SFG2908

REPUBLIC OF YEMEN

YEMEN EMERGENCY HEALTH AND NUTRITION PROJECT

MEDICAL WASTE MANAGEMENT PLAN

January 19, 2017

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Executive Summary

This project financing is an IDA grant in an amount equivalent to US$200 million to finance health and nutrition services as well as help maintain the capacity of the existing health system, i.e. public HFs and community level engagement.

The proposed project will help preventing morbidity and mortality among Yemeni population, particularly children and pregnant and lactating women (PLW), through the provision of life saving and high impact evidence-based health and nutrition interventions in the context of on-going emergency. The project includes life-saving quality health service delivery for mothers, newborn and children through: (1) Mobile service delivery to provide a package of health and nutrition interventions to IDPs, overburdened host communities and populations in areas with no functional health facilities (2) Outreach activities from still functional health facilities and district health offices to provide services in areas in tier 3 and tier 2 areas i.e. those far from the health facilities. (3) Nationwide Immunization campaigns to maintain the Polio free status and to support prevent any Measles outbreaks (4) Community based maternal and newborn care though community midwives (CMWs) to ensure mothers have ANC, SBA and PNC available at their homes or communities (5) Quality life-saving services for acutely malnourished children under 60 months, and mothers through Screening, Detection and referral of children under 59 months and PLW, and treatment of severe acute malnutrition in children under 5 years either through Outpatient Treatment Programmes (OTPs), or Inpatient Treatment Programmes (ITPs). (6) Interventions for prevention of under-nutrition among children and mothers in priority governorates through Micronutrient supplementation for children 6 to 24 months, and provision of IYCF behaviour change and communication strategies at a community-level and integrated IYCF counselling at health facilities level. The project will also support the procurement of supplies for maternal, newborn and child health services at first level care and referral facilities.

Under the proposed Emergency Health and Nutrition Project (EHNP), UNICEF and WHO will be the grant recipients as well as the managing and implementing entities on an exceptional basis, where each organization is responsible for their respective activities based on the project design.

The project will include several interventions including, inter alia, nationwide immunization campaigns which is the only activity with potential limited environmental impacts. Considering the nature, magnitude and interventions of this project, particularly under the nationwide immunization campaigns, the World Bank's policy on Environmental Assessment (OP/BP 4.01) is triggered for this project and the proposed operation is classified as category 'B'. Accordingly, it was required to prepare a safeguards instrument that is a Medical Waste Management Plan (MWMP) to ensure due diligence with the Bank's safeguards policies, to avoid causing harm, and to ensure consistent treatment of environmental impact by the implementing agencies

which are the World Health Organization (WHO) and the United Nations International Children's Emergency Fund (UNICEF).

The Medical Waste Management Plan's overall objective is to prevent and/or mitigate the negative effects of medical waste on human health and the environment. The plan includes advocacy for good practices in medical waste management and is to be used by health, sanitary and cleaning workers who manage medical waste in mobile and fixed units, as well as health centers that are included in the project. All the health facilities and health services supported through the World Bank project are to have appropriate procedures and capacities in place to manage medical waste. The plan includes good practices and procedures for the waste packaging and storage, segregation, transportation, treatment and Disposal.

A monitoring program has been developed including indicators to address potential negative impacts of the medical waste and to ensure that unforeseen impacts are detected and the mitigation measures implemented efficiently. The monitoring plan includes indicators for the storage, segregation, transportation and disposal of the medical waste. The plan will be implemented both internally as part of the project's overall monitoring and reporting process, and externally by the third party monitoring service which will be used under the project.

1. Background

Ever since the onset in 2014 of armed conflict in Yemen, the health system has been distressed by significant challenges that have jeopardized its ability to meet the basic health and nutrition needs of the Yemeni people. Specifically, essential health facility (HFs) inputs, including health workforce capacity, have become more scarce and, in many places, non-existent.

Health status indicators have shown marked declines secondary to conflict-related factors and malnutrition rates among children have increased. The availability of maternal and newborn health (MNH) services, as well as child health and nutrition services, stands at 35 percent and 42 percent,1 respectively. Malnutrition rates are rising in Yemen among children under five and pregnant and lactating women are the most affected. Around 2.1 million are currently estimated to be malnourished, including 1 million children affected by Moderate Acute Malnutrition (MAM) and 320,000 children suffering from Severe Acute Malnutrition (SAM).

Health service indicators have shown similar declines. Only 45 percent of HFs are fully functional as many HFs have been rendered non-operational due to conflict-related damages or destruction of supporting critical infrastructure, including for example waste water treatment plants. Other facilities were left deserted by staff owing to security risks associated with work at those facilities. The conflict has also generated a new wave of IDPs in certain geographic areas and has deepened economic pressures on most citizens with increasing poverty and unemployment rates. This has shifted health service utilization away from private and NGO sectors to the public system, resulting in increased demands on an already overburdened system.

WHO and UNICEF have maintained a steady presence, scaled up their operations, and strengthened their policy coordination following the conflict's onset. The Health Engagement Plan, with representation from local level players and agreement among development partners, identified the urgent needs of the country where the funding gap for health and nutrition essential services for 2016 stood at an estimated US $300 million as of July 2016. The Health Cluster, led by WHO and UNICEF, developed and is currently implementing this plan with a focus on the provision of an essential package of services (EPS) to address the health needs of the population and to maintain the operational capacity of the existing health system at the governorate health offices (GHOs) and district health offices (DHOs).

The emergency project include several interventions including nationwide immunization campaign activities. A review of these campaigns indicated that the management of the medical waste and disposal of used vaccination kits was weak.

This document will first provide the summary of the World Bank funded project and its institutional and implementation arrangements. It will then give an overview of the Medical Waste Management plan.

[1] Health Resources Availability Mapping System June 2016

2. Project Description

2.1 Project Components

This World Bank project will finance health and nutrition services as well as help maintain the capacity of the existing health system, i.e. public HFs and community-level engagement. The project will include three components discussed as follows:

Component 1: Improving Access to Health, Nutrition, and Public Health Services

This component will support the coverage of the population of Yemen with well-defined packages of health and nutrition services at both primary health care (PHC) and first level of referral/secondary care centres. The services are intended to cater to the essential and most urgent needs of the population through integrating the PHC model with the first level referral services, and thus ensuring a continuum of care for the population. In addition, it will support the integration of key mental health services into the provided package. The component will also prioritize the targeting of the most disadvantaged groups on a needs basis within the context of conflict, namely: women of reproductive age, children, and IDPs. This component includes three subcomponents:

Subcomponent 1.1: Strengthening the Integration of Primary Health Care Model (implemented by UNICEF)

This subcomponent will ensure continued service delivery at the PHC level to provide the essential health and nutrition services for the population.

PHC facility health and nutrition services. The services offered under this subcomponent will support the operations and services offered inside fixed PHC facilities. This subcomponent will include provision of medical and non-medical equipment, required nutrients and medicines, training of staff, and costs associated with clinical and administrative supervision.

Integrated outreach health and nutrition services. Given the significant service gap, this subcomponent will complement the fixed facility and community-based services through an integrated outreach model. This model will cater to the needs of the population in remote areas or IDPs through outreach rounds, and in areas without functioning fixed facilities, through mobile teams.2 Outreach rounds and mobile teams offer similar packages of PHC services and will be flexible to accommodate additional services based on the identified needs of target areas.

The integrated outreach model will include the following services and related activities: (a) MNH services; (b) child nutrition; (c) Integrated Management of Childhood Illness (IMCI); (d) mental health services; and (e) routine delivery of selected public health programs such as, but not limited to, routine immunization and malaria.

[2] Mobile teams will be targeting those areas without functioning fixed facilities and thus, those teams work on a biweekly basis. Outreach rounds operate in remote areas (zone 2 and 3) where there are fixed facilities (zone 1).

Community-based health services. The services provided at the PHC facilities and through the integrated outreach model will be complemented by a basic package of services at the household level through a nationwide network of community health volunteers (CHVs) and midwives. This network of community volunteers will also be trained to provide some psycho-social support for women and children.

This subcomponent will cover the basic equipment, medical and non-medical supplies, required nutrients and medicines, vaccines, training, and implementation expenses required for the aforementioned services through the facilities, integrated outreach, mobile teams and community-based services.

Subcomponent 1.2. Supporting Health and Nutrition Services at the First Level Referral Centers (implemented by WHO)

This subcomponent will complement the PHC model through ensuring the continuum of care. Therefore, it will support the following activities: (a) management of SAM cases with complications and for patients who failed Outpatient Therapeutic Program (OTP) at Therapeutic Feeding Centers (TFCs) and/or Stabilization Centers (SCs); (b) provision of Basic Emergency Obstetric and Neonatal Care (BEmONC) and Comprehensive Emergency Obstetric and Neonatal Care (CEmONC) services in targeted referral centers; and (c) provision of equipment, maintenance, medical and non-medical supplies, essential drugs, vaccines, training, and implementation expenses required for the first level referral centers. This subcomponent will also support the provision of basic supplies (water and fuel) and essential medicines to PHC facilities within an integrated supply chain system serving the referral centers in coordination with UNICEF's targeted PHC's.

Subcomponent 1.3. Sustaining the National Health System Preparedness and Public Health Programs (implemented by WHO)

Disease surveillance and outbreak response. This will include the roll-out of the current electronic Disease Early Warning System (eDEWS) nationwide through improving the core functions of the system, including data collection from HFs, field investigation, implementation of preparedness plans as well as stockpiling, vector control, and field activities to respond to outbreaks, such as cholera, dengue fever, and malaria.

National public health campaigns. The project will support the implementation of the nationwide immunization and treatment campaigns such as polio, measles, trachoma, and schistosomiasis. Funds will be made available to support the implementation expenses of the campaigns as well as the procurement of vaccines and drugs, if needed.

Cholera management. A multifaceted approach will be supported to prevent and control cholera, and to reduce deaths. A combination of surveillance (through eDEWS), water (chlorination), sanitation and hygiene, social mobilization, treatment, and oral cholera vaccines (OCVs) will be used. Therefore, the project will support the WHO-developed Cholera Kits for the prevention and control of cholera outbreak.

Component 2: Project Support, Management, Evaluation and Administration (implemented by WHO)

This component will support project administration and monitoring and evaluation activities (M&E) to ensure smooth and satisfactory project implementation. The component will finance: (a) general management support for both WHO and UNICEF; and (b) hiring of a third-party monitoring (TPM) agency for which the terms of reference (TOR) will be agreed upon with the World Bank, and will complement the current TPM arrangements at both agencies. Both UNICEF and WHO will perform core project management and implementation support activities through their multidisciplinary teams located in their offices in Sana'a and satellite offices all over Yemen. This will be achieved through the following; (a) Monitor the project targets, and evaluate the program results in coordination with the existing local health workforce; (b) handle procurement, financial, and disbursement management, including the preparation of withdrawal applications under the project; (c) ensure that independent audits of the project activities are carried out; and (d) ensure that all reporting requirements for IDA are met according to the Project Grant Agreement. The two organizations will support the field supervision and program evaluation activities through their existing resources. The project, however, will complement the project monitoring and evaluation not only to measure the results, but also to extract lessons and recommendations for future interventions.

Component 3: Contingent Emergency Response

The objective of this sub-component is to improve the country's response capacity in the event of an emergency, following the procedures governed by OP/BP 10.00 paragraph 13 (Rapid Response to Crisis and Emergencies). There is a probability that during the life of the project an epidemic or outbreak of public health importance or other health emergency may occur, resulting in major adverse economic and/or social impact. In anticipation of such an event, this contingent emergency response component (CERC) provides for a request from UNICEF and WHO to the World Bank to support by re-allocating funds from other project components or serving as a conduit to process an additional financing from the PEF or other funding sources for eligible emergencies to mitigate, respond and recover from the potential harmful consequences arising from the emergency situation. An "Emergency Response Operational Manual" (EROM) will be prepared by UNICEF and WHO and agreed upon by the World Bank team in case this component will be triggered.

3. Baseline Data

3.1 Characterization of the country & demography

The Republic of Yemen (ROY) is located in the southern part of the Arabian Peninsula and extends about 1100 km from the Red Sea in the west to Oman in the east. The Indian Ocean is in the south and Saudi Arabia in the north. The total area is 555,000 km2, with varied topography, from the coastal plains and lowlands to highlands in the central region (with elevation reaching 3,700 meters) and plateau regions in the east and north.

Administratively, the country has 22 administrative and geographic units called governorates. Each governorate has several districts. The governorates are subdivided into 333 districts (muderiah), which are subdivided into 1,996 sub-districts, and then into 40,793 villages and 88,817 sub villages.

About half of Yemen's population of about 26.8 million live in areas directly affected by the conflict which started 2015. Over 21.1 million Yemenis (80 percent of the population) are in need of humanitarian assistance and 2.8 million Yemenis have been forcibly internally displaced. Severe food insecurity affects 14 million people, and an estimated 3.3 million are malnourished, including 1.4 million children, of whom 462,000 are suffering from acute malnutrition. Basic services across the country are on the verge of collapse.3 Chronic drug shortages and conflict-related destruction constrain access to health care services for around 14 million Yemenis, including 8.3 million children. Basic services across the country are on the verge of collapse. Since the start of the cholera outbreak on October 6, 2016, the number of suspected cholera cases in Yemen has soared to 6,119 and WHO reported 68 deaths associated with cholera in 10 governorates as of November 24, 2016.[4]

3.2 Administrative organization of health care in Yemen

The Yemen Health System dates back to the last quarter of the 19th century, the period during which Britain entered the southern part of the country. It also dates back to the second half of the 20th century, thanks to the two revolutions of September 1962 in the Northern part and October 1963 in the Southern part of the country at that time. After Yemen Unification in 1990, the health system had also been unified, as there was no big difference between the two systems except that the health system in the southern part was defective while it was viable in the Northern part. The role of the private sector has been enhanced in the eastern and southern provinces after the unification. Generally speaking, one can say that the Yemen Health system represents about 95% of the total health care and services provided to the citizen with a government finance to its prevention, medical and rehabilitation activities. Its structure is horizontally based on the health centers and units at the first touchline. Vertically, the health system depends on the prevention health programs and projects against epidemic and non-epidemic diseases.

[3] http://reliefweb.int/report/yemen/2017-humanitarian-needs-overview

[4] Figures are updated as of November 25, 2016

With the start of the current crisis, a new set of challenges emerged that jeopardized the very core foundations of the Yemeni health system and its ability to meet the most basic health and nutrition needs of the population. Only 45 percent of HFs are fully functional and the availability of maternal and newborn health (MNH) services, as well as child health and nutrition services stand at 35 percent and 42 percent,5 respectively. Essential inputs to the health facilities (HFs) and outreach teams have become scarcer and, in many places, non-existent. This is most evident in: (a) severe shortages of essential medicines and medical supplies required at all levels of care with huge disruptions in procurement, transport and supply-chain capabilities; (b) diminished, and sometimes non-existing, safe potable water from the public domain and lack of essential fuel, power, maintenance, water pumps, among others; (c) insufficient operational and logistical resources for essential health and nutrition programs at first level referral centers, especially for emergency obstetric and maternal care as well as referral nutrition services, further risking the lives of hundreds of thousands. Consequently, the Expanded Program for Immunization (EPI) and national vaccination campaigns have been interrupted, threatening the re-emergence of some vaccine preventable diseases and risking the lives of millions of the Yemeni children. Also, pockets of new diseases that are usually associated with conflict-stricken countries (for example, cholera and trachoma) are emerging under a health system lacking adequate surveillance and rapid response systems for early detection and treatment.

[5] Health Resources Availability Mapping System June 2016

4. Legal Framework & Institutional Arrangements

Legal Regulatory Framework

International and national legislation is the basis for improving health-care waste practices in any country. It establishes legal controls and permits the national agency responsible for the disposal of health-care waste. For this project, the following legal laws and regulatory guidelines apply:

Yemeni National Laws

- Environmental Protection Law nr.26 of 1995 aiming at protection conservation of the environment and maintenance of its natural ecosystems
- Cleanliness Law nr.39 of 1999
- Water Law (33) for 2002

World Health Organization (WHO) Guidelines

The following WHO guidelines apply for this project:
-WHO guidelines on hand hygiene in health care of 2009
-Management of Wastes from Health-Care Activities of 2013
-Management of waste from injection activities at district level: guidelines for district health managers of 2006
-Management of solid health-care waste at primary health-care centers of 2005
More of WHO resources & guidelines are accessible under:
https://www.healthcare-waste.org/resources/documents/

United Nations International Children Emergency Fund (UNICEF) Guidelines

The project will operate under the following UNICEF guidelines:
-Cholera Toolkit of 2013
Other UNICEF publications and resources are available under:
https://www.unicef.org/publications/index_pubs_su.html

World Bank Safeguards Policies & Guidelines

- OP. 4.01 on Environmental Assessment: The World Bank policy on Environmental Assessment OP. 4.01 is triggered as the project involves the disposal of the vaccination kits, syringes and potentially other medical waste. The project is categorized as B because of the potential small-scale and site-specific impacts associated with the disposal of vaccinations kits. This waste management plan is prepared and will be implementation by the implementing agencies to fulfill the requirement of the OP. 4.01.

- Environmental, Health, and Safety Guidelines (accessible at www.ifc.org/ehsguidelines).

Institutional Arrangement

Under the proposed Emergency Health and Nutrition Project (EHNP), UNICEF and WHO will be the grant recipients as well as the managing and implementing entities on an exceptional basis, where each organization is responsible for their respective activities based on the project design and the implementation experience under the HPP and SCP. Both organizations managed to set implementation mechanisms in place for both projects, through the existing local public system structures, to deliver various results on the ground during the ongoing conflict in Yemen. Since March 2015, these agencies further strengthened and expanded their operational capacities and presence in the country to address the health issues at different levels.

WHO and UNICEF are key leaders of the Yemen Health Cluster, which is contributing to the Health Engagement Plan in Yemen. Through their respective networks of providers, contractors, GHOs, DHOs, and international/local nongovernmental organizations (INGOs/LNGOs), both organizations have existing institutional and implementation channels for the delivery of essential services and ensuring the availability of critical medicines nationwide. These implementation arrangements, which proved successful under the HPP and SCP, are context specific and flexible based on the population needs and local capacity (DHOs or NGOs) to provide the identified package of healthcare services. Therefore, both organizations will work with the existing local health system structures at the governorate, district and community levels to preserve the national capacity and maintain the core functions of the health system. On the PHC level, UNICEF will work closely with the public facility staff hired at the facility level (doctors, nurses, technicians, etc.). Outreach and mobile teams will be primarily staffed by local health facility and community level workers and will be augmented by external capacities should the need arise. GHO and DHO staff networks will be used in their supervisory, support, and monitoring roles. However, CBO's will be utilized to directly provide the needed services in areas where insufficient health staff is the norm or in areas with large concentrations of IDPs. UNICEF will also be responsible for the training, development and monitoring of CHV's.

At the Secondary Care level, WHO will provide direct logistical, operational and capacity support to the teams working in public hospitals at various targeted units (maternal wards, neonatal wards and nutrition TFC/SCs). Contracting for the needed capacities to serve in deprived hospitals will be also provided for. WHO will also work closely with vendors and suppliers to maintain adequate flow of basic supplies (water and fuel) and essential medicines for all levels of care. WHO will also be responsible for operationalizing the sites under eDEWS which are staffed by public health workers in terms of logistics and capacity readiness. Finally, WHO will oversee the logistical preparation and execution of the national targeted campaigns

against various infectious agents by working closely with implementing teams following the same modalities, and in close collaboration with UNICEF.

5. Medical Waste Management Plan (MWMP)

The safe and sustainable management of medical waste is a public health imperative and a responsibility of partners working in the health sector. Improper management of medical waste poses a significant risk to patients, health-care workers, the community and the environment. This problem can be solved. The right investment of resources and commitment will result in a substantive reduction of disease burden and corresponding savings in health expenditures.[6]

The effective management of medical waste is an integral part of a national health-care system, and as such needs to be integrated in this project. A holistic approach to medical waste management should include a clear delineation of responsibilities, occupational health and safety programs, waste minimization and segregation, the development and adoption of safe and environmentally-sound technologies, and capacity building.

Medical waste refers to the entirety of waste generated by health care and medical research facilities and laboratories. Though only 10-25% of medical waste is considered hazardous, posing various health and environmental risks, it is essential that a comprehensive plan be developed to prevent and mitigate these risks.[7]

Objective

The plan's overall objective is to prevent and/or mitigate the negative effects of medical waste on human health and the environment. This must be managed in a safe manner to prevent the spread of infection and reduce the exposure of health workers, patients and the public to the risks from medical waste. The plan includes advocacy for good practices in medical waste management and is to be used by health, sanitary and cleaning workers who manage medical waste in mobile and fixed units, as well as health centers that are included in the project. All the health facilities and health services supported through the World Bank project are to have appropriate procedures and capacities in place to manage medical waste.

MWM is part of a set of measures to ensure patient safety and quality of medical services. In addition to the implementation of the MWMP, WHO and UNICEF will further develop and support the implementation of appropriate standards for patient safety, including for example Infection Prevention and Control measures, and adequate water, sanitation and hygiene standards. Together, they will be integrated in a performance monitoring system.

5.2 Storage of Consumable Materials and Vaccinations

Medical products need storage in an access-controlled environment. It is important to identify products that are at risk of theft or abuse or have the potential for addiction, and to provide

[6] http://www.who.int/water_sanitation_health/facilities/waste/hcwprinciples.pdf?ua=1;

[7] Yves Chartier, Jorge Emmanuel, Ute Pieper, Annette Prüss, Philip Rushbrook, Ruth Stringer, William Townend, Susan Wilburn, Raki Zghondi, eds, *Safe management of wastes from health-care activities* (Malta: World Health Organization, 2014), page 3.

increased security for those items. This includes products that are in high demand or have the potential for resale (black market value). As this this plan deals with medical waste, the focus on the following section will be on the handling and storage of vaccinations.

Vaccine Storage and Handling

Exposure of vaccines to temperatures outside the recommended ranges can decrease their potency and reduce the effectiveness and protection they provide. Storage and handling errors can cost thousands of dollars in wasted vaccine and revaccination, and create medical waste. Vaccine management, including proper storage and handling procedures, is the basis on which good immunization practices are built. Vaccines must be stored properly from the time they are manufactured until they are administered. Assuring vaccine quality and maintaining the cold chain is a shared responsibility among manufacturers, distributors, public health staff, and health-care providers. A proper cold chain is a temperature-controlled supply chain that includes all equipment and procedures used in the transport and storage and handling of vaccines from the time of manufacture to administration of the vaccine. By following a few simple steps and implementing best storage and handling practices, providers can ensure that patients will get the full benefit of vaccines they receive.

Storage and Handling Plans

Every facility should have detailed written protocols for routine and emergency vaccine storage and handling and they should be updated annually. These policies and procedures should be available in writing as a reference for all staff members and easily accessible. A routine storage and handling plan provides guidelines for daily activities, such as:

- Ordering and accepting vaccine deliveries
- Storing and handling vaccines
- Managing inventory
- Managing potentially compromised vaccines

Every facility should also have an emergency vaccine retrieval and storage plan. The plan should identify a back-up location where the vaccines can be stored. Considerations when choosing this site include appropriate storage units, temperature monitoring capability, and a back-up generator that can maintain power to the vaccine storage units. Potential back-up locations might include a local hospital, pharmacy, long-term care facility, or the Red Cross. There should be an adequate supply of packing materials and portable refrigerators and freezers or qualified containers and packouts on hand. Power outages or natural disasters are not the only events that can compromise vaccine. Forgotten vials of vaccine left out on the counter or doses of

vaccine stored at improper temperatures due to a storage unit failure are other examples of how vaccines can be potentially compromised. Contact the local or state health department immunization program, vaccine manufacturer(s), or both for appropriate actions or guidelines that should be followed for all potentially compromised vaccines. Do not discard vaccines unless directed to by the immunization program and/or the manufacturer.

Measures to Prevent / Reduce Exposure to Infections / Diseases

Health care providers and personnel may be exposed to general infections, blood-borne pathogens, and other potential infectious materials (OPIM) during care and treatment, as well as during collection, handling, treatment, and disposal of health care waste. The following measures are recommended to reduce the risk of transferring infectious diseases to health care providers:

- Formulate an exposure control plan for blood-borne pathogens;
- Provide staff members and visitors with information on infection control policies and procedures;
- Establish Universal / Standard Precautions22 to treat all blood and other potentially infectious materials with appropriate precautions, including:
  - Immunization for staff members as necessary (e.g.vaccination for hepatitis B virus)
  - Use of gloves, masks, and gowns
  - Adequate facilities for hand washing24. Hand washing is the single most important procedure for preventing infections (e.g. nosocomial and community). Hand washing should involve use of soap / detergent, rubbing to cause friction, and placing hands under running water. Washings of hands should be undertaken before and after direct patient contacts and contact with patient blood, body fluids, secretions, excretions, or contact with equipment or articles contaminated by patients. Washing of hands should also be undertaken before and after work shifts; eating; smoking; use of personal protective equipment (PPE); and use of bathrooms. If hand washing is not possible, appropriate antiseptic hand cleanser and clean cloths / antiseptic towelettes should be provided. Hands should then be washed with soap and running water as soon as practical o Procedures and facilities for handling dirty linen and contaminated clothing, and preparing and handling food
  - Appropriate cleaning and waste disposal practices for the health care workplace

- The following recommendations should be implemented when using and handling of needles / sharps:
  - Use safer needle devices and needleless devices to decrease needle stick or other

sharps exposures.

- Do not bend, recap, or remove contaminated needles and other sharps unless such an act is required by a specific procedure or has no feasible alternative
- Do not shear or break contaminated sharps
- Have needle containers available near areas where needles may be found
- Discard contaminated sharps immediately or as soon as feasible into appropriate containers
- Used disposable razors should be considered contaminated waste and disposed of in appropriate sharps containers

- Establish policies to exclude animals from facility property.

5.3 MEDICAL WASTEMEDICAL WASTE MANAGEMENT PROCEDURES

As highlighted by WHO recommendations[8], the first step in medical waste management is to minimize waste. To this end, a standardized assessment tool should be developed to identify gaps in the management process, including occupational health issues. Though all staff are responsible for managing waste, to ensure optimal waste management, it is recommended to establish a facility-based Waste Management Committee and designate a single waste management project lead. The project lead should coordinate the medical waste management system and be supported by the health facility management. In addition, the roles and responsibilities of key personnel engaged in waste management activities should be defined during all phases (i.e. generation, segregation, transportation and final disposal) and a waste-management committee should be established.

Medical Waste Segregation, Collection, and Transport

A programmed routine for biomedical waste collection should be established as part of the medical waste management plan. Waste should be separated into categories and placed in designated containers (i.e., covered buckets) as soon as it is generated in the treatment room or department. Health care workers are responsible for appropriately disposing of the waste. The number of places where patients and visitors can dispose of waste should be minimized (e.g. using designated containers in communal areas). WHO recommends that small amounts of chemicals can be collected with infectious waste.

Large amounts of hazardous chemicals should be packed in chemical resistant containers and be sent to specialized treatment facilities (if available).

Waste buckets should be transported with their lids securely in place to prevent spillage. When many containers need to be transported, a cart or trolley should be used to prevent back injury.

[8] http://apps.who.int/iris/bitstream/10665/85349/1/9789241548564_eng.pdf

Offsite transport of hazardous waste should be subject to national regulations. If there are none, then the 'Recommendations on the transport of dangerous goods' published by the UN may be referred to. Certain recommendations should be followed by the sanitary workers and cleaners:

1. Collection of medical waste should be from key sites (e.g. within nursing stations, mobile and fixed units), followed by transfer to the designated point(s) for segregation and/or treatment
2. Waste should be collected daily at the same time (or as frequently as required) and transported to the designated central storage/treatment site.
3. No bags should be removed unless they are labelled with their point of production (health unit/center) and contents.
4. Bags or containers should be replaced immediately with new ones of the same type.
5. There should be enough buckets provided to ensure an appropriate number of clean buckets in rotation. Buckets should be washed and disinfected before reuse.
6. The waste should be placed in rigid or semi-rigid and leak-proof containers.

Waste Segregation Strategies

At the point of generation, waste should be identified and segregated. Non-hazardous waste, such as paper and cardboard, glass, aluminum and plastic, should be collected separately and recycled. Food waste should be segregated and composted. Infectious and / or hazardous wastes should be identified and segregated according to its category using a color-coded system. If different types of waste are mixed accidentally, waste should be treated as hazardous. Other segregation considerations include the following:

- Avoid mixing general health care waste with hazardous health care waste to reduce disposal costs;
- Segregate waste containing mercury for special disposal.
- Management of mercury containing products and associated waste should be conducted as part of a plan involving specific personnel training in segregation and clean up procedures;
- Segregate waste with a high content of heavy metals (e.g. cadmium, thallium, arsenic, lead) to avoid entry into wastewater streams;
- Separate residual chemicals from containers and remove to proper disposal containers to reduce generation of contaminated wastewater. Different types of hazardous chemicals should not be mixed;
- Establish procedures and mechanisms to provide for separate collection of urine, feces, blood, vomits, and other wastes from patients treated with genotoxic drugs. Such wastes are hazardous and should be treated accordingly
- Aerosol cans and other gas containers should be segregated to avoid disposal via incineration and related explosion hazard;
- Segregate health care products containing PVC to avoid disposal via incineration or in landfills

On-site Handling, Collection, Transport and Storage

- Seal and replace waste bags and containers when they are approximately three quarters
- Full bags and containers should be replaced immediately;
- Identify and label waste bags and containers properly prior to removal;
- Transport waste to storage areas on designated trolleys / carts, which should be cleaned and disinfected regularly;
- Waste storage areas should be located within the facility and sized to the quantities of waste generated, with the following design considerations:
    - o Hard, impermeable floor with drainage, and designed for cleaning / disinfection with available water supply
    - o Secured by locks with restricted access
    - o Designed for access and regular cleaning by authorized cleaning staff and vehicles
    - o Protected from sun, and inaccessible to animals / rodents
    - o Equipped with appropriate lighting and ventilation
    - o Segregated from food supplies and preparation areas
    - o Equipped with supplies of protective clothing, and spare bags / containers
- Unless refrigerated storage is possible, storage times between generation and treatment of waste should not exceed the following:
    - o Temperate climate: 72 hours in winter, 48 hours in summer
    - o Warm climate: 48 hours during cool season, 24 hours during hot season
- Store mercury separately in sealed and impermeable containers in a secure location;
- Store cytotoxic waste separately from other waste in a secure location;
- Store radioactive waste in containers to limit dispersion, and secure behind lead shields.

Waste Handling Safety Measures

1. All personnel handling infectious medical waste shall wear gloves and additional protective medical clothing and personal protective equipment (PPE) appropriate to the level of risk they encounter and shall remove any protective medical clothing used prior to leaving the work area and to place it in a designated area or container. When performing procedures where splashing is not expected, gloves are the minimum PPE that may be worn;
2. Protective medical clothing and PPE should not be submitted for laundering unless sterilized;
3. When performing procedures where splashing may occur or when infectious medical waste bags or containers may contact more than the worker's hands and wrists, the following medical protective clothing and PPE is required in addition to gloves;
    - Appropriate protective medical clothing should be of material that does not permit infectious medical waste from penetrating and reaching workers clothes or skin;
    - Eye protection, surgical face masks, and face shields when personnel may reasonably anticipate facial exposure to infectious medical waste.

- Implement immunization for staff members, as necessary (e.g. vaccination for hepatitis B virus, tetanus immunization).

Medical Waste Storage and Packaging

1. A temporary waste storage area, inside the waste zone, should be set aside to store soft waste until it can be incinerated. Storage of medical waste should be for the minimum possible time, 24-48 hours in hot countries, 48-72 hours for cold countries (WHO).
2. Biomedical waste other than sharps and bulk liquids must be packaged in sealed in bags which are leak-proof and rip-resistant.
3. Sharps shall be placed in rigid leak and puncture resistant containers.
4. Bulk liquids to be transported off-site shall, in addition to the above requirements, be placed in rigid containers.
5. All medical waste must be stored in a secure area designated for this material.
6. Pathological waste, stored anywhere for more than 24 hours must be refrigerated. Storage of biomedical wastes may need to be stored at the facility of origin until a large enough quantity is accumulated to warrant on-site treatment, or until transport to an offsite treatment facility is scheduled.

The following general guidelines apply to typical medical waste storage, transfer, and collection areas:

1. Store medical/infectious waste in a designated area located at or near the treatment site or the waste pickup point.
2. Areas used to store medical/infectious waste should be durable, easily cleanable, impermeable to liquids, and protected from vermin and other potential mechanisms that might spread infectious agents.
3. The manner of storage should maintain the integrity of the containers, prevent leakage of waste from the container, provide protection from the weather, and maintain the waste in a non-putrescent, odorless state (this may require refrigeration).
4. Storage areas should have adequate ventilation systems.
5. Access should be securely controlled and limited. Due to the hazardous nature of some medical wastes, appropriate methods of storing waste will help to prevent accidents and infections. Storage locations should be accessible, exclusive, secure, hygienic and sanitary, located as far as possible from patient treatment areas. Storage locations should be integrated with the physical and architectural infrastructure of the healthcare facility.

Transport to External Facilities

- Transport waste destined for off-site facilities according to the guidelines for transport of hazardous wastes / dangerous goods in the General EHS Guidelines;
- Transport packaging for infectious waste should include an inner, watertight layer of metal or plastic with a leak-proof seal. Outer packaging should be of adequate strength and capacity for the specific type and volume of waste;

- Packaging containers for sharps should be puncture-proof;
- Waste should be labeled appropriately, noting the substance class, packaging symbol (e.g. infectious waste, radioactive waste), waste category, mass / volume, place of origin within hospital, and final destination;
- Transport vehicles should be dedicated to waste and the vehicle compartments carrying waste sealed.

Disposal of Contaminated Waste

In facilities that have a waste zone, this is the final disposal site of the medical waste. A fully functional waste zone should have the following components:

1. An incinerator or burner for treatment of soft waste.
2. An ash pit for disposal of residues from the incinerator or burner and a covered pit with a hatch lid.
3. A sharps pit for disposal of sharps containers. A sealed, covered pit with a 1m length of pipe incorporated in the top to prevent access to the contents.
4. An organics pit for disposal of human tissue and other biological waste.
5. An infiltration facility or sewer for the disposal of liquids.

The waste zone should be kept locked at all times. The waste manager has the responsibility for its correct management. Kitchen waste and general waste from patients and visitors is not classified as medical waste.

Types of medical wastes are in annex 1. A non-exhaustive list of activities to be undertaken by the waste management committee or the manager is outlined in the list below.

Table 1: Common medical waste and disposal methods

Waste Item*	Waste Collection	Storage	Treatment/Disposal
Needles, ampoules, scalpels, broken glass and vials	Closed sharps container	No	Sharps pit
Needle caps, syringes (w/o needles), masks, gloves, paper and dressings	Soft bucket	Temporary	Incinerator/ash Pit
Human body tissue, blood and fluids	Organics bucket	No	Organics pit
Wastewater	Bucket	No	Sewer/Infiltration facility
Domestic waste	Bin in communal area	No	Domestic waste pit

Best Practice for the Disposal of Liquid Contaminated Wastes

Liquid contaminated waste (e.g. human tissue, blood, feces, urine and other body fluids) requires special handling, as it may pose an infectious risk to healthcare workers with contact or handle the waste. Steps for the disposal of liquid contaminated wastes are the following:

- Wear PPE (utility gloves, protective eyewear and plastic apron)
- Carefully pour wastes down a utility sink drain or into a flushable toilet and rinse the

toilet or sink carefully and thoroughly with water to remove residual wastes. Avoid splashing.

- If a sewage system doesn't exist, dispose of liquids in a deep, covered hole, not into open drains. This should be located at a safe distance from water sources.
- Decontaminate specimen containers by placing them in a 0.5% chlorine solution for 10 minutes before washing them.
- Remove utility gloves (wash daily or when visibly soiled and dry).
- Wash and dry hands or use an antiseptic hand rub as described above.

Acids and alkalis should be diluted; pH neutralized and disposed of to the sewer with water. Neutralization can be done with lime, which is cheap and effective.

In cases where wastewater is not discharged to sanitary sewage systems, HCF operators should ensure that wastewater receives on-site primary and secondary treatment, in addition to chlorine disinfection. Techniques for treating wastewater in this sector include source segregation and pretreatment for removal / recovery of specific contaminants such as radio isotopes, mercury, etc.; skimmers or oil water separators for separation of floatable solids; filtration for separation of filterable solids; flow and load equalization; sedimentation for suspended solids reduction using clarifiers; biological treatment, typically aerobic treatment, for reduction of soluble organic matter (BOD); biological or chemical nutrient removal for reduction in nitrogen and phosphorus; chlorination of effluent when disinfection is required; dewatering and disposal of residuals as hazardous medical / infectious waste.

Additional engineering controls may be required for (i) removal of active ingredients (antibiotics and miscellaneous pharmaceutical products, among other hazardous constituents), and (ii) containment and treatment of volatile constituents and aerosols stripped from various unit operations in the wastewater treatment system.

Wastewater generated from use of wet scrubbers to treat air emissions should be treated through chemical neutralization, flocculation, and sludge settling. Sludge should be considered hazardous, and may be treated off-site in a hazardous waste facility, or encapsulated in drums with mortar and landfilled. Sludge treatment should include anaerobic digestion to ensure destruction of helminthes and pathogens. Alternatively, it can be dried in drying beds before incineration with solid infectious wastes.

Cholera Epidemic**:** In case of a cholera epidemic, hospital sewage must also be treated and disinfected. *Vibrio cholerae,* the causative agent of cholera, is easily killed and does not require use of strong disinfectants. Buckets containing stools from patients with acute diarrhea may be disinfected by the addition of chlorine oxide powder or dehydrated lime oxide (WHO 1999).

The most contaminated waste water will come from the mortuary, showers, laundry, and kitchen washing area. Waste water from this area must, therefore, be disposed of in soak pits possibly after first going through grease traps (so that the soak pit does not become clogged).

Soakaways must be located at least 30 meters from any groundwater source and the bottom of any soakaway pit is at least 1.5 meters above the water tables.
Annex 3 shows the treatment and disposal methods for categories of health care waste

Best Practice for the Disposal of Solid Contaminated Wastes

Solid contaminated waste (e.g. surgical specimens, used dressings and other items contaminated with blood and organic materials) may carry microorganisms. Remember:

- Never use hands to compress waste into containers
- Hold plastic bags at the top
- Keep bags from touching or brushing against the body while lifting or during transport

Steps for the disposal of solid contaminated wastes are:

- Wear heavy-duty or utility gloves when handling and transporting solid wastes.
- Wearing glasses if you are working with material that may splash into your face or eyes
- Dispose of solid wastes by placing them in a plastic or galvanized metal container with a tight-fitting cover. Never recap needles after use.
- Collect the waste containers on a regular basis and transport the burnable ones to the incinerator or area for burning.

If incineration is not available or waste is non burnable, bury it. Remove utility gloves (wash daily or when visibly soiled and dry).

- Wash and dry hands or use an antiseptic hand rub as described above.
- Disposing of waste into designated containers as soon as it is generated
- Wearing boots, overalls, glasses and gloves when disposing of waste
- Using adequate tools to avoid contact with waste (brush, shovel)

It should be mentioned that properly designed and operated sanitary landfills will protect against air and groundwater contamination. Disposal of waste into open dumps is not considered good practice and should be avoided. Pre-treatment of waste prior to land disposal may involve encapsulation (filling containers with waste and an immobilizing material and sealing the containers).

Incineration

Incineration is a high-temperature process that reduces the volume and weight of waste. This process is usually selected to treat waste that cannot be recycled, reused or disposed of in a sanitary landfill or dumpsite. Medical waste produced under this project will be incinerated at health facilities that are equipped with incinerators. In facilities with no incinerators, wastes will be properly collected and safely transported to bigger facilities with incinerators.

Types of Incinerators

Incinerators can range from extremely sophisticated, high-temperature ones to very basic units that operate at much lower temperatures. All types of incinerators, if operated properly,

eliminate micro-organisms from waste and reduce the waste to ashes. Four basic types of incinerators are used for treating waste:

a) Double-chamber, high-temperature incinerators are designed to burn infectious waste.
b) Single-chamber, high-temperature incinerators are less expensive and are used when double chamber incinerators are not affordable.
c) Rotary kilns operate at high temperatures and are used for destroying cytotoxic substances and heat-resistant chemicals.
d) Drum or brick (clay) incinerators operate at lower temperatures and are less effective, but can be made locally using readily available materials.

Types of Waste That Should Not Be Incinerated

While it is possible to incinerate soft waste, the below items SHOULD NOT be incinerated:

1. Pressurized gas containers (aerosol cans)
2. Large amounts of reactive chemical waste
3. Silver salts and photographic or radiographic wastes
4. Plastic containing polyvinyl chloride (blood bags, IV tubing or disposable syringes)
5. Waste with high mercury or cadmium content, such as broken thermometers, used batteries and lead-lined wooden panels
6. Ampoules or vials, as molten glass will cause the grate to block up and vials can explode.
7. Bottles of chemicals and reagents due to risk of explosion and formation of toxic gases.
8. Needles due to the risk of needle stick injury from the metal ash.
9. Expired drugs.
10. Kitchen waste as this is wet, does not burn and will lower the efficiency.

Solid wastes that should not be incinerated will be packaged, transported to and disposed of in Government recognized landfill.

Annex 3 shows the treatment and disposal methods for categories of health care waste

Waste Minimization, Reuse, and Recycling

Facilities should consider practices and procedures to minimize waste generation, without sacrificing patient hygiene and safety considerations, including:

- Source reduction measures:
- Consider options for product / material substitution to avoid products containing hazardous materials that require the product to be disposed as hazardous or special waste (e.g. mercury or aerosol cans), and preferring products with less packaging or products that weigh less than comparable products that perform the same function
- Use of physical rather than chemical cleaning practices (e.g. using microfiber mops and cloths), where such practices do not affect disinfection and meet relevant standards for hygiene and patient safety.
- Waste toxicity reduction measures:
- Consider options for product / material substitution for equipment containing mercury or other hazardous chemicals; products that may become hazardous waste when disposed; products made of polyvinyl chloride (PVC6); halogenated compounds; products that off-gas volatile organic compounds (VOCs), or products that contain persistent, bioaccumulative

and

- toxic (PBT) compounds; products that contain substances which are carcinogenic, mutagenic or reproductive toxins (CMR)
- Use of efficient stock management practices and monitoring (e.g. for chemical and pharmaceutical stocks), including:
- Small / frequent orders for products that spoil quickly and strict monitoring of expiry dates
- Complete use of old product before new stock is used
- Maximization of safe equipment reuse practices, including:
- Reuse of equipment following sterilization and disinfection (e.g. sharps containers)

How to Build and Use a Simple Drum Incinerator for Waste Disposal[9]

Simple drum incinerator is the best practice for biomedical waste treatment for healthcare facilities with limited resources and where high-temperature incinerators are not affordable, waste may be incinerated in a drum incinerator, a drum incinerator is the simplest form of single chamber incinerator. It can be made inexpensively and is better than open burning.

Steps for building & using simple drum incinerator are the following:

- Where possible, select a site downwind from the clinic.
- Build a simple incinerator using local materials (mud or stone) or a used oil drum (e.g. a 55-gallon drum). The size depends on the amount of daily waste collected.
- Collect all waste containers and locate them next to the incinerator for easy handing during operation**.**
- Make sure the incinerator has:
    a) Sufficient air inlets underneath for good combustion
    b) Loosely placed fire bars to allow for expansion
    c) An adequate opening for adding fresh refuse and for removal of ashes
    d) A long enough chimney to allow for a good draft and evacuation of smoke
- Place the drum on hardened earth or a concrete base.
- Burn all combustible waste, such as paper and cardboard, as well as used dressings and other contaminated wastes. If the waste or refuse is wet, add kerosene so that a hot fire burns all the waste. Ash from incinerated material can be treated as non-contaminated waste.
- Ashes should always be removed from the incinerator PRIOR to operation; otherwise the efficiency of combustion will be compromised.
- It is recommended to install an ashtray under the grate to catch the ashes.
- Pull out the ashtray and grate out and carefully clean with the brush and ash shovel.
- Dispose of the ash directly to the ash pit.
- Any remaining ashes inside the chambers should be removed with a small, long handled

[9] See also Guidelines on How to Construct, Use, and Maintain a Waste Disposal Unit. WHO, 2005, and De Montfort Medical Waste Incinerator at http://www.who.int/management/quality/Waste/en/index2.html

brush and the ash shovel, transferred to a bucket and disposed of in the ash pit.

Open Burning

Open is not recommended because it is dangerous, unsightly and the wind will scatter the waste. If open burning must be done, burn in a small, designated area, transport waste to the site just before burning and remain with the fire until it is out.

Burying Waste

Only contaminated and hazardous waste needs to be buried. In healthcare facilities with limited resources, safe burial of wastes on or near the facility may be the only option available for waste disposal. To limit health risks and environmental pollution, some basic rules are:

1. Access to the disposal site should be restricted (Build a fence around the site to keep animals and children away).
2. The burial site should be lined with a material of low permeability (e.g. clay), if available.
3. Select a site at least 50 meters (164 feet) away from any water source to prevent contamination of the water table. The site should have proper drainage, be located downhill from any wells, free of standing water and not in an area that flood.
4. Large quantities (over 1 kg) of chemical (liquid) wastes should not be buried at the same time; burial should be spread over several days. Safe on-site burial is practical for only limited periods of time (1–2 years), and for relatively small quantities of waste. During the interval, staff should continue to look for a better, permanent method for waste disposal.

Annex 3 shows the treatment and disposal methods for categories of health care waste

How to Make and Use a Small Burial Site for Waste Disposal

- Find an appropriate location.
- Dig a pit 1 meter (3 feet) square and 2 meters (6 feet) deep. The bottom of the pit should be 2 meters (6 feet) above the water table.
- Dispose of the contaminated waste in the pit and cover the waste with 10–15 cm (4–6 inches) of dirt each day. The final layer of dirt should be 50–60 cm (20–24 inches) and compacted to prevent odors and attraction of insects, and to keep animals from digging up the buried waste. Depending on the volume of waste, this pit should last 30 to 60 days.

Cost of Implementing the Medical Waste Management Plan

The cost associated with the implementation of the arrangements, practices and measures suggested in this plan is built in the overall cost of implementing the project. No special requirements are needed for implementing this plan.

Awareness Raising & Capacity Building

Health care staff should be trained and aware of good practices and procedures of waste management under this plan. Such practices and procedures should be disseminated to the health care units/facilities to be implemented as part of the project activities through the following options:

- Designating one of the members of the teams to train other health care staff on the management of generated waste.
- Printing leaflets and booklets of good practices/procedures for waste management and disseminate these materials to the health units/facilities with medicine and vaccination.
- Recruiting staff/consultants whose task is to train health care staff on managing wastes generated from facilities and units supported under this project.

6. MONITORING PLAN

Monitoring is required to follow-up on decisions made to intervene in various activities of medical waste management in order to protect human health and the environment. This can be achieved through periodic internal and external processes of monitoring and evaluation on a continuous basis, at all institutional levels.

To ensure that objectives of the MWMP are achieved, the implementation of the plan has to be monitored by both internal and external bodies including the WHO, UNICEF & MoPH. These bodies will use existing institutional arrangement as mentioned in chapter 4 to ensure proper waste management at health units and facilities.

Monitoring Objectives

The aim of the monitoring is to establish appropriate criteria to address potential negative impacts of MWM and to ensure that unforeseen impacts are detected and the mitigation measures implemented at an early stage. Specific objectives of the monitoring plan are to:

- ensure that any additional impacts are addressed appropriately;
- check the effectiveness of the recommended mitigation measures;
- ensure that the proposed mitigation measures are appropriate;
- demonstrate that medical waste management is being implemented according to plan and existing regulatory procedures; and
- provide feedback to implementing agencies in order to make modifications to the operational activities where necessary.

Monitoring Arrangements

The medical waste management plan will be monitored both internally and externally. Internally, the plan will be part of the project's overall monitoring and reporting. UNICEF & WHO will ensure that the staff hired at the unit/facility level will be monitoring the implementation of the medical waste management plan. At least one staff should be partially tasked with monitoring the plan in each health unit or facility. The reporting on the plan will be part of the regular reporting of the project components/activities at local, governorate and national levels. Externally, the project will use third party monitoring service for intervention and activities under each component of the project. To that end, a TOR has been prepared for the third party monitoring service, including tasks on monitoring the implementation of the medical waste management plan. The third party monitoring team will be also reporting on the implementation of the medical waste management plan.

The cost of implementing the monitoring plan is included as part of the project's cost.

Monitoring Indicators

Considering the type of interventions implemented by this projects which are anticipated to have limited, site specific impacts, the following will be used to monitor progress in implementing the medical waste management plan:

- Existence of human resource capacity in health care unites and facilities with basic knowledge to deal medical waste;
- Existence of records on waste generation; and
- Development of mechanisms for proper and safe medical waste management & disposal.

The monitoring of environmental effects is necessary to ensure that predicted impacts are addressed effectively and efficiently through the mitigate measures indicated. Specific monitoring indicators for consideration include the following:

Internal Packaging and Storage

- Separation of waste (at point of generation)
- Storage bins / bags
- Frequency of removal

External Packaging and Storage

- Segregation of waste
- Storage area
- Frequency of waste removal
- Amount of waste generated per day

Transportation (if required)

- Identification of waste management contractor (accredited or certified)
- Conditions for transportation
- Equipment/vehicles (to prevent scattering, spillage, odour nuisance and leakage).

Treatment and Disposal

- Incineration
- Sterilization by Heat
- Sanitary Landfill

Administration

- Ensure effective record keeping, each health institutions shall keep records on:
    - The type and volume or weight of waste generated
    - The means of transportation, type and volume transported
    - Commissioned waste contractor (company name, type of license, treatment and disposal).
    - Disposal method - volume incinerated, volume treated and disposed

Annex 2 includes a questionnaire for monitoring medical waste management.

Annex 1: Major Categories of Medical Waste

Waste type	Description
1. Infectious waste	Infectious wastes are susceptible to contain pathogens (or their toxins) in sufficient concentration to cause diseases to a potential host. Examples include discarded materials or equipment, used for the diagnosis, treatment and prevention of disease that has been in contact with body fluids (dressings, swabs, nappies, blood bags etc). It also includes liquid waste such as faeces, urine, blood or other body secretions.
2. Pathological and anatomical waste	Pathological waste consists of organs, tissues, body parts or fluids such as blood. Anatomical waste consists in recognizable human body parts, whether they may be infected or not.
3. Hazardous pharmaceutical waste	Pharmaceutical waste includes expired, unused and contaminated pharmaceutical products, drugs and vaccines. This category also includes discarded items used in the handling of pharmaceuticals like bottles, vials and connecting tubing.
4. Hazardous chemical waste	Chemical waste consists of discarded chemicals (solid, liquid or gaseous) that are generated during disinfecting procedures. They may be hazardous (toxic, corrosive, flammable or reactive) and must be used and disposed of according to the specification formulated on each container.
5. Waste with a high content of heavy metals	Waste with high contents of heavy metals and derivatives are highly toxic (e.g. cadmium or mercury from thermometers or manometers).
6. Pressurized containers	Pressurized containers consist of full or emptied containers or aerosol cans with pressurized liquids, gas or powdered materials
7. Sharps	Sharps are items that can cause cuts or puncture wounds (e.g. needle stick injuries). They are highly dangerous and potentially infectious waste. They must be segregated, packed and handled specifically within the HCF to ensure the safety of the medical and ancillary staff.
8. Highly infectious waste	This includes microbial cultures and stocks of highly infectious agents from medical laboratories. They also include body fluids of patients with highly infectious diseases.
9. Genotoxic/cytotoxic waste	Genotoxic waste includes all the drugs and equipment used for mixing and administration of cytotoxic drugs. Cytotoxic drugs or genotoxic drugs are drugs that have the ability to reduce the growth of certain living cells and are used in chemotherapy for cancer.
10. Radioactive waste	Radioactive waste includes liquids, gas and solids contaminated with radio nuclides whose ionizing radiations have genotoxic effects. These include x- and g-rays as well as a- and b- particles.

Source: Safe Management of Wastes from Health-Care Activities, WHO 1999

Annex 2: Medical Waste Management Monitoring Questionnaire

Health Facility (name, location): _____

_____

_____

Type/Category of Health Facility (tick one):

☐ Tertiary: Specialist, National, Teaching Hospitals

☐ Secondary: Governorate Gen. Hospitals, Sub-HCF Hospital, Private Hospitals

☐ Primary; Health Centre, Dispensary

☐ Mobile health care unit

No. of inpatients: _____ /day

No. of outpatients: _____ /day

No. of beds (total): _____ /day

Type of solid waste produced and estimated quantity

(Consult classification and mark X where waste is produced)

Type	Estimated Quantity
Sharps	
Pathological waste	
Infectious waste	
Pharmaceutical waste	
Pressurized containers	

Waste segregation, collection, storage, and handling

Describe briefly what happens between segregation (if any) and final disposal of:

Sharps _____

Pathological waste _____

Infectious waste _____

Pharmaceutical waste _____

Pressurized containers _____

Waste segregation, collection, labelling, transport, and disposal

1. Handling of segregated waste	Sharps	Pathological waste	Infectious waste	Pharmaceutical waste	Pressurized containers
Indicate by X the type of waste (if any) that is segregated from general waste stream.					
Where is the segregation taking place (i.e. operating room, laboratory, among others)?					
What type of containers/bags (primary containment vessels) are used to segregate waste (bags, cardboard boxes, plastic containers, metal containers, among others)? describe accurately.					
What type of labelling, colour-coding (if any) is used for marking segregated waste? Describe					
i. Who handles (removes) the segregated waste (designation of the hospital staff member)? ii. Is the waste handler using any protective clothing (gloves, among others) during waste handling? Yes/No.					
What type of containers (plastic bins, bags, cardboard boxes, trolleys, wheelbarrows, safe boxes, metal containers, among others) are used for collection and internal transport of the waste? Describe.					
Where is the segregated waste stored while awaiting removal from the hospital for disposal? Describe.					
Describe briefly the final disposal of segregated waste (taken to municipal landfill, buried on hospital grounds, incinerated (external incinerator, own incinerator), open burned, removed from premises, among others)					
If removed from premises; who is responsible for removal? Health facility/self, private collector, State Environmental protection Agency					
If removed from premises; what form of transport is used? Enclosed waste track, open					

waste track, open pick-up, among others					
How often is the waste removed from site?					
Daily					
3 – 4 times per week					
1 – 2 times per week					
Once a week					
Every two weeks					
Once a month					
Less often					

Is safety clothing issued to staff involved in medical waste collection, i.e. gloves, aprons, among others?

☐ Yes ☐ No

If yes, please list the safety clothing/items issued to medical waste collectors and the frequency of issue:

Items issued	**Daily**	**Weekly**	**Monthly**	**As Needed**
Aprons				
Gloves				
Safety shoes				
Overhauls				
Others (specify)				

Which of these waste collection, handling, transport and disposal activities are undertaken by Health-care staff and which are outsourced? List the party responsible for that activity, where the activity is outsourced and the start and end dates of the contract entered into:

ACTIVITY	**RESPONSIBLE PARTY (self/facility, Environmental Protection Agency, Private collector, among others)**	**NAME OF THE RESPONSIBLE PARTY/PRIVATE COLLECTOR**
Collection		
Handling		
Transport		
Incineration		
Disposal		

Personnel involved in the management of Health-care waste

1. (a) Designation of person(s) responsible for organization and management of waste collection, handling, storage, and disposal at the hospital administration level.

   _____

   _____

(c) Has he/she received any training on hospital waste management? Yes ☐ No ☐

If yes, what type of training and of what duration?

_____

_____

Annex 3: Treatment and Disposal Methods For Categories Of Health Care Waste

Type of waste	Summary of treatment and disposal options / notes
Infectious waste: Includes waste suspected to contain pathogens (e.g. bacteria, viruses, parasites, or fungi) in sufficient concentration or quantity to cause disease in susceptible hosts. Includes pathological and anatomical material (e.g. tissues, organs, body parts, human fetuses, animal carcasses, blood, and other body fluids), clothes, dressings, equipment / instruments, and other items that may have come into contact with infectious materials.	**Waste Segregation Strategy**: Yellow or red colored bag / container, marked "infectious" with international infectious symbol. Strong, leak proof plastic bag, or container capable of being autoclaved. **Treatment**: Chemical disinfection; Wet thermal treatment; Microwave irradiation; Safe burial on hospital premises; Sanitary landfill; Incineration (Rotary kiln; pyrolytic incinerator; single-chamber incinerator; drum or brick incinerator)[e] • Highly infectious waste, such as cultures from lab work, should be sterilized using wet thermal treatment, such as autoclaving. • **Anatomical waste** should be treated using Incineration (Rotary kiln; pyrolytic incinerator; single-chamber incinerator; drum or brick incinerator[e]).
Sharps: Includes needles, scalpels, blades, knives, infusion sets, saws, broken glass, and nails etc.	**Waste Segregation Strategy**: Yellow or red color code, marked "Sharps". Rigid, impermeable, puncture-proof container (e.g. steel or hard plastic) with cover. Sharps containers should be placed in a sealed, yellow bag labeled "infectious waste". **Treatment**: Chemical disinfection; Wet thermal treatment; Microwave irradiation; Encapsulation; Safe burial on hospital premises; Incineration (Rotary kiln; pyrolytic incinerator; single-chamber incinerator; drum or brick incinerator)[e] • Following incineration, residues should be landfilled. • Sharps disinfected with chlorinated solutions should not be incinerated due to risk of generating POPs. • Needles and syringes should undergo mechanical mutilation (e.g. milling or crushing) prior to wet thermal treatment
Pharmaceutical waste: Includes expired, unused, spoiled, and contaminated pharmaceutical products, drugs, vaccines, and sera that are no longer needed, including containers and other potentially contaminated materials (e.g. drug bottles vials, tubing etc.).	**Waste Segregation Strategy**: Brown bag / container. Leak-proof plastic bag or container. **Treatment**: Sanitary landfill[a]; Encapsulation[a]; Discharge to sewer [a]; Return expired drugs to supplier; Incineration (Rotary kiln; pyrolytic incinerator [a]); Safe burial on hospital premises[a] as a last resort. • Small quantities: Landfill disposal acceptable, however cytotoxic and narcotic drugs should not be landfilled. Discharge to sewer only for mild, liquid pharmaceuticals, not antibiotics or cytotoxic drugs, and into a large water flow. Incineration acceptable in pyrolytic or rotary kiln incinerators, provided pharmaceuticals do not exceed 1 percent of total waste to avoid hazardous air emissions. Intravenous fluids (e.g. salts, amino acids) should be landfilled or discharged to sewer. Ampoules should be crushed and disposed of with sharps. • Large quantities: Incineration at temperatures exceeding 1200 °C. Encapsulation in metal drums. Landfilling not recommended unless encapsulated in metal drums and groundwater contamination risk is minimal.
Genotoxic / cytotoxic waste: Genotoxic waste may have mutagenic, teratogenic, or carcinogenic properties, and typically arises from the feces, urine, and vomit of patients receiving cytostatic drugs, and from treatment with chemicals and radioactive materials. Cytotoxic drugs are commonly used in oncology and radiology departments as part of cancer treatments.	**Waste Segregation Strategy:** See above for "infectious waste". Cytotoxic waste should be labeled "Cytotoxic waste". **Treatment**: Return expired drugs to supplier; Chemical degradation; Encapsulation[a]; Inertization; Incineration (Rotary kiln, pyrolytic incinerator); • Cytotoxic waste should not be landfilled or discharged to sewer systems. • Incineration is preferred disposal option. Waste should be returned to supplier where incineration is not an option. Incineration should be undertaken at specific temperatures and time specifications for particular drugs. Most municipal or single chamber incinerators are not adequate for cytotoxic waste disposal. Open burning of waste is not acceptable. • Chemical degradation may be used for certain cytotoxic drugs – See Pruss et al. (1999) Annex 2 for details. • Encapsulation and inertization should be a last resort waste disposal option.

Type of waste	Summary of treatment and disposal options / notes
Chemical waste: Waste may be hazardous depending on the toxic, corrosive, flammable, reactive, and genotoxic properties. Chemical waste may be in solid, liquid, or gaseous form and is generated through use of chemicals during diagnostic / experimental work, cleaning, housekeeping, and disinfection. Chemicals typically include formaldehyde, photographic chemicals, halogenated and nonhalogenated solvents[d], organic chemicals for cleaning / disinfecting, and various inorganic chemicals (e.g. acids and alkalis).	**Waste Segregation Strategy**: Brown bag / container. Leak-proof plastic bag or container resistant to chemical corrosion effects. **Treatment**: Return unused chemicals to supplier; Encapsulation[a]; Safe burial on hospital premises[a]; Incineration (Pyrolytic incinerator[a]; • Facilities should have permits for disposal of general chemical waste (e.g. sugars, amino acids, salts) to sewer systems. • Small hazardous quantities: Pyrolytic incineration, encapsulation, or landfilling. • Large hazardous quantities: Transported to appropriate facilities for disposal, or returned to the original supplier using shipping arrangements that abide by the Basel Convention. Large quantities of chemical waste should not be encapsulated or landfilled.
Radioactive waste: Includes solid, liquid, and gaseous materials that have been contaminated with radionuclides. Radioactive waste originates from activities such as organ imaging, tumor localization, radiotherapy, and research / clinical laboratory procedures, among others, and may include glassware, syringes, solutions, and excreta from treated patients.	**Waste Segregation Strategy:** Lead box, labeled with the radioactive symbol. **Treatment**: Radioactive waste should be managed according to national requirements and current guidelines from the International Atomic Energy Agency. IAEA (2003). Management of Waste from the Use of Radioactive Materials in Medicine, Industry and Research. IAEA Draft Safety Guide DS 160, 7 February 2003.
Waste with high content of heavy metals: Batteries, broken thermometers, blood pressure gauges, (e.g. mercury and cadmium content).	**Waste Segregation Strategy:** Waste containing heavy metals should be separated from general health care waste. **Treatment**: Safe storage site designed for final disposal of hazardous waste. • Waste should not be burned, incinerated, or landfilled. Transport to specialized facilities for metal recovery.
Pressurized containers: Includes containers / cartridges / cylinders for nitrous oxide, ethylene oxide, oxygen, nitrogen, carbon dioxide, compressed air and other gases.	**Waste Segregation Strategy:** Pressurized containers should be separated from general health care waste. **Treatment**: Recycling and reuse; Crushing followed by landfill • Incineration is not an option due to explosion risks • Halogenated agents in liquid form should be disposed of as chemical waste, as above.
General health care waste (including food waste and paper, plastics, cardboard)**:**	**Waste Segregation Strategy**: Black bag / container. Halogenated plastics such as PVC should be separated from general health care facility waste to avoid disposal through incineration and associated hazardous air emissions from exhaust gases (e.g. hydrochloric acids and dioxins). **Treatment:** Disposal as part of domestic waste. Food waste should be segregated and composted. Component wastes (e.g. paper, cardboard, recyclable plastics [PET, PE, PP], glass) should be segregated and sent for recycling.

Source: Safe Management of Wastes from Health-Care Activities. International Labor Organization (ILO), Eds. Pruss, A. Giroult, and P. Rushbrook (1999)

Notes:

a. Small quantities only
b. Low-level infectious waste only
c. Low-level liquid waste only
d. Halogenated and nonhalogenated solvents (e.g. chloroform, TCE, acetone, methanol) are usually a laboratory-related waste stream for fixation and preservation of specimens in histology / pathology and for extractions in labs.
e. Note on incinerators. Pyrolytic and rotary kiln incinerators should be used. Use of single-chamber and drum / brick