Perception of Hospital Waste Management among Health Personnel in Rivers West Senatorial District, Rivers State

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ABSTRACT

This paper examined the perception of hospital waste management amongst health personnel in Rivers West Senatorial District of Rivers State. Three hypotheses were formulated to achieve the aim of the study. The study population comprised of all the health personnel in the one hundred and nineteen health facilities in Rivers West Senatorial District. A sample of 400 health personnel was selected for the study using multistage sampling procedure. Data was collected using a structured questionnaire and were analyzed using simple percentage (%), ANOVA and binary logistic regression. The analyses showed that health personnel have good knowledge of hospital waste management as 210(52.5%) were found to be knowledgeable about hospital waste management. No significant difference was found between the ages of health personnel ($p>0.05$), gender $p<0.05$, $df = 1$, $\chi^2 = 70.124$), years in service ($p<0.05$, $df = 4$, $\chi^2 = 130.526$) and knowledge of hospital waste management. It was recommended among others that government should provide adequate funds for better execution of waste management programmes. This would help secure modern waste management technology that could make hospital waste management better.

Key words: Perception, Waste management, Rivers West Senatorial District, Rivers State

INTRODUCTION

The rising cases of poor waste management practices in the city of Port Harcourt cannot be over-emphasized as government has observed a lot of challenges. Used syringes, dampers, toiletries, delivery materials *etc* have been indiscriminately dumped in dumpsites even in common waste bins. Several cases of aborted foetus have been found even abandoned babies.

Hospital waste management is a daily routine and needs to be addressed on daily basis. The term "hospital waste" healthcare or "biomedical waste" refers to any waste generated during diagnosis, treatment, immunization of human beings or animals, or in research activities pertaining diseases and health problems. Hospital or Healthcare waste is composed of all forms of waste generated at various healthcare centers, hospitals, medical research facilities, maternities, pharmacies and medical laboratories. These wastes come in form of solids or semi-solids derived from healthcare centers during the process of diagnosis of sick persons, patients' review and/or treatment of humans and animals (Askarian *et al*., 2010). Similarly, Gajurval (2014) believes that healthcare wastes are those waste materials produced during diagnosis, treatment/care and vaccination of humans and/or animals, or when one is carrying out a study/research. Hospital waste is categorized into eight: general waste, radioactive waste, pathological waste, chemical waste, infectious waste, sharp objects, pharmaceutical waste as well as waste in form of pressurized containers (Chamberlain, 2020; Gajurval, 2014; Mathur *et al.*, 2012).

It is characterized by the production and testing of biological products from man and animals. The waste produced in the course of healthcare activities carries a higher potential for infection and injury than any other type of waste (Das *et al*., 2024; Park, 2011). Similarly, according to Deress *et al*. (2019) a total of 55 medical

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waste handlers were studied from 12 healthcare facilities. Among this, 25 (45.4%) were diploma and certificate holders. The majority (69.1%) of the study participants were not provided with proper training. There was a lack of personal protective devices and waste management equipment supply. Regarding knowledge, attitude, and practices, 25 (45.5%), 43 (78.2%), and 44 (80%) of the study participants had adequate knowledge, favorable attitude, and adequate practice scores, respectively. The amount of hazardous waste generated from healthcare activities may appear low but they are highly infectious, radioactive and toxic. In actual fact, healthcare wastes usually have long-lasting impact on the health of humans and the environment is not spared especially when fresh water and the soil are affected including healthcare staff, waste managers, visitors of healthcare centers and/or even the entire society (Habeeb & Ahmad, 2015; Nwosu *et al.*, 2024).

The level of perception and awareness of hospital waste management among health personnel in Nigeria is quite low compared to developed countries (Abah & Ohimain, 2011). Many health personnel in Nigeria may not adequately aware of the segregation of waste in the hospital as this situation disposes them to hazardous waste infections around the hospital premises. This mismanagement of hospital waste poses risk to the people and the environment. According to the Health Professions Council of South Africa, HPCSA (2008), many health personnel do not have adequate awareness of the types of waste generated in the hospitals and their effect on the individual. Some hospital workers do not have a good knowledge on the methods of disposal of hospital waste. It is very imperative to note that health care personnels are the closest to the waste generated in the hospitals and so care and knowledge of the dangers of such materials must be known.

In a study by Olaifa *et al.,* (2018) in KwaZulu-Natal reported poor knowledge of healthcare waste management was generally inadequate, with 42.7% of the participants scoring 'poor' overall. Another study by Azuike *et al.,* (2015) in Nigeria revealed that awareness of health care waste management among the health care workers was high. In similar research by Bhattacharjee and Saha (2014) in Gazipur reported that, doctors had better knowledge of waste management than other 87-8% and were familiar with WHO guideline about the biological waste management and handling. Udayanga *et al.,* (2023) posited that majority of respondents were characterized with a high knowledge level (76.9%) and positive attitudes (53.8%) on HW management in their study on Knowledge, perceptions and practices on healthcare waste management and associated occupational health hazards among healthcare professionals in the Colombo District, Sri Lanka which was based on a cross-sectional study.

Studies by Mahmoudi *et al.* (2016), in Tehran showed that the mean score of knowledge was 54.7 ±14.4 and their knowledge classified on a moderate level. There was positive correlation between knowledge and age variables as the findings showed that there is a considerable deficiency about knowledge of the respondents in the study of fundamentals desirable management of sharp waste. This implies that age affect knowledge of hospital waste management. In another study by Makhura *et al.* (2016) in South Africa revealed that knowledge and practices of health care professionals with regard to medical waste disposal were not associated with age, gender or years of experience, there was an association between professional category, knowledge and practices. Kumar *et al.* (2013) in a similar study carried out in Pakistan revealed that the mean age of the health workers was 30±5 years. Infectious waste management practice within both hospitals were not found to be statistically significant (P = 0.33). However, the socio-demographic information like age, gender, level of education and experience when compared with the practice were found statistically significant ($P<0.05$). In a similar study by Mohammed *et al.,* (2017), in Sulaimani reported that factors which were significantly associated with the better knowledge score was the male gender having a high educational degree, being trained in waste management and has been in service for more than 5 years.

Another study by Khan *et al.* (2017), in Muzaffarabad revealed that the mean age of these participants was of 33 years (minimum of 25 and maximum of 41 years) and average work experience was 7 years. Among them, n67 (58%) were male and n47 (42%) were female, n13 (11.4%) were doctors, n68 (60%) were of paramedical staff and n33 (29%) were junior staff. The overall satisfactory knowledge and attitude score (≥60% answers correct) of doctors was significantly higher than others. Knowledge about the color coding for specific wastes were insignificantly higher among doctors, rather only n4(30.7%) doctors responded to this question. According to Sengodan and Anoruth (2017), in South India, the result showed that knowledge on biomedical waste management is more in the young doctors who scored an average of (7.99) followed by the nursing students (7.80) and laboratory technicians (7.55) out of 10. The result also indicated that awareness was not

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uniform among individual groups with a mean square of 4.057 and there exists considerable variation within the groups with a mean square of 1.035.

The recent outburst by the Rivers State Waste Management Agency (RIWAMA) on the challenges of poor hospital waste management is of great concern especially by the actions of both hospitals' management and the personnel. The need to enlighten and educate the health personnel becomes imperative as the management may not be too aware of the disposal practices by the staff in most cases. The indiscriminate dumping of unsorted hospital waste is most likely due to lack of knowledge which this research work aims to achieve so that policy makers and regulators can take into cognizance. So many unknown ailments may be developed by scavengers and then to the public as most hospital waste come in as mixed waste instead of sorting and segregating them. This is supported by the responses of similar research results earlier on awareness and practice of medical waste management among healthcare workers is often limited with inadequate sensitization and lack of proper implementation of the existing National guidelines at the study site (Chisholm *et al.*, 2021; Mmereki *et al.*, 2024; Zimba *et al.*,2021).

Therefore, requisite awareness level of hospital waste management is of enormous benefit to all individuals in various parts of the world as it helps to convince health personnel to have positive attitude towards managing hospital waste and so prevent the spread of a lot of hospital borne diseases HIV/AIDS, Hepatitis B, skin disease, urinary tract infections among health personnel and visitors. The state of waste management in health facilities in Rivers State is typified by hips of refuse and made of packed liquid and solid materials in water proof on bare floors, or on the grouped at places close to the hospitals with easy access to scavenger, rodents and reptiles. Lack of knowledge or misinformation about hospital waste management has led to health personnel portraying negative attitude towards hospital generated waste which has led to so many challenges.

METHODOLOGY

Study Area

Rivers West Senatorial District is one of the three senatorial districts in Rivers State, Nigeria. The district covers eight Local Government Areas; Abua-Odual, Ahoada East, Ahoada West, Akuku Toru, Asari-Toru, Bonny, Degema and Ogba- Egbe-ma-Ndoni. In 2014, it had a population of 2,366,158 (NPC, 2006). The study adopted the descriptive survey design. The researcher collected data on the knowledge of waste management and subject them to statistical interpretations without manipulating any variable in the study.

Population, Sample and Sampling Technique for the Study

The population for this study consisted of all health personnel in the Rivers West senatorial district. The sample size for the study consisted of 400 of health personnel in Rivers West senatorial district. Multistage sampling procedure was adopted in this study.

Research Instrument

The instrument for data collection was questionnaire designed by the researcher with title perception and practices of hospital waste management among health personnel. The instrument was made of 2 sections. Section A provided the socio-demographic data of respondents and section B focused on the perception of hospital waste management among health personnel.

Validity and Reliability of the Instrument

The instrument was validated by three experts in reproductive health and family planning. Suggestions from these three experts were incorporated in re-writing the final copy of the questionnaire. The reliability of the instrument was tested using the test-retest method and was analyzed using Pearson's Product Moment Correlation (r). A reliability value of 0.76 was obtained indicating that the instrument was reliable.

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Methods of Data Analysis

Data collected from this study were analyzed using simple percentage (%), ANOVA, chi-square test, charts and binary logistic regression.

RESULTS AND DISCUSSION

Result

The results of the study are presented in Tables 2, 3, 4 and 5 based on the perception of health personnel regarding hospital waste management. The results revealed the perception of respondents on hospital waste management. The result showed that the grand mean was 2.54 which is greater than the criterion value of 2.5. This implies that respondents had good awareness of hospital waste management.

Table 2: Awareness Level of Hospital Waste Management

Item	Yes F (%)	No F (%)	Mean	SD	Decision
1.Personal protective equipment is to be used routinely when handling medical waste	379(94.7)	21(5.3)	2.62	0.57	Good
2.Placing medical waste in wrong bin is a high risk	400(100)	-	3.00	0.00	Good
3.There are waste bins for disposal of different types of wastes produced in the hospital	400(100)	-	2.50	0.00	Good
4.There is policy document regarding adequate disposal procedures of human tissue remains in your faculty	400(100)	-	2.51	0.00	Good
5.Disposing human tissue remains in domestic waste is an adequate disposal procedure	127(31.8)	273(69.3)	3.1	1.33	Good
6.Disposing expired blood units in domestic waste is an adequate disposal procedure	127(31.8)	273(68.2)	3.0	1.29	Good
7.Is it necessary to sort medical waste at the point of generation	295(73.8)	105(26.3)	2.55	0.90	Good
8.Liquid waste must be disposed into the sewage without processing or treatment	358(87.5)	42(10.5)	1.63	0.67	Poor
9.Do you consider used dressings, cottons and plasters as medical waste*	379(94.8)	-	2.00	0.00	Poor
10.Hospital used carton, papers and plastics are classified as medical waste	358(89.5)	42(10.5)	2.11	0.31	Poor
11.Improper waste disposal can lead to needle stick injuries	400(100)	-	3.00	0.00	Good
12.Are you aware that the colour code for disposal of human, biological and any object that has been in contact with	210(52.5)	190(47.5)	2.48	0.50	Poor

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body fluids is yellow					
13.Do you know that the colour code for microbiological waste is red	295(73.8)	105(26.3)	2.84	0.81	Good
14.Untreated medical waste can be stored for not more than 48 hours in temporary storage area	337(84.2)	63(15.8)	1.58	0.75	Poor
15.Any waste mixed with medical waste must be treated as medical waste	378(94.5)	22(5.5)	2.61	0.46	Good
16.Are you aware that improper waste disposal may lead to transmission of diseases	358(89.5)	42(10.5)	3.11	0.31	Good
Grand mean				**0.49**	**Good**

***Non response excluded.**

HO_1: There is no significant difference between age of health personnel and knowledge of hospital waste management.

Table 3: One-Way ANOVA result showing the significant difference between age of health personnel and knowledge of hospital waste management

Source		**SS**	**Df**	**MSS**	**F-cal**	**P-value**	**Decision**
Between groups		2.150	2	1.075	0.221	0.102	Rejected
Within groups		1482.115	398	5.370			
Total		**1484.265**	**400**				

***Significant**

Table 3 shows One-Way ANOVA on significant difference between age of health personnel and knowledge of hospital waste management. The finding of this study showed a significant difference as $p>0.05$ α-level, $F(2,398) = 0.221$, $p = 0.102$. The null hypothesis which states that there is no significant difference between age of health personnel and knowledge of hospital waste management was then rejected.

HO_2: There is no significant relationship between gender of health personnel and perception of hospital waste management.

Table 4: Chi-squared test showing the relationship between gender of health personnel and perception of hospital waste management

Gender	**Perception**		**Total**	**df**	**χ^2-value**	**P-values**
	Good F (%)	**Poor F (%)**				
Male	105(26.2)	169(42.3)	274(68.5)	1	70.124	0.000
Female	105(26.2)	21(5.3)	126(31.5)			
Total	210(52.4)	190(47.6)	400(100)			

***Not Significant.**

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The null hypothesis states that there is no significant relationship between gender of health personnel and awareness of hospital waste management. The findings of the study revealed a non-significant relationship between gender of health personnel and knowledge of hospital waste management ($P<0.05$, df = 1, χ^2 = 70.124). The null hypothesis is therefore accepted.

HO_3: There is no significant relationship between years in service of health personnel and level of awareness of hospital waste management.

Table 5: Binary logistic Regression analysis showing the relationship between years in service of health personnel and hospital waste management

Years in service	Knowledge		Total	Df	χ^2	P-values	Odds Ratio (OR)	95%CI
	Good F (%)	Poor F (%)						
1-5	-	22(5.5)	22(5.5)	4	130.53	0.000	0.092 Ref	0.32-6.74
6-10	-	42(10.5)	42(10.5)					
11-15	42(10.5)	63(15.8)	105(26.2)					
16-20	42(10.5)	-	42(10.5)					
20 and above	126(31.5)	63(15.8)	189(47.2)					
Total	**210(52.5)**	**190(47.5)**	**400(100)**					

***Not Significant.**

On binary logistic analysis, the finding of the study showed a non-significant relationship between years in service of health personnel and knowledge of hospital waste management ($P<0.05$, df = 4, χ^2 = 130.53). The result showed that respondents who had spent fewer years in service were 10.87 times less likely to have good knowledge of hospital waste management compared to those who had spent longer years in service (OR=0.092, 95% CI: 0.32-6.74).

Discussions

In regard to the finding of this study, the result showed a good awareness of hospital waste management among health personnel working in different health facility. It indicates that grand mean score (2.54) is relatively greater than the criterion referenced mean (2.50) depicting that the respondents had a relatively good awareness of waste management in the hospital. The result is in consonance with the studies by Azuike *et al.* (2015) who stated that 126 (38.1%) of workers in the hospital have the awareness of health care waste management among the health care workers which was high but the practice of waste management was not optimal. Also, this study is in line with studies by Mahmoudi *et al.* (2016) showed a relatively high level of awareness of sharp waste management among nurses with no deficiency of practice of the respondents. In the same vein, the finding of this study agrees with that of Sengodan and Amruth (2017) which revealed an insignificant influence with gender of health personnel and awareness of hospital waste management ($p<0.05$, df = 1, χ^2 = 10.124) but not surprisingly that females as well as males have taken cognizance of the recent development in the area of information and communication technology and the mass media to boost their knowledge in various aspect of life related to health. It is also in line with studies by Suganya (2016), who reported that 23(77%) of respondents had adequate exposure with 23% moderate awareness level of hospital waste management by nurses. To buttress further, this study was supported by those of Musa *et al.*, (2023) whose results revealed good knowledge of waste management amongst nurses (88.18%), doctors (86.68%), medical laboratory scientists and technicians (77.48%), ward attendants (19.1%), and cleaners (17.5%), respectively. This is in contrast with the studies of Bhattacharjee *et al.* (2014) and Enwere and Diwe (2014) as

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the former showed a poor level of awareness regarding biomedical waste management (4%) whilst the latter revealed 91(94.8%) poor level of awareness of handling patients' materials as compared to laboratory scientist and physicians. According to Chercoss *et al.* (2018) concluded that the proportion of waste handlers who had a good knowledge of healthcare waste management at Gondar University Hospital was 48%. Also, Khan *et al.* (2017) do not agree with the finding of this study which depicted that there is no significantly higher among doctors (30.7%) regarding specific waste. The main reasons for the differences were based on large population, larger sample size, difference in study setting time and research design that were adopted.

HO_1: There is no significant difference between age of health personnel and perception of hospital waste management. The findings of this study showed a significant difference between age of health personnel and awareness of hospital waste management as p>0.5 alpha level, (F (2,398) = 0.221, p = 0.102). The findings of this study are in line with that of Shivalli and Sowmyashree (2015) who found that age did not significantly (P>0.05) influence the awareness of health personnel on hospital waste management. These findings are similar to that of Makhura *et al*. (2016), who found that age is not statistically significant with the awareness and practice of hospital waste management among health professionals. These similarities may be due to homogeneity of the populations studied. However, the findings of this study were not in consonance with the study of Kumar *et al.* (2013), where it was reported that age when compared with the practice of hospital waste management were found to be statistically significant. The difference between the present study and the previous one may be due to the years those studies were carried out and their educational training.

HO_2: There is no significant relationship between gender of health personnel and perception of hospital waste management. The findings of the study revealed a non-significant relationship between gender of health personnel and awareness of hospital waste management ($P<0.05$, df = 1, $\chi^2 = 70.124$). This could be attributed to the number of males and females studied, level of education and literacy, personal idiosyncrasies, environmental factors and prevalent waste management practices in the facility but not necessarily as a male or female. This finding is similar to that of Makhura *et al*. (2016), who reported that gender is not associated with knowledge of health personnel on hospital waste management. However, the studies of Mohammed *et al*. (2017), is not in keeping with the present study as it found that gender is significantly associated with better knowledge score on hospital waste management especially among males. The findings of Azuike *et al.* (2015) found a high awareness of hospital waste management among both sexes. This was also in disagreement with the studies of Habeeb and Ahmad (2015) on the handling of health care waste management and gender differences in the Madinah Primary Healthcare Centers, Kingdom of Saudi Arabia. These findings are not surprising as females and males have taken advantage of the recent development in the area of information and communication technology and the mass media to boost their knowledge in various aspect of life which is related to health. The findings are at variance with findings of Kumar *et al.* (2013) which revealed that gender has a significant influence on awareness of hospital waste management. However, the differences in the study between genders may be due to the area of training or specialty where they are more interested to work. Studies have also showed no direct relationship with path coefficient of 0.0001 (t = 0.0015) between waste segregation of male and healthcare waste management (HCWM) but showed the relationship of waste segregation of female pertaining to waste management and how it will affect the HCWM. It showed that the path coefficient of 0.0565 and t-value of 1.3669. However, that did not have a direct relationship between waste segregation of female and HCWM. Therefore, there was no statistically significant relationship between male and female respondents in the segregation process at the HCWM (Habeeb & Ahmad, 2015). This result does not agree with those found for municipal solid waste management in Poland which indicated that waste generation rate is more depended on ratio of men and women based on quantitative size of each group (Talalaj & Walery, 2015). In a similar fashion, women were denied access to the operation of waste tricycles showing gender sensitivity in some areas on the basis that it requires physical strength (Amoah *et al*., 2023).

HO_3: There is no significant relationship between years in service of health personnel and awareness of hospital waste management. The results of the study showed no significant relationship between years in service of health personnel and knowledge of hospital waste management ($P<0.05$, df = 4, $\chi^2 = 130.53$), and that respondents who had spent fewer years in service were 10.87 times less likely to have good knowledge of hospital waste management compared to those who had spent longer years in service (OR = 0.092, 95% CI: 0.32 – 6.74). The findings of the study corroborate with the study of Hakim *et al.* (2014) where it was found that training and duration of work experience were not significantly associated with the awareness of health

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personnel on hospital waste management. In similar research study, less than half of the health care workers (43.2%) attended training on hospital waste management which was a similar finding from the study conducted in 2015 (Choden, 2015, Zimba *et al*.,2021). The similarities between these studies may be due to similar individual characteristics as most persons may have long service in their working environment but may show negligence to some issues that are of great importance. However, the findings of Mohammed *et al*. (2017) support the fact that those who had long duration of service have better exposure and awareness of hospital waste management. According to Habeeb and Ahmad (2015), generally, female respondents had higher qualifications and income, and longer working experience than males. About 80% of the departments managed by females had the correct type of container compared to the males' 42%. This might be due to the fact that spending longer years in service exposes one to certain experiences which he or she was not taught in classroom. At variance with the findings is study by Mahmoudi *et al*. (2016) which reported a positive correlation between years of experience and knowledge of biomedical waste management. Similarly, finding of Kumar *et al*. (2013) are not in line with the findings which reported a statistical significance in experience and perception. This study provides an evidence and insight on the relationship between awareness of hospital waste management for researchers and other academic scholars.

On the aspect of the actual waste management practice, research questions 11-16 gives good insight of above average on best practices such as in the awareness of improper waste disposal can leading to needle stick injuries (100%), on colour code for disposal of human, biological and any object that has been in contact with body fluids is yellow (52.5%), on colour coding for microbiological waste being red (73.8%), untreated medical waste can being stored for not more than 48 hours in temporary storage area (84.2%), any waste mixed with medical waste being treated as medical waste (94.5%) and any waste mixed with medical waste being treated as medical waste (89.5%) respectively. The above result also shows some level of awareness on the intricacies and dangers of poor hospital waste management practices. There were no relevant issues on training and re-training on waste management but only based on sight practice hence copy kind of learning during oral interview sessions under closed door for fear of intimidation and punishment as supported earlier by Zimba *et al*. (2021) on the awareness and practice of medical waste management among healthcare workers is often limited with inadequate sensitization and lack of proper implementation of the existing National guidelines at the study site. Similarly, underfunded healthcare systems, poor training and lack of awareness of policies and legislations on handling medical waste have led to increased improper handling of waste within hospitals, healthcare facilities and transportation and storage of medical waste (Chisholm *et al*., 2021; Mmereki *et al*., 2024).

CONCLUSION

This study was based on three hypotheses to support the perception of hospital waste management amongst health personnel in Rivers West Senatorial District of Rivers State. Three hypotheses were formulated to achieve the aim of the study. The findings of this study showed a significant difference between age of health personnel and the perception of hospital waste management. Conversely, the findings of the study also revealed a non-significant relationship between gender of health personnel and awareness of hospital waste management as well no significant relationship between years in service of health personnel and awareness of hospital waste management. There is the need to carry out more sensitizations on issues of health information management both on the sides of health personnel and the regulatory agencies of government.

It was recommended among others that government should provide adequate funds for better execution of waste management programmes. This would help secure modern waste management technology that could make hospital waste management better. Similarly, based on the findings of the study, the following recommendations are made;

i) Government should provide adequate funds for better execution of waste management programmes,
ii) Environmental awareness not only in the health facilities but other institutions such as companies, industries and schools and the state agency responsible for waste management and sanitation should take up to the challenges of waste disposal and ensure regular evacuation of the waste in the different health facilities.

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