

Knowledge, attitude and practice of hospital waste disposal among cleaners in a tertiary health institution in Plateau State, Nigeria

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Abstract

Background: Hospital waste disposal has become an important public health concern especially in low and middle-income countries. Health hazards could occur where there are inadequate and improper techniques in handling these wastes. The aim of this study was to assess the knowledge, attitude and practice of hospital waste disposal among cleaners in a tertiary hospital of Plateau State, Nigeria.

Method: This was a cross-sectional study carried out among 206 cleaners. Data was collected using a semi-structured interviewer-administered questionnaire. Knowledge, attitude and practice were all graded and scored. Analysis was done using Epi Info version 3.5.4 at a confidence level of 95% and p-value of < 0.05.

Results: The mean age of respondents was 36.9 ± 9.5 years. The highest level of education was secondary school among 110 (54%) of them and 169 (82%) had been working for ≤ 10 years. Knowledge, attitude and practice was good among 83

(41%), 203 (98%) and 17 (8.3%) of respondents respectively. Knowledge grade and previous training were found to have a statistically significant relationship with practice on biomedical waste disposal ($p < 0.05$).

Conclusion: The study revealed a lack of knowledge and poor practice of hospital waste disposal among hospital cleaners though with most having a good attitude. The hospital needs to train and retrain hospital cleaners, adopt and enforce guidelines specific for their use on medical waste disposal.

Key words: Hospital waste disposal, cleaners, knowledge, attitude, practice

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Introduction

Hospital waste, improperly managed, poses potential health risks to humans, animals and the environment.¹ Exposures can occur among hospital workers, patients and the general public.² It is estimated that 10 to 25% of healthcare waste is hazardous and with medical advancements, there has been an increase in waste production per patient in healthcare facilities globally.^{2,3} The risk of exposure to hospital waste, infection and death is said to be higher in developing countries.⁴⁻⁷

Assessments of healthcare workers have found that cleaners and waste collectors are less likely to have been trained on hospital waste management compared to clinical staff, especially in developing countries.^{8,9,10} Studies have also found cleaning or sanitary staff to be ignorant on all aspects of hospital waste disposal including post-exposure prophylaxis and concurrently

showed poor or improper disposal practices, hand hygiene, use of personal protective equipment (PPE) and poor reporting of exposure incidences.^{7,10-16} Lack of training, lack of guidelines, lack of waste disposal equipment such as safety boxes, colour coded boxes, domestic gloves and designated disposal sites have also been shown to affect compliance and encourage poor disposal practices.^{7,14,17,18}

This study aimed to assess the knowledge, attitude and practice of hospital waste disposal among cleaning staff and factors that may influence them. This would provide a basis for recommendations of proper conducts that would improve safety in hospital waste management and reduce the burden of preventable infections.

Material and Methods

Study setting and study population

The study was conducted in the Jos University Teaching Hospital (JUTH), Plateau State, Nigeria. It is a 600-bed capacity tertiary health facility that provides diverse and specialized services in various aspects of health care, training and research.¹⁹ Cleaners are personnel involved in day to day tidying of the hospital. They handle infectious and non-infectious wastes generated during the course of patient management. These wastes include sharps and needles, blood and blood products, urine and body secretions. They are employed both by the hospital management and through contracts with private agencies. They run shifts, are posted to the wards and

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emergency units while some take care of the corridors and other areas of the hospital as needed. The number of cleaners was estimated to be 365 in number spread unevenly across the four employers. The study population comprised of male and female cleaners of the hospital. It included all who have been working in the unit for at least one month as the authors' adjudged this was sufficient time for respondents to be familiar with the processes in the unit for waste disposal to give reliable responses in the practice section. Those who were excluded were those who were on leave (annual, sick or maternity), those in administrative departments and those whose primary duties did not involve handling hospital waste.

Study design, sample size and sampling method

This study employed a cross-sectional study design to assess the knowledge, attitude and practice of hospital waste disposal among cleaners working in JUTH. The minimum sample size was calculated using the Cochran's formulae ($n \leq z^2 pq/d^2$)²⁰ and deriving the prevalence (p) from a previous study that found a 38.7% level of good practice of hospital waste management among non-professionals (cleaners, ward attendants, porters).²¹ Finite correction for small populations²² was also done and 10% of the calculated sample size of 183 was added to arrive at an estimated sample size of 202. All who met the inclusion criteria were selected giving a total of 206 respondents.

Data collection

Data collection was with the use of a semi-structured interviewer administered questionnaire developed from literature review of similar studies.^{2,8,21,23,24} It was pretested among similar cadre of staff in Plateau State Specialist Hospital (PSSH), a tertiary hospital in the State. The questionnaire comprised of four sections which included: socio-demographic information, knowledge on hospital waste disposal, attitude towards hospital waste disposal and practice of hospital waste disposal. Eligible respondents were identified from the information provided by the heads of the various units. Respondents were approached when they reported for duty on their various shifts, after consent was obtained, the questionnaire was administered in a space that provided privacy.

Data analysis

Data were entered, cleaned and analyzed using Epi Info version 3.5.4. Data was summarized and presented using tables. Categorical variables were expressed as frequencies and percentages while quantitative variables were expressed as mean \pm standard deviation. Knowledge, attitude and practice were scored and

graded as explained below. Grading of all scores were categorized based on cut offs of 70% and 50% of total scores. Chi square and Fischer exact were used to determine associations between knowledge, attitude and practice grades and other selected variables. A p-value of <0.05 at a confidence level of 95% was considered statistically significant.

Scoring and grading

Knowledge level of respondents was assessed based on a maximum attainable score of 39. A score of 1 for each correct/'yes' answer and zero for a 'no' or 'I don't know' response was allocated. For grading, 27 and above ($\geq 70\%$) was adjudged as good knowledge; scores between 19 and 26 (50% – 69%) as fair knowledge while those scoring 18 and below ($<50\%$) as poor knowledge. Attitude was assessed using 7 stem questions with a scoring system of 5 to 1 from 'strongly agree', 'agree', 'I don't know', 'disagree' and 'strongly disagree' respectively with a maximum possible score of 35. A score of 25 and above ($\geq 70\%$) was adjudged as good attitude, score of 18 – 24 (50% – 69%) was fair, while those scoring less than 18 ($<50\%$) were adjudged as poor attitude. The scores for practice of hospital waste disposal was done as that for knowledge with a maximum attainable score of 32. In the grading, scores of 22 and above ($\geq 70\%$) were categorized as good practice; scores of between 16 and 21 (50% – 69%) were categorized as fair practice while those scoring 15 and below ($<50\%$) were categorized as poor practice.

Ethical consideration

Ethical clearance was sought and obtained from JUTH Human Research and Ethics Committee. Permission was obtained from the relevant hospital departments. Verbal and written informed consent were obtained from all the respondents before collection of data. Respondents were assured of strict confidentiality and anonymity of information obtained from them.

Results

Sociodemographic and work characteristics of respondents

A total of 206 cleaners participated in the survey and questionnaires from all the respondents were considered for analysis making the response rate to be 100%. All the respondents were within the age range of 21 to 65 years with mean age of 36.9 ± 9.5 years. A total of 172 (83.5%) were females, 139 (67.5%) were married and among them and 110 (53.7%) had secondary level of education while 62 (29.8%) had primary level of education, 22 (10.7%) had tertiary level of education and 12 (5.9%) had none. The median working years was 7.0 years while the median number of months spent in current unit was 8.0 months.(Table 1)

Table 1: Personal and work characteristics of the respondents

Variable	Frequency n=206	%	
Age range (years)	21-30	66	32.0
	31-40	79	38.4
	41-50	43	20.9
	51-60	16	7.8
	>60	2	1.0
Sex	Female	172	83.5
	Male	34	16.5
Marital status	Married	139	67.5
	Single	54	26.2
	Widowed/widower	11	5.3
	Divorced	2	1.0
Level of education	None	12	5.9
	Primary	62	29.8
	Secondary	110	53.7
	Tertiary	22	10.7
Religion	Christianity	204	99.0
	Islam	2	1.0
Working years	1-10	169	82.0
	11-20	25	12.1
	21-30	12	5.8
Unit presently working in	Wards	133	64.6
	Clinics	16	7.8
	Laboratories	9	4.4
	Emergency units	21	10.2
	Theatres	13	6.3
Months in current unit	≤ 12	147	71.4
	12 - 60	52	25.2
	>60	7	3.4
Shift	Yes	150	72.8
	No	56	27.2
Current shift (n=150)	Afternoon	59	39.3
	Morning	56	37.3
	Night	35	23.3

*corridors, domestic unit, offices within hospital, toilets, mortuary, radiology, physiotherapy, infectious control unit, intensive care unit

Knowledge of medical waste disposal

Knowledge grade of respondents was found to be good in 84 (40.8%), fair in 65 (31.6%) and poor in 57 (27.7%) of them with a mean score of 24.3 ± 6.0. Responses to knowledge questions are shown in Table 2. Respondents acknowledged that medical waste is dangerous [198 (96.1%)] and that it has the potential to cause disease [175 (88.3%)] and injury [31 (15.7%)]. A total of 178 (86.4%) were aware that medical wastes are supposed to

be separated and 165 (81.7%) stated that it should be disinfected before final disposal. A total of 139 (67.5%) were aware of the colour coding used for separation of wastes, however, only about a third were able to name at least one of the colour codes used or sharp boxes. Respondents were able to list various methods of disposal, the personal protective equipment that they should be using and ways that cleaners can be exposed to infection. A total of 128 (62.1%) of respondents knew that vaccines were required for protection against infectious diseases while on the job. The vaccines stated include TT [107 (83.6%)]; HBV [102 (79.7%)]; BCG [90 (70.3%)] and YF vaccine [55 (43.0%)]. Among the 206 participants, only 110 (53.4%) were aware of post exposure prophylaxis. A total of 177 (85.9%) said they needed guidelines and posters showing them how hospital wastes should be handled.

Table 2: Knowledge responses on hospital waste management among cleaners

Variable	Response	Frequency(n=206)	%
Medical waste is dangerous	Yes	198	96.1
	No	8	3.9
Dangers of medical waste (n=198)*	Disease	175	88.3
	Injury	31	15.7
Diseases that can be contracted*	TB	172	83.5
	HIV	168	81.6
	HBV	164	79.6
	HCV	146	70.9
Hospital waste should be separated	Yes	178	86.4
	No	20	9.7
	Don't know	8	3.9
Reasons for separation (n = 178)	To avoid injury	106	59.6
	To avoid infection	44	24.7
	For easy identification	28	15.7
Aware of colour codes	Yes	139	67.5
	No	67	32.5
Colour codes for hospital waste separation* (n = 139)	Red	16	11.5
	Yellow	8	5.8
	Black	15	10.8
	Sharp box	71	34.5
	Hospital waste should be disinfected before disposal	Yes	165
Methods of hospital waste disposal*	No	19	9.2
	Do not know	22	10.7
	Open dumping	108	52.4
Open burning	Open burning	106	51.5
	Incineration	86	41.7
	Burial	49	23.8

Table 2: Continued

Variable	Response	Frequency(n=206)	%
Aware of PPE	Sea disposal	10	4.9
	Yes	205	99.5
	No	1	0.5
Types of PPE named* (n = 205)	Hand gloves	195	95.1
	Facemask	184	89.8
	Safety boots	167	81.5
	Apron/Overall	96	46.8
Routes of exposure to diseases from waste	Non-use of hand gloves	183	88.8
	Non-use of face mask	179	86.9
	Non-use of protective boots	164	79.6
	Non-use of apron	158	76.7
	Leaking of garbage bags	124	60.2
	Awareness of vaccines required for HCWs	Yes	128
No		78	37.9
Vaccines stated* (n = 128)	Tetanus toxoid	107	83.6
	HBV	102	79.7
	BCG	90	70.3
	Yellow fever	55	43
Awareness of post-exposure prophylaxis	Yes	110	53.4
	No	96	46.6
Knowledge grade	Good	84	40.8
	Fair	65	31.6
	Poor	57	27.7

*multiple response

Attitude towards hospital waste disposal

Attitude was adjudged to be good in 198 (96.1%) of respondents, fair in 7 (3.4%) and poor in 1(0.5%). The mean attitudinal score was 32.5 ± 3.5. Most of the

respondents 148 (71.8%) strongly agreed that not separating wastes at the point of generation increased the risk of injury. A total of 153 (74.3%) strongly agreed that they could get infected while handling wastes. A total of 155 (75.2%) strongly agreed that wearing protective wears would reduce their risks of getting diseases. A total of 160 (77.7%) strongly agreed that waste was detrimental to the community if not properly handled. On attitude towards vaccination, 133 (64.6%) of the respondents strongly agreed that hepatitis B vaccination prevents hospital acquired infection. (Table 3)There was a statistically significant relationship (Fisher exact p ≤ 0.02) between knowledge grade and attitude of cleaners on hospital waste disposal.

Practice of hospital waste disposal among respondents

The practice grade of respondents was found to be good in 17 (8.3%), fair in 81 (39.5%) and poor in 108 (52.2%) with a mean practice score of 15.0 ± 5.1. A total of 156 (75.7%) had previously been trained on hospital waste handling. A total of 92 (44.7%) said that medical wastes are always separated using the colour coded boxes at their units. Methods used for transporting waste included placing it on the head; 106 (51.5), with the hands; 80 (39.3) and with a trolley; 20 (9.2%). A total of 199 (96.6%) always used at least one form of PPE with the most frequent one in use being the hand gloves [188 (91.3%)]. Guidelines for handling waste were not followed by 98 (47.6%) respondents and reasons given included non-availability of guidelines, for no reason and thinking it was not necessary. Completed doses of HBV and TT had been collected by 80 (38.8%) and 24 (18.6%) of the respondents respectively. A total of 47 (22.8%) participants had never been screened for HIV. Needle pricks or splash incidents had occurred with 73 (35.4%) respondents out of which 39 (53.4%) had reported the incident. Other details are as shown in Table 4. There was found to be a statistically significant relationship between practice and knowledge grade (p < 0.001) and previous training (p < 0.001) as shown in Table 5.

Table 3: Attitude of cleaners on hospital waste disposal

Statement	Strongly agree	Agree	I don't know	Disagree	Strongly disagree
	Freq (%)	Freq (%)	Freq (%)	Freq (%)	Freq (%)
Non-segregation of waste at source increases waste handlers' risk of injury	148 (71.8)	49 (23.8)	3 (1.5)	6(2.9)	0 (0.0)
Containment of sharps helps safe management of hospital waste	146 (70.9)	55(26.7)	3(1.5)	2(1.0)	0 (0.0)
Handling waste can lead to infection	153 (74.3)	40(19.4)	4(1.9)	8(3.9)	1(0.5)
Use of PPE reduces risk of infections	155 (75.2)	45 (21.8)	3 (1.5)	1 (0.5)	2 (1.0)
Poorly handled waste is hazardous to the community	160 (77.7)	38 (18.5)	4 (1.9)	4 (1.9)	0 (0.0)
Policies and guidelines on wastes management are necessary	153 (74.3)	40 (19.4)	10(4.9)	2 (1.0)	1 (0.5)
Hepatitis B vaccination prevents its transmission among staff	133 (64.6)	48 (23.3)	14 (6.8)	9 (4.4)	2 (1.0)

Table 5: Associations between Practice and selected variables

Variable	Response	Frequency	(%)
Had formal training on hospital waste handling	Yes	156	(75.7)
	No	50	(24.3)
Components of training done* (n = 156)	Lectures	113	(72.5)
	Demonstrations	38	(24.4)
	Practical sessions	48	(30.7)
Medical waste separated at point of collection	Yes	135	(65.5)
	No	71	(34.5)
Colour coded bags/containers used for separation	Yes	92	(44.7)
	No	78	(37.9)
	Not always	36	(17.5)
Sharps waste separated from other wastes	Yes	181	(87.9)
	No	25	(12.1)
Bags used for waste collection prevents leakage	Yes	85	(41.3)
	No	76	(36.9)
	Not sure	45	(21.8)
Methods used for transporting waste	On the head	106	(51.5)
	With hands	81	(39.3)
	Trolley	19	(9.2)
Trolley cleaned after use (n = 20)	yes	18	(90.0)
	no	2	(10.0)
At least one form of PPE always used	Yes	199	(96.6)
	No	7	(3.4)
Type of PPE available for use*	Hand gloves	188	(91.3)
	Face mask	169	(82.0)
	Protective boots	147	(71.4)
	Safety goggles	31	(15.0)
	Apron	25	(12.1)
	Cleaner is supervised	Yes	182
Follows guidelines when handling waste	Yes	108	(52.4)
	No	98	(47.6)
Reasons for not following guidelines (n = 98)	Guidelines not provided	82	(83.0)
	Don't know	10	(10.2)
	Not necessary	7	(7.1)
Have received vaccine for HBV	Yes	83	(40.3)
	No	123	(59.7)
Doses of HBV received (n = 83)	1	31	(37.3)
	2	22	(26.5)
	3	30	(36.1)
Have received TT	Yes	129	(62.6)
	No	77	(37.4)
Doses of TT received (n = 129)	1	21	(16.3)
	2	37	(28.7)
	3	29	(22.5)
	4	18	(14.0)
	5	24	(18.6)

Table 5: Contd.

Variable	Response	Frequency	(%)
Screened for HIV	Yes	159	(77.2)
	No	47	(22.8)
Has had needle pricks or splashes	Yes	73	(35.4)
	No	133	(64.6)
Needle prick or splash incident reported (n = 73)	Yes	39	(53.4)
	No	34	(46.6)
Practice score grade	Good	17	(8.3)
	Fair	81	(39.5)
	Poor	108	(52.2)

*multiple response

Table 5: Associations between Practice and selected variables

Variable	Practice Grade			χ^2 value	p-value
	Good	Fair	Poor		
Knowledge					
Good	11 (13.1)	49 (58.3)	24 (28.6)	32.46	<0.001
Fair/Poor	6 (4.9)	32 (26.2)	84 (68.9)		
Attitude Grade					
Good	17 (8.6)	79 (39.9)	102 (51.5)	-	0.626*
Fair/Poor	0 (0.0)	2 (25.0)	6 (75.0)		
Previous training					
Yes	17 (10.9)	72 (46.2)	67 (42.9)	24.09	<0.001
No	0 (0.0)	9 (18.0)	41 (82.0)		
Years of work					
1-10	10 (5.9)	68 (40.2)	91 (53.8)	7.14	0.128
11-20	5 (20.0)	8 (32.0)	12 (48.0)		
21-30	2 (16.7)	5 (41.7)	5 (41.7)		

*Fisher Exact

Discussion

Knowledge of hospital waste disposal

This study found that less than half of the respondents had good knowledge on hospital waste disposal. This is a consistent finding in many studies where cleaning/sanitary staff are found to be less knowledgeable than more specialized medical staff.^{4,8,10,25} Even at that, there were gaps in their knowledge as was seen in the responses provided. This study group in particular were seen to mostly have a maximum of secondary school level of education. They are also not medically trained staff who would have been exposed to a structured form of training that would expose them to the occupational hazards they would come across. Also being mostly contract staff, they may not be specifically trained to work in hospitals. Generally, knowledge of health matters have been seen to be better with an increased level of education resulting in better health behaviours.²⁶ Though they were aware of

waste separation, their knowledge was incomplete in respect to the reasons for the separation and the colour coding used for it. This is similar to that found in similar studies.^{27,28} This could lead to mishandling of waste where provision has been made for separation as respondents reported that colour coded separation of waste was not being done in all units. Though almost all were aware that there were diseases that could be transmitted while handling waste, only about half were aware of PEP that could be given when an exposure incident occurs. The lack of this vital information will reduce the capacity of cleaners to protect themselves from workplace hazards. Though about 75% had attended training, future trainings should seek to fill these gaps.

Attitude on hospital waste disposal

Though not many had good knowledge, almost all had a good attitude towards hospital waste disposal. This is better than what has been documented in other studies.^{10,21,24} It is however comparable to a study conducted in a teaching hospital in Kashmir Pakistan.²⁹ This study also showed a statistically significant relationship between knowledge and attitude of cleaners on hospital waste disposal, implying that even though the level of knowledge was not as good, it still had an influence on their attitude. A good attitude suggests that they recognize that they are working in a hazardous environment and may be more willing to make changes that will help them protect themselves. This is a motivating factor that could be leveraged on to engage them in training that would improve their skills.

Practices on hospital waste disposal

More than half of the study participants were found to have poor practices, a finding that is consistent with other similarly conducted studies.^{7,14,17,18} Knowledge and previous training was found to be significantly associated with practice. Training has been found to be a veritable tool in improving knowledge, attitude and practice. A study that combined the use of training, practical demonstrations and reminders showed a marked improvement in knowledge and waste management practices among health workers in the intervention group.³⁰ It may therefore require repeated trainings and reminders to improve practices among waste disposal staff rather than a one-off training. Also, it will require strict supervision as 48% stated that they do not follow guidelines and 11% said they are not usually supervised. Also 83% of the respondents said no guidelines were provided for their use. WHO recommends that for an effective waste management system in health institutions, there must be a policy and plan on ground that is integrated into the daily routine of workers with strict supervision to ensure compliance.³¹ The poor

practices demonstrated in this study could be partly attributed to lack of equipment such as sharp boxes, color coded bins, trolleys, PPE (e.g. facemask, hand gloves, aprons) as deduced from the responses of the workers. For waste management practices to be effectively done, the institution has a responsibility to support workers with the necessary equipment to complete their assignments.³² Despite the hazards that this group of workers are exposed to most were not protected by vaccination from infectious diseases common to HCWs. The socio-demographic statistics showed that the largest proportion of respondents were within the age range of 21 – 40 years which is a productive and sexually active age group. Infection with diseases such as HBV, HCV, HIV could lead to transmission to others and significant morbidity and mortality among the workforce and the population in general. In addition Up to 35% had experienced exposure incidents, out of which 47% did not report the incident for further action. Low reporting of such incidents is not unusual among health workers.^{32,33} However, these findings point to a lack of mechanisms and systems within the hospital to ensure that workers are well trained, good practices are known and consistently followed so that hospital cleaners are protected in their work space.

Conclusion

This study found a majority with low level of knowledge, good attitude and poor practices of hospital waste disposal among cleaners in the Jos University Teaching hospital. There is a need for training and re-training of this group of workers supported by clearly defined plans and policy guidelines that are strictly enforced through supervision and punitive measures and provision of the necessary equipment for waste disposal.

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Conflicts of Interest

We the authors declare that we have no conflict of interest in the writing of this manuscript.

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