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## RESEARCH ARTICLE

### KNOWLEDGE AND PRACTICE OF MEDICAL WASTE MANAGEMENT AMONG HEALTH WORKERS IN A NIGERIAN GENERAL HOSPITAL

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#### ABSTRACT

**Background:** Medical waste is hazardous posing serious threats to environmental health and requiring specific treatment and management prior to final disposal. The problem is growing with an ever-increasing number of hospitals, clinics, and diagnostic laboratories in Nigeria, yet there is dearth of information for planning an effective intervention. This study assessed the knowledge and practice of medical waste management among healthcare workers at a General hospital in Anambra, Nigeria.

**Methods:** Stratified sampling technique was used to select consenting study participants viz: doctors, nurses, pharmacists, laboratory technicians, and healthcare attendants, who work in the in the 70-bed capacity secondary healthcare centre in the state.

**Results:** Mean age of the participants was 30<sup>+</sup> 7 years. Ten (10) doctors, 20 nurses, 8 pharmacists, 6 laboratory technicians and 36 healthcare attendants were recruited for the study. Segregation of waste at source was known by 80%, 70%, 50%, 90%, and 5.6% of doctors, nurses, pharmacists, laboratory technicians and healthcare attendants respectively. All the doctors and nurses, 75%, 66.7% and 35% of pharmacists, laboratory technicians and healthcare attendants respectively were aware of the hazardous consequences of improper medical waste handling. However, the real practice of medical waste management was poor among the respondents and majority of them had not received training on the subject.

**Conclusion:** Lack of adequate training on healthcare waste management may be responsible for the improper waste management practices observed in the health facility. Thus, on the job training program and monitoring is needed for all staff, with special emphasis on healthcare attendants.

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## INTRODUCTION

In the persuasion of the aim of reducing health problems, eliminating potential risks, and treating sick people, healthcare services inevitably create waste which itself is hazardous to health. It is estimated that annually about 0.33million tones of waste is generated and, the waste generation rate ranges from 0.56 to 0.67kg per bed per day (Nkonge *et al.*, 2012). Nigeria's major tertiary health facilities are today fighting to clear heaps of solid waste from their environments. These strategic centers of health security are being gradually overtaken by the messy nature of unattended heaps of solid wastes emanating from wards, clinics, theatre and other sectors of the hospital (Isu, 2013). About 75-90% of waste produced in healthcare establishments is general waste.

This includes papers, packaging materials, dust and the like. The remaining 10-25% of waste is hazardous and could be composed of sharps (needles, lancets etc.), syringes, blood or body fluid, contaminated surgical instruments, delivery bowls, used gauzes and gloves, plasters, etc; it may also contain expired drugs, laboratory reagents and other chemicals (Askarian *et al.*, 2004; OrI and Akgill, 2004). In hospitals, different kinds of therapeutic procedures (i.e. chemotherapy, dialysis, surgery, delivery, autopsy, biopsy, etc.) are carried out and result in the production of infectious wastes, sharp objects, radioactive wastes and chemical materials (Prüss *et al.*, 2009). Medical waste contains highly toxic metals, toxic chemicals, pathogenic viruses and bacteria (Coronel *et al.*, 2002; Muhlich *et al.*, 2003), which can lead to pathological dysfunction of the human body (Sigsgaard *et al.*, 2004; Ray *et al.*, 2005). Medical waste presents a high risk to doctors, nurses, technicians, sweepers, hospital visitors and patients due to arbitrary management (Massrouje, 2001; Becher and Lichtnecker, 2002).

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It is a common observation in Dhaka City Bangladesh, that poor scavengers, women and children collect some of the medical wastes (e.g. syringe-needles, saline bags, blood bags etc.) for reselling despite the deadly health risks. It has long been known that the re-use of syringes can cause the spread of infections such as AIDS and hepatitis (Tamplin *et al.*, 2005). The collection of disposable medical items (particularly syringes), its resale and potential re-use without sterilization could cause a serious disease burden (Uwaegbulam, 2004). Solid wastes have become recurring features in our hospital environment. It is no longer in doubt that our healthcare facilities are inundated with the challenges of un-cleared solid wastes.

Thus, health workers are often confronted with the hazardous impact of healthcare waste to their collective health and safety. The hue and cry over the health consequences of exposed and fermenting rubbish have not been quantified, although their impact is noticeable (Mato *et al.*, 1999). A United Nations Report in 2004 noted with regret that while developing countries are improving access to clean drinking water they are falling behind on sanitation goals (WHO, 2002). At one of its summit in 2004, the World Health Organization and the United Nations Children's Fund in a joint report stated that: "about 2.4 billion people will likely face the risk of needless disease and death by the year 2015 because of bad sanitation". The report also noted that bad sanitation- fuels the spread of diseases like cholera and basic illness like diarrhea, which kills a child every 21 seconds. The safe disposal and subsequent destruction of medical waste is a key step in the reduction of illness or injury through contact with this potentially hazardous material, and in the prevention of environmental contamination (WHO, 2002 and <http://www.epa.gov/volume2>, 1997). Solid waste management is the process of collecting, storing, treatment and disposal of solid wastes in such a way that they are harmless to humans, plants, animals, the ecology and the environment generally (Blenkharn, 2006).

The unhealthy disposal of solid waste is one of the greatest challenges facing developing countries (Kofoworola, 2007). It is a problem recognized by all nations at the 1992 Conference on Environment and Development, and regarded as a major barrier in the path towards sustainability (UNCED, 2008). The sustainable management of healthcare waste (HCW) has continued to generate increasing public interest due to the health problems associated with exposure of human beings to potentially hazardous wastes, arising from healthcare. The nature and quantity of healthcare waste generated as well as institutional practices with regards to sustainable methods of healthcare waste management, including waste segregation and waste recycling are often poorly examined and documented in several countries of the world despite the health risks posed by the improper handling of HCW (Stephen and Elijah, 2011).

Despite the magnitude of problems emanating from poor healthcare waste management there is yet to be an implemented legal provision guiding the management of healthcare waste in Nigeria. The poor state of solid waste management in our healthcare setting is caused by inadequate facilities, poor funding, and poor implementation of policies as well as lack of knowledge and poor waste management practices. In USA, 1994, 39 cases of HIV infection were

recognized by the center for disease control and prevention as occupational infections mainly from poor healthcare waste management of sharps. A total of 347 injuries occurred, mainly due to improper disposal of needles (Almuneef and Memish, 2003). According to the world health organization, in 2000 alone it was estimated that injections with contaminated syringes caused 21million hepatitis B virus (HBV) infection (32% of all new infections), 2million hepatitis C virus (HCV) infection (40% of all new infection) and at least 260,000 HIV infections (5% of all new infection) in the world (<http://www.who.int/mediacentre/factsheets>, April 2014). Moreover incineration of waste produces toxic chemicals in the emissions leaving the stack (Geradu, 1995). According to the Environmental Protection Agency (EPA) USA, medical waste is the third leading source of dioxin emissions in the US and the fourth leading source of mercury emissions (<http://www.epa.gov/dioxin>, 2008).

Heavy metals and dioxin may be dispersed over a wide area, settling on the food we eat and the water we drink. According to the EPA, up to 15% of women of childbearing age are exposed to mercury levels high enough to put their newborns at risk of irreversible neurological and developmental damage. Fetal exposure to mercury can cause mental retardation, learning disabilities, attention deficit, gait disturbances and impairments of language and memory (<http://www.epa.gov/dioxin>, 2008). The problem of effective solid waste management has to do with poor social services delivery efforts which cause unnecessary delays in solid waste clearance. It is either broken down machinery, non-maintenance of dumpsters, poor waste segregation using colour coded receptacles and irregularities in the designation of sanitary landfill sites (Stephen and Elijah, 2011). Despite this laudable attention, the attitude of Nigerians as regards to collection, disposal, processing, treatment, and recycling wastes have defied solution.

It is believed that the waste disposal habit of the people, corruption, work attitude, inadequate plants and equipment among others are the major factors militating against effective solid waste management in hospitals. Despite the menace emanating from improper healthcare waste disposal, only few studies have been done to find a probable solution. Improvement on healthcare waste management can be recorded if more studies are done to ascertain the knowledge, attitude, practice and implementation of policies regarding proper waste management. The objectives of this study include ascertaining the knowledge and attitude of healthcare workers towards solid waste management problems in their environment and determining the practice of proper waste management methods in General Hospital Onitsha.

## MATERIALS AND METHODS

This was a cross sectional descriptive study carried out at General Hospital Onitsha Anambra state, Nigeria. It is a 70-bed capacity hospital which provides emergency, surgical, and maternal and child health services to Onitsha populace and Anambra state at large. The study population was made up of health workers in the hospital including doctors, nurses, pharmacists, laboratory technicians and health attendants. The minimum sample size was worked out using the formula

$$nf = \frac{n}{1+n} N$$

where: N is the estimate of the population size  
 nf is desired sample size when population is <10,000  
 n is desired sample size when population is >10,000

$$\text{Sample size } n = \frac{(z^2 pq)}{d^2}$$

n = minimum sample size; z = standard normal deviate (1.96);  
 p = prevalence (knowledge) of healthcare waste management in a study done in Awka Anambra State (95%) (Aisien and Shobowale, 2005); q = the proportion of people in the population without factor under study; q = 1-p; d = degree of precision (d=0.05)

$$n = \frac{(1.96)^2(0.95)(1-0.95)}{(0.05)^2} = 73$$

Therefore, nf = 73

$$\begin{aligned} & [1 + (73/120)] \\ & = \frac{73}{1.608} = 45.4 \end{aligned}$$

Hence, nf = 45 (desired sample size)  
 74% attrition rate of sample size was

$$= \frac{74 \times 45}{100} = 33.3$$

Therefore, total desired sample size = 33.3 + 45 = 78.3

The stratified sampling technique was carried out to recruit consenting participants for the study. The heterogeneous hospital workers population was divided into homogeneous units (strata) to select 10 doctors, 20 nurses, 8 pharmacists, 6 laboratory technicians and 36 health attendants in proportion to their total numbers in the hospital.

The instruments for data collection were both self and interviewer administered questionnaires used to obtain relevant information from the respondents. The questionnaire contained five sections on demography, knowledge, attitude, practice and some determining factors of medical waste management. Data was analyzed manually by tally method and electronic calculator was used to work out the percentages. The result was then represented in tables and pie charts.

### Ethical Consideration

This work was done with permission from the Ethics Committee of the University Teaching Hospital through the department of Community Medicine. Informed consent was obtained from the respondents after due explanation of the aim of the study. Confidentiality of the answers was also guaranteed.

### Limitation of the Study

The major problem affecting the collection of data for the study was centered on unwillingness of some of the respondents to provide answers to the questions. Paucity of previous works on this topic in our environment was also a limitation. It must be acknowledged that, this is an initial single-center, small sample size, hospital-based investigation intended to lay the foundation for larger state and country-wide studies that will better inform government policies on hospital waste management.

### RESULTS

The study population consisted of 20 (25%) males and 60 (75%) females consisting of doctors, nurses, pharmacists, laboratory technicians and health attendants. Their mean age was 30 ± 7 years. Nine (90%) of doctors, 18(90%) of nurses, 7(87.5%) of pharmacists, 5(83.3%) of laboratory technicians and 21(58.3%) of healthcare workers knew about waste segregation. Segregation at source was known by 80%, 70%, 50%, 90%, and 5.6% of doctors, nurses, pharmacists, laboratory technicians and healthcare attendants respectively.

**Table 1. Respondents' Knowledge of Waste Management**

| Waste management Knowledge items                 | Doctors<br>N=10(100%) | Nurses<br>N=20(100%) | Pharmacists<br>N=8(100%) | Lab technicians<br>N=6(100%) | Health attendant<br>N=36 |
|--|-----------------------|----------------------|--------------------------|------------------------------|--------------------------|
| Waste Segregation                                | 9(90)                 | 18(90)               | 7(87.5)                  | 5(83.3)                      | 21(58.3)                 |
| Segregation at source                            | 8(80)                 | 14(70)               | 4(50)                    | 5(83.3)                      | 2(5.6)                   |
| Waste separation                                 |                       |                      |                          |                              |                          |
| Sharps   | (35.7)                | 53.4                 | 60                       | 50                           | 50                       |
| Infectious waste                                 | (23.5)                | 24                   | 24.5                     | 33                           | 14.3                     |
| Chemical waste                                   | (26.5)                | 11.6                 | 3.3                      | 6                            | 14.3                     |
| Woods  | (7.2)                 | 6                    | 10                       | 3                            | 14.3                     |
| Plastics   | (7.1)                 | 5                    | 2.2                      | 8                            | 14.3                     |
| Knowledge of colour coded bags                   | 6(60)                 | 16(80)               | 6(75)                    | 5(90)                        | 25(69.4)                 |
| Waste Storage                                    |                       |                      |                          |                              |                          |
| Hospital dumpsite                                | 10(100)               | 18(90)               | 3(37.5)                  |                              | 18(50)                   |
| At site of collection                            |                       | 2(10)                | 2(25)                    | 3(50)                        | 7(19.4)                  |
| No idea  |                       |                      | 3(37.5)                  | 3(50)                        | 11(30.6)                 |
| Best waste disposal method                       |                       |                      |                          |                              |                          |
| Sanitary Landfill                                | 80                    | 60                   | 40                       | 60                           | 30                       |
| Incineration                                     | 85                    | 50                   | 20                       | 50                           | 20                       |
| Buried on hospital ground                        | ---                   | 20                   | ---                      | ---                          | 50                       |
| Open burning                                     | ---                   | ---                  | 10                       | ---                          | 60                       |
| Best container for waste collection and disposal |                       |                      |                          |                              |                          |
| Plastic bin                                      | 8 (80)                | 7 (35)               | 4 (50)                   | 5 (83.3)                     | 25 (69.4)                |
| Bags   |                       | 6 (30)               |                          |                              | 4 (11.1)                 |
| Cardboard boxes                                  |                       | 4 (20)               |                          |                              | 2 (5.6)                  |
| Trolleys/Wheel barrows                           | 2 (20)                | 3 (15)               | 4 (50)                   | 1 (16.7)                     | 5 (13.9)                 |

Whereas all the doctor respondents knew about injury resulting from poor waste management, only 35% of health care attendants possessed the same knowledge. Table 1 shows that 35.7%, 53.4%, and 50% of doctors, nurses, and healthcare attendants knew sharps should be separated from other wastes. The table showed that 6(60%) of doctors, 16(80%) of nurses, 6(75%) of pharmacists, 5(90%) of laboratory technicians, and 25(69.4%) of healthcare workers knew about colour coded bags. Also 10(100%) of doctors, 18(90%) of nurses, 3(37.5%) of pharmacists and 18(50%) of healthcare attendants went for dumpsite as site for temporary storage of waste.

Table 2 shows that the proportion of doctors, nurses, pharmacists, laboratory technicians and healthcare attendants that displayed positive attitude to containment of sharps were 40%, 30%, 50%, 33.3%, and 38.9% respectively. The table showed that 80%, 90%, 75%, 16.7% and 83.3% of doctors, nurses, pharmacists, laboratory technicians and healthcare attendants showed positive attitude. On the respondents' general practice of waste management, 64(80%) of them always disposed their waste into appropriate receptacle, while 70(87.5%) of the respondents cover the waste bin after disposal.

**TABLE 2. Respondents' Attitude towards medical waste management**

| Attitude Items  | Doctors<br>N=10 | Nurses<br>N=20 | Pharmacist<br>N=8 | Laboratory technician<br>N=6 | Healthcare attendants<br>N=36 |
|---|-----------------|----------------|-------------------|------------------------------|-------------------------------|
| Waste separation reduces injury risk to handlers          | 10<br>(100)     | 20<br>(100)    | 6<br>(75)         | 4(66.7)                      | 35<br>(97.2)                  |
| Must occupational safety of waste handlers be ensured?    | 8<br>(80)       | 18<br>(90)     | 6<br>(75)         | 1(16.7)                      | 30<br>(83.3)                  |
| Puncture proof containers are most appropriate for sharps | 4(40)           | 6(30)          | 4(50)             | 2(33.3)                      | 14(38.9)                      |

**TABLE 3. Respondent' General Practice of Waste Management**

| Where should segregation take place | Doctors<br>N=10 (%) | Nurses<br>N=20(%) | Pharmacist<br>N=8(%) | Laboratory technicians<br>N=6(%) | Healthcare attendant<br>N=36(%) |
|-------------------------------------|---------------------|-------------------|----------------------|----------------------------------|---------------------------------|
| Segregation at production site      | 8(80)               | 14(70)            | 4(50)                | 5(90)                            | 2(5.6)                          |
| Segregation at site of Collection   | 2(20)               | 2(10)             | 2(25)                | 1(10)                            | 6(16.7)                         |
| Segregation at disposal site        |                     | 4(20)             | 2(25)                |                                  | 28(77.7)                        |
| Uses of colour-coded bags           |                     |                   |                      |                                  |                                 |
| Separate waste                      | 4 (40)              | 5 (25)            | 3 (37.5)             | 3 (50)                           | 9 (25)                          |
| Store waste                         | 6 (60)              | 2 (10)            | 1 (12.5)             |                                  | 20 (55.6)                       |
| Transport waste                     |                     | 13 (65)           | 4 (50)               | 3 (50)                           | 7 (19.4)                        |

**Table 4. Relationship between waste management items and cadre of health worker respondents**

| Factors                               | Doctors<br>N=10(%) | Nurses<br>N=20(%) | Pharmacist<br>N=8(%) | Laboratory technician<br>N=6(%) | Healthcare attendants<br>N=36(%) | X <sup>2</sup> | P value |
|---------------------------------------|--------------------|-------------------|----------------------|---------------------------------|----------------------------------|----------------|---------|
| Should waste be segregated            | 9 (90)             | 18(90)            | 7(87.5)              | 5(83.3)                         | 21(58.3)                         | 11.7           | 0.002   |
| Knowledge of colour coded bags        | 6(60)              | 13(65)            | 3(37.5)              | 5(83.3)                         | 20(55.6)                         | 3.47           | 0.48    |
| Practice of waste management          | 8(80)              | 14(70)            | 4(50)                | 5(83.3)                         | 2(5.6)                           | 36.6           | 0.0000  |
| Received training on waste management | 8(80)              | 12(60)            | 1(12.5)              | 4(66.7)                         | 19(52.8)                         | 6.03           | 0.28    |

**Table 5. Relationship between gender and waste management**

| Factors                          | Number of Males |    | Number of Females |    | X <sup>2</sup> | P value |
|----------------------------------|-----------------|----|-------------------|----|----------------|---------|
|                                  | YES             | NO | YES               | NO |                |         |
| Should waste be segregated       | 17              | 3  | 50                | 10 | 0.031          | 0.86    |
| Knowledge about color-coded bags | 14              | 6  | 39                | 21 | 0.168          | 0.68    |
| Practice of waste management     | 9               | 11 | 17                | 43 | 1.899          | 0.168   |
| Training on waste management     | 12              | 8  | 21                | 39 | 3.868          | 0.049   |

Furthermore, 80%, 60%, 40% 60% and 30% of doctors, nurses, pharmacists, laboratory technicians and healthcare attendants respectively know about the waste disposed in the landfill, while 85%, 50%, 20%, 50%, and 20% of doctors, nurses, pharmacists, laboratory technicians and healthcare attendants respectively know about the waste disposed using incinerator. Moreover, 2(20%) of the doctors, 3(15%) of the nurses, 4(50%) of the pharmacists, 1(16.7) of the laboratory technicians and 5(13.9%) of the healthcare attendants went for trolley, wheel barrow as a means of internal waste collection and transport.

Also, 17% of the respondents said they always wear protective clothing when handling waste, 45% said they do so sometimes while 38% rarely wear protective clothing. Table 3 shows that 8 (80%) of doctors, 14(70%) of nurses, 4(50%) of pharmacists, 5(90%) of laboratory technicians and 2(5.6%) of healthcare attendants went for segregation at source as the best method. The table showed that 6(60%) of doctors, 13(65%) of nurses, 3(37.5%) of pharmacists, 5(90%) of laboratory attendants and 20(55.6%) of healthcare attendants said that the major use of colour coded bags was for separation of wastes.

Table 4 shows that there is a significant difference between the cadres of health workers in the knowledge waste management (specifically segregation)  $p=0.02$ . Also there was a significant difference between the cadres of health workers on the practice of waste management;  $p=0.000$ . Concerning training on waste management, 8(80%) of the doctors, 12(60%) of the nurses, 1(12.5%) of the pharmacists, 4(66.7%) of Laboratory technicians and 19(52.7%) of healthcare attendants had received such training. Table 5 indicates that male health workers are significantly more likely to be sent for training on waste management than their female counterparts;  $p=0.49$

## DISCUSSION

In this study, recruited healthcare workers were assessed about their knowledge, attitude and practice of healthcare waste management. Concerning their knowledge of waste segregation, 90% of doctors and nurses each and 87.5%, 83.5% and 58.5% of pharmacists, laboratory technician and healthcare attendants respectively knew about waste segregation. This showed that the respondents had a fair knowledge. The high knowledge recorded in this study may be attributed to training received by the nurses and healthcare attendants recently before the study. There was however a significant difference ( $P<0.05$ ) in this knowledge between the more educated healthcare worker (doctors, nurses, pharmacist, laboratory attendants) and the healthcare attendants. This trend is similar to the findings of Saini *et al* who measured the knowledge regarding biomedical waste management. Their result showed that consultants, residents, and scientists respectively have 85%, 81%, and 86% knowledge about the biomedical waste management while nurses, sanitary staff, operation theatre and laboratory staff have 60%, 14%, 14%, and 12% awareness of the subject respectively (Saini *et al.*, 2005). This is an indication that the people with higher education tend to have greater awareness about waste management issues than their less educated counterparts. Therefore the difference in knowledge may be due to the difference in educational level of doctors and other paramedical workers and thus exposes the need to fill this gap in knowledge through regular informal education of the paramedical workers.

Segregation of medical waste at source is the golden rule of healthcare waste management. Knowledge of this strategy was displayed by 80%, 70%, 50%, 90%, and 5.6% of doctors, nurses, pharmacists, laboratory technicians, and healthcare attendants respectively. This is strikingly similar to the finding of another study by Yadavannavar *et al* which recorded that majority of their staff knew about segregation of healthcare waste at source (Yadavannavar *et al.*, 2010). In a similar vein, Deo *et al.* found that 90% of paramedical and 80.6% of medical staff were aware of this (Deo *et al.*, 2006).

Use of different color-coding bags for segregation is one of the most important parts of healthcare waste management rule, yet low proportions of the participants especially, nurses, pharmacist, laboratory technician and health attendant were positively disposed towards putting them to correct use. Comparable low knowledge was equally reported by some other studies. Deo *et al.* showed that only 28.62% of paramedical and 20.23% of medical staff knew about this issue, whereas 74% of Puducherry study participants did not

know about color coding of the healthcare waste bags (Deo *et al.*, 2006). However very high knowledge was shown among doctors and nurses in a study at Johannesburg Hospital by Ramokate *et al* who reported greater than 90% knowledge of various types of bins among them (Ramokate *et al.*, 2009). On assessing the attitude about different health problems due to healthcare waste, it was seen that all the doctors and nurses, and 75%, 66.7%, 35% of pharmacists, laboratory technicians and healthcare attendants had good perception about the risk of diseases transmitted by healthcare wastes. This result was similar to some other studies including a study by Pandit *et al.* and Saraf *et al.* which showed that all the doctors were aware that improper management of healthcare waste causes different health hazards like infections (HIV/AIDS, Hepatitis B and C), injuries, and environmental pollutions (Pandit *et al.*, 2005; Saraf *et al.*, 2006). A study by Araoye showed that 82% of the study population agreed that contact with infective waste could lead to infectious diseases such as HIV/AIDS, 88% Hepatitis B, and 76% Hepatitis C (Araoye *et al.*, 2003). A need to periodically acquaint the participants with the updated healthcare waste management and handling rules was felt (WHO, 2002).

The relatively good knowledge of medical waste management by participants apparently did not translate to practice as only 17% of the members of waste management team used protective clothing while handling waste. About 40%, 25%, 37.5% 50%, 25% of Doctors, Nurses, Pharmacist and health attendants respectively practiced correct use of colour coded bags. It was striking that despite the respondents' appreciable knowledge, their practice of waste management was poor. Hebel-Ulrich in his study found that many responses regarding knowledge indicate that the awareness about hygiene exists, but is not being practiced and irresponsible waste management suggests the need for a well planned waste management program (Hebel-Ulrich *et al.*, 2005). In conclusion, safe and effective management of waste is not only a legal necessity but also a social responsibility.

Lack of knowledge, poor attitude and inefficient practice of proper waste management are some of the problems militating against the proper hospital waste management. Display of apathy to the concept of waste management by health workers is a major stymie to the practice of waste disposal. Majority of the respondents had fair knowledge, attitude and inadequate practices related to waste management. This study has exposed a need to improve the knowledge about waste management to protect the environment from negative impact of waste. The importance of training regarding biomedical waste management cannot be overemphasized; lack of proper and complete knowledge about biomedical waste management impacts negatively on practices of appropriate waste disposal.

It is therefore recommended that strict implementation of biomedical waste management rules must be enforced by hospital management. Also accredited healthcare facilities should compulsorily train their personnel and the training sessions should be regular and frequent depending on the patient load in the various healthcare facilities. Finally, more attention should be directed at the healthcare attendants in order to close the yawning gap in their knowledge and practice of medical waste management.

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