College of Medicine and Health Sciences

School of Health Science

IMPROPER MEDICALWASTE MANAGEMENT SYSTEME AT MUSANZE PRISON'S HEALTH CENTER

A dissertation submitted in partial fulfillment of the requirements for Master of Hospital and Healthcare Administration **(MHA).**

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DECLARATION

I, Fabiola BORA, hereby declare that this capstone thesis project entitled "**Improper Medical Waste Management System at Musanze Prison's Health Center**." is my original work. I have not copied from any other students' work or from any other sources except where due reference or acknowledgement is made explicitly in the text, nor has any part been written for me by another person.

Candidate _____ Date _____

DEDICATION

This capstone thesis is dedicated to:

This capstone dissertation is dedicated to:

My lovely husband Patrick TWIHANGANE,

You inspired in me the sense of effort and perseverance.

My sons Assa Jephta Yannick and Arnie Enzo Aymeric,

My love to you inspired me to work harder and aim higher.

My beloved late parents Emmanuel Ntegekurora and Julienne MUKARUGWIZA

You did not have the chance, to see the fruits of your effort on me, your absence is regrettable.

My siblings Innocent , Froribert, Aubry and Ange Manzi.

My sister and brother in law Liliane, Eric and Derrick.

You are a real family to me.

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ABSTRACT

Background

Medical waste management is a major issue in a health facility due to the risk it has on the environment and the persons who are in contact whit it. If managed through inappropriate healthcare waste management systems, it can adversely affect the environment and public health. By this project, we sought to improve the medical waste management system at Musanze Prison's Health Center.

Methods

A pre and post interventional study to treat the effect of improve medical waste management system by availing materials, providing guidelines and protocols on medicals waste management at Musanze Prison's Health Center. Sample was made on 672 observations on medical segregation in 3 services in pre intervention, and on 712 observations in post intervention. Chi Square tests were used to compare the pre- and post-intervention on medical waste segregation and the percentage of provided materials. Data analysis was completed using SPSS v.17.0 statistical software at a significance level of $P<=0.05$

Results

The medical waste system was improved in were medical waste were segregated from 30% in pre intervention to 78.6% in post intervention. ($P<0.001$). The number of dust bin increased from 1 dust bin in service (33.3%) to 3 dust bin in each service (100%).

Conclusion

Medical waste management system was improved at MPHC by providing enough equipment and availing MOH guideline on medical waste management.

The project increased the medical waste management significantly at Musanze Prison Health Canter by providing additional dust bin, refreshment of staff on medical waste management. The implementation was simple and cost-effective.

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LIST OF ACRONYMS AND ABBREVIATIONS

RCS	Rwanda Correction Service
MPHC	Musanze Prison's Health Center
OPD	Out Patient Department
HIV	Human Immunodeficient Virus
TB	Tuberculosis
VCT	Voluntary Counseling and Testing
IEC	Education, Information and Communication
HC	Health Center
WHO	World Health Organization
SPSS:	Statistical Package for the Social Sciences

CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND

Rwanda Correction Service (RCS) , is a Government institution, which deals with prisoners issues in general. Among other obligations, RCS manages prisoner's health problems through health centers located in each of 12 National prisons. Musanze Prison's Health Center is one of the Musanze Prison's institutions, which is located in North Province, Musanze District, not far from Rugengeri District Hospital. The Musanze Prison's Health Center is under control of the Ministry of Health as well as other health facilities in the country. The objective of Musanze Prison's Health Center is to promote the health of its inmate population by providing health care services through the curative services, which include Out Patient Department (O.P.D) and Tuberculosis (T.B) management service. Preventive services which include Antiretroviral (ARVS), Voluntary Counseling and Testing/ Provider Initiated Test VCT/PIT and, Pharmacy. It also offers Administrative services including (accounting).

The prison's health center offers the minimum package of activities ranging from OPD service, Education, Information and Communication (I.E.C), V.C.T, A.R.V service, and detecting and management of TB. (2)

Any serious case the Health Center cannot manage is being transferred to the District Hospital for special attention. Musanze Prison's Health Center has 5 health workers in total among others: four nurses and one laboratory technician.

1.2 PROBLEM STATEMENT

Medical waste is not properly managed according to MOH guidelines.

At Musanze Prison's Health Center, poor segregation of medical waste was observed, due to the single use of dustbin for all medical waste except for needles.

We noticed that medical waste storage, manipulation and transport are still poorly done according to Rwanda ministry of health standards.

1.3 OBJECTIVE

To improve the waste management system from 30% to 50% from August 2016 to March 2017 at Musanze Prison Health Center.

1.4 HYPOTHESIS

H^0: Providing guidelines about waste management and train people on guidelines will not improve medical waste management system at Musanze Prison's Health Center.

H_a: Providing guidelines about waste management and train people on guidelines will improve medical waste management system at Musanze Prison's Health Center.

1.5 JUSTIFICATION OF THE PROJECT

Mismanaged of medical waste can cause serious consequences ranging from exposing staff and environment, to preventable transmitted diseases to increased health care cost from increased morbidity and unnecessary mortality. This quality improvement project aims to increasing

medical waste management system by availing enough required equipment, guidelines and training staff on improved practice.

1.6 ORGANIZATION OF THE THESIS

This thesis is divided into six main chapters. Chapter one introduces the setting and background of the Health Center and describes the mismanagement of medical waste at the Health Center. It outlines the hypothesis of providing additional materiel, creating guidelines and refreshes the staff on proper use of dust bin to resolve the problem. Chapter two contains the literature review on the resources, impact, of improper medical waste management system and comparison on medical waste management system from other countries were done. Chapter three describes the design of the study. A detailed root cause analysis, the selection of intervention and method of evaluating the effectiveness of the intervention is described. In chapter four, they are results of the study and discussion of results of the project is in chapter five. The last chapter, chapter six, concludes and summarizes the study; any recommendation based on this study is also listed in this chapter.

CHAPTER TWO: LITERATURE REVIEW

World Health Organization consider health care waste as special waste and the most hazardous and potentially dangerous of all waste arising in community. (3)

Health care waste is the total waste stream from a health care facility that includes both potential infectious waste and non-infectious waste materials. (4)

Waste management: the activities, administrative and operational, that are used in handling, packaging, treatment, conditioning, reducing, recycling, reusing, storage and disposal of wrapper of packaged waste.

Color-coding system is system for relating the contents of packaging containers by using different colors. (2)

They are two types of medical waste:

- Non-hazardous or non- risk waste (approximately of 75-90% of waste generated in a health care). Those include waste comprising of food remnant, paper cartons, fruit peels, packaging materials etc
- Hazardous or risk medical waste (the remaining 10-25% of medical waste). Those are chemical waste (reagents, solvents), pathological waste (body parts, foetus) and, infectious waste (blood and body fluids)(5)

- Infectious wastes are those one which are suspected to contain pathogens (bacteria, viruses, parasites, or fungi) on a quantity which can cause diseases in susceptible host while.

- Pathological waste are those tissues, organs and, body parts.

-Sharps are items that cat or puncture wounds, such as needles, blades and, broken glass.

This category is considered as a highly hazardous health care waste.

- Pharmaceutical waste includes expired drugs and, vaccines while..

- Genotoxic waste is made of waste which may have mutagenic, teratogenic, or carcinogenic properties. It may include cytostatic drugs, biologic waste from patients treated with cytostatic drugs. (3)

Note that if both those types are mixed together the whole waste become harmful (5). Poor management of health care waste is the source of illness from infectious waste; they can also be the source of injuries from used needles. If medical waste has not been packaged safely, health care personnel can come into contact with this dangerous waste.(6)

All over the world, health facilities grow in number in order to meet the health care demand of the population. As consequence the increase of health facilities increases the generation of medical waste.

The generation of health care waste is different from a country to another. This also depend on the type of health facility, proportion of patient treated per, proportion of reusable items used in a health care facility.

The high generation of medical waste compounded by poor handling and disposal practices has increased the risk of environment pollution and disease transmission.(1) When medical waste are disposed without prior segregation and treatment, needle stick injuries arise, landfills or waste dumps may also come in contact with infectious waste, by indirect contact through contaminated environment, water, air or land. Medical waste can indirectly impact on health. (7) Poor medical waste management practice is resulting in the mixing of hazardous waste with the general waste, which exacerbate the problem of waste management (8). Mismanagement of medical waste combines the improper handling of waste during its generation, collection, storage ,transport and

its treatment (9). It is helpful and important to develop hygienic systems for the disposal of medical waste where they are regular collected, categorized and separated at the point of their source (10).

Worldwide, medical waste pose a high risk of disease among population. According to the assessment made by WHO in 22 developing counties shows that health care facilities do not use proper waste management in range of 18% to 64%. The proportion of hazardous medical waste in Pakistan is about 20%,in Nigeria 26.5% and in Sub-Saharan Africa about 2-10%,in Bangladesh it is about 36.03% and in Tanzania 50%.(11)

In Rwanda, the main sources of medical waste are Health facilities (Referral, Provincial, District, Health Centers, Health post), Community Health Workers, Emergency Medical Care, Prison Hospital or clinic etc.(7)

A study done on 20 selected health care facilities in Lagos State shown that there is poor state of medical waste management in Nigeria (12). In Africa, poor medical waste management is similar in different countries like in South Africa, Mozambique, Swaziland, Kenya and Tanzania (5).

In general, they are different kind of medical waste. Hazardous infectious waste usually are empty plastic drips ,used blood infusion bag, cotton swabs, dressings, and plasters, syringes, used testing kits, laboratory sample containers, nasogastric tube, etc. And for sharps waste, are all those sharps object like needles, broken vials, cut glass, etc (8).

According to World Health Organization (WHO) , medical waste is the product generated in a health facility and consist of sharps, blood, body parts, chemicals, pharmaceuticals, medicals services and radioactive materials.(13) They are composed of two categories: general waste and medical waste, and from those categories, they are again infectious waste and non infectious

waste (14). At a health facility, waste is generally sorted into color-coded bins or bags, with each receptacle denoting a different waste stream or waste type (15).

At Musanze Prison's Health Center, poor segregation of medical waste was observed, even the use of dust bin where one is used for all medicals waste except for needle only. As this Health Center serve inmate people who are already exposed to infections more than other populations, poor medical waste management can easily affect not only this population but also its health workers without forgetting its neighborhood. The poor segregation of waste is observed in OPD service, laboratory service, and ARV service as well as in pharmacy. The same, their storage, manipulation and transport is still poorly done according to Rwanda health ministerial standard.

All of this exposes the medical corps, hygiene manpower and patients to contamination of different diseases the way we can see it in the table below.

Table 1: Diseases caused by mismanagement of medical waste.

Bacterial	Tetanus, Gas Gangrene and other wound infections, Cholera, and other diarrhea dieses etc
Viral	Various hepatitis, Poliomyelitis, HIV infection, etc
Parasitis	Emoebiaisi, Giardiasis, ascariasia, Etc
Fungal infections	Various fungal infections like candidiasis, cryptococcoses,etc

There are a couple of conditions, which must be taken in consideration before choosing an option for treatment and disposal of health-care waste including:

1. The quantity of waste produced daily at the health center level.
2. Availability of appropriate site for waste treatment and disposal.
3. Possibility of treatment in central facility.
4. The availability of a nation regulation.
5. The availability of equipment.
6. The availability of resources (human, financial, materials) (16).

The good management of medical waste involves a number of steps which include:

- The segregation of waste into categories,
- Initial labeling of different types of waste in specific waste containers,
- Onsite storage of waste as awaits collection from the healthcare facility,
- Their transport to an offsite treatment facility,
- Treatment of residues following treatment.

It is imperative that all these steps are diligently followed without exception in order to reduce the potential environmental hazard and public health risks.(17)

CHAPTER THREE: METHODOLOGY

3.1 STUDY DESIGN

A pre and post intervention study design was utilized in this project to evaluate the effect of the intervention. The pre-intervention period from June to August 2016 and post intervention from January to March 2017, involved all the team of health facility which include Nurses, Laboratory Technician and, Support personnel. Collection of observation on waste management practice at Musanze Prison's Health Center was done in order to set a base line on Medical waste management practices; an analysis of root cause was done in order to identify the real cause of the improper management of medical waste system at the health facility. According to the root cause, interventions were designed and implemented from December 2016 and became the daily routine of the Health Facility. A post intervention evaluation was conducted in March 2017.

3.2 BASELINE DATA COLLECTION PROCEDURE

Tool

To understand the magnitude of Improper medical waste management system at Musanze Prison's Health Center, a tool was confectioned (done by the team) and used in our study (Appendix A) in order to observe the presence of dust bin, segregation of waste at the point of generation, the labeling of waste containers, and onsite storage.

Measuring the magnitude

An improper waste management system at Musanze Prison's Health Center is observed by failures in segregation and errors in color-coding dust bin due to few materials. Sorting and storage, based on the different categories were not adequately done to allow efficient disposal.

Sample

All practices on medical waste management made from 23th May to 20th Jun 2016 were recorded twice a day (morning and in afternoon) and all were recorded in the collection tool. The form was available in OPD, LAB and, ARV department, according to the designed tools and at the end of data collection, forms were returned to the investigator. The same tool was reused in the post intervention period to evalute the outcome of the intervention.

3.3 ROOT CAUSE ANALYSIS

A team, including nurses, Lab Technician, and accountant from the prison's administration, was formed to conduct the root cause analysis in order to identify the final root cause.

The initial step of root cause analysis included a literature review on the indicators of a good medical waste management in general. This include (1) the segregation of waste into categories at the point of generation,(2) the Initial labeling of different types of waste in specific waste containers, (5) Onsite storage of waste as awaits collection from the healthcare facility, (6)The transport of medical waste to an offsite treatment facility,(7) and Treatment of residues following treatment.

It is imperative that all these steps are diligently followed without exception (18).

- A meeting was conducted with nurses, Lab tech, and support staff, to discuss the possible causes of inappropriate medical waste management. Five possible root causes were identified by the health centre's staff staff. These causes range from lack of knowledge, overload of the personnel, and lack of enough space to keep waste, and insufficiency of equipment without forgetting the absence of policy or guideline on medical waste management

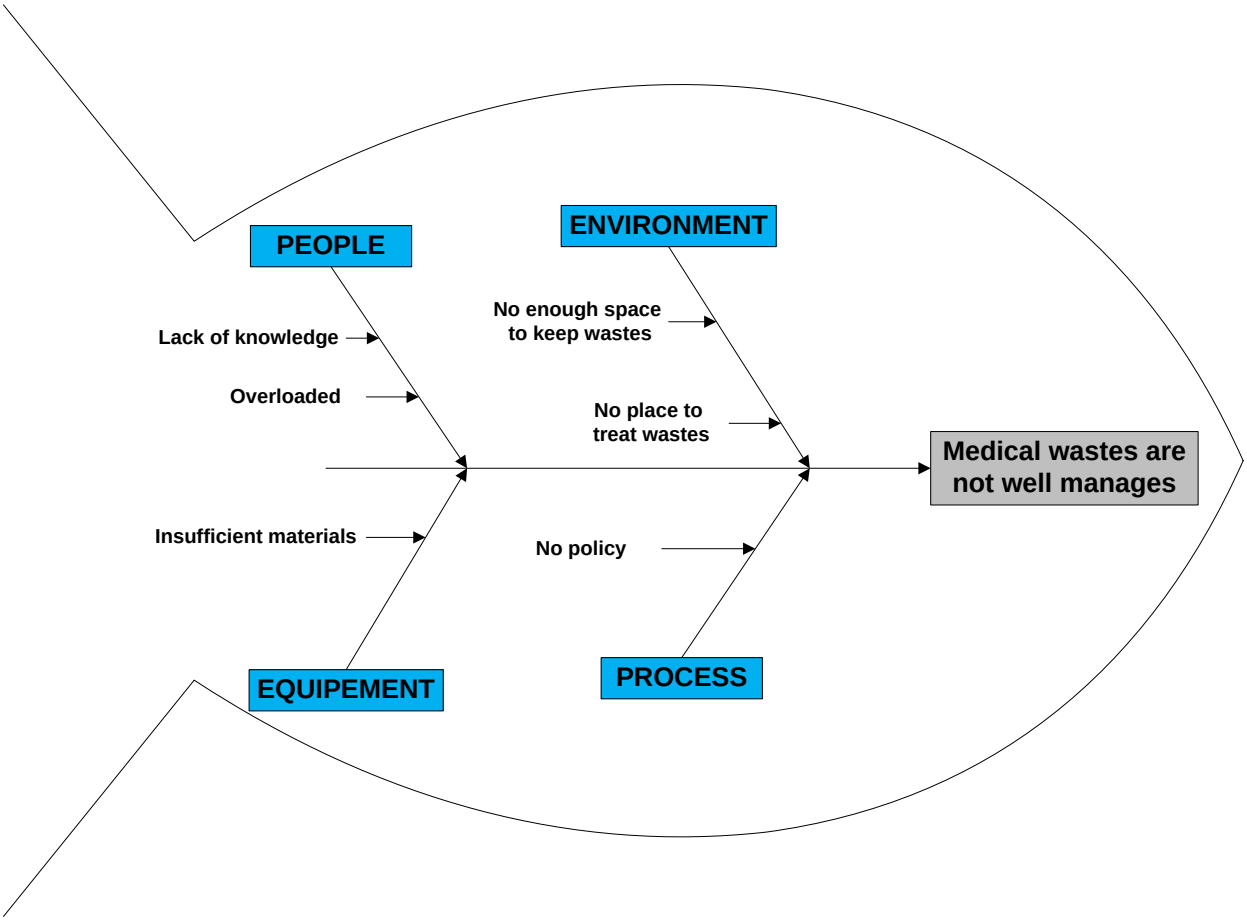

Figure 1: **Fishbone diagram summarizing the possible root causes**

3.3.1 Lack of knowledge

We first investigated on the knowledge of the team whether they were trained or not on medical waste management. According to data corrected, for five nurses, lab technician and man powers who work in Musanze Prison's Health Center, four of them were trained about medical waste management which represents 80% of all of them and one nurse was not trained representing 20% of the team. This shows that the staffs of Musanze Prison's Health Center are aware of medical waste management, presuming that the lack of training is not the cause of mismanagement of medical waste at Musanze Prison's Health Center.

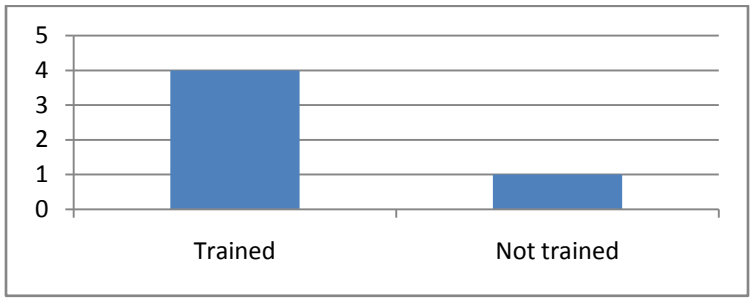

Figure 2 : Explicit what was found during the assessment on lack of knowledge

3.3.2: Overload of the staff.

To know about the workload of staff and the segregation and labeling of dustbin, the staff was asked about their daily assigned job and we found that at Musanze prison's health center, staff is overloaded due to a high number of inmates and a small number of health personnel. However as it was mentioned above, is aware of medical waste segregation and dustbin labeling even if not

done consistently. This analysis brings us to think that that the staff is aware of medical waste management and probably they don't do it due to high workload. Which could be one of root cause of improper medical waste management system at Musanze Prison's Health Center.

3.3.3. Insufficient equipment

It was also observed that there is a shortage of equipment used to manage medical waste at Musanze Prison's Health Center, the team made an inventory of dustbins in each service.

This shows that wastes were collected in one dustbin in every service except in store place where wastes are stocked and no any dustbin placed there, as consequence, wastes were even on the parterre or stocked in cartons, resulting in. Medical wastes being mixed from the point of generation up to the point of storage because of lack of materials. Infectious waste should be stored in a yellow container, pathological in a red container, sharps in a yellow marked sharps and general waste in a black container.(3)

Table 2:

Table 2: insufficiency of materials

SERVICE	NUMBER OF DUST BIN				TOTAL
	0	1	2	3	
O.P.D		1			1
Laboratory		1			1
A.R.V service		1			1
Storage site	0				0

3.3.4: Absence of policy and procedures

At this point, we looked for any policy or guideline on medical waste management in services which guide the management of waste at Musanze Prison's Health Center. It was aimed to see if there are hands on practices based on those policies and guidelines.

National guidelines about medical waste management recommend 3 dustbins: one for infected waste, one for non-infected waste and the other one for sharp wastes. (7) Unfortunately we didn't find any document on this. The absence of guidelines and policies are a handicap in medical waste management at Musanze Prison's Health Center.

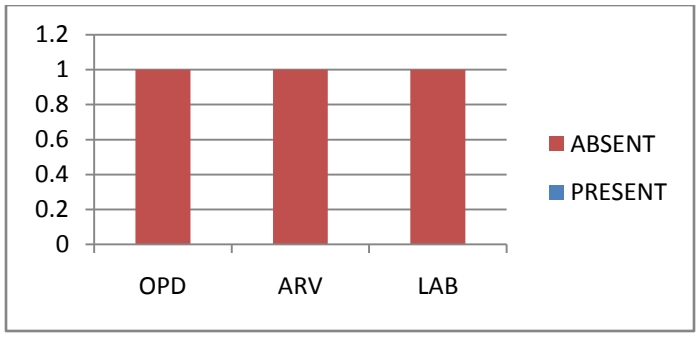

Figure 3 :Presence of policy and guideline

3.3.5. No enough space to store waste

It was also observed that there is no enough space to store waste as the cause of improper medical waste management. We had even found By that medical waste were parterre, at Musanze prison's health center, however there is enough room where to store medical waste but they were not dustbins.

3.3.6. No space to treat medical waste.

At Musanze Prison's Health Center, there is no a designed place where they can destroy or treat the medical waste. However, the health center bring its medical wastes at Ruhengeri Hospital where there is an incinerator. This shows that the absence of space to threat its medical waste is not a problem even if the construction of its own incinerator is envisaged in future.

Our analysis showed as result that the mismanagement of medical waste at Musanze Prison's Health Center was due to insufficient equipment because was impossible to separate and manage well three kinds of medical waste in one dustbin from each service.

3.4 INTERVENTION

Based on the root cause, the team proposed a set of alternative solutions. The team conducted a comparative analysis on the alternative solutions based on the cost, impact, time and feasibility of each intervention. The highest score is five (5),which means the most ideal solution, while the lowest score was one (1),which means the least ideal solution. The identified solution to improve medical waste management system at Musanze Health Center was to avail new addition dustbins and to avail the policy and procedures on medical waste management.

3.4.1. AVAILABILITY OF ADDITIONAL DUST BINS

Even if it will involve extra money, the impact and feasibility of our intervention are positive because it will facilitate the proper segregation of waste at their generation point and during their storage and transport to the point of final treatment resulting in medical waste management.

3.4.2 AVAIL THE POLICY REGARDING MEDICAL WASTE MANAGEMENT

Even if it was scored 2nd among best solution, availability of policy and procedures regarding Medical waste management are capital, as is recommended by Ministry of Health, we don't do anything without police, procedure and protocols to guide us. (19) That is after getting additional dustbins, policy, procedures and guidelines should follow.

3.5 MEASURES

The key to minimization and effective management of health care waste is segregation and identification of waste.(20) As the outcome was that the waste should be separated and each in specific dustbin, in order to measure the impact of our intervention, three outcome measures were used in our study to evaluate the results of the intervention. One, the percentage of availability of dust bin in each service; two, the absence of mixed medical waste in Health Center's Services ; three, the existence of policy and procedure for medical waste management at the HC.

3.6 DATA ANALYSIS

The availability of dust bin in each service.

The availability of dust bin in each service data were collected using the data collection tool. The information was transferred to MS Excel for compilation then transferred to SPSS 20.0 for analysis.

The presence of mixed medical waste in Health Center's Services.

The presence of mixed medical waste in Health Center's Services data were collected using a data collection tool. The obtained information was transferred to MS Excel for compilation and was analysed through SPSS 20.0.

The lack of policy and procedure for medical waste management at the HC

The lack of policy and procedure for medical waste management at the HC data were collected using a data collection tool. The obtained in formations entered to MS Excel for compilation before analyzed using SPSS 20.0.

Chi Square tests were used to compare the pre- and post-intervention on absence of mixed medical waste. Fisher's exact test was used to compare the pre-intervention and post-intervention on presence of dustbin in every service and existence policy and procedure on medical waste management due to small sample size. All data analysis was completed MS Excel and were at a significance level of $P< 0.05$.

3.7 ETHICAL CONSIDERATIONS

The authorization from the administration of the Prison was obtained before starting to collect data .No patients' medical, clinical or social information was collected in this study. This project was approved by the Musanze Prison's management team.

CHAPTER FOUR: RESULTS

A total of 202 (30%) non segregated medical waste out of 672 were observed in pre intervention. A total of 152 (78, 6%) non segregated medical waste out of 712 were founded in post intervention period. The medical waste segregation was improved significantly from 30% to 78.6%. The presence of mixed medical waste in Health Center's Services were reduced in post intervention with P< 0.001.

Percentage of staff who have high level of knowledge about medical waste management significantly increased from 80% pre intervention to 100% post intervention (P=0.003)

The table billow shows how the indicator of waste segregation was achieved in pre and post intervention.

Table 3 : Pre and post intervention about medical waste segregation.

	Pre intervention	Post intervention	P-value
Observations on Medical waste segregation N	672	712	-
Medical waste well segregated	202(30%)	152(78%)	-
OPD	2	345	<0.001*
LAB	0	367	<0.001*
ARV	100	687	<0.001*

Table 4: pre and post intervention about the number of dust bin in services.

		Pre intervention	Post intervention	Change
Number of recommended dust bin	N	3	3	-
Number of dust bin	OPD	1(33.3%)	3	2(66.6%)
	LAB	1(33.3%)	3	2(66.6%)
	ARV	1(33.3%)	2	1(33.3%)
	W.S. R	0(0%)	2	2(66.6%)

DISCUSSION

The interventions made significantly increased the system of medical waste management, reduced the non-segregation of medical waste at the point of production and storage from 30% to 78.6%, increased the number of dust bin, from 33.3% to 78.6%, surpassed our objective of 28.6%.

Good medical waste management in a health facility depends on dedicated management team, good administration, good organization and full participation of all concerned staff. (21) The success of this intervention was due to identifying an achievable project, participation of the whole team of nurses, lab tech, management committee, focus on one single issue to solve, setting achievable and realistic objective conducted to the success of this project.

Many factors contributed in the success of this project. Team work, shearing the project with the team, this helped in the way the concerned were part of team and we created the interventions together instead of feeling they were ordered to follow the new system.

Identifying a problem which can be managed at the level of the health center contributed in the successful of the project and made interventions possible to be realized. We targeted a reasonable, achievable and, realistic objective. Even if at the health center we had other problems, but we choose to focus on a single problem to be solved first then other the next time. An assessment of the magnitude and a deep root cause analysis helped us in choosing appropriate intervention in order to resolve the problem. Dairy follows up of medical waste segregation in every service which generate medical waste was the key activity.

This project was not without limitations, we faced a resistance to change. Some nurses didn't follow the new instruction and did not follow the guidelines provided on medical waste management. The study was conducted in a small health center and result may differ in other settings. Regular follow up on the propel use of dust bin, use of checklist, and presentation of funding to the concerned staff were done. Availability of Guidelines on medical waste management in every service and explained to everyone.

When we started this project, we thought that it will be easy to change the way we used to manage medical waste at Musanze Prison 'health Center, but it was totally different. Behavior change is always a process, by this project; I learned that once you have a purpose, commitment, self confidence and teamwork, you can reach meaningful result. We worked as a team in order to improve medical wastes mismanagement system at Musanze Prison's Health Center, and we realized that it is possible to achieve it once we work together as committed team.

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The project significantly improved medical waste management system at MPHC by providing enough equipment and availing MOH guideline on medical waste management.

Expanding its application to other prison's health center should be considered in the future.

The project increased the medical waste management significantly at Musanze Prison Health Canter by providing additional dust bin, refreshment of staff on medical waste management. The implementation was simple and cost-effective. Expanding its application to other Prison's health centers in Rwanda should be considered in the future.

6.2 Recommendations

We recommend that Musanze prison's Health Center has to maintain the achieved progress in medical waste management system in order to ensure that the improvements made is sustained over time.

To Rwanda Correction Service, Medical department

As this project improved the medical waste management system of Musanze prison's health center, the strategies used during this project can be used in other Prison's health centers across Rwanda.

To Ministry of Health

We can recommend also to the MOH to use this system to others health centers in order to prevent the population from evitable disease caused by medical waste mismanaged.

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APPENDIX

Appendix A: Data collection tool on magnitude.

Session N° and Date	Presence of dust bin							Wastes segregation			Labelling			On site store		Waste management	
	OPD			LAB			ARV	OPD	LAB	ARV	OPD	LAB	ARV	Present	Well used	Well done	Bad done
	1	2	3	1	2	3	1										
1																	
2																	
3																	
4																	
5																	
Total																	

Appendix B : DECISION MATRIX

Strategic alternatives	Evaluation criteria's 5: most ideal, 1: least ideal				
	Impact	Expense	Feasibility	Time	Total
Use appropriately the existing dust bin.					
Make available additional dustbins					
Educate patient and staff on appropriate use of dustbin					
Hire outside person to final treat medical waste.					

Appendix C: COMPARATIVE ANALYSIS

This analysis is conducted with the following comparative criteria: impact, time to effect, feasibility, and cost.

The highest score is five (5),which means the most ideal solution, while the lowest score is derived to one (1),which means the least ideal solution.

Interventions	**Impact**	**Expense**	**Feasibility**	**Time**	**Total**
Use appropriately the existing dust bin.	1	5	5	5	16
Make available additional dustbins	5	4	5	4	18
Avail the policy regarding medical wastes management.	5	5	4	3	17

Appendix D: Implementation Plan

Task	**Responsible**
Meeting with HC staff, Introduce the request of new dust bin to management team.	Head nurse of HC (Researcher)
Request for guidelines and procedures on medical waste management to Ruhengeri hospital's Hygiene focal	Researcher
Procurement procedures for purchasing new dust bin	Researcher and Logistic officer
Purchase new dust bin	Researcher
Refresh training on appropriate use of dust bin	Head nurse
Implementation begins (Use of new dust bin)	Nurses and Lab tech of HC
Supervise and check if new Dust bin are used appropriate.	Researcher
Data analysis on medical waste management	Researcher
Monitoring medical waste management	Researcher
Provide feedback to team	Researcher

Appendix E: IMPLEMENTATION PLAN: GANTT'S CHART

No	Detailed list of tasks/activities	Start date	End date	2016								2017							
				November				December				February				March			
				w1	w2	w3	w4	w1	w2	w3	w4	w1	w2	w3	w4	w1	w2	w3	w4
1	Meeting with HC staff, Introduce the request of new dust bin to management team.	04-11-16	24-11-16																
2	Request for guidelines and procedures on medical waste management to Ruhengeri hospital's Hygiene focal point	25-02-16	02-12-16																
3	Procurement procedures for purchasing new dust bin	02-12-16	22-12-16																
4	Purchase new dust bin	23-12-16	28-12-16																
5	Refresh training on appropriate use of dust bin	29-12-16	30-12-19																
6	Implementation begins (Use of new dust bin)	03-01-17	24-02-17																
8	Supervise and check if new Dust bin are used appropriate.	25-02-17	03-03-17																
9	Data analysis on medical waste management	04-03-17	13-03-17																
10	Monitoring medical waste management	12-03-17	19-03-17																
11	Provide feedback to team	20-03-17	20-03-17																

Appendix F: EVALUATION PLAN

Indicator	**Definition**	**Person**	**How**	**When**
% of availability of dust bin in each service	In every service there is a bin for: 1for Infected waste,1 for non infected waste,1for sharp wastes, and they are used appropriately	Head nurse	check with checklist	2 weeks, twice daily in December
Absence of mixed medical waste in Health Center's Services.	Each type of waste is separated appropriately.	Health center's team	Check with checklist	2 weeks in March

Indicator	Definition	Person	How	When
Existence of policy and procedure for medical waste management at the HC	Policy exists or not	Head nurse	Check in every service	End November
# of staff refreshed on medical waste management	# nurses and cleaners in HC refreshed in the new policy	Head Nurse	Training sign in sheet report	End of December
% of staff use appropriate the dust bin	Waste well separated in each service.	Hygiene focal point	Observation study	March