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Research Article

Practices on Biomedical Waste Management Among Healthcare Workers at Benjamin Mkapa and Dodoma Regional Hospital

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Abstract

Healthcare facilities generate a lot of biomedical waste, which are source diseases and infection to people. Therefore, this study assessed the knowledge and practice as well as the relationship between knowledge and practice on biomedical waste management among healthcare workers of Benjamin Mkapa and Dodoma regional hospital.

The study employed the use of descriptive cross sectional design to a sample size of 100 healthcare workers from both hospitals categorized as doctors, pharmacists, laboratory technician, nurses, and waste handlers/cleaners. Primary data was collected using questionnaire and analyzed using descriptive statistical technique guided by statistical package for social science (SPSS) version 22 (IBMSPSS 22.0).

The results show that (52.2%) and (54.8%) healthcare workers from Benjamin Mkapa and Dodoma regional hospital had inadequate knowledge as well as (63%) and (66.7%) did not practice proper biomedical waste management. Biomedical waste management practice was seen to be positively influenced by participant's level of knowledge at ($r = 0.998$, p-value < 0.01) and ($r = 0.956$, p-value < 0.05).

This study recommends periodic in-service trainings and monitoring on biomedical waste management. Adequate supply of equipment used for biomedical waste management should be provided to the Hospital healthcare workers.

Keywords: Assessment; Biomedical Waste Management; Health Care Workers; Practice

Introduction

Background information

Biomedical waste is a total waste, which generated from the healthcare facilities (HCFs) during the course of the healthcare delivery process; it includes syringes, needles, ampoules, dressings, disposable plastics and microbiological wastes [1].

Day to day activities in healthcare facilities generate a lot of waste which are biological in nature and are potential sources of infection transmission, especially hepatitis B and C, HIV/ AIDs, and tetanus [2].

All individuals exposed to hazardous healthcare waste are potentially at risk of infection transmission, including those within healthcare establishments that generate hazardous waste and those outside these sources who are in contact with such waste [2].

Biomedical waste management involves classification of waste, proper handling techniques of solid waste, focus on immunization campaigns, solving challenges of plastics and glass in the medical waste and medical waste treatment in particular incineration [2].

Healthcare facilities in developing countries dispose their waste in dustbins along with general wastes; some even re-use sharps and syringes, thereby increasing the risk of transmission of infections. Prevention of occupational exposure to healthcare waste involve strict adherence to universal precautions and standard methods of segregation and disposal of healthcare wastes [3].

Statement of the research problem

In most of developing countries where healthcare sector is still experiencing inadequate resources, management of biomedical wastes has received less attention and priority it deserves [4].

In our country this is proved by Tanzania health Policy document of 2007 which recognizes the inadequacy of healthcare waste management as one of the challenges in the health sector [5].

In addition reports generated during supportive supervision activities in 2014, in 15 regions revealed that most of the regions visited had no health care waste management (HCWM) regional coordinators and HCWM plan [5].

In order to overcome problems associated with poor management of biomedical wastes. Assessment of knowledge and practice of healthcare workers on HCWM is very important.

Therefore this study aimed to assess knowledge and practice on HCWM among healthcare workers at Benjamin Mkapa and Dodoma regional hospital as well as the relationship between knowledge and practice on biomedical waste management among healthcare workers from the two hospitals.

General research objective

To assess the knowledge and practice on biomedical waste management among healthcare workers at Benjamin Mkapa and Dodoma regional hospital.

Specific research objectives

- To assess level of knowledge among health care workers regarding to biomedical waste management at Benjamin Mkapa and Dodoma regional hospital
- To evaluate the current practices of healthcare workers on biomedical waste management at Benjamin Mkapa and Dodoma regional hospital
- To establish the relationship between knowledge and practice regarding to biomedical waste management among healthcare workers at Benjamin Mkapa and Dodoma regional hospital.

Significance of the research

The findings of this study is of great importance to different groups, such as policy makers and planners, community surrounding the hospital, healthcare workers, patients attending clinic at the hospital, and both government and non-government organization.

Materials and Methods

Study area

The study was conducted at Benjamin Mkapa hospital and Dodoma regional hospital located in the city of Dodoma, which is the capital city of United republic of Tanzania. Dodoma urban district is one of seven administrative districts that make up Dodoma region. Dodoma urban district is surrounded by Chamwino and Bahi districts lying between latitudes 6.00º and 6.30ºsouth and longitude 35.30º and 36.02º east [6].

Study design

Descriptive cross sectional research design was used to assess the awareness and practice of healthcare workers on bio medical waste management. Both qualitative and quantitative research design methods were employed to collect data within the period of August to October 2021.

Study population

The study population includes both medical and non-medical staffs at Benjamin Mkapa and Dodoma regional hospital. The medical staff consisted of Doctors, Nurses, pharmacist and laboratory technicians while non-medical staff consisted of cleaners and wastes handlers.

Sampling procedure and sample size

Non probability purposive sampling method was used to select healthcare workers who participated in this study based on relative ease of access.

The sample size was 100 healthcare workers from both hospitals. The sample comprised of 80 medical staffs consisting of

Doctors, Nurses, Pharmacist, and Laboratory technicians and 20 non-medical staffs consisting of Cleaners and wastes handlers.

Type of data

Primary data was collected through a self-administered structured questionnaire and observational survey. The data obtained was used to obtain and compare level of knowledge and practice.

Data analysis

Based on given responses to questions designed to measure level of knowledge and practices of healthcare Score were given as one (1) for correct answers and zero (0) for incorrect answers respectively.

These scores was added to a single value out of a possible total score of 15 items for knowledge and 9 items for practices questions on biomedical waste management.

Percentage scores for knowledge and practice were analyzed and participant who scored ≥ 60% were considered having "satisfactory" knowledge and practice while those who scored < 60% were considered "unsatisfactory" for each variable tested.

Data obtained ware then analyzed using the International Business Management Statistical Package for Social Sciences 22.0 (IBMSPSS 22.0).

Ethical clearance

An approval to conduct this study was sought from the Open University of Tanzania (OUT) prior to going for field data collection. Due permission was also obtained from at hospitals where the study was scheduled to be conducted. Request for consent to participate in the study was also sought from the potential participants. Confidentiality was assured to the respondents of the questionnaires that the data collected was for academic purposes only.

Results

Response rate

From sample size of 100 health care workers, total of 88 healthcare workers which is 88% of sample size consented to participate in the study. Among 88 participants, 46 participants were from Benjamin Mkapa Hospital.42 participants were from Dodoma Regional Hospital.

Demographic characteristics of the respondents

Among all healthcare workers who participated in this study large number was Nurses and cleaners/waste handlers followed by doctors, Pharmacists and Laboratory technicians. High percentage of participants in this study were females as they were (56.5%) of all participant from Benjamin Mkapa hospital and (59.5%) of all participant from Dodoma regional hospital. Majority of respondents who participated in study were aged between 36-45 years having between 1-20 years of experience (Table 1).

	Benjamin Mkapa hospital N = 46 n (%)	**Dodoma Regional hospital N = 42 n (%)**
Gender Male Female	 20 (43.5) 26 (56.5)	 17 (40.5) 25 (59.5)
Age 20 – 35 36 - 45 >45	 16 (21.7) 37 (47.9) 23 (30.4)	 22 (30.9) 31 (42.9) 19 (26.2)
Professional categories Doctors Nurses Pharmacists Laboratory technician Cleaners/waste handlers	 9 (19.57) 10 (21.74) 9 (19.57) 8 (17.39) 10 (21.74)	 8 (19.5) 11 (23.81) 7 (19.05) 7 (14.29) 9 (23.81)
Years of experience 1 - 10 11 - 20 >20	 30 (65.2) 10 (21.7) 6 (13.1)	 12 (28.6) 20 (47.6) 10 (23.8)

Table 1: Number (n), percentage (%), and distribution of respondents according to gender, age, professional categories and years of experiences.

Level of Knowledge and practice regarding to BWM among healthcare workers at Benjamin Mkapa Hospital

Satisfactory scores regarding to knowledge and practice among healthcare workers on biomedical waste at Benjamin Mkapa hospital is presented in table 2.

The results of this study shows that highest number of doctors (66.7%), Pharmacists (55.6%), and Laboratory technicians (50%) who participated in this study scored 60% and above which is a satisfactory score for the questions designed to measure level of knowledge while small number of Nurses (40%) and cleaners or waste handlers (30%) scored 60% and above which is a satisfactory score for the questions designed to measure level of knowledge.

Regarding to biomedical waste management practice among healthcare workers highest number of doctors (55.5%) and pharmacists (44.4%) scored 60% and above which is a satisfactory score for the questions designed to measure level of practice while small number of Laboratory technicians (37.5%), Nurses (30%) and cleaners or waste handlers (20%) scored 60% and above which is a satisfactory score for the questions designed to measure level of practice.

Professional categories	Number of study participants	Participants with ≥ 60% score on Knowledge	Participants with ≥ 60% score on Practice
	N	n (%)	n (%)
Doctors	9	6 (66.7)	5 (55.5)
Nurses	10	4 (40.0)	3(30.0)
Pharmacists	9	5 (55.6)	4 (44.4)
Laboratory technicians	8	4 (50.0)	3 (37.5)
Cleaners/ Waste handlers	10	3 (30.0)	2 (20.0)
Total	46	22 (47.8)	17 (37.0)

Table 2: Shows numbers (n) and percentages (%) of participants with satisfactory score on Knowledge and practice regarding to BWM at Benjamin Mkapa Hospital.

The overall results shows that only 47.8% of participants at Benjamin Mkapa hospital scored 60% and above to questions intending to measure knowledge on biomedical waste management. While only 37% of participants scored 60% and above to questions intending to measure level of practice on biomedical waste management.

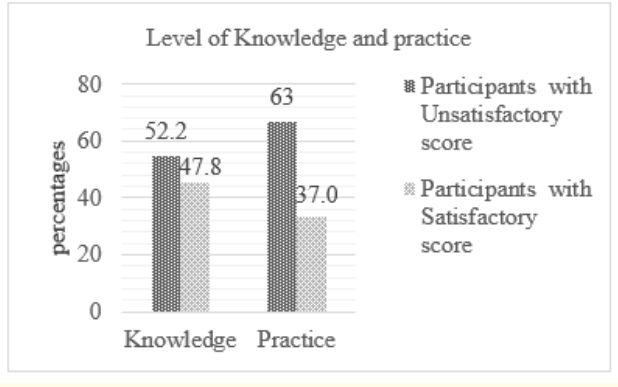

Figure 1: Participant's level of knowledge and practice on BWM at Benjamin Mkapa hospital.

Relationship between knowledge and practice regarding to biomedical waste management among healthcare workers at Benjamin Mkapa hospital

Results for analysis on relationship between knowledge and practice at Benjamin Mkapa hospital using Pearson correlation presented in table 3 showed that, there was a statistically significant linear relationship between knowledge and practice among healthcare workers at ($r = 0.998$, p-value < 0.01). The direction of the relationship is positive meaning that knowledge and practice are positively correlated as the two variable tends to increase together.

		Satisfactory score on knowledge	Satisfactory score on Practice
Satisfactory score on knowledge	Pearson Correlation	1	.998**
	Sig. (2-tailed)		<.001
	N	5	5
Satisfactory score on Practice	Pearson Correlation	.998**	13 mm (0.51 in)
	Sig. (2-tailed)	<.001	
	N	5	5
**. Correlation is significant at the 0.01 level (2-tailed).			

Table 3: Shows correlation co-efficient on knowledge and practice regarding to BWM among healthcare workers at Benjamin Mkapa hospital.

Level of Knowledge and practice regarding to BWM among healthcare workers at Dodoma regional hospital

Results from figure 2, show that only 45.2% of participants at Dodoma regional hospital scored 60% and above to questions intending to measure knowledge on biomedical waste management. While only 33.3% of participants scored 60% and above to questions intending to measure level of practice on biomedical waste management.

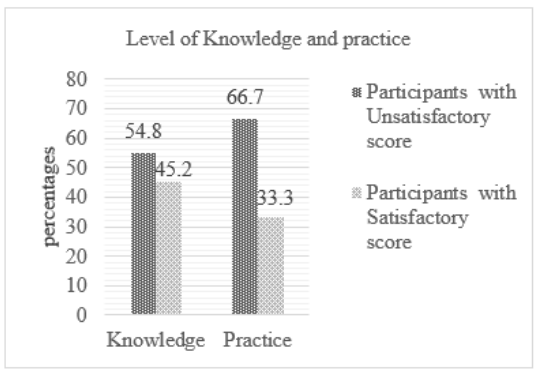

Figure 2: Participant's level of knowledge and practice on BWM at Benjamin Mkapa hospital.

Highest number of doctors (62.5%), Pharmacists (57.1%), participated in this study scored 60% and above which is a satisfactory score for the questions designed to measure level of knowledge while small number of nurses (45.5%), laboratory technicians (42.9%) and cleaners/ waste handlers (22.2%) who participated in this study scored 60% and above which is a satisfactory score for the questions designed to measure level of knowledge.

Regarding to biomedical waste management practice among healthcare workers highest number of doctors (50%) and pharmacists (42.9%) scored above 60% which is a satisfactory score for the questions designed to measure level of practice. while small number of nurses (36.4%), laboratory technicians (28.6%) and cleaners/waste handlers (22.2%) who participated in this study scored above 60% which is a satisfactory score for the questions designed to measure level of practice.

Professional categories	Number of study participants	Participants with ≥ 60% score on Knowledge	Participants with ≥ 60% score on Practice
	N	n (%)	n (%)
Doctors	9	6 (66.7)	5 (55.5)
Nurses	10	4 (40.0)	3(30.0)
Pharmacists	9	5 (55.6)	4 (44.4)
Laboratory technicians	8	4 (50.0)	3 (37.5)
Cleaners/Waste handlers	10	3 (30.0)	2 (20.0)
Total	46	22(47.8)	17(37.0)

Table 4: Shows numbers (n) and percentages (%) of participants with satisfactory score on Knowledge and practice regarding to BWM at Benjamin Mkapa Hospital.

Relationship between knowledge and practice regarding to biomedical waste management among healthcare workers at Benjamin Mkapa hospital

The results were presented in table 5, show that there is a statistically significant linear relationship between knowledge and practice among healthcare workers at ($r = 0.956$, p-value < 0.05). The direction of the relationship is positive meaning that knowledge and practice are positively correlated as the two variable tends to increase together.

		Satisfactory score on knowledge	Satisfactory score on Practice
Satisfactory score on knowledge	Pearson Correlation	1	.998**
	Sig. (2-tailed)		<.001
	N	5	5
Satisfactory score on Practice	Pearson Correlation	.998**	13 mm (0.51 in)
	Sig. (2-tailed)	<.001	
	N	5	5
**. Correlation is significant at the 0.01 level (2-tailed).			

Table 5: Show correlation co-efficient on knowledge and practice regarding to BWM among healthcare workers at Benjamin Mkapa hospital.

Discussion

This chapter discusses the results of the study in relation to study objectives as follows; Knowledge among health care workers regarding to BWM, practice regarding to BWM and the relationship between knowledge and practice regarding to BWM among healthcare workers.

On Specific objective one, the finding of this study states that levels of knowledge among healthcare workers at the study sites were relatively low. The results shows that 52.2% of participants at Benjamin Mkapa hospital and 54.8% of participants at Dodoma regional hospital scored below 60% to questions intending to measure knowledge. Therefore the result depict the fact that majority of healthcare workers who participated in the study had low level of knowledge as far as biomedical waste management is concerned.

Findings of this study are consistent with a study conducted in Gondar Town, North West Ethiopia in 2012, on medical waste disposal practices among health care workers which indicated that the majority of health care workers had a low level of knowledge on the existence of manuals on medical waste, types of medical waste, color coding of containers for waste and the importance of waste segregation [7].

However, the findings of this study is not similar with the findings of the study done by [8] which showed that knowledge regarding bio-medical waste management was inadequate across all the groups and 90% of the doctors were unaware of the bio-medical waste management rules. Because Doctors and Pharmacists who participated in this study from both hospitals had good knowledge on BWM compared to other HCW.

On Specific objective two, the results shows that level of practice on biomedical waste management among healthcare waste from both two hospitals were relatively low. That is 63% of participants from Benjamin Mkapa hospital and 66.7% of participants from Dodoma regional hospital scored below 60% to questions intending to measure level of practice. Hence majority of participants from both hospitals did not follow the proper biomedical waste management practice.

The findings are supported by [8] who conducted a study to assess Knowledge altitude and practice of healthcare workers and found that the Medical waste management practices were poor in all the groups of personnel surveyed at a tertiary healthcare institute in Dakshina, India.

[9] supported the findings of this study through their study carried out in Tanzania employed random sampling design to obtain the low level health facilities (LLHFs) which included health centers and special clinics. Found that in some facilities even though segregation was performed, sharp wastes were later found mixed with general waste during incineration.

The findings of a study by [9] corroborated with the study conducted by [10] at 278 private clinics in Addis Ababa, Ethiopia. The results show that 201(72%) of 278 private clinics had healthcare management guidelines. Although only 120(43.2%) of the clinics had good practice on biomedical waste management including segregation of biomedical waste.

On Specific objective three, the results shows that there was a statistically significant linear relationship between knowledge and practice among healthcare workers at ($r = 0.998$, p-value < 0.01) and ($r = 0.956$, p-value < 0.05). These results shows that the higher the knowledge, the likelihood to good practice on bio medical waste management.

In absence of any knowledge, improper biomedical waste management may occur. The results of this study is in line with the study done by [11] which report on positive correlation between knowledge and practice at ($r = 0.44$) at $P < 0.012$ using Spearman's Rank correlation method.

The results of another study which was conducted in the hospitals of Gondar Town in 2013 on medical waste disposal practices among health care workers also shows that knowledge on medical waste types, diseases transmitted through contact with infectious waste, training and availability of guidelines was significantly associated with health care waste management practice [12].

Additionally a study by [12] found similar findings after conducting correlation analysis among knowledge, altitude and practice of healthcare workers in respect of medical waste

management. The analysis was conducted based on Pearson correlation coefficients, and positive and significant correlations ($P < 0.01$) were found between knowledge and practice at ($r = 0.396$). Therefore knowledge of the personnel was associated with good practice towards medical waste management.

Conclusion

This study shows average of (52.2%) healthcare workers from Benjamin Mkapa hospital and (54.8%) of healthcare workers from Dodoma regional had inadequate knowledge on biomedical waste management and (63%) healthcare workers from Benjamin Mkapa hospital and (66.7%) from Dodoma regional hospital did not practice proper biomedical waste management. Therefore concluded majority of healthcare workers from both hospitals had inadequate knowledge anddid not have good practice towards biomedical waste management.

Recommendations

Since majority of healthcare workers in this study had inadequate knowledge on biomedical waste management. This study recommends the followings

- Periodic in service trainings on biomedical waste management which will enhance proper bio-medical waste management among healthcare workers.
- Government authorities such as ministry of health and National environmental management council (NEMC) should provide more training sessions for healthcare workers on medical waste management and should also disseminate regulatory information, to healthcare workers for proper compliance.
- Training programs recommended by this study need to focus on empowering the healthcare professionals on biomedical waste management with broad scope and practical knowledge in all aspects on biomedical waste management. Hospitals must follow ethical requirements and the institutional level policies for biomedical waste management.
- Healthcare workers must be monitored with checklists and regular inspections for biomedical waste management. This will bring accountability as far as to biomedical waste management practice.
- Adequate supplies of equipment for biomedical waste management should be made available in all hospitals in Tanzania to ensure proper practice as well as management of biomedical waste.

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