Original Research Article

Assessment of Medical Waste Management Practices at Gitega Regional Hospital, Burundi: A Case Study

ABSTRACT

Background. Medical waste management (MWM) is a critical social responsibility shared by healthcare institutions and governments. Effective waste management systems must integrate with various societal sectors, including health, economics, politics, environment, and education. Adherence to proper MWM practices among healthcare providers demonstrates significant variability, likely due to considerable knowledge deficiencies and behavioral factors.

Objectives. This study was carried out to identify the factors hindering optimal MWM at Gitega Regional Hospital, central province of Burundi.

Methodology. A cross-sectional, analytical study was conducted at Gitega Regional Hospital, central province of Burundi, from August 1 to 15, 2023. The target population comprised healthcare unit providers, with a sample size of 135 participants. Data were collected through a questionnaire and analyzed using Epi Info software version 7.2.5.0. A bivariate analysis was performed to assess the association between proper MWM and independent variables. Odds ratios with 95% confidence intervals were calculated, and a *p*-value of 0.05 was considered statistically significant.

Results. A significant proportion of respondents (73.33%) exhibited insufficient knowledge, while 66.67% demonstrated negative attitudes and behaviors towards MWM. Although 57.78% of respondents reported adequate supplies of MWM tools, factors such as knowledge (OR = 2.66, 95% CI: 2.66-5.86), tool supply (OR = 1.31, 95% CI: 0.63-2.74), and attitudes/behaviors (OR = 1.7, 95% CI: 0.81-3.58) were identified as significant barriers to optimal MWM at Gitega Regional Hospital, central province of Burundi.

Conclusions: The study found a significant correlation between healthcare providers' knowledge, attitudes, and behaviors, waste management tools availability, and MWM efficacy at Gitega Regional Hospital. However, suboptimal management was attributed to limited regulatory authorities' involvement. Further surveys are needed to gain more insights and gather nationwide information.

Keywords*: Medical Waste Management, Healthcare providers, Gitega Regional Hospital, Waste treatment*

1. INTRODUCTION

Medical waste management (MWM), especially in developing countries, presents a significant public health challenge (WHO, 2018). Healthcare facilities, frequently underresourced, face difficulties in implementing effective waste management (WM) systems. This waste, laden with toxic substances and pathogens, poses a risk of environmental contamination and public health hazards (Chisholm et al., 2021). The consequences of inadequate MWM are far-reaching, including the transmission of infectious diseases, environmental pollution, and occupational hazards for healthcare workers. International studies have consistently highlighted the prevalence of suboptimal waste management practices in many healthcare facilities, underscoring the urgent need for effective disposal systems (Wafula et al., 2019).

Medical waste management in Africa remains a significant challenge. Healthcare facilities, frequently underresourced, struggle to implement effective WM systems (Chisholm et al., 2021). Consequently, much of the medical waste is inadequately treated, posing a substantial risk of environmental contamination and public health hazards (Janik-Karpinska et al., 2023). A 2002 World Health Organization (WHO) report revealed that 18–64% of healthcare facilities in 22 developing countries lacked adequate MWM systems (Sahiledengle, 2019). A subsequent joint WHO and United Nations International Children's Emergency Fund (UNICEF) assessment in 2015 indicated that only 58% of healthcare facilities in 24 countries had appropriate systems for safe disposal of healthcare waste. Additionally, the global annual administration of 16 billion injection syringes is often accompanied by inadequate management practices (Padmanabhan & Barik, 2019).

In Burundi, as in many African countries, MWM remains a significant concern. Despite initiatives to improve practices, progress has been limited. Healthcare facilities face numerous challenges, including resource constraints, inadequate staff training, and insufficient infrastructure (Minisante Burundi, 2019). To address these issues, it is crucial to identify specific obstacles hindering effective MWM within each institution. The development and implementation of tailored strategies, encompassing clear protocols, staff training, and investment in appropriate equipment, are essential to improving the situation. To gain a deeper understanding of the challenges associated with MWM in Burundi, this study focused on Gitega Regional Hospital, the oldest regional hospital in the country. The primary objective was to identify specific obstacles hindering optimal MWM within this institution and to evaluate the overall effectiveness of the current system, particularly in terms of treatment processes, organizational structure, and adequacy of tools employed.

2. MATERIAL AND METHODS

2.1 Type of Study, Location, and Period

This cross-sectional, analytical study aims to propose operational solutions for medical waste management (MWM) in Burundi, specifically at Gitega Regional Hospital, by applying principles, methods, and tools from project management and management sciences. The study was conducted at Gitega Regional Hospital, Gitega Health District, Burundi, from August 1 to 15, 2023.

2.2 Target Population

The target population of this study comprised healthcare unit providers, including physicians, nurses (all categories), laboratory technicians, health promotion technicians, radiology technicians, maintenance workers, including cleaning staff, and laborers.

2.3 Inclusion and Exclusion Criteria

This study included all healthcare unit providers and auxiliary staff at Gitega Regional Hospital who provided voluntary consent to participate. Individuals who declined to participate or were not directly involved in waste chain management services, such as directors and financial personnel, were excluded from the study.

2.4 Study Variables

2.4.1 Dependent Variable

The primary outcome variable of this study is "effective biomedical waste management."

2.4.2 Explanatory of Independent Variables

Factors Linked to Hospital Organization and Operation

Insufficient budget for medical waste management (MWM), non-functional hygiene committees, infrequent awareness-raising sessions for patients and caregivers, inadequate provision of waste collection containers, lack of a functional waste area (WA), infrequent emptying of waste containers, and absence of a dedicated WA operator.

Factors Linked to Staff Knowledge: Insufficient staff training, non-adherence to medical waste (MW) sorting protocols, inadequate staff training, and limited knowledge of solid waste management (SWM) procedures.

Attitude and Behavior Factors: Separation of waste by type, timely disposal within 48 hours, proper closure of waste containers, maintenance of ¾ container capacity, utilization of safety boxes for sharps, and avoidance of floor waste disposal.

Factors Related to Legislation and Basic Principles: Non-adherence to international and national guidelines, absence of initial assessment, undefined responsibilities, and lack of subcontracting and regional cooperation.

2.5 Sample Size and Sampling Technique

The sample size was determined based on the total number of healthcare professionals involved in medical waste management at Gitega Regional Hospital (n = 188). A total of 135 questionnaires were collected, resulting in a response rate of 71.81%. Non-responses were primarily due to absences related to leave, training, illness, or maternity leave. A small number of participants also declined to participate in the study. A convenience sampling approach was employed, selecting respondents who were present at the department. The number of questionnaires administered was based on each individual's role in medical waste management.

2.6 Data Collection Tools

Data were collected through a mixed-methods approach. A questionnaire, consisting of both open-ended and closed-ended questions, was administered to hospital staff. Additionally, an evaluation grid was used to observe respondents' practices during their routine duties.

2.7 Questionnaire Processing and Data Analysis

The questionnaire was analyzed question by question, according to the variables. Answers to the questions in Section 1 about knowledge were weighted. To assess the level of knowledge, a score of 14/20 on all variables was taken as a minimum score for a person with sufficient knowledge of medical waste management (MWM).

To assess respondents' attitudes and behaviors toward MWM, an individual evaluation and observation grid was administered and scored. This grid enabled us to identify staff members who demonstrated excellent MWM practices and those with negative attitudes or behaviors. A minimum score of 16/20 was established as the threshold for positive attitudes and behaviors and excellent MWM practices within each department. Finally, data were presented using Microsoft Excel version 13 and analyzed via Epi Info software version 7.2.5.0. A bivariate analysis was performed to assess the association between proper MWM and independent variables. Odds ratios (OR) with 95% confidence intervals (CI) were calculated, and a *p*-value of 0.05 was considered statistically significant (Tenny & Hoffman, 2023).

3. RESULTS AND INTERPRETATIONS

A. Source of Data

Table 1 illustrates the functional distribution of respondents, with nurses comprising the largest group (60%), followed by maintenance staff (22.96%). Doctors and laboratory technicians constituted smaller proportions, at 8.15% and 6.67%, respectively.

Category	Employee Category	
	Workforce	Frequency (%)
Physicians	11	8,15
Nurses (all categories)	81	60
Laboratory technicians	9	6,67
Health promotion technician	1	0,74
Radiology technicians	2	1,48
Maintenance workers	31	22,96
Total	**135**	100

Table 1: Categorical Distribution of Respondents

B. Staff Knowledge Assessment

The majority of participants were experienced healthcare professionals, with 59.26% having a tenure of more than ten years. In terms of educational background, secondary education was the most common (52.29%), followed by higher education (33.33%). The illiteracy rate among participants was minimal, at 3.70%.

Table 2: Classification of Respondents Based on Education and Experience

Education level	Education and experience status				
	Workforce	Frequency (%)	Length of service in years	Workforce	Frequency (%)
University	45	33,33	1 to 5 years	21	15,56
Secondary	71	52,59	6 to 10 years	17	12,59
Primary	14	10,37	Less than one year	17	12,59
None	5	3,70	More than 10 years	80	59,26
Total	135	100	Total	135	100

The survey results highlight a significant disparity in healthcare worker knowledge of MWM. While nearly all respondents (96.55%) could identify the various stages (sorting, collection, transport, storage, treatment, and disposal), a substantial majority (78.52%) lacked detailed knowledge of these stages. Additionally, while color-coded waste containers and labeling were the primary identification methods for 55.56% and 31.85% of respondents, respectively, a notable proportion (12.59%) claimed to be able to recognize waste types directly from their point of origin, suggesting a deeper understanding of the processes.

Table 3: Distribution of Healthcare Workers by Knowledge of MWM Phases and Identification Criteria.

Knowledge of MWM steps	Knowledge and identification status				
	Workforce	Frequency %	Identification modes	Workforce	Frequency (%)
No	106	78,52	Color and type of garbage cans (e.g. safety box)	75	55,56
Yes	29	21,48	Labeling	43	31,85
Stages cited					
Sorting, collection, transport, storage, treatment, final disposal	28	96,55	Production room	17	12,59
Transport and incineration	1	3,45	Other	0	0
Total	135	100	Total	135	100

The survey results highlight a significant lack of awareness among healthcare workers regarding the risks associated with improper MWM. Nearly 80% of participants were unaware of all potential health hazards linked to poor medical waste handling. The most commonly cited health risks were disease transmission, toxic exposure, and injury. Regarding environmental risks, air and soil pollution were identified as primary concerns by the majority of respondents, with water pollution also being mentioned.

Table 4: Analysis of Respondent Perception of the Dangers of Inadequate Medical Waste Handling.

Risk awareness at MWM	**Awareness on MWM status**	
	Workforce	**Frequency (%)**
No	107	79,26
Yes	28	20,74
Risks cited		
Spread of disease	78	72,90
Toxic risk, risk of injury, burns	28	27,10
Air and soil pollution	46	34,07
Pollution of water resources	39	28.88

The survey results highlight a significant lack of MWM training among healthcare workers. Only 31.85% of respondents reported having received such training.

Table 5: Categorization of Respondents Based on MWM Training Status.

Have received training	**Training on MWM status**	
	Workforce	**Frequency (%)**
No	92	68,15
Yes	43	31,85
Total	135	100

The survey results highlight a significant lack of knowledge about MWM among healthcare workers. A substantial majority (73.33%) admitted to inadequate understanding of the subject.

Table 6: Distribution of Healthcare Workers by their Level of Understanding of MWM.

Level of knowledge	**Knowledge on MWM status**	
	workforce	**Frequency (%)**
Insufficient	99	73,33
Adequate	36	26,67
Total	135	100

The analysis revealed a significant correlation between healthcare worker knowledge of MWM and their adherence to best practices. Healthcare professionals with inadequate knowledge were found to be approximately two and a half times more likely to fail to adhere to proper medical waste handling procedures (Odds Ratio = 2.66; 95% CI: 1.21-5.86). These findings support the hypothesis that knowledge deficits are a major barrier to effective MWM in healthcare settings.

Table 7: Distribution of Respondents According to their Level of Knowledge and Proper Management of Medical Waste

Knowledge	**Proper medical waste management status**

	No		Yes		WKce	Fc	OR	CI at 95%
	WKce	**Fc**	**WKce**	**Fc**			2,66	1,21<
Insufficient	72	72,73	27	27,27	99	73,33		2,66
Adequate	18	50	18	50	36	26,67		<5,86
Total	90	66,67	45	33,33	135	100		

WKce: Workforce Fc: Frequency OR: Odds Ratio CI: Confidence Interval

C. Information on Organizational Factors

The survey findings indicate a near-universal presence of infection control committees within healthcare facilities (95.56%). However, the functional efficacy of these committees is more varied, with only 38.76% of respondents reporting full operational capacity. Despite often being led by qualified professionals, a significant majority (86.82%) perceive resource allocation as insufficient. While commonly used personal protective equipment (PPE) such as gloves and gowns is generally available, nearly half of respondents (45%) consider the quantity inadequate. Furthermore, 63.70% of participants reported a lack of adequate supervision in MWM.

Table 8: Distribution of Respondents According to Awareness of the Hygiene Committee

Hygiene committee	**Awareness from hygiene committee status**	
	Workforce	**Frequency (%)**
No	6	4,44
Yes	129	95,56
Is the hygiene committee fully functional?		
No	79	61,24
Yes	50	38,76
Is the budget allocated to the hygiene committee sufficient?		
No	112	86,82
Yes	17	13,18
Existence of supervision sessions		
No	86	63,70
Yes	49	36,30
Total	**135**	**100**

The primary method of final waste disposal is incineration, specifically utilizing a Montfort-type incinerator (51.11%). Supplementary waste management involves glass crushing. While direct burning is employed in 25.93% of cases, it is a less frequent practice. Two trained operators oversee the waste disposal area and manage the incineration process.

Table 9: Respondent Distribution by Final Waste Disposal Technique

Technique used	**Disposal technique status**	
	Workforce	**Frequency %**
Burning	35	25,93
Incineration	69	51,11
Grinding	21	15,56
Burial	10	7,41
Total	135	100

Table data indicate that 71.11% of respondents affirmed the existence of waste-type-specific treatment protocols within the hospital.

Table 10: Distribution of Respondents According to the Existence of a Specific Waste Treatment System

Specific treatment according to waste type	Waste treatment status	
	Workforce	Frequency (%)
No	39	28,89
Yes	96	71,11
Total	135	100

The tabular data reveals that a significant proportion of respondents (57.78%) confirmed the adequacy of medical waste management (MWM) tool supply, whereas 42.22% reported insufficient availability.

Table 11: Distribution of Respondents by Perceived Adequacy of MWM Tool Supply

Provider categories	MWM tool supply status					
	Insufficient	Frequency	Adequate	Frequency	Workforce	Frequency (%)
Physicians	7	63,64	4	36,36	11	8,15
Nurses (all categories)	36	44,44	45	55,56	81	60
Laboratory technicians	3	33,33	6	66,67	9	6,67
Health promotion technician	1	100	0	0	1	0,74
Radiology technician	1	50	1	50	2	1,48
Maintenance workers	9	29,03	22	70,97	31	22,96
Total	57	42,22	78	57,78	135	100

Analysis of the tabular data reveals a significant association between insufficient supply of medical waste management (MWM) tools and suboptimal MWM practices. A substantial proportion (70.18%) of respondents reporting insufficient tool supply exhibited poor MWM practices, compared to 35.90% of those with adequate supply. The odds ratio of 1.31 (95% CI: 0.63-2.74) further support this association. These findings corroborate the hypothesis that inadequate MWM tool supply hinders the implementation of effective MWM strategies.

Table 12: Distribution of Respondents by Good WM Practices and Tool Supply

Supply of MWM tools	Good medical waste management							
	No		Yes		Workforce	Frequency	OR	IC at 95%
	Workforce	Frequency	Workforce	Frequency			1,31	0,63<
Insufficient	40	70,18	17	29,82	57	42,22		1,31
Adequate	50	64,10	28	35,90	78	57,78		<2,74
Total	90	66,67	45	33,33	135	100		

D. Legislative Framework and Fundamental Principles

A significant majority of respondents (93.33%) reported a lack of awareness regarding national MWM guidelines. Similarly, 98.52% of respondents indicated unfamiliarity with international agreements pertaining to MWM.

Table 13: Respondent Knowledge of National and International MWM Directives

National directives	Knowledge on MWM directives	
	Workforce	Frequency (%)
No	126	93,33
Yes	9	6,67
International directives		
No	133	98,52
Yes	2	1,48
Total	135	100

E. Attitudes and Behavioral Patterns

The tabulated data indicate that a significant proportion of respondents (50.37%) do not consistently practice source separation for waste. In contrast, a majority (57.04%) adhere to the 48-hour timeframe for waste removal from treatment rooms. Notably, a substantial number of respondents (66.67%) maintain open waste containers, while 33.33% ensure proper closure. Furthermore, a considerable portion (70.37%) do not comply with the 75% capacity limit for waste containers. However, a majority (73.33%) utilize safety boxes for the disposal of sharps waste.

Table 14: Individual Assessment of Attitudes and Behaviors Toward MWM

Source separation of waste by type	Attitudes and behaviors status	
	Workforce	Frequency (%)
No	68	50,37
Yes	67	49,63
72-Hour Waste Disposal		
No	58	42,96
Yes	77	57,04
Maintain Closed Waste Containers		
No	90	66,67
Yes	45	33,33
Waste Containers Filled to 75% Capacity		
No	95	70,37
Yes	45	29,63
Use of Sharps Containers		
No	36	26,67
Yes	99	73,33
Total	135	100

A majority of respondents (66.67%) exhibit negative attitudes and behaviors towards MWM, while 33.33% demonstrate positive practices.

Table 15: Categorization of Respondents Based on the Level of Adherence to Good MWM Practices

Provider categories	Respondent behavior status			
	Negatives	Frequency	Positives	Frequency (%)
Physicians	5	45,45	6	54,55

Nurses (all categories)	59	72,84	22	27,16
Laboratory technicians	6	66,67	3	33,33
Health promotion technician	0	0	1	100
Radiology technician	1	50	1	50
Maintenance workers	19	61,29	12	38,71
Total	90	66,67	45	33,33

Analysis of the tabular data reveals a significant association between negative attitudes and behaviors and suboptimal MWM practices. A significant proportion (70.79%) of respondents with negative attitudes exhibited poor waste management practices, compared to 41.30% of those with positive attitudes. The odds ratio of 1.70 (95% CI: 0.81-3.58) further supports this association. These findings corroborate the hypothesis that negative attitudes and behaviors hinder the implementation of effective MWM strategies.

Table 16: Categorization of Respondents Based on Adherence to Proper MWM Practices and Associated Attitudes

Attitudes and behavior	**Proper medical waste management**							
	No		**Yes**		**Workforce**	**Frequency**	**OR**	**IC at 95%**
	Workforce	Frequency	Workforce	Frequency			1,7	0,81<
Negatives	63	70,79	26	29,21	89	65,93		1,70
Positives	27	58,70	19	41,30	46	34,07		<3,58
Total	90	66,67	45	33,33	135	100		

4. DISCUSSION

This study aimed to identify the barriers hindering effective medical waste management (MWM) at Gitega Regional Hospital. A cross-sectional survey was conducted among 135 healthcare providers involved in the hospital's waste management chain. In this chapter, we present and discuss the study findings, comparing them with relevant literature from similar contexts. The results of our study showed that the majority of our respondents (60%) were nurses, followed by doctors (8.15%) and maintenance staff (22.96%). Our findings closely align with the findings of Zimba Letho et al.'s study, which found that nurses constituted the largest group of respondents (44.1%), followed by technicians (23.5%), and health assistants (3.2%) (Letho et al., 2021). Our study's findings align with those of Gizalew et al. 2021 study on healthcare waste management and risk factors among health professionals in public health facilities in Ethiopia, where 117 (32.7%) were nurses and 74 (20.7%) were laboratory technicians. From an education perspective in Ethiopia, 241 (67.3%) were secondary certificate holders, followed by 114 (31.8%) university degree holders (Gizalew et al., 2021). Similarly, in our study, 52.29% of respondents were secondary school graduates, compared with 33.33% university graduates. The uneducated represent only 3.70% of all respondents. However, Thirunavukkarasu et al. found that 60.4% of healthcare workers in Saudi Arabia had a bachelor's degree in their study on knowledge, attitude, and practice toward biomedical waste management, which differs from our findings (Thirunavukkarasu et al., 2022).

No significant influence of the health provider category or education level was observed in either our study or other related surveys. Regarding length of service, the majority of respondents (59.26%) had been with the company for over a decade, while 15.56% had between one and five years of experience. These results contrast with those of Gizalew et al. (2021), who reported that 67.3% of their respondents had one to five years of experience (Gizalew et al., 2021). Consistent with our findings, health provider experience did not significantly influence the outcomes of either our survey or other relevant studies.

A significant majority (78.52%) of respondents in our study demonstrated a lack of awareness regarding the stages of MWM. Moreover, only 24.48% of respondents were able to correctly identify all stages of MWM, including sorting, collection, transport, storage, treatment, and final disposal. Our findings diverge from those of A. Kasoki, where 79% of respondents identified storage, sorting, transport, and incineration as key components of good management (Kasoki, 2009). However, our results align more closely with those of Maffouamene et al. (2023), who investigated knowledge,

attitudes, and practices related to infectious risk waste management in healthcare facilities in Cameroon's Central Region. Notably, a substantial proportion of respondents (98.18%) could only identify the sorting stage of MWM (Maffouamene et al., 2023). These findings highlight the need for increased training and awareness initiatives among healthcare providers at Gitega Regional Hospital to ensure the implementation of proper MWM practices.

Regarding waste identification, the majority of respondents (55.56%) relied on color-coded garbage cans and safety boxes, while 31.85% utilized labeling systems. A smaller proportion (12.59%) identified waste types based on their knowledge of production room processes. Our findings align closely with those of Zimba Letho et al., who reported satisfactory knowledge of color-coded waste among healthcare providers in a National Referral Hospital (Letho et al., 2021). Similarly, Abdou Moumini's study on biomedical waste management at Souro Sanou University Hospital found that 59.05% of respondents recognized the use of coded garbage can liners (Moumini, 2013). These findings underscore the importance of color coding and labeling systems in facilitating proper waste segregation and management.

A significant proportion of respondents (79.26%) demonstrated a lack of awareness regarding the risks associated with medical waste mismanagement. This finding contrasts with the results of Maffouamene et al., who reported that 75% of their study participants were aware of these risks (Maffouamene et al., 2023). Our study highlights a critical need for increased training and awareness initiatives among staff at Gitega Regional Hospital to improve MWM practices.

Regarding participation in waste management training, 31.85% of respondents reported receiving training in MWM. This figure is comparable to the 31% reported by Hayleeyesus and Cherinete (2016) in their Ethiopian study (Hayleeyesus & Cherinete, 2016). However, our survey revealed that 73.33% of respondents demonstrated insufficient knowledge of medical waste management. This finding aligns with the results of Bonkoungou (2017), who reported that only 44.45% of respondents in their study on biomedical waste management had adequate knowledge of waste types, associated risks, and proper management practices (Bonkoungou, 2017). The survey results indicated that a significant majority (93.33%) of respondents were unaware of national guidelines for medical waste management. Moreover, 98.52% of respondents reported no knowledge of international agreements pertaining to MWM. These findings are consistent with those of Maffouamene et al., where none of the participants were aware of Cameroonian or international regulations for waste management or the disposal of infectious medical waste (Maffouamene et al., 2023). Shortly, our study highlights a substantial gap in awareness of existing regulations among healthcare providers at Gitega Regional Hospital, both nationally and internationally.

Our study revealed that 66.67% of respondents exhibited negative attitudes and behaviors toward proper MWM. This finding contrasts with the results of studies conducted in India. Zala et al. (2023) reported a favorable attitude among 98.2% of 384 participants (Zala & M, 2023), while Dalui et al. found that nearly two-thirds (74.1%) held a positive attitude (Dalui et al., 2021). These discrepancies highlight the critical need for enhanced awareness and education regarding MWM practices, specifically at Gitega Regional Hospital.

Hygiene committees play a crucial role in healthcare systems by ensuring access to essential materials for hand hygiene and other infection prevention and control (IPC) measures (Lowe et al., 2021). Our study found that 95.56% of respondents reported the existence of a hygiene committee, while 38.76% confirmed its full functionality. However, a significant proportion, 86.82%, indicated inadequate budgetary allocation for the committee. These findings diverge from those of Bonkoungou in Burkina (2017), who reported the existence of fully functional hygiene committees and departments among all respondents (Bonkoungou, 2017). Our survey at Gitega Regional Hospital revealed the existence of a hygiene committee, but it lacked a consistent activity schedule and budgetary allocation within the hospital's annual action plan.

Incineration was the most prevalent final disposal technique reported by respondents (51.11%), followed by burning (24.93%). Glass waste was typically crushed using a glass crusher. These findings diverge from those of Diao (2011), who reported inadequate waste management practices at every stage, from sorting to disposal, in the Ouagadougou commune. Insufficient and unsuitable equipment was also identified as a significant issue within the Burkina Faso waste management system. Diao (2011) suggested the need for safer treatment techniques, such as autoclaves, microwaves, and chemical disinfection, to mitigate risks associated with waste treatment (Diao, 2011). In contrast, the current survey at Gitega Regional Hospital primarily revealed the use of outdated and unsafe methods for final waste treatment. Two primary limitations constrained this study. First, the research was confined to a single regional hospital in Burundi. Second, a scarcity of similar studies in the region hindered comparative analysis.

5. CONCLUSION

Effective medical waste management (MWM) is a critical social responsibility shared by healthcare institutions and governmental bodies. A comprehensive waste management system must interface with various societal systems, including health, economic, political, environmental, and educational spheres. Factors such as staff training, adequate supply of MWM tools, and provider attitudes and behaviors significantly influence the sanitary conditions within healthcare facilities.

Our study findings identified a statistically significant correlation between the knowledge, attitudes, and behaviors of healthcare providers, the availability of waste management tools, and the efficacy of MWM practices at Gitega Regional Hospital. Furthermore, the suboptimal management observed can be attributed to the limited involvement of regulatory authorities, particularly those responsible for inspection and enforcement. Further surveys are needed to fully gain insights from other regional hospitals of the Burundi government while also progressing in collecting general information nationwide.

ETHICAL AND ORGANIZATIONAL ASPECTS

The Declaration of Helsinki, a set of ethical guidelines for medical research involving human subjects, guided the conduct of this study. Prior to data collection, participants were provided with a detailed explanation of the study's objectives and assured of the anonymity and confidentiality of their responses. Verbal informed consent was obtained from each participant. Additionally, the study received ethical approval from the Office of the Ministry of Health, representing the Research National Ethical Committee, under reference number 633/666/DGSSLS/2023.

DISCLAIMER (Artificial intelligence)

Authors hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators, have been used during the writing or editing of this manuscript.

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