Guardian of Sierra Leone's Economic Security

PERFORMANCE AUDIT REPORT ON

THE MANAGEMENT OF HEALTHCARE WASTES

AT REGIONAL REFERRAL HOSPITALS BY THE MINISTRY OF HEALTH AND SANITATION (MOHS)

OCTOBER, 2018

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FOREWORD

This performance audit report is submitted for tabling before Parliament. In doing this, I refer to section 11(1) of the Audit Service Act, 2014, which sets out the role of the Auditor-General thus: 'to audit and report on all public accounts of Sierra Leone and all public offices including the Judiciary of Sierra Leone, the central and local government institutions, the University of Sierra Leone and other public sector institutions of like nature; all statutory corporations, companies and other bodies and organisations established by an Act of Parliament or statutory instrument, or otherwise set up wholly or in part out of public funds'.

Section 11 (2) (c) of the Audit Service Act, 2014 confers on the Auditor-General, the right to carry out value-for-money and other audits to ensure that efficiency and effectiveness are achieved in the use of public funds. In addition, Section 63 (1) sub-section (1e) of the Government Budgeting and Accountability Act, 2005provides that: 'the Auditor-General shall ascertain whether financial business has been carried out with due regard to economy in relation to results achieved'. Sub-section 66 (4) of the Act further states that: 'nothing in this section shall prevent the Auditor-General from submitting a special report for tabling before Parliament on matters that should not await disclosure in the annual report'.

In line with my mandates as described above, we have undertaken this performance audit on the Ministry of Health and Sanitation on the management of healthcare wastes at regional referral hospitals in the four regions of Sierra Leone.

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Auditor-General

ABBREVIATIONS

LIST OF ABBREVIATIONS	
CSO	Civil Society Organisation
EPI	Expanded Programme on Immunisation
FWMC	Freetown WasteManagement Company
HCW	HealthcareWastes
HCWM	HealthcareWaste Management
IPC	Infection Prevention and Control
MoHS	Ministry of Health and Sanitation
NGOs	Non-Governmental Organisations
SOP	Standard Operating Procedure
SDGs	Sustainable Development Goals
UNDP	United Nations Development Programme
UNDP-GEF	United Nations Development Programme - Global Environment Facility
UNEP	United Nations Environment Programme
UNICEF	United Nations International Children's Emergency Fund
UNOPS	United Nations Office for Project Services
WHO	World Health Organisation
WMP	Waste Management Plan

GLOSSARY OF KEY TERMS

Nosocomial: Is an infection that is acquired in a hospital or order healthcare facilities. It is sometimes called healthcare associated infection.

General wastes: These are wastes that do not possess any hazardous physical or chemical characteristics and are not contaminated with blood, body fluids, secretions, or excretions.

Healthcare wastes: These are wastes that include all the wastes generated by healthcare establishments, research facilities, and laboratories related to healthcare services.

Infectious wastes: These are waste materials/items suspected of containing pathogens of sufficient quantity or concentration to cause disease in the human body.

Sharps: These are a subset of infectious wastes capable of causing cuts or puncture wounds to the skin whether contaminated with BBF or not.

Pathological wastes: This is sometimes termed as "anatomical wastes". They are any recognisable human tissues, organs, body parts, or BBFs (body, blood and fluid). They accounts for <1% of all Healthcare facilities (HCF) wastes. Examples include: placentae, limbs, etc.

Chemical wastes: These are wastes that consist of discarded solid, liquid and gaseous chemicals that possess toxic, flammable, reactive, or oxidizing characteristics. They accounts for <3% of all HCF wastes. Examples include: mercury, acids, solvents, lithium batteries, etc.

Pharmaceutical wastes: These are wastes that include expired, unused, spilt and unwanted contaminated pharmaceutical products such as drugs, vaccines, sera etc.

Cytotoxic wastes: These include expired, unused, spilt and unwanted chemotherapeutic or antineoplastic drugs commonly used for the treatment of cancer patients. Both categories also include discarded items used in their handling such as bottles or boxes with residues, gloves, masks, connecting tubes, and drug vials.

Radioactive wastes: These are any liquid, gas, or solid wastes contaminated with radionuclides which ionizing radiations have genotoxic effect on human tissue.

Combustion: This is the process of burning something.

Pyrolysis: This is the application of heat to chemical compounds in order to cause decomposition

Gasification: This is a technology that converts carbon-containing materials (including coal, wastes and biomass) into synthetic gas which in turn can be used to produce electricity and other valuable products, such as chemicals, fuels, and fertilizers.

Post-exposure prophylactic treatment: This is also known as post-exposure prevention (PEP). It is any preventive medical treatment which starts after exposure to a pathogen (such as a disease-causing virus) in order to prevent the infection from occurring.

EXECUTIVE SUMMARY

The wastes produced in the course of healthcare activities carry a higher potential of causing infection and injury. Therefore, due to its potential environmental hazards and public health risks healthcare wastes pose, the management of healthcare wastes is of great importance for the welfare of the people and the country at large. The World Health Organisation (WHO) has graded healthcare wastes as the second most hazardous after radioactive wastes. The misuse of injections (inadequate management of used sharp materials) has contributed to new cases of infections including 2% of HIV, 33% of Hepatitis B and 42% of Hepatitis C[1]. The need for an improved management of wastes is emphasised in the Sustainable Development Goals (SDGs) as a way of minimising the chances of malaria, cholera, diarrhoea and other water related diseases which contribute strongly to high mortality rate[2].

The Ministry of Health and Sanitation (MoHS) in pursuing its aims of reducing healthcare problems and eliminating potential risks to people's health, has its Environmental Health and Sanitation Directorate which acts as the leading body to oversee the waste management activities in the country. This includes healthcare wastes. The Ministry through this Directorate has developed national waste management policies and guidelines that have components of healthcare waste management.

Despite such strides, healthcare waste management remains a challenge in the country. It is against this backdrop that the Audit Service Sierra Leone in line with its legal mandate conducted a performance audit in order to assess the management of healthcare wastes at government's referral hospitals and suggest recommendations for improving on healthcare waste management.

The audit covered the period between 2014 and 2016 (including available information in 2017). It sought answers to the following audit questions:

- How has the Ministry of Health and Sanitation planned the implementation of healthcare waste management activities?
- To what extent are the standards on healthcare wastes complied with?
- How adequate is the capacity of the Ministry in managing healthcare wastes?
- Are those exposed to healthcare wastes aware of the risks associated with them?

Interviews were conducted with key staff of the Ministry of Health and Sanitation, personnel at regional referral hospitals and representatives of other stakeholder organisations. The audit was conducted in accordance with International Standards of Supreme Auditing Institutions (ISSAI) and the African

[1] *WHO, Fact Sheet No 231 October. 2006*

Organisation of Supreme Audit Institutions-English (AFROSAI-E) Performance Audit manual. Below are highlights of key findings of the audit:

PLANNING OF HEALTHCARE WASTE MANAGEMENT ACTIVITIES

- **No specific plan for healthcare waste activities**

The auditors noted that the Ministry had developed national plans and guidelines that integrated healthcare waste management. These plans and guidelines were however not translated into annual work plans for the period under review. The plans were to be used to identify activities, responsible personnel, monitoring tools and estimate of resources needed to manage healthcare wastes in the four referral hospitals visited. It was clear that activities regarding healthcare wastes management were undertaken on ad-hoc basis.

As a result, there were no clear objectives, no defined responsibilities and monitoring tools were not in place. And therefore, the needed resources were not determined. Subsequently, resources allocated were limited and this affected negatively the management of healthcare wastes.

- **Healthcare waste management not adequately budgeted for**

The audit team noted that the allocations for healthcare waste management were used exclusively for administrative purposes, such as stationary, fuel and other travelling expenses in respect of the Environmental Health and Sanitation Directorate. The Ministry neither budgeted, nor spent for items related to waste management such as consumables (containers, waste bags, sharp boxes, gloves, etc…), equipment for health facilities and training of staff.

Furthermore, the review of the prioritised operational work plan and related cost for the hospitals visited revealed that waste management activities were not included in their priority list of activities and therefore not budgeted for.

As a consequence, much needed resources such as consumables, equipment, trained staff etc. were scarcely available to effectively manage healthcare wastes.

- **Healthcare waste management team not in existence**

It was revealed through interviews and reviewed documents that there was no waste management team in place to specifically oversee or coordinate healthcare waste management activities in all the referral hospitals visited. This clearly indicates that healthcare waste management issues were given little attention or less commitment at the senior management level in the hospitals, therefore issues regarding the proper management of healthcare wastes were not fully attended to, or were mostly being ignored. This also limits coordination of healthcare wastes management activities in other units within the hospital.

- **Inadequate steps taken to minimise healthcare wastes**

Adequate steps were not taken by the Ministry to minimise healthcare wastes in the four regional referral hospitals as stipulated in the National IPC Guidelines of 2015 as there were no waste minimisation plans in all hospitals visited.

In the absence of wastes minimisation plans, it is not possible to properly determine resources needed for wastes management activities. In addition to this, excess wastes are generated thereby increasing the cost of their disposal.

- **Lack of mechanisms for healthcare wastes tracking**

None of the four referral hospitals had data on the types, quantities, treatment and disposal of wastes generated in the hospitals as required by the National IPC Guidelines of 2015. As a consequence, wastes generation data in a HCF could not be established at a given time. This amongst others makes it difficult or impossible to identify the rates of production in the different medical areas and plan accordingly.

- **Inefficient monitoring of health care wastes management activities**

Evidence of monitoring and evaluation was not provided during the audit both at the Ministry headquarters and at the regional offices. In the regional hospitals, we noted that the environmental health officers (representing the Ministry) were not monitoring healthcare wastes activities. Failure to monitor the management of medical wastes has contributed to worsening the deplorable state of wastes management activities.

- **EIA license not obtained by the MoHS for treatment and disposal of healthcare wastes**

Modern wastes treatment equipment autoclaves, shredders and incinerators were provided in the hospitals during the last three years. The auditors noted that an Environmental Impact Assessments (EIA) license for the operations of those equipment and the disposal methods adopted had not been obtained by the Ministry from the Environmental Protection Agency – Sierra Leone (EPA-SL). In the absence of an environmental impact assessment and licence for management of medical wastes, there is a high risk of environmental pollution for which mitigating measures would not be instituted.

COMPLIANCE WITH HEALTHCARE WASTE STANDARDS

- **Improper use of bins and bags in the segregation of healthcare wastes**

The audit team visited the various wards in all the hospitals where they noted that yellow bags were used for infectious, pathological and laboratory wastes. Black bags were used to collect general wastes. Sharps were collected in sharps containers. There were no brown containers for the pharmaceutical and chemical wastes as well as the radiological wastes in hospitals visited.

According to interviews with officials of the hospitals, the inconsistencies in the colour of the containers used were as a result of the non-availability of the required colours in the right quantities.
Cases were noted where healthcare waste were placed in bins without plastic bags, therefore contaminating the bins with infected wastes

- **Inappropriate segregation of healthcare wastes**

The audit exercise revealed that healthcare wastes (including infectious wastes) were put into the same container. The audit team inspected the contents of those containers placed in the wards and observed that in all the wards visited, wastes were not segregated even though the containers were labelled to indicate their required contents. Healthcare wastes were found in general wastes containers and general wastes in infectious wastes containers. Sharps were also found in both infectious wastes containers and general wastes containers.

As a consequence, mixing of infectious and non-infectious general waste led to increase in the volume of infectious waste. It could as well result in large volumes of wastes that need to be incinerated or burned. Failure to segregate highly infectious waste like rejected laboratory cultures (specimen) from general waste has the potential of exposing health workers, patients and waste handlers to unlimited number of diseases that they can acquire in the course of their work, thereby sustaining cuts, wounds or infections from contaminated sharps.

- **Overfilled healthcare wastes containers in the hospitals**

Physical inspections done during the audit revealed that healthcare wastes containers were overfilled and not collected in a timely manner for transportation to their final disposal sites. As a result, wastes handlers, patients and visitors were exposed to offensive odour. In addition, overfilled healthcare wastes containers will lead to healthcare wastes pillage in the hospital thereby increasing the risk of infection through direct contact.

- **Healthcare wastes not treated before disposal**

The audit team noted that wastes generated within the hospitals were not treated before their final disposal. It was disclosed that the wastes collected were taken directly to the burning pit.
Three hospitals (Connaught Hospital, Bo Government Hospital and Kenema Government Hospital) had autoclaves; however they were not in use.

- **Inappropriate on-site storage of healthcare wastes prior to disposal**

The audit team noted that none of the hospitals visited had appropriate on-site storage facilities. Healthcare wastes were stored at areas of disposal. At Connaught hospital, during the inspection of the on-site storage point for the general wastes, we found that wastes were piled there and mixed with

healthcare wastes wrapped in biohazard bags. They were exposed to sunlight and rain, kept in an open area, not protected and was accessible to unauthorised personnel. The regional hospitals stored wastes at the area of disposal. In Makeni hospital, wastes dumped close to the burning pit included pathological wastes; and scavenger birds (vultures which are typically known to feed on animal remains) were found at the disposal site. Other infectious wastes such as sharp boxes, blood transfusion sets, used gauze and cotton wools were also found littered around the vicinity of the burning pit. In Bo, boxes full of sharps were stored close to a locally constructed incinerator. Keeping healthcare wastes in easily accessible areas creates a risk that the waste will be transmitted back to the wards through unauthorised personnel or rodents.

- **Unsafe disposal of healthcare wastes**

i. Disposal of infected general waste in municipal dumpsite

During the inspection of the temporary storage of general wastes waiting to be transported and disposed of in the municipal landfill by MASADA, we found that infectious wastes in yellow bags were mixed up with general wastes in wastes containers.

This result in infecting all general wastes and exposes wastes handlers and scavengers to the high risk of acquiring diseases caused by microorganisms transmitted through human blood or other potentially infectious materials such as HIV, Hepatitis B and C, and Tetanus to name few.

ii. Liquid wastes discharged into the Atlantic Ocean

In the Connaught hospital, untreated liquid wastes were directly emptied through a channel that runs into the ocean.

This wastewater is potentially infected, thereby threatening marine life. It contaminates seafood, thereby threatening people's life especially those consuming seafood and those using beaches. There is also a risk of infecting swimmers as they may unconsciously drink the water during the course of swimming.

In addition to this, none of the hospitals visited was connected to efficient, working sewage-treatment plants. This implies that healthcare wastewater is also discharged in either surface watercourses or percolates into underlying groundwater with no treatment. This poses a very high risk to the environment and can lead to several waterborne diseases that are a threat to human life.

iii. Dumping healthcare wastes close to the facility

The audit team found that healthcare wastes had been dumped at the back of the hospital fence, very close to the ocean. They appeared to have been dumped there long ago as some were covered by grass. Dumping wastes around is a dangerous practice and is worse when it is dumped close to the ocean. When it rains, rain water washes away the wastes into the ocean and healthcare wastes accumulate to beaches.

This was particularly observed at Lumley beach where syringes, needles and sets of drip with needles were found together with other municipal solid wastes.

This constitutes a serious threat to people entertaining at beaches as they can be punctured by those infected needles. This as well contaminates seafood, thereby threatening people's life especially those consuming seafood.

iv. Unsafe methods adopted for final disposal of healthcare wastes

The method adopted for healthcare wastes disposal is by burning them in a pit. According to IPC guidelines, burning pits present a hazard to healthcare workers disposing of waste not only from an infection or chemical hazard risk during waste depositing and burning, but also through physical risk of a fall. In addition, incomplete, low-temperature burning presents an environmental pollution risk. They emit smoke which spread and pollute air.

v. Inappropriate burning of healthcare wastes

At the Connaught hospital, during inspections of the disposal site, the burning pit, it was noted that all healthcare wastes including pathological wastes generated in the hospital were disposed of in a burning pit that was in an open location close to residential areas. In addition to this, the former burning pit was overfilled and was left uncovered.

In Makeni and Kenema Government Hospitals, the disposal site referred to as burning pit could not be seen due to a pile of general wastes and healthcare wastes (including pathological wastes) that were partly burnt. The burning pit was overfilled and wastes were scattered all over. Even if they burn those wastes, it is impossible to cover them as recommended in the IPC guidelines. This poses a very high risk to surrounding environment, health workers, wastes handlers as well as patients.

CAPACITY FOR HEALTHCAREWASTE MANAGEMENT

- **Lack of trained and certified staff to operate modern healthcare wastes equipment**

The audit team discovered that there was no trained and certified staff to operate the modern equipment such as incinerators, autoclaves and shredders, which were available in the hospitals.

The only training provided was on the operation of autoclave and this was delivered to volunteers that were serving at Connaught hospital during the Ebola period (when this equipment was installed in the various hospitals). Since the end of the Ebola epidemic, volunteer workers are no longer serving the hospital and the autoclave is not operational.

In the absence of trained and certified staff to operate the available equipment, the latter will remain idle, leaving the risk related to disposal of un-treatment healthcare wastes unattended and therefore

exposing much wastes handlers, healthcare workers, patients and surrounding environment to infection.

- **Insufficient healthcare waste consumables**

Healthcare waste consumables were insufficient for use by the hospitals on a daily basis. It was established that these consumables especially biohazard bags were sold in the open markets particularly in Freetown and used for purposes not consistent with their actual use.

The limited availability of healthcare wastes consumables increases the possibility of waste handlers repeatedly using the same PPEs or not using them at all. This further increases the risk of acquiring infectious diseases by healthcare workers and waste handlers.

- **Healthcare wastes equipment kept idle**

The audit team noted that modern waste management equipment such as autoclaves, incinerators and shredders had been supplied to the hospitals by the MoHS and its partners. These equipment have however either not been put into use since they were supplied or they have stopped using them since the end of the Ebola epidemic.

Consequently, the equipment was just there in the premises of the hospitals and not serving the purposes for which they are intended. With exception to Bo Government Hospital which is using an "old school incinerator" which is also not effective, other hospitals are still using burning pit yet they have equipment that could enable them to manage healthcare waste at an acceptable level of standard.

- **Healthcare wastes handlers not adequately protected**

The audit team noted that healthcare waste handlers were not immunised against infectious diseases such as Lassa Fever, Hepatitis B and C, etc. Post-exposure prophylactic treatment and regular medical surveillance were not given to staff even when they are mostly exposed to handling infectious wastes.

In the absence of such provision or immunisation programme for healthcare providers and wastes handlers, there is a greater risk of exposure and transfer of diseases potentially acquired from infectious healthcare wastes.

AWARENESS OF THE RISK ASSOCIATED WITH HEALTHCARE WASTES

- **Inadequate mechanisms to create public awareness on the risk associated with healthcare wastes**

The audit exercise indicated that there had been inadequate awareness raising programmes for sensitising the public on the dangers associated with healthcare wastes. The posters displayed in and outside the wards of the hospitals were merely directing people where to deposit wastes. These posters were considered inadequate to inform them on the dangers or risks associated with healthcare wastes and how to avert them.

OVERALL CONCLUSION

Sierra Leone being a signatory to the World Health Organisation's standards has developed its national standards, policies and guidelines on the management of healthcare wastes. Despite such developments, the findings of this report has led to the conclusion that healthcare wastes produced at the regional referral hospitals have not been properly managed by the Ministry of Health and Sanitation. This had been the case because healthcare waste management activities have not been adequately planned for; available standards not fully complied with; weak capacity to manage healthcare wastes; and the low level of awareness raising on the risk associated with healthcare wastes. This has led to high risk of infection among medical personnel and the public at large.

OVERALL RECOMMENDATION

It is recommended that the MoHS undertake the following:

- Institute mechanisms to ensure that hospitals prepare periodic healthcare waste management plans that provide detailed description of objectives, activities and resources to be used for all activities.
- The MoHS in collaboration with the hospital management should establish a close supervision, monitoring system and follow-ups to ensure that, segregation practices, standard operating procedures prescribed in the IPC guidelines are complied with for safe handling and disposal of healthcare wastes
- Conduct training needs assessment to identify training gaps as well as relevant training programs on healthcare wastes. Develop strategies, immunise or vaccinate healthcare staff including waste handlers and develop written emergency procedures to deal with accidents and spillage.
- Put mechanisms in place to ensure that the public is aware of the risk associated with healthcare wastes through various sensitisation programmes.

1. INTRODUCTION

1.1 BACKGROUND

The management of healthcare wastes is of great importance to the welfare of the people, the environment, the government and the world at large. This is due to the potential environmental hazards and public health risks it poses. The wastes produced in the course of healthcare activities carry a higher potential for infection and injury. Poor healthcare waste treatment methods may produce poisonous chemicals. The World Health Organisation has graded Healthcare Wastes (HCW) as the second most hazardous after radioactive wastes.

Goal 3 of the Sustainable Development Goals (SDGs) indicates that improved general waste management will minimise chances of malaria, cholera, diarrhoea and other water related diseases which contribute strongly to high mortality rate.

Healthcare facilities across the country, including the referral hospitals produce significant quantities of healthcare wastes. Therefore, in order to reduce morbidity and mortality caused by communicable diseases due to improper waste management, all wastes generated in the country need to be handled and disposed of in an appropriate manner.

The Ministry of Health and Sanitation (MoHS) in pursuing its aims of reducing health problems and eliminating potential risks to people's health, provides healthcare services which inevitably generate wastes that may in itself be hazardous to human health. The Ministry through its Environmental Health Division acts as the leading body to oversee the waste management activities in the country including healthcare wastes, using the National Infection Prevention and Control (IPC) Guidelines published in 2015. The Ministry should also provide the overall coordination, technical advice and solicit funds for waste management activities.

1.2 MOTIVATION OF THE AUDIT

Sierra Leone like other developing countries faces the problem of Healthcare Waste Management (HCWM). There are no reliable statistics on healthcare wastes generated in the country.

The multiplication and expansion of healthcare facilities particularly in urban areas as a result of dramatic population growth; on-going immunisation campaigns for Measles, Tuberculosis and Tetanus, usage of disposable syringes and needles in avoidance of HIV/AIDS transmission, has the potential to increase the generation of HCW[3].

According to the World Health Organisation, misuse of injections (inadequate management of used sharp materials) has contributed to new cases of infections including: 2% of HIV, 33% of Hepatitis B and 42%

[3] *Goal 3 of the Sustainable Development Goals (SDGs) - 'ensure healthy lives and promote well-being for all at all ages" P.15*

of Hepatitis C[4]. As a result of the misuse, healthcare wastes pose a significantly negative impact on human health and the environment.

Infectious healthcare wastes pose far more serious health risks especially to staff who worked in healthcare facilities during the Ebola outbreak in 2014. Inadequate and unsafe disposal of healthcare wastes contributed to the rapid spread of the Ebola disease in Sierra Leone[5]. Low technical and administrative skills leading to poor practices, inadequate training for health workers, weak infrastructure due to lack of priority, planning and budgeting on HCWM have been the major challenges in Sierra Leone.

In light of the above challenges, efforts have been made to improve the management of healthcare wastes. The Integrated National Wastes Management Strategic Plan 2012-2016 and the National Infection Prevention and Control policy and guidelines amongst others, have been developed to address the challenges of HCWM.

Despite the formulation of policies, strategies and guidelines on the management of healthcare wastes, its proper management remains a concern to the public. In 2014, it was expressed in the Awoko newspaper that a civil society organisation, Health Alert, including some members of the public were concerned about the illegal disposal of bio-healthcare wastes in the ocean which ends up on beaches along the Western Area peninsula coastline[6]. In October 2016, the ASSL during its performance audit strategic planning activity, found a pile of healthcare wastes on the Lumley beach in Freetown. This is shown in the picture below:

Photo taken on 30thOctober, 2016 showing healthcare wastes found on Lumley Beach, west of Freetown

Against this background, the Audit Service Sierra Leone in line with its legal mandate conducted a performance audit to assess the management of healthcare wastes in regional referral hospitals and suggest recommendations for improving on healthcare waste management.

[4]*WHO, Fact Sheet No. 231 October, 2006*
[5]*http://www.undp.org/content/dam/sierraleone/docs/Ebola%20Docs./SL%20FS%20Health*
[6]*Awoko newspaper,19th June, 2014; headlined - Civil Society Concern on Bio healthcare wastes disposal*

1.3 DESIGN OF THE AUDIT

1.3.1 Purpose of the audit

The purpose of the audit was to assess the management of healthcare wastes by the MoHS. To achieve this objective, the audit considered three main questions:

- How has the Ministry of Health and Sanitation planned the implementation of healthcare wastes management activities?
- To what extent are the standards on healthcare wastes complied with?
- How adequate is the capacity of the Ministry in managing healthcare wastes?
- Are those exposed to healthcare wastes aware of the risks associated with them?

1.3.2 Scope

The audit was conducted on the MoHS and it focused on the management of healthcare wastes for the period 2014–2016 (including available information in 2017). Fieldwork on the audit was undertaken at the main government referral hospitals in the four regions.

1.3.3 Methods of data collection

The audit commenced with an opening conference with key personnel of the MoHS in April, 2017. This meeting was followed by data collection from the Ministry's offices in Freetown including the Connaught, Bo, Kenema and Makeni Government Hospitals.

The following primary (interview and observation) and secondary (document review and inspection) sources were used for the collection of data/information during the course of the study:

i. Documents review

This activity was carried out to get an in-depth knowledge/understanding of the management of healthcare wastes by the Ministry, and the regulations, policies, processes and procedures governing healthcare waste management in the country. Furthermore, documents were reviewed to understand the level of stakeholders' involvement in the management of healthcare wastes and to confirm or verify relevant information obtained during interviews with key personnel of the Ministry and other stakeholders. Documents reviewed are listed in Appendix I.

ii. Physical observation and inspection

The audit team conducted an inspection of objects/equipment; facilities and structures including incinerators, autoclaves, shredders and buildings accommodating them and dump or landfill sites to examine their physical condition and also observed how the segregation of healthcare wastes was carried out.

iii. Interviews

The audit team conducted interviews with 25 key personnel of the MoHS, Central Medical Stores, regional referral hospitals, and contracting cleaning firm in order to verify information gathered. See Appendix II for the list of personnel interviewed and the purpose for which they were interviewed.

1.3.4 Audit criteria

In order to assess the performance of the MoHS on the management of healthcare wastes, assessment criteria were drawn from various sources and best practices for the management of wastes generally. These sources included:

- National Infection Prevention and Control Policy, 2014
- National Infection Prevention and Control Guidelines, 2014
- National Strategic Roadmap on Integrated Waste Management, August 2014
- Safe Management of Wastes from Healthcare Facilities (2nd Edition–WHO Blue Book) 2014
- National Policy Roadmap on Integrated Wastes Management, March 2015
- National Infection Prevention and Control Action Plan, June 2016-June 2019
- Integrated National Waste Management Strategic Plan, 2012-2016
- Healthcare Waste Management Plan, April 2016
- Financial Management Regulations, 2007
- Environmental Protection Agency Act, 2008

The assessment criteria were focused on: generation, segregation, collection, storage, treatment and disposal; availability of equipment; utilisation of funds relating to healthcare waste management activities, retiring and monitoring; and evaluation of healthcare waste management activities.

2 DESCRIPTION OF THE AUDIT AREA

2.1 REGULATORY AND POLICY FRAMEWORK

The Government of Sierra Leone has legislation and policies in place to regulate waste management and sanitation in the country. These comprise the following:

i. **Integrated National Waste Management Strategic Plan, 2012-2016**: It provides the framework that will guide the efforts of the Ministry and its partners in attaining the health related Millennium Development Goals (MDGs). The plan further provides a framework of healthcare waste management strategies to assist in the day-to-day and long term management of healthcare wastes in the health facilities.

ii. **National Infection Prevention and Control Policy-2014:** This policy document provides guidance on the implementation of Infection Prevention and Control (IPC) programmes at all healthcare establishments; and also for healthcare providers in the public and private sectors by outlining roles, responsibilities, reporting and accountability processes at each level of the healthcare system. The policy establishes minimum national standards for the effective prevention and management of healthcare associated infections, and promotes IPC at all healthcare delivery facilities in Sierra Leone.

iii. **National Infection Prevention and Control Guidelines-2015:** This is a guiding document which provides a framework for the development and implementation of guidelines and standard operating procedures (SOPs). The aim of this document is to establish a culture of safety for patients and health workers in health facilities and to improve healthcare wastes management so that government and communities will be equipped to respond to and manage outbreaks in the country.

iv. **Safe Management of Wastes from Healthcare Facilities (2nd Edition–WHO Blue Book)-2014:** The new Blue Book is designed to continue to be a source of impartial health-care information and guidance on safe waste management practices in healthcare facilities. Sierra Leone is a signatory to the WHO Blue Book.

v. **National Policy Roadmap on Integrated Wastes Management March-2015:** This policy provides simplified information for key sector stakeholders including their respective duties and responsibilities, as well as providing a framework for implementing other waste sector initiatives and activities.

vi. **Healthcare Waste Management Plan-April 2016:** This plan is intended to recommend feasible and cost-effective measures to prevent or reduce significant adverse impacts to acceptable levels. The plan focused on management practices and design measures which should be put in place to ensure that environmental impacts are minimised during civil work

activity; and that human health and environmental concerns are fully addressed on an on-going basis during project implementation.

vii. **National Infection Prevention and Control Action Plan, June 2016-June 2019:** One of the objectives of this plan is to ensure effective healthcare waste management in health facilities as per policy guideline by 2018.

viii. **Environmental Protection Agency Act, 2008:** This Act established the Environmental Protection Agency–Sierra Leone whose responsibility is to provide for the effective protection of the environment and for other related matters. It requires projects whose activities impact on the environment to obtain Environmental Impact Assessment (EIA) licences. Such projects among others include: wastes management and disposal (e.g. sewage systems and treatment plants, landfills, treatment plants for household and hazardous wastes).

MOHS VISION AND MISSION

According to the National Health Sector Strategic Plan, 2012–2016, the vision and mission of the Ministry are derived from the National Health Policy 2002, and were aimed at contributing to the achievement of the goals of the PRSP II (Agenda for Change), the Ouagadougou Declaration and the MDGs.

Vision

Functional national health systems delivering, efficient, high quality healthcare services that is accessible, equitable and affordable for everybody in Sierra Leone.

Mission

To contribute to socio-economic development by promoting health and ensuring access to quality health, population and nutrition services by the population of Sierra Leone through effectively functioning national health systems.

2.2 ROLES AND RESPONSIBILITIES FOR HEALTHCARE WASTE MANAGEMENT

i. MoHS

The overall responsibility for regulating and supervising healthcare wastes at health facilities rests with the Ministry. It is responsible for overseeing healthcare waste management activities in the country; providing oversight, staffing requirements, developing regulations and policies and overall coordination of activities. It is also responsible for developing healthcare waste management strategies[7].

[7]National IPC Policy 2015, Pg 9 (1.3)

ii. Hospital Board

The Board is setup to ensure better management of the hospital, including the provision of an efficient medical care to the public. It has the responsibility to appoint staff for the hospital both professional and otherwise; and determine the remuneration and other conditions of service for the staff; and undertake periodic assessment of the manpower, physical and financial resources of the hospital[8].

iii. Hospital Management

The main responsibility of the hospital is to provide healthcare services to the public. In providing these services, different categories of healthcare wastes are generated; and the hospitals have the implicit responsibility to manage these wastes in a way that the risks associated with them are mitigated. This should be done in line with national legislation, policies and international best practices.

The implementation of healthcare waste management practices at the hospital is carried out by the following units or departments:

i. Environmental Unit:

According to the interview held with the Environmental Officer at the Connaught Hospital, the main role of the Unit is to ensure proper sanitation of the hospital. Trained staff and volunteers in the hospital collect all medical, surgical and wastes from the various collection point such as wards, outpatients, trauma, isolation, blood bank, etc. that are to be incinerated, disposed of into the burning pit or other disposal sites. In addition, the Unit is responsible for monitoring the cleaning of the mortuaries on a daily basis to ensure safe collection and handling of wastes generated and provides advice where necessary.

ii. Infection Prevention Control (IPC) Unit:

The head of the hospital IPC Unit also doubles as the chairperson for the Hospital IPC Committee and is responsible for the implementation of the National IPC policy and procedures at the hospital. The hospital IPC Unit through the focal person will report progress and issues to the Matron at their standing meetings every two weeks on emerging issues reported to the Matron.
The hospital IPC focal unit activities include:

- Ensuring implementation of the National IPC Policy at the hospital facility;
- advising staff on all aspects of IPC to maintain a clean and safe environment for patients, visitors and staff;

[8]Hospital Board Act 2013, (Section 13(1))

- monitoring staff adherence to IPC practices (e.g. sharps safety, disinfection, sterilization, wastes management) and ensures compliance with National IPC Guideline and SOPs;
- initiating immediate corrective actions when lapses in IPC are noticed;
- collaborating with District IPC focal person, Nursing Supervisor and NGO Mentor (if available) to ensure the recommended IPC practices and trainings are implemented and conducted within the hospital;
- planning and conducting on-going training programmes to ensure that all hospital staff are knowledgeable and are implementing the recommended IPC practices;
- ensuring the necessary and recommended IPC equipment and supplies are identified, forecast, available and used appropriately; (e.g. stocking wards with PPEs, waste management equipment, soap and water in Veronica buckets)
- monitoring and documenting on a daily basis, IPC activities and incidents within the hospital, including hospital acquired infections, healthcare worker injuries and other indicators as required by the National IPC Programme;
- conducting IPC assessments as per National IPC Programme requirements;
- generating and presenting reports for the monthly Hospital IPC Committee meeting. These reports include incidence of hospital acquired infections, healthcare worker injuries and other indicators as required;
- coordinating and obtaining input from the Hospital IPC Committee members to support the Medical Superintendent in developing the IPC component of the hospital budget;
- developing a yearly Hospital IPC Programme risk assessment and action plan which includes performance measures to meet the above activities; and
- reporting on the IPC activities and issues to the monthly District IPC Committee chairperson during the committee meetings[9].

iii. Matron's Office:

The Hospital IPC focal person reports to the Medical Superintendent through the Hospital Matron, during monthly Hospital IPC Committee meetings. The Matron is responsible to give the necessary facility-level direction on staff practices, equipment and supplies (consumables).She ensures management addresses IPC issues brought to her attention by the Hospital IPC focal person[10].

[9]National IPC Policy, 2015 – Pg 17 (2.3.3)
[10]National IPC Policy, 2015 – Pg 16 (2.3.3)

2.3 ROLES AND RESPONSIBILITIES OF OTHER KEY PLAYERS

The following are the key stakeholders and their roles and responsibilities in the management of wastes at the Connaught Hospital:

- UNOPS
- KINGS Partnership-Sierra Leone.
- HAFWEN
- Environmental Protection Agency-Sierra Leone (EPA-SL)
- MASADA

1. United Nations Office for Project Services (UNOPS)

This UN agency has provided refurbishment to the incinerators, the incinerator houses and also provided another incinerator at the Connaught Hospital.

2. Kings Partnership-Sierra Leone

Kings Partnership-Sierra Leone is an International Non-governmental Organisation (INGO) that works with individuals and institutions in Sierra Leone to build a strong and resilient healthcare system. They provide training on IPC issues and other logistical support such as medical consumables for the management of healthcare wastes at the Connaught hospital. However, their operations ended in January 2017.

3. Environmental Protection Agency-Sierra Leone (EPA-SL)

The EPA-SL is the government body that is solely responsible for the effective management and protection of the environment. In addition, the Agency is charged with the responsibility of issuing licenses to proponents with activities that impact the environment following an Environmental Impact Assessment (EIA) study.

In the case of the hospitals, EIA license should be obtained for the installation of incinerators and for the creation of dump or disposal sites.

4. MASADA

The hospital management contracted MASADA (a waste management company based in Freetown) for the collection of domestic wastes from the point of storage for final deposit/disposal at the central waste dumpsite-'Bomeh'. The hospital management procured small and big bins from MASADA for the disposal of domestic wastes. The bins are placed at the accumulation points, where all these domestic wastes are deposited and collected for final disposal when filled.

2.4 FUNDING

The funding for healthcare waste management is being provided by the GoSL through quarterly financial allocations to the MoHS. Budgets are prepared by the MoHS, approved by Parliament and allocations made by the Ministry of Finance and Economic Development (MoFED) to the Ministry. Below is a table showing funds received by the MoHS for the management of healthcare wastes nationwide for the period under review.

Table 1: Illustration of allocations to MoHS

Years	Amount (Le)
2016	14,000,000
2015	92,700,000
2014	19,940,000
Total	126,640,000

Source: Expense Analysis by MoFED 2014–2016

2.5 MANAGING HEALTHCARE WASTES

Healthcare wastes are wastes generated as a result of healthcare services or activities. These wastes originate from minor and scattered sources, including wastes produced in the course of healthcare undertaken in the home (e.g. home dialysis, self-administration of insulin, recuperative care) and in healthcare facilities.

Healthcare wastes can be generated in the following operational areas; government hospitals, private hospitals, nursing homes, physicians' offices, dentists' offices, dispensaries, mortuaries, blood banks and collection centres, animal houses, laboratories and research institutions. The improper handling of these wastes can lead to so many diseases, amongst which are: HIV/AIDS, nosocomial, hepatitis A and B, Lassa fever, Ebola, etc.

Healthcare wastes can be classified into: general wastes, pathological wastes, sharp wastes, infectious wastes, chemical wastes, radioactive wastes, pharmaceutical wastes, and genotoxic wastes.[11]

According to the National IPC Guidelines 2015, the process of managing healthcare wastes involves various steps. These steps include: segregation of wastes into different categories, onsite storage of wastes awaiting collection from the healthcare facility, transportation of wastes to a treatment facility, treatment of wastes and final disposal of the residues following treatment.[12] For these processes to be efficiently

[11]National IPC Policy, 2015 – Pg73 (4.7.1)
[12]National IPC Policy, 2015 – Pg73 (4.7)

and effectively carried out there is need to strengthen the capacity of the facility. It is desired that appropriate equipment and trained personnel are required to undertake these activities.

1. Generation of Healthcare Wastes

Generation of healthcare wastes is the production of used and unwanted materials as a result of healthcare activities by healthcare facilities, or persons during the provision of healthcare services. Healthcare wastes are generated in a healthcare facility and should be segregated into different factions, based on their potential hazards and disposal routes by the person who produces or manages each waste item. However, the management of every facility needs to put strategies in place to minimise or reduce wastes generated in these facilities. This strategy is referred to as waste minimisation strategy and this is integral in healthcare waste management plan to reduce costs and create a clean and more sustainable environment.

If wastes cannot be avoided, then mechanisms by which it can be minimised are as follows:

- Establish a wastes minimisation plan.
- Acquire healthcare products that suit the environment in which the facility is located (e.g. least damaging products to environment)–green procurement (e.g. less packaging, less toxicity, easily recycled)–purchase devices that can be reused safely–purchase items that can be recycled or recovered (i.e. converted into new products or energy).
- Manage stock of hazardous chemicals by ordering as and when necessary; taken into account the lead time, reorder quantity and levels.
- Convert to reusable items where possible according to manufacturer's instructions(e.g. cups, spoons)
- Ask suppliers and local industries what wastes they can take or buy back.

2. Segregation of Healthcare Wastes

Healthcare wastes should be segregated into different components, based on their potential hazards and disposal routes, by the person who generates each waste item whatever their position in the organisations. Coloured and labelled containers should be available for each segregated waste component. Lidded containers should be used for all hazardous waste streams.

Table 1. Shows Recommended Segregation Scheme as per the IPC guidelines		
WASTE TYPE	**CONTAINER COLOUR AND MARKING**	**TYPE OF CONTAINER**
Infectious Clinical Wastes	Yellow with biohazard symbol	Strong, leak-proof plastic bag. Held inside rigid, clearly marked lidded bin. Bag preferably 70 µm thick (ISO 7765 2004)
Sharp	Yellow, labelled "sharps", with biohazard symbol	Rigid, puncture-resistant container preferably commercial and standard certified.
Pathological autoclave and laboratory wastes	Red, labelled "pathological" for burning	Rigid leak proof container with sealable lid
Chemical & pharmaceutical	Brown, labelled with relevant symbol and "Do not autoclave"	Unspecified /bag/box/bin must adequately contain substance; no leakage
Radiological	Not special label with radioactive symbol and "Do not burn"	Lead-lined box (for onsite storage until activity level falls below prescribed limit)
General	Black	Plastic bag

Source: National Infection Prevention and Control guidelines - 2015 (4.7.5.2 pg. 84)

3. Healthcare Waste Collection

Waste containers must be collected on a regular basis to reduce overflow and odour risks. It is recommended that bins should be emptied on a daily basis or when they are ¾ full. Waste containers that are more than this margin pose risk to staff. Unlike the other forms of waste containers, sharp bins must not be more than 2/3 full and the lid must be fully closed. Overflowing bins/sharp boxes are hazardous, especially sharps. Any attempt to compress the wastes into the bin, or removing wastes to put into a new bin might be very risky to the health.

4. Storage

If possible, wastes collected should be disposed of immediately. In larger HCFs it may be necessary to store wastes onsite while awaiting treatment. If storage is necessary, store for the minimum time possible; preferably only a few hours and at a reduced temperature, or minimise wastes in warm climates to avoid the production of odour. Ensure that carts/trolleys can be wheeled inside the storage area. Consider building another form of catch-containment if liquid wastes are stored.

Wastes must be stored preferably in a ventilated and secured area not accessible to patients, the public, or animals in order not to attract or be accessible to vermin, and covered area so that it remains dry. It must be labelled with the relevant hazard symbols.

Radioactive wastes must be stored separately behind lead shielding until the radioactivity has decayed to legislatively acceptable levels, after which it may be discarded as general wastes, unless a higher risk category is present (e.g. sharps).

5. Transporting Wastes

Transportation of wastes can be explained in two folds. Transportation of wastes can be the removal of wastes from point of generation to point of storage; and also from point of storage to disposal or final point of treatment.

In hospitals, wastes should commonly be transported by internal cart or trolley. Bins must not be emptied in patient-care areas. Waste bins must be closed, transported upright, and safely emptied directly into the pit, burning pit, incinerator, or other treatment systems appropriate for the category of wastes. The transport route is less important from an infection risk point of view, provided necessary safeguard measures are in place, but account should be taken of public aesthetics, patient and public traffic ease of transport and route efficiency. When emptying bins, the sides or handles should be grabbed and not the upper rim. All bins must be washed clean prior to reuse. Carts/trolleys meant for the collection of wastes from the bins, must be regularly decontaminated. This process should take place during less busy times. Transport staff should wear adequate personal protective gears (gloves, strong and closed shoes, overall and masks).

6. Treatment of healthcare wastes

This refers to the process that eliminates, removes, kills or deactivates all forms of life and biological agents present in a specified region, such as a surface, a volume of liquid medication or in a compound. The process by which healthcare wastes are treated under a standard temperature is known as sterilisation. Regulated healthcare wastes are treated in a steam steriliser. The wastes shall be subjected to the optimum operational standards of temperature.

In the event that an autoclave unit does not operate at an optimum temperature (800–1500 degrees Celsius), the device should not be used, and should be clearly and legibly tagged **"DO NOT USE",** and state the reason along with the signature of person placing the tag.

7. Disposal

Disposal is the treatment of wastes to its final point. The health officer is responsible to remove regulated healthcare wastes generated in the hospital for final disposal. Regulated healthcare wastes should only be transported for disposal by transporters. Treated steam sterilized wastes contained in red bags should be placed in orange plastic bags, sealed and disposed of via the solid wastes stream. Regulated healthcare wastes shall be disposed of only by:

(i) Steam sterilisation (autoclaving), followed by placement in the solid wastes stream; or
(ii) Incineration by a licensed and regulated healthcare waste disposal facility[13].

The following are other methods of disposal:

Onsite burial in pits

A pit is constructed to a standard size at the depositing site to dispose of wastes. The depth of the pit should be above the groundwater level. The bottom of the pit is then line with clay or permeable material. An earth mound is constructed around the mouth of the pit to prevent water from entering. A fence is then constructed around the area to prevent unauthorised entry. Inside the pit, place alternating layers of wastes, covered with soil and then permanently seal it with cement and embedded wire mesh.

Burial in special cells in dumping sites (if available in the affected area)

Cells used to contain wastes can be constructed when burying wastes at dump sites. The cell should be at a reasonable depth to keep the wastes away from scavengers. The bottom of the cell should be covered by soil or a material with low permeability. The wastes in the cell should be covered immediately with soil to prevent access by people or animals. It is strongly recommended that healthcare wastes be transported in a safe manner to minimise public exposure to bio contaminated wastes.

Encapsulation

This involves the placing of sharp wastes or pharmaceutical wastes in hard containers, such as metal drums, followed by the addition of immobilising materials, such as cement, bituminous sand or clay. When dry, the drum or container can be sealed and buried in local landfill or a pit in a healthcare facility.

[13]Healthcare Wastes management plan 2016, Annex 7 Pg. 48

3 FINDINGS, RECOMMENDATIONS AND CLIENT'S RESPONSE

3.1. PLANNING OF HEALTHCARE WASTE MANAGEMENT ACTIVITIES

3.1.1 No specific plan for healthcare wastes activities in the hospitals

i. Healthcare waste plans at national level

The Ministry is responsible for regulating and overseeing healthcare wastes management activities in the country. These amongst others include developing strategies, policies and plans.[1]

We noted during the audit that the Ministry has developed national plans and guidelines that integrate healthcare wastes management, and provide policy guidelines for the management of healthcare wastes as listed below:

1. Integrated National Wastes Management Strategic Plan, 2012 - 2016
2. National Infection Prevention and Control Policy, 2014
3. National Infection Prevention and Control Guidelines - 2015
4. National Policy Roadmap on Integrated Wastes Management, March 2015
5. Healthcare Wastes Management Plan, April 2016
6. National Infection Prevention and Control Action Plan June 2016 -June 2019

ii. Healthcare waste plans at hospital level

According to the 2015 National Infection Prevention and Control (IPC) Guidelines, each healthcare facility (HCF) shall establish a waste management plan. It also requires a responsible person at the HCF to prepare a comprehensive document that outlines policies and procedures for the management of healthcare wastes. The waste management plan should also be widely promoted within the facility to all involved[14].

We noted during the audit that the Ministry had developed national plans and guidelines that integrate healthcare waste management. These plans and guidelines provide policy guidelines for the management of healthcare wastes and were to be translated into annual work plans; identifying activities, responsible personnel, monitoring tools and estimate of resources needed to manage healthcare wastes in the facility.

In spite of the progress made at national level, it was also revealed during the audit exercise that in the four referral hospitals, there were no healthcare waste management plans for the period under review. It was noted that activities regarding healthcare waste management were undertaken on ad-hoc basis.

This can be attributed to the Ministry's failure to adequately roll out and monitor the implementation of the national policies and guidelines on healthcare waste management.

[14] 4.7.3 pg. 80 IPC guidelines

As a result, there are no clear objectives, responsibilities were not defined, monitoring tools were not in place; and needed resources were not determined. Subsequently, resources allocated were limited and this affected negatively the management of healthcare wastes.

Recommendation

The Ministry should institute mechanisms to roll-out the national policies and guidelines related to healthcare wastes management. Furthermore, they should ensure that hospitals prepare periodic wastes management plans and monitor implementation.

Client's response:

- *The Ministry said they have a HCWM Plan of 2002 & 2012. This plan will be reviewed and rolled out in all hospitals subject to the availability of funds*

Auditor's Comment:

This plan is five years outdated, a copy of such plan was not submitted to the audit team for review

3.1.2 Healthcare waste management not adequately budgeted for

The IPC guidelines state that the MoHS and its partners should ensure appropriate budgetary allocations at facility level[15].

For the period under review (2014-2016); the Ministry budgeted Le 151,000,000 and was allocated Le126,640,000as shown in the table below:

Table 3: Illustration of budget and allocations to MoHS			
YEAR	**AMOUNT BUDGETED (Le)**	**AMOUNT ALLOCATED and EXPENDED (Le)**	**Percentage expenditure of Budget**
2014	61,000,000	19,940,000	**32.7%**
2015	60,000,000	92,700,000	**154.5%**
2016	30,000,000	14,000,000	**46.7%**
TOTAL	**151,000,000**	**126,640,000**	**83.9%**

Source: Expense Analysis 2014–2016 and Recurrent and Development Expenditure Estimates (MoFED)

After budget allocation, the Ministry has the prerogative of spending the amount allocated according to their priorities.

[15] *Pg. 80, 4.7.3 of National IPC Guidelines*

From the review of Expense Analysis for the above amount allocated, we noted that the Ministry used it exclusively for administrative purposes, such as stationary, fuel, and other travelling expenses for the Environmental Health and Sanitation Directorate.

The Ministry neither budgeted nor spent the monies on items related to wastes management such as consumables (containers, wastes bags, sharp boxes, gloves, etc.), equipment for health facilities and training of staff.

Furthermore, the review of the prioritised operational work plan and related cost for the hospitals visited revealed that wastes management activities were not included in their priority list of activities and therefore not budgeted for.

It was explained during interviews that waste management consumables used by the hospitals were supplied from the stock balance at the Central Medical Stores of the items acquired for the Ebola epidemic. Since then, the Ministry had not budgeted for replenishing the stock items.

As a consequence, much needed resources such as consumables, equipment, trained staff etc. were scarcely available to effectively manage healthcare wastes.

Recommendation

It is recommended that the MoHS include healthcare waste activities into their budget and should ensure that the same is done in hospitals.

Client's response:

The Ministry said that meetings will be conducted with the hospitals management and priorities costed budget on HCWM will be developed and forwarded to the PS, DFR, CMO, DoH&L and DEHS for final approval and allocation of fund (subject to the availability of funds).

Auditor's Comment:

The issue remains unresolved as the recommendation was not implemented.

3.1.3 Healthcare waste management team not in existence

According to the national IPC guidelines, healthcare facilities shall establish a waste management team. Membership will be determined by the size of the HCF. This team shall comprise the following:

- Head of the HCF
- Heads of department
- IPC focal person
- Pharmacist
- Radiation officer
- Matron

- Hospital Engineer/Head of maintenance
- Financial Manager
- Cleaning Supervisor[16]

The Wastes Management team's responsibility is to develop a written waste management plan that clearly defines the duties and responsibilities of all members of staff. They should ensure adherence to the plan and keep the plan up-to-date by setting regular review dates. They should as well ensure that the plan clearly states the mechanisms for: segregation, containment, colour-coding and labelling, collection and transport, storage, treatment and disposal of wastes.

It was revealed through interviews and documents reviewed that there was no waste management team in place to specifically oversee or coordinate healthcare waste management activities in all the referral hospitals visited.

This clearly indicates that healthcare waste management issues were given little attention or less commitment at the senior management level in the hospitals. Hence, issues regarding the proper management of healthcare wastes were not fully attended to or were mostly being ignored. This also limits coordination of healthcare waste management activities in other units within the hospitals.

Recommendation

The hospital management should establish a healthcare waste management team to oversee and coordinate specifically healthcare waste management activities in the HCF in line with the IPC guidelines with immediate effect.

Client's response:

The MoHS responded that they are in the process of ensuring that the various hospital managements establish healthcare waste management sub-committee subject to the availability of funds.

Auditor's Comment:

The issue remains unresolved and will be kept in view for subsequent/follow-up audit.

3.1.4 Inadequate steps taken to minimise healthcare wastes

The national IPC guidelines state that in order to reduce costs and create a clean, more sustainable environment, waste minimisation must be an integral part of all waste management. Waste minimisation plan should be one of the mechanisms to minimise wastes[17].

During the course of the audit, a waste minimisation plan was among the documents requested from the management of all the referral hospitals visited, but none of them made this document available to the

[16] 4.7.3.2 Pg. 80 of IPC Guidelines
[17] National IPC Guidelines, pg. 82 (4.7.4.2)

audit team for review. Interviews with senior officials of the hospitals disclosed that management of hospitals have not developed strategies to minimise healthcare wastes.

In the absence of wastes minimisation plans, it is not possible to properly determine resources needed for wastes management activities. In addition to this, when excess wastes are generated, it thereby increases the cost of their disposal.

Recommendation

The hospital management should develop appropriate strategies for the minimisation of healthcare wastes in the hospitals including wastes minimisation plans which should be reviewed and updated periodically in line with the IPC guidelines.

Client's response:

- *The Ministry said that Healthcare waste minimisation strategies and plans have been developed since 2012 and will be printed and circulated to all hospitals, subject to the availability of funds.*

Auditor's Comment:

This plan, though outdated for five years, was not submitted to the audit team for review

3.1.5 Lack of mechanisms for healthcare waste tracking

The World Health Organisation's Safe Management of Wastes from Healthcare Activities of 2014 stipulates that knowing the types and quantities of wastes produced in a healthcare facility is an important first step in safe disposal of healthcare wastes.

Waste-generation data can be used in estimating the required capacities for containers, storage areas, transportation; and treatment technologies. Waste-generation data can be used to establish baseline data on rates of production in different medical areas and for procurement specifications, planning, budgeting, calculating revenues from recycling, optimization of waste-management systems, and the necessity of environmental impact assessments[18].

It was noted during the audit exercise that records or statistics of healthcare wastes generated, (types, quantities, treatment and disposal) were not maintained in all the referral hospitals identified for the audit.

As a consequence, waste generation data in a HCF could not be established at a given time. This amongst others makes it difficult or impossible to identify the rate of production in the different medical areas and plan accordingly.

Recommendation

The hospital management should ensure that wastes generation data are captured on a daily basis. This should serve as one of the basis in developing the wastes management plan.

19. Safe management of wastes s from health-care activities(WHO), Pg 11, 2.8

Client's response:

The Ministry said that meetings will be conducted with environmental health officers assigned to hospitals on the assessment of healthcare waste management practices in hospitals and establish HCWM database systems subject to the availability of funds.

Auditor's Comment:
The issue remained unresolved.

3.1.6 Inefficient monitoring of healthcare waste management activities

One of the objectives set by the Ministry is to monitor and evaluate the HCWM plan as specified in the Integrated National Waste Management Strategy of 2012-2016. It is stated in the National Infection Prevention and Control Guidelines of 2015 that the wastes management team should develop a written wastes management plan which should incorporate regular monitoring of healthcare wastes management procedures.[19]

It is the responsibility of the Environmental Health and Sanitation Division of the Ministry to monitor healthcare wastes management activities. This division should be represented by the District Environmental Health Superintendent in the districts and the Environmental Health Officers in the hospitals.

During the audit, the Ministry did not provide evidence of a total of 36 monthly operational reportson monitoring for the period under review (January2014–December 2016).
Interviews with the Environmental Health Officer at the Connaught Hospital revealed that routine checks are conducted but could not provide the auditors with any reports. In the regional hospitals, we noted that the environmental health officers (representing the Ministry) were not monitoring healthcare wastes activities.

Failure to monitor the management of medical wastes has contributed to worsening the deplorable state of wastes management activities.

Recommendation

The MoHS should ensure that monitoring activities are implemented as stated in the Integrated National Waste Management Strategy.

[19]IPC Guidelines (Page 81, 4.7.3.2)

Client's response:

The MoHS will allocate fuel and one vehicle to conduct the above meetings, quarterly supportive supervisions, grading/monitoring of healthcare waste management in all hospitals, subject to the availability of funds.

Auditor's Comment:
The issue remains unresolved.

3.1.7 EIA license not obtained by MoHS for treatment and disposal of healthcare wastes

EIA is a systematic process of identification, prediction and analysis of significant environmental impacts (positive or negative) of a proposed activity and its practical alternatives on the physical, biological, cultural and socio-economic characteristics of a particular area in order to provide necessary information for enhancing decision making.

After EIA, the Environmental management plan of the site is developed to ensure that appropriate environmental management practices are followed. Before carrying out waste management and disposal of hazardous waste, it is a requirement for such activities to have an Environmental Impact Assessment (EIA) license. This is provided for under section 24 (1) of the EPA Act, 2008 as amended in 2010 which states that no person shall undertake or cause to be undertaken any of the projects whose activity involves wastes management and disposal such as, sewage systems and hazardous wastes unless he holds a valid license in respect of such project.[20]

During the review of documents and interviews conducted with personnel of the MoHS and the EPA-SL, we noted that an Environmental Impact Assessments (EIA) licence was not obtained by the Ministry for the operation of those healthcare wastes treatment equipment and the disposal methods adopted. Autoclaves and incinerators were installed (during last three years) and burning pits were established in all the referral hospitals visited.

According to EPA-SL, a waiver was granted to the Ministry to install the waste management equipment during the health emergency period of the Ebola epidemic in the country. Following the end of the health emergency in November 2015, the EPA-SL in a letter dated 12th April 2016, had advised the Ministry on the requirement to obtain EIA licenses in respect of the different projects of which healthcare wastes is not an exception.

In the absence of an environmental impact assessment on management of medical wastes, there is a high risk of environmental pollution for which mitigating measures would not be instituted.

[20] *Sec. 23 (1) EPA Act 2008 (as amended 2010)*

Recommendation

We recommend that the Ministry should put in place modalities to obtain an Environmental Impact Assessment license in respect of all healthcare waste treatment equipment and disposal methods adopted.

Client's Response:

The MoHS will collaborate with the EPA-SL to obtain the EIA license and develop an Environmental Management Plan for all hospitals subject to the availability of funds.

Auditor's Comment:
The issue remains unresolved and will be kept in view for subsequent/follow-up audit

3.2 COMPLIANCE WITH HEALTHCARE WASTE MANAGEMENT STANDARDS

3.2.1 Improper use of bins and bags in the segregation of healthcare wastes

The IPC guidelines recommend that healthcare wastes generated should be segregated into different types and put in different containers, based on their types. Colour coding is normally recommended as follows:

- Yellow for infectious wastes;
- Black for general wastes,
- Brown for chemical and pharmaceutical wastes; and
- Red for pathological and laboratory wastes[21].

These colour coding have to be applied both for plastic bags and bins. Plastic bags have to be placed in bins to avoid direct contact of healthcare wastes with the bins, therefore enabling waste handlers to collect waste by removing the bags from the bins.

The audit team visited the various wards in all the hospitals and noted that **Yellow bags** were used for infectious, pathological and laboratory wastes. **Black bags** were used to collect general wastes. Sharps were collected in sharps' containers. There was no brown container for the pharmaceutical and chemical wastes as well as the radiological wastes in hospitals visited.

According to interviews with officials of the hospitals, the inconsistencies in the colour of the containers used were as a result of the non-availability of the required colours in the right quantities.

Cases were noted where healthcare wastes were placed in bins without plastic bags, thereby contaminating the bins with infected wastes. See photo below for details:

[21] *National Infection Prevention and Control Guideline, 2015,Pg 83, 4.7.5.2*

Healthcare wastes placed in bins without plastic bags, Photo taken on 11th June 2017 at the Makeni Government Hospital

Healthcare wastes placed in an inappropriate bin without plastic bags in the laboratory of Connaught Hospital, Photo taken on 25th April, 2017

Placing infectious waste in bins without plastic bags and continued use of bins can easily result in spreading disease to health workers, patients and waste handlers.

Appendix III shows the status of the application of the recommended colours and labels for the different types of wastes generated in the provision of healthcare service in hospitals.

Recommendation

The Ministry and hospital managers should provide the right coloured containers for the segregation and collection of healthcare wastes in the hospitals and ensure that all wastes be appropriately segregated according to their nature and potential hazards and at all levels.

Client's Response:

The Ministry will allocate funds to honour the costed priority plans for the different hospitals subject to the availability of funds.

Auditor's Comment:

The issue remains unresolved and will be kept in view for subsequent/follow-up audit

3.2.2. Inappropriate segregation of healthcare wastes

Healthcare wastes shall be segregated into different components based on their potential hazards and disposal route. Segregation should be carried out by the producer of the waste as close as possible to its place of generation, which means segregation should take place in a medical area, at a bedside, in an operating theatre or laboratory by nurses, physicians and technicians.

The simplest waste-segregation system is to separate all hazardous waste from the larger quantity of non-hazardous general waste.

To provide a minimum level of safety to staff and patients, the hazardous waste portion is commonly separated into two parts: used sharps and potentially infectious items. In the latter, the largest components are typically tubing, bandages, disposable medical items, swabs and tissues. The types of containers can be used for other categories of wastes, such as chemical and pharmaceutical wastes, or to separate out pathological waste, where it is to be handled and disposed of in different ways from the other portions of the waste flow.[22]

The audit exercise revealed that healthcare wastes (including infectious wastes) were put into the same container. The audit team inspected the contents of those containers placed in the wards and observed that in all the wards visited, wastes were not segregated even though the containers were labelled to indicate their required contents. Healthcare wastes were found in general wastes containers and general wastes in infectious wastes containers. Sharps were also found in both infectious wastes containers and general wastes containers.

Photos below show the status of segregation of healthcare wastes in the four hospitals visited:

[22] T*he National Infection Prevention and Control Guideline s, 2015, Pg 83, 4.7.5.1*

(a) Makeni Government hospital

Photo taken on 11/6/17: general wastes container in the paediatric ward at the Makeni Government Hospital showing mixture of gloves, sharps, gauze and used water plastics and bottles.

(b) Bo Government hospital

Sharps/general waste put into the soiled linen trolley at the Bo Government Hospital male ward as at 9th June 2017

(c) Kenema Government Hospital

Photo of solid wastes mixed with used bottles and giving set at the Kenema Government Hospital. Photo taken on 5th June 2012/

(d) Connaught hospital

Used gloves in general container and packaging of biscuits and water in infectious wastes container, photo taken on 25th April, 2017 at Connaught hospital

As a consequence, mixing of infectious and non-infectious general waste leads to increase in the volume of infectious waste. It can as well result in a large volume of waste that needs to be incinerated or burned.

Failure to segregate highly infectious waste like rejected laboratory cultures (specimen) from general waste has the potential of exposing health workers, patients and waste handlers to unlimited number of diseases that they can acquire in the course of their work, thereby sustaining cuts, wounds or infections from contaminated sharps.

Recommendation

The hospital management should put mechanisms in place to ensure that proper segregation of healthcare wastes is done in the different wards of the hospitals.

Client's Response

National Integrated Waste Management Unit will conduct quarterly meetings, supportive supervision grading/monitoring and reporting on HCWM practices across hospitals subject to the availability of funds.

Auditor's Comment:
The team still maintains this finding as the issue remained unresolved.

3.2.3. Overfilled wastes containers within the hospitals

Waste bags and sharps containers should be filled to no more than three quarters full. Wastes bins should be emptied on a daily basis or whenever they are ¾ full[23]. Once this level is reached, they should be sealed ready for collection. This can avoid unpleasant odour in hospitals. The packaging and sealing should be conducted with care to ensure that no healthcare waste overflow to the external surface of the containers.

Upon sealing, waste bags and containers should be labelled. Labelling is used to identify the source, record the date of waste generation, type and quantities of waste produced in each area, and allow problems with waste segregation to be traced back to a medical area[24]. A simple approach is to attach a label to each filled bag or container with the details of the medical area, date and time of closure of the container and the name of the person filling out the label. Using an international hazard symbol on each waste container is also recommended.

The auditors observed during physical inspection that healthcare wastes containers were overfilled and were not collected for transportation to their final disposal sites. The photo below depicts instances of bio-hazard and sharp wastes containers filled above the standard level of 3/4 in the Kenema and the Makeni Government Hospitals.

[23] National Infection Prevention and control Guidelines, 2015,Pg 87, 4.7.5.7
[24] National Infection Prevention and control Guidelines, 2015,Pg 77, 4.7.1.10

Photo taken on 5/6/2017 - Overfilled container with healthcare wastes in the corridor of Kenema Government Hospital

Photo taken on 12th June 2017 - Overfilled sharp boxinfectious (with syringes and needles) at the Makeni Government Hospital

As a result, wastes handlers, patients and visitors were exposed to offensive odour. In addition, overfilled healthcare wastes containers will lead to healthcare wastes pillage in the hospital thereby increasing the risk of infection through direct contact.

Recommendation

The management of the hospitals should ensure that healthcare wastes containers are collected on a daily basis or when they are ¾ full and transported to the final point of disposal.

Client's Response:

National Integrated Waste Management Unit will conduct quarterly meetings, supportive supervision grading/monitoring and reporting on HCWM practices across hospitals subject to the availability of funds.

Auditor's Comment:

The team still maintains this finding as the issue remained unresolved.

3.2.4. Healthcare wastes not treated before disposal yet equipment is available

According to UNEP Guidance Manual, some medical areas produce healthcare wastes that can reasonably be suspected to be contaminated with highly contagious pathogens (germs). Such sources include all laboratory samples containing body fluids, tissues or faecal stools and isolation (quarantine) wards. Wastes from these sources should always be pre-treated at source and then placed into Yellow/Red bags before joining the waste stream within the hospital.

As stipulated in the WHO Blueprint of 2014, autoclaves have been used for more than a century to sterilize medical instruments, and for several years they have been adapted for the treatment of infectious

wastes. They are capable of treating a range of infectious wastes, including sharps, materials contaminated with blood and limited amounts of fluids, isolation and surgery wastes, laboratory wastes (including gauze, bandages, drapes, gowns and beddings) from patient care. With sufficient time and temperature, it is technically possible to treat small quantities of human tissue.

However, if an autoclave is not available at source to ensure a thermal treatment, highly infectious waste can be disinfected in a concentrated 2% solution of sodium hypochlorite and left overnight before being discarded in a specific yellow bag properly sealed and itself discarded with other infectious healthcare wastes. It is recommended that each laboratory have an autoclave room dedicated for the specific pre-treatment of this category of waste only. The treatment process is necessary to prevent or minimise the exposure of medical staff and waste handlers to diseases caused by microorganisms transmitted through human blood or other potentially infectious materials. Autoclaves are also used in hospitals for the sterilization of recyclable items like plastics and laboratory instruments.

During the audit, we noted that none of the four hospitals did treatment of healthcare wastes before disposal. Three hospitals (Connaught Hospital, Bo Government Hospital and Kenema Government Hospital) had autoclaves; however they were not in use. The photo below shows untreated infectious wastes, dumped close to the burning pit area.

Used blood transfusion set thrown in the field within Makeni Government Hospital disposal site vicinity, Photo taken on 11th June 2017

Recommendation

It is recommended that MoHS should ensure that modern healthcare wastes treatment technologies including equipment and chemicals for decontamination are available and used in hospitals as recommended in the Integrated National Wastes Management Strategy and the IPC Guidelines.

Client Response:

National Integrated Waste Management Unit will conduct quarterly meetings, supportive supervision grading/monitoring and reporting on HCWM practices across hospitals subject to the availability of funds.

Auditor's Comment:
The team still maintains this finding as the issue remained unresolved.

3.2.5. Inappropriate on-site storage of healthcare wastes prior to disposal

Healthcare wastes are temporarily stored before being treated or disposed of on-site or transported off-site. A maximum storage time should not exceed 24 hours. Non-risk healthcare wastes should always be stored in a separate location from the infectious/hazardous healthcare wastes in order to avoid cross-contamination. A storage facility, sized according to the volume of waste generated as well as the frequency of collection, must be found inside all healthcare facilities. The facility should not be situated near food stores or food preparation areas, and its access should always be limited only to authorised personnel. It should also be easy to clean, have good lighting and ventilation.

During the audit we noted that none of the hospitals visited had appropriate onsite storage facilities. Healthcare wastes were stored at areas of disposal.

i. Connaught Hospital

Healthcare wastes were disposed of within the hospital area while the general wastes were disposed off-site by a cleaning firm hired by the Freetown City Council. During the inspection of the on-site storage point for the general wastes, we found that wastes were piled there and mixed up with healthcare wastes wrapped in biohazard bags. They were exposed to sunlight and rain, kept in an open area, not protected and was accessible to unauthorised personnel. See photo below:

Photo taken on 24th January 2017 : On site storage containers in the Connaught Hospital showing a mixture of healthcare and general wastes awaiting transportation for final disposal.

ii. Regional Referral Hospitals

The regional hospitals stored wastes at the area of disposal. In Makeni hospital, wastes dumped close to the burning pit included pathological wastes and scavenger birds (vultures which are typically known to feed on animal remains) were found at the disposal site. Other infectious wastes such as sharp boxes, blood transfusion sets, used gauze and cotton wools were also found littered around the vicinity of the burning pit. In Bo, boxes full of sharps were stored close to a locally constructed incinerator.

See photos below for details:

Used sharp boxes stored in an unsecured area waiting final disposal. They were in open space close to the incinerator; unauthorised personnel can easily access the area. Photo taken in Kenema, on 5th June, 2017

Keeping healthcare wastes in easily accessible areas creates a risk that the waste will be transmitted back to the wards through unauthorised personnel or rodents.

Recommendations

- Hospitals should build a storage facility within their premises. Access to the facility should be lockable and always limited to only authorized personnel. It should also be easy to clean, have good lighting and ventilation, and designed to prevent rodents, insects or birds from entering.
- Non-risk healthcare wastes should always be stored in a separate location from the infectious/hazardous healthcare wastes in order to avoid cross-contamination.

Client's Response

National Integrated Waste Management Unit will conduct quarterly meetings, supportive supervision grading/monitoring and reporting on HCWM practices across hospitals subject to the availability of funds.

Auditor's Comment:
The team still maintains this finding as the issue remains unresolved.

3.2.6. Unsafe Disposal of Wastes

i. Disposal of infected general waste in municipal dumpsite

General wastes generated in healthcare facilities constitute 85% of total wastes. They are generally non-infectious wastes. However, whenever they are in contact with infectious wastes, they are also infected and should be treated and disposed of in the same way as infectious healthcare wastes[25].

Inspection of the temporal storage of general wastes (awaiting transportation and disposal in the municipal landfill by MASADA) revealed that infectious wastes in yellow bags were mixed up with general wastes in wastes containers. This resulted in general wastes being infected and exposed waste handlers and scavengers to high risk of acquiring diseases caused by microorganisms transmitted through human blood or other potentially infectious materials such as HIV, Hepatitis B and C, Tetanus to name few. See photos below for details:

General wastes mixed-up with infectious healthcare wastes at temporal storage, Photo:Connaught hospital;25th April, 2017.

[25] *WHO, Safe Management of Wastes from Healthcare Activities,Second Edition. Section 2.6, , Page 8.*

	
Drip set in wastes transported to the municipal landfill, resulting from mixing up Healthcare wastes and general wastes,	A child picking wastes from municipal wastes dumping site. He may be in contact with infectious wastes and get infected

Source: Auditor-General's annual report, 2015, pg. 87.

Recommendation

The MoHS should devise strategies of ensuring that hospitals do not mixed up healthcare wastes at any point.

Client's response

National Integrated Waste Management Unit will conduct quarterly meetings, supportive supervision grading/monitoring and reporting on HCWM practices across hospitals subject to the availability of funds.

Auditor's Comment:

The team still maintains this finding as the issue remained unresolved.

ii. Liquid wastes discharged into the Atlantic Ocean.

A large part of the wastewater from healthcare facilities is potentially infectious and poses a higher risk than domestic wastewater. Depending on the service level and tasks of the health-care facility, the wastewater might contain chemicals, pharmaceuticals and contagious biological agents. Sewers ofhealth-care facilities are often not watertight, and a significant part of the wastewater in many places may leak into the groundwater[26].

[26] *WHO, Safe management of Wastes from Health-Care Activities, Second Edition, page 147-148*

Disinfection of wastewater from health-care establishments is required; particularly if the wastewater is discharged into any water body used for recreational activities or discharged into coastal waters close to shellfish habitats. Chlorine-based disinfectants are traditionally used to disinfect such health-care wastewater.

The Connaught hospital which is the principal referral hospital provides medical and surgical services, treatment for HIV/AIDS, Hepatitis, Leprosy to in and outpatients. It is situated on the bank of the Atlantic Ocean, near King Jimmy wharf. This ocean largely provides the fishes that are the major source of protein for most of the country's population. It also provides recreational opportunity (swimming) for inhabitants of the Freetown municipality and its surroundings including tourists.

It was revealed during the audit that the untreated liquid wastes generated in this hospital were directly emptied through a channel that runs into the ocean. (See photo below)

Photo of wastewater channelled to the ocean., Photo: Connaught hospital;30th January 2017

This wastewater is potentially infected, thereby threatening marine life. It contaminates seafood, therefore threatening people's life especially those consuming seafood and those using beaches. There is also a risk of infecting swimmers as they may unconsciously drink the water when swimming.

In addition to this, none of the hospitals visited was connected to efficient, working sewage-treatment plants. This implies that health-care wastewater is also discharged in either surface watercourses or

percolates into underlying groundwater with no treatment. This poses a very high risk to the environment and can lead to several waterborne diseases that are a threat to human life.

Recommendation

It is recommended that MoHS should ensure that healthcare liquid wastes are treated and disposed of appropriately.

Client's Response

National Integrated Waste Management Unit will conduct quarterly meetings, supportive supervision grading/monitoring and reporting on HCWM practices across hospitals subject to the availability of funds.

Auditor's Comment:

The issue remains unresolved since the recommendation is yet to be implemented.

iii. Dumping healthcare wastes outside the fence and washed away into the Ocean

The largest proportion of health-care waste generated is potentially infectious and if not properly managed can cause serious threats to the environment and human life. The IPC guidelines provide clear guidance on how waste should be managed to mitigate the inherent risks of healthcare wastes management.

During our physical inspection at Connaught hospital, we found healthcare wastes freshly dumped within the compound; and these were infectious wastes as they were in a yellow bag which is used to collect infectious wastes. Others had been dumped outside the fence, very close to the ocean. They appeared to have been dumped there long ago as some were covered by grass. Dumping wastes anywhere is a very dangerous practice, but worsened when they are dumped close to the ocean. When it rains, it washes away the wastes into the ocean and healthcare wastes accumulate at the beaches. This was particularly observed at Lumley beach where syringes, needles and sets of drip with needles were found together with other municipal solid wastes.

This constitutes a serious threat to people entertaining at beaches as they can be punctured by those infected needles. This also contaminates seafood, thereby threatening peoples' lives especially those consuming seafood. See photos below for details:

Infectious healthcare wastes dumped in the hospital compound, close to the get located near the ocean, photo taken on 30th January 2017 at Connaught hospital

Healthcare wastes dumped outside the fence of hospital, close to the Ocean, photo taken on 30th January 2017 at Connaught hospital

Healthcare wastes washed away by rain. found at Lumley Beach, They are mainly composed of drip sets with used needles, Photo taken on 30th October 2016

Recommendation

It is recommended that the management of Connaught Hospital should ensure that healthcare wastes are properly disposed of to avoid indiscriminate dumping.

Client's Response

National Integrated Waste Management Unit will conduct quarterly meetings, supportive supervision grading/monitoring and reporting on HCWM practices across hospitals, subject to the availability of funds.

Auditor's Comment:

The issue remains unresolved since the recommendation is yet to be implemented.

iv. Unsafe methods adopted for final disposal of healthcare wastes

One of the technologies recommended by WHO that can treat all types of HCW properly and has the advantage of significantly reducing the volume and weight of the waste treated is a starved-air incinerator. This comprises a primary chamber and a post-combustion secondary chamber. In the primary chamber, the waste is thermally decomposed through an oxygen-deficient, medium-temperature combustion process (800 to 900 °C), producing solid ashes and gases. The primary chamber includes a fuel burner, used to start the process. The gases produced in the primary chamber are burned at high temperature (ranging from 1100 to 1600 °C) in the secondary chamber, using an excess of air to minimise smoke, carbon monoxide and odours. If the temperature drops below 1100 °C, additional energy should be provided by a gas or fuel burner[27].

During the audit, we noted that the method adopted for healthcare waste disposal was burning pit. According to IPC guidelines, burning pits present a hazard to healthcare workers disposing of waste not only from an infection or chemical hazard risk during waste depositing and burning but also through physical risk of a fall. In addition, incomplete, low-temperature burning presents an environmental pollution risk[28]. They emit smoke which spread and pollute air. See photo below:

[27] *WHO, Safe Management of Wastes from Health-Care Activities, Second Edition, page 119*

[28] *National Infection Prevention and control guidelines, 2015 page 79*

Photo: burning pit emitting smoke (air pollution); photo: Connaught hospital;30th January 2017

Photo: burning pit emitting smoke and polluting air at Kenema hospital;5th June 2017.

Recommendation

The Ministry of Health should put in place and implement appropriate methods of disposing healthcare wastes in line with WHO recommended standards in order to mitigate risk associated with healthcare wastes management.

Client's Response

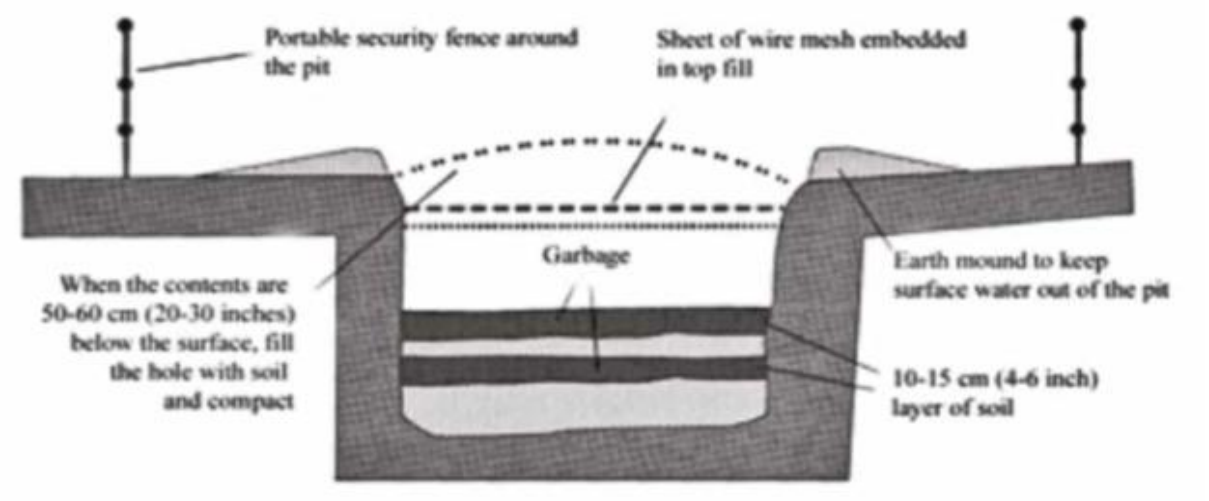
National Integrated Waste Management Unit will conduct quarterly meetings, supportive supervision grading/monitoring and reporting on HCWM practices across hospitals subject to the availability of funds.

Auditor's Comment:

The issue remains unresolved since the recommendation is yet to be implemented

v. Inappropriate burning of healthcare wastes

According to IPC guidelines[29], the pit should be located away from public access areas, patient care areas, vegetable gardens, water-tables, and water courses. It should be a hole of at least 2 meters deep and 1.5 to 2 meters across. The bottom of the pit should be at least 2 meters above the water table. A fence should be constructed around the pit to preclude public, children and animals. Burning pit operations involve carefully placing wastes into pit; avoiding container rupture or splashing; pouring diesel fuel on the waste and carefully ignite from a distance; watching and ensuring all wastes are burned. If pit fire goes out before waste is completely burned, the operation should be repeated. When waste is completely burned, waste should be covered with 10cm dust. When the burning pit is ¾ full of the wastes, it should be covered with mould and a new one constructed. The figure below shows how a burning pit should be.



Source: National IPC guidelines, 2015, pg. 90.

[29] *Fig 2: Plan of a burn pit and its construction; National IPC guidelines, 2015, page 90*

During the audit, the following observations were made:

a) Connaught Hospital

During inspections of the final disposal site, the burning pit, it was noted that all healthcare wastes including pathological wastes generated in the hospital were disposed of in a burning pit that was in an open location close to residential areas such as Kroobay and Kingtom communities and the sea. In addition to this, the former burning pit was overfilled and was left uncovered. See photos below for details:

Photo of a burn pit located very close to residential area and crops; photo:30th January; Connaught hospital

Photo: former burn pit overfilled and not covered at Connaught hospital;30th January

b) Makeni Government hospital

In Makeni Government Hospital, the disposal site referred to as burning pit could not be seen due to a pile of general wastes and healthcare wastes (including pathological wastes) that were partly burnt. The burning pit was overfilled and wastes were scattered all over. Even if they burn those wastes, it is impossible to cover them as recommended in the IPC guidelines. This poses a very high risk to the surrounding environment, health workers, wastes handlers as well as patients. See photo below:

Photo: burn pit with a pile of healthcare wastes mixed up with general wastes and unburned wastes;11th June 2017,Makeni Government Hospital

c) Kenema Government hospital

In the Kenema Government Hospital, we observed that the burning pits used as final disposal points were already full and overflown with different type of wastes. Wastes disposed of in these pits were scattered all over.

The disposal point was located within the hospital premises close to the wards, other healthcare facilities and the communities close to the hospital area. The fence of the disposal site was damaged and had not been reconstructed, thereby exposing the wastes to the public and animals.

Adequate steps have not been taken by the hospital management to ensure that when wastes are completely burnt, they are covered with 10cm dirt, and new burning pits are reconstructed to replace the overfilled ones.

This increases access to healthcare wastes by unauthorised persons and domestic animals thereby increasing the risk of contracting diseases associated with the improper disposal of healthcare wastes.
See photo below:

Photo: burning pit located in open area with scattered wastes;6th June 2017,Kenema Government hospital.

d) Bo Government hospital

Bo Government hospital is using a locally constructed incinerator (old school incinerator). It is located closer to other offices, wards and residential areas. The use of locally constructed incinerators present a potential hazard to people in both close and more distant proximity by noxious fumes released during the burning process. The photo below shows disposal of medical waste using locally constructed incinerators.

Photo: locally constructed incinerator within the Bo government hospital, and very close to residential area;9th June 2017

Recommendation

The Ministry should engage relevant stakeholders to ensure that healthcare facilities dispose of the various types of healthcare wastes in a safe manner.

Client's Response:

National Integrated Waste Management Unit will conduct quarterly meetings, supportive supervision grading/monitoring and reporting on HCWM practices across hospitals subject to the availability of funds.

Auditor's Comment:

The issue remains unresolved since the recommendation is yet to be implemented.

3.3 CAPACITY FOR HEALTHCARE WASTE MANAGEMENT

3.3.1 Lack of trained and certified staff to operate modern healthcare waste equipment

Healthcare waste management equipment are highly technical and can hardly be operated by untrained persons/staff. It is emphasised in the IPC guidelines that the autoclave for example, must only be operated by trained and certified personnel[30].

Healthcare wastes management equipment available in the four hospitals visited are mainly incinerator, autoclave and shredders.

From interviews with hospital managers, we noted that there were no trained and certified staff to operate the above equipment.

The only training provided was on the operation of autoclave and this was delivered to volunteers that were serving at Connaught hospital during the Ebola epidemic (when this equipment were installed in the various hospitals). Since the end of Ebola outbreak, volunteer staff are no longer serving the hospital and the autoclave is not operational. In the absence of those trained volunteers, the autoclave will remain idle, leaving the risk related to disposal of un-treatment healthcare waste unattended and therefore exposing much wastes handlers, healthcare workers, patients and surrounding environment to infection.

Recommendation

The Ministry should make sure that there are trained and certified personnel to operate the healthcare wastes equipment available in the hospitals.

Client's response:

MoHS will conduct more training for incinerator and autoclave operators, maintenance technicians and healthcare waste handlers on the management of healthcare wastes across the service chain, depending on the availability of funds.

Auditor's Comment:
The issue remains unresolved and followed up in subsequent audit.

3.3.2 Insufficient healthcare wastes consumables

Access to the right supplies including PPEs, disinfectant solutions, and wastes bags to provide safety to health workers is a priority for the efficient and effective management of healthcare wastes activities[31]

[30] *IPC Guidelines 4.7.6 Pg 90*
[31] IPC Guidelines 2015, 4.7, pg. 73

The Central Medical Stores (CMS) is the main division of the Ministry responsible for the supplies of drugs, medical consumables and equipment to all government health facilities. Interviews with store keepers at the CMS, review of documents (goods received notes, requisition cards) and physical inspection of stores revealed that healthcare wastes consumables such as gloves, different colours of waste bags, aprons, face shield, gowns etc. were insufficient for the management of healthcare wastes on a daily basis in the hospitals. In addition, interviews conducted with hospital managers revealed that these items were also in short supply in the hospitals.

According to the storekeeper at the CMS, the items in the stores were the remainders of Ebola stock that have not been replenished since the end of the epidemic in 2015. These remainder items were also misappropriated and thus exacerbated the situation. These consumables especially the gowns and plastic bags were sold in open markets particularly in Freetown as shown in the photos below.

Photos: peddlers selling PPEs and biohazard bags for infectious healthcare waste in the street of Freetown for use as rain coats during the rainy season in 2017

The limited availability of healthcare wastes consumables increases the possibility of waste handlers repeatedly using the same PPEs or not using them at all. This further increases the risk of acquiring infectious diseases by healthcare workers and waste handlers.

Recommendation

The Ministry should ensure that stock is replenished frequently to meet the demands of the hospitals and enforce strict stock control procedures that will keep track of the release of stock items.

The Ministry should put mechanisms in place to discourage the sale of healthcare waste consumables and to avoid their misappropriation.

Client's Response:

MoHS will conduct meetings and develop priority costed plans for all hospitals which will be finally presented to stakeholders for support, subject to the availability of funds.

Auditor's Comment:

The issue remains unresolved since the recommendation is yet to be implemented.

3.3.3 Healthcare wastes equipment kept idle

The suitability of treatment and disposal methods for healthcare wastes depends largely on availability of tools and equipment. One of the preconditions set out in the IPC guidelines for the management of healthcare wastes is access to the right equipment such as disinfectant autoclaves for treatment of medical wastes, shredders for shredding treated wastes and incinerators for disposal of wastes. These equipment were available in the hospitals we visited, however, they were not in use.

i. Autoclaves and Shredder not utilised

As stipulated in the WHO Blueprint of 2014, autoclaves have been used for more than a century to sterilize medical instruments, and for several years they have been adapted for the treatment of infectious wastes. They are capable of treating a range of infectious wastes, including sharps, materials contaminated with blood and limited amounts of fluids, isolation and surgery wastes, laboratory wastes (including gauze, bandages, drapes, gowns and bedding) from patient care. With sufficient time and temperature, it is technically possible to treat small quantities of human tissue.

A shredder can reduce waste volume up to 90%.

a) Connaught Hospital:

During the Ebola epidemic, an autoclave (as shown in the photo below) was donated to the Connaught Hospital in 2014 by the Republic of Korea in collaboration with the United Nations Development Programme's Global Environmental Facility (UNDP-GEF). It is worth noting that this equipment had not being in use or operational since the end of the Ebola activities in November 2015. From the

interview with the management of the hospital, the autoclave was not in use due to the lack of trained personnel to operate it.

b. Bo Government Hospital:

A new autoclave and a shredder were donated to the hospital by UNDEP-GEF in 2016.We however found them still wrapped in the plastics from the manufacturer's packaging and had never been in use since acquisition. The shredder was abandoned in an open area where it was exposed to rain and sunlight. From the interview with the management of the hospital, it was explained that the experts who delivered the equipment had promised to install these equipment but that was not done and no timeframe was set for their installation.

Moreover, in the case of the shredder, the auditors were informed that they did not have the capacity to move it to an appropriate location as they would require a crane to do so. They also did not have the technical knowledge to install the shredder.

a) Kenema Government Hospital:

The hospital had a new autoclave and a shredder that were also not in use due to the unavailability of space to install the equipment.

Below are some photos of some of the above reported idle equipment:

Photo:a disinfectant autoclave at the Connaught Hospital (Not in use);4/7/17

Photo: an idle uninstalled shredder; Kenema hospital;11th June, 2017

ii. Locally Constructed Incinerators not in use

According to the IPC guidelines, locally constructed incinerators should be part of adopted methods for the disposal of infectious wastes in addition to burning pit; although such incinerators are unlikely to reach the recommended temperature levels of above 800 °C.

a) Connaught Hospital

During audit inspection in March 2017, we found that the hospital had two locally constructed incinerators donated by UNOPS. They were however not in use for over a year after construction. From the review of the handing-over note, the incinerator was handed over by UNOPS to the hospital on 24th April, 2017. It was disclosed in an interview with key personnel of the hospital that they have since not been able to use the facility because it has not been considered fit for its intended purpose. However, the Ministry could not produce any documentary evidence to support their claims.

b) Kenema Government Hospital

During the Ebola epidemic, an incinerator was constructed by the military which was not used because according to the Medical Superintendent, it was not properly constructed. Installation of the UNOPS donated incinerator was yet to be completed at the time of our visit in June 2017.

c) Bo Government Hospital

The audit team noted that there were two locally constructed incinerators and both were not in use. One of the incinerators was donated by UNOPS and installation was still in progress at the time of our visit.

b) Makeni Government Hospital

One incinerator was donated by UNOPS but its installation had not been completed. The management of the hospital expressed dissatisfaction over the delay. Another incinerator was not in use because it was situated very close to the staff quarters.

Below are photos of examples of incinerators donated by UNOPS

Photo: incinerator donated by UNOPS to hospitals, not in use; Bo hospital,9th June 2017

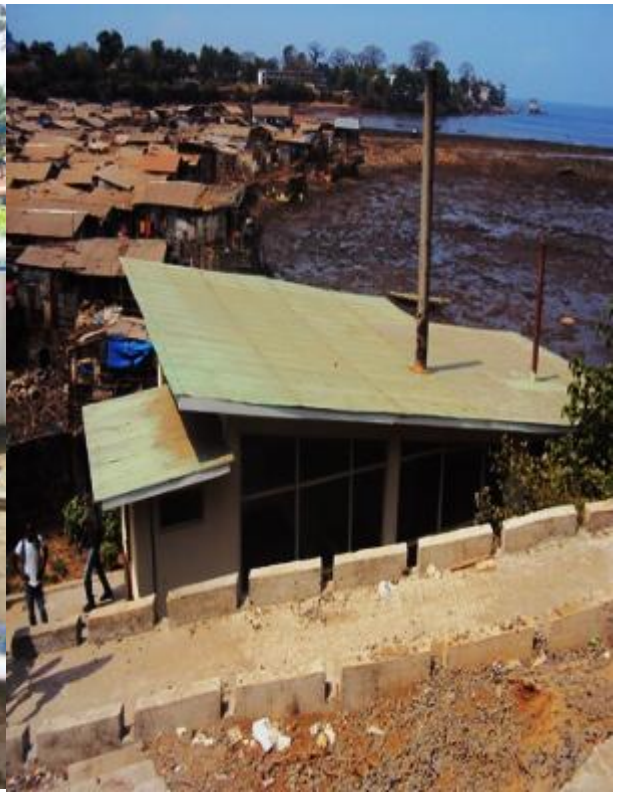


Photo: incinerator donated by UNOPS to hospitals, not in use; Connaught hospital,30th January 2017

iii. Electrical Incinerators not utilised

According to the 2nd edition of the WHO Blueprint on Safe Management of Wastes from Healthcare activities, incinerators can be used to breakdown the chemical and physical organic materials through the process of combustion, pyrolysis and gasification. It provides high -temperature combustion ranging from about 800 °C to more than 1600 °C.

It was noted that the electrical incinerators were donated by the Chinese Government to the regional hospitals visited. They were however not operational as installation had not been completed by the MoHS.

Consequently, the equipment were just there in the premises of the hospitals and not serving the purposes for which they are intended. With the exception of Bo Hospital which is using an "old school incinerator" which is also not effective, other hospitals are still using burning pit yet they have equipment that could enable them to manage healthcare waste at an acceptable level of standard.

Recommendation

Mechanisms should be put in place by the Ministry and the management of the hospitals to ensure that appropriate and timely steps are taken for the efficient and effective use of these and all other healthcare wastes management equipment available in the hospitals.

Client's Response:

MoHS will conduct assessment on the equipment and conduct refresher training for Incinerator/Autoclave Operators, Maintenance Technicians and Healthcare Wastes Handlers.

Auditor's Comment:

The issue remains unresolved since the recommendation is yet to be implemented.

3.3.4 Health workers and wastes handlers not adequately protected

Health-care waste handlers are at greatest risk from infectious hazards. The risk of acquiring a secondary infection following needle-stick injury from a contaminated sharp is very high.

The risk of infection with hepatitis B is more than 10 times greater than for hepatitis C, and up to 100 times greater than for Human Immunodeficiency Virus (HIV).

Workers at risk from infection and injury include healthcare providers, hospital cleaners, maintenance workers, operators of waste-treatment equipment, and all personnel involved in waste handling and disposal within and outside health-care facilities. Sensible occupational health and safety measures include among others:

- Standardizing and writing health-care waste management procedures to reduce the risk of accidents.
- Providing equipment and clothing for personal protection and
- Establishing an occupational health programme that includes information, training and medical measures when necessary, such as immunization, post-exposure prophylactic treatment and regular medical surveillance[32].

For personal protection[33], staff that are in contact with healthcare wastes should wear the following personal protective clothing:

- Suitable heavy-duty gloves when handling healthcare wastes containers;

[32] *Chap. 11, 11.1pg 181 of Blue book*

[33] *UNEP &WHO , Preparation of National Health-Care Waste Management Plans in Sub-Saharan Countries, page 21-22*

- Safety shoes or industrial boots to protect the feet against the risk of containers being accidentally dropped; and
- Industrial apron or leg protectors.

The audit noted that despite the fact that the hospitals had scaled up in the use of personal protective equipment (PPEs) since the Ebola epidemic, interviews with key management staff in the hospitals disclosed that healthcare providers and waste handlers were not immunized against infectious diseases like Lassa Fever, Hepatitis B and C and Tetanus etc. neither were they given post-exposure prophylactic treatment and regular medical surveillance even when they are mostly exposed to handling infectious wastes.

In the absence of such provision or immunization programme for healthcare providers and wastes handlers, there is a greater risk of exposure and transfer of diseases potentially acquired from infectious healthcare wastes.

Recommendations

- The MoHS/Hospitals' management should provide for the immunisation of all healthcare staff including wastes handlers against all communicable diseases for which vaccines are available.
- The MoHS and hospital managers should develop written emergency procedures to deal with accidents and spillage and train all staff and other healthcare wastes handlers for emergency response.
- Every HCF should designate personnel to handle emergencies, coordinate actions and report to managers and regulators.
- In order to reduce the risks of infection to healthcare staff, the MoHS should set up operating procedures for healthcare wastes handlers and other relevant staff to be immunised and establish standardized emergency procedures in cases of accidental contact with wastes streams.

Client's Response:

MoHS will conduct meeting with hospitals managements and facilitate the development of standard emergency procedure for management of incidence of injury and ensure that Healthcare Wastes handlers are vaccinated.

Auditor's Comment:

The issue remains unresolved since the recommendations are yet to be implemented.

3.4 LOW AWARENESS OF THE RISKS ASSOCIATED WITH HEALTHCARE WASTES

3.4.1 Inadequate mechanisms to create public awareness on the risks of healthcare wastes

According to the National IPC Guidelines 2015, healthcare facility (HCF) leaders and managers should ensure awareness raising/promotion to HCW, patients, visitors and caregivers[34].

Activities undertaken during the audit exercise proved that there had not been adequate awareness raising programmes organised for the public on the dangers associated with healthcare wastes. During the visits to the wards in the hospitals, it was observed that there were posters displayed in the wards and outside the wards of the Kenema, Bo and Makeni Government hospitals directing people where to deposit the wastes they generate. These were merely directing people as to where to put the wastes they generate and not in any way informing people about the dangers or risks associated with these healthcare wastes or how to avert them. The photo below is examples of posters displayed in wards in the Kenema regional hospital.

Photo:direction of where to deposit wastes: Kenema Government Hospital; 5th June, 2017

Interviews conducted with key staff of the hospitals revealed that there were no programmes organised (public health campaigns, radio/television discussions and sensitisation workshops) to raise awareness among the public on such risks.

The low level of awareness among the public on the hazards linked with healthcare waste could potentially expose patients, visitors and the general public to the risk of contracting infections linked with healthcare wastes.

[34]National IPC guideline pg.73(4.7 Health Care Wastes Management)

Recommendation

It is recommended that mechanisms (sensitisation workshops, media discussions on radio/television, display of posters, visitor education campaigns, etc.) are put in place to ensure that the public is aware of the risks associated with healthcare wastes. These mechanisms should be included in waste management plans of the hospitals, budgeted for and adequately implemented, monitored and reported accordingly.

Client's response:

MoHS in collaboration with its development partners will strengthen the information, education and communication on proper healthcare waste management practices in all hospitals.

The MoHS will start conducting nationwide sensitisation workshops, media discussions on radio/television, display of posters, visitor education campaigns, etc.

Auditor's Comment:

The issue remains unresolved and will be followed-up in subsequent audit.

3 CONCLUSION

Sierra Leone having adopted the World Health Organisation's Standards on safe management of healthcare wastes activities, has developed the national standards, policies and guidelines on the management of healthcare wastes. Despite such developments, the findings of this report have led to the conclusion that healthcare wastes produced at the regional referral hospitals have not been properly managed by the Ministry of Health and Sanitation. This has been the case because healthcare waste management activities have not been adequately planned for implementation; available standards not fully complied with; weak capacity to manage medical wastes; and low level of awareness on the risk of healthcare wastes. This has led to high risk of infection to medical personnel and the public at large.

The following are specific conclusions:

PLANNING OF MEDICAL WASTE MANAGEMENT ACTIVITIES

Waste management activities have not been prioritised by both the Ministry and the hospitals especially after the Ebola epidemic in 2015. The four regional referral hospitals have not adequately integrated healthcare waste management activities through a well-developed activity plan that describes waste minimisation strategies and plans, data on the types and volumes of wastes, resource allocation (i.e. human, equipment and financial) and related environmental health risks. Hence activities regarding healthcare waste management were undertaken on ad-hoc basis. The absence of a waste management team contributed to the shortcomings highlighted in the poor coordination of healthcare waste management.

COMPLIANCE WITH MEDICAL WASTE MANAGEMENT STANDARDS

The segregation and treatment of healthcare wastes are the most important interventions in the management of hazardous wastes, which was not fully complied with in the four regional referral hospitals visited. Non-infectious, infectious, highly infectious and sharp wastes were mixed as a result of inconsistencies in the colour coding of the containers used, the unavailability of the right colours in the right quantities and at the right time. Seemingly, the final disposal points for healthcare wastes were predominately located close to in-patient wards, other patient care facilities; and the immediate surroundings of the hospital. This poses significant risk to people who may eventually get in contact with infectious or hazardous healthcare wastes. Continuous burning of the healthcare wastes had negative effects not only to humans and the environment, but also caused damage to the physical infrastructure (fences) of the disposal sites particularly when they were not reconstructed; thereby exposing these waste to the public and animals.

CAPACITY FOR MEDICAL WASTE MANAGEMENT

Although the ASSL acknowledges the efforts of the Ministry and its partners for acquiring modern healthcare waste treatment equipment such as, incinerators, autoclaves and shredders, they were however not considered adequate to effectively manage healthcare wastes. The lack of trained and certified staff to operate the available equipment had contributed to the inefficient and ineffective treatment of the healthcare wastes generated in the four regional referral hospitals. In the absence of Environmental Impact Assessments (EIA) license for those equipment and the disposal methods adopted by the hospitals, there is increased risk of environmental pollution which cannot be mitigated in short or long term. The unavailability of sufficient medical waste consumables coupled with the fact that waste handlers were not immunised against infectious diseases such as, Lassa Fever, Hepatitis B and C, HIV etc., exposes them and others to contact such diseases. In the absence of post-exposure prophylactic treatments and regular medical surveillance, medical staff are at high risk of being infected as was evident during the Ebola epidemic.

AWARENESS OF THE RISK ASSOCIATED WITH MEDICAL WASTES

It was apparent that there was low level of awareness raised on the risks associated with healthcare wastes as the mechanisms in place were inadequate. The auditors arrived at this conclusion because they were not provided with evidence of sensitisation and education programmes on healthcare wastes; people were only directed as to where they can put wastes without any additional information on risk factors and their potential effects.

APPENDICES

APPENDIX I: LIST OF DOCUMENTS REVIEWED

1. Hospital Board Act, 2003
2. Environment Protection Agency Act, 2008
3. National Health Policy 2002
4. Integrated National Waste Management Strategic Plan 2012-2016
5. Healthcare Waste Management Plan, April 2016
6. National Strategic Roadmap on Integrated Waste Management, August 2014 Third Draft
7. National Policy Roadmap on Integrated Waste Management, March 2015 Final Draft
8. Comprehensive EPI Multi-Year Plan 2012-2016
9. National Infection Prevention and Control Policy, 2014
10. National Infection Prevention and Control Guidelines, 2014
11. National Infection Prevention and Control Action Plan, June 2016-June 2019
12. Safe Management of Wastes from Healthcare Facilities (2nd Edition – WHO Blue Book)
13. Bo City Council Waste Management Plan 2020
14. Healthcare Waste Management Guidance Note (May 2000 HNP)
15. Draft Waste Management Plan – Sept 2002 (SHARP)
16. Rebuilding Sierra Leone's Healthcare
17. Performance Audit Report South Africa
18. Expense Analysis 2014 – 2015
19. Chapter 8 Healthcare Wastes : Generation, Treatment and Disposal, January 2009
20. Chapter 8 Waste Management at Medical Centres 2005
21. Sierra Leone Waste Management Challenges
22. Evaluating Non-incineration Alternatives-Healthcare Waste Treatment and Disposal, May, 2000
23. Final Management Letter on the Audit of the MoHS Headquarters, 31st December, 2015
24. Final Management Letter on the Audit of King Harman Road Government Hospital, 31st December 2015
25. Connaught Hospital, Management Letter 2014 – 2015
26. Ola During Children's Hospital, Management Letter 2014 – 2015
27. Prince Christian Maternity Hospital, Management Letter 2014 - 2015

APPENDIX II: LIST OF KEY PERSONNEL INTERVIEWED

List of Personnel Interviewed		
Organisation	**Designation**	**Purpose**
MoHS	Permanent Secretary	To understand the following: administrative structure, different sources of revenue and strategies, procedures for the implementation of healthcare waste management activities.
	Director of Environmental Health& Sanitation Unit	To understand the following: planning, implementation of policies and standards, and funding the healthcare waste management activities.
	Waste Manager	To understand the following activities in the healthcare waste management: planning, implementation and funding of the healthcare waste management activities.
	Biomedical Engineer	To understand his roles and responsibilities , required equipment necessary for the management of healthcare wastes in the facility.
	District Environmental Health Superintendents– Bo, Kenema and Makeni.	To understand the following: planning, implementation of policies and standards, and funding of the healthcarewaste management activities.
Government Hospitals	Hospital Care Manager/Medical Superintendents (4)	To understand the following: planning, implementation and source of funding, and the capacity of personnel in the healthcare waste management activities.
	Hospital Secretary (4)	To understand the following: planning, implementation and funding, and capacity in the healthcare waste management activities.
Connaught **Bo** **Kenema** **Makeni**	Matron (4)	To understand their involvement in the planning of waste management activities and how they monitor waste management activities

	IPC Focal Person (4)	To understand their involvement in the planning of waste management activities and how they monitor healthcare waste activities.
	Environmental Officer (1)	To understand their involvement in the planning of waste management activities and how they monitor healthcare waste activities.
	Pharmacist (4)	To understand how expired drugs and medical supplies are disposed of.
	Storekeeper (4)	To understand the capacity of the hospital with regards,medical supplies and equipment.

APPENDIX III: AUDITORS' OBSERVATION OF THE APPLICATION OF RECOMMENDED COLOURS/SYMBOLS FOR DIFFERENT TYPES OF WASTES

Table 4: Auditors' observation of the application of recommended colours/symbols for different types of wastes

Wastes Type	Container colour and markings	Symbol	Type of container	Auditors' observation
Infectious clinical wastes	Yellow with biohazard symbol		Strong, leak-proof plastic bag. Held inside rigid, clearly marked lidded bin. Bag preferably 70 µm thick (ISO 7765 2004)	Yellow colours were used but with correct coding
Sharp	Yellow, labeled "sharps", with Biohazard symbol		Rigid, puncture-resistant container preferably commercial and Standard certified	Sharp boxes were used
Pathological and Laboratory wastes	Red, label "Pathological for Burning		Rigid leak-proof container with sealable lid	Yellow colours were used
Chemical and Pharmaceutical wastes	Brown, label with relevant symbol and "Do not autoclave"		Unspecified bag/box/bin must adequately contain substance (no leakage)	Not found in all hospitals
Radiological wastes	Not specified label with Radioactive symbol, and "Do not burn"		Lead-lined box (for on-site storage until activity level falls below prescribed limit)	Not found in all hospitals
General wastes	Black		Plastic bag	Black plastic bags were in use with correct labels

APPENDIX IV:SHORTAGES IN THE SUPPLY OF HEALTHCARE WASTE CONSUMABLES

SHORTAGES IN THE SUPPLY OF HEALTHCARE WASTE CONSUMABLES						
Health Facility	**Unit**	**Date**	**Item**	**Quantity Requested**	**Quantity Received**	**Variance between requested and supplied**
Kenema Government Hospital	Paediatric Ward	16th September, 2016	Disposable Apron	500	200	300
			Disposable glove	5,000	2,000	3,000
	Maternity	20th September, 2016	Disposable glove	3,000	1,000	2,000
	Operating Theatre	25th October, 2016	Head cover	100	0	N/A
			Shoe cover	100	0	N/A
			Cover roll	100	0	N/A
	Clinical Laboratory	26th October, 2016	Apron	2 Roll	0	N/A
	IPF	6th June, 2017	Gloves	2,000	400	1,600
Bo Government Hospital	Wards 7	22nd May, 2017	Examination gloves	2,000	400	1,600
			Disinfectant	5	3	2
	Paediatric Unit (Ward 8)	23rd May, 2017	Gloves medium	1,000	500	500
			Head cover	50	0	N/A
	Male Medical Unit	29th May, 2017	Isolation gown	2,000	0	N/A
			Examination gloves	2,000	500	1,500
			Disposable apron	1,000	200	800

SHORTAGES IN THE SUPPLY OF HEALTHCARE WASTE CONSUMABLES						
Health Facility	**Unit**	**Date**	**Item**	**Quantity Requested**	**Quantity Received**	**Variance between requested and supplied**
	Lactating Ward	29th May, 2017	Examination gloves	2,000	500	1,500
	Paediatric Unit (Ward 8)	30th May, 2017	Plastic apron	200	0	N/A
			Head cover	50	0	N/A
	Ward 3	30th May, 2017	Hard hand gloves	50	20	30
			Apron	200	0	N/A
			Sharp box	25	10	15
	Paediatric Unit (Ward 8)	6th June, 2017	Gloves Large	2,000	1,000	1,000
			Gloves medium	1,000	0	N/A
			Disposable plastic apron	200	0	N/A

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