.7%) had knowledge regarding the categories of waste, 321 (86.8%) had knowledge regarding the type of waste produced in the hospital, 293 (79.2%) were trained to waste differentiation in a color-coding container, 273 (73.8%) knew about the hospital policies regarding needle stick injuries, and 325 (87.8%) responded that they knew about the infection control department, which deals with hospital waste management. 296 (72.7%) knew the risk factors for healthcare workers and patients if the waste was not properly handled; furthermore, 180 (48.6%) knew about the color-coding container that had been used for anatomical waste; 160 (43.2%) knew about the color-coding container that was used for wasted sharps and infectious solid waste; and 336 (63.8%) knew about the type of color-coding container that was used for discarding medicine and cytotoxic drugs (Table 2).

Table 2: Association of Knowledge of Health Care Workers regarding Medical Waste Management

Variables	Doctors (n=127)	Nurses (n=85)	Paramedics(n=158)	Total (n=370)	P value
Do you know the category of waste?					
Yes	115(31.1%)	84(22.7%)	144(38.9%)	343(92.7%)	
No	9(2.4%)	1(0.3%)	14(3.8%)	24(6.5%	0.023
No answer	3(0.8%)	0(0.0%)	0(0.0%)	3(0.8%)	
What type of waste is produced in the hospital?					
Solid waste	16(4.3%)	1(0.3%)	4(1.1%)	21(5.7%)	
Chemical waste	4(1.1%)	0(0.0%)	2(0.5%)	6(1.6%)	0.000

					P value
Infectious solid waste	17(4.6%)	2(0.5%)	3(0.8%)	22(5.9%)	
All of them	90(24.3%)	82(22.2%)	149(40.3%)	321(86.8%)	
Have you been trained about waste differentiation put into color-coding containers?					
Yes	97(26.2%)	78(21.1%)	118(31.9%)	293(79.2%)	
No	28(7.6%)	5(1.4%)	40(10.8%)	73(19.7%)	0.001
No answer	2(0.5%)	2(0.5%)	0(0%)	4(1%)	
Do you know the hospital policies about reporting needle stick injuries?					
Yes	103(27.8%)	71(19.2%)	99(26.8%)	273(73.8%)	
No	22(5.9%)	14(3.8%)	59(15.9%)	95(25.7%)	0.00
No answer	2(0.5%)	0(0.0%)	0(0.0%)	2(0.5%)	
Is there an infection control department in this hospital that deals with waste management?					
Yes	107(28.9%)	77(20.8%)	141(38.1%)	325(87.8%)	
No	18(4.9%)	5(1.4%)	14(3.8%)	37(10.0%)	0.03
No answer	2(0.5%)	3(0.8%)	3(0.8%)	8(2.2%)	
What can be a risk for healthcare workers and patients if waste is not handled correctly?					
Sharps inflicted injuries	23(6.2%)	7(1.9%)	4(1.1%)	34(9.2%)	
Toxic exposure	9(2.4%)	18(4.9%)	17(4.6%)	44(11.9%)	
Airborne pathogen	6(1.6%)	1(0.3%)	7(1.9%)	14(3.8%)	0.00
Bacterial infections	2(0.5%)	0(0.0%)	7(1.9%)	9(2.4%)	
All of them	87(23.5%)	59(15.9%)	123(33.2%)	269(72.7%)	
Do you know which color-coding container is used for human anatomical waste?					
Red	76(20.5%)	42(11.4%)	62(16.8%)	180(48.6%)	
Black	28(7.6%)	38(10.3%)	65(17.6%)	131(35.4%)	
Yellow	11(3.0%)	2(0.5%)	9(2.4%)	22(5.9%)	0.001
Blue	4(1.1%)	0(0.0%)	7(1.9%)	11(3.0%)	
No answer	8(2.2%)	3(0.8%)	15(4.1%)	26(7.0%)	
Do you know which color-coding container is used for wasted sharps and infectious solid waste?					
Red	52(14.1%)	31(8.4%)	62(16.8%)	145(39.2%)	
Yellow	65(17.6%)	39(10.5%)	56(15.1%)	160(43.2%)	
Blue	7(1.9%)	13(3.5%)	14(3.8%)	34(9.2%)	0.00
Black	3(0.8%)	2(0.5%)	14(3.8%)	19(5.1%)	
No answer	0(0.0%)	0(0.0%)	12(3.2%)	12(3.2%)	
Which type of color-coding container is used for discarding medicine and cytotoxic drugs?					
Red	73(19.7%)	68(18.4%)	95(25.7%)	236(63.8%)	
Yellow	28(7.6%)	4(1.1%)	25(6.8%)	42(11.4%)	
Black	13(3.5%)	10(2.7%)	5(1.4%)	28(7.6%)	0.00
Blue	13(3.5%)	3(0.8%)	21(5.7%)	52(14.1%)	
No answer	0(0.0%)	0(0.0%)	12(3.2%)	12(3.2%)	

Table 3: Attitude of the health care workers regarding medical waste management

	Variables	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	*P value*
1	Is Medical Waste segregation important?	320 (86.5)	27 (7.3)	6 (1.6)	15 (4.1)	2 (0.5)	0.00
2	Is the Participation of healthcare workers necessary in waste management?	307 (83)	44 (11.9)	3 (0.8)	14 (3.8)	2 (0.5)	0.00
3	Do you agree that infection control education can improve waste management among healthcare workers?	240 (64.9)	97 (26.2)	15 (4.1)	7 (1.9)	11 (3)	0.00
4	Do you think Medical Waste management is your professional task?	87 (23.5)	238 (64.3)	17 (4.6)	17 (4.6)	11 (3)	0.00
5	Do you think medical waste can be improved by using color-coded bins?	142 (38.4)	166 (44.9)	28 (7.6)	22 (5.9)	12 (3.2)	0.00
6	Is Labeling the container before filling it with waste an important step?	179 (48.4)	144 (38.9)	16 (4.3)	17 (4.6)	14 (3.8)	0.00
7	Should stricter enforcement strategies be followed in waste management?	168 (45.4)	151 (40.8)	23 (6.2)	13 (3.5)	15 (4.1)	0.00
8	Do you think waste is sufficiently segregated in this hospital?	77 (20.8)	183 (49.5)	81 (21.9)	19 (5.1)	10 (2.7)	0.04

Table 3 demonstrates medical waste segregation is crucial. Most participants stated that healthcare workers' participation is essential, and that infection control education may enhance healthcare workers' waste management. Before filling the container with garbage, it is crucial to label it. Tighter enforcement tactics should also be used in waste management.

Others, however, concurred that professionals should handle waste management, that medical waste management may be enhanced by employing color-coded containers, and that this hospital's trash was adequately divided. Moreover, there was a significant association between the level of attitude and the factors. However, waste segregation in the hospital was not substantial.
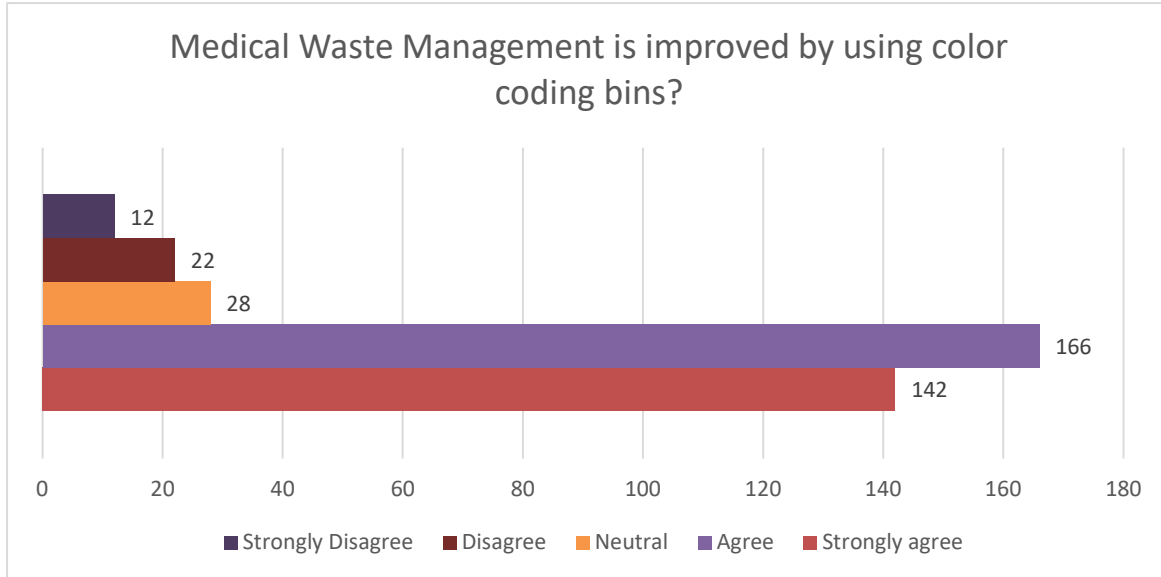

Figure 2: Medical Waste Management is improved by using color-coding bins in the study population

One hundred forty-two participants agreed that medical waste management is improved by using color-coding bins, 166 decided on this statement, 28 stayed neutral, 22 disagreed, and 12 strongly disagreed with the word (Figure 2).

Table 4 depicts the Attitudes of healthcare workers regarding medical waste management. Of 370 participants, 320 (86.5%) strongly agreed that medical waste segregation is essential, of which 104 (28.1%) were doctors. 83 (22.4%) were nurses, and 133 (35.9%) were paramedics. 307 (83%) participants strongly agreed regarding the participation of healthcare workers in waste management: 134 (36.2%) paramedics, 98 (26.5%) doctors, and 75 (20.3%) nurses. It was observed that 240 (64.9%) of the healthcare workers. We firmly agreed that infection control education could improve waste management among healthcare workers and 89 (24.1%) paramedics. 77 (20.8%) were nurses, and 74 (20.0%) were doctors. Meanwhile, 238 (64.3%) agreed that

medical waste management is their professional task, as well as paramedics (30.3%), doctors (20.5%), and nurses (13.5%). Further, it showed that 160 (44.9%) agreed that medical waste could be improved by using color-coding bins, mostly paramedics (77 (20.8%), nurses (30 (8.1%), and doctors (59 (15.9%). Regarding the importance of labeling, 179 (48.4%) strongly agreed that labeling the container before filling it with waste is essential. Out of which 72 (19.5%) were paramedics, 60 (6.2%) were nurses, and 47 (12.7%) were doctors. There were 168 (45.4%) participants who strongly agreed regarding stricter enforcement strategies that should be followed in waste management; among those, 70 (18.9%) were paramedics. 52 (14.1%) were doctors, and 46 (12.4%) were nurses. In the last question regarding segregation, 18.3 (49.5%) agreed that the waste could be sufficiently segregated in the hospital; among those, 93 (25.1%) were paramedics, 35 (14.3%) were doctors, and 37 (10.0%) were nurses.

Table 4: Association of Attitudes of the healthcare professionals towards medical waste management

Is Medical Waste segregation necessary?	Doctors 127	Nurses 85	Paramedics 158	Total 370	*P value*
Strongly agree	104(28.1%)	83(22.4%)	133(35.9%)	320(86.5%)	0.000
Agree	8(2.2%)	0(0.0%)	19(5.1%)	27(7.3%	
Neutral	1(0.3%)	2(0.5%)	3(0.8%)	6(1.6%)	
Disagree	13(3.5%)	0(0.0%)	2(0.5%)	15(4.1%)	
Strongly disagree	1(0.3%)	0(0.0%)	1(0.3%)	2(0.5%)	
Do you think the participation of healthcare workers in waste management is necessary?					
Strongly agree	98(26.5%)	75(20.3%)	134(36.2%)	307(83.0%)	
Agree	14(3.8%)	8(2.2%)	22(5.9%)	44(11.9%)	

Neutral	1(0.3%)	0(0.0%)	2(0.5%)	3(0.8%)	0.002
Disagree	12(3.2%)	2(.5%)	0(0.0%)	14(3.8%)	
Strongly disagree	2(0.5%)	0(0.0%)	0(0.0%)	2(0.5%)	
Do you agree that infection control education improves waste management?					
Strongly agree	74(20.0%)	77(20.8%)	89(24.1%)	240(64.9%)	
Agree	36(9.7%)	6(1.6%)	55(14.9%)	97(26.2%)	0.000
Neutral	6(1.6%)	0(0.0%)	9(2.4%)	15(4.1%)	
Disagree	2(0.5%)	0(0.0%)	5(1.4%)	7(1.9%)	
Strongly disagree	9(2.4%)	2(0.5%)	0(0.0%)	11(3.0%)	
Do you think Medical Waste management is your professional task?					
Strongly agree	25(6.8%)	35(9.5%)	27(7.3%)	87(23.5%)	
Agree	76(20.5%)	50(13.5%)	112(30.3%)	238(64.3%)	0.000
Neutral	8(2.2%)	0(0.0%)	9(2.4%)	17(4.6%)	
Disagree	9(2.4%)	0(0.0%)	8(2.2%)	17(4.6%)	
Strongly disagree	9(2.4%)	0(0.0%)	2(0.5%)	11(3.0%)	
Do you think medical waste management can be improved by using color-coded bins?					
Strongly agree	37(10.0%)	47(12.7%)	58(15.7%)	142(38.4%)	
Agree	59(15.9%)	30(8.1%)	77(20.8%)	166(44.9%)	0.000
Neutral	14(3.8%)	2(0.5%)	12(3.2%)	28(7.6%)	
Disagree	8(2.2%)	3(0.8%)	11(3.0%)	22(5.9%)	
Strongly disagree	9(2.4%)	3(0.8%)	0(0.0%)	12(3.2%)	
Is labeling the container before filling it with waste a critical step?					
Strongly agree	47(12.7%)	60(16.2%)	72(19.5%)	179(48.4%)	
Agree	58(15.7%)	16(4.3%)	70(18.9%)	144(38.9%)	0.000
Neutral	8(2.2%)	0(0.0%)	8(2.2%)	16(4.3%)	
Disagree	5(1.4%)	7(1.9%)	5(1.4%)	17(4.6%)	
Strongly disagree	9(2.4%)	2(0.5%)	3(0.8%)	14(3.8%)	
Do you think that stricter enforcement strategies should be followed in waste management?					
Strongly agree	52(14.1%)	46(12.4%)	70(18.9%)	168(45.4%)	
Agree	47(12.7%)	27(7.3%)	77(20.8%)	151(40.8%)	0.000
Neutral	14(3.8%)	4(1.1%)	5(1.4%)	23(6.2%)	
Disagree	5(1.4%)	8(2.2%)	0(0.0%)	13(3.5%)	
Strongly disagree	9(2.4%)	0(0.0%)	6(1.6%)	15(4.1%)	
Do you think that medical waste is sufficiently segregated in the hospital?					
Strongly agree	26(7.0%)	21(5.7%)	30(8.1%)	77(20.8%)	
Agree	53(14.3%)	37(10.0%)	93(25.1%)	183(49.5%)	0.044
Neutral	34(9.2%)	22(5.9%)	25(6.8%)	81(21.9%)	
Disagree	9(2.4%)	5(1.4%)	5(1.4%)	19(5.1%)	
Strongly disagree	5(1.4%)	0(0.0%)	5(1.4%)	10(2.7%)	

Table 5: Practice of health care workers in Waste management

Variables	Options	f	%	*P value*
Which types of medical waste disposal facilities are available at your hospital?	Incineration	317	85.7	P <0.05
	Autoclaving	25	6.8	
	Burning	24	6.5	
	No answer	4	1.1	
Which personal protective equipment is used for dealing with medical waste?	Gloves/masks	15	4.1	P < 0.05
	Glasses/gown	2	0.5	
	Shape covers/leg protectors	6	1.6	
	All of the above	345	93.2	
	No answer	2	0.5	

Table 5 shows that the majority of respondents gave favorable answers, and the values were determined to be necessary regarding the healthcare professionals' classification. The methods of disposing of medical waste their hospital offers include burning, autoclaving, and incineration, as explained to the responders. A total of 317

(85.7%) respondents said that incineration is available, followed by autoclaving (25 6.8%), burning (24 6.5%), and not responding (4.1). The significance of this question regarding the designation of healthcare professionals was discovered.
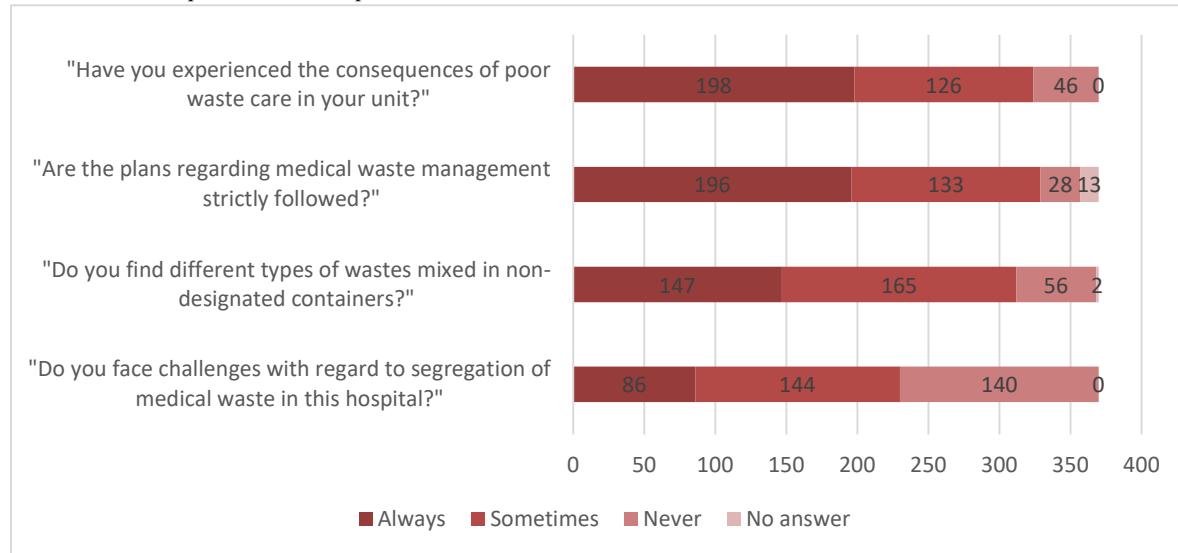
Figure 3. Practices of Healthcare Workers in Waste Management

The pattern of the practice of HCWs in BMW management. Most HCWs (53.5%) have always experienced the consequences of poor waste care in the Unit. 52.9% always strictly follow the plans regarding MWS. Most participants

(44.5%) found different types of waste mixed in non-designated containers. Moreover, 38.9% of patients face challenges about the segregation of medical waste in the hospital (Figure 3).
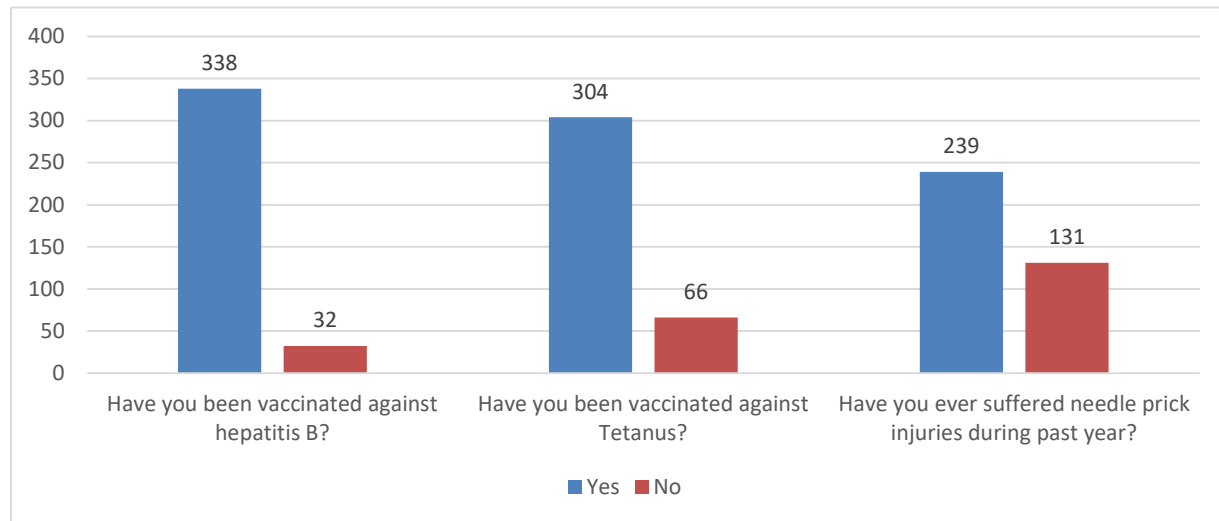

Figure 4: Vaccination status of the study population

Figure 4 shows that most workers had been vaccinated, as shown. In case of suffering needle prick injuries, 64.6 percent responded that they had suffered, whereas 35.4 did not suffer any needle prick injury in the past year. Significance was found with the designation of health care workers for the variable of needle prick injuries (p<0.05)

Discussion

This study aimed to evaluate the medical waste management knowledge, attitudes, and practices of three groups of healthcare workers: doctors, registered nurses, and paramedics employed at the National Institute of Cardiovascular Disease and the Sayed Abdullah Shah Institute of Medical and Health Science in Shahwan, Sharif District Jmashoro.
Numerous investigations confirm the current study's conclusions. A recent study showed a statistically

significant relationship between gender, job experience, and academic attainment.

The study's findings showed that the three groups of HCWs at the hospital under investigation differed in their understanding, attitudes, and practices regarding waste management. There were deficiencies in the waste management knowledge of each category of healthcare workers in this study. In terms of waste management knowledge, the majority of healthcare workers scored highly in understanding the essentials of MWM and handling elements, such as the categorization of different types of waste, policies on needle-stick injury, the existence of an infection control department within the hospital, and differentiating containers based on color coding.

In the current study, 38.9%, 31.1%, and 22.7% of paramedics, doctors, and nurses have good knowledge of the waste category and type. Our results, however, differ from those of research conducted at Yusuf Dantsoho Memorial Hospital (YDMH), Kaduna, Nigeria, which showed that 88.9% of doctors, 87.9% of nurses, and 83.3% of technicians had enough understanding of how to dispose of medical waste properly. Furthermore, 79.2% of the population was studied by paramedics (31.9%), doctors (26.2%), and nurses (21.1%) regarding aspects of knowledge regarding waste differentiation, training, and disposal of waste after collection. Studies contradicting our findings indicate that medical professionals such as nurses and doctors knew more about color-coding containers and rubbish segregation than other staff members (Mousavi et al., 2016). Most doctors, 103 (27-8%), reported knowing needle-stick injury reporting guidelines, which is inconsistent with the results from various research (Asadullah et al., 2013; Mugabi et al., 2018). Moreover, 269 (72.7%) respondents indicated they were aware of the risks to one's health that result from insufficient MWM.

The World Health Organization indicates that incorrect handling of medical waste generated in healthcare facilities may pose a severe risk to the environment, the general public, and healthcare workers(Janik-Karpinska et al., 2023). 86% of respondents agreed that medical waste segregation is crucial in waste management. This was in line with the findings of other studies (Mane et al., 2016; Mugabi et al., 2018).

64.9% of respondents strongly agreed that infection control education may help healthcare staff manage waste better. Healthcare personnel benefit from training because it imparts knowledge, provides information, and fosters understanding. HCW training can significantly reduce health risks. A prior study found that a significant number of healthcare workers and service providers had not undertaken any activity that may have prepared them for the appropriate transmission of illnesses, significantly affecting their comprehension (Al-Ahmari et al., 2021). In the current study, 44.9% agreed that medical waste can be improved by using color-coded bins. In the existing study, 48.4% strongly agreed that labeling the container before filling it with waste is essential. Comparable to another survey conducted in southeastern Nigeria, just 40% of hospital managers stated they had participated in any MWM training. If the HCWs have a positive attitude, they will follow the healthcare institution's policies, processes, and evidence-based practices (Asdaq et al., 2021).

In the present study, most healthcare workers (52.9%) always followed the plan guidelines regarding MWM. These findings are consistent with studies in West Bengal (Dalui et al., 2021). 38% face challenges with the segregation of medical waste in the hospital. Similarly, another study revealed that, regarding practice, 68% of HCWs knew that segregation was the most essential thing in waste management. MWM requires teamwork, and no single class was responsible for this. As per WHO guidelines, medical personnel should have a hepatitis B infection vaccination to prevent work-related problems in medical settings. The research found that there was a low level of hepatitis B infection vaccination despite the significant likelihood of work-related accidents among healthcare workers. In comparison, the rates are 85.8% and 95%, respectively. Inaccessibility and cost of immunization could be the potential foundations for the low inoculation status of HCWs in the study (Amouei et al., 2015; Mane et al., 2016).

Conclusion

This study shows a good knowledge of healthcare waste management among healthcare workers. All healthcare workers should have medical waste management guidelines ready and easily accessible. For hospitals to handle trash properly, staff refresher training and continuous surveillance of their waste management practices are crucial. Strict implementation of guidelines on biomedical waste management, including waste segregation, should be done to protect waste handlers and hospital visitors.

Declarations

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All data generated or analyzed during the study are included in the manuscript.
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The authors declared absence of conflict of interest.

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