CLINICAL WASTE MANAGEMENT PRACTICES AND ASSOCIATED FACTORS AMONG HEALTH CARE WORKERS IN KABGAYI HOSPITAL, RWANDA

Author: IKUZE REMEZO Alice (Department of Public Health, Mount Kenya University of Rwanda)

Co-Authors:

Dr. Michael Habtu Fissehaye, MPH, PhD (Department of Public Health, Mount Kenya University of Rwanda).

Dr. Habineza Alphonse, PhD (Env. Sci. Eng.) (Department of Public Health, Mount Kenya University of Rwanda).

ABSTRACT

Background: The remarkable increase in waste generation is seen, where globally 75%–90% of non-hazardous wastes, whereas 10%–25% are hazardous wastes and Around 0.5 kg (bed-day) of hazardous waste are generated in the high-income countries, whereas 0.2 kg (bed-day) are generated in low-income countries. (Emad,2011). For the only African continent over 67,000 healthcare facilities generate 283,000 tons of clinical waste each year and the proportion of healthcare facilities that use inappropriate waste disposal method varies from 18% to 64%. In Rwanda national volume of 5.168 kg/day of medical waste is generated by inpatients and outpatients and total amount of 60,775,164 kg of waste annually, which is made of 74% of non-infectious waste, 24% of liquid waste and 1.2 % of infectious and/or hazardous waste. (MWMP, 2017).

Material and Methods: My study used a cross-sectional study design with quantitative method approach. A simple random sampling technique was performed for 200 representative sample out of 400 total population including doctors, nurses, midwifes, lab technicians, pharmacists and allied health professionals. A Structured questionnaire was the main tool of data collection. Descriptive analysis displaying frequency and proportions were as well used. P-value less than 0.05 were significantly considered to associate with outcome variable in binary logistic regression analysis and the strengths of association multivariate logistic regression analysis were measured by AOR with a 95% confidence level.

Results: The study revealed that more than a half (68%) had a good practice . The factors strongly associated with good practice after multivariate analysis were gender, profession, and working hours in a day. Males had good practice of clinical waste management (AOR: 1.837, 95% CI:1.09-

4.116), medical doctor had good clinical waste management practice (AOR:4.035, 95% CI:1.382-11.778), working hours in a day was strongly associated with good clinical waste management practice(AOR:1.899, 95% CI:1.000-3.608) than over time.

Conclusion: The current study found that practice about clinical waste management were high at 68% and Gender, occupation and working hours in a day were the factors strongly associated with good clinical waste management practice among healthcare workers in Kabgayi hospital, Rwanda. Therefore, There should be an increase in continuous education and training, towards waste management and to make it a responsibility to anyone among healthcare workers from both gender and from different professional groups at the hospital. There should be an increase of number of healthcare workforce to bring about improved team work and task shifting at district hospital. And researchers should be encouraged to conduct research pertaining clinical waste management over a wide geographic area.

Key words: Clinical waste management practice, factors associated with clinical waste management practice, health care workers, Kabgayi hospital, Rwanda.

Introduction

The remarkable increase in waste generation is seen where globally 75%–90% are non-hazardous wastes, whereas 10%–25% are hazardous wastes and round 0.5 kg (bed-day) of hazardous waste are generated in developed countries, whereas 0.2 kg (bed-day) are generated in developing countries. (Emad,2011). In Rwanda national volume of 5.168 kg/day of clinical waste is generated by both inpatients and outpatients' services and every year total amount of 60,775,164 kg of waste is made up of 74% of general waste, 24% of watery waste and 1.2 % of hazardous waste. (MWMP, 2017). Clinical waste management has been a major public health concern in developing countries, including Rwanda, the poor clinical waste management is often the reason of more than 30 highly infectious pathogens. Globally, almost 5.2 millions of people (including 4 millions of children) deaths is related to clinical waste exposure. The measure of exposure to clinical waste can vary from developing simple conditions, as well as more deadly and highly infectious diseases like HIV/AIDS, and Hepatitis B (HBV). Moreover, the injections with contaminated needles caused 21 million of hepatitis B, 2 million hepatitis C (HCV) and 260,000 HIV. (Mitiku et al., 2022).

According to WHO survey between 18% and 64% of healthcare facilities in developing country, use inappropriate and traditional waste treatment and disposal technologies (Jovanovic et al., 2016). Therefore, poor practices of clinical waste can lead to outbreaks of communicable diseases, risk to non-communicable diseases in humans, and adverse effects on environment. (Bataduwaarachchi et al., 2018). According to Rwanda national institute of statistics, the management of clinical waste is still poor where improper excreta disposal, poor solid and liquid waste management are responsible for the high portion of Rwandan's disease burden. (Erigene Rutayisire et al.,2019). Although Rwanda Ministry of Health had set rules and regulations regarding clinical waste management in health care facilities, some gaps were identified such as: lack of personal protectictive equipment, lack of coordination and training plan toward MWM,

Absence of monitoring system and lack of information manifested by poor clinical waste management. (LEONCIE, 2017). There is few researches on assessment of clinical waste management practices and the associated factors in Rwanda which is the reason the researcher developed an interest in assessing clinical waste management practices and associated factors among healthcare workers at Kabgayi Hospital in Muhanga District.

Research materials and Methods

Research Design

My study was conducted using cross sectional design combined with quantitative method. This cross-sectional study method proved to be successfully measure the outcome and the exposure at one period of time in the study participants (Setia, 2016). Kabgayi hospital located in Muhanga district which is one of the 8 districts that make up the Southern Province.

Sample size

A sample size of 200 health care workers at Kabgayi hospital were selected using Yamane's formula. These respondents belonged to five groups: Midwives, nurses, medical Doctors, Lab technicians and allied health workers (Radiotherapist, physiologist, dental therapist, environmental health, Pharmacists and clinical psychologists).

Sampling Techniques

The simple random sampling technique was used as it is unbiased survey , Thus the selection of respondents was randomly performed. Each unit of the population was identified and each unit had an equal chance of being included in the sample. The choice of a unit did not affect the chances of another unit to be selected. A list of all 400 present health workers was made in order to sample 200 to represent other healthcare workers in Kabgayi Hospital. Each individual assigned unique number between 1 and 400. Then 400 pieces of paper with numbers are folded and mixed together where 200 were drawn at random from the barrel, and the associated numbers appeared automatically.

Data Collection Methods

In this study a researcher created a structured questionnaire as the main tool for data collection, the questionnaire was composed by: section one which focused on respondents' demographics, and section two which consists of closed- ended guided by universal precaution rules about Clinical waste management. This self-administered questionnaire made it possible to collect more information on health care workers 'practices and the associated factors.

After the pilot study that have been conducted at Kabgayi hospital and after measuring the consistency, we worked on the problem revealed during collection and adapt accordingly the instruments.

<p style="text-align:center">Procedures of Data Collection</p>

After the research approval was granted, an initial contact with the respondents was determined. This was done by informing healthcare workers about the process of managing the research questionnaires and clarifying time and the way. Before the instruments were administered, the following were done: The benefits from the study and the study objectives were explained, the informed consent and assent form were signed, the serial numbers of hospital were assigned instead of names and finally the validity and reliability of the instruments were checked. After the questionnaires had been managed and completed by respondents, the research team double-checked that they were completed as recommended.

Data Analysis

The Statistical Package for Social Sciences (SPSS Version. 21) was used for data entry and data analysis. Descriptive statistics was done showing frequencies and percentages of practices and factors associated with clinical waste management practice. P-value was used to check the significance relationship between outcome and independent variables in binary logistic regression analysis and AOR and 95% confidence level of were used to check the relationship strengths in multivariate logistic regression analysis.

The practice levels as far as waste management is concerned were reported from the scores. The mean score was calculated and found out 26.26, and this was used as cutoff point required quantifying practice on clinical waste management, any score that is lesser than the mean was classified as poor practice while the above mean score is classified as good practice with regards clinical waste management (Mitiku et al., 2022).

Ethical Consideration

The ethical clearance from Research ethical committee of Mount Kenya University was granted to the researcher for data collection. Ethical Committee of Kabgayi Hospital approved data collection to the researcher. The signed informed consent for voluntary participation was signed by Both the researcher and the participants; the purpose of the study and the benefit were explained. The respondents' confidentiality by explicitly omitting names from the questionnaire was protected and research released documents emphasize that the collected data and related information was strictly for only academic purposes.

Results

Demographic Characteristics of Respondents

The following are the socio demographic characteristic of the study participants: age group, gender, education, profession, work experience as presented in below table.

Sociodemographic variables for clinical WM among HCWs in Kabgayi hospital, of Muhanga district, Rwanda, August,2023.

Variables	Frequency	Percentage
Age group		
20-30	34	17.0
31-45	109	54.5
46-65	57	28.5
Gender		
Male	120	60.0
Female	80	40.0
Education level		
Diploma	71	35.5
Bachelor	93	46.5
Master	36	18.0
Profession		
Doctors	33	16.5
Nurses	53	26.5
Midwife	43	21.5
Lab technicians	29	14.5
Allied health professions	42	21.0
Work experience		
Between 0-3years	26	13.0
Between 4-7 years	67	33.5
Between 8-12years	58	29.0
Above 12years	49	24.5

Source: Primary research 2022

As presented by the above table: all participants were 20 years and above; the majority 110 (55%) were in age between 31-45 years. Most of the participants were male 120 (50%) and the majority of participants had a bachelor's degree 93 (46.5%). Regarding the profession, the bigger number of participant were nurses 53(26.5%) followed by the midwives 43(21.5%) and allied health professionals 42(21%).According to the work experience the biggest group is between 4-7 year 67(33.5%) followed by the experience of between 8-12 years 58(29%).

Presentation of findings

Objective One: To determine the level of waste management practices among health care workers in Kabgayi Hospital.

The practices were summarized for the total 38 points. The individual responses varied according to their practice based on universal precaution rules about clinical waste management.

The negative responses were coded as 0 and positive as 1.

The mean score was calculated and found out 26.26, and this was used as cutoff point where any score that is lesser than the mean was classified as poor practice while the above mean score was classified as good practice with regards clinical waste management (Mitiku et al., 2022).

Good practice= 68% and Poor practice= 32%

Distribution of levels of practice score

Poor practice 32%

Good practice 68%
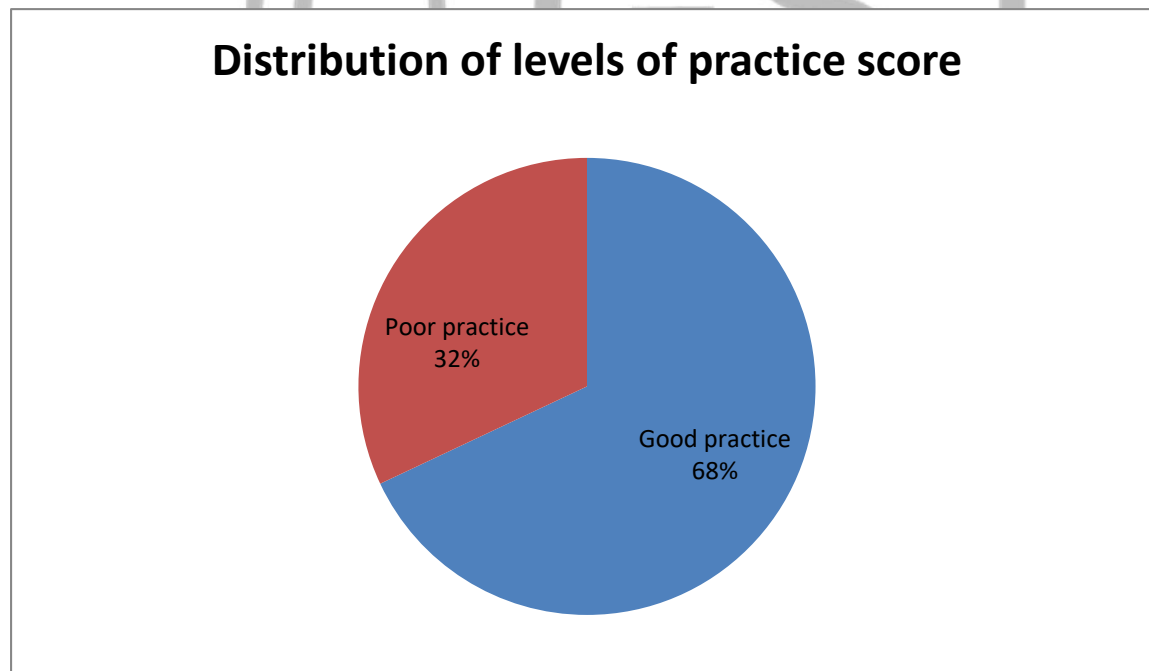
Objective two: To establish the socio-demographic factors associated with waste management practices among health care workers in Kabgayi Hospital .

The bi-variate logistic regression analysis findings, demonstrated that Clinical WM Practices is significantly associated with : profession (Pvalue= 0.035), gender (pvalue= 0.042) and working experience (Pvalue= 0.026).

Association between socio-demographic and level of clinical WM Practice among HCWs in Kabgayi hospital, Muhanga district,Rwanda,August,2023.

Variables	Level of practices		P value
	Good practice	**Poor Practice**	
Profession			
Doctor	25(75.8)	8(24.2)	
Nurses	32(60.4)	21(39.6)	**0.035**
Midwife	22(51.2)	21(38.8)	
Lab technicians	13(44.8)	16(55.2)	
Allied health professionals	18(42.9)	24(57.1)	
Gender			
Male	73(66.4)	47(52.2)	**0.042**
Female	37(33.6)	43 (47.8)	
Education level			
Diploma	39(54.9)	32(45.1)	
Bachelors	52(55.9)	41(44.1)	0.950
Masters	19(52.8)	17(47.2)	
Age category			
20-30 years	17(50)	17(50)	
31-45 years	60(55)	49(45)	0.76

46-65 years	33(57.9)	24(42.1)		
Work experience				
Between 0-3 years	14(53.8)	12(46.2)		
Between 4-7 years	46(68.7)	21(31.3)	**0.026**	
Between 7-12 years	30(51.7)	28(48.3)		
Above 12 years	20(40.8)	29(59.2)		

Source: Primary research 2023

Objective Three: To assess the institutional factors associated with waste management practices among health care workers in Kabgayi Hospital.

The study participants were requested to mention the perceived factors which might be influencing clinical waste management from the list of 9 predetermined factors.

Those factors were categorized into two groups basing on what the participants scored" Yes" as the right factor and" No "as the factor which is not considered by the participants.

The institutional factors that were significantly associated with waste management practice are: Working hours in a day, shortage of staff, lack of appropriate equipment, lack of awareness and training towards MWM and institutional financial issues.

Association between institutional factors and the level of clinical WM Practice among HCWs in Kabgayi hospital, of Muhanga district, Rwanda, August, 2023.

Variables	N (%)	WM Practices		P.Value
		Good	**Poor**	
		N (%)	**N (%)**	
Working hours in a day				**0.019**
Yes	71(35.5)	29(14.5)	42(21)	
No	129(64.5)	75(37,5)	54(27)	
Shortage of staff				**0.054**
Yes	144(72)	81(40.5)	63(31.5)	
No	56(28)	23(11.5)	33(16.5)	

Lack of appropriate equipment				**0.03**
Yes				
No	107(53.5)	48(24)	59(29.5)	
	93(46.5)	56(53.8)	37(38.5)	
Lack of coordination				0.698
Yes	136(68)	72(69.2)	64(66.7)	
No	64(32)	32(28)	32(28)	
Lack of MWM committee				0.180
Yes	116(58)	65(32.5)	51(25.5)	
No	84(42)	39(20)	45(22.5)	
Lack of awareness and training towards MWM				**0.039**
Yes	116(58)	68(34)	48(24)	
No	84(42)	37(19.5)	47(23.5)	
Institution financial issues				**0.039**
Yes	90(45)	49(24.5)	41(20.5)	
No	110(55)	55(27.5)	55(27.5)	
Supplier issues				0.670
Yes	143(71.5)	73(70.20)	70(72.9)	
No	57(28.5)	31(29.8)	26(27.1)	
Lack of clinical WM guidelines				0.389
	123(61.5)	61(30.5)	62(31)	
	77(38.5)	43(21.5)	34(17)	

Source: Primary research 2023

Multivariable logistic regression analysis for factors associated with clinical WM practice among HCWs in Kabgayi hospital, of Muhanga district, Rwanda,August,2023.

Variables with a p-value less than 0.05 were taken into multivariate logistic regression analysis and AOR with a 95% confidence level was used to measure the strength of association.

Variable	AOR	95% C.I		Pvalue
		Lower	Upper	
Gender				
Male	1.837	1.096	4.116	**0.026**
Female	Ref			
Profession category				
Doctors				
Nurses	**4.035**	1.382	11.778	**0.011**
Midwife	**3.617**	1.122	11.657	**0.031**
Lab technician	2,489	0.0852	7.275	0.096
Allied health professional	1.365	0.0469	3.977	0.568
	Ref			
Worked hours in a day				
No	1.899	1.000	3.608	**0.05**
Yes	Ref			

The findings presented in the above table 4.7 showed that clinical waste management practices were strongly associated with gender, profession, and overtime working hour in a day. Males had good practice of clinical waste management (AOR: 1.837, 95% C.I: 1.096, 4.116), medical doctor had a good practice of medical waste management (AOR:4.035, 95% CI:1.382, 11.778), working hours in a day was associated with a good practice of medical waste management (AOR:1.899, 95% CI: 1.00, 3.608) than overtime working hours in a day.

5.Discussion

The results of the three objectives are going to be discussed to be compared with other studies. Regarding the first objective, to determine the level of waste management practices among health care workers in Kabgayi Hospital. The findings from this current research revealed that 68% of the study sample reported good practice of clinical waste management. This finding is in line with the findings of two previous studies done in: Thailand of 92.2% of good practice.(Akkajit et al., 2020), the study in northwest Ethiopia with 80% of good practice . (Deress et al., 2019). However, higher than the findings of three studies done in: Kwazulu Natal with 53.9 % of good practices (Olaifa et al., 2018), the study in Yaoundé with 50%.(Woromogo et al., 2020),the study in Rwanda with 33.5% of healthcare personals had good practice (Erigene Rutayisire et al., 2019.). This is due to much emphasis that have been putted on during COVID 19 crisis as the response to high increase in clinical waste all through continuous education and online training. (Mitiku et al., 2022).

Regarding the second objective to establish the socio-demographic factors associated with waste management practices among health care workers in Kabgayi Hospital. The current study showed that clinical WM practices were statistically found to be associated with gender, profession.

Male participants were 1.837 times more likely to practice good clinical waste management compared to their female counterpart. This finding was supported by a study carried out in Ethiopia (Mesfin et al., 2014). This might be explained by reality that males are more likely to be cautious and determined for their work compared to their counterpart females.

Medical doctor were 4.035 times more likely to practice clinical waste management than allied health professionals. This finding was supported by the studies done in Ethiopia (Mesfin et al., 2014). The possible explanation might be due to people from some professions don't take responsibilities to clinical waste management especial when their work does not directly expose them much to the infectious and sharps wastes.

Regarding the third objective: to assess the institutional factors associated with clinical waste management, working hours in a day was the only factor among the institutional factors that was associated with clinical waste management practices.

Participants who worked a normal time were 1.899 times more likely to practice of clinical waste management compared to those with overtime working hours in a day. The finding was supported by the previous study in Ethiopia (Mesfin et al., 2014). This is due to overtime working hours in a day which could lead to tiredness and lack of attentiveness associated with poor clinical waste management practices.

This research only assessed clinical waste management practice and the associated factors, and not the causal relationship between factors and clinical waste management practice. Busy schedules and staff rotations posed a major challenge to data collection, again the practices were reported and not observed and actual HCWs' practices may differ substantially from reported practices. The study results of this research would be not generalized to the whole country as it was conducted in only Kabgayi hospital located in Muhanga District, Eastern Province.

Conclusion

The current study found that practice about clinical waste management were high at 68% and Gender, occupation and working hours in a day were the factors associated with good practice of clinical waste management among healthcare workers in kabgayi hospital, Rwanda.

Recommendations

Based on the current study findings that clinical WM practices were statistically found to be associated with gender, profession, and overtime working hour in a day. The following recommendations were proposed:

1. There should be an increase in continuous education and training, towards waste management and to make it a responsibility to anyone among healthcare workers from both gender and from different professional groups at the hospital.

2.There should be an increase of number of healthcare workforce to bring about improved team work and task shifting at district hospital.

3.Researchers should be encouraged to conduct research pertaining clinical waste management over a wide geographic area.

References

Act, P. H. (2021). Code of Practice for Clinical and Related Waste Management. February. https://ww2.health.wa.gov.au/~/media/Corp/Documents/Health-for/Public-health-act/Code-of-practice-for-clinical-and-related-waste-management.pdf

Akkajit, P., Romin, H., & Assawadithalerd, M. (2020). Assessment of Knowledge, Attitude, and Practice in respect of Medical Waste Management among Healthcare Workers in Clinics. Journal of Environmental and Public Health, 2020(September). https://doi.org/10.1155/2020/8745472

Al-Emad, A. A. (2011). Assessment of medical waste management in the main hospitals in Yemen. Eastern Mediterranean Health Journal, 17(10), 730–737. https://doi.org/10.26719/2011.17.10.730

Anna Ndapandula Haifete, Amukugo Hans Justus, H. L. (2016). Knowledge , Attitude and Practice of Healthcare Workers on Waste Segregation At Two Public Training Hospitals. European Journal of Pharmaceutical and Medical Research, 3(5), 674–689. www.ejpmr.com

Chisholm, J. M., Zamani, R., Negm, A. M., Said, N., Abdel daiem, M. M., Dibaj, M., & Akrami, M. (2021). Sustainable waste management of medical waste in African developing countries: A narrative review. Waste Management and Research, 39(9), 1149–1163. https://doi.org/10.1177/0734242X211029175

CPCB. (2016). Guidelines for Management of Healthcare Waste BMW 2016. 80. https://cpcb.nic.in/uploads/Projects/Bio-Medical-Waste/Guidelines_healthcare_June_2018.pdf

Deress, T., Jemal, M., Girma, M., & Adane, K. (2019). Knowledge, attitude, and practice of waste handlers about medical waste management in Debre Markos town healthcare facilities, northwest Ethiopia. BMC Research Notes, 12(1), 1–7. https://doi.org/10.1186/s13104-019-4174-7

Dewi, O., Sukendi, S., Ikhwan, Y. S., & Nazrianti, E. (2019). Characteristics and factors associated with medical waste management behaviour in private dental health services in Pekanbaru city, Indonesia. Open Access Macedonian Journal of Medical Sciences, 7(1), 157–161. https://doi.org/10.3889/oamjms.2019.039

From, A. E. (2014). Theory Building in Applied Disciplines. Journal of Chinese Human Resource Management, 5(1), 87–90. https://doi.org/10.1108/jchrm-06-2013-0023

Hakim, S. A., Mohsen, A., & Bakr, I. (2014). Knowledge, attitudes and practices of health-care personnel towards waste disposal management at Ain Shams University Hospitals, Cairo. Eastern Mediterranean Health Journal, 20(5), 347–354. https://doi.org/10.26719/2014.20.5.347

Infrastructure, M. O. F. (2022). NATIONAL INTEGRATED SOLID WASTE MANAGEMENT.

Jovanovic, V., Jovanovic, D., Matic, B., & Djonovic, N. (2016). The influence of healthcare factors on medical waste management in Serbian hospital facilities. PONS - Medicinski Casopis, 13(2), 57–63. https://doi.org/10.5937/pomc13-11846

Kuchibanda, K., & Mayo, A. W. (2015). Public health risks from mismanagement of healthcare wastes in Shinyanga municipality health facilities, Tanzania. Scientific World Journal, 2015. https://doi.org/10.1155/2015/981756

LEONCIE, U. (2017). Knowledge and Practice Regarding Medical Waste. July, iv.

Meleko, A. (2018). Assessment of Health Care Waste Generation Rate and Evaluation of its Management System in Mizan Tepi University Teaching Hospital (MTUTH), Bench Maji Zone, South West Ethiopia. Annals of Reviews & Research, 1(4). https://doi.org/10.19080/arr.2018.01.555566

Meleko, A., Tesfaye, T., & Henok, A. (2018). Assessment of Healthcare Waste Generation Rate and Its Management System in Health Centers of Bench Maji Zone. Ethiopian Journal of Health Sciences, 28(2), 125–134. https://doi.org/10.4314/ejhs.v28i2.4

Mesfin, A., Worku, W., & Gizaw, Z. (2014). Assessment of Health Care Waste Segregation Practice and Associated Factors of Health Care Workers in Gondar University Hospital, North West Ethiopia, 2013. Universal Journal of Public Health, 2(7), 201–207. https://doi.org/10.13189/ujph.2014.020703

Ministry of Health. (2016). National Health Care Waste Management Guidelines Page 1. 1–57.

Mitiku, G., Admasie, A., Birara, A., & Yalew, W. (2022). Biomedical waste management practices and associated factors among health care workers in the era of the covid-19 pandemic at metropolitan city private hospitals, Amhara region, Ethiopia, 2020. PLoS ONE, 17(4 April), 1–17. https://doi.org/10.1371/journal.pone.0266037

Muduli, K., & Barve, A. (2012). Challenges to Waste Management Practices in Indian Health Care Sector 2 . Issues Associated With Health Care Wastes 3 . Health Care Waste in India 4 . Challenges to Health Care Waste Management Practices in India. 3(Icese), 7–8.

Olaifa, A., Govender, R. D., & Ross, A. J. (2018). Knowledge, attitudes and practices of healthcare workers about healthcare waste management at a district hospital in KwaZulu-Natal. South African Family Practice, 60(5), 137–145. https://doi.org/10.1080/20786190.2018.1432137

Pariatamby, A., Bhatti, M. S., & Hamid, F. S. (2019). Waste Management in Developing Countries. 494–519. https://doi.org/10.4018/978-1-7998-0198-6.ch020

R. Bataduwaarachchi, V., Thevarajah, R., & Weeraratne, C. L. (2018). Medication waste disposal practices among patients attending selected out patient departments in a tertiary care institution: a cross sectional survey. International Journal of Basic & Clinical Pharmacology, 7(5), 888. https://doi.org/10.18203/2319-2003.ijbcp20181630

Report, A. F. (2013). Fiscal Year 2013 About This Report.

Setia, M. S. (2016). Methodology series module 3: Cross-sectional studies. Indian Journal of Dermatology, 61(3), 261–264. https://doi.org/10.4103/0019-5154.182410

Taherdoost, H. (2018). Validity and Reliability of the Research Instrument; How to Test the Validation of a Questionnaire/Survey in a Research. SSRN Electronic Journal, January 2016. https://doi.org/10.2139/ssrn.3205040

Washburn, L. (2020). Understanding the Health Belief Model. University of Tennessee, 4(2004), 4. https://extension.tennessee.edu/publications/Documents/W931-C.pdf

Wassie, B., Gintamo, B., Mekuria, Z. N., & Gizaw, Z. (2022). Healthcare Waste Management Practices and Associated Factors in Private Clinics in Addis Ababa , Ethiopia. https://doi.org/10.1177/11786302211073383

Woromogo, S. H., Djeukang, G. G., Yagata Moussa, F. E., Saba Antaon, J. Saint, Kort, K. N., & Tebeu, P. M. (2020). Assessing Knowledge, Attitudes, and Practices of Healthcare Workers regarding Biomedical Waste Management at Biyem-Assi District Hospital, Yaounde: A Cross-Sectional Analytical Study. Advances in Public Health, 2020. https://doi.org/10.1155/2020/2874064