MANAGEMENT OF SOLID BIOMEDICAL WASTE FROM A HOSPITAL IN MAHAJANGA I

GESTION DES DECHETS BIOMEDICAUX SOLIDES D 'UN HOPITAL DE MAHAJANGA I

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SUMMARY
Biomedical waste presents a real health and environmental risk; the aim is to describe the management of biomedical waste in a hospital in Mahajanga I, and thus contribute to the improvement of the method of treatment of biomedical waste within the PzaGa Androva University Hospital in Mahajanga I;

This is an observational and prospective cross-sectional study which took place at the University Hospital CHU PZaGa, during the period from March to August 2022, an interrogation was carried out using a questionnaire submitted to the agents in this establishment to evaluate the following variables: Waste typology, waste sorting, method of disposal, risks and handling accidents.

The participation rates were 50.1%, the most responded were nurses, the average seniority was 5 years of service (92%), regarding waste; the most frequent were DAOM (similar to household waste), There is a positive response for the agents regarding waste sorting (76.4%); (70%) for storage, manual transport represents the most important (75%) followed by rolling bins ( ) and wheelbarrows ( ), 75% of the agents are trained on DBM management

DBM is treated by smokeless incineration at high temperatures of 800 to 1200°C.
To ensure the management of biomedical waste, introduce a new training and awareness strategy for staff in hospital waste management.
Keywords: biomedical waste; environment; risk; management; PzaGa University Hospital.

RESUME

Les déchets biomédicaux est présente un réel risque sanitaire et environnemental ; le but est décrire la gestion de déchet biomédicaux dans un hôpital de Mahajanga I, et ainsi contribue à l'amélioration du mode de traitement de déchet biomédicaux au sein du CHU PzaGa Androva à Mahajanga I ;
Il s'agit d'une étude transversale observationnelle et prospective qui a eu lieu au centre Hospitalier Universitaire CHU PZaGa , au cours de la période allant de Mars en Aout 2022 , un interrogatoire a été réalisé à l'aide d'un questionnaire soumis aux agents dans cette établissement pour évaluer les variables suivants : Typologie de déchets , les tri de déchets , le mode d'élimination , les risques et les accidents de manipulations .
Les taux de participations étaient de 50,1 % , les plus répondit était les infirmiers l'ancienneté moyenne était de 5 ans de service (92 %) , en ce qui concerne les déchets ; les plus fréquents étaient les DAOM (assimilables aux ordures ménagères), Il y a une réponse positive pour les agents en ce qui concerne le tri des déchets (76,4%); (70 %) pour les stockages , le transport manuel représente le plus important (75%) suivie de poubelle roulante ( ) et de brouette ( ) , 75 % des agents sont formés sur la gestion de DBM
le traitement de DBM se fait par l'incinération sans fumée à haute température de 800 à 1200° C . .
Pour assurer la gestion de déchet biomédicaux introduire de nouvelle stratégie de formation et de sensibilisations de personnel à la gestion de déchets Hospitaliers .
Mots clés : déchets biomédicaux ; environnement ; risque ; gestion ; CHU PzaGa .

INTRODUCTION

Healthcare institutions whose primary mission is to care for, treat, and improve the health of patients are major producers of various organ waste. Indeed, the rapid population growth in Madagascar generates an increasing amount of waste (1). Due to their healthcare activities, they produce waste from healthcare activities and generate toxic

pollutants in the environment (air, water, soil, animals, plants, landscape) and in humans, which can be dangerous for health and the environment.

According to WHO, approximately 85% of healthcare waste is comparable to household waste and is not hazardous, and can be infectious (toxic and radioactive).

It is estimated that 16 billion people are infected worldwide each year, but not all used needles and syringes are properly disposed of.

In 2010, injections performed with used needles and syringes resulted in 33,800 new infections of the Human Immunodeficiency Virus (HIV), 1.7 million infections of the hepatitis B virus and 31,500 million infections of hepatitis C. Doctors, nurses, midwives, nursing assistants and cleaning staff are at the forefront of exposure to these diseases (2).

Biomedical waste includes all waste, in the activities of diagnostic, preventive, curative and palliative treatment in the field of human and veterinary medicine, they are produced by human health, hygiene, veterinary, research and medical teaching establishments, clinical testing laboratories and vaccine production or testing establishments (3).
WMW is classified into five categories (4):
Category A: Non-hazardous WMW (household waste, food scraps, packaging)
Category B: WMW requires special attention (anatomical waste, sharps, pharmaceutical waste, blood and fluid waste)
Category C: Infectious and highly infectious waste (laboratory waste and microbiological culture waste)
Category D: Other hazardous waste (chemical, gaseous, liquid, or solid substances with a high heavy metal content)
Category E: Radioactive WMW (cobalt, technetium, iridium)

DBM management is described as a process aimed at ensuring the hygiene of healthcare establishments, the safety of healthcare personnel and the community. This study aims to improve the management of biomedical waste in the PZaGa University Hospital center specifically. It involves establishing the typology of waste and determining the risks associated with waste management. DBM management is a reality at the level of hospital structures in Mahajanga. This situation poses risks to the health and safety of healthcare personnel, the population and the environment.

MATERIALS AND METHODS:

The city of Mahajanga is located in the North West region of Madagascar, the city covers an area of 150,023 km2 with a population of 246,022 inhabitants (in 2013). It has a ZAFISAONA Gabriel university hospital center and on the one hand a level III reference center and on the other hand a research and expertise training built in 1924, it is composed of 40 pavilions in an area of 13ha 43A 6 Ca, currently its capacity is 298 functional beds with an average occupancy rate of 40%, this PZaGa University Hospital is located on a small hill overlooking the fokontany of Androva Mangarivotra **in a district of downtown Mahajanga, it is a large hospital in the North-West of Madagascar with multiple and different services, administrative service and concession of technical service management, doctor, emergency and resuscitation services, surgery, operating room, technical platform, pediatrics, external consultations.**

This is a cross-sectional descriptive study conducted from March to August, a period of 6 months, at the PZaGa University Hospital in Mahajanga, which is the national reference center for patients, training, and learning for health professionals.
A letter was sent in advance to hospital managers to obtain authorization and support for conducting the survey.
The study population includes hospital managers (Director, heads of medical and surgical services; general, pharmaceutical, and laboratory supervisors; healthcare staff, surface technicians, and incinerator operators).
The data collection tools for the latter were:
A questionnaire sent to hospital managers, department heads, department supervisors, and hygiene managers to assess the mechanisms of DBM management.

An interview guide for DBM operators: surface technicians, incinerator operators and healthcare personnel (doctors, nurses, midwives) to assess their knowledge of DBM management.
An observation grid to allow for relationships and objectivization of information collected during questionnaires, interviews and observations within the departments, a digital camera to support observations within the departments, a data entry sheet for processing. La méthodes de recueils des données était basé sur les observations directes , les questionnaires , les entretiens et les photographies .
The variables studied were the different categories of DBM produced, different stages of DBM management (sorting, packaging, storage, transport, disposal), the means of protection made available to staff, staff knowledge of management and health risks linked to DBM.
The difficulties encountered were mainly related to the refusal of some people to participate in the survey.

The collected data was entered using Excel;
The PZaGa University Hospital of Mahajanga is equipped with biomedical waste management materials and equipment funded by the Japanese people (smokeless incinerator with high temperature from 800 to 1200 ° C); wheelie bins and trash cans of different colors, needle cutters, large containers.

Results

Socio-professional characteristics

The participation rate was 50.1% (n = 159), including 8.2% for cleaning staff; 0.6% for pharmacists, 2.5% for imaging technicians, 1.25% for laboratory technicians, 40.25% for nurses, 23.9% for midwives, 22% for doctors, and 1.3% for teachers.

The average length of service was five years for the majority of surveys (92%) (Table I).

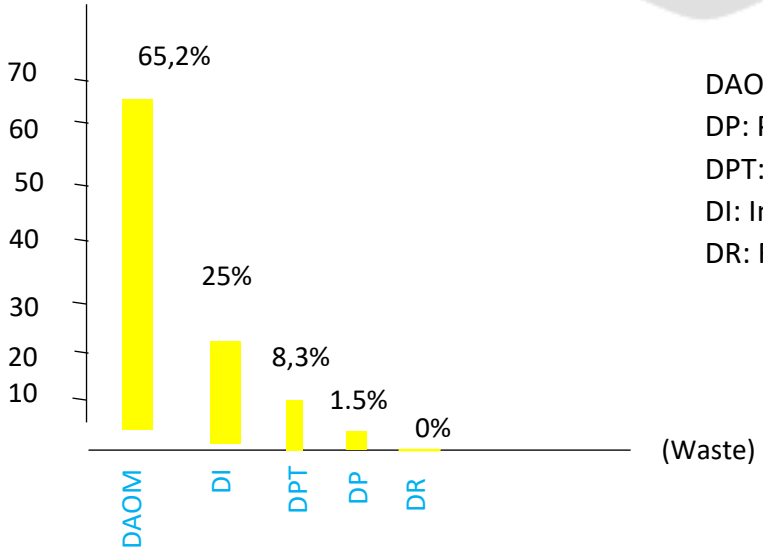
Table I: Professional characteristics of the surveyed population (CHUPZaGa)

	Effectif (n)	Pourcentage (%)
Professional category no.: 159		
Professor	02	1,3
Physician	35	22
Nurse	64	40,25
Midwife	38	23,9
Laboratory technician	2	1,25
Imaging technician	4	2,5
Pharmacist	1	0,6
Cleaning person	13	8,2

Professional seniority

<1 an	5
[1 à 5 old]	42
[5 à 10 old]	73
10 old et plus	39

Types of waste produced (%)



DAOM: Household Waste
DP: Pharmaceutical Waste
DPT: Sharps Waste
DI: Infectious Waste
DR: Radioactive Waste

Figure I: Distribution of different types of waste by CHUPZaGa

Figure I shows that waste similar to household waste is the most produced with a percentage of 65.2%, infectious waste 25%;

sharps waste with a rate of 8.3% and pharmaceutical waste with a rate of 1.5%.

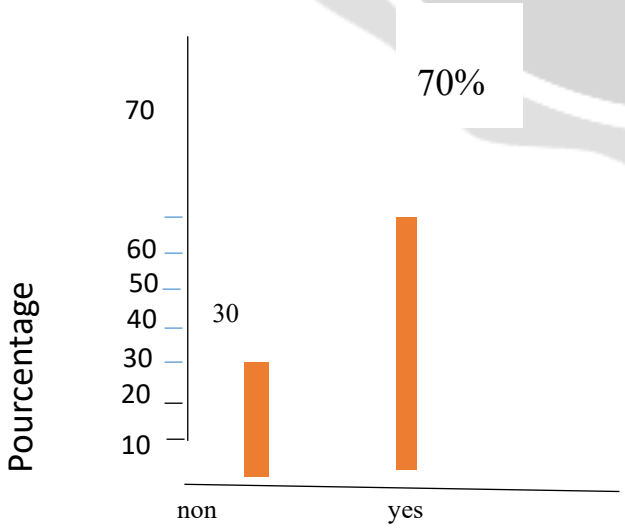
METHOD OF MANAGING WASTE PRODUCED

"The observations and surveys carried out show that 76.4% of health workers carry out correct sorting, 20.6% of workers did not carry out correct sorting often, the mixture of DASRI in the DAOM

Figure II: Sorting system

INTERMEDIATE STORAGE ROOM

Intermediate storage of waste in a specific, secure, ventilated, easily cleanable room in this approach we carried out this observation the results are as follows, the bins for DASRI are placed inside the service and the bins for DAOM are placed outside each pavilion and corridors of the service, the fact that these bins are accessible to patients and visitors constitutes a traumatic but especially infectious risk for them. In addition to the bad smell and the development of insectes.



- Figure 3: Intermediate storage room

Means of transporting biomedical waste

Among the means of transport used in the various departments, manual transport represents the largest percentage (70%). The safest methods are wheeled bins and wheelbarrows. 100%

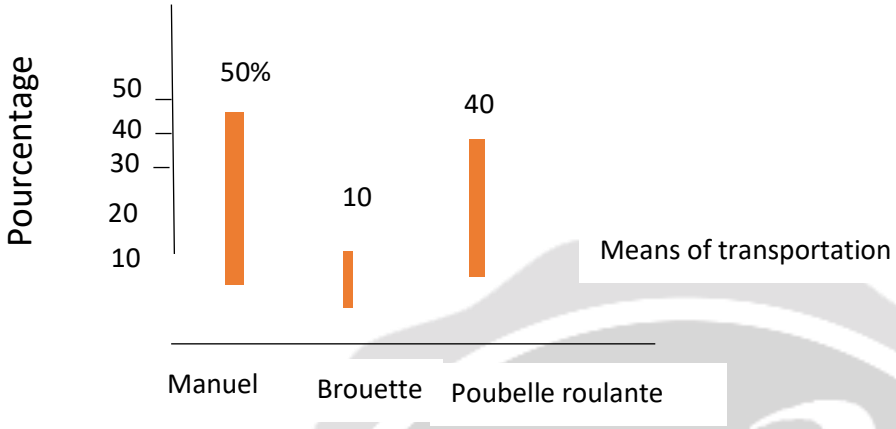


Figure 4: The means of transport of biomedical waste

Treatment Method

The biomedical waste treatment used at CHUPZaGa is by incineration; the residue is disposed of as ash and stored in a concrete slab.

Training on biomedical waste management.

Training is a key factor in good medical waste management. Respondents were asked whether they were trained or not. The responses provided are shown in Figure 5.Treatment Method

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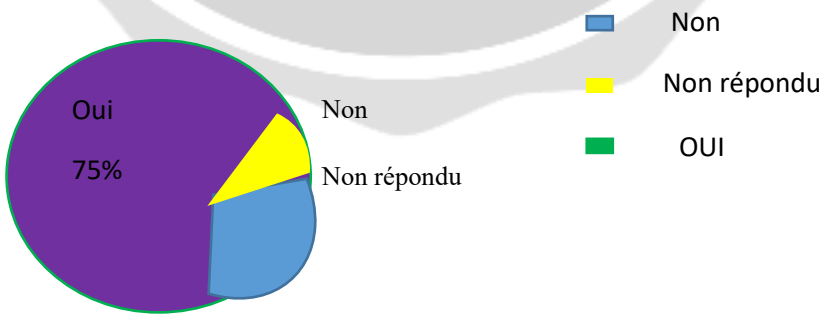

Risks Associated with Healthcare Waste Management

Risks of HIV, AIDS, and Hepatitis B and C InfectionFigure5 : La formation sur gestion de DBM

Table: Distribution of biomedical personnel according to exposure to diseases

Maladies	CHUPZaGa	
	n	(%)
Yes	37	24.5
No	107	70.9
No response	5	3.3
Total	151	≈ 100%

Risks Associated with Healthcare Waste Management

Risks of HIV, AIDS, and Hepatitis B and C Infection

DISCUSSION :

The urban commune of Mahajanga considers itself a health hub in the northwest region of Madagascar, and as such, it has various health facilities. In this regard, they produce various types of waste in considerable quantities, which requires proper waste management to avoid health and environmental risks.

At the PZaGa University Hospital of Mahajanga, two main categories of waste were distinguished, namely waste similar to household waste (DAOM) and healthcare activity waste (DAS). This waste is the result of the cohabitation of purely administrative services with healthcare services within the PZaGa University Hospital of Mahajanga; Messi (2016) had also identified different types of waste in the city of Yaoundé ( ), the majority of respondents were doctors, midwives, nurses, nursing assistants followed by cleaning agents. They have sufficient professional seniority to master their practices. Our study shows that 76.5% of healthcare staff apply a sorting system; this sorting, by allowing the identification and separation of biomedical waste, significantly reduces the amount of waste, sorting is the most important step" for successful management of medical waste, considering that approximately 10 to 25% of medical waste is hazardous ( ), treatment and disposal costs could be greatly reduced if proper sorting is carried out, waste sorting is specifically our study notes an absence in some services of safety box, replaces essentially by plastic bottle observation by bottles filled on board with overflow and the use of plastic bottle for collection highlighting the absence categorized by personnel and especially the existence of a break in the supply of this material.

The transport of DBM within the department and to the central storage location constitutes a risky step because this transport should follow a circuit far from areas frequented by patients and visitors and is carried out with the safety mechanism using wheeled bins. This type of bin must be easy to load, unload or clean. The storage of hazardous waste requires special conditions, namely secure premises that are locked, easy to clean, well lit, ventilated and prohibited from access by any person outside the departments, if in our study, the storage locations exist and meet the standards..

Concerning the method of disposal, we observed that in CHU PZaGa the practice was the most suitable in a similar study (Ndiaye et Al 2012) it was reported that incineration was the method of disposal of four out of five structures in Senegal ( ); incineration is a major emitter of atmospheric pollutants ( ); CHU PZaGa practice of incineration at high temperatures of 800 to 1200°C, without smoke.

The handling of HIV-infected medical waste is responsible for 0.2% of transmission cases worldwide according to statistics from 2010 ( ), according to the WHO, around 23 million people contracted viral hepatitis A or B following the hazardous handling of sharp, unsterilized waste. According to our survey, 75% of those questioned benefit from training and therefore have the knowledge and skills to correctly manage biomedical waste.

Regarding the occurrence of accidents, it was noted that among the respondents (25.5%), medical personnel and collection personnel were injured while handling biomedical waste. This study reveals that insufficient management of healthcare waste has a direct impact on the health of personnel in the handling environment, on the one hand, and an indirect impact on the environment, on the other, with the release of pathogens and toxic pollutants through the disposal method throughout the management chain.

CONCLUSIONS:

This research is a descriptive cross-sectional study aimed at describing the management of solid biomedical waste at the Zafisaona Gabriel hospital in Mahajanga Androva. Data analysis revealed that the CHU PZaGa hospital produces waste similar to household waste (food waste, paper, cardboard, garden waste, etc.) and healthcare waste (infectious, sharp, anatomical and pharmaceutical waste). The CHU PZaGa hospital does not produce radioactive waste. The waste management process begins with sorting (for all departments) and packaging of waste, collection,

transport, storage and treatment of hospital waste, insufficient material resources, poorly informed staff on the regulations relating to DBM and a missing own budget and the DBM management process not respected, an inappropriate internal management system in the majority of departments.

In order to improve waste management at the PZaGa University Hospital in Mahajanga, train all staff in DBM management, waste sorting, risk related to handling and storage of infectious waste, development of posters, awareness raising regarding waste sorting (color code, etc.) moreover, the PZaGa University Hospital should provide adequate and sufficient objects and equipment so that the sorting and packaging materials always comply with the standards and recommendations of the World Health Organization, so for daily collection, the number of collection agents must be added in order to avoid the overcrowding of waste in the bin or bin.

This collection should be in the rolling bin to facilitate transport. For better waste management; capacity building will significantly improve good DBM management practice at the PZaGa Mahajanga University Hospital, thus the incineration of infectious waste more than twice a week will ensure the complete destruction of all different types of waste, this will improve the sanitary framework of the establishment at the PZaGa Mahajanga University Hospital.

APPENDICES

ILLUSTRATIONS

SMOKELESS INCINERATOR

DAOM TRASH BINS

INFECTIOUS WASTE

STORAGE OF INFECTIOUS WASTE

CONCRETE SLAB

METAL BIN FOR INFECTIOUS WASTE

RED BIN FOR INFECTIOUS WASTE

PRECISION SCALE

PLASTIC BOTTLE FILLED WITH SHARP AND POISONOUS WASTE

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