

MINISTRY OF HEALTH

Health Care Waste Management in Ghana

MOH Policy and Guidelines for Health Institutions

March 2006

MINISTRY OF HEALTH

Health Care Waste Management Policy

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FOREWORD

Although awareness regarding healthcare waste management seems to have improved in recent years, there is a need for a systematic approach to it in terms of effective segregation, safe collection and storage, as well as ultimate treatment. This policy and guidelines seeks to ensure that HCW is managed effectively in compliance with existing laws and regulations and others to be passed in future

The recommendations for better management of the healthcare wastes in the nation's health care facilities have been presented in detail as a guide for facilities at various levels of the health care system. It is envisaged that this will enable health practitioners both in the public and private health sub- sectors to understand the various activities required to be carried out.

Health and safety concerns and guidance have been addressed as part of this policy and guidelines to ensure that managements of institutions put in place measures to limit exposure of their staff and the general public to the hazardous components of health care waste. It is hoped that provision will be made for the supply of all necessary personal protective equipment and their use enforced during the performance of all activities that potentially generate infectious waste as well as those that go into the handling of such waste.

The need for training and the monitoring of the healthcare waste management system have been outlined in order for the management at the facilities to enhance common knowledge of safe healthcare waste management and in order to evaluate their management practices during the implementation of the waste management system.

The importance of ensuring the availability of financial resources to make the system function cannot be overemphasized. It is hoped that all facility managers will include waste management in their list of priorities and consequently make necessary budgetary allocations towards capacity building of its staff and securing the tools necessary for efficient waste management on an on-going basis.

This policy document is the outcome of a collaborative effort between health personnel and personnel of the Ministry of Local Government and Rural Development and the Environmental Protection Agency among others. It is therefore hoped that this collaboration will be enhanced in the implementation of these guidelines with each organization playing its rightful role in order to give the necessary impetus to ensure proper management of Health Care Waste in Ghana.

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We acknowledge the valued input and direction throughout the assignment by the Co-ordinator Dr. (Mrs) Edith Clarke and Mr James Hottor who jointly prepared the report. The immense role played by Dr. T. N. Awuah-Siaw, Director Institutional Care and Mr Andreas Eskesen Consultant to the Estates Management Unit, GHS, towards the editing of the document is also acknowledged.

Health managers of many institutions in all sub-sectors within the health sector participated as members of working groups, while others took part in several fora to discuss and make useful suggestions. Their views have helped to shape a policy that is reflective of the interests of all stakeholders in the health sector in an effort to create a sustainable system of health care waste management.

Our belief is that this participation has enabled us to come up with a workable policy as well as guidelines which will enjoy the support of all concerned. We thank each one of you for all the effort and sacrifices you have made in this endeavour.

Finally, our warmest appreciation goes to all and sundry who contributed in diverse ways to make the development of this policy a success.

TABLE OF CONTENT

ABBREVIATIONS.....	V
GLOSSARY	VII
1. INTRODUCTION	1
1.1 THE NATURE OF PROBLEMS OF HEALTH CARE WASTE	1
1.2 THE POLICY AND LEGAL CONTEXT	2
1.2.1 Legal	3
2. SCOPE OF POLICY	5
2.1 OBJECTIVES OF THE POLICY	5
2.2 SCOPE OF THE POLICY	5
3. POLICY STATEMENT	6
4. TECHNICAL GUIDELINES.....	8
4.1 CLASSIFICATION OF HEALTH CARE WASTE.....	8
4.2 OVERVIEW OF IMPLEMENTATION OF SAFE HEALTH CARE WASTE HANDLING AND DISPOSAL SYSTEM.....	10
4.2.1 Steps in Health Care Waste Management.....	10
4.2.2 Segregation and Containment of Waste.....	12
4.2.3 Colour Coding:	13
4.2.4 Storage.....	14
4.2.5 Internal Storage.....	15
4.2.6 External Storage.....	16
4.2.7 General Requirements for Waste Collection Containers	17
4.2.8 Standards for Disinfection of Reusable Health Care Waste Containers:	17
4.2.9 Collection and Transportation of Health Care Wastes.....	17
4.2.10 General Requirements for the Transportation of Health Care Waste	18
4.2.11 Requirements for the Transportation of Radioactive Waste Containers.....	18
4.3 CONTRACTING WITH WASTE MANAGEMENT CONTRACTOR	19
4.4 TREATMENT OPTIONS FOR VARIOUS WASTE STREAMS.....	19
4.5 RECOMMENDED EQUIPMENT	25
4.6 WASTE MINIMIZATION.....	27
4.7 WASTE WATER TREATMENT AND DISPOSAL	27
4.8 SPILLAGE PROCEDURES	28
4.8.1 Procedure for Handling Spillage of Clinical Waste.....	28
4.8.2 Spillage of Chemicals.....	29
4.9 WASTE MANAGEMENT PLANS.....	30
4.10 CONTINGENCY PLAN.....	30
4.11 HEALTH AND SAFETY	30
4.12 RECORD KEEPING AND DOCUMENTATION.....	31
5. TRAINING, CAPACITY BUILDING AND RESEARCH	33
6. INFORMATION, EDUCATION AND COMMUNICATION (IEC) AND ADVOCACY	34
6.1 INFORMATION, EDUCATION AND COMMUNICATION.....	34
6.2 ADVOCACY	34
7. IMPLEMENTATION.....	36
7.1 GENERAL PRINCIPLES OF IMPLEMENTATION	36
7.2 Implementation at Various Levels	36
7.2.1 At the Institutional Level	37

7.2.2 At the District Level.....	37
7.2.3 At the Regional Level	37
7.2.4 At the National Level	37
7.3 RESPONSIBILITY FOR IMPLEMENTATION.....	37
8. MONITORING AND REVIEW	39
8.1 MONITORING AND CONTROL	39
8.2 AUDITS	40
8.2.1 Periodic Management Audit	40
8.2.2 External Random Audit.....	40
8.2.3. Audit Tool	40
8.3 REVIEWS	40
BIBLIOGRAPHY	41
APPENDIX 1.....	36
LIST OF WORKING GROUP MEMBERS AND PARTICIPATING ORGANIZATIONS	37
APPENDIX 2 :.....	44
SAMPLE FORM FOR ASSESSMENT OF WASTE GENERATION	44
APPENDIX 3.....	39 ERROR! BOOKMARK NOT DEFINED.
CLINICAL WASTE AUDIT TOOLS.....	40

ABBREVIATIONS

CEO	Chief Executive Officer
DA	District Assembly
DDHS	District Director of Health Services
DHMT	District Health Management Team
EPA	Environmental Protection Agency
EU	European Union
GHS	Ghana Health Service
HASS	Health Administration and Support Services
HCWM	Health Care Waste Management
HCWMC	Health Care Waste Management Committee
HRDD	Human Resources Development Division
HQ	Head Quarters
IAEA	International Atomic Energy Agency
IEC	Information Education and Communication
LI	Legislative Instrument
LPG	Liquefied Petroleum Gas
MDAs	Ministries, Departments and Agencies
MOH	Ministry of Health
NAP	National Action Plan
NGO	Non-Governmental Organisation
OPD	Out-Patient Department
PPE	Personal Protective Equipment
PPME	Policy, Planning, Monitoring and Evaluation
RDHS	- Regional Director of Health Services

- RHMT - Regional Health Management Team
- SOPs - Standard Operating Procedures
- WHO - World Health Organisation

GLOSSARY

Clients – Patients and their caregivers, visitors to the health facilities.

Etiologic Agents: Organisms or other agents that cause a particular disease

Hazardous Waste: Waste that can have a significant adverse effect on public health and/or the environment due to its infectiousness, toxicity, corrosiveness, carcinogenicity or other properties.

Health Care Waste: All untreated solid and liquid waste (both hazardous and non-hazardous) generated during the administration of medical care, veterinary care or the performance of medical research involving humans and animals. These include infectious, pathological, radioactive, pharmaceutical and other hazardous wastes.

Infectious Waste: Waste containing pathogenic organisms like bacteria, viruses, parasites and fungi in sufficient quantities to cause disease in susceptible hosts.

Pathogens: Disease causing agents

Pathological Waste: Tissues, organs, body parts, foetuses, etc. that have the potential to be infectious and are therefore sometimes classified as a subcategory of infectious wastes.

Sharps Container: Puncture resistant waste container used for disposal of needles and associated syringes.

Sharps: All items that pose a risk of injury and infection due to their puncture and cutting properties e.g. needles, scalpels, knives, glass, syringes, pipettes and similar items having a point or sharp edge or that are likely to break during transportation and result in a pointed or sharp edge.

1. INTRODUCTION

1.1 The Nature of Problems of Health Care Waste

The provision of health care, like any other human activity, generates waste which has to be managed and disposed of in a safe manner in order to minimize risks it poses to the health of health workers, clients and the community at large. The greater part of waste generated by health institutions is not hazardous and can be managed like household waste. This constitutes about 75% to 90% of all waste generated in health institutions. However, the remaining 10% to 25 % is hazardous and requires special arrangements for management. Examples of hazardous health care waste are pathological waste such as tissues and body fluid, pharmaceuticals e.g. expired or unused drugs, sharps (syringes, disposable scalpels, blades, etc.), non sharps (swabs, bandages, disposable medical devices, etc) and chemicals (solvents, disinfectants, etc.), as well as waste water including effluents from mortuaries. These pose risks by being infectious, toxic, radioactive or causing injuries.

In 1992, the Waste Management Department of the Accra Metropolitan Assembly conducted a study in 6 major hospitals in Accra which showed the unit generation of health care waste to be 1.2 kg/bed/day. This is likely to be increasing due to an increasing number of hospital beds and improved standards of living. With a bedstate of 4,372 in Accra in 2002 (does not include all private facilities) and an occupancy rate of 99%, it is estimated that waste generated per day is over 5.2 tons daily. This translates to over 1,850 tons of health care waste annually, over 330 tons of which could be hazardous, assuming 18% of waste generated is of hazardous nature. The study also found that the waste generated vary in proportion to the level of complexity and specialized functions performed, the population of in- and out- patients and the number of auxiliary departments within the facility e.g. radiology, laboratory, research, etc. Thus the quantities of waste generated were found to be high in the teaching, regional and district hospitals as compared to private clinics, health centres and health posts.

Currently, there is no sector-wide waste management system in place, with the result that individual health institutions devise their own methods and systems, some of which are ineffective. There is also no valid monitoring mechanism to verify compliance to agreed norms and practices. A survey carried out in 2001 to assess health care waste management in health facilities in Ghana showed that waste management practices were below acceptable standards and posed risk to staff and communities. Key findings of that survey include:

- i. Absence of a national policy and guidelines and standard operating procedures
- ii. Different systems in place for waste segregation
- iii. No colour coding in place and wastes were not labelled;
- iv. Containers for waste were unacceptable and not standardized.
- v. Vehicles for transporting waste were inadequate;
- vi. Storage sites for waste within the facilities were open, accessible to unauthorised persons and animals, breeding grounds for flies, rodents and other insects;
- vii. Final disposal of waste was unacceptable; burying, open burning, in some cases infectious waste was dumped on open grounds.

As a result of some education on proper collection and storage and the introduction of the Demontfort incinerators in district hospitals, this situation is improving.

An inventory of potential emission of dioxins and furans from incinerator use conducted by the Ghana Health Service (GHS) and the Ghana Atomic Energy Commission (GAEC) in 2004 showed the potential for levels of these substances to be higher than comparable parameters in Europe in the mid 1980s. Though no maximum exposure limit has been set for these chemicals, in view of the substantial health risk from exposure to them, the objective as spelt out in the Stockholm Convention (2001), which Ghana has ratified, is to reduce them to the lowest possible level.

Widespread expansion in incinerator use is likely to result in much higher levels of emissions. This combined with emissions from other sources and an increase in green house gases from incineration is likely to cause substantial environmental contamination. The study therefore proposed that the long-term objective should be to limit the number of incinerators used to a few high capacity ones which (if acquired) should be fitted with APC systems that meet international standards. These could be shared among districts/regions.

In view of the difficulties in transportation from small peripheral facilities, the aim at this level should be to improve the operation of the De Monfort and other locally made brick incinerators in these areas. This could be achieved through attaining correct temperatures in the incineration chambers and chimneys through pre-heating and avoiding the overloading of the incinerator with waste. The use of LPG gas for preheating where firewood is difficult to find could also be considered.

Secondly, the introduction of other environmentally friendly treatment options such as micro wave systems and waste autoclaves should be considered alongside state of the art incinerators.

In order to address these shortfalls, the Ministry of Health set up a working group made up of stakeholders in the sector, both public and private to develop policy and guidelines for managing health care waste.

1.2 The Policy and Legal Context

Waste management in Ghana is a multi-sectoral effort with the Ministry of Local Government and the Environmental Protection Agency playing key roles as implementer and regulator respectively. This responsibility is discharged through the District, Municipal and Metropolitan assemblies which are directly under the Ministry of Local Government on the one hand and the offices of the Environmental Protection Agency on the other. The ultimate responsibility for ensuring that waste is disposed of, however, lies with the person or institution that generates the

waste in line with the principle of ‘the polluter pays’. Health care institutions are therefore responsible for the waste that is generated by their activities and are required to take practical steps to ensure their separation, storage, treatment and safe disposal while enjoying the collaboration and support of the relevant stakeholder ministries and agencies.

1.2.1 Legal

There is no specific law that addresses the management of health care waste in Ghana at the moment. Existing laws and policies assign certain functions to some institutions such as district assemblies and the Environmental Protection Agency (EPA) through EPA Act 490 (1994) and the National Sanitation Policy (1999) but lacks specific provisions for dealing with health care waste in a comprehensive manner. The Sanitation Policy calls for institutional measures for collection of the waste while the Buildings Regulation states that hazardous and domestic refuse shall be treated separately. This situation leaves room for the performance of the function to fall through the cracks. The current policy builds on the guidelines for management of health care and veterinary waste whose development was led by the Environmental Protection Agency (EPA) in 2002.

Some of the laws that have relevance for Health Care Waste Management include:

- The Constitution of the Republic of Ghana, 1992
- The Environmental Protection Agency Act, 1994 (Act 490)
- Environmental Assessment Regulations, 1999 (LI 1652)
- The Local Government Act, 1993 (Act 462)
- National Building Regulations, 1996 (LI 1630)
- Town and Country Planning Ordinances, 1944 (Cap 84)
- Vaccination Ordinance Cap 76
- Quarantine Ordinance Cap 77
- Mosquito Ordinance Cap 75
- Infectious Disease Ordinance
- Food and Drugs Law 305b (1992)
- Mortuaries and Funeral Facilities Act, 1998 (Act 563)
- The Criminal Code, 1960 (Act 29)

The Constitution of Ghana enshrines the human rights of the individual and requires the President to report to Parliament at least once a year all the steps taken to ensure the realization of policy objectives contained in Chapter 6 and in particular, the realization of basic human rights, a healthy economy, the right to work, the right to good health care and the right to education (Section 34(2)). Section 41 of the Constitution lists certain duties and responsibilities associated with the exercise and enjoyment of rights and freedoms, among which is the duty to protect and safeguard the environment.

The Criminal Code, 1960 (Act 29) 296(1) provides that whoever places or permits to be placed, any carrion, filth, dirt, refuse, or rubbish, or any offensive or otherwise unwholesome matter, on any street, yard, enclosure, or open space, except at such places as may be set apart by the local

authority or health officer for that purpose commits a punishable offence. The code went further in section 297 (1), to state that when an offence has been committed under section 296 (1) but the offender has not been identified or discovered, the fact of any carrion or other substance mentioned in that subsection being found in front of any premises shall be prima facie evidence of its having been placed there by the occupier of the premises. By going to this extreme, the law seeks to ensure that residents take responsibility for the streets in front of them as well as their premises. There are similar provisions in the other laws cited above. The National Building Regulations, 1996 (LI 1630) stipulates in Section 145 (1) that a building for residential, commercial, industrial, civic or cultural use shall have a facility for refuse disposal. It went further to state in Section 145 (2) a requirement that each dwelling unit shall have a standardised dustbin or other receptacle approved by the District Assembly in which all refuse generated shall be stored temporarily. It provides for transfer stations to be located within reach and preferably protected from rain and the prevention of spreading, pest infestation and scavenging activities.

To improve on the current situation, there is the need for a specific law that addresses how health care waste should be handled in order to avoid any ambiguities.

2. SCOPE OF POLICY

2.1 Objectives of the Policy

The policy seeks to ensure that health care waste is managed effectively in compliance with existing laws and regulations and others to be passed in future in order to protect health care workers, their clients (patients, caregivers and visitors) and the environment from potentially disease-causing waste materials. The Guidelines provide standards, procedures and processes for handling health care waste in the sector institutions and mechanisms for performance and performance monitoring.

2.2 Scope of the Policy

The Policy and Guidelines apply primarily to all health institutions whether public, private, quasi-governmental, non-governmental or faith-based, that operate in the country at all levels: Tertiary/Teaching/Specialist Hospitals, Regional Hospitals, District Hospitals and Subdistrict Health Institutions i.e. Health Centres/Clinics and Community Clinics. Health Research Institutions, Laboratories, Alternative Health Care Providers, (including traditional healers and Traditional Birth Attendants (TBAs). Mortuaries, Funeral Homes and Undertakers, Pharmacies and Chemists are also included. The principles outlined are equally applicable to situations of home based care for persons infected with HIV/AIDS and other ailments as well as those in the “service industry” which encompasses Traditional Birth Attendants, “Wanzams”, Barbers, Hairdressers etc. Whilst reference may be made to general domestic waste generated by these institutions, the focus of the Policy and Guidelines is health care waste that is considered hazardous. Institutions and companies with responsibility for treatment, transport and disposal of waste are also expected to familiarize themselves with the provisions of the Policy and Guidelines and must comply with them.

The policy classifies waste into hazardous and non hazardous waste and details steps in its handling; from generation, segregation, storage, transportation and treatment to final disposal as well as equipment and tools required. It also assigns roles and responsibilities to various stakeholders and further prescribes measures for protection of handlers.

3. POLICY STATEMENT

All waste that meets the definitions of hazardous waste shall be considered as such and be treated in line with this policy and other legal requirements in force at the time.

- i. Every health institution shall have the responsibility to separate, store, label, treat, transport and dispose of all waste in the manner prescribed in this policy and other laws and regulations regarding Health Care Waste Management so as to safeguard the safety of its workers, clients and the environment.
- ii. All health institutions and their officers have a duty of care to:
 - store waste correctly and prevent its spillage or loss of any kind;
 - Segregate wastes that require different methods of disposal;
 - Label waste to identify its source and contents;
 - Pass waste on only to persons authorized to receive it;
 - Receive waste only when properly authorised to do so and only from an authorised person;
 - Describe the waste (on the appropriate forms) in sufficient detail that subsequent carriers and disposers can deal with it safely and are liable for any negligence on the part of the institution or its officers.
 - All health institutions and waste management companies shall keep accurate records on waste management activities.
 - Places of final disposal of treated waste shall be identified and acquired.
- iii. Wherever practicable, the disposal site approved by the District, Municipal or Metropolitan Assembly in consultation with an officer of the Environmental Protection Agency for the disposal of waste shall have a section designated for the disposal of treated health care waste.
- iv. Provided the “proximity principle” (the principle of treating and disposing of waste as close as possible to the point of generation) is observed, health institutions in the same vicinity may share facilities in order to minimize costs. Since there are a lot more health facilities in the urban areas, centralisation of treatment facilities such as incinerators and autoclaves is practicable. (Rural and peri-urban areas would for the time being continue to make use of the decentralised system of incineration.) This will require a support transport system that is efficient and poses minimal risk to the environment.
- v. Efforts shall be made to select treatment options which pose minimal risk to the environment within the limits imposed by available financial, human and technical resources.

- vi. The Ministry of Health (MOH) will collaborate with the Ministry of Local Government and Rural Development (MLGRD), District Assemblies, corporate and individual employers within the health sector as well as all other stakeholders to ensure an effective management of health care waste.
- vii. In order to ensure efficiency of the system and further enhance inter-sectoral collaboration, environmental health officers will be employed by the MOH/GHS as full time employees for the health facilities.
- viii. Institutions shall develop contingency plans to provide guidance on measures to be taken in the event of unexpected incidents such as spillages, fire, flooding etc.
- ix. The health and safety of staff involved in health care waste management shall be ensured through the provision of safe systems of work and the institution of a system of regular medical monitoring and immunization complemented by relevant information and training.
- x. Information, Education and Communication strategies shall be used to educate the public on the importance of health care waste management and the role of society in advocating for and ensuring its effective implementation.

The MOH shall facilitate and collaborate with other stakeholder institutions in the conduct of research into the processes and technologies for health care waste management.

4 TECHNICAL GUIDELINES

In pursuit of the policies set out in the preceding sections, the technical guidelines provided below shall apply.

4.1 Classification of Health Care Waste

Health care waste includes all untreated solid and liquid waste (both hazardous and non-hazardous) generated during the administration of medical care, or the performance of medical research involving humans and animals. These include infectious (including pathological and sharps) radioactive, pharmaceutical and other hazardous wastes as well as general waste.

Generally, between 75-90% of the waste produced by health-care providers is non-risk or “general” health-care waste, comparable to domestic waste. The remaining 10-25% of health care waste is regarded as hazardous. These guidelines therefore identify two broad categories of health care waste. These are:

- i. General or non-hazardous waste not contaminated with blood, body fluids, or other harmful agents or materials (also referred to as domestic or municipal wastes) such as paper, fabrics, glass, food residues and containers;
- ii. Wastes considered hazardous due to their potential for creating a variety of health risks as a result of their actual or presumed biological, chemical and/or radioactive contamination. Due to their potentially hazardous nature, these wastes require care from the point of generation until final disposal.

The classification system adopted is based on the point of generation, method of storage and the treatment options available, as shown in Table 1. These categories are a general guide and are not meant to be all-inclusive and specific to all situations that may be encountered in a health care facility. Therefore, as questionable situations arise, each health care facility must decide if a particular device, material or substance should be regarded as hazardous waste, based on available information and guidance from the District Assembly, Ministry of Health or Environmental Protection Agency.

Table 1: Classification of Health Care Waste in Ghana

Type	Classification and Description	Content/Examples
A	GENERAL/NORMAL WASTE This type of hospital waste is similar to domestic waste. It is not harmful except for the fact that it is produced within the hospital environment and therefore requires special handling. It includes sweepings from lawns, corridors, offices, workshop, stores, waste from kitchen, etc.	<ul style="list-style-type: none"> ▪ Paper, cardboard, plastic materials including those from points of generation, kitchen waste, ash, sawdust, pieces of wood etc.
B	INFECTIOUS WASTE These types of waste from the hospital have physical and chemical characteristics similar to those of industrial hazardous waste and waste generated by both in-patients/out-patients or animals which is likely to contain pathogenic micro-organisms. It includes materials that can be infectious to patients, health care workers and the public. It therefore requires special management both inside and outside the hospital until it is finally disposed of. This may further be classified under the following sub classification:	<ul style="list-style-type: none"> ▪ Laboratory waste generated by microbiological investigation. ▪ Potentially infected blood and human and animal tissue. (e.g. HIV)
1	SHARPS These are sharp-edged wastes with puncture and/or cutting properties that pose risk of injury and infection. They may be stained or contaminated with blood or body fluids from injection rooms, surgical equipment etc.	<ul style="list-style-type: none"> ▪ Needles, syringes, surgical blades, scalpels, test tubes, ampoules, glass instruments, pipettes etc
2	PATIENT WASTE/ CULTURE/ SPECIMEN These are wastes generated from in- or out-patient activities and may be contaminated or stained with blood or body fluids from surgical operations, injection room (other than sharps) etc. Clinical specimen, laboratory culture and human tissue.	<ul style="list-style-type: none"> ▪ Stained or contaminated material (e.g. soiled cotton wool, used bandages/dressings, gloves, linen, blood transfusion bags, urine, faeces). ▪ Culture plus specimen (e.g. experimental specimen (animals), tissue culture, urine, stool) ▪ Urine, faeces (stool) from laboratory <p>Experimental specimen (animals)</p>
3	PATHOLOGICAL/ORGANIC HUMAN/ANIMAL TISSUE This type of waste includes amputations and other body tissues resulting from surgical operations, autopsy (post-mortem), and birth and requires special treatment for ethical and aesthetic reasons.	<ul style="list-style-type: none"> ▪ Internal body organs, amputated limbs, placentas foetus. ▪ Human liquid wastes (e.g. urine, blood products/blood) ▪ Effluents from mortuaries

C	PHARMACEUTICAL WASTE These are wastes generated from the pharmacy	<ul style="list-style-type: none"> ▪ Expired drugs (solid/liquid, plastic or glass containers) ▪ Residues of drugs in chemotherapy that may be cytotoxic, genotoxic, mutagenic or carcinogenic
D	CHEMICAL WASTE This is basically made up of spent chemicals from research and analytical laboratories, and pharmaceutical companies.	<ul style="list-style-type: none"> ▪ Acid, Alkali, organic substances, solvents, and heavy metals.
1	RADIOLOGICAL WASTE Any waste material (solid or liquid) produced from image processing at the radiology department.	<ul style="list-style-type: none"> ▪ Chromo sulphuric acid ▪ Glacial acetic acid ▪ Photographic developer ▪ Fixer solution ▪ X-ray photographic film
2	ACIDS	<ul style="list-style-type: none"> ▪ Hydrochloric acid ▪ Oxalic acid
3	ALKALIS	<ul style="list-style-type: none"> ▪ Sodium hydroxide ▪ Potassium hydroxide
4	VOLATILE SOLVENTS	<ul style="list-style-type: none"> ▪ Ethanol, Methanol, Xylene, Chloride tape
5	ORGANIC SUBSTANCES	
6	HEAVY METALS	<ul style="list-style-type: none"> ▪ Mercury
E	RADIOACTIVE WASTE Any solid, liquid, or pathological waste contaminated with radioactive isotopes of any kind.	<ul style="list-style-type: none"> ▪ Solid-papers, gloves, cotton swabs, needles (sharps), equipment etc. ▪ Liquid-patient excreta, rest of solution administered to patient, gastric content. ▪ Spent radiation sources ▪ Technetium generators ▪ Radium needles.
F	INCINERATOR ASH/SLUDGE AND OTHER BY PRODUCTS OF WASTE TREATMENT This is the waste generated from the combustion of hospital waste, which will have to be disposed of in a landfill site.	<ul style="list-style-type: none"> ▪ Incinerator fly ash and its residues ▪ Leachate etc

With the exception of domestic wastes, all other waste streams are potentially hazardous.

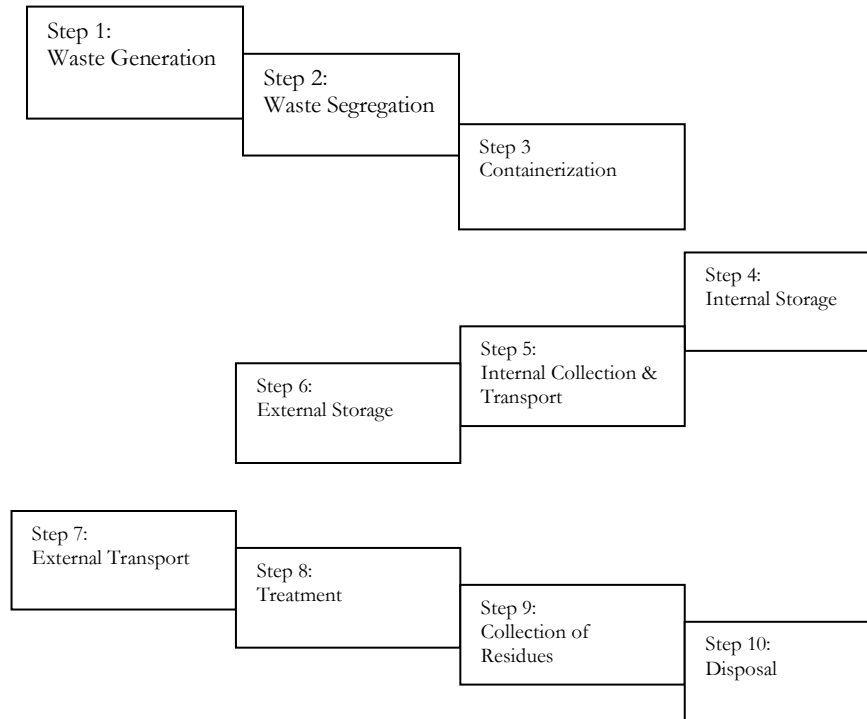
4.2 Overview of Implementation of Safe Health Care Waste Handling and Disposal System

4.2.1 Steps in Health Care Waste Management

The stages in Health Care Waste Management (HCWM) are production of waste, segregation of the waste, internal storage (in the wards and other departments), packaging/labelling and internal transportation to an external storage site i.e. transit storage site e.g. an on-site central storage point. All these stages take place within the facility and are followed by transportation to a treatment plant, (on or off-site) and final disposal.

The stages in HCWM are summarized in figure 1. In each institution, the head of the facility must ensure that the steps are followed to ensure adequate collection and disposal of the health care wastes. Furthermore, microplanning should be carried out starting from the facility and subdistrict level upwards to the regional level to ensure the most cost-effective means of collecting, transporting, treating and final disposal of the waste.

Fig 1: Steps in Health Care Waste Management



HCWM is most effective when proper methods are employed at each step whilst bearing in mind the following considerations:

- i. The nature of waste, level of toxicity and risk to health.
- ii. Legal - the prevailing regulations (on health and environment)
- iii. Financial – investment and running costs as against the facility’s/district’s /region’s budget.
- iv. Technical – technologies available on the market and existing options in the sub-region.
- v. Patient load/quantity of waste generated daily
- vi. Sustainability – viewed alongside the availability of energy sources and other utilities to run equipment.
- vii. Local community preferences – whilst some communities may have an aversion for some treatment options available for some types of waste for cultural, religious and other reasons; (e.g. use of steam autoclaves or incineration of body parts),

others may welcome treatment options solely on the basis of technological feasibility and environmental friendliness. For whatever approved reasons treatment options are chosen by a locality, health care institutions and waste management companies shall ensure that safety and efficiency are not compromised.

4.2.2 Segregation and Containment of Waste

The following guidelines shall apply to waste segregation and containment:

- i. Different type of waste requires different method of handling, treatment and disposal. Therefore, it is important that health care waste is segregated into the various sub-categories for safety reasons and to facilitate minimization as well as application of appropriate treatment and disposal methods. Appropriate handling, treatment and disposal of waste by sub-category will help to reduce costs as the type of waste influences the disposal method used, hence disposal costs. Non-segregation of the waste renders all clinical waste generated infectious or hazardous and results in higher management costs.
- ii. Segregation should be at source; that is it should take place as close as possible to the point of generation of the waste and should always be the responsibility of the waste producer.
- iii. Each waste stream segregated must be placed in an appropriately colour-coded container as shown in Table 2.
- iv. Instruction posters regarding the procedure for waste segregation should be pasted in all areas where segregation takes place and other vantage points.
- v. For effective planning, each level of the health system should make estimates of their own waste production: this implies that each facility should estimate the waste it generates. This includes all wastes generated during clinical care (including surgery), routine and mass immunization. The estimates should be collated by the DHMT in each district to obtain the district waste generated and further, by the RHMT to estimate regional level waste generation. Each region should then submit returns on these levels quarterly to GHS headquarters.
- vi. Health institutions shall ensure that every waste they generate and pass on to a transporter or waste management company to be transported for treatment/disposal is accompanied by a signed statement certifying that the waste has been properly segregated, stored and/or treated (as applicable) in accordance with this policy and guidelines and no longer constitutes a hazard. In cases where institution lacks the facility to treat and therefore hands in untreated waste, the certificate shall disclose this fact. There shall be affixed to every waste a label which indicates the classification, the processes it has gone through and the initials of the officer(s) who processed it.
- vii. All health institutions shall recruit and train health care waste management officers and ensure that they are well equipped to handle health care waste. Health care waste management training should be incorporated/ strengthened in both pre-service and in-service training of health personnel. This training notwithstanding, where it is preferred to do so for reasons of cost, efficiency, or other reasons the management function may be outsourced to a duly certified waste management company.

- viii. The teaching hospital and GHS should submit their returns to the MOH or an appropriate body or department designated by the MOH, which should further collate the statistics into a composite estimate of the national health care waste.

A sample form for assessment of waste generation for use by health facilities and other levels of the health care system is shown in Appendix 1.

4.2.3 Colour Coding:

Colour coding of waste containers and plastic bags should be used to facilitate efficient segregation of waste.

The recommended colour coding scheme for Ghana (adapted from WHO) is as follows:

- BLACK** General waste (e.g. kitchen waste, paper, cardboard, sweeping etc)
- YELLOW** - Infectious waste (e.g. sharps, patient waste, human/animal tissue and cultures/specimens) with the biohazard label
 - Radioactive waste with the radioactive symbol.
- BROWN** Hazardous waste (e.g. expired drugs, vaccines, chemicals etc). Where only small amounts of chemical wastes are generated, these may be added to the infectious waste.

Some variations to this arrangement may occur based on treatment options used in particular locations, which will also influence the level of segregation.

Table 2 shows the colour coding for the storage medium and transportation of health care waste. Colour coding for the plastic bags should always correspond or match with the waste containers both at the internal and external storage sites.

Table 2: Colour Coding for Storage and Transportation

Waste Type	Description of Waste	Colour Code
A	General Waste	▪ Black plastic bag and container of appropriate size
B	Infectious Waste	
B1	sharps	▪ Yellow puncture-resistant containers and plastic bags
B2	Patient Waste	▪ Yellow plastic bags, bins and other containers
B3	Culture/Specimen	▪ Yellow plastic bags, bins and other containers
B4	Pathological/Organic Human Tissues	▪ Yellow plastic bags and bins
C	Pharmaceutical Waste	▪ Brown plastic bags, bins and containers
D	Chemical Waste	▪ Brown plastic bags, bins and containers

Waste Type	Description of Waste	Colour Code
D1	Photographic Chemical Waste <ul style="list-style-type: none"> - Photographic developer - Fixer solution - X-ray photographic film 	<ul style="list-style-type: none"> ▪ Brown plastic containers - To be recycled/reused - To be neutralised
D2	Laboratory Waste	<ul style="list-style-type: none"> ▪ Brown containers with appropriate labels
	- Acids	- Acid label
	- Alkalis	- Alkali label
	- Solvent	- Solvent label
	- Organic Substances	- Organic substances label
	- Heavy metal e.g. Mercury	- Heavy metal label
E	Radioactive waste <ul style="list-style-type: none"> - Solid-combustible/non-compactable - Non combustible/non-compactable - Liquid-Aqueous - Spent sealed sources 	<p>Yellow containers with radioactive symbol:</p> <ul style="list-style-type: none"> - Durable plastic bags which can be sealed - Puncture-resistant containers (metal) - Thick walled polythene bottles or organic-glass containers but should have secondary container to prevent them from breaking - Container in which the source was originally received.
F	Incinerator Ash and Sludge	<p>Where separated,</p> <ul style="list-style-type: none"> ▪ Yellow metal containers labelled “Ash” ▪ Yellow metal containers labelled “Sludge” <p>Otherwise</p> <ul style="list-style-type: none"> ▪ Yellow metal containers labelled “Ash and Sludge”

All health care waste should be packaged in appropriately labelled and colour-coded containers according to the recommendations provided in Table 2 above. Containers used must be appropriate for the type of waste being handled. These containers must be robust and resistant to corrosion. After use, they must be well sealed to prevent spillage during handling and transportation.

Some modification to the level of segregation may occur based on the demands of the treatment option selected e.g. an option such as reverse polymerisation process from microwave treatment is able to handle different kinds of waste simultaneously and therefore the degree of segregation required for the use of that technology is minimal.

4.2.4 Storage

Storage refers to the manner in which the waste is contained during the time lapse between its generation and collection for final disposal. This is classified into Internal Storage and External Storage. Consideration for storage must be based on the classification or type of waste being dealt with and the potential risk of infection to health-care workers and waste

disposal staff. Labels on containers should be permanent and legible for the entire storage period.

4.2.5 Internal Storage

Internal storage is the temporary placement of waste at the point of generation (e.g. ward, OPD) before transfer to external storage points and **should not exceed 24 hours**. Internal storage considerations should be based on the classification or type of waste being dealt with and the potential risk of infection to health-care workers and waste disposal staff. The following measures should be taken to ensure safe management of waste at the points of generation:

- i.** Storage time shall be reduced as much as practicable. Multiple daily removal of the waste is recommended;
- ii.** Every site within the Health Care Facility e.g. ward, theatre, laboratory, pharmacy, kitchen, laundry etc.) should be provided with sufficient number of suitable waste containers;
- iii.** Polythene bags must be placed in rigid containers with the opening folding outward over the rim to minimize contamination of the surrounding. The top of the container should have a wider diameter than the base;
- iv.** Disposable polythene bags shall be of appropriate size with a minimum of 60 microns and maximum of 100 microns in thickness;
- v.** Filled bags shall be sealed off using a plastic strip which when fastened cannot be re-opened; the bags should be sealed when $\frac{3}{4}$ full. To serve as a reminder, the bags should have a mark showing the $\frac{3}{4}$ mark.
- vi.** Sharps shall be stored in puncture-resistant containers made of thick cardboard, plywood or strong plastic/metal;
- vii.** Sharps shall not be manipulated (e.g. by breaking or bending) before disposal and needles shall not be recapped before discarding since this is a common cause of puncture injury;
- viii.** Puncture resistant containers shall be placed as close as possible to the area where sharp items are used;
- ix.** Infectious and hazardous waste shall be segregated at the point of origin rather than at the transfer or external storage site to facilitate appropriate packaging, colour coding and transportation;
- x.** Storage bins shall be placed in roofed built-in areas protected from water, rain, wind, animals and pests such as rodents, cockroaches etc and scavengers;
- xi.** Bio-hazard marks and other warning signs shall be conspicuously posted on doors leading to storage sites to prevent people from unnecessarily gaining access to the area;
- xii.** Access (entrance) to storage area shall be securely locked when unattended;
- xiii.** Storage areas shall have sufficient space to afford easy access or removal of waste;
- xiv.** Health care waste shall be collected one way to external storage site without returning to the point of generation: thus the need for sizable receptacles for effecting the transfer

- xv.** Transfer of waste bags from internal to external storage shall be done with care to prevent rupturing or opening of bags which can contaminate the environment;
- xvi.** Vehicles (carts etc) used for transporting waste from internal to external storage sites shall be made of a smooth surface material (e.g. plastic) for easy cleansing and disinfection.
- xvii.** The containers used for internal storage as well as the storage sites should be cleaned, disinfected and fumigated frequently

4.2.6 External Storage

External storage refers to storage at the transit point where waste is stored after removal from internal storage until it is collected and transported for treatment and final disposal. The external storage is usually situated within the health care facility, while treatment and/or disposal sites could be on-site or outside the facility. The frequency of removal of waste stored depends on the volume and nature of waste generated. The following measures should be taken to ensure the safe disposal of the waste:

- i.** Facilities for external storage should be removed from kitchen, laundry, ward etc but be within the precincts of the facility and shall be easily accessible to collection vehicles;
- ii.** The facility shall be enclosed and surrounded by an impervious wall of appropriate height and provided with a gate and lock;
- iii.** The walls and floors shall be smooth, without cracks, impervious, easy to clean and disinfect; cleaning and disinfection must be carried out as frequently as possible.
- iv.** The site shall be spacious and well ventilated and may, for cost effectiveness in managing wastes in small facilities, accept waste from other Health Care Facilities if it has the capacity to process the increased volume and the type of waste.
- v.** All loading and unloading of waste shall take place within the designated collection area around the storage point;
- vi.** Larger volume waste bins – 240 litres and above – should be available at the external storage facility to receive waste containers from the internal storage points. These bins shall be marked for ease of identification of content and the markings must correspond with the colour code used for polythene bags in internal storage;
- vii.** Health care waste shall not be compressed during collection;
- viii.** Waste bins shall be washed and disinfected after each collection and more frequently if required.
- ix.** Waste water from the point of generation and storage area must be drained into septic tanks and soakaways and must not be allowed to drain off into storm water drainage or streams; liquid wastes must be appropriately treated (e.g. disinfection, neutralization) prior to final disposal.
- x.** External storage facilities must meet certain basic standards for the type of waste stored e.g. refrigerators for storing organic tissues should be considered and provided in facilities. This

will ensure that the temperature of body parts will be such as to prevent further decomposition or multiplication of pathogens; where refrigeration is not available, these materials should be disposed of without delay.

- xi.** Bio-hazard marks and other warning signs shall be conspicuously posted on doors to prevent people from unnecessarily gaining access to the area;
- xii.** Only authorized persons shall have access to external storage area
- xiii.** Staff should be trained to understand the principles of segregation and to follow procedures for colour coding, storage and documentation.
- xiv.** Records on waste generated and processed including the type of waste, volumes and/or weight, and the persons who processed them at the various stages should be kept.

4.2.7 General Requirements for Waste Collection Containers

Containers for waste collection should meet the following requirements:

- i.** They should be non-transparent;
- ii.** They should be impervious to moisture;
- iii.** They should be of sufficient strength to prevent damage during handling or use;
- iv.** They should be leak proof;
- v.** They should have close fitting lids;
- vi.** They should be fitted with handles for easy manipulation;
- vii.** They should be light weight and convenient for lifting;
- viii.** They should be designed to minimize physical contact.

4.2.8 Standards for Disinfection of Reusable Health Care Waste Containers:

Detailed washing and disinfection procedures for reusable collection equipment and storage containers as well as equipment used for internal transport (trolleys, wheelbarrows, bins etc.) should be in place in all health facilities. There should also be an appropriate site selected for this activity to take place. Necessary tools for carrying out this activity should be in place. These include brushes, detergents and soaps, appropriate disinfectants, as well as personal protective gear including gloves, masks, safety glasses and Wellington boots.

4.2.9 Collection and Transportation of Health Care Wastes

Collection and transportation of health care waste from Health Care Facilities should dovetail into the general waste management plan of the District Assembly.

At the institutional level, all health care waste should be sorted on site before collection and transportation. The recommended colour coding must be used. This will allow for easy

identification of content of containers thus preventing careless handling and the risk of secondary infection. Wastes from health facilities shall be packaged and transported separately based on the adopted classification as shown in Table 2.

Transporters of waste should be trained in identification of different waste streams.

4.2.10 General Requirements for the Transportation of Health Care Waste

Where a facility is not equipped to carry out on site treatment and disposal of health care waste, collection, transportation and disposal of the health care waste shall only be done by accredited Waste Management Contractors who are certified by the District Assembly. Relevant departments of the District Assemblies should work in collaboration with the Health Care Facilities in the district;

All necessary care must be taken to prevent odour nuisance to the neighbourhoods during transportation;

Where infectious wastes and other wastes have been mixed together, they must be considered infectious and managed as such;

Potentially hazardous health care waste must be transported directly to the disposal or treatment site within the shortest possible time;

Vehicles used for transportation of this waste must be so constructed as to prevent the scattering of packaged wastes, odour nuisance, and must be leak proof;

Waste must not be compacted or subjected to any other treatment that could cause bags or containers to rupture;

All vehicles used for the transportation of health care waste shall carry the bio-hazard mark on all sides;

Labels should be firmly attached to containers so that they do not become detached during transportation and handling.

4.2.11 Requirements for the Transportation of Radioactive Waste Containers

Radioactive waste containers must be brightly coloured (normally yellow), should be marked “Radioactive Waste” and should bear the international radioactive symbol to distinguish it from containers meant to receive other types of waste. All radioactive waste packages or containers should have labels bearing the radiation symbol on them. The label should be completed and signed by the officer in charge of waste management in the organization. The labels should be firmly attached to the containers or packages so that they do not become detached during transportation and handling. The printing on the labels should be permanent and legible for the entire storage and transportation period.

Radioactive waste should be adequately packaged and contained for transport to ensure safety, not only of those involved in the transport operation, but also for those who could be affected as a result of transport operations in accordance with the International Atomic Energy Agency (IAEA) Regulations for the Safe Transport of Radioactive Material.

(Requirements, 1996, Safety Standards Series ST-1, IAEA, Vienna). Drivers transporting radioactive material have to be suitably trained and carry contingency plans on the vehicle detailing action to be taken in the event of an accident.

The Radiation Protection Institute of the Ghana Atomic Energy Commission is preparing a regulation on the Safe Transport of Radioactive Materials, which should be complied with

4.3 Contracting with Waste Management Contractor

Where the facility is not equipped to carry out on-site treatment and disposal of health care waste, the institution should engage a Health Care Waste Management Contractor based on EPA guidelines i.e. the contractor must be licensed by the District Assembly to collect and transport its health care wastes to a designated site for treatment and disposal.

As a minimum requirement, a contract entered into between a Waste Management Contractor and the health care institutions should contain the following:

- i.** Type and quantity of waste to be transported;
- ii.** Final destination of waste to be transported (municipal disposal site or the waste treatment facility of another health care facility);
- iii.** What could be recycled, if anything;
- iv.** Terms of sub-contracting, if permitted;
- v.** Reporting format and information flow and feed-back mechanisms;
- vi.** Conditions for termination of contract;
- vii.** Financial standing of the contractor.

Before commissioning a Health Care Waste Contractor, the head of the institution/facility should verify the particulars of the Contractor with respect to the following:

Whether licensed by the District Assembly;

- i.** Type of license e.g. whether for collection, transportation and / or disposal;
- ii.** Type of waste that can be handled by the contractor (scope of contract);
- iii.** Times for renewal of the license, which should be done annually;
- iv.** Contractor's capacity, e.g. fleet size, work-force, creditworthiness etc;
- v.** Knowledge / experience in handling health care waste;
- vi.** Any other points of interest.
- vii.**

4.4. Treatment Options for Various Waste Streams

The recommended treatment options for various waste streams to guide each level of health institutions are provided in Table 3. They are based on technology available and cost considerations. However, within limits provided by this policy, safety considerations and

existing laws, each institution should determine the configuration of treatment options that is feasible considering the resources available to it and other peculiar factors. For instance, equipment with the capacity to handle more waste than individual institutions generate can be strategically located to serve more than one institution for cost effectiveness, if spatial location permits accessibility. Where, considering the volume of waste generated, the cost of segregation and transportation to that centre is much cheaper than buying incinerators for each facility only to process very small volumes of waste that are generated infrequently, it will be better to share resources. Such considerations are important for facilitating the rational use of resources. This necessitates a process of micro planning using a bottom-up approach.

Table 3: Treatment and Disposal Options

Waste Type	Treatment / Level of Health System	Final Disposal
General waste (food, paper, packing materials) etc	Biodigestion, Composting, Incineration (controlled combustion), Recycling (card-board, paper, glass) <ul style="list-style-type: none"> ▪ Health Centre / Clinic – Community post clinics 	Landfill, protected pits

Waste Type	Treatment / Level of Health System	Final Disposal
	<ul style="list-style-type: none"> ▪ District – Community Post Ingestive Bio-diagnosis, in cin er at ion ▪ Regional Hospi- tals – 	

Waste Type	Treatment / Level of Health System	Final Disposal
	Incineration, Biodegradation. • Treatment of Hospital Waste - All levels Recycling - All levels	
Infectious Waste Sharps	Incineration- All levels Chemical disinfection- All levels Waste autoclaves – regional/ tertiary levels	land fill

Waste Type	Treatment / Level of Health System	Final Disposal
Patients' waste	Incineration - All levels	land fill
Culture/specimen	Discontinuation by autoclaving/incineration – All levels	land fill
Pathological /organic Human tissue	Incineration – All levels Approved Burial Grounds, Health Centres,	land fill
Hazardous Waste Pharmaceutical tablets and capsules	Crushing – All levels	land fill
Syrups and injectables	Crushing of injectables All levels Syrups - Diluted and washed down the drains – All levels	land fill
Cytotoxic drugs, Vaccines	Incineration at high temperature - All levels	Landfill
Photographic chemical waste <ul style="list-style-type: none"> • Photographic developer • Fix 	Incineration at high temperature (1000°C)	Landfill

Waste Type	Treatment / Level of Health System	Final Disposal
<ul style="list-style-type: none"> • X-ray photographic film 		
Radioactive waste	Compaction, storage decay Immobilization. Ghana Atomic Energy to be consulted – All levels	Specialty designed landfill
Laboratory Waste	Dilute with large volumes of water (12x) -For those that are infectious, chemical disinfection and incineration – All levels	Sewage Landfill
Acids, Alkali	Dilute with large volumes of water (12x) – All levels	Sewage
Solvents	Chemical decontamination (see EPA guidelines)	Sewage
Organic Substances	Chemical decontamination (see EPA guidelines)	Sewage

Stage of Waste Management cycle	Equipment Required by level
1 – Waste Generation	Personal Protection Equipment (PPE) - Gloves,

Waste Type	Treatment / Level of Health System	Final Disposal
Heavy Metals	Complexation	Sewage

4.5 Recommended Equipment

For safety and effectiveness, some equipment is required for each stage of the waste management process. The recommended items /equipment required at the various stages of handling various waste streams at different levels of facility are summarized in Table 4 while equipment for treatment are listed in Table 5.

Table 4: Equipment for Waste Management Processes	Overall, aprons, boots, nose masks and goggles, and top loading weighing scales, colour coded bags and
Stage of Waste Management cycle	Equipment Required by level
1 – Waste Generation	Personal Protection Equipment (PPE) - Gloves,
2 – Waste Segregation	Overall, aprons, boots, nose masks and goggles, and
3 – Containerization	Top loading weighing scales, colour coded bags and, metal bins
4 – Waste Segregation	PPE – colour coded containers, security
5 – Internal Collection and Transport	PPE, safety boots, gloves, colour coded plastic bags to ensure the safety of workers.
6 – Internal Storage	Colour coded bins (Need for involving of local
7 – Internal Collection and Transport	Trucks, wheelbarrows (with stainless wheels), PPE into plastic bags locally of workers. PPE, security
8 – External Storage	Colour coded bins (Need for involving of local
9 – Treatment	Manufacture equipment; See Tables 3 and 5 for bins and plastic bags locally)
10 – Collection of Residues	PPE, dust pans, brooms, brushes
10 – Internal Transport	PPE, spades, pick axes.
8 – Treatment	Treatment equipment; See Tables 3 and 5 for options PPE
9 – Collection of Residues	PPE, dust pans, brooms, brushes
10 – Final Disposal	PPE, spades, pick axes.

Table 5: Recommended Treatment and Disposal Equipment

Recommended Equipment	Facility / Level
1. Highly efficient (high temperature, filtered incinerators) Equipment / Controlled combustion treatment facilities.	Teaching Hospital (large capacity incinerators), Regional and District hospitals (medium capacity incinerators). Subdistrict facilities (small capacity incinerators). Large and medium capacity equipment may be shared between facilities.
2. Microwave systems	Teaching and regional hospitals/shared with district facilities
3. Waste Autoclaves	Facilities at all levels
4. Biodigesters	Regional, district levels
5. Ball mills	All levels
6. Crushers	All levels
7. Compost pits	District hospitals and health centres in rural areas
8. Protected pits (final disposal of sludge)	District hospitals and health centres in rural areas, regional hospitals

4.6 Waste Minimization

Health facilities must aim at reducing the impact of health care risk waste in their operations by minimizing the generation of health care risk waste at source and, to a lesser extent, recycling.

This may be achieved through the following measures:

- Keeping individual waste streams segregated, thereby keeping hazardous waste segregated from the non-hazardous.
- Improving inventory control by using up old stocks of drugs and chemicals before using new stock and ordering hazardous chemicals only when needed and in minimal quantities to avoid outdated inventory.
- Co-operating with other facilities by exchanging drugs and pharmaceuticals getting close to their expiry dates
- Recycling of general wastes such as uncontaminated card board, paper, glass and plastic. Where there is risk of contamination with infectious agents, these items must be regarded as infectious and handled as such.

Consideration should be given to recycling as much waste as possible in instances where this does not increase health risks or costs e.g. recycling of uncontaminated cardboard boxes and waste paper.

4.7 Waste Water Treatment and Disposal

Waste water from Health Care facilities is of similar quality to urban waste water, but may also contain various potentially hazardous components.

Hazardous components of waste water from Health Care Facilities include the following:

- i.** Bacteria, viruses and helminths discharged from wards treating patients with infectious diseases.
- ii.** Hazardous chemicals from cleaning and disinfection operations.
- iii.** Pharmaceuticals from pharmacies and various wards.
- iv.** Radioactive isotopes.

Waste in categories ii, iii and iv must be segregated and treated appropriately.

Waste water in category i and other general liquid effluents should be connected to the sewerage system if available, or to other technically sound on-site systems. However, during epidemics or where highly infectious patients are involved, high risk type wastes should be pre-treated by chemical disinfection before disposal.

The use of biodigesters is an option for treatment of waste water from toilets and latrines. Waste water from kitchens and biodegradable potentially infectious waste can also be handled via this means. It is however not advisable to treat other infectious waste by this method. The biogas (methane) produced may be used in kitchen appliances (stoves and refrigerators).

The recommended treatment option for many chemical wastes such as cytotoxic drugs, vaccines and acid waste from the laboratory is high temperature incineration. Currently, there is no treatment facility for such wastes. For the long term, efforts will be made to acquire at least one suitable incinerator for their treatment. Until then, disposal of liquid chemical wastes will comprise dilution with large volumes of water, neutralization (where indicated) and washing down the drain. Chemical decontamination is to be used for organic substances and solvents.

4.8 Spillage Procedures

Whilst all efforts should be made to avoid loss or spillage of any kind, in the event of the latter occurring, a clear procedure must be followed. A ready supply of all necessary equipment must be in place for use whenever such an event occurs. It is important that information and training for staff is provided prior to any such eventuality.

The aim of a spillage procedure is to:

- i.** Contain the spillage
- ii.** Limit the escape
- iii.** Protect staff, patients and visitors
- iv.** Protect the environment
- v.** Restore the area to normalcy as quickly as possible.
- vi.** Minimize the effect of the spillage on normal service provision.

4.8.1 Procedure for Handling Spillage of Clinical Waste

The main risk is that of cross infection, and the procedure consists of donning protective clothing consistent with the risk, in most cases disposable gloves, and apron if appropriate, and placing the waste items into the appropriate yellow bag; or into a sharps box in the case of needles, blades or other sharp items, taking special care not to receive a sharps injury. Sharps must not be retrieved by hand.

The following guidelines shall therefore apply:

- i. Staff cleaning spills shall wear protective clothing suitable for the spillage at hand.
- ii. Standard cleaning equipment including a mop and cleaning bucket plus cleaning agents shall be readily available for spills management and shall be stored and sign-posted in an area known to all staff.
- iii. The procedure for spill management will depend on the following:
 - Nature of the spill, e.g. blood, urine and faeces.
 - Possible pathogens that may be involved.
 - Size of the spill i.e. spot, splash, puddle, large spill.
 - Type of surface involved i.e. linoleum, carpet, wood, laminated, etc.
 - Area involved i.e. preparatory laboratory, teaching, common access areas, etc.
 - Likelihood of bare skin contact with the soiled area.
- iv. For a small spill, disinfect using a disinfectant cleaning solution preferably chlorine based such as Bleach and clean.
- v. For a large spill, flood with the disinfectant, mop and clean the area with disinfectant cleaning solution using a mop and allow to air dry or where available, with absorbent paper which is then placed in a yellow bag.
- vi. Large spills of cultures or concentrated infectious agents shall also be flooded with high-level disinfectant (germicide like bleach) before cleaning and then decontaminated with fresh disinfectant.

4.8.2 Spillage of Chemicals

The essential steps are:

- i.** Contain the spillage to prevent further spread
- ii.** Prevent exposure of:
 - Other persons in the vicinity
 - Staff dealing with the spill
- iii.** Absorb and dispose as quickly as possible
- iv.** Decontaminate the area and return it to normal use.

Similar principles apply to any other chemical spillage. For chemicals like *glutaraldehyde* which readily evaporate to produce very irritant fumes, a respirator designed for use with organic vapours should be worn. The liquid should be mopped up as quickly as possible with absorbent, disposable materials, which must then be double bagged and removed to the open air waste storage compounds as soon as possible.

The area of the spill should be well ventilated, and will require sufficient time for the vapour to disperse before being reoccupied.

Mercury is another chemical whose handling should be mentioned. The main risk is that of skin absorption on contact with mercury, and by inhalation of mercury vapour which may slowly vaporise into the air from exposed surfaces of mercury. The risk is increased in hot, confined areas.

Mercury readily combines with other metals to form ‘amalgams; which in turn emit mercury vapour, and from which mercury may be absorbed by skin contact. Prevent contact with rings, by removal of jewellery, or wearing of disposable gloves, and with any metal equipment, as they may be difficult or impossible to decontaminate.

The aim of the spillage procedure is to collect any significant quantity of free mercury (that could possibly be recycled) and to chemically combine any small remaining residues as quickly as possible with a hot suspension of sulphur and slaked lime (calcium hydroxide) that may be obtained from the facility’s laboratory. After drying out, the powder mixture is collected into a tightly capped plastic bottle.

4.9 Waste Management Plans

Each facility should develop a waste management plan which should detail internal written procedures for handling health care waste. A checklist of what such a waste management plan or procedures should contain is found in Appendix 3.

4.10 Contingency Plan

Each facility shall develop a contingency plan to provide guidance to waste management and other staff as well as visitors to facilities on measures to be implemented in the event of unexpected incidents. This plan is to include among others measures to manage spillages, fire, flooding and other hazards peculiar to the locality.

4.11 Health and Safety

The Ministry of Local Government and Rural Development through the District Assemblies jointly with the Ministry of Health and its implementing agencies as well as other corporate and individual employers within the health sector are responsible for providing the necessary resources for correct and effective health care waste management. Managers in the above MDAs and other organizations are expected to provide safe systems of work for staff generating, handling, storing, transporting treating and carrying out final disposal of waste.

They are to institute a system of regular medical screening and immunizations for all staff involved in waste management.

They are to provide appropriate information and training for all relevant staff.

They are to conduct regular monitoring and periodic reviews of the system, so that deficiencies are corrected within a reasonable timescale and the system continuously improved in the light of experience gained.

Individual employees of the health sector are expected to exercise reasonable care to protect themselves and others who may be affected by their actions or inactions.

In order to avoid any injuries or infection of people, health care waste handlers must

- i.** Co-operate in matters of health and safety
- ii.** Correctly use personal protective equipment and any other work equipment designated for the task.
- iii.** Correctly apply the information and training received at induction and subsequently in handling issues such as:
 - Taking all necessary measures to ensure that re-usable containers are effectively disinfected before re-use.
 - Providing adequate service storage areas for health care waste.
 - Making provision for minimal manual handling of health care risk waste by ensuring that tools and equipment to facilitate handling are in place.
- iv.** Report any perceived hazards in their working environment or deficiencies in the safe system of work to their manager.

In the event of an injury arising out of waste handling, it must immediately be reported to the relevant manager or supervisor and action taken based on the infection prevention, OHS and HIV / AIDS policies of the sector.

4.12 Record Keeping and Documentation

Each health institution is required to maintain records of its waste management. In addition to stores and logistics management records at the institutional level issues regarding the type of waste, where it is generated, when separated, by whom and every other subsequent action until final disposal or handing over to a waste disposal company, when such is the case, shall be documented. The following are important specific information which should be documented by each institution:

- i. Information on Waste types and Handling Processes
 - Date
 - The type and volume/ weight of waste generated;
 - The type, origin and weight of waste received from other health care facilities (in cases where facilities are shared);
 - The means of transportation, type and volume transported;
 - The particulars of the commissioned waste contractor (name of company, type of license, site of treatment and / or final disposal);
 - Disposal method and quantities per method: e.g. volume incinerated, volume at every point of intermediate treatment, volume finally disposed of..

- ii. Records of environmental performance for incinerators should also be sent to the above authorities twice yearly.
- iii. The DHMTs and RHMTs shall ensure record compilation and analysis by the health facilities under their jurisdiction.

5 . TRAINING, CAPACITY BUILDING AND RESEARCH

It is essential that training in the safe and correct management of health care waste is provided to all staff including health managers. This can be facilitated by the adoption of the following strategies:

- i) Pre- Service and Post Basic training of health workers should include health care waste management. There is the need therefore to review health training institutions' curricula to incorporate waste management.
- ii) Health care waste management should also be incorporated into in-service training curricula. This training should be tailored to the needs of health care providers.
- iii) Health managers shall ensure that all their staff undergo in-service training in health care waste management.
- iv) Training Curricula, Guidelines, and Training Manuals on health care waste management shall be developed to facilitate Pre-Service, In-Service and Post Basic training.
- v) Standard Operating Procedures (based on the national guidelines) shall be developed and communicated to all persons involved in the handling, transporting and disposal of health care wastes as well as their supervisors.
- vi) These standards should form the basis for the in-service training to be provided for managers and staff involved in the day to day disposal of health care waste. Their training should also cover contingency management of incidents involving health care management.
- vii) The responsible agencies within the health sector shall co-ordinate the drawing up of training curricula which should be adaptable for regional and district training in health care waste management and should be budgeted for in the annual budget at all levels of the health care system and the necessary funds allocated to it as a matter of priority.
- viii) Collaboration between the health sector and universities as well as other research institutions should be strengthened to facilitate the development of and adaptation of technologies available for health care waste management.

6. INFORMATION, EDUCATION AND COMMUNICATION (IEC) AND ADVOCACY

6.1 Information, Education and Communication

The importance of education of a people can not be over emphasized. The more conscious the society is of health care waste risks and how to minimise them, the more effective health care waste management will be. If our citizens understand the classification of waste, the need for waste minimization and separation using the recommended colour codes from their studies in school and adult education programmes, they will handle properly the waste they generate as patients and visitors to our hospitals, thereby facilitating health care waste management in the health facilities. This is even more critical considering the prevailing situation in which, in the face of the inadequacy of health personnel, relatives of patients have to play more roles in caring for their relatives on admission.

The IEC plan will involve the use of mass media to educate the public on the importance of health care waste management, the coding system and what type of waste is to be placed in a particular type of vessel and the other essential elements of such education. Relevant aspects of the education should also be incorporated into the curricula of basic schools and adult education programmes. The public health as well as clinical care units should incorporate information on health care waste management into outreach education programmes. Finally, at the institutional level, signs and posters should be strategically posted to educate and guide the public.

6.2 Advocacy

Advocacy should be undertaken vigorously to solicit support for the policy from all stakeholders. Measures to achieve this include the following:

- i.** The findings of the evaluation of health care management practices should be disseminated to all the stakeholder ministries, departments and agencies involved at the highest possible level.
- ii.** The attention of the development partners and all civil society organizations should be drawn to the existing situation in order to obtain the widest possible support including financial commitment for the implementation of this and the development of a legal framework.
- iii.** Feature articles in the print media drawing key messages from the findings of the policy should be published. This is necessary for whipping up the multi-sector collaboration and financial support that is required for the success of the programme.

- iv.** Other means of disseminating information will also be explored, for example use of mobile cinema vans in collaboration with Information Service Department; production of documentaries and docu-dramas which could be aired on TV stations; and posting of related information on websites of Ministry of Health/ Ghana Health Service/ The Ministry of Information and National Orientation (MNO) / Environmental Protection Agency (EPA) and those of other MDAs and Stakeholders.
- v.** There should also be media encounters, all in an effort to move health care waste management to the top of our priorities. We ought to be saying that *if we can not handle the waste that we generate in the process of curing our people and this can become a serious source of health problem, then our people are better off without a health system. Our health institutions should be safe places to acquire cure not infections.*
- vi.** To secure the commitment of private health institutions, the MOH should involve them through their respective trade associations, in programs meant to implement the policy. The implementation of the policy has financial implications for health institutions which may tend to be a disincentive in the face of scarce resources. The private health institutions in particular should be encouraged to participate in the training programs that the MOH will organise for the health institutions under cost sharing arrangements.
- vii.** The assistance of development partners, NGOs and other civil society organizations should be sought in order to reduce the financial burden on the institutions at least at the beginning. In the long term, more durable solutions to the funding problem that are consistent with the existing cost recovery policy should be explored.
- viii.** The advocacy program should also encourage health care training institutions to include health care waste management into their curricula. All effort should be made to inform and educate key stakeholders in order to achieve unity of purpose and action. These efforts should include institutions that are responsible for approving new health institutions, e.g. Private Hospitals and Maternity Homes Board, to ensure that they insist on the health care waste management readiness of new institutions in terms of facilities, human resources, plans and other aspects of capacity to deliver. The same rigorous standards should be maintained in the monitoring of existing institutions and sanctions should include the withdrawal of certificates until the relevant shortfalls are corrected.

7. IMPLEMENTATION

Health care waste management involves more than one sector. Intersectoral collaboration is therefore necessary for the effectiveness of the implementation of the programmes since the key players come from different ministries with their individual command structure.

7.1 General Principles of Implementation

One of the key principles that inform the implementation plan outlined in the ensuing sections include '*the polluter pays*' principle which requires the generator of waste to be legally and financially responsible for its disposal. But at the same time, there should be laid down steps to dispose of refuse if the polluter is unable to pay for its disposal. The other principles are:

The Basel Convention - concerned with trans-boundary movements of hazardous waste including health care waste.

The Precautionary Principle which advocates the adoption of measures to protect health and safety when the magnitude of the particular risk is uncertain.

The Proximity Principle which requires hazardous waste including health care waste to be disposed of at the closest possible location to its source in order to minimise the risks involved in its transport.

The National Environmental Policy which seeks to guide development in accordance with quality requirements to prevent, reduce and, as far as possible, eliminate pollution and nuisances.

The National Environmental Sanitation Policy, 1999 which also requires all health care institutions to establish institutional waste management systems for the primary management of wastes. It requires Health Care Facilities to pre-treat health care waste (e.g. by autoclaving) prior to storage. The policy further states that District Assemblies shall provide for collection of hazardous and health care waste. Transport of such waste shall be in closed no-compaction vehicles which should be cleaned and/or disinfected at the end of every collection day

Dedicated Funding which should be made available at all levels of implementation of the policy. Whereas every institution is to budget for treatment of waste in their annual plans, government will take responsibility for sourcing funding for capital items with a huge financial outlay such as incinerators and autoclaves. This is particularly important at the start of implementation activities to ensure that the process is quick-started and also increase the likelihood of sustainability.

7.2 Implementation at Various Levels

The following constitute implementation actions to be instituted at various levels of the health care system.

7.2.1 At the Institutional Level

At the institutional level, each facility shall establish a HCWMC preferably led by the head of the institution to supervise, advice and manage.

The membership of HCWMC shall comprise the head of the institution, the Environmental Health Officer and three other senior officers (preferably heads of relevant departments involved in generating or handling waste in the facility).

7.2.2 At the District Level

At the district level, DHMT will have responsibility for co-ordination and supervision.

7.2.3 At the Regional Level

At the regional and teaching hospital, clinical care units will have the overall responsibility for ensuring the implementation of the policy.

7.2.4 At the National Level

At the national level, the MOH will be responsible for monitoring the implementation of the policy among the various sub sectors across the country. Within the Ghana Health Service, the Institutional Care Directorate (ICD) will have ultimate responsibility for implementation. The Estate Management Unit (EMU) of the Health Administration and Support Services (HASS) will act on behalf of the ICD in assuming day to day responsibility for co-ordinating waste management activities, ensuring that treatment and other related facilities are in functioning order and in the monitoring and supervision of the estate units within health facilities. This role will be performed in close co-operation with the ICD.

7.3 Responsibility for Implementation

The MOH has ultimate responsibility for the implementation of this policy which is meant to provide guidance for the health sector as a whole. Each sub sector namely, the Ghana Health Service, the Teaching Hospitals, Quasi-Government Hospitals, Mission Hospitals and the Private sector health institutions are expected to comply with the provisions of the policy and guidelines.

There are other ministries apart from the MOH, which play complementary roles in the management of health care waste. These include the district/municipal/metropolitan assemblies, the Ministry of the Environment and Science, Ministry of Local Government and Rural Development, and Veterinary Services Department. The policy is therefore meant to dovetail the plans and responsibilities of these MDAs. Thus whilst the MOH through the individual institutions is responsible for segregating, storing and treating HCW, the

district/municipal/metropolitan assemblies have to ensure that the waste is transported and disposed of in the appropriate manner. In practice therefore, the health institutions' responsibility translate into the proper segregation, treatment where possible and transport to the transit point. The district/municipal/metropolitan assemblies have to ensure that there are well trained and effective companies in the system to do the transportation and disposal and in some cases, treatment. They are the ones to screen, license and supervise the private waste management companies.

8. MONITORING AND REVIEW

Monitoring and review are very critical functions for the effectiveness of any programme. No matter how well a programme is planned and implemented, there are chances that some details may be overlooked. Good supervision and monitoring, as processes are underway, are critical in addition to post audits, to assure the discovery of errors and their correction in good time. They also provide the opportunity to review the plans as well as training programmes in order to make them more effective. Periodic reviews are also important in accessing program impact. Thus the effectiveness of the programmes will be assessed from both the point of view of management processes and programme impacts. The guidelines for Monitoring and Review are presented in the Sections 8.1 to 8.3.

8.1 Monitoring and Control

The objective of monitoring and control is to ensure that problems and risks involved are identified while preventing the development of future problems and enhancing safety.

Assemblies are expected to enforce compliance.

Though the HCWM committees are to advise on the handling and disposal of waste, daily supervision is to be carried out by the waste control manager (line manager of labourers and auxiliary staff involved in waste management) who in turn is answerable to the head of the institution. The institutional heads therefore have overall responsibility for ensuring that procedures are in place, are being implemented and sanctions enforced where appropriate. They are expected to work closely with the HCWM committee which they (or their representative) chair and conduct regular spot checks.

In addition to daily and weekly inspections of procedures, the following parameters are to be monitored:

- i. Standard operating procedures (SOPs) which constitute part of these guidelines for persons involved at each stage of handling waste should be monitored frequently by supervisors in the health facility, by the DHMTS and the RHMTS.

The SOPs cover areas like waste minimization, segregation of waste, transportation, storage, treatment and final disposal. In addition, it should cover the disinfection of reusable health care risk waste containers based on standards for disinfection as required by this guideline.

- ii. Minimum environmental performance requirements for controlled combustion treatment facilities like incinerators should be carried out at the onset of use of the facility and at least once yearly based on guidelines to be provided by the EPA.

Where it may be considered more effective to conduct these determinations centrally, arrangements should be made to organize testing from national level.

8.2 Audits

8.2.1 Periodic Management Audit

Each regional directorate should arrange to carry out its own internal audit on waste management practices in their facilities at least once annually, and follow up any serious incident which is relevant to waste management procedures. This is in an effort to amend procedures where appropriate in order to improve the management of the waste. The results of the audit should be forwarded to GHS / MOH headquarters and communicated to health institutions involved.

8.2.2 External Random Audit

Random audits on waste management will be carried out each year by the Ministry of Health which may delegate the Occupational and Environmental Health Unit, Institutional Care Division or other appropriate department to carry out this function on its behalf.

Additionally, audits offered by audit bodies external to the MOH will be encouraged, to facilitate objective evaluations which favour comparisons with international norms on waste management.

8.2.3. Audit Tool

Audit tools designed for measuring compliance with clinical waste procedures should be used for audits. An example of such an audit tool is to be found at Appendix 2

8.3 Reviews

There should be a review of the performance of the HCWM programme two years after the launch of the policy and at the end of the fifth year to assess the compliance and the programme's impacts. These reviews will use the findings of studies conducted on health care waste practices in the hospitals as baseline and will assess the progress of the programme against the key indicators established. The types of waste disposal methods in use, emissions from incinerators and whether the composition meets the standards set by the relevant authorities and other issues will be tracked.

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17. Mortuaries and Funeral Facilities Act, 1998 (Act 563)
18. The Criminal Code, 1960 (Act 29)
19. World Health Organization, Safe management of wastes from health care facilities, 1999

Appendix 1

LIST OF WORKING GROUP MEMBERS AND PARTICIPATING ORGANIZATIONS

<u>ORGANIZATION</u>	<u>NAMES OF REPRESENTATIVE</u>
1. Ministry of Health	Dr. Maureen Martey
2. ICD/GHS	Dr. T.N. Awuah-Siaw
3. Nursing Division, MOH	Mariama Sumani
4. Estate Management Unit	Yahya Khasem
	Andreas Eskesen
	Asuma Adams
	Andrew Danquah
5. Ministry of Local Government and Rural Development	Kweku Quansah
6. Environmental Protection Agency	Mr Jonathan Allotey (E.D)
	Mrs. Shirley Otinkorang
7. Environmental Health Unit, Korle-Bu Teaching Hosp	Felix Boateng
8. Metropolitan Public Health Dept. (MPHD), AMA	Jonas Amanu
9. Ghana AIDS Commission	Kyeremeh Atuahene
10. Tema General Hospital	Mrs Agnes Codjoe
11. Police Hospital	Sylvester Boyou
12. CHAG	E.K. Danquah
13. Ghana Registered Midwives' Association	Kathleen Ababio
14. Public Health and Reference Laboratory	William Dei-Alorse
15. Pharmacy Unit, Ghana Health Service, Accra	P.C. Adjei
16. EPI, Ghana Health Service	Francis Abotsi

17. Food and Drugs Board

Eric Karikari-Boateng

18. Partneris Consult

Ben Treveh

19. James Hottor

Bridges

20. Occupational & Environmental Health Prog., GHS

Dr B. EdNignpense

Obed Opoku Agyekum

Dr Edith E.K..Clarke (Co-ordinator)

APPENDIX 3:

CLINICAL WASTE AUDIT TOOLS

i. Sharps Handling and Disposal

Ward / Dept. -----Date-----Time-----

	CRITERIA	Y	N	N/A	COMMENTS	REMEDIAL ACTION
1	The box used as specified in the safe Use and Disposal of Sharps Policy					
2	The box is assembled in accordance with manufacturer's instructions.					
3	The sharps container is safely sited in a suitable position (chosen by risk assessment) for convenient use, but inaccessible to young to young children.					
4	The sharps container is filled according to the manufacturer's instructions.					
5	The contents of sharp boxes are appropriate.					
6	The sharps container is free from protruding sharps.					
7	The sharps containers are available according to local needs.					
8	The sharps containers are labelled with ward names / number, and dated when full.					
9	Full sharps containers are securely fastened prior to collection.					
10	Full sharps containers are safely stored prior to collection.					
11	Correct responses obtained from a random member of staff, to the question: "What action would you take following a needle stick injury?"					

Comments:

ii. Waste Disposal

	CRITERIA	Y	N	N/A	COMMENTS	REMEDIAL ACTION
1	The waste Management Policy is available to staff.					
2	The Policy on the safe disposal of immunization waste is available.					
3	Waste Management Posters are on display					
4	Broken glass and crockery is disposed of in a safe manner, according to local arrangements.					
5	Used batteries are segregated for 'Special Waste Collection'					
6	Cardboard boxes are stored flat, in a safe manner, prior to collection.					
7	Waste bins are foot operated and in good working order, and lined with the correct colour bag.					
8	Waste bins are in clean condition.					
9	Waste bins are correctly labelled, and display additional information to users, where appropriate.					
10	Contents of yellow bags are appropriate.					
11	Contents of black bags are appropriate.					
12	Waste bags are securely sealed when $\frac{3}{4}$ full and correctly labelled.					
13	Bags waiting for collection are safely stored away from the public					
14	If heavy gauge bags are required, an appropriate cord tie is used to secure the bag					
15	Random member(s) of staff understand the waste Management Policy					