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Assessment of Healthcare Waste Management Practices of Community Pharmacists in Jos Metropolis

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ABSTRACT

Background: Proper management of healthcare waste (HCW) is of great concern because of potential public health risks and damage to the environment associated with such waste. The distinct categories of HCW are sharps wastes, infectious wastes, pharmaceutical wastes, such as cytotoxic wastes, hazardous chemical wastes, radioactive wastes, and non-hazardous general wastes. A majority of Nigerian community pharmacies generate most of the categories of HCW by their mode of practice informing the need to evaluate their knowledge of the different categories of HCW and their HCW handling and disposal practices. The study aimed to evaluate the knowledge of the different categories of HCW generated within the community pharmacies and their HCW disposal practices.

Methods: A cross-section of 100 registered community pharmacists in Jos metropolis handling HCW was administered a structured questionnaire. The questionnaire was structured according to WHO guidelines on the safe management of HCWs to assess their knowledge of the different categories of HCWs generated within their premises and the HCW handling practices. Data were coded and abstracted into a Microsoft Excel spreadsheet for simple descriptive and inferential analysis.

Results: A total of 72 respondents completed the questionnaires giving a 72% recovery rate. Many of the respondents 52 (72.2%) were aware of the different categories of HCW, while 20 (27.7%) were unable to correctly identify the different categories of HCW. 73.6 % stated having a procedure for handling the waste generated and 95.8 % were aware that HCW should be segregated from general wastes.

However, the handling and disposal of HCW was done by 63.9 %. From the study, 31.9% of the respondents reported the disposal of sharp waste in safety boxes while 25% used closed waste bins, open burning (38.9%) and disposal with general wastes (22.2%). However, only 5.6 % of the respondents were aware of the colour coding system of HCW.

Conclusion: The results suggest that the respondents have a high knowledge of the different categories of HCW but lower waste-handling practices. To prevent exposing their workers and the public to potential health risks, it is recommended that the healthcare sector needs more training for the proper management of healthcare waste associated with the products and services they provide.

1. INTRODUCTION

Health-care waste or medical waste is defined as 'all the waste generated within health-care facilities, research centres and laboratories related to medical procedures, also known as materials, generated because of patient diagnosis, treatment, or immunization of human beings or animals [1-2]. The distinct categories of healthcare wastes are sharps wastes, infectious wastes, pathological wastes, pharmaceutical wastes (including cytotoxic) wastes, hazardous chemical wastes, radioactive wastes, and non-hazardous general wastes. Between 75% - 85% of the total waste generated in healthcare facilities is considered general non-hazardous waste, and the remaining 15% is considered hazardous material that may contain infectious agents, might be genotoxic, might contain toxic or hazardous chemicals and pharmaceuticals, might be radioactive and can contain sharps [3-4].

Community pharmacies in developing countries such as Nigeria serve as a first point of call for the public when

assessing healthcare due to their proximity and easy access [2,13]. They typically provide an array of services ranging from drug retailing and dispensing, provision of drug information, first aid/wound dressing, administration of injections, and simple laboratory investigations such as urine pregnancy tests, rapid malaria tests, simple blood sugar tests, etc. leading to the generation of health care wastes.

A study carried out in India revealed that about a quarter of pharmacies were providing services such as the administration of injections, wound dressing, and laboratory and consultation services in addition to medicine dispensing and counselling services.[5] In the National Healthcare Waste Management Plan of Nigeria, Pharmacies have been quoted as a minor source of healthcare waste because of the volume of waste produced.[6] The management of healthcare waste is a major challenge, particularly in developing countries like Nigeria where practices, capacities, and policies on waste disposal are grossly inadequate and require intensification, as HCW is very often combined with municipal waste and could pose grave consequences [7-8]. Wastes produced through healthcare activities pose a greater risk of infection and injury than any other type of waste, so safe and effective methods of handling such wastes should therefore be a top priority in any healthcare institution. Producers of healthcare waste are responsible for its treatment and final disposal as emphasized by various International Conventions including Agenda 21 adopted in 1992 at the United Nations Conference on Environment and Development (UNCED).[9] A study of medical waste management in Nigerian healthcare institutions revealed many gaps in healthcare waste management; absence of medical waste tracking, unavailability of the waste management plan, lack of records on medical waste generated, poor medical waste handling practices, open burning of waste and burial on fallow land within some hospitals [5, 10-11]. Studies conducted in other African Countries revealed similar reports[12-13]. It is reported that yearly, an estimated 16 billion injections are administered worldwide but not all the needles and syringes are properly disposed of afterwards[3]. The management of healthcare waste is of great concern given the potential public health risks and damage to the environment. The study, therefore, aimed to assess community pharmacists' awareness of the categories of healthcare waste, determination of the types of healthcare waste generated by the community pharmacies, and evaluate the healthcare waste handling practices of community pharmacies from the point of generation to the point of disposal.

METHODS

This was a cross-sectional study carried out to assess the healthcare waste management practices of community pharmacies within Jos Metropolis using a structured questionnaire.

STUDY AREA

The study was carried out in Jos, the most urban and capital city of Plateau State, Nigeria. The city lies between longitudes 8º 53' and latitude 9º 56', covering about 9400 km^2 in area with a population of about 3.2 million [12].

STUDY POPULATION

All 106 registered community pharmacies within Jos metropolis as of the year 2019.

SAMPLE SIZE

There were 106 registered community pharmacies, and all were used

STUDY TOOL

A questionnaire based on WHO guidelines on the safe management of waste from healthcare facilities was designed with 3 sections. Section A contained demographic data, section B for assessment of the awareness of different categories of healthcare waste and Section C dealt with the assessment of healthcare waste handling concerning segregation and disposal [9]. A pilot test was conducted in 5 community Pharmacies and thereafter, minor corrections were made to the questionnaire. The questionnaire contained both open-ended and close-ended questions and sought information on participants' Demographics, awareness of categories of HCW generated on the premises, knowledge and practices of collection and segregation of HCW, methods used and general handling of generated waste and willingness to receive training on HCW management (Tables 2, 3 and 4).

DATA COLLECTION

The study-specific questionnaire was administered to 100 community pharmacists after obtaining informed consent from the respondents by the main author and two trained assistants. At the time of carrying out this research, there were 106 registered community pharmacists in Jos metropolis and 5 were used for the pilot study. Data collection covered a month, from which 72 questionnaires were received, giving a 72% response rate.

ETHICAL APPROVAL

Ethical approval was obtained from the institutional review board of Jos University Teaching Hospital. The pharmacist managers were presented with an informed consent form and written informed consent was obtained. The questionnaires were coded to ensure the confidentiality of each pharmacy premises and the information obtained was stored on a computer with restricted access.

DATA ANALYSIS

The data obtained were coded and abstracted into a Microsoft Excel spreadsheet and thereafter translated into SPSS Version 20 for descriptive and inferential analysis. The Chi-square test and Fisher's Exact Test were used to estimate the relationship between categorical values. A high level of awareness was defined as having answered >70 % of the knowledge questions correctly.

RESULTS

Demographics of respondents

The demographic characteristics indicated that 41 (56.9%) of the respondents were male and 31 (43.1%) were female, where many of the respondents 54 (75%) fell within the age bracket of 25-44. Most of the respondents, 58 (80.6%) had B. Pharm as their highest level of qualification. Forty-two (42) (58.3%) were superintendent pharmacists and 14 (19.4%) were sole proprietors or owners of the premises. About 47 (65.3%) of the premises surveyed were retail-only premises while 23 (31.9 %) engaged in both wholesale and retail practice. 30 (41.7%) of the respondents had less than 5 years of practice, 19 (26.4%) had 5-10 years of experience and 23 (31.9%) had over 10 years of practice in community pharmacy.

Table 1

Demographics of respondents

Demographic characteristics	Frequency	Percent (%)
Gender		
Male	41	56.9
Female	31	43.1
Age groups (years)		
18-24	2	2.8
25-34	31	43.1
35-44	23	31.9
45-54	9	12.5
55-64	5	6.9
65+	2	2.8
Highest Educational Qualification		
BPharm	58	80.6
PharmD	1	1.4
MSc	12	16.7
PhD	1	1.4
Employment status		
Superintendent pharmacist	42	58.3
Locum pharmacist	16	22.2
Soleproprietor/manager	14	19.4
Premises type		
Retail only	47	65.3
Wholesale only	2	2.8
Wholesale/retail	23	31.9

Aware of **categories of HCW generated by community pharmacies**

Many of the respondents 52 (72.2%) were aware of the different categories of healthcare waste, while 20 (27.7%) were unable to correctly identify the different categories of healthcare waste. Pharmaceutical waste is the highest category of healthcare waste generated with 93.1%, followed by sharps waste at 84.7%, and then chemical waste at (47.2 %). From the data, 8.3% and 65.3% of the premises generated pathological and infectious wastes respectively (Figures 1 & 2).

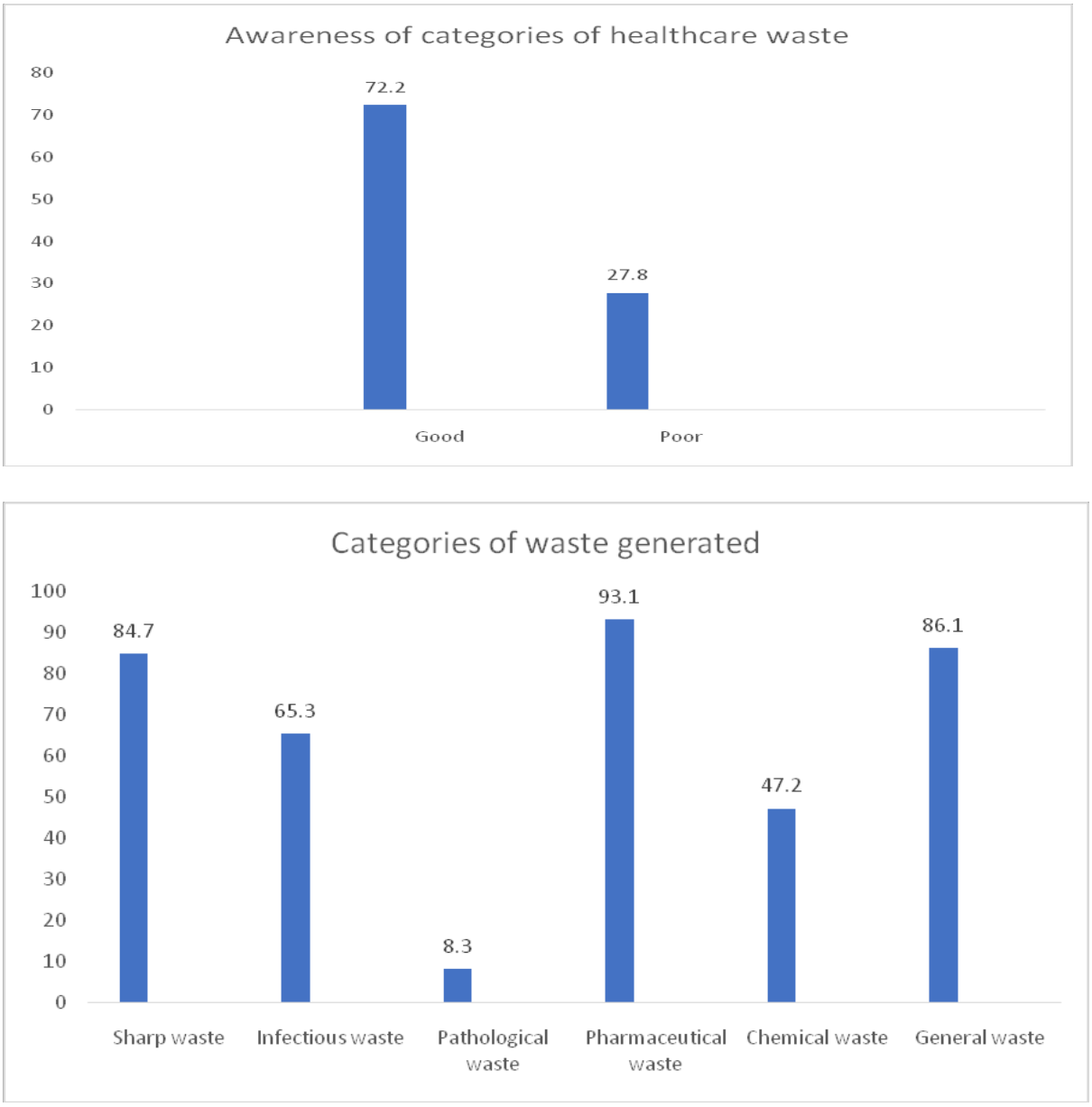

Figure 1: Bar chart showing the types of categories of healthcare waste generated from community practices

Knowledge and practice of collection and segregation of healthcare wastes

Of the respondents surveyed, 73.6 % indicated having a procedure for collecting or handling the waste generated on their premises and 95.8 % were aware that HCW should be segregated from general wastes. The separation of HCW from general wastes on the premises was done by 63.9 % and various types of containers were used for sharps. Furthermore, about 31.9% of the respondents disposed of sharp waste in safety boxes while 25% disposed of sharp waste in closed waste bins. Of the premises surveyed 63.9 % collected waste daily and just 5.6 % of the respondents were aware of the colour coding system for classifying HCW (Table 2).

Table 2

Data obtained from respondents on the knowledge and practice of collection and segregation of HCW

Variable	Frequency	Percent (%)
Do you have a procedure for collecting/handling healthcare waste?		
Yes	53	73.6
No	17	23.6
No response	2	2. 8
Should healthcare waste be segregated from general waste?		
Yes	69	95.8
No	2	2.8
No response	1	1.4
Do you separate healthcare wastes from general wastes collected on your premises?		
Yes	46	63.9
No	23	31.9
No response	3	4.2
Indicate the kind of container you used for your sharps disposal.		
Nylon bags	9	12.5
Open plastic baskets	11	15.3
Cartons	2	2.8
Water bottles or tins with covers	6	8.3

Closed waste bins	18	25.0
Safety boxes	23	31.9
Not applicable	2	2.8
No response	1	1.4
How often do you dispose of waste collected at your premises?		
Daily	46	63.9
Weekly	16	22.2
Monthly	2	2.8
Yearly	0	0.0
Not applicable	36	11.1
Are you familiar with the colour-coding system for healthcare waste?		
Yes	4	5.6
No	62	86.1
No response	6	8.3

Handling practices of HCW by community pharmacists

Twenty-eight of the respondents (38.9 %) of respondents had a good theoretical knowledge of the methods used in handling healthcare wastes while 18 (25 %) did not know about handling HCW. About 20 % of the respondents knew how to handle HCW, sharps and bandages while 2.8 % knew how to pack and return expired drugs to company representatives with 20.8% submitting expired drugs to NAFDAC for disposal (Table 3)

Table 3: Data showing methods used in handling healthcare waste of community pharmacists from point of generation to disposal

Responses	**N (%)**
Methods of handling healthcare waste	
"Collecting in a waste bin and burning/incinerating"	28 (38.9)
"Dumping with general waste	16 (22.2)
To professional waste handlers or environmental sanitation workers	8 (11.1)
Collecting and burning in primary healthcare incinerator	2 (2.8)

No response	18 (25)
Methods of handling needles and sharp wastes	
Disposed in safety boxes/closed containers and incinerated/burned	24 (33.3)
Disposed in nylon bags and dumped with other general wastes	14 (19.4)
Submitted to professional waste handlers	8 (11.2)
Buried	2 (2.8)
Burned in a drum and disposed of in a dugout well	1 (1.4)
Collected in a nylon bag and buried	2 (2.8)
No response	21 (29.1)
Method of handling expired drugs	
Packed and returned to company representatives	2 (2.8)
Packed and submitted to NAFDAC for disposal	15 (20.8)
Packed and kept in the pharmacy	6 (8.3)
Crushed and disposed in a pit	1 (1.4)
Packed and incinerated	1 (1.4)
Packed and taken to the central store	2 (2.8)
Disposed in neighborhood dump	4 (5.6)
Submitted to waste handlers or sanitation workers	6 (8.3)
No response	35 (48.6)
Methods of handling swabs and bandages	
Burning/incinerating	20 (27.8)
Disposed of with general waste in dumpsite	13 (18.1)
Submitted to waste handlers or sanitation workers	7 (9.7)
No response	32 (44.4)

Willingness of respondents to be trained in HCW management

Sixty-nine (95.8 %) indicated the willingness to have formal training on healthcare waste management whereas 1 (1.4 %) indicated no interest in formal training in healthcare waste management (Table 4).

Table 4: **Data showing the willingness of respondents to be trained on healthcare waste management**

Variables	**N(%)**
If you have the opportunity to attend training on healthcare management, would you be interested?	
Yes	69 (95.8)
No	1 (1.4)
No response	2 (2.8)

DISCUSSION

Of the total number of respondents surveyed, more males than females were managers of the premises and the females in practice demonstrated a slightly higher level of awareness of healthcare waste compared to their male counterparts. A similar study conducted in Lagos showed that 74.4% were aware of proper pharmaceutical waste management and about 41.7% were aware of the periodic requests for waste submission by the Association of Community Pharmacists of Nigeria (ACPN) whereas 48.3% were unaware[14]. They concluded that though awareness was high, the standard practice of disposal was low. Studies from other regions such as the United Arab Emirates also revealed that the disposal of pharmaceuticals was of much concern however, the UAE has licenced contractors by health authorities involved in the disposal of unused medications. In their study, the majority of pharmacists (68.4 %, n = 286) agreed that expired pharmaceutical and non-pharmaceutical products, other than those disposed of via contractor, should be done through a specialized centre. This opinion was found to be strongly associated with years of practice as community pharmacists ($P < 0.05$)[15]. Similar studies conducted in Nigeria and Cameroon and globally suggest that improper disposal of pharmaceuticals is a global problem which plays an important role in environmental contamination and that improper disposal is still predominant among environmentally aware people, which suggests that knowledge and awareness of environmental issues regarding medicines disposal only partially explains people's medicine disposal habits[16,17,18].

A high number of the respondents managing the premises had a minimum qualification of a B.Pharmacy degree and it is expected that the knowledge and practice of HCW disposal should be high considering the training received however, the percentage of respondents handling the proper disposal of HCW in practice was lower than the knowledge exhibited. The practice gap observed in this study shows the need for more awareness and training possibly under the mandatory continuing professional development (MCPD) courses run by the Pharmacy Council of Nigeria or through ACPN.[3] It is expected that having formal training on healthcare waste management will translate to better awareness of HCW compared to those who have not had any formal training, as was observed in this research. This would enable the implementation of the sector taking responsibility for the wastes generated from products and services rendered Some of the respondents who had received formal training showed good knowledge of the collection and segregation of the HCW generated.

Almost all the premises generated pharmaceutical waste at least weekly, and this was expected since they deal with pharmaceuticals and during business, some drugs may get damaged, or expire. A large percentage of the premises were observed to generate sharps waste mostly through the administration of injections, however, this practice calls for adequate training in handling sharps. The study reveals that there is a need for attention to be given to this aspect of the

practice by the regulatory authorities. A study conducted in India revealed that about a quarter of pharmacies were providing services such as the administration of injections, wound dressing, and laboratory and consultation services in addition to medicine dispensing and counselling services [5].

From the study, about three-quarters of the respondents agreed they had a procedure for handling healthcare waste generated on their premises; although some agreed that healthcare waste should be segregated from general waste, only about half of the respondents separated healthcare waste from general waste. Furthermore, about one-third of the respondents disposed of sharp waste in safety boxes while one-quarter disposed of sharp waste in closed waste bins. Waste segregation has been suggested to be key to effective healthcare waste handling. Other studies carried out in developing countries have reported very poor healthcare waste segregation practices as well [11-12]. The data from community pharmacies in Jos showed various methods of handling the HCW collected on their premises. The results further exposed a knowledge and practice gap within the community pharmacies, so the need for training and the development of standard operating procedures (SOPs) is important to meet global practices. The training will stem the norm, especially in developing nations where medical waste (MW) is very often combined with municipal waste. From the responses, expired drugs were submitted to NAFDAC as reported by a small percentage. Some others reported that the drugs were crushed and disposed of in community dump sites whereas about one-third of the respondents gave no responses to how these items were handled. Other poor practices reported are the collection of waste in open baskets, open burning, or burying in shallow pits. Open burning of pharmaceuticals has been reported to threaten the health and safety of the handling staff, the public, and the environment [5, 8 11, 12.] A poor understanding of colour coding was also observed in this study. To encourage and facilitate segregation at source, reusable waste containers or baskets with liners of the correct size and thickness should be placed as close as possible to the point of generation. They can be properly colour-coded and have specific symbols marked on them, e.g. yellow or red for infectious waste with a marked international infectious waste symbol. The colour coding for the segregation of bio-medical waste is important to ensure proper handling or disposal[19]. A high percentage of the respondents indicated the willingness to receive training because they believed it would improve their knowledge of HCW. The data from this study should provide direction for the regulatory authorities and professional associations on the need for training on safe, affordable, efficient, sustainable practices with culturally acceptable methods of disposal and treatment of healthcare wastes and the authors strongly suggest that the training on HCW management should form part of continuous professional education for community pharmacies.

CONCLUSION

The Awareness of the different categories of healthcare waste was high (72.2%) and the most HCW generated was observed to be pharmaceuticals (93.1%). The study also showed that the handling of HCW disposal was lower at 63.9% and this calls for stricter implementation and regulations concerning HCW disposal to effect a change in attitudes and practices. The data from this study contributes to the knowledge and practices of HCW disposal in community practices in Jos metropolis.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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