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Assessment of Knowledge and Perception among Health Workers towards Proper Biomedical Wastes Management in Selected Hospitals in Abuja

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Abstract

Biomedical wastes are 'special type' of waste generated from diagnostic, research laboratories and health care institutions where screening, diagnosis and treatment are carried out. These wastes have been categorically classified as hazardous wastes that should be given priority attention from the source to final disposal in order to avert public health issues. The study aimed to assess the knowledge and perception of health workers towards biomedical waste management in selected hospitals in Abuja. Data were collected by structured questionnaire and on- the-spot observation. Six hospitals that provided health care services to the increasing population of Abuja residents were surveyed. Descriptive and inferential statistical analysis were used in the analysis of the data. Chi-square (χ^2) test was used to determine the level of significance set at $p<0.05$. The years of work experience of the respondents showed that 98 (24.50%) have spent 1-5 years on the job, 80 (20.00%) of the respondents have spent 5-10 years on the job, 88 (22.00%) of the respondents have spent 10-15 years on the job while majority 134 (33.50%) of the respondents had spent more than 15 years on the job. The study showed that there was a significance difference in the knowledge and perceptions of health workers to the biomedical waste management ($p<0.05$). High level of knowledge and perception among the health workers was observed. There is still need for training and retraining of the health workers, hospital visitors and the general public, sensitization on the risks and benefits associated with proper biomedical waste management.

Keywords*: Biomedical, hazardous, health workers, hospitals, waste management.*

Introduction

Biomedical wastes (BMW) constitute a significant portion of infectious wastes, which are potentially dangerous and creates a favourable medium for the growth of resistant microbes that possess high pathogenicity and virulence properties to cause diseases (Babanyara *et al.*, 2013). Biomedical wastes have been defined by several workers based on sources of generation, forms and type of wastes. World Health Organization, (WHO, 2000) in its definition stated that biomedical wastes are hospital wastes in the solid or liquid form that contain infectious wastes such as microbiological wastes, pathological wastes from surgeries, human tissues and blood, anatomical wastes, laboratory wastes, sharps (needles, syringes, scalpel blades) and soiled dressings. Hazardous wastes include chemotherapeutic chemicals, pharmaceuticals, medical devices, genotoxic waste, radioactive materials and heavy metals (Bassey *et al.*, 2006; WHO, 2011) while non-hazardous wastes include all other general wastes such as papers, food debris, laundry and kitchen wastes. Biomedical effluent are liquid biomedical wastes that could be infectious. Pruss *et al*. (1999) defined biomedical wastes are both potential risk waste and non-risk waste materials. They are wastes generated during observation, diagnosis, therapeutic, research, rehabilitation and other health care procedures (Bassey *et al.*, 2006; Ola-Adiza *et al.*, 2015). It comprises wastes generated by health care establishments, research facilities, and laboratories including minor or scattered sources such as treatment taken at home e.g. insulin injection (Hiremath *et al.*, 2017).

Biomedical waste is a global issue, failure to practice or implement standard rules and regulations on adequate biomedical waste management will subject health care system in jeopardy as it is crucial in the prevention of nosocomial diseases (hospital-acquired infections) (Hiremath *et al.*, 2017), occupational health related issues, epidemics (Awodele *et al*., 2016), blood-borne diseases (Derres *et al.*, 2018), environmental pollution (Chima *et al.*, 2011; Babanyara *et al*., 2013), reproductive health issues, neurological disorders in children, mutagenicity, dermatitis and cancer related health issues (Ngwuluka *et al.*, 2009).

Awareness and knowledge associated with issues, risks and benefits of biomedical waste management especially among health workers in this part of the developing world have been hampered. Improper approach and poor attention towards the management of this 'special waste' shows that knowledge is lacking triggers the need for training, capacity building, seminars and sensitization of the health workers on biomedical waste management. In view of the aforementioned drawbacks the study was aimed to assess the knowledge and perception of the health workers in selected hospitals in Abuja.

Materials and methods

Selection of the area

The study was carried out in Abuja which is the Federal Capital Territory of Nigeria. Abuja is divided into six Area Councils of which Abuja Municipal Area Council is one of them that can be described as a densely populated area due to the heavy presence of government and commercial activities. According to United Nation Fund for Population Activities, UNFPA (2015), Federal Capital Territory is estimated to have a population of 3,324,000 people. The city habours many private and public (district) hospitals to serve the increasing population.

Sample size determination

The researcher used Cochran's formula ($n_0=z^2pq/e^2$) for calculating sample size when the population is infinite (Glenn, 1992).

Where:

n_0 = sample size

z = selected critical value of desired confidence level

p = estimated proportion of an attribute that is present in the population

q = 1- p

e = desired level of precision taking 95% confidence level with ±5% precision, the calculation for required sample size was calculated as follows:

p = 0.5; hence q =1-0.5 = 0.5; e = 0.05; z =1.96

$n_0 = z^2pq/e^2$

$n_0 = (1.96)^2(0.5)\ (0.5)/\ (0.05)^2$

n_0 = 384.16

Therefore; n_0 = 384 (minimum sample size for this study)

An overage of (12%) of 384 was added to the sample size to offset for the reasons of non-response, incomplete response and late response in order to have the acceptable minimum response size for the study.

Sampling technique

Six (6) hospitals were selected for the study, using random sampling method. The hospitals were stratified into two groups; public and private based on the ownership and management of the hospitals and were lettered alphabetically to ensure anonymity and confidentiality.

Data collection

Structured self-administered and self-completed questionnaires were used to collect the data. The study and questionnaire were explained to the individual participants to obtain their consent to participate in the study. Participation was voluntary and participants were free to withdraw at any time. Confidentiality was assured by excluding all the names of the hospital surveyed and respondents.

Data analysis

Statistical Package for Social Sciences (SPSS version 20.0) was used for the analysis of the data. Chi-Square statistical test of significance was used to determine the level of significance of association. Level of significance was set at $p \leq 0.05$.

Results and discussion

Four hundred and thirty (430) questionnaires were administered to the respondents, while 400 were completed and returned giving a response rate of 93.02%.

Table 1, shows the socio-demographic factors of the respondents across the six hospitals in Abuja. The male respondents 220 (55.00%) were

more than the female respondents. The respondents' years of experience ranged between 1 and above 15 years. More than half of the respondents had 10 to above 15 years of biomedical waste management experience. The result is similar to the report of Imam *et al*. (2019) where health workers with over 7 years working experience of both doctors and nurses had the highest frequency. In Ethiopia, the report of Derress *et al*. (2017) and in Lagos, Awodele *et al*. (2016) are at variance with the result of the present study where health workers with working experience of 1-5 years recorded the highest frequency 143 (48.3%) and 35 (33.30%) respectively. The method of sampling technique, motivation and working environment could account for the variation of the population of the health workers with varying years of working experience in the hospitals. It is important to note that the years of working experience could greatly impact on the knowledge and practice of proper biomedical waste management.

On the knowledge and perception of health workers on biomedical waste management (Table 2), all the 400 (100.00%) respondents agreed that biomedical waste management has emerged as a serious public health issue and should be tackled with every sense of urgency by health workers to forestall the menace. A total of 381 (95.25%) respondents agreed that appropriate biomedical waste management (BMWM) process includes essential steps; segregation, labelling, treatment, transport, storage and disposal. Of the respondents 345 (86.25%) agreed that health workers should be well trained, strongly persuaded and motivated towards achieving a sustainable biomedical waste management. More so, 303 (75.75%) respondents agreed that the total waste generated from healthcare activities, is composed of 80% general waste (non-hazardous) and 20% hazardous waste which requires 'special treatment' and may be higher because of poor handling of such 'special waste.' While 281 (70.25 %) respondents agreed that health care facilities should manage biomedical waste in a safe and clean way and adhere to prescribed biomedical waste management rules. The findings in the study are similar to previous reports; that biomedical management has become a worldwide public health issue (Chakraborty *et al*., 2014), biomedical wastes constitutes 85-80% of non-hazardous and 15-20% hazardous wastes (WHO, 2000; Chartier *et al*., 2014), proper biomedical waste management involves vital steps which includes segregation, storage, transportation, treatment and disposal (Asadullah *et al*., 2013; Kumari *et al*., 2014) and health workers should be trained (Uchechukwu *et al*., 2017; Deress *et al*., 2018; Imam *et al*., 2019).

On a related note, knowledge on the major sources of biomedical waste in hospitals (Table 3), showed labour/delivery room 395 (98.75%), operating theatre 383 (95.75%), blood bank 376 (94.00%) and in-patient wards 364 (91.00%). The finding of the study agrees with the study carried out at a medical centre in Keffi town, Nassarawa State of Nigeria where the labour room had the highest wastes generated in the hospital followed by in- patients wards (Useh *et al*., 2018). Mathur *et al*. (2012) in India reported that the major sources of biomedical wastes are generated from both private and government hospitals including blood banks etc. Large volume of biomedical waste in these units could be attributed to the type of medical procedures, anatomical wastes, number of patients and emergency purposes.

The benefits associated with proper biomedical waste management to assess the knowledge on benefits of proper biomedical waste management (Table 4). All the 400 (100.00%) respondents agreed that reduction in the cost of infection control within the hospital is a benefit from proper biomedical waste management. Equally all the 400 (100.00%) respondents agreed that low incidence of community and occupational health hazards is a benefit from proper biomedical waste management. Furthermore, 375 (93.75%) of the respondents agreed that enhancement of the aesthetic value of the healthcare surroundings is a benefit from proper biomedical waste management. Of the respondents, 287 (71.75%) agreed that reduction in the cost of waste management is a benefit from proper biomedical waste management. The results show that the level of knowledge of the respondents on proper biomedical waste management and its benefits is appreciable. The findings of this study are similar with the reports of (Awodele *et al*., 2016; Amjal and Amjal, 2017; Uchechukwu *et al.,* 2017; Derres *et al.*, 2018) in the respective countries (Nigeria, Pakistan, Nigeria, and Ethiopia). The availability and strict compliance to the biomedical waste management guidelines at the service areas of the health facilities and regular training of the health professionals could account

for the high frequency of the respondents that exhibited knowledge on biomedical waste management. As adequate knowledge can improve the attitude of the health workers which will invariably impacts on proper biomedical waste management practices. Adequate knowledge on biomedical waste management by health workers will help in reducing the risks associated with biomedical waste management (Uchechukwu *et al.*, 2017).

The relationship between knowledge of health workers and biomedical waste management (Table 5), showed a significance difference between the knowledge level of the health workers and biomedical waste management ($p \leq 0.05$).

Table 1. Socio-demographic Characteristics of Respondents

Socio-demographic Characteristics	**Category**	**Study Participants n (%)**
Gender	Male	220 (55.00)
	Female	180 (45.00)
Health Professionals	Doctors	64 (16.00)
	Nurses	115 (28.75)
	Laboratory Scientists	96 (24.00)
	Pharmacist	71 (17.75)
	Others	54 (13.50)
Years of Working Experience	1-5	98 (24.50)
	5-10	80 (20.00)
	10-15	88 (22.00)
	> 15	134 (33.50)
Educational Qualification	Bachelor's degree	343 (85.70)
	Fellowship	3 (0.75)
	Master's degree	6 (1.50)
	Doctorate	4 (1.00)
	Others	44 (11.00)
Member of Biomedical WMT	Yes	191 (47.75)
	No	209 (52.25)
Hospital Type	Public	289 (72.25)
	Private	111 (27.75)

Table 2. Knowledge and perception of health workers on biomedical waste management

	Response Scales n (%)				
Knowledge and Perception	**Strongly Agree**	**Agree**	**Not Sure**	**Disagree**	**Strongly Disagree**
Biomedical waste management has emerged as a serious public health issue and should be tackled with every sense of urgency by health workers to forestall the menace	301 (75.25)	99 (24.75)	0 (0.00)	0 (0.00)	0 (0.00)
Total waste generated from healthcare activities, is composed of 80% general waste (non-hazardous) and 20% hazardous waste which requires special treatment and may be higher because of poor handling of such 'special waste'	47 (11.75)	256 (64.00)	42 (10.50)	52 (13.00)	3 (0.75)

Health facilities manage biomedical waste in a safe and clean way and adhere to prescribed biomedical waste management rules	97 (24.25)	184 (46.00)	101 (25.25)	18 (4.50)	0 (0.00)
Health workers are well trained, strongly persuaded and motivated towards achieving a sustainable biomedical waste management	55 (13.75)	290 (72.50)	21 (5.25)	32 (8.00)	2 (0.50)
Appropriate biomedical waste management (BMWM) process includes essential steps; segregation, labeling, treatment, transport, storage and disposal	231 (57.75)	150 (37.5)	19 (4.75)	0 (0.00)	0 (0.00)

Table 3. Major Sources of Biomedical Wastes in the Public and Private Hospitals

	Response Scales n (%)				
Sources	**Strongly Agree**	**Agree**	**Not Sure**	**Disagree**	**Strongly Disagree**
Hospital/in-patient wards	195 (48.75)	169 (42.25)	32 (8.00)	4 (1.00)	0 (0.00)
Out-patient department	5 (1.25)	191 (47.75)	109 (27.25)	95 (23.75)	0 (0.00)
Diagnostic units	89 (22.25)	203 (50.75)	98 (24.50)	10 (2.50)	0 (0.00)
Pharmacy	110 (27.50)	120 (30.00)	151 (37.75)	19 (4.75)	0 (0.00)
Operating Theatre	162 (40.50)	221 (55.25)	17 (4.25)	0 (0.00)	0(0.00)
Labour/Delivery Room	242 (60.50)	153 (38.25)	5 (1.25)	0 (0.00)	0 (0.00)
Blood Banks	199 (49.75)	177 (44.25)	20 (5.00)	4 (1.00)	0 (0.00)
Dental Unit	100 (25.00)	116 (29.00)	181 (45.25)	3 (0.75)	0 (0.00)
Mortuary	148 (37. 00)	145 (36.25)	107 (26.75)	0 (0.00)	0 (0.00)

Table 4. Benefits of Proper Biomedical Waste Management

	Response Scales n (%)				
Benefits	**Strongly Agree**	**Agree**	**Not Sure**	**Disagree**	**Strongly Disagree**
Reduction in the cost of infection control within the hospital	315 (78.75)	85 (21.25)	0 (0.00)	0(0.00)	0(0.00)
Low incidence of community and occupational health hazards	295 (73.75)	105 (26.25)	0 (0.00)	0(0.00)	0(0.00)
Enhance the aesthetic value of the healthcare surroundings	125 (31.25)	250 (62.50)	25 (6.25)	0(0.00)	0(0.00)
Reduction in the cost of waste management	110 (27.50)	177 (44.25)	105 (26.25)	4(1.00)	4 (1.00)

Table 5. Relationship between Knowledge and Perceptions of Health Workers and Biomedical Waste Management

	Knowledge and Perceptions of Health Workers				
Biomedical Waste Management	**High Knowledge (%)**	**Low Knowledge (%)**	**Total**	χ^2	**p-value**
Good waste management	298 (94.3)	18 (5.7)	316 (100.0)	312.4534	0.000
Poor waste management	15 (17.9)	69 (82.1)	84 (100.0)		

The chi-square (χ^2) test revealed that there was a relationship between knowledge and perceptions of health workers and biomedical waste management since the p-value is (< 0.05) therefore the alternative hypothesis was accepted stating that knowledge and perceptions of health workers was a significant factor of biomedical waste management.

Conclusion

The study showed that the health workers had an appreciable knowledge of biomedical waste management which is evident in their approach towards achieving clean and safe hospital environs. The study showed that there was a significance relationship between knowledge and biomedical waste management which means that a proper biomedical waste management largely depends on knowledge of the health workers.

Recommendation

Regular training and retraining of health workers and waste management personnel on the potential health risks, benefits and safety measures of biomedical waste management. Use of instructive posters and pictures on proper biomedical wastes management at designated service areas in the health care facilities.

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