ANNEX III

INFECTION CONTROL AND WASTE MANAGEMENT PLAN (ICWMP)

FOR

KENYA COVID-19 EMERGENCY RESPONSE PROJECT (P173820)

UNDER THE

COVID-19 STRATEGIC PREPAREDNESS AND RESPONSE PROGRAM

AUGUST, 2020

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ABBREVIATION / ACRONYMS

BOD	Biochemical Oxygen Demand
BSCs	Biological Safety Cabinets
BSL II	Biosafety Level II
BTCs	Blood Transfusion Centres
CBMWTF	Common Bio-medical Waste Treatment Facility
CDC	Centre for Disease Control
COVID-19	Corona Virus Disease-2019
CPHO	County Public Health Officer
CWMO	County Waste Management Officer
DPH	Director Public Health
DPs	Development Partners
EHS	Environmental Health and Safety
EMCA	Environmental Management and Coordination Act
ERP	Emergency Response Plan
ESF	Environment and Social Framework
GDP	Gross Domestic Product
GMPP	Good Microbiological Practices and Procedure
HAIs	Hospital Acquired Infections
HCF	Healthcare facilities
HCW	Health Care Waste
HCWM	Health care Waste Management
ICAO	International Civil Aviation Organization
ICU	Intensive Care Unit
ICWMP	Infection Control and Waste Management Plan
ID	Infectious Disease
IPC	Infection Prevention and Control
IU	Isolation Unit
KENAS	Kenya Accreditation Service
KNBTS	Kenya National Blood Transfusion Centres
LIS	Laboratory Information System
M&E	Monitoring and Evaluation
MDR-TB	Multiple Drug Resistant Tuberculosis
NPHL	National Public Health Laboratories

NTF	National Task Force
PCR	Polymerase Chain Reaction
PMT	Project Management Team
PPE	Personal Protective Equipment
PPM	Parts Per Million
PUI	Person Under Investigation
PUM	Person Under Monitoring
RBTCs	Regional Blood Transfusion Centres
RRTs	Rapid Response Teams
SARS	Severe Acute Respiratory Syndrome
SDS	Safety Data Sheet
SOPs	Standard Operating Procedures
TB	Tuberculosis
TTIs	Transfusion Transmissible Infections
UN	United Nations
UNITID	University of Nairobi Institute of Tropical and Infection Diseases
WBG	World Bank Group
WHO	World Health Organization
WMO	Waste Management Officer

1.0 Introduction

Kenya has an approximate population of 47,564,296, 75% in rural areas (KNBS, 2019); with roughly 46% of the country's population live below the poverty line. The country's gross domestic product (GDP) per capita is US$ 1377. With a Gini coefficient estimated at 0.445, nearly half of Kenyans (46%) live below the poverty line[1]. In Kenya, 75% of the population have received some formal education – 52% with primary education and 23% with secondary education and above. Agriculture Sector is the mainstay of the economy, as of 2013, the sector contributed 25% to GDP directly, with 65% of Kenya's total exports and providing 18% of formal employment.

In the day to day socio economic endeavors, the people of Kenya according to the Ministry of Environment and Forestry (2019) generates an approximate 22,000 tons of waste daily, with healthcare waste being approximately 220 tons/day (1% of total waste produced/day). These health care wastes are generated in health-care services among other human undertakings, either in rural or urban settings may inevitably pose serious risk to public health or have harmful environmental effects. Potentially infectious waste such as; sharps, cultures from medical laboratories or infected blood, or infected wipes or masks from quarantine, isolation and treatment centers, carry a higher risk of infection and injury than any other type of waste. Other wastes of significant importance include; body fluids, all body parts, human tissues, placenta and radioactive waste among others. The absence of proper health care waste management measures to prevent exposure from infectious health-care waste (HCW) results in adverse health risks to the general public, the patients as well as the medical and supportive staff.

With the coronavirus disease (COVID-19) pandemic continuing to spread and its impacts upon human health and the economy intensifying day-by-day, there is urgent need to treat waste management including medical, household and other infectious waste, as an urgent and essential public service in order to minimize possible secondary impacts upon public health and the environment.

COVID-19 outbreak is associated with the generation of many types of infectious wastes, including infected masks, gloves and other protective equipment, together with a higher volume of general waste of the same nature. Unsound management of this waste could cause unforeseen "knock-on" effects on human health and the environment. The safe handling, treatment and final disposal of this waste is therefore a vital element in an effective emergency response.

Effective management of biomedical and health-care waste associated with COVID-19 requires appropriate identification, segregation, collection, storage, treatment, transportation and disposal, as well as important associated standard precautions including hand hygiene, cleaning and disinfection, personal protection and training.

Improper disposal of the infectious health care waste may result in masks, gloves, syringes and needles being scavenged and reused thus leading to spread of diseases. Even after the formulation of policies and laws on health care waste management, many health care establishments in Kenya still is lagging behind the enforcement of legislation for handling, and disposal of health care waste. Furthermore, improper treatment or disposal of HCW such as open-air burning constitute to a significant source of pollution to the environment through the release of substances such as dioxins, furans or mercury coupled with the virus persistence for days in the environment deposited; this calls for the formulation of this Infection Control and Waste Management Plan in relation to COVID-19 pandemic.

[1] The World Bank, 2015 (http://data.worldbank.org/country/kenya)

1.1 Project Context and Components

The Project will be implemented throughout Kenya and will contribute to improved COVID-19 surveillance and response. Although 14 counties have been targeted for implementation of project activities, specific locations where sub-components will be implemented have not yet been identified (these will mainly be located in yet to be identified Hospitals, Ports of Entry (POE), Isolation and Quarantine Areas). Kenya has considerable geographical diversity and as a result, is endowed with great diversity of plant, animal and microbial genetic resources. The civil works supported under this project (Component 3) include construction/renovations and equipping of Isolation rooms in all PoEs, isolation rooms in all 14 high risk counties, strengthening capacity of Kenyatta National Hospital Infectious Disease Unit, Mbagathi, Kenyatta University Teaching and Referral Hospital and Moi Teaching and Referral Hospital to manage infectious diseases – including structural changes to improve negative pressure airflow, floor and air quality. The works as much as possible will take place in existing facilities (identified Hospitals, Ports of Entry (PoE), Isolation and Quarantine Areas). The project is not expected to endanger natural habitats or cultural sites.

COVID-19 Preparedness and Response activities such as the operation of laboratories (equipment, reagents /chemicals) as well as quarantine, isolation centers, screening posts and blood centers can have considerable environmental and social impacts; the activities to be undertaken within this healthcare facilities will generate infectious medical waste. Such activities will be implemented in urban as well as remote areas (including border areas and areas of potential communal conflicts); above all in the latter quality control will be essential. Some of the target project areas are located in close proximity to fragile states and as a major land and air transportation hub greatly exacerbate the vulnerabilities to epidemics. Additionally, Kenya currently shelters about 490,000 registered refugees mainly from South Sudan and Somalia. The project will also support the Kenya Blood Transfusion Service in six regional blood transfusion centers in Nairobi, Embu, Nakuru, Mombasa, Eldoret, Kisumu and 25 other satellite centers by ensuring the availability of safe blood and blood products.

1.2 Targeted Healthcare Facility per project Component

1.2.1 Component 1. Medical Supplies and Equipment [US$8,472,500 equivalent]

This component aims to improve the availability of supplies and equipment needed to respond to COVID-19 and other public health emergencies and strengthen the capacity of the MoH to provide timely medical diagnosis for COVID-19 patients.

Support under this component will include but not limited to the following areas:

a) Strengthening capacity of seven laboratories (including two zoonotic laboratories) to manage large scale testing for COVID-19 cases and other infectious diseases. Activities that will be supported will include procurement of specialized equipment (i.e. Polymerase Chain Reaction (PCR) machines, sequencer, test kits etc. to allow screening of multiple pathogens and purchase of kits

b) Providing sample collection and packaging supplies, reagents and transport media, including shipment of COVID -19 samples to the National Public Health Laboratories (NPHL) and other referral laboratories;

c) Procurement of Personal Protective Equipment (PPE), pharmaceuticals and non-pharmaceutical commodities and supplies required for COVID -19 case management and infection prevention control; and

d) Strengthening clinical care capacity in selected hospitals to provide critical care for patients with severe illnesses. According to the WHO, while most patients with COVID-19 are

developing a mild or uncomplicated illness, approximately 14 percent develop severe disease requiring hospitalization and oxygen support, and 5 percent require admission to an Intensive Care Unit (ICU). This support will, therefore, increase the capacity of the MoH and County Governments to manage severe cases through the procurement of ICU sets and dialysis beds

1.2.2 Under Component 3: Quarantine, Isolation and Treatment Centers [US$12,676,400 equivalent]

This component will strengthen the health systems capacity to effectively provide Infection Prevention and Control (IPC) and case management of COVID-19 cases. Key areas of support include construction/renovations and equipping the following facilities:

a) Facilities for isolation rooms in all PoEs; Jomo Kenyatta International Airport, Moi International Airport, Kisumu International Airport, Eldoret International Airport, Wilson Airport, Wajir, Malindi, Busia, Malaba, Namanga.

b) Isolation room facilities in all 14 high risk counties, Level Five hospitals and high-volume Level Four hospitals.

c) Strengthening capacity of the Kenyatta National Hospital Infectious Disease Unit Mbagathi, Kenyatta University Teaching and Referral Hospital and Moi Teaching and Referral Hospital to manage infectious diseases – including structural changes to improve negative pressure airflow, floor and air quality among others.

1.2.3 Component 4. Medical Waste Management [US$3,387,600 equivalent]

This component will ensure the safe disposal of medical waste generated by COVID-19 laboratory and medical activities.The selection of the waste treatment facilities will be based on available supporting infrastructure and resources such as reliable resources of power, fuel,, total amount of medical waste generated by the HCF, and would consider the need for temporal storage due to the peak waste generated due to COVID-19 in comparison to average monthly medical waste generated.

It will include:

a) Procurement of specialized waste treatment facilities for one national level referral hospitals and other referral laboratories, where the waste management facilities are not available. No refurbishment of existing waste treatment facilities is planned and,

b) Construction of incinerator areas, ash pits, acquisition of licenses and training in incinerator use and medical waste packaging such as bags and safety boxes. (these will mainly be at the identified project beneficiary referral laboratories, healthcare facilities, Isolation and Quarantine Areas),

1.2.4 Component 6: Availability of Safe Blood & Blood Products [US$10,000,000 equivalent]

This support will go towards transforming and strengthening the capacity of the National, Regional Blood Transfusion Service (KNBTS)[2] to provide safe blood and blood products. This component will include:

a) Enhancing blood collection and supply services through strengthening the coordination of six Regional Blood Transfusion Centres (RBTCs) and satellite centres; procurement of consumables and supplies for blood collection; procurement of supplementary auxiliary

[2] The KNBTS has six RBTCs in Nairobi, Embu, Nakuru, Mombasa, Eldoret and Kisumu and 25 satellite centres.

equipment for the blood collection centres such as blood mixers, blood bank refrigerators and blood donor coaches; and strengthening systems for blood mobilization, collection and retention.

b) The Project will expand the KNBTS testing capacity by upgrading 3 strategic and high-volume Satellites centers. This will include procurement of auxiliary and multiplex laboratory equipment, and purchase of reagents for screening of TTI and pathogen inactivation.

c) Enhancing screening for transfusion transmissible infections (TTIs). In order to ensure that blood for transfusion is safe and free from TTIs, the project will expand the KNBTS testing capacity. This will include procurement of auxiliary and multiplex laboratory equipment, and purchase of reagents for screening of TTI and pathogen inactivation;

d) Full automation of blood component processing systems in 31 KNBTS sites, maintaining cold rooms for blood storage, procurement and maintenance of generators to ensure limited loss of the blood and blood products, and establishing a preventive maintenance plan for all the laboratory equipment in collaboration with the NPHL equipment maintenance Centre of Excellence.

e) Strengthening quality assurance systems in line with international standards and best practices on blood safety. The KNBTs will pursue blood bank accreditation from the African Society for Blood Transfusion standards and further accredit two remaining testing centers to ISO 15189 standards. Support will also include training and mentorship of technical staff, testing centres enrolment into proficiency testing schemes and the contracting of integrated courier services for blood transfusion.

1.3 Design Requirement

The project will use existing laboratories with established standards that meet the Biosafety Level III (BSL III) design requirements. This is suitable for work involving agents that pose moderate hazards (COVID-19) to personnel and the environment. It entails:

- laboratory personnel have specific training in handling pathogenic agents and are supervised by scientists competent in handling infectious agents and associated procedures;
- access to the laboratory is restricted when work is being conducted;
- all procedures in which infectious aerosols or splashes may be created are conducted in BSCs or other physical containment equipment; and

The following standard design, special practices, safety equipment, and facility requirements shall be adhered to.

1.3.1 Laboratory Facilities

It is essential to ensure that medical health laboratories adhere to appropriate biosafety practices. Any testing for the presence of the virus responsible for COVID-19 or of clinical specimens from patients meeting the suspected case definition should be performed in appropriately equipped laboratories, by staff trained in the relevant technical and safety procedures. National guidelines on laboratory biosafety should be followed in all circumstances[3]. The following shall be the minimum requirements for the beneficial laboratories under the Project WHO Laboratory Biosafety Manual and WHO interim guidance for laboratory biosafety related to 2019 nCoV:

[3] Laboratory biosafety manual, 3rd ed. Geneva: World Health Organization; 2004 (https://www.who.int/csr/resources/publications/biosafety/Biosafety7.pdf?ua=1 , accessed 14 February 2020).

1. Ample space and a designated hand-washing basin must be provided, with appropriate restriction of access,
2. Doors must be properly labelled, and laboratory walls, floors, and furniture must be smooth, easy to clean, impermeable to liquids and resistant to the chemicals and disinfectants normally used in the laboratory,
3. Laboratory ventilation, where provided (including heating/cooling systems and especially fans/local cooling split-system air-conditioning units – specifically when retrofitted) should ensure airflows do not compromise safe working. Consideration must be made for resultant airflow speeds and directions, and turbulent airflows should be avoided; this applies also to natural ventilation,
4. Laboratory space and facilities must be adequate and appropriate for safe handling and storage of infectious and other hazardous materials, such as chemicals and solvents,
5. Facilities for eating and drinking must be provided outside the laboratory, and first-aid-facilities must be accessible,
6. Appropriate methods for decontamination of waste, for example disinfectants and autoclaves, must be available and close to the laboratory,
7. The management of waste must be considered in the laboratory design. Safety systems must cover fire, electrical emergencies, and emergency/incident response facilities, based on risk assessment,
8. There must be a reliable and adequate electricity supply and lighting to permit safe exit,
9. Emergency situations must be considered in the design of the existing labs, as indicated in the local risk assessment, and should include the geographical/meteorological context,
10. Laboratory furniture must be capable of supporting anticipated loads and uses. Open spaces between benches, cabinets, and equipment should be accessible for cleaning,
    a. Bench tops must be impervious to water and resistant to heat, organic solvents, acids, alkalis, and other chemicals.
    b. Chairs used in laboratory work must be covered with a non-porous material that can be easily cleaned and decontaminated with appropriate disinfectant.
    c. Ample space must be provided for the safe conduct of laboratory work and for cleaning and maintenance,
11. Safety systems should cover fire, electrical faults, emergency shower and eyewash facilities with First-aid areas or rooms suitably equipped and readily accessible should be made available. In-depth design requirement for the laboratories is elaborated in WHO Laboratory Biosafety Manual and WHO interim guidance for laboratory biosafety related to 2019 nCoV.

1.3.2 Quarantine / Isolation Rooms at Health Care Facilities

When an isolation room is being incorporated into an existing facility, it is rarely possible to create the ideal room. Physical and financial factors often constrain the construction. It is critical to create a room that is fit for its purpose; therefore, the design intent of this section should be adhered to as closely as possible in line with the WHO Interim Infection Prevention and Control Recommendations for Coronavirus Disease 2019 (COVID-19) in Health Care Settings. When converting existing

accommodation into Class N rooms, the easiest and least expensive option is to adapt existing single rooms with ensuite facilities[4].

It is recommended that a quarantine facility should be of:

- at least 3 SQM of space per person for personal space at a quarantine site exclusive of space required for eating, recreation, offices or ancillary services.
- an isolated ensuite rooms with wash room facilities,
- a dormitory set-up with a maximum of 5 -10 beds per room or zone separated from one another by a curtain or wall with each bed separated by a minimum of 1metre from all sides

The following requirements should be met in any conversion:

i) furnishing and fittings: a) clinical hand wash basin with non-touch, fixed temperature mixer tap; b) wall-mounted soap dispensers; c) disinfectant hand rub dispensers; d) disposable towel holders; e) glove dispensers; f) storage for clean personal protective equipment; g) clean waste bins. observation window in corridor wall with integral privacy blinds;

ii) Adequate ventilation either natural or mechanical.

iii) The door is kept closed at all times (preferably with a patient observation window so that the patient can be seen without the need to open the door),

iv) Hand washing station with running water and soap and alcohol-based hand rub. These should be placed near the point of care, at the entrance and exit of the isolation room.

v) Preferably should have toilet and bathroom so the patient does not leave the room. In case the room does not have one, a dedicated toilet and bathroom should be identified.

vi) Patient bedside locker or table for placing items

vii) Easy to clean surfaces (no carpets, preferably no curtains)

viii) Space for provision of PPE at the entrance to the room for HCWs

ix) A designated team of HCWs, to care for known or suspected COVID-19 patients. These HCWs care only for these patients during their shift.

x) Keep a roster of all staff working in the isolation areas including visitors, for possible outbreak investigation and contact tracing.

xi) investigate the use of a pressure stabilizer above the room door; and

xii) Provision of two-way intercommunication system between the patient's room and the nurses' station.

More guidance can be acquired in the Interim Infection Prevention and Control Recommendations for Coronavirus Disease 2019 (COVID-19) in Health Care Settings. The typical schematic diagram for a quarantine / isolation room is shown on Figure 1.1 below[5];

[4] Proposed Guidelines On Planning and Design of Covid-19 Quarantine and Treatment Centres, and Long Term Infrastructural Interventions for the Kenyan Context, 2020.

[5] Interim Guidelines for Isolation Room(s) or Quarantine Area for COVID-19 Patients in Health Care Facilities

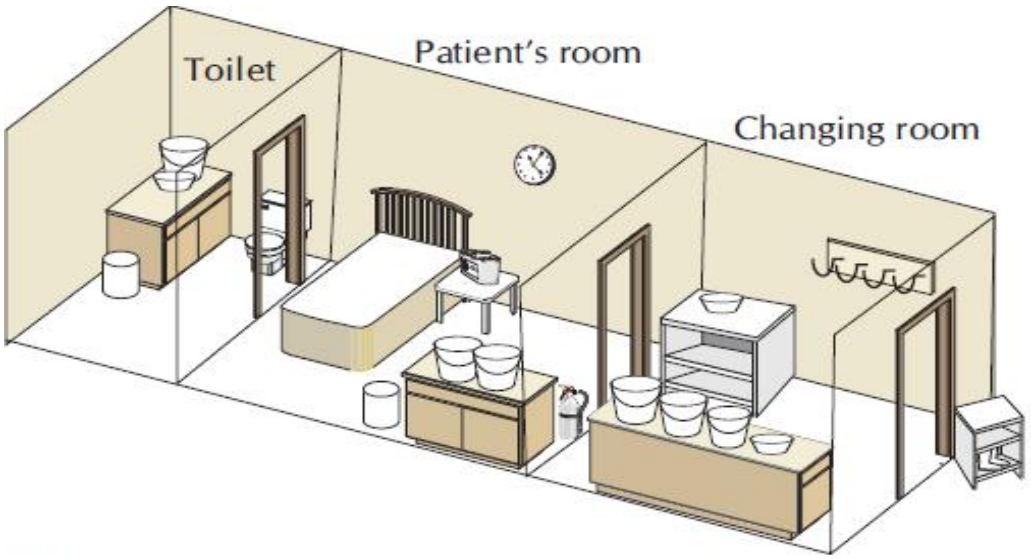

Figure 1- 1: Typical Layout of a Quarantine / Isolation Room

1.3.3 Design, size and location of an incinerator[6]

Proper design and operation of incinerators should achieve desired temperatures, waste residence times inside the furnace, and other conditions necessary to destroy pathogens, minimize emissions, avoid clinker formation and slagging of the ash (in the primary chamber), avoid refractory damage destruction, and minimize fuel consumption. Good combustion practice (GCP) elements also should be followed to control dioxin and furan emissions. An Environment and Social Impact Assessment for new construction and /or installation of waste treatment unit shall be undertaken and license to operate the waste treatment facility shall be obtained from NEMA in line with EMCA Waste Management Regulations, 2006. Technology to be selected will be based on available supporting infrastructure and resources (reliable sources of power, fuel, etc.), total amount of medical waste generated by the HCF, and would consider the need for temporal storage due to the peak waste generated due to COVID-19 in comparison to average monthly medical waste generated.

The design consideration of the incinerator should fullfil the following criteria:

Primary combustion

i. The primary combustion chamber shall be accepted as the primary combustion zone and shall be equipped with a burner/s burning gas or low sulphur liquid fuel.

ii. The minimum combustion temperature of the primary chamber shall not be less than 850^0 C.

Secondary combustion

iii. The secondary combustion chamber shall be accepted as the secondary combustion zone and shall be fitted with a burner/s burning gas or low sulphur liquid fuel with capacity to reach $1{,}100^o$ C.

iv. The residence time in the secondary chamber shall not be less than two seconds.

Additional Specification include:

The incinerators should incorporate air control parts to mitigate air pollution and have an additional specifications for hot water system to generate hot water as part of resource use efficiency.

[6] https://www.who.int/water_sanitation_health/medicalwaste/077to112.pdf

The incinerator should be housed in a controlled shed free of rodents, adequate ventilation with sanitary facilities including toilet, cloak room and wash area, and

The incinerator facility should have appropriate fire suppression equipment including fire extinguishers, sand bucket and fire blanket, and equipped First Aid Kit and health and safety manual.

Chimney Design Requirements: The chimney shall have a minimum height of nine (9) meters above ground level and clear the highest point of the building by not less than six (6) meters for flat roofs or 3 meters for pitched roofs. The topography and height of adjacent buildings (i.e. closer than 5 meters chimney height) shall be taken into account see Figure 1-2: Stack Height computation design for Incinerator Chimney as per the GIIP see WBG General EHS Guidelines for Environmental Air Emissions and Ambient Air Quality and WHO Treatment and disposal technologies for health-care waste.

The incinerator shall be sited in accordance with the relevant legislations (EMCA Waste Management regulations, 2006, National Construction Authority Act, 2011, Public Health Act, 2012 and the County Government Act, 2017).

Site selection design criteria of incinerators should consider : i) direction of the prevailing winds should be away from the populated areas (patient wards, residential areas) or where food is grown; ii) There should be no public passage within the immediate proximity of the incinerator, iii) location should be secure and free from risk of vandalism, iv) the location should permit construction of the incinerator housing, store waste awaiting final treatment and an ash pit.

The above design is in line with the WBG guidelines and according to GIIP (see Figure 1-2):

(Based on United States 40 CFR, part 51.100 (ii)).

$H_G = H + 1.5L$; where

H_G = GEP stack height measured from the ground level elevation at the base of the stack

H = Height of nearby,structure(s) above the base of the stack.

L = Lesser dimension, height (h) or width (w), of nearby structures

"Nearby structures" = Structures within/touching a radius of 5L but less than 800 m.

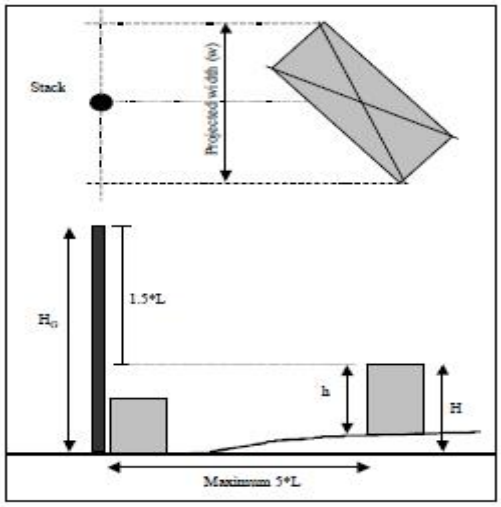

Figure 1-2: Stack Height design for Incinerator Chimney

Other essential facility within the incinerator are the ash pit and waste storage area which should be constructed adjacent to the incinerator.

Ash pit–where ash and other residues from the incineration process are disposed of. It is considered the final disposal point of healthcare wastes. It should be located in the immediate proximity of the incinerator to ensure convenient transfer of ash. The ash pit should be 1.5 m above water table and its wall lined to prevent contamination of underground water as well as positioned to prevent the risk of

flooding. It should also be covered and secured with a lock to prevent access to unauthorized persons and avoid accidents.

Storage area–Adequate storage space should be provided for safety boxes and waste bags[7] awaiting incineration. The storage capacity should be adequate and take consideration of peak waste generated due to increased patient intake as a result of COVID-19 related cases in comparison to the average monthly medical waste generation. The area should be secured to prevent unauthorized access and covered to keep the safety boxes dry. Storage should also be provided for tools, records, personal protective equipment and fuel (both kerosene and firewood). Additional operational guidelines can be found in Kenya Health Care Waste Management Incinerator Operator Manual.

1.4 Biosafety Levels

The selected laboratories will be identified during project implementation and shall meet the requirements of Biosafety Level III including Moi Teaching and Referral Hospital MTRH among other laboratories which will be included in the project operational manual:

Moi Teaching and Referral Hospital (MTRH) Laboratory was identified and supported in the last phase (2019/2020 FY) of the World Bank funded projects for the construction of Public Health Biosafety Level II Laboratory (BSL II)[8], an Isolation Ward with capacity of 15 patients and an Incinerator Plant is in place. The project will be equipped with facilities fully to the status of BSL II Lab and fully furnished Isolation Ward with the Lab fitted with Teleconferencing facilities and a Laboratory Information System (LIS). The Isolation wing will help the hospital manage cases of hemorrhagic fevers and other highly infectious diseases such as Multiple Drug Resistant Tuberculosis (MDR-TB) and COVID-19; the laboratory will be upgraded to meet a biosafety level 3 (BSL-3) requirement.

The remaining Level V and Level IV healthcare facilities (HCF) laboratories are all accredited to ISO 15189-2012, thus meeting the status of BSL II laboratories and will be scaled up to meet the requirements of BSL III Laboratories for facilities which will be used in testing of COVID-19 in line with Laboratory biosafety guidance related to coronavirus disease 2019 (COVID-19).

[7] Safety box and waste bags are used to hold waste temporarily within the waste incinerator house awaiting incineration (Health Care Waste Management Incinerator Operator Manual for Kenya, 2009).

[8] http://www.mtrh.go.ke/?p=1312

1.5 Access to Water and Power Supply

The selected healthcare facilities both the referral hospitals and Level IV and Level V hospitals, laboratories, PoE and isolation & quarantine areas are connected with clean water from the on-site boreholes or connected to county water and sanitation supply service providers. In cases where the selected HCFs have their own borehole (s), (upon complying with the National water quality standards for portable water), these will be used as the main source of water supply to the HCF as well as in the laboratory. In most cases, the municipal water is not reliable enough to be considered as a sole water supply source and shall need to be supplemented always such as through water harvesting. All the selected HCFs are connected to the National grid provided by Kenya Power and Lighting Company and they also have power backup generators. The operational capacity and status including routine testing should be confirmed periodically for these emergency back -up generators.

2.0 Infection Control and Waste Management

2.1 Overview of Infection Control and Waste Management in the HCFs

Healthcare/Medical waste is defined as "all waste generated by health-care establishments (human or veterinary), including research facilities and laboratories. It can include waste generated in the course of healthcare in homes. Hazardous healthcare waste is of primary concern, due to its potential to cause infections, disease or injury. Precise definitions of types of healthcare waste (HCW) must consider the associated hazards and should be incorporated into Kenya Infection Control and Healthcare Waste Management (HCWM) legal, regulatory, technical, and information documents. On the other hand, Infection prevention and control (IPC) is defined as the discipline concerned with preventing of the spread of infections within the health-care setting and at community level.

IPC are evidence-based practices and procedures that are applied consistently in health care settings to prevent or reduce the risk of transmission of micro-organisms to health care providers, clients, residents and visitors. Therefore, either at health care or community setting, IPC is concerned with interventions relating to health and environment, which can be divided into 4 parts; Personal (staff) protection; Patient protection; Population (Community) Protection and Environment protection.

According to the WHO, about 15-25% of total health-care waste should be infectious waste, and improper handling of health care waste can cause serious health problems for workers, community and environment. WHO reports showed that worldwide, about 5.2 million people (including 4 million children) die each year from waste related diseases. The hazards of exposure to health care waste can range from gastro-enteric, respiratory, and skin infections to more deadly diseases such as HIV/AIDS, and Hepatitis (Babanyara et. al 2013). WHO reported that globally, injections with contaminated syringes caused 21 million hepatitis B infections (32% of all new infections), 2 million hepatitis C infections (40% of all new infections) and 260,000 HIV infections (5% of all new infections). More specifically medical waste has a high potential of carrying micro-organisms that can infect people who are exposed to it, as well as the community at large if it is not properly disposed of. Many of these infections were avoidable if the wastes had been disposed of safely (WHO 2004)[9].

Although treatment and proper disposal of health-care waste reduces risks, indirect health risks may occur through the release of toxic pollutants into the environment through treatment or disposal. For instance, landfills can contaminate drinking-water if they are not properly constructed. Occupational risks exist at disposal facilities that are not well designed, run, or maintained. Furthermore, incineration of waste has been widely practiced but inadequate incineration or the incineration of unsuitable materials results in the release of pollutants into the air and generate ash residue. Incinerated materials containing chlorine can generate dioxins and furans, which are human carcinogens and have been associated with a range of adverse health effects. Incineration of heavy metals or materials with high metal content (in particular lead, mercury and cadmium) can lead to the spread of toxic metals in the environment. Dioxins, furans and metals are persistent and bio accumulate in the environment. Materials containing chlorine or metal should therefore not be incinerated.

The beneficiary health-care activities in the laboratory, quarantine, isolation and treatment centers will protect and restore health and save lives however, the amount of infectious waste and by-products being generated may cause adverse potential health and environmental impacts. The average distribution on types of medical waste for purposes of waste management planning is approximately 80% non-infectious and 20% infectious such as biological/pathological waste, chemical/pharmaceutical waste and sharp materials. The quantity of infectious wastes generated will

[9] https://www.who.int/water_sanitation_health/medicalwaste/en/hcwmpolicye.pdf

increase due to infectious nature of COVID-19. According to WHO guidelines, all the waste generated in and around the care of COVID-19 patients is treated as infectious waste.

2.2 Classification of Health Care Waste

The WHO guidelines on Safe management of wastes from Health-care activities (2014) and the National Health Care Waste Management Plan (2016-2021) categorizes healthcare waste into two groups as hazardous and non-hazardous wastes, and the hazardous waste is also classified into 6 classes of solid waste and 1 liquid waste (effluent):

i. Infectious waste (clinical waste)

Infectious waste is material suspected to contain pathogens (bacteria, viruses, parasites or fungi) in sufficient concentration or quantity to cause disease in susceptible hosts. This category includes:

- Waste contaminated with blood or other body fluids;
- Cultures and stocks of infectious agents from laboratory work;
- Waste from infected patients in isolation wards, surgery and autopsies (e.g. excreta, tissue, and dressing from infected or surgical wounds, clothes soiled with human blood or other body fluid).

ii. Sharps

Sharps are all objects and materials that pose a potential risk of injury and infection due to their puncture or cutting properties (e.g., syringes with needles, blades, broken glass). For this reason, sharps are considered one of the most hazardous categories of waste generated during medical activities.

iii. Pathological and anatomical wastes

- Pathological waste could be considered a sub-category of infectious waste, but is often classified separately – especially when special methods of handling, treatment and disposal are used.
- Pathological waste consists of tissues, organs, body parts, blood, body fluids and other waste from surgery and autopsies on patients with infectious diseases.

iv. Pharmaceutical and cytotoxic waste

Pharmaceutical waste includes; expired, unused, spilt and contaminated pharmaceutical products, such drugs, vaccines and sera (serum) that are no longer required. The category also includes discarded items used in the handling of pharmaceuticals, such as bottles or boxes with residues and drug vials. Cytotoxic waste is considered a sub-group of hazardous pharmaceutical waste, due to its high degree of toxicity.

v. Highly infectious waste

Highly infectious waste includes; all viable biological and pathological agents artificially cultivated in significant elevated numbers. Cultures and stocks, dishes and devices used to transfer, inoculate and mix cultures of infectious agents belong to this category of waste.

vi. Radioactive Waste

Radioactive waste includes liquids, gas and solids contaminated with radio nuclides whose ionizing radiations have genotoxic effects. These are found in the waste products from patients who are undergoing radiation treatment.

vii. Special hazardous waste (waste with high contents of heavy metals)

Special hazardous waste refers to chemical wastes that can pose health problems when they come in contact with people by accidental inhalation, skin contact and/or ingestion. This includes gaseous, liquid and solid chemicals, waste with a high content of heavy metals such as batteries, pressurized containers, broken thermometers, blood pressure gauges, photographic fixing and developing solutions in X-ray departments, and halogenated or non-halogenated solvents.

viii. Liquid Waste

Effluents are a non-chemical liquid wastes that comes out of laundry, kitchen, toilet, shower and laboratory rooms which may be contaminated by pathogenic micro-organisms. Effluents from isolation wards, treatment centers and medical diagnostic laboratories should be considered as hazardous liquid waste that should receive specific treatment (thermal, chemical and irradiation) before being discharged into the sewer/drainage system, if such a system exists. During operation of the laboratory activities, all wastes generated in the laboratories of the facility (including sample packaging materials, culture materials, petri dishes, PPE, and associated process wastes) would leave the laboratories only after decontamination using the facility's autoclave, after being chemically sterilized or released effluent from the labs and isolation area directed to a pretreatment chamber before release to public sewers.

Currently, proposed laboratories to be used to manage the large-scale testing for COVID-19 cases also provide several laboratory services for community and public health management including; referral laboratory services for whole country. The inclusion of COVID-19 testing in the operation of these laboratories will increase the amount of contaminated liquid waste. The potential medical waste from HCFs and laboratories are summarized in table 2.2.

NB: Given the infectious nature of the novel coronavirus, some wastes that are traditionally classified as non-hazardous may be considered hazardous, the volume of waste will increase considerably given the number of admitted patients during COVID-19 outbreak. Special attention should be given to the identification, classification and quantification of the healthcare wastes.

2.3 Healthcare Waste Management System in the HCF[10]

Kenya like other developing countries faces the problem of HCWM. While generally less than 10% of HCW is considered infectious, many health facilities have poorly developed waste-segregation practices, leading to up to 50% of waste being categorized as infectious. The main reason for this is the increased generation of diverse types of healthcare waste due to the multiplication and expansion of healthcare facilities as a result of population growth, ongoing immunizations and treatment of various conditions including emerging and re-emerging communicable and non-communicable diseases. The different types of health care wastes generated from these health care services poses potential health risks to the health workforce, the environment and community at large.

[10] The National Plan on Health Care Waste Management (2016-2021).

Health care settings produce infectious waste that may lead to Hospital Acquired Infections (HAIs) and HIV/AIDS among health care workers, waste handlers, and patients. HAIs have been a major contributor to morbidity and mortality burden in the developing world. In Kenya, the actual burden of HAIs has not been accurately quantified, but it is projected to account for about 10% to 25% of hospital admissions in government health facilities, 2.5% of HIV infections in health care workers, 32% of hepatitis B cases, and 40% of hepatitis C cases (WHO 2010). In addition, it is important to note that waste from viral haemorrhagic fevers (e.g., Ebola), COVID-19 and multi drug resistant TB pose a great threat to the health workforce and the general public.

The standard practice in most hospitals in Kenya is that health care waste is separated into three main categories as follows: i) Infectious or hazardous health, ii) General waste or non-infectious waste and (iii) Sharps in puncture proof safety boxes.

2.3.1 Health Care Waste Generation

Appropriate handling, treatment, and disposal of waste by type can help to reduce costs and in the same breath serve as safeguard in the protection of public health and the environment. Critical here is the observance of health care waste production with the following being key result areas:

- Waste Generation; Most health facilities generate varying quantities of waste ranging from one health facility to the other in accordance with their patient workload and treatment offered in the health care facilities. However, very few facilities measure the amount of waste generated.
- Waste Minimization; Waste minimization is a strategy for sound management of health care waste although most health facilities in Kenya still have difficulties in practicing waste minimization or showing any efforts geared towards waste minimization.
- Waste receptacles: The containment of waste from points of generation is critical towards the achievement of sound management of health care waste. Previous assessments in Kenya have revealed that sharps waste was generally well contained at 95% in both government facilities and faith-based hospitals. For non-sharps waste, the 10 liter and 30-liter bins are the commonest bins provided in most clinical areas while use of bins without liners is common.

Figure 2-1: Shows the schematic diagram of the typical waste streams in the HCF / laboratory (quarantine, isolation and treatment centers, laboratory and blood service centers).

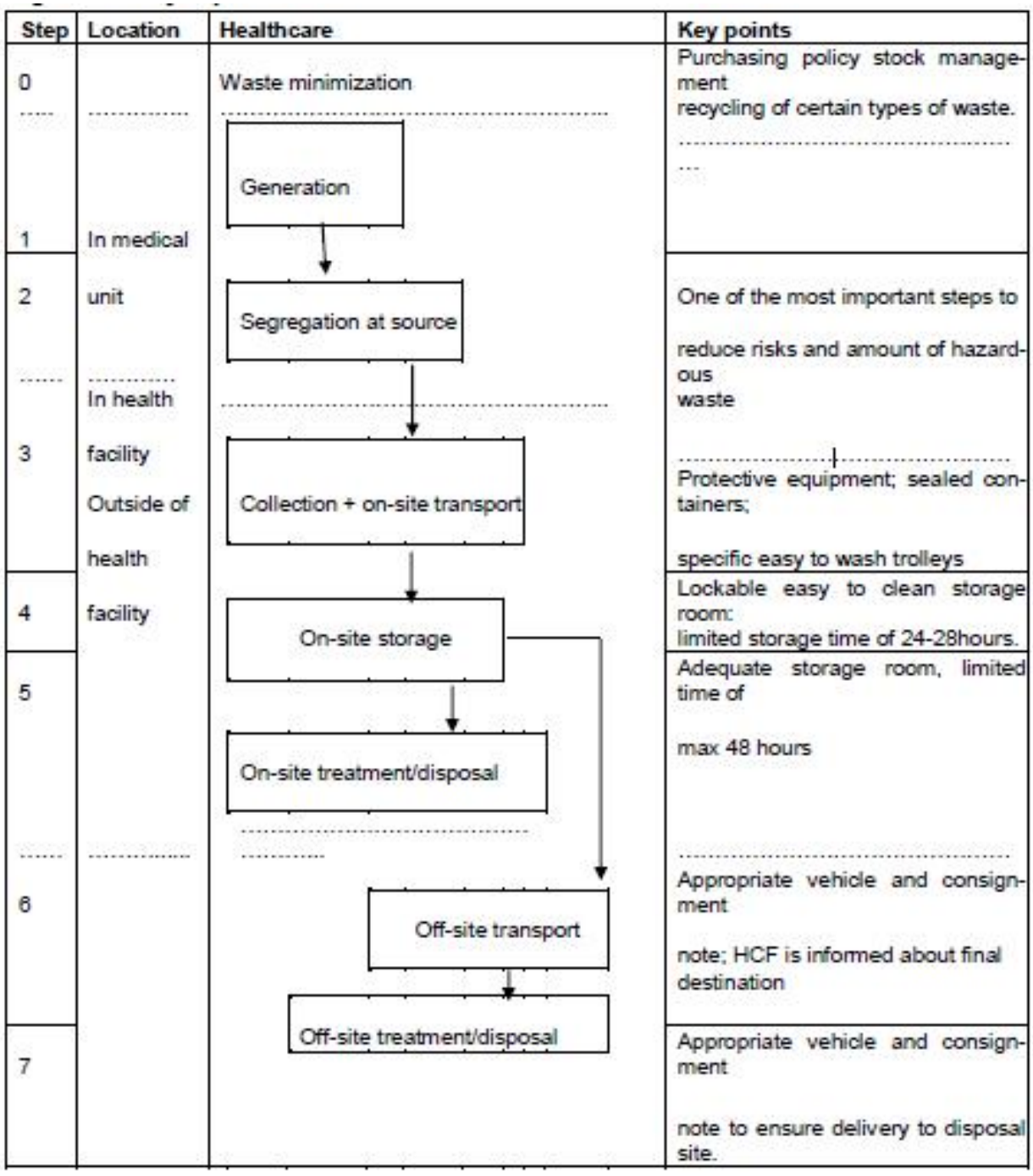

Figure 2- 1: Flow chart of waste streams in the HCF as per the HCWMP (2016-2021)

2.3.2 Health Care Waste Handling

Health-care waste management options may themselves lead to risks in human health and environment and no perfect readily achievable solution exists in the management of health-care waste. Waste, whether generated at smaller rural clinics or larger facilities, can be managed where adequate well-operated infrastructures exist. In order to achieve sound implementation of waste management, most healthcare institutions have adopted the following steps as a strategy for success;

- Waste Segregation Practices: Segregation of waste by type is observed in some facilities in the country which have embraced segregation practices using color -coded bins. Segregation of HCW is done according to the following categories; infectious or clinical waste (hazardous waste), Non-infectious or general waste, highly infectious waste, and sharps waste. In few hospitals, glass waste is placed in its own category. Use of colour codes for waste containers is low in the facilities. The following colour codes for HCW are provided in the Ministry of Health, National Guidelines for HCW and are legislated by NEMA:
    - Red for highly infectious waste;
    - Yellow for infectious and sharps waste;
    - Black for non-infectious waste.

The ICWMP should borrow from WHO recommendations to use red colored bins to contain pathological and/or highly infectious waste. Careful segregation of waste into different categories helps to minimize the quantities of hazardous waste.

Poor segregation and poor choice of technology for treatment and disposal of waste are two problems identified that are due in part to inadequate management practices or simply because of absence of adequate provision of waste receptacles.

- Packaging of Healthcare waste: The packaging involved putting waste colour-coded waste bags, with most waste being kept at waste holding storage areas without being sealed. The practice in Kenya is that most waste is loaded onto waste transportation facilities without being tied or covered.
- Labelling: Labelling of waste bags is a recommended practice to ensure each waste category is easily identified, and waste loads can be traced back to their point of generation. The current practice in most health facilities in Kenya is that labelling is rarely done.

2.3.3 Waste Transportation and Storage

Waste Transportation: It is common practice in Kenya that most hospitals continue to use wheelbarrows for the transportation of waste within the health care facilities and within its compounds, while only a few of the facilities were using trolleys. The use of wheelbarrows should be discouraged since it leads to spillage of waste. It is noticeable that more than half of the hospitals have noticeable waste spillage within health facility compounds posing a risk to human health and the environment. The recommended practice for waste transportation within hospitals should be dedicated trolleys with separate ones for infectious waste to be drawn on paved surfaces to waste treatment sites.

Waste Storage: Generally, about 47% of hospitals in Kenya have refuse storage areas/rooms. In some of these hospitals, disused rooms, some with leaking roofs are used to store waste. Of the waste storage areas provided, 61% of health facilities have waste storage facilities that are fenced of or has restricted entry. The frequency of collection of waste in most hospitals is done once daily and in few cases, it is done twice or thrice per day. Few hospitals had identified some areas with high waste generation for two or three collections daily.

2.3.4 Waste Treatment and Disposal

Treatment of Healthcare Waste The goal of treating health care waste is to render the waste safe for disposal, therefore it aims at eliminating hazards and exposures. WHO and Stockholm convention guidelines among other related global best practices recommend “prioritizing consideration of alternative waste treatment processes” that do not generate dioxins and furans.

Most dispensaries lack placenta pits and septic tanks for the safe disposal of maternity health care wastes. Most hospitals in Kenya currently treat their waste on-site. Among 15% of hospitals have

approved waste treatment equipment. Incineration in levels four and five health facilities is the commonest method of waste treatment at 62% using functional incinerators such as at Isiolo, Moi Voi hospital, , Eldama Ravine hospital, Makindu and Maragua hospital, Busia referral hospital and Kitale referral hospital funded under the World Bank project among other health facilities. The rest were either dysfunctional or undergoing repair. Most of the wastes taken from hospitals for treatment off-site were glass waste and domestic waste or non-infectious waste. Open burning, open dumping is still practised along with incineration. Most healthcare facilities practising on-site or off-site treatment of their waste have been established not to keep records of the waste they treat on-site or contract for off-site disposal. Other waste treatment facilities available in Kenyan hospitals include; compost pits for non-hazardous biodegradable waste, use of non-burn technologies through either medical waste microwaves or auto claves with inbuilt shredders for the 10 medical microwaves[11] and separate shredders for the five installed medical waste autoclaves[12]. Other than incinerators, these non-burn waste treatment technologies may be procured and be installed in where isolation and treatment facilities will be established in all 14 high risk counties, identified Level Five hospitals and high-volume Level Four hospitals as well as laboratories and blood services sites.

Final Waste Disposal: Most hospitals in Kenya have improved the maintenance of their compounds around the final waste disposal areas based on 2008-2012 HCWM plan. However, less than half of the health facilities did not maintain cleanliness around their waste disposal areas. Worth to note also is that a big number of them (76%) had no visible waste observed (Kenya Health Facility Assessment (KHFA) 18/19 FY) at the Facility sharps disposal site (incineration area). This is without taking into consideration the method used to destroy (treat) the sharps waste.

Previous studies show that 64% of the health facilities had done good siting of their waste disposal areas while about 12% of the facilities had tried to site the disposal area or facility fairly well. Small proportion of 24% of the health facilities however did not do good sitting of their waste disposal areas. Good siting of waste disposal sites or facilities entails locating them where they do not cause pollution or injury to the occupants of adjacent dwellings. Most rural hospitals were doing on-site disposal of waste in pits while some private and a few public hospitals macerate placenta by use of macerator then drain through the main sewer line or the hospital drainage system. Some healthcare facilities use contracted companies to dispose maternity waste off-site. In majority of the rural areas, most dispensaries lack placenta pits and septic tanks for the safe disposal of maternity health care wastes. Under the Transforming Health System Universal Care Project (THS UCP) funded under the World Bank, counties have made investments in the management of healthcare waste through constructing of new placenta pits/ash pits and planned transportation of healthcare waste to centralized incinerators for treatment and final disposal.

2.3.5 Occupational Health & Safety

Personal Protective Equipment: Awareness of the danger of disease transmission from infectious waste among health workers in most health facilities raised demand for provision of personal protective equipment (PPEs) to waste handlers. Use of gumboots for protection of waste handlers feet, and possession of heavy duty gloves for hand protection is common. The provision of respirators or face masks, overalls, helmets, and plastic goggles for eyes protection was poor on an overall average of 37%. The use of the PPEs is what has not been internalized among expected users. In most waste

[11] Kenyatta National Hospital Nairobi, Kisii Level 6 Hospital, Nakuru Level 5 Hospital, Machakos Level 5 Hospital, Jaramogi Odinga Oginga Level 5 Hospital, Moi Teaching and Referral Hospital in Eldoret, Nyeri Level 5 Hospital Kakamega Level 5 Hospital, Embu level 5 Hospital, and Port Reitz Hospital in Mombasa.

[12] Coast General Hospital in Mombasa, Malindi Level 4 Hospital in Kilifi, Karatina Level 4 hospital in Nyeri, Bungoma level 5 hospital and the National Public Health Laboratories.

treatment sites where waste operators had possession of respirators or goggles, most of those found handling waste did not have them on but wore them on noticing visitors.

Overall, adherence to occupational health and safety measures, which include occupational health and safety provisions, employer responsibility, use of PPEs and workers protection and coordination of OHS activities in the management of health care waste is still weak in Kenya.

2.3.6 Capacity Building

Training plans on HCWM: Best practices in Health Care Waste Management require that all healthcare staff receive induction and repeated training on health care waste management. From the study 61% of all technical staff had received training on the management of healthcare waste, while 65% of waste operators had been trained. The deployed member of staff for waste management duties was expressed as adequate in 57% of assessed health care facilities. However, most staff members deployed to handle waste were engaged in doing other chores apart from waste management.

Development of Waste Management Plans: From previous assessments, only 16.7% of healthcare facilities had health care waste management plans. A good waste management plan is a good basis for implementing waste management plans that has allocation of roles, responsibilities and resources. A well-thought-out plan describes the actions to be implemented by authorities, health-care personnel and waste management workers. At the national level, a plan is critical for government to define its intentions to make improvements, and the resources required across the country for successful implementation of environmental safeguards.

Under the fundamental principle of duty of care that any person or organization generating or handling HCW is morally responsible to take care of the waste while under their responsibility; all persons associated with financing and supporting health-care activities should provide for the costs of managing health-care waste; this is the duty of care. Manufactures also share a responsibility to take waste management into account in the development and sale of their products and services. The County governments and the respective health facilities in counties are expected to deploy the right personnel to manage health care waste, develop their health care waste management plans and allocate resources for their operationalization in accordance with the relevant strategic objectives.

2.3.7 Finance and Resources

Most health care facilities do not have the direct vote for the costs involved in managing healthcare waste. In most cases, it is difficult to separate the cost of managing waste; currently the cost is lumped up with other operational costs. Obtaining resources to purchase bins, bin-liners, funds for personnel deployment and maintenance of health care waste treatment equipment has been difficult to obtain.

2.4 Infection Control Measures

Kenya has limited experience in managing highly infectious medical wastes such as COVID-19. Kenya COVID-19 Project is assessed to have a high environmental risk and will require that appropriate precautionary measures are planned and implemented. There is a possibility for infectious micro-organisms to be introduced into the environment if they are not contained within the PoE, laboratory or the quarantine, isolation and treatment or the blood services facilities due to accidents/ emergencies, such as a fire response or natural phenomena event (e.g., flood, land slide). The expected healthcare infectious/hazardous waste also includes wastes generated during management of COVID-19 patients. In addition, medical wastes can include; chemicals and other hazardous materials used in diagnosis and treatment of COVID-19. If the contamination is due to highly infectious agents, it may cause severe human disease, present a serious hazard to workers, and may present a risk of spreading COVID-19 to the community.

This section 2.4 provides wide range of measures and background information for reference in the development of sub-project specific ICWMP. The ESMF provides general mitigation measures for similar risks and impacts as the ICWMP and both measures apply under this project.

WHO guidelines should be adopted in the acquisition of the medical supplies and equipment (reagents and pharmaceuticals), sample collection, packaging, transportation and laboratory practices, as well as blood collection, storage and transmission; to limit potential exposure of communities to COVID-19 infection.

IPC strategies to prevent or limit transmission in health care settings as per the WHO Infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected, include the following:

a) ensuring triage, early recognition, and source control (isolating patients with suspected COVID-19);

b) applying standard precautions for all patients;

c) implementing empiric additional precautions (droplet and contact and, whenever applicable, airborne precautions) for suspected cases of COVID-19;

d) implementing administrative controls;

e) using environmental and engineering controls.

Healthcare facilities should adopt IPC measures as stipulated in the, Interim Infection Prevention and Control Recommendations for Coronavirus Disease 2019 (COVID-19) in HealthCare Settings, National Infection and Control Guideline for Healthcare Services in Kenya, COVID-19-Plan-Prevention and Control in Communities and COVID-19 Quarantine Protocols to limit the COVID-19 infection to the healthcare workers and community members in general; including the acquisition of specialised medical equipment and supplies as enlisted below:

2.4.1 Management of the Healthcare Personnel

- Healthcare personnel should not report to work if they have a febrile respiratory illness.
- In communities where transmission is occurring, healthcare personnel who develop a febrile respiratory illness should be excluded from work and should be tested for COVID-19. If negative, then they should stay away from work until symptoms resolve. If positive, then they should proceed to isolation for 14 days; and
- Healthcare personnel, who develop a febrile respiratory illness and have been working in areas of the hospital where SARS-COV-2 patients are present, should be excluded from work for 7 days or until symptoms have resolved, whichever is longer.

Stewardship of personal protective equipment, antivirals, medical equipment and supplies: Health Facilities should implement plans to ensure appropriate allocation of personal protective equipment, including gloves, masks, N95 respirators, and antiviral medications. Referral isolation centres should be adequately staffed, equipped with functional mechanical ventilators, oxygen, patient monitors and consumables.

Environmental and engineering infection control: Routine cleaning and disinfection strategies should be applied to the environmental management of SARS-COV-2. Management of laundry, utensils and medical waste should be performed in accordance with procedures for infectious waste management (refer to the National Guidelines for the Management of COVID-19 (2020) and EMCA Waste Management Regulation (2006)).

Implementation of Respiratory Hygiene/Cough Etiquette: To prevent the transmission of all respiratory infections in healthcare settings, including SARS-COV 2, respiratory hygiene/cough etiquette measures should be implemented.

Elements of Respiratory Hygiene/Cough Etiquette include:

i. Education of healthcare facility staff, patients, and visitors;

ii. Posted signs in language appropriate to the population served with instructions to patients and accompanying family members or friends;

iii. Source control measures (e.g., covering the mouth/nose with a tissue when coughing and disposing of used tissues, using surgical masks on the coughing person when tolerated and appropriate); and

iv. Hand hygiene after contact with respiratory secretions; and

v. Spatial separation, ideally > 1 metre (>3 feet), of persons with respiratory infections in common waiting areas when possible.

N.B. Covering sneezes and coughs and placing masks on coughing patients are proven means of source containment that prevent infected persons from dispersing respiratory droplets into the air. Physical proximity of <3 feet has been associated with an increased risk for transmission of infections via the droplet route and therefore supports the practice of distancing infected persons from others who are not infected. For detailed infection control measures refer to MoH COVID-19, Infection Prevention and Control (IPC) and Case Management, Kenya (excerpts on Annex III) and National Infection Prevention and Control Guidelines for Health Care Services in Kenya.

2.4.2 Infection Control and Hand hygiene

WHO notes that management of healthcare waste as an integral part of health facility or hospital hygiene and infection control. Healthcare waste can be considered as a reservoir of pathogenic micro-organisms, which if someone is exposed could give rise to an avoidable infection. If waste is inadequately managed, these micro-organisms can be transmitted by direct contact, by inhalation or by a variety of animal vectors (e.g. flies, rodents, roaches), which could come into contact with waste.

Standard precautions are the basic level of infection control precautions which are to be used, as a minimum, in the care of all patients. See **Annex III** for a summary on infection prevention and control by use of standard precautions including hand hygiene.

Hand hygiene in both health care and non−health care settings is one of the most important measures that can be used to prevent transmission of COVID-19 infection. In health care settings, health care workers (HCWs) should apply the WHO's 5 Moments for Hand Hygiene approach before touching a patient, before any clean or aseptic procedure is performed, after exposure to body fluid, after touching a patient, and after touching a patient's surroundings. In homes, schools and crowded public spaces − such as markets, places of worship, truck stopovers, departures or destination points and train or bus

stations, the WHO's 5 Moments for Hand Hygiene hand washing should apply as follows; before preparing food, before and after eating, after using the toilet or changing a child's diaper and after touching animals. Functioning hand washing facilities with water and soap should be available within 5 meters of toilets.

Treatment and handling requirements for excreta by implementing WASH practices, particularly hand washing with soap and clean running water, should be strictly applied and maintained because these provides an important additional barrier to COVID-19 virus transmission and other infections.

Consideration should be given to safe management of human excreta throughout the entire sanitation chain, starting with ensuring access to regularly cleaned, accessible and functioning toilets or latrines and to the safe containment, conveyance, treatment and eventual disposal of sewage.

When there are suspected or confirmed cases of COVID-19 in the home setting, immediate action must be taken to protect caregivers and other family members from the risk of contact with respiratory secretions that may contain the COVID-19 virus.

- Provision of PPE (boots, apron, long-sleeved gown, gloves, mask, and goggles or a face shield),
- Perform hand hygiene after removing PPE.

2.4.3 Medical supplies and Equipment

The project shall procure medical supplies (reagents, pharmaceuticals and equipment's), in line with the National Health Policy and project operational manual. The materials to be procured include:

- procurement of consumables and supplies for blood collection; procurement of supplementary auxiliary equipment for the blood collection centres such blood mixers, blood bank refrigerators, blood donor coaches, Automating blood transfusion service systems, auxiliary and multiplex laboratory equipment,
- procurement of specialized equipment (i.e. PCR machines, sequencer etc.) to allow screening of multiple pathogens,
- procurement of personal protective equipment (PPE), pharmaceuticals and non-pharmaceutical commodities and supplies required for infection prevention control, and
- procurement of specialized waste treatment facilities for one national-level referral hospital, other referral laboratories and health facilities or where these are not available.

Specifically, the following should be the minimum requirements:

2.4.3.1 Delivery of supplies and equipment

- Records should be kept for each delivery including the description of goods, quality, quantity, supplier, supplier batch number, date of receipt and assigned batch number.
- Each container should be carefully inspected for possible contamination, tampering and damage and any suspected containers or the entire delivery quarantines for further investigation,
- Each equipment should be having the service manual with specifications, schematics, operating instructions, troubleshooting, repair and maintenance procedures, cleaning and/or sterilization recommendations, and replacement parts list.

- Sustainability of the equipment's (medical equipment/waste treatment facilities), should be taken into consideration, this will include technology transfer to the local technicians at the selected laboratories and the healthcare facilities used as isolation and quarantine areas. Clinical or Biomedical engineers shall be trained to undertake equipment calibration, maintenance, repair, user training, and decommissioning activities, and
- Environmental issues (e.g. types of material, special disposal requirements of hazardous consumables) shall be taken into account, because they will affect the longevity and acceptability of benefits delivered from the use of equipment.

Further information for servicing and maintenance of health care equipment should be accessed on: WHO Guidelines for Health Care Equipment Donations.

2.4.3.2 Delivery of Pharmaceuticals

- Pharmaceutical products should be handled and distributed according to Good management practices;
- Storage areas should be clean dry and maintained within acceptable temperature limits. Storage should be off the floor and suitable spaced areas to permit cleaning and inspection; and
- Storage areas precautions must be taken to prevent unauthorized persons from entering storage areas, among other issues.

Detailed guidance for delivery of supplies, equipment and pharmaceuticals can be referred in the WHO Safe management of wastes from health-care activities

2.4.3.3 Collecting and Handling Laboratory Specimens for COVID-19

All suspected COVID-19 specimens collected for laboratory investigations should be regarded as potentially infectious. Health Care Workers (HCWs) who collect, handle or transport any clinical specimens should adhere rigorously to the following standard precaution measures and biosafety practices to minimize the possibility of exposure to pathogens.

- Ensure that HCWs who collect COVID-19 specimens use appropriate PPE (i.e., eye protection, an N95 mask, a long-sleeved gown, gloves). If the specimen is collected with an aerosol-generating procedure, personnel should wear a particulate respirator at least as protective as a certified N95, an EU standard FFP2, or the equivalent;
- Ensure that all personnel who transport COVID-19 specimens are trained in safe handling practices and spill decontamination procedures in line with the International Best Practices for WHO Guidance on regulations for the transport of infectious substances 2019–2020.
- Place COVID-19 specimens for transport in leak-proof specimen bags (i.e., secondary containers) that have a separate sealable pocket for the specimen (i.e., a plastic bio-hazard specimen bag), with the patient's label on the specimen container (i.e., the primary container), and a clearly written laboratory request form;
- Ensure that COVID-19 laboratories in health care facilities adhere to appropriate biosafety practices and transport requirements, according to the type of organism being handled;
- Carry out risk assessment for the beneficiary laboratories using Risk Assessment Template for Laboratories handling COVID-19 Samples (refer to Annex IA),

- Deliver all COVID-19 specimens by hand whenever possible; and
- Document clearly each patient's full name, date of birth and suspected COVID-19 of potential concern on the laboratory request form. Notify the laboratory as soon as possible that the specimen is being transported.

Upon arrival at facility receiving, these COVID-19 sample containers should be examined for damage, logged in, and taken to the laboratory for removal of the external packaging material. Damaged packages should be handled in accordance with procedures for laboratories. The removed packaging should then be autoclaved and disposed as solid waste. The interior packing with the intact sample should be placed safely and securely in the respective laboratory under chain-of-custody procedure until the authorized personnel is ready to process the samples. The samples could also be immediately processed, in which case the materials should be placed directly into culture media (such as a liquid or semi-solid nutrient material or media).

2.4.3.4 Blood Collection, Storage and Transmission

The purpose of this section is to describe the simple procedures for the safe storage and transportation of blood and blood components that should be followed in every blood bank or transfusion service, whatever its size and the equipment and materials available. It focuses on the storage and transportation of blood and blood components that have been collected or prepared in plastic blood collection bags containing an anti-coagulant– preservative solution to ensure safe blood in line with Kenya Policy Guidelines on Blood Transfusion (2010) and WHO Guidelines on safe blood transfusion.

The essential parts of the blood cold chain are:

- trained staff
- standard operating procedures
- suitable equipment for the safe storage and transportation of blood and blood products
- controlled environment, and
- monitoring of processes, equipment and the quality of the products.

Whole blood and red cells should be stored in a blood bank refrigerator: that is, one that is specifically designed for the storage of blood. Blood bank refrigerators have inbuilt temperature monitoring and alarm devices and a cooling fan to ensure the even distribution of cold air throughout the equipment.

NB: the whole blood and red cells must be stored at a temperature of +2°C to +6°C and must never be allowed to freeze.

An efficient system should be adopted to ensure that all blood and blood components are maintained in the correct storage conditions whenever they are moved from one location to another, including: from mobile collection sites to the processing laboratory, from the blood bank to a different facility (to a hospital, blood bank or clinic), from the hospital blood bank to wards and operating rooms. The maximum transit time for blood and blood components is 24 hours.

Blood Time Temperature Indicator (BTTI) should be adopted to monitor the temperature of whole blood and red cells in the following situations:

- storage in cold boxes in the case of a power failure;
- transportation in blood transport boxes from one blood bank to another;
- movement of blood from the blood bank to the patient's bed side; and
- return of unused blood from the point of potential use to the hospital blood bank;

Further information on the Safe Blood and blood Product and management, maintenance and use of blood cold chain equipment is available on, Policy Guidelines on Blood Transfusion in Kenya, 2001 WHO Guidelines and Principles for Safe Blood Transfusion Practice and WHO Manual on the management, maintenance and use of blood cold chain equipment respectively.

2.4.3.5 Bio-Safety Guidelines-Blood

The following bio-safety guidelines should be followed by all Blood Transfusion Centers (BTCs) with regard to safe handling of blood:

- Wash hands thoroughly with soap/ detergent and/or antiseptic solutions and water before and after every procedure or any contamination.
- Use protective barriers such as gloves, gowns or aprons, goggles and masks for direct contact with blood.
- Waste handlers should use pierce-proof gloves, aprons and protective shoes or boots.
- All BTC staff should be vaccinated against Hepatitis B.
- Disinfect work surfaces after the procedure and also at the end of each working day with 0.1% sodium hypochlorite solution.
- Place needles and other sharp materials into a puncture-resistant container containing 0.5% sodium hypochlorite solution.
- Safe collection and disposal of needles and sharps in puncture- and leakage-proof containers.
- Do not recap needles, but if unavoidable, use a one-handed technique.
- Cover all cuts and abrasions promptly with a waterproof dressing.

In case of any spillage, cover the area with 0.5% sodium hypochlorite solution and leave for 15-30 minutes and then wipe dry with disposable paper toweling. Discard soiled paper appropriately. Wipe the surface again with disinfectant.

2.5 Waste Management Guiding Principles

Improper management of health care waste can cause serious health problem for health workers and other workers along the waste management chain, community and the environment. Medical wastes have a high potential of carrying micro-organisms that can infect people who are exposed to it, as well as the community at large if it is not properly disposed of. Wastes that may be generated from labs, bloods services , quarantine, isolation and treatment facilities and screening posts to be supported by the COVID-19 readiness and response could include solid and liquid contaminated waste (e.g. blood, other body fluids and contaminated fluid) and infected materials (used water ; lab solutions and reagents, syringes, bed sheets, majority of waste from labs and quarantine and isolation centres, etc.), which requires special handling and awareness, as it may pose an infectious risk to healthcare workers in contact or handle the waste. It is also important to ensure that sharps are properly disposed of.

This sub-section 2.5 provides background information for reference and basis for development of sub-project specific ICWMP. This plan has taken into account the four internationally accepted principles that guide systems development and maintenance to safeguard public health and protect environment. These are the precautionary principle, polluter pay principles, duty of care and proximity principle.

Precautionary Principle: Health facilities (blood service centres, laboratories, isolation, quarantine, treatment centers) administrators or managers are required to prepare and be responsible for the protection, preservation and restoration of the environment. Medical practitioners should be cautious

when handling medical waste to ensure that they protect themselves, those around them and the environment;

Polluter Pays Principle: Health facilities (blood service centers, laboratories, isolation, quarantine, treatment centers) administrators or managers shall be legally and financially responsible for safe handling of waste, environmentally sound disposal of waste and creating an incentive to produce less waste.

Duty of Care Principles: Health facilities (blood service centers, laboratories, isolation, quarantine, treatment centers) administrators or managers handling or managing substances or related equipment are ethically responsible for applying the utmost care, and

Proximity Principle: the treatment and disposal health care waste from the health facilities (blood service centers, laboratories, isolation, quarantine, treatment centers) should take place as near as possible to the point of production as is technically and environmentally possible to minimize risks involved in transportation.

Infectious waste if not managed properly has the potential to endanger the health of patients, health-care workers, waste-handlers, waste-pickers and the general population. To manage the waste generated from the health facilities (blood service centers, laboratories, isolation, quarantine, treatment centers), the following waste mitigation strategies (Figure 2-2) usually referred to as key steps in management of HCWM shall be implemented:

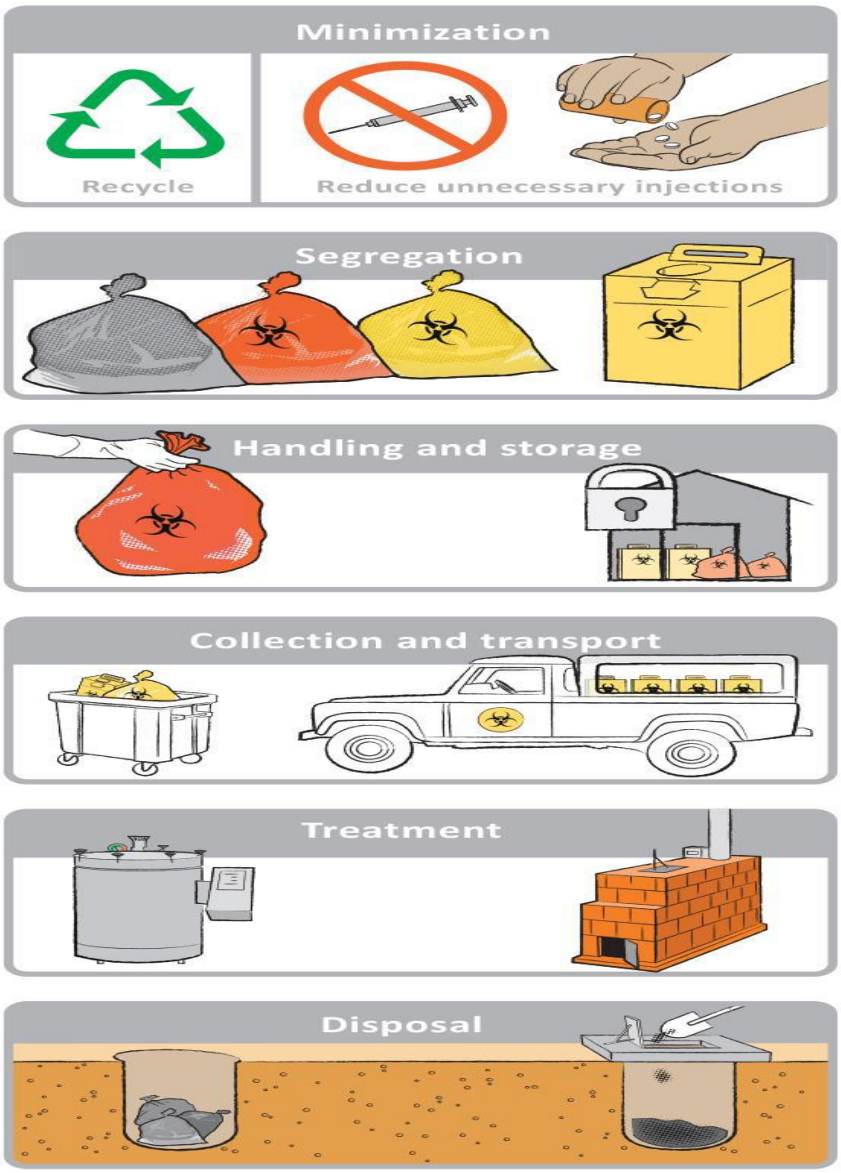

Figure 2- 2: Infectious Healthcare Waste Management

In achieving sound management of waste, a hierarchy of waste management should always be applied. This is a ranking of waste management methods in terms of their 'desirability'. The hierarchy is based largely on the concept of the 3R's – reduce, reuse, recycle. The most preferable approach is that which produces as little waste as possible, thus minimizing the amount entering the waste stream, taking cautious and very careful attention the risks involved. Therefore, while applying this to HCWM, ensuring safety of the workers and protection of the environment at every level of control is very critical (see Figure 2- 3):

Figure 2- 3: Waste Minimization Stages

2.5.1 Waste Minimization

The best practice is to ensure that all health facilities (blood service centers, laboratories, isolation, quarantine, treatment centers) should minimize their waste generation to the barest possible minimum amounts. Appropriate plans, strategies and actions should be established to ensure adequate medical waste minimization at source by implementing the following waste minimization strategies:

- Source reduction. Purchasing and supplying materials which are less wasteful and/or generate less medical waste.
- Stock management. Frequent auditing; use of the oldest stock first and checking the expiry date of products during receiving and issuing of commodities.
- Encouraging the use of recyclable products. Using materials that can be reused both off-site and on-site.
- Centralized purchasing, supply of medical goods to ensure the selection of less wasteful materials;
- Source suppliers who may deliver chemicals and pharmaceuticals in small quantities, this will encourage the hospital administration to make purchase in small manageable quantities,
- Ensure good management and control practices especially in the purchase and use of pharmaceuticals; and
- Enforcing a rigorous and careful segregation of the infectious waste at source.
- Segregation of waste at the point of generation. Sorting the waste into different categories helps to minimize the quantities of infectious waste generated.
- Reduction of unnecessary injections to reduce on sharps waste
- Training of relevant staff on waste minimization and benefits especially the medical staff to make changes towards less wasteful clinical practices.

2.5.2 Waste Segregation and Colour Coding

In the case of COVID-19 all the waste generated in care of COVID-19 patients is considered as infectious waste and will be segregated in the yellow/red bags and adhere to Kenya Health Care Waste Management Strategic Plan 2016-2021, bio-medical waste management rules, 2016 for segregating and colour-coding as outlined below in Table 2- 1 and **Figure 2-4** as well as recommended by WHO Safe management of wastes from health-care activities with the following colour- coding system:

- **Black:** All bins or bags containing non-risk HCW.

- **Yellow:** Any kind of container filled with infectious HCW, including safety boxes.
- **Red:** Any kind of container filled with heavy metal or effluent.
- **White:** Any container or bin filled with drug vials, ampoules, or glass bottles for glass recycling or reuse.

Double layered bags should be used for the collection of waste from isolation and treatment wards to ensure that no accidental leakage occurs from the bags.

In Kenya the hospital management are responsible for provision of receptacles specifically suited for each waste category. In the case of COVID-19 all the waste generated in care of COVID-19 patients is considered as infectious waste and will be segregated in the yellow/red bags. The waste generated from treatment facilities, will be segregated and colour-coded as outlined below in Table 2-1 as recommended by WHO. Others measures include:

- Facility containing a Person Under Investigation (PUI) or Person Under Monitoring (PUM) should be encouraged to segregate all medical waste (face masks, wipes, tissues).
- Keep separate coded bins/bags/containers in wards and maintain proper segregation of waste for PUI/PUM as per the Regulations 37-43 of EMCA (Waste Management) regulations, 2006.

Table 2-1: Three-bin and safety box system used at all health faculties

Segregation category	Colour Coding	Container	Examples	Marking
Sharp Waste	White or yellow (Marked "Sharps')	Bag or bin (Puncture Proof)	Syringes with needles, blades	Biohazard symbol and appropriate MOH messages on injection safety
Infectious clinical waste (different type)	Yellow	Bag or bin (Strong leak proof plastic bag with biohazard symbol)	Laboratory waste, materials potentially not infected with blood.	
Highly Infectious	Red (Marked Highly Infectious)	Containers capable of being autoclaved	Laboratory waste, materials potentially infected blood, swabs, cultures / TB laboratories, contaminated blood clots, glassware, swabs containers /specimen bottles and culture media.	
Non-Infectious/ nonhazardous (non-clinical)		Plastic Bag or container.	Paper, ash, cardboard, carton boxes	
Chemical and Pharmaceutical	Brown	Plastic bag or Container	Waste containing chemical substances (e.g. laboratory reagents; film developer; disinfectants that are expired or no longer needed; solvents; waste with high content of heavy metals, e.g. batteries; broken thermometers and blood-pressure gauges), Cytotoxic waste, expired drugs	Marking will vary with classification of the chemical

Segregation category	Colour Coding	Container	Examples	Marking
Radioactive waste	Yellow with black radioactive symbol	Lead Box	Waste containing radioactive substances (e.g. unused liquids from radiotherapy or laboratory research; contaminated glassware, packages or absorbent paper; urine and excreta from patients treated or tested with unsealed radionuclides; sealed sources)	 Radio Active symbol

Figure 2- 4: Waste Segregation

2.5.3 Packaging and Labelling of Healthcare Waste

The packaging involves putting wastes in the colour-coded waste bags (bin liners) and label it for easy identification of waste streams and easy tracking back. All waste bags or containers should be labelled with basic information in English language and or in Swahili; most waste being kept at waste temporal holding storage areas without being sealed. Basic label information should include type of waste in the container; name of the health department, date of collection and, warning of hazardous nature. In general, labelling is important in order to:

- Identify the source of infectious or date of generation in case of an accident or improper segregation of the waste, ensure that the workers responsible for infectious management handle the different types of wastes safely, ensure that each staff member feels more responsible for what they put into the bag/receptacle.
- Ensure that Medical Departments gather data on the amount of waste produced in each department.

The packaging should be appropriate for the type of waste involved. In order to reduce the risk of exposure to medical waste, stringent packaging protocols including; decontaminating the waste containers at point of origin must be adhered to. The following guidelines should be included for packaging sharps and other health care wastes:

- The bio-medical waste should be collected and stored separately by the same common bio-medical waste treatment facility (CBMWTF) staff prior to handling it. A dedicated collection bin labelled as infectious waste should be used to store waste from the isolation wards.
- At the waste treatment area, prioritize treatment within 48 hours and disposal of waste coming from the treatment and isolation areas immediately upon receipt.
- The inner and outer surface of the containers, bins and trolleys used for storage of infectious waste should be disinfected with sodium hypochlorite solutions.
- There would be special packaging characteristics for some treatment techniques; incineration requires combustible containers while steam sterilization requires packaging material that allow steam penetration and air evacuation,
- Once the waste generated has been containerized/packaged for disposal it must not be in a position to be exposed again as it is moved from site to site en route to final disposal.

2.5.4 Waste Collection and Handling

Collection of waste from beneficiary health care facilities is extremely important particularly to avoid over spilling of waste out of collection containers and infections to medical staff and general public; collection should be done promptly and routinely or as often as required. Collection of waste should be done by approved and trained personnel fully equipped with appropriate PPEs and conveying machinery such as waste trolley and carts. Administrators or managers, health care workers and laboratory staff of health facilities should be actively involved in collection of waste as well as the waste handlers. They should ensure that their containers/bags (Bins/safety boxes and collection receptacles) are never more than three-quarter full before sealing them at their points of generation. Replacement bags should be made available at each waste collection period. They should also ensure that such collection containers are appropriately labelled as per Kenya Health Care Waste Management Plan 2016-2021.

- As a precaution double layered bags (using 2 bags) should be used for collection of waste from isolation wards so as to ensure adequate strength and no leaks.
- Dedicated medical waste collection should be made available by the facility management, to ensure the double-bagged waste bags are disposed of immediately.
- Collect and store biomedical waste separately prior to handling over the same to NEMA licensed waste collectors in case the facility is utilizing the services of an off-site treatment facility. It is important to use a dedicated collection bin labelled as infectious waste to store all COVID-19 waste and keep separately in temporary storage room prior to handing over to authorized Biomedical Waste Collectors; and
- Maintain a separate record of waste generated from Isolation, quarantine and treatment areas.

2.5.4.1 Waste Handling Safety Measures

All health care waste handlers should wear appropriate PPE (that is, boots, apron, long-sleeved gown, thick gloves, mask, and goggles or a face shield) and perform hand hygiene after removing it. For more information refer to the WHO guidance, Safe management of wastes from health-care activities. Personal Protective equipment should be disposed of accordingly as infectious waste.

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 should be provided 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.

Additionally, immunization shall be undertaken for staff members, as necessary (e.g. vaccination for hepatitis B virus, tetanus immunization).

Sharps containers (i.e., safety boxes) shall be placed as close to the point of use as possible and practical, ideally within arm's reach.

Safety boxes shall not be placed on a floor or in high traffic areas (corridors outside laboratory rooms or sample preparation rooms) where people could bump into them or be stuck by someone carrying sharps to be disposed of.

Infectious waste bins should be covered before collection. It should be cleaned and disinfected with 0.5% chlorine solution after emptying and before reuse.

In case of blood spillage:

- Put on appropriate PPE before visiting the site;
- Mop up liquid from large spills using paper towels, and place them into the infectious waste;

2.5.5 Waste Storage

There shall be designated multiple waste storage area designed for different types of wastes with appropriate design and capacity to store the generated waste and shall be classified into internal and external. Consideration for storage shall be based on the classification or type of waste being dealt with and the potential risk of infection to health-care workers and waste disposal staff. The storage place must be identified depending on the type of waste. WHO guidelines provide key recommendations for storage facilities of health care waste which includes: i) the storage area should have a hard standing floor with good drainage that allows easy cleaning and disinfection, ii) adequate water supply and supply of cleaning equipment and PPE for staff, iii) easy access by staff handling the waste and lockable to prevent unauthorized entry of persons, iv) should be away from any food preparation areas and patients wards.

The following rules should be observed for proper storage of infectious waste:

- Initial packaging and storage should take place where infectious waste is generated.
- Medical waste from isolation/quarantine areas should be pretreated or decontaminated to reduce the microbial load,
- Treatment processes methods may include autoclaving, incineration, chemical disinfection, grinding/ shredding/disinfection methods,
- Storage of waste shall then be moved to a temporary on-site storage location that is secure and completely closed or lockable,
- The facility should have earmarked segregation points, as close to the generation points of infectious waste as possible.
- The facility should ensure availability of good quality and adequately sized containers for waste segregation and on-site storage. These should preferably be thick plastic and should be lined with non- chlorinated plastic liners, refer to additional information in WHO water, sanitation, hygiene

and waste management for COVID-19 and WHO Safe management of wastes from health-care activities.

Internal storage is the temporary placement of waste at the point of generation before transfer to external storage points. A temporal storage location for the infectious waste should be designated within the health-care facilities, PoE, isolation and quarantine areas and laboratories External storage refers to the transit point where waste is stored after removal from primary storage to the time it is collected and transported for treatment and final disposal. External storage location should be isolated and stored in the larger containers found near the waste treatment facilities awaiting treatment. Infectious waste should not be stored for more than 48 hours after generation before treatment.

To ensure infectious waste is kept separately, the central storage receptacles for each color-coded bags should be placed in similarly color-coded receptacles. This waste should be pre-treated (autoclaving, chemical treatment) before being transported to final treatment point.

2.5.6 Transportation

Consideration for transportation should be based on the classification or type of waste being dealt with and the potential risk of infection to health-care workers and waste disposal staff. Transportation is classified into On-site transport and Off-site transport, the waste generated from HCF is treated and disposed both at (on-site) and also there shall be off-site transport**.** On-site transport involves conveying of wastes from the various points of generation within a laboratory to a temporary storage location also within the same area. Waste transportation within hospitals should be done by using dedicated trolleys with separate ones for infectious waste to be drawn on paved surfaces to waste treatment sites.

2.5.6.1 On-site Transportation

On-site transport should take place during less busy times whenever possible. Set routes should be used to prevent exposure to staff and patients and to minimize the passage of loaded carts through patient care and other clean areas. Depending on the design of the health-care facility, the internal transport of waste should use separate floors, stairways or elevators as far as possible. Regular transport routes and collection times should be fixed and reliable. Transport staff should wear adequate personal protective equipment, gloves, strong and closed shoes, overalls and masks.

Hazardous and non-hazardous waste should always be transported separately. In general, there are three different transport systems; the following should be adhered to when carrying out On Site transportation.

- Waste transportation trolleys for general waste should be painted black, only be used for non-hazardous waste types and labelled clearly “General waste” or “Non-hazardous waste”.
- Infectious waste should not be transported together with other hazardous waste, to prevent the possible spread of infectious agents. Trolleys should be colored in the appropriate colour code for infectious waste (yellow) and should be labelled with an “Infectious waste” sign.
- Waste should never be transported by hand even if the distance is short due to risks of accident/exposure to infectious material,
- Other hazardous waste, such as chemical and pharmaceutical wastes, should be transported separately in boxes to central storage sites.
- The collected waste should not be left even temporarily anywhere other than at the designated storage room.
- Containers should be covered with lids during storage and transport.

- The use of waste chutes in health-care facilities is not recommended, because they can increase the risk of transmitting airborne infections.

2.5.6.2 Off-site Transportation

During the transportation of waste outside the Labs, HCF, quarantine and isolation centers the following safety precautions should be included: -

- Off-site transportation of waste should comply with the national regulations EMCA Waste Management Regulations, 2006. Health care waste transportation, must be carried out by MOH trained personnel in liaison with NEMA licensed waste collection companies.
- Single-bagged waste and containers of sharps and liquids should be placed within a rigid or semi rigid container such as a bucket, box, or carton lined with a plastic bag.
- When transporting plastic bags of infectious waste, care should be taken to prevent tearing of the bags.
- Infectious waste should not be compacted before treatment.
- Outside selected HCFs, infectious waste should be transported in closed, leak-proof, rigid containers using companies that are licensed by NEMA and that the HCFs management ensures that they comply with all requirements.
- The transportation should be properly documented, and all vehicles will carry a consignment note from the point-of collection to the treatment facility.
- Staff should be fully aware of emergency procedures for dealing with accidents and spillage.
- Recycling of waste MUST be avoided to prevent human contact with COVID19 infections.
- Landfill sites with informal waste picking shall need increased education awareness, management and security.

Vehicle requirements: Off-site transportation of COVID-19 infectious waste should follow i) the MoH/NEMA guidelines for the vehicle requirements for transporting infectious waste for both the Pick Up and Truck ii) carry adequate supplies of protective clothing, waste bags, cleaning tools and disinfectants in case of spillage iii) internal finish of the vehicle should be good to allow for ease in cleaning and disinfecting the vehicle after use;

Labelling of the transport vehicle: The transport vehicle should be labelled according to the type of waste that is being transported. The label that is displayed will depend on the United Nations classification of the waste. Before sending hazardous health-care wastes off-site, transport documentation (commonly called a "waste tracking note") should be prepared and carried by the driver with the following information: i) waste classes ii) waste sources iii) pick-up date iv) destination v) driver name vi) number of containers or volume vii) Receipt of load received from responsible person at pick-up areas;. On completion of a journey, the transporter should complete a consignment note and return it to the waste producer for filing.

2.5.7 Waste Treatment and Disposal Methods

Waste Treatment: The project shall adopt the World Health Organization (WHO[13]) waste treatment techniques which minimize the formation and release of chemicals or hazardous emissions. In general, proper treatment and disposal of healthcare waste is necessary to ensure that its impact on the environment and human health is minimized or eliminated. Among all the current existing technologies for the treatment and disposal of infectious waste, the most appropriate technology shall be applied, and this should be the safest, reliable, affordable, and sustainable taking into considerations technical, human, financial and available infrastructure and resources (power and fuel) available.

[13] WHO Safe management of wastes from health-care activities, Second edition.

Foremost, , the technology so chosen should be able to guarantee minimization of the immediate public health risks associated with infectious waste management as well as with the lowest negative impact on the environment.

There are several methods appropriate for infectious waste treatment, depending on the type of waste material. These treatment methods shall include one of the following options or combination of options: steam sterilization (autoclaving), incineration, thermal inactivation, gas/vapor sterilization, chemical disinfection, shredding, maceration, and sterilization by radiation, or electromagnetic radiation.

All biological wastes from health Care facilities (isolation and quarantine centers) should be decontaminated and marked as "Treated Biohazard Waste" prior to disposal in designated containers for treated infectious waste. HCFs, Isolation & Quarantine Centers Infectious Medical Waste should be handled in the following ways:

- Workers shall be provided with adequate PPEs, including three (3) layer masks, splash proof aprons, gowns, nitrite gloves, gumboots and safety goggles.
- All PUI/PUM related waste should be double bagged, "swan neck" tied and the outside sprayed with a 0.5% chlorine disinfectant solution (1% household bleach solution).
- If dedicated medical waste collection is available, then the double-bagged waste should be disposed of immediately.
- The surface of containers/bins/trolleys (inner and outer) used for storage of waste should be disinfected with 1% Sodium Hypochlorite Solution.

If blood spillage has occurred (e.g. because of a laboratory sample breaking in the phlebotomy area or during transportation, or excessive bleeding during the procedure), clean it up. The following procedure shall be adhered to:

- Remove as much blood as possible with wet cloths before disinfecting;
- Assess the surface to see whether it will be damaged by a bleach and water solution.
- For cement, metal and other surfaces that can tolerate a stronger bleach solution, flood the area with an approximately 5000 parts per million (ppm) solution of sodium hypochlorite (1:10 dilution of a 5.25% chlorine bleach to water); and
- For surfaces that may be corroded or discolored by a strong bleach, clean carefully to remove all visible stains. Make a weaker solution and leave it in contact for a longer period of time. For example, an approximately 525 ppm solution (1:100 dilution of 5.25% bleach) is effective.

If a person was exposed to blood through non-intact skin, mucous membranes or a puncture wound, complete an incident report, as described in WHO best practices for injections and related procedures toolkit. For transportation of blood samples outside a hospital, equip the transportation vehicle with a blood spillage kit.

2.5.7.1 Incinerator control method

MOH is gradually moving to non-burn technologies in bid to promote circular waste approaches instead of traditional linear approaches. Proper design and operation of incinerators should achieve desired temperatures, waste residence times inside the furnace, and other conditions necessary to destroy pathogens, minimize emissions, avoid clinker formation and slagging of the ash (in the primary chamber), avoid refractory damage destruction, and minimize fuel consumption. Good Combustion Practice (GCP) elements also should be followed to control dioxin and furan emissions (see desired design for incinerators on section 1.3.3).

If existing on-site incinerators are used, mitigation measures will be taken to control emissions to air in line with WBG EHS guidelines for healthcare facilities and WHO Safe management of wastes from health-care activities.

The good practices include:

- Waste reduction and segregation to minimize quantities of waste to be incinerated;
- Siting incinerators away from patient wards, residential areas or where food is grown;
- A clearly described method of operation to achieve the desired combustion conditions and emissions; for example, appropriate start-up and cool-down procedures, achievement and maintenance of a minimum temperature before waste is burned, use of appropriate loading/charging rates (both fuel and waste) to maintain appropriate temperatures, proper disposal of ash and equipment to safeguard workers;
- Periodic maintenance to replace or repair defective components or replace the scrubbers ;
- Improved training for operators and management including the availability of an operating and maintenance manual, visible management oversight, and regular maintenance schedules.
- Ensure provision of well sited ash pits to properly dispose of contaminated ash from incineration,
- The incinerator housing should have adequate water supply and provision of sanitation facilities (toilets and wash areas) for use by the staff and,
- Installed incinerators should be compliant with the Environmental standards; national regulations (EMCA,Waste management regulations, 2006, EMCA, Air quality regulations, 2014) as well as the World Bank Group EHS guidelines.

Caution

Due diligence of an existing incinerator should be conducted to examine its technical adequacy, process capacity, performance record, and operator's capacity. In case any gaps are discovered, corrective measures should be recommended.

Always refer to Safety Data Sheet (SDS) of the pharmaceutical waste before incineration

Health and safety provisions should be made available at the incinerators facilities including; fire extinguishers, sand buckets, first aid kits

Flammable pharmaceutical waste should NOT be incinerated. The treatment methods for Infectious Waste is summarized on Table 2-2:

Table 2- 2: Type of infectious waste expected to be generated from HCFs/Labs and Treatment methods

Waste Category	Type of waste	Source Facility / Laboratory	Treatment Method
Waste cultures and stocks of microorganisms or etiologic agents	Cultures and stocks of infectious agents or microorganisms Cultures of specimens from medical and pathological laboratories. Disposable containers, materials, and supplies that may have been contaminated during the manipulation of microbial cultures and stocks	Labs, Blood Bank Center, PoE, Isolation & Quarantine Areas	Infectious wastes are disinfected / sterilized at the laboratory and incinerated in high temperature, double chambered pyrolytic incinerator, or they can be microwaved or again autoclaved. In the case of COVID-19 the infectious waste will be pretreated by disinfection using 0.5% or 0.05% chlorine solution in accordance with the materials to be treated.
Human pathological wastes including human blood and blood products and their containers Waste	Pathological waste consists of human tissues; organs; body parts; dialysate; cerebrospinal, synovial, pleural, peritoneal, and pericardial fluids; and their respective containers. Human blood and blood product wastes (e.g. blood plasma, platelets, red or white corpuscles, and other derived licensed products such as interferon, etc.) Items saturated or dripping with human blood or blood products Items caked with dried human blood or blood products	Labs, Blood Bank Center, PoE, Isolation & Quarantine Areas	Chemical disinfection, Wet thermal treatment/ autoclave or microwaved and Incineration (Pyrolytic incinerator) Highly infectious waste, such as cultures from lab work, should be sterilized using autoclave. Pathological waste should be treated using Incineration (pyrolytic incinerator).
Used sharps waste	This category includes used hypodermic needles, syringes (with or without the attached needles), Pasteur pipettes, disposable plastic pipettes, scalpel blades, blood vials, test tubes, needles with attached tubing, Broken plastic culture dishes, unbroken glass culture dishes, and other types of broken and unbroken glassware that was in contact with infectious material including microscope slides and covers lips.	Labs, Blood Bank Center, PoE, Isolation & Quarantine Areas	All used sharps will be placed in specific cardboard boxes called safety boxes and incinerated preferably in an appropriate double-chamber (>850°C) incinerator, in HCFs compound or offsite as well as other appropriate methods.
Chemical waste	laboratory reagents; disinfectants (such as formaldehyde, chloroform, phenol, ethyl alcohol, isopropyl alcohol, amyl alcohol, and sodium hypochlorite) that are expired or no longer needed; and contaminated chemicals.	Labs, Blood Bank Center, PoE, Isolation & Quarantine Areas	Diluting with a distilled water and/ or neutralization using a lime or acid. Return expired drugs to supplier;
Liquid Waste	Chemicals used in the production of biological, laboratory reagents; disinfectants, alcohol, amyl alcohol, and sodium hypochlorite, expired drugs.	Labs, Blood Bank Center, PoE, Isolation & Quarantine Areas	All effluents in HCFs will be disinfected with bleach and drained to a septic tank or cesspool for both storage and treatment in the compound of health facilities.

Waste Category	Type of waste	Source Facility / Laboratory	Treatment Method
		centers & Blood Bank Center.	Return expired drugs to supplier;
	Sanitary liquid waste		Sanitary liquid waste are drained to a septic tank or cesspool for both storage and treatment in the compound of health facilities. Grey water should be treated / decontaminated to meet all applicable standards/requirements to the extent possible before discharging to the sewer line with in HCFs,
Hazardous wastes	Contaminated face masks, wipes, tissues	Labs, Blood Bank Center, PoE, Isolation & Quarantine Areas	Contaminated hazardous wastes would be incinerated or autoclaved or microwaved Other hazardous waste that should **not be incinerated** see note below the table 2-2
Non-hazardous wastes	Paper, cardboard, medical supplies packaging and other non-contaminated materials from other HCFs, isolation and quarantine centers.	Labs, Blood Bank Center, PoE, Isolation & Quarantine Areas	Non-hazardous wastes would be incinerated and ash disposed in the line on-site ash pit or off-site into the municipal waste stream.

Source: National Health Care Waste Management Plan 2016-2021

NOTE: Not all the healthcare waste generated in the healthcare facilities will be incinerated. Other waste not recommended for incineration include; radioactive waste, waste with high content of heavy metals (transported to specialised facilities for metal recovery), pressurised containers (catridges/cylinders) and glass (should be treated through recycling/re-use).

Waste Disposal: Final disposal of the non-hazardous healthcare waste and residues or by-products from the treatment of waste should be disposed of in the following ways among others;

- Municipal landfills: This is a designated site for disposal of municipal waste in a controlled manner to minimize pollution to ground water, land, and the air.
- Burial in pits: Infectious waste pits, placenta pits, ash pits.
- Sterilized and shredded microwaved or autoclaved waste can be channelled to waste reprocessing facilities or be disposed of through the municipal waste stream to the landfills.

Please note that incineration is not a disposal method because the ash residue has to be disposed either in a protected ash pit or municipal landfill.

Pretreatment of waste at the lab using autoclaving process involves placing waste to be treated in a special container. When autoclaving occurs, an indicator strip on the container changes color. This allows lab workers and waste management workers to be able to tell at a glance whether waste has undergone autoclaving. Performance of the autoclave is automatically tracked electronically to ensure its effectiveness. This method is the same waste management method used by sections of the hospitals and similar facilities that produces highly infectious waste that requires pretreatment before allowing it join the other hospital waste stream for further treatment and disposal. Management will send sterilized wastes produced by the laboratory or other sections producing highly infectious waste to incinerator that fulfils the emission standard on Environmental, Health, and Safety Guidelines for Health Care Facilities (2007) or other appropriate waste treatment technologies.

These emission levels should be achieved without dilution, at least 95 percent of the time that the plant or unit is operating, to make calculation as a proportion of annual operating hours. Hence, MoH should plan for the procurement of incinerators which fulfil this emission standard to the extent possible.

2.5.8 Liquid Waste Generated Treatment and Disposal

Liquid contaminated waste (e.g. pathological sample, blood, faeces, urine, other body fluids and contaminated fluid) Healthcare facilities requires special handling, as it may pose risk to healthcare workers with contact or handle the waste. Typically, a system of sewer pipes linked to form a sewerage system should collect waste water from around a facility and carry it below ground to a central location for treatment at selected HCFs (quarantine/isolation/treatment/Blood centers) and Laboratories. The treatment plant should be located at a facility, and waste water collected from laboratory by pipe system and passed into different units of liquid waste treatment units in line with WHO Water, sanitation, hygiene and waste management for COVID-19 technical guidance. All infectious waste generated from healthcare facilities (including sample packaging materials, culture materials, petri dishes, PPE and associated process wastes) would leave the facility only after decontamination using the autoclave or after being chemically sterilized.

Chemical Treatment Methods: use disinfectants such as dissolved chlorine dioxide, bleach (sodium hypochlorite), peracetic acid, lime solution, ozone gas or dry inorganic chemicals (e.g. calcium oxide powder) See **Table 2-3**. Chemical processes often involve shredding, grinding or mixing to increase exposure of the waste to the chemical agent. In liquid systems, the waste may go through a de-watering section to remove and recycle the disinfectant.

The COVID-19 virus is an enveloped virus with a fragile outer membrane that can be destroyed by applying the following method of disinfection using 0.5% or 0.05% chlorine solution in accordance with the materials to be treated.

Table 2- 3: Recommended Chlorine Concentrations for Disinfection

Percentage	Dilution	Purpose or Use
2%	4 tablespoons of granular chlorine in 2 liters of water	Infectious stool, vomitus, cadavers
0.5%	4 tablespoons of granular chlorine in 8 liters of water	Cleaning floors, footbath, Bed mattresses contact tracing, toilets
0.05%	1 tablespoon of granular chlorine in 20 liters of water	Hand washing, washing of soiled clothes, dishes

Source: WHO Cleaning and disinfection of environmental surfaces in the context of COVID-19 Interim guidance, May 2020 and Interim Infection Prevention and Control Recommendations for Coronavirus Disease 2019 (COVID-19) in Health Care Settings in Kenya.

2.5.8.1 Overall Requirements

Health and environmental workers should always wear heavy utility gloves and shoes when handling or transporting liquid medical waste of any kind. When carrying or disposing of liquid medical waste, they should be careful to avoid splashing the waste on themselves, others, or on the floor and other surfaces.

Staff should carefully pour liquid waste down a sink, drain, flushable toilet, or latrine. If this is not possible, bury it in a pit along with solid medical waste. Moderate quantities of mild liquid or semi-liquid pharmaceuticals such as solutions containing vitamins, cough syrups, intravenous solutions, eye drops (but not antibiotics or cytotoxic drugs), may be diluted in a large flow of water and discharged into municipal sewers. Pharmaceutical wastes shall not be disposed of into slow-moving or stagnant water. Unless there is an adequate waste-water treatment plant that allows for waste water pre-treatment, blood should be disinfected before discharged to a sewer.

2.5.8.2 Sanitation and Plumbing

People with suspected or confirmed COVID-19 disease should be provided with their own flush toilet or latrine that has a door that closes to separate it from the patient's room. Flush toilets should operate properly and have functioning drain traps. When possible, the toilet should be flushed with the lid down to prevent droplet splatter and aerosol clouds. If it is not possible to provide separate toilets, the toilet should be cleaned and disinfected at least twice daily by a trained cleaner wearing the minimum PPE (gown, gloves, boots, mask, and a face shield or goggles). Further, and consistent with existing guidance, staff and health care workers should have toilet facilities that are separate from those used by all patients.

WHO recommends the use of standard, well-maintained plumbing, such as sealed bathroom drains, and back flow valves on sprayers and faucets to prevent aerosolized faecal matter from entering the plumbing or ventilation system, together with standard waste water treatment. Risks pertaining to the adequacy of the collection system or to treatment and disposal methods should be assessed following a safety planning approach, with critical control points prioritized for mitigation.

2.5.8.3 Toilets and the handling of faeces

According to WHO Water, sanitation, hygiene and waste management for COVID-19 technical guidance, it is critical to conduct hand hygiene when there is suspected or direct contact with faeces (if hands are dirty, then soap and water are preferred to the use of an alcohol-based hand rub). If the patient is unable to use a latrine, excreta should be collected in either a diaper or a clean bedpan and immediately and carefully disposed of into a separate toilet or latrine used only by suspected or confirmed cases of COVID-19. In all health care settings, including those with suspected or confirmed COVID-19 cases, faeces must be treated as a biohazard and handled as little as possible. Anyone handling faeces should follow WHO contact and droplet precautions and use PPE to prevent exposure, including long-sleeved gowns, gloves, boots, masks, and goggles or a face shield. If diapers are used, they should be disposed of as infectious waste as they would be in all situations. Workers should be properly trained in how to put on, use, and remove PPE so that these protective barriers are not breached. If PPE is not available or the supply is limited, hand hygiene should be regularly practised, and workers should keep at least 1 m distance from any suspected or confirmed cases.

If a bedpan is used, after disposing of excreta from it, the bedpan should be cleaned with a neutral detergent and water, disinfected with a 0.5% chlorine solution, and then rinsed with clean water; the rinse water should be disposed of in a drain or a toilet or latrine. Other effective disinfectants include commercially available quaternary ammonium compounds, such as cetylpyridinium chloride, used according to manufacturer's instructions, and peracetic or peroxyacetic acid at concentrations of 500−2000 mg/L. Chlorine is ineffective for disinfecting media containing large amounts of solid and dissolved organic matter. Therefore, there is limited benefit to adding chlorine solution to fresh excreta and it is possible that this may introduce risks associated with splashing.

The off-site waste treatment shall be applied to the HCFs, quarantine and isolation centers without sewer line to dispose human excretory. For this reason, a well-designed manhole shall be constructed and or renovated together to temporarily hold the sanitary wastes and disposed off-site the facility. Due diligence of such external waste management facilities should be conducted to examine its technical adequacy, process capacity, performance record, and operator's capacity. In case any gaps are discovered, corrective measures should be recommended and agreed with the government or the private sector operator.

2.5.8.4 Safely disposing of grey water or water from washing PPE, surfaces and floors.

WHO Water, sanitation, hygiene and waste management for COVID-19 technical guidance recommends cleaning of utility gloves or heavy duty, reusable plastic aprons with soap and water and then decontaminate them with 0.5% sodium hypochlorite solution after each use. Single-use gloves (nitrile or latex) and gowns should be discarded after each use and not reused; hand hygiene should be performed after PPE is removed. If grey water includes disinfectant used in prior cleaning, it does not need to be chlorinated or treated again. However, it is important that such water is disposed of in drains connected to a septic system or sewer or in a soak away pit. If grey water is disposed of in a soak away pit, the pit should be fenced off within the health facility grounds to prevent tampering and to avoid possible exposure in the case of overflow. Specification for ideal liquid waste treatment plan design is described in Fi*gure 2-5* and with the effluent discharges meeting EMCA Guidelines for Effluent Discharge to Public Sewers in the Water Quality Regulations 2006 *Table 2-4*:

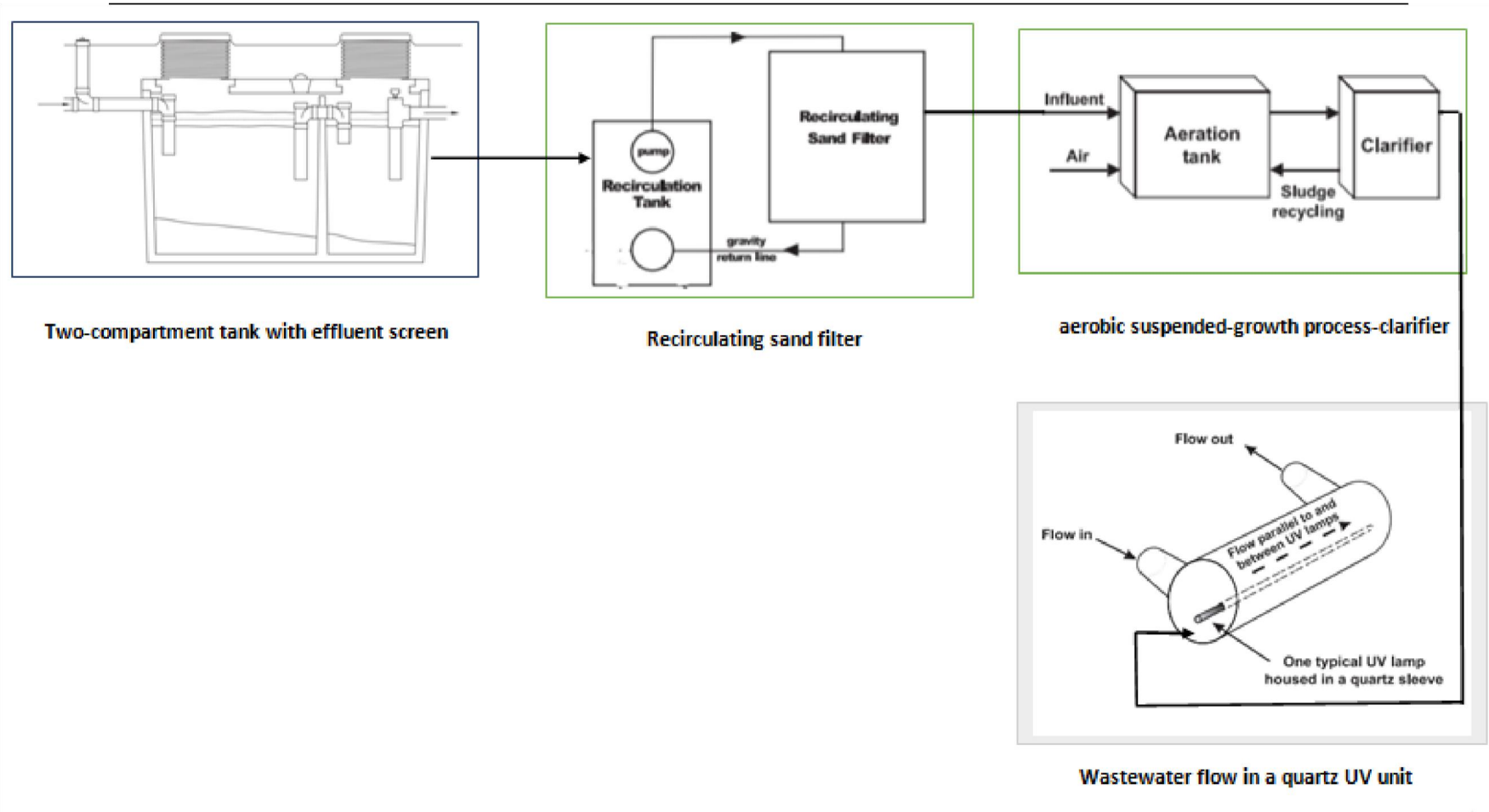

Figure 2- 5: A schematic diagram of the liquid waste treatment facility

2.5.8.5 Monitoring the liquid Waste Management System

To maintain the onsite waste treatment operating system and ensure sustainable, continuous monitoring system shall be established. Both individual systems and sets of systems within a delineated management area would be monitored to ensure proper performance and the achievement of public health and environmental goals. A combination of visual, physical, bacteriological, chemical, and remote monitoring approaches shall be used to assess system performance. Specific requirements for reporting to the appropriate regulatory agency would also be defined in a management program. The right to enter the health facility to access and inspect components of the on-site system is also an essential element of an effective management program.

Effluent guidelines are applicable for direct discharges of treated effluents to surface waters for general use. EMCA Guidelines for Effluent Discharge to Public Sewers in the Water Quality Regulations, 2006 (*Table 2- 4*); World Bank EHS General Guidelines for Environmental Waste water And Ambient Water Quality, should be adhered to. Finally, when the waste water meets the effluent quality standards it shall be discharged to on-site sewer lines or transported to Waste Water Treatment Plant(s) at respective counties for final disposal of the waste.

Table 2- 4: EMCA Standards for Effluent Discharge into Public Sewers

PARAMETER	Maximum levels permissible
Suspended solids (mg/L)	250
Total dissolved solids (mg/L)	2000
Temperature ^{0}C	20 - 35
pH	6-9
Oil and Grease (mg/L) -where conventional treatment shall be used	10
Oil and Grease (mg/L)- where ponds is a final treatment method	5
Ammonia Nitrogen (mg/L)	20
Substances with an obnoxious smell	Shall not be discharged into the sewers
Biological Oxygen Demand BOD_5 days at 20 ^{o}C (mg/L)	500
Chemical Oxygen Demand COD (mg/L)	1000
Arsenic (mg/L)	0.02
Mercury (mg/L)	0.05
Lead (mg/L)	1.0
Cadmium (mg/L)	0.5
Chromium VI (mg/L)	0.05
Chromium (Total) (mg/L)	2.0
Copper (mg/L)	1.0
Zinc (mg/L)	5.0
Selenium (mg/L)	0.2
Nickel (mg/L)	3.0
Nitrates (mg/L)	20
Phosphates (mg/L)	30
Cyanide Total (mg/L)	2
Sulphide (mg/L)	2
Phenols (mg/L)	10
Detergents (mg/L)	15
Colour	Less than 40 Hazen units
Alkyl Mercury	Not Detectable (nd)
Free and saline Ammonia as N (mg/L)	4.0
Calcium Carbide	Nil

PARAMETER	Maximum levels permissible
Chloroform	Nil
Inflammable solvents	Nil
Radioactive residues	Nil
Degreasing solvents of mono-di-trichloroethylene type	Nil

Remarks

And any other parameter as the Authority and the sewerage service provider may prescribe.

Not detectable (nd) means that the pollution status is below the detectable level by the measurement methods established by the Authority.

Nil means that the pollution status is not detectable and is recorded Zero (0) by the measurement methods established by the Authority.

2.5.9 Managing Blood / Body fluid Exposure[14]

Persons including HCWs with percutaneous or muco-cutaneous exposure to blood, body fluids, secretions, or excretions from a patient with suspected or confirmed COVID-19 infectious disease, should immediately and safely stop any current tasks, and leave the patient care area.

Safely take off PPE according to the steps in the procedure, in the anteroom.

- Treat affected exposed area:
- wash the affected skin surfaces or the percutaneous injury site with soap and water
- Irrigate mucous membranes (e.g. conjunctiva) with copious amounts of water or an eyewash solution, and not with chlorine solutions or other disinfectants.

Immediately report the incident to the chief of unit, IPC focal point (following hospital exposure procedure) as soon as the HCF staff exist the isolation room/ unit.

Exposed persons should be medically evaluated for:

- COVID-19 infectious disease (ID) (of isolated patient)
- other potential exposures (e.g., HIV, HBV, HCV) if sharp/needle-stick injury

Exposed persons must receive follow-up care, including:

- fever monitoring, twice daily period of recording symptoms will depend on the ID, and
- Counselling and psychological support.

Immediate consultation with an expert in infectious diseases for any exposed person who develops fever, symptoms after exposure.

If fever appears and other symptoms, isolate HCF staff, and follow procedure for ID suspected until a negative diagnosis is confirmed, Or

People suspected of having infected should be cared for/isolated, and the same recommendations outlined in this document must be applied until a negative diagnosis is confirmed.

Conduct contact tracing and follow-up of family, friends, co-workers and other patients, who may have been exposed to ID or COVID 19 virus through close contact with the infected HCW/ staff.

[14] Interim Infection Prevention and Control Recommendations for Coronavirus Disease 2019 (COVID-19) in Health Care Settings

2.6 Handling of Dead Bodies

Discourage any local practices (touching/ being in contact with the corpse) by HCW, family, friends. Dead body remains should not be sprayed, washed or embalmed. Use fully PPE to safely handle dead body including: disposable gown with long-sleeves, waterproof apron, disposable, non-sterile gloves (over the cuffs of the gown), surgical mask (wear particulate mask if autopsy), eyes protection (preferable face-shield, or goggle), rubber gloves and rubber boots. Other measures include:

- Put corpse in waterproof/ impermeable body bag immediately; and transfer to the mortuary as soon as possible after death,
- Bury or incinerate corpse without delay,
- Train and pre-position an SDB Team in local communities, preferably adopting a member of the local community on this team; and
- Ensure SDB teams are fully knowledgeable about WHO SDB protocols and associated activities including decontamination, community involvement and psychosocial support.

Any staff and visitor who is entering in the isolation room/ isolation unit (IU), or has any contact with contaminated equipment, linen, waste, dead body MUST:

- Register their name and contact details in the log book of isolation room/ unit, for contact tracing purpose,
- Follow up health status, fever & other symptoms (refer to suspect case definition/ triage form)
- Take and record temperature twice daily, for the entire incubation period after the last contact
- Notify to chief of unit, IPC team, focal point if any symptoms,

Have a good hygiene, drink plenty of safe drinking water, and rest to avoid mistake due to overwhelmed, severe fatigue.

Provide supervision and support from chief of IU, IPC focal point and director of hospital, by promoting preventive medicine:

- No pregnant women should be working in isolation room/ unit
- Provide psychological support to the staff/team who work in isolation room/ unit
- Prevent heat illness/ dehydration (serious risk of heat illness while wearing PPE in tropical conditions).

For HCWs who are developing symptoms

- Stop work immediately or do not report to work;
- Limit interactions with others (self-quarantine / isolation);
- Exclude themselves from area (self-quarantine / isolation);
- Notify the chief of unit or focal point if any fever > 38°C. and/ or other symptoms (refer to case definition);
- Exposed persons must receive follow-up care (e.g. antiviral therapy when available), counselling and psychological support; and
- Inform supervisor, for contact tracing and follow-up of family, friends, co-workers and other patients, who may have been exposed to the disease through close contact with the infected HCW/staff.

Get additional information from the WHO Infection Prevention and Control for the safe management of a dead body in the context of COVID-19.

3.0 Emergency Preparedness and Response (EPR)

The purpose of this section is to provide emergency response for the healthcare facilities (hospitals, PoE, isolation & quarantine centers and laboratories) with regard to the potential threat associated with both novel pathogen identified (COVID-19) and other non -COVID - 19 risks that could affect Health Care Facilities operations (including risks to workers and patients and on operation of waste treatment and disposal options) in line with the requirements of ESS4. Emergency incidents occurring in a HCF may include spillage, occupational exposure to infectious materials or radiation, accidental releases of infectious or hazardous substances to the environment, medical equipment failure, failure of solid waste and waste water treatment facilities, and fire. These emergency events are likely to seriously affect medical workers, communities, the HCF's operation and the environment.

Most of the selected HCF (PoE, isolation / quarantine areas and the laboratories) have been in operational offering community health care services and handling infectious diseases but there is no such event has occurred; the probability of negative event is very low although Kenya has not handled infectious pandemic of the scale of COVID-19.

3.1 EPR for Laboratories

The laboratories used in COVID-19 testing would adhere to the application of the WHO laboratory biosafety manual,WBG EHS and National Public Health Laboratory requirements and have well established system for emergency preparedness and response. The operation of the laboratory shall adhere to the WHO Guidelines for laboratory biosafety guidance related to coronavirus disease (COVID-19). At minimum the following shall be adhered to:

- All procedures must be performed based on risk assessment (refer to Annex IA) and only by personnel with demonstrated capability, in strict observance of any relevant protocols at all times.
- Initial processing (before inactivation) of all specimens shall take place in a validated BSC,
- Propagative work (for example, virus culture, isolation or neutralization assays) shall be conducted at a containment laboratory with inward directional airflow (BSL-2).
- Appropriate disinfectants with proven activity against enveloped viruses shall be used e.g. hypochlorite, alcohol, hydrogen peroxide, quaternary ammonium & phenolic compounds).
- Patient specimens from suspected or confirmed cases should be transported as UN3373, "Biological Substance Category B". Viral cultures or isolates should be transported as Category A, UN2814, "infectious substance, affecting humans".
- Instil administration control measures namely: policy, purpose, distribution, definitions, etc.,
- Organization of emergency areas (command centres, medical stations, Assembly Point etc.)
- Spell out clear roles and responsibilities for staff at the facility in line with Good Microbiological Practices and Procedures (GMPP),
- Institute clear communication systems to be followed at the facilities,
- Ensure that PPE (gown with long-sleeves, waterproof apron, non-sterile gloves (over the cuffs of the gown), mask, eyes protection (preferable face-shield, or goggle), rubber gloves and rubber boots) are used at all times.
- Emergency Equipment: Procedures would be prepared for using, inspecting, testing, and maintaining the emergency response equipment.
- First-aid kits: including medical supplies such as bottled eye washes and bandages, should be available and easily accessible to personnel.
- Reporting of all Incidents at the laboratory and route cause undertaken,

- Spill kits: A spill kit including disinfectant, should be easily accessible to personnel.

Refer to WHO Laboratory Biosafety Manual, 3rd edition for additional information.

3.2 EPR for Hospitals, Isolation & Quarantine Areas PoE and KNBTS

In order to reduce the likelihood of exposure to/release of a biological agent to environment, or to reduce the consequences of such incidents, a site-specific contingency plan should be developed that provides specific standard operating procedures (SOPs) to be followed in possible emergency scenarios that apply to the work and local environment. All Healthcare personnel at hospitals, PoE, quarantine and isolation areas must be trained on highly infectious disease case management, with a focus on COVID-19 and have periodic refresher training to maintain competency.

Adequate funding to procure and distribute IPC materials, drugs, supplies and medical equipment for prevention, investigation and management of the novel corona virus should be at disposal all the time.

Rapid response teams (RRTs) at HCFs (hospitals, isolation & quarantine centers, and PoE) will be trained/oriented and mobilized with necessary logistics, particularly to:

- coordinate response activities at the respective level,
- communicate and convene meeting with key stakeholders,
- assess critical needs to develop quick response plan based on the critical needs,
- ensure effective supply chain management, and
- collect information and report to relevant authorities.

Health facilities should adopt appropriate crowd management and triage system to limit infection within the Healthcare Facility (refer to Form on Annex 1B: This form is to be completed for all health workers who have been exposed to a confirmed COVID-19 patient in a health care facility).

Measures will be taken to minimize hospital visits by people for minor health problems to avoid crowd and reduce over pressure to health facilities.

A mechanism will be developed to run telemedicine service targeting the general population, health care providers and expert communities to improve health service delivery in the context of COVID-19 ensuring necessary network connectivity for smooth functioning of telemedicine service.

A mechanism will be developed to monitor continuity of health service and response to other health emergencies like cholera outbreaks or any other infectious disease.

Appropriate PPEs should be provided to HC workers and ensure they are trained on use: disposable gown with long-sleeves, waterproof apron, non-sterile gloves, surgical mask (N95), eyes protection (preferable face-shield), and rubber boots

Prevention and protection messages will be disseminated at scale using means and media including Call Centres with a focus on reaching vulnerable population groups and addressing stigma and discrimination as well as continuation of appropriate and healthy behaviors and practices (e.g. for pregnant women on danger signs and birth preparedness, breastfeeding, early child cares,

A designated trained team will be assigned for health care facilities, waste management and decontamination for each hospital, isolation & quarantine areas, and PoE, essential transport such as ambulance and quarantine stations.

Dead body management: The deceased will be handed to the family and relatives in line with MOH guidelines on management of COVID 19 dead bodies with clear instruction as mentioned in the WHO Infection Prevention and Control for the safe management of a dead body in the context of COVID-19.

Mental health services and psychosocial counselling: This services and support will be provided to the patients, families and health care workers through appropriate medium such as group counselling Apps.

3.3 Emergency Response Plan for Waste Treatment Facility

In the event that an emergency situation occurs in which the activities at the waste treatment facility poses a threat to the public's health as well as environmental contamination, the following need to be addressed immediately:

- Identify the cause of emergency,
- Call for the external support from the County Emergency Departments / Police
- Notifying the workers and surrounding residents to take necessary protective measures according to the nature of the incident;
- Liaise with the county disaster department to organize the evacuation of the residents to safety, and determining the means of evacuation according to the weather and geographical conditions and the population density;
- Set up the emergency shelter outside the safety boundary of the incident site;
- The responsible entity in the emergency environmental incidents should take immediate actions to control or cut-off the source of pollution, taking all possible measures to control the situation, in order to prevent the secondary pollution and the derivative incidents;
- The field rescue team should be organized immediately if necessary to reduce the casualty and property loss; and
- Individuals in the contaminated area should be evacuated to safety, and irrelevant individuals should be barred from the area.

Termination of emergency situation:

The emergency for the situations above that meet the following requirement is qualified to be terminated:

1) The scene of incident has been under control, and the conditions for the incident to occur are removed;
2) The leakage or release of pollution source has been limited within a stipulated scope;
3) The hazard caused by the incident has been thoroughly removed and cannot cause any new incident;
4) It is not necessary to continue to adopt professional emergency disposals at the incident site; and
5) Necessary measures have been taken for protecting the public from any secondary danger.

NB: If the existing waste disposal facility has the Emergency Response Plan, the plan will be updated to meet the minimum requirement for handling potential infectious healthcare waste and the workers trained on the emergency response plan of the HCF.

4.0 Institutional Arrangement and Capacity Building

The MoH is the main implementing agency for the Project and has designated Environment specialists as part of the team to oversee the implementation of the project activities and ensure compliance with safeguard instruments (including ICWMP) and World Bank ESF requirements.

The ICWMP will be disseminated and implemented by the PMT with support from the Directorate of Public Health (Laboratory and Environmental Health Departments), KNBTS and the Counties (healthcare facilities, quarantine, isolation and treatment centers) implementing components of this project.

At the National level institutional responsibility for implementation of safeguard instruments will rest with the PMT. The PMT has environment safeguards officer who will support the project implementation and monitoring of project activities as well as adherence to the environment and social due diligence requirements. At County level (PoE, healthcare facilities at level IV & level V, quarantine, isolation and treatment centers, laboratories as well as the blood services, the PMT environmental specialists will collaborate with the County Public Health Officer designated to the project and respective national level functions at KNBTS, will take lead in ensuring implementation and monitoring of the project activities.

Capacity on the content and application of the ICWMP will be built at all levels and be applied to all counties, national referral facilities and referral laboratories including those under KNBTS targeted by the Project. The respective project beneficiary facilities will be required to prepare site specific ICWMP following the template provided in Annex IV and will be responsible for day to day supervision on implementation of the mitigation measures as discussed extensively in table 5.1.

Monitoring and reporting of activities by the PMT will be continuous to ensure adherence to set specifications and safety to people and the environment. The Bank will provide project implementation support and would base environmental supervision on the Environment and Social Commitment Plan and other safeguard instruments developed to support the environment and social due diligence for activities financed under the project.

There would also be external monitoring of project activities by other relevant government ministries such as National Environment Management Authority or its designate officers at the Counties, County Department of Water and Environment and Directorate of Occupational Safety and Health (DOSH) as required.

4.1 Healthcare Facility HCWM / IPC / OSH Committee[15]

The Committee will oversee the review, approval and oversight of project waste management, IPC and environmental matters including built environment activities. Specifically, the committee will be responsible for assessment of facilities in collaboration with the project Environmental Safeguards specialist, and developing procedures, practices, and training of personnel on waste management, IPC and environmental issues, or taking other steps necessary to assure compliance with WHO guidelines, WBG EHS Guidelines, and World Bank ESF Guidelines and National Regulations. To successfully carry out these responsibilities, the committee members should have sufficient knowledge and expertise in environment, health and safety. The Committee will approve their Healthcare Facility ICWMP upon the recommendation of the Environment Safeguard Specialist, modifications to secure approval, disapproval, suspension or termination of related project activities as required to assure

[15] The HCWM/IPC/OSH composition of the committee shall be formed in line with the National Infection Prevention and Control Guidelines for Health Care Services in Kenya, 2010 page 9.

compliance with applicable regulations and guidelines. Besides, the Committee will supervise the infection control and waste management system and the committee will be responsible to action the facility waste management and environmental safeguards officer to ensure compliance for any deviation from the waste management procedure practices or malpractice during waste handling transportation, storage, treatment and disposal. In addition, the committee is expected to act in line with the polluter pays principle and whenever required should ensure allocation of adequate financial and human resources to implement their ICWMP.

4.2 Laboratory Biosafety and Biosecurity Committee

The Biosafety Committee will oversee the review, approval and oversight of bio-hazards in activities at the lab. Specifically, the committee will be responsible for assessment of facilities in collaboration with the Biosafety Officer, and developing procedures, practices, and training of research personnel, or taking other steps necessary to assure compliance with WHO standard, WBG EHS Guidelines, *Laboratory Biosafety and Biosecurity Policy Guidelines*, *Kenya Biosafety Act 2009* and other pertinent standards and regulations. To successfully carry out these responsibilities, the committee members should have sufficient knowledge and expertise in biomedical research practices and biosafety and biosecurity. The Committee has the authority to approve, require modifications to secure approval, disapprove, suspend or terminate research activities as required to assure compliance with applicable regulations and guidelines. Besides, Biosafety Committee will supervise the infection control and waste management system and the committee will be responsible to action for any deviation from the waste management procedure practices or malpractice during waste handling, transportation, storage, treatment and disposal.

4.3 Roles for Infection Control and Waste Management

4.3.1 Project Management Team

The PMT will be responsible for overall Project management and coordination. To ensure success of the Project, the MoH:

i. Established a dedicated PMT located under the Director General of Health Office with the Project Manager having a direct reporting line to the PS-MoH.

ii. Designate staff with appropriate skills and/or recruit on exceptional basis to fill skills gaps including:

   a. The PMT's dedicated Project Manager (PM) manager with overall responsibility for the effective functioning of the Project and supported by seven designated coordinators, M&E officer, a project account, a procurement officer, Environment safeguards officer, social safeguards officer, and a finance officer. The PMT organizational structure aligned to the Project components and operational structures is presented in Figure 4- 1.
   b. Staff for THS-UCP will provide technical assistance and mentorship to this Project, specifically to this effect, the environment safeguards officer.

iii. Build staff capacity to support project implementation of the ICWMP, and

iv. PMT will work closely with the PMT for the THS-UCP to implement ICWMP.

v. Review, as needed, technical specifications for ICWMP for COVID-19 preparedness and response commodities, including other essential commodities to be procured.

Figure 4- 1 shows the Project Management Team Organogram:

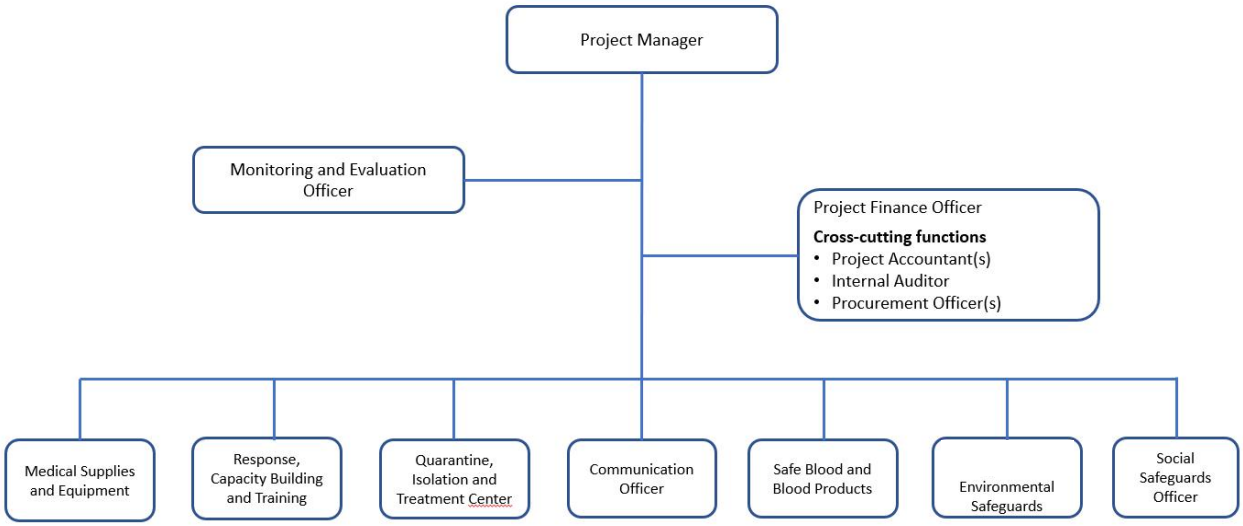

Figure 4- 1: Project Management Team (Organogram)

4.3.1.1 Project Manager

The PM is responsible for overall management and implementation of the project and management of PMT including financial, procurement, safeguards, resources and communications management in relation to the Project. S/he provides leadership on project planning and the day-to-day management of all Project operations; monitors all project activities to ensure timely implementation and compliance with all reporting and documentation requirements of the project; and disseminates information related to the project to stakeholders and other interested parties. S/he functions under the overall guidance and supervision of the Principal Secretary, MoH.

Specific responsibilities

- Ensure the environmental and social safeguards specialist develop the appropriate plans and implement,
- Taking action to ensure any deterioration in performance is rectified timely and performance put on track,
- Providing sufficient resources (people, training, funds, equipment, etc.),
- Establish a strong PMT coordination mechanism,
- Ensure the waste management officer gets needed support from components leaders on matters infection control and waste management, and
- Ensure timely reporting on waste management, which includes; key performance indicators (quantities of waste timing of collection/disposal, training, financial outgoings and income).

4.3.1.2 Environmental Safeguards Specialist

The Project Environment Safeguards Specialist will provide support and technical assistance to the MoH in the implementation of the Project to ensure Environment, Health and Safety management issues are effectively and efficiently handled in line with the applicable national legislation and

regulations and in compliance with the World Bank Environment and Social Framework (ESF) requirements. The Environmental Specialist will be required to carry out the outlined responsibilities in implementation of the ICWMP:

- Monitor and report on implementation of Infection Control and Waste Management Plan (ICWMP) ,
- Approval and monitoring sub- project specific ICWMPs of the project beneficiary laboratories and HCF
- Conduct regular field visits to assess and monitor and report on issues related to Healthcare waste management in the health facilities/quarantine/isolation centers, waste disposal facilities and laboratories;
- Carry out regular trainings on infection control and waste management to the relevant stakeholders, and
- Review and file the records of waste transfer notes, for different wastes stream from HCFs.

4.3.1.3 Project Components Coordinators

In consultation with the waste management and environmental safeguard coordinator respective components leaders, shall;

- Ensure that his or her component comply with the infection control and waste management minimum standards through developing a sub project specific ICWMP (goal, budget, personnel, roles, supervision, training, reporting) and share the same with the safeguard team as regularly as required,
- In line with the polluter pay principle and whenever required should ensure prudent use of both the financial and human resources available to implement the component's ICWMP including up to final disposal.
- Ensure the facilities where the component target have adequate supply of healthcare waste management commodities such as: safety boxes, bins, bin liners, and PPE.
- Advocate for health worker safety.
- Provide supportive supervision in HCWM and IPC as prescribed in the project's operational manual.

4.3.1.4 Infection Control and Waste Management Coordination at the National and County Levels

The project will work through existing infection control, waste management, environmental and safety safeguards coordination mechanisms in order to strengthen intra and inter sectoral actions, partnerships and collaborations on infection control and waste management as well as on Occupational safety and health including biosafety and biosecurity. This will help in building a common strategy, allow the various technical areas draw on the expertise of each other as well as other agencies and avoid duplication of efforts and investments for infection control and waste management (see Figure 4- 2).

Such coordination at both National and Counties draws from existing arrangements known as the Technical Working Groups or advisory committees on HCWM and IPC respectively. The role of coordination mechanisms includes, among others;

- To work with PIU in developing more specific guidance, direction and review for sub-project ICWMP. This would help provide technical input to the PIU and help develop practical and operational plans.
- To run the secretariat/TWG/advisory committees on infection control and health care waste management at the Ministry of Health and respective counties Departments of Health.
- To harmonize and coordinate actions in liaison with the head of the divisions responsible for infection control, waste management as well as biosecurity and safety and occupational health and safety.
- To convene quarterly meetings in liaison with the respective department, development partners and other stakeholders.
- To support and coordinate the preparation of annual plans on the component of infection control and infectious waste management and compile a national budget.
- To implement model pilot Programmes and best practices nationally through selected County Health Management Teams (CHMTs).
- To coordinate monitoring and evaluation of activities of infection control and health care waste management.
- To identify areas for operational research in waste management practices and treatment technologies as well as infection control, and
- Consolidate gaps identified by specific national level facilities, counties and mobilize for resource to support counties.
- The counties will be responsible for operational budget and implementation of the ICWMP.

This will strengthen and enhance coordination and sustained implementation of ICWMP across the national level and counties.

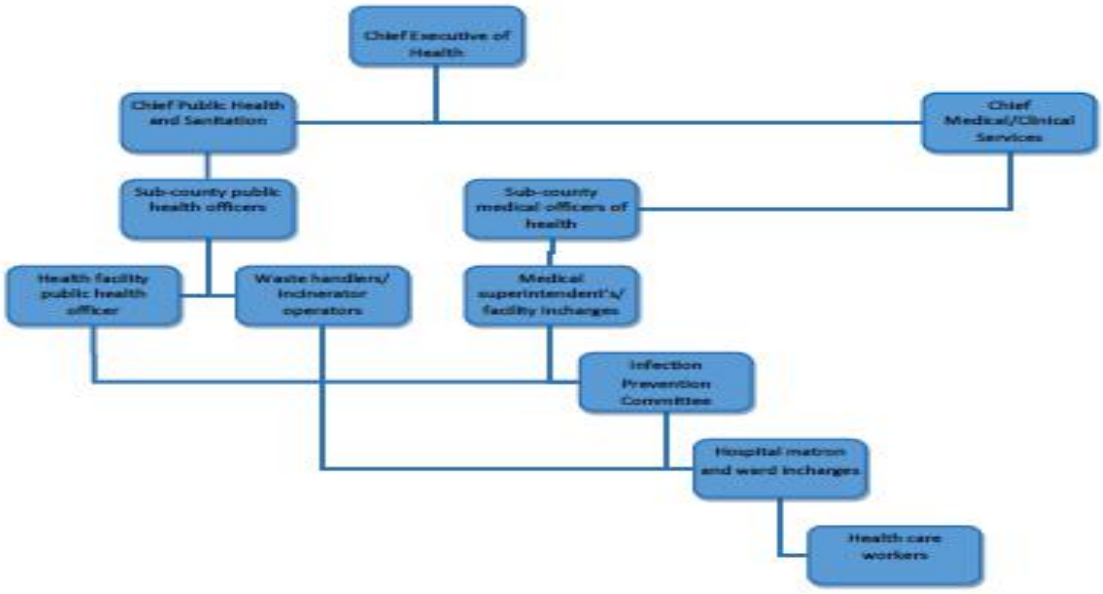

Figure 4- 2: County Level Infection Waste Organogram as per the HCWM strategic plan 2015 – 2020

4.4 Staffing and Capacity Building

Effective infection control and waste management will have both professional and auxiliary staffs that are required for the continuous and proper operation of the respective facilities. The HCFs will employ or designate on a full-time or on surge basis necessary personnel, which will be determined based on the work load in line with the MoH Human Resources for Health Norms and Standards Guidelines for the Health Sector 2014. Therefore, besides the critical other health workers for the respective facility, the infection control, waste management and environmental safeguards team will comprise;

- Public Health officer/ Environmental safeguards specialists /
- IPC officer
- HVAC technician
- Electrical technician
- Equipment and instrument maintenance technician/biomedical engineer
- Well trained security staff
- Cleaners
- Waste handlers
- Incinerator Operator
- Medical waste autoclave or microwave operator

However, its noted that all critical staff right from the head of the respective facility, the heads of departments or sections and all staff working in the quarantine centers in the target counties or the PoEs, isolation and treatment centers, the laboratories and blood services as well as in all other facility service areas, will be responsible for the waste they produce and ensure that appropriate standard precautions are adhered to, see Figure 5-3 waste management structure. Among them not mentioned earlier include;

- Head of Hospital
- Heads of Hospital Departments
- Chief Pharmacist
- Radiation Officer
- Matron/Senior Nursing Officer
- Housekeeping In-charge
- Hospital Manager
- Hospital Engineer
- Supplies officer: supply chain management
- Financial Controller,
- County Public Health officer
- Hotel Manager / Isolation / Quarantine Centers Manager,
- KNBTS Director / Regional Directors,
- Waste Handlers, and
- Incinerator Operator

4.4.1 HCF HCWM /IPC Committee

In line with best practices large facilities, for example high volume level 4 and up to the highest level, that is level 6 are expected to appoint a dedicated healthcare waste management officer, establish a functional Committee with representatives from across the clinical, management and support services as well as subgroups/subcommittees for recycling and others waste management streams.

Smaller level 4 facilities going down to dispensaries, HCWM can be managed by the IPC committees with a public/environmental health officer, being the one tasked with waste management (see Figure 4-3. The head of the facility is usually the chairperson while the waste management personnel serves as the secretariat. However, in where there is no public health officer, the IPC officer/coordinator or

one of the staff trained in waste management take up waste management and coordinating responsibilities.

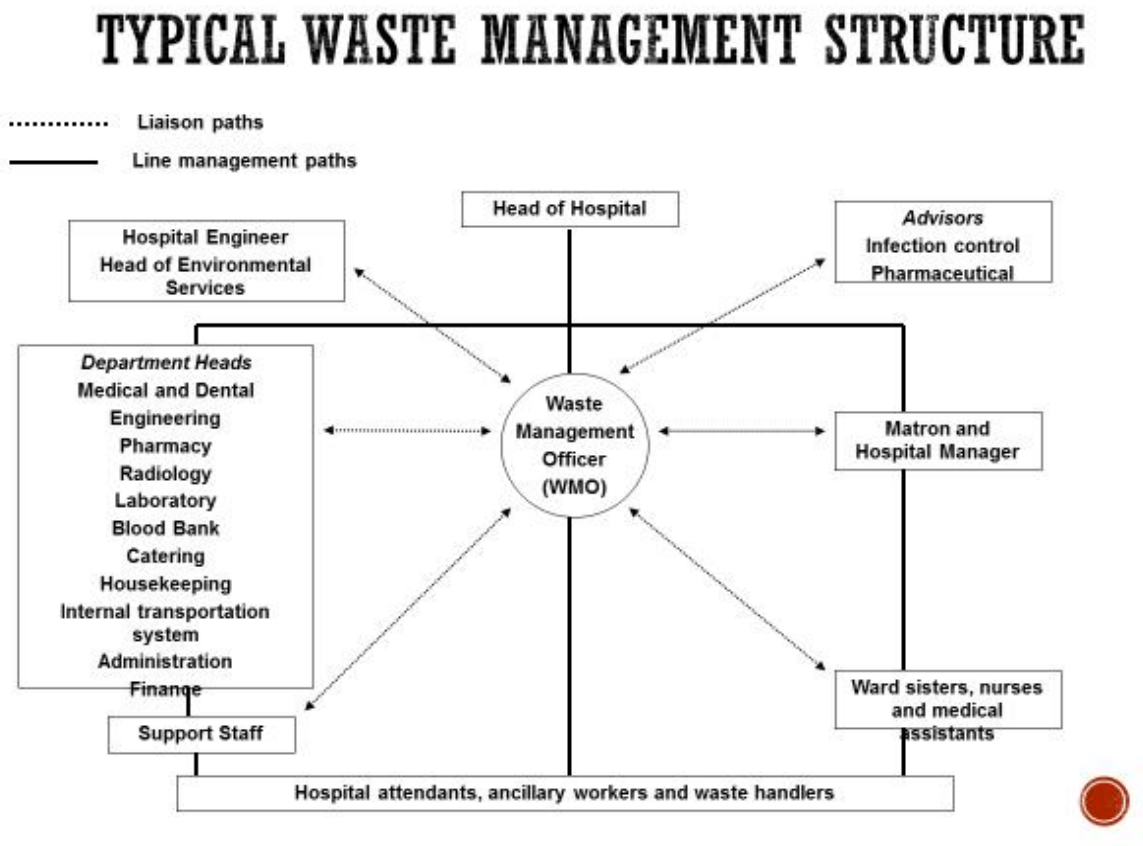

Figure 4- 3: Waste Management Structure

4.4.1.1 Committee Roles and Responsibilities

The Committee will oversee the review, approval and oversight of project waste management, IPC and environmental matters including built environment activities.

Specifically, the committee will be responsible for assessment of facilities in collaboration with the project environmental safeguards specialist, and developing procedures, practices, and training of personnel on waste management, IPC and environmental issues, or taking other steps necessary to assure compliance with WHO guidelines, WBG EHS *Guidelines,* and other pertinent standards and regulations. To successfully carry out these responsibilities, the committee members should have sufficient knowledge and expertise in environment, health and safety. The Committee will approve their healthcare facility ICWMP upon the recommendation of the project environmental safeguards specialist modifications to secure approval, disapproval, suspension or termination of related project activities as required to assure compliance with applicable regulations and guidelines. Besides, the Committee will supervise the infection control and waste management system. In addition the committee will be responsible to implement the corrective action the facility waste management measures to ensure compliance for any deviation from the waste management procedure practices or malpractice during waste handling transportation, storage, treatment and disposal. In addition, the committee is expected to act in line with the polluter pays principle and whenever required should ensure allocation of adequate financial and human resources to implement their ICWMP.

4.4.1.2 Overall Committee Responsibilities

- Monitor and report on issues related to safe healthcare waste management and application of measures for infection prevention and control
- Comply with all relevant national regulations, WBG EHS guidelines, and World Bank ESF
- Create and administer facility healthcare waste management policy
- Meet regularly, plan and set targets for continuous improvements in ICWM
- Set and administer healthcare waste management budget

4.4.2 Head of Healthcare facilities

Head of Hospital (Medical superintendents /health facility in-charge/ Healthcare Administrator) do supervise the everyday operations of healthcare facilities. They focus on improving the quality of patient care by ensuring the facilities are well-staffed, finance well-managed and general management of the facility. Some of the specific roles include:

- Establish a waste-management team to oversee the preparation of specific HCF ICWMP and monitor its implementation,
- Ensuring adequate financial resources allocated to fully implement specific ICWMP,
- Designate a waste-management officer to supervise and implement the ICWMP in the HCF
- Obtain and be familiar with national waste management policies and set regular (e.g. annual) review dates for the facility HCWM policy.
- Ensure adequate training for staff and designate the staff responsible for coordinating and implementing training courses on OHS, IPC, Healthcare waste management and emergency response procedures,
- Provide measures in place to prevent health-care waste from causing environmental pollution or adverse effects on human health;
- Ensure health care waste management system in the HCF is managed according to the national regulations through; ensuring that health-care waste is adequately segregated and safely packed, especially in the case of sharps which should be packed in puncture-proof containers; and ensure that bags or containers of health-care waste are handled only by those officially licensed to transport and/or dispose of such waste.

4.4.3 Departmental Managers,

The departmental managers should:

- Develop a facility HCWM plan (goal, budget, personnel, roles, supervision, training, reporting). Allocate adequate financial and human resources to implement the plan including up to final disposal.
- Ensure adequate supply of safety boxes, bins, bin liners, and PPE.
- Create a climate of support for needle stick injury reporting.
- Develop a protocol for management of needle-stick injury.
- Advocate for health worker safety.
- Provide supportive supervision in HCWM.

4.4.4 County Waste Management Officer (CWMO)

All County Public Health Officers (CPHO) should designate a county waste management officer in charge of county waste management; to map out and document all health care facilities in the county indicating waste management gaps, recommend actions as well implementations of the actions.

The CPHO will be responsible for monitoring of the healthcare waste management system at respective counties. It is therefore essential that the CPHO has direct access to the implementing facilities and reports directly to the County CEC for Health facility. He or she is responsible for the county hospitals waste management officers stationed in health facilities and work in close liaison with other heads of Public Health or Preventive and Promotive Health Services at the county, notable is the sanitation officer, food quality and control officers, among others.

At service level, the Waste Management Officer based at the facilities should:

- Ensure the day-to-day operation and monitoring of the waste-management system
- Supervise waste handlers and waste management staff;
- Liaise with the department heads to make sure that their staff are carrying out waste-related tasks properly;
- Ensure availability of waste management equipment;
- Monitor performance indicators and ensure reports are brought to the committee.
- Manage healthcare waste management budget;
- Organize staff training and information.
- Document, report and review any reported incidents concerning the handling of health-care waste in liaison with the infection-control department.
- Liaise with the Supplies Department to ensure that an appropriate range of coded bags and containers for health-care waste, protective clothing, and collection trolleys are available at all times;
- Be responsible for installing and maintaining waste treatment and storage facilities and handling equipment to comply with the specifications in the NEMA standards;
- Be responsible for coordinating maintenance and repair of waste treatment facilities; and
- Develop maintenance standards for waste management equipment. It is normal that most equipment requires preventive maintenance especially the incinerator, autoclave or the microwave.

4.4.5 Infection Control Office

The responsibilities for the Infectious Control Officer include:

- Liaise with the waste-management officer
- Provide advice about the control of infection, and the standards of the waste treatment and disposal system.
- Identify training requirements according to staff grade and occupation
- Organize and supervise staff training courses on the infection risks from poor waste management
- Liaise with the department heads, the matron and the hospital manager to coordinate training.
- May also have overall responsibility for chemical disinfection, the safe management of chemical stores, and minimizing chemical waste creation.

4.4.6 Chief Pharmacist/Radiation Officer

The responsibilities include:

- Minimisation/management of wastes from their departments, including:
- Advise on pharmaceutical/radioactive waste treatment and disposal;
- Stay up to date on minimisation, proper treatment and safe disposal of pharmaceutical/radioactive wastes,
- Coordinate monitoring of pharmaceutical/radioactive waste,

- Ensure personnel in their departments receive adequate training,
- The chief pharmacist also has the special responsibility of ensuring that genotoxic products are used safely, and that genotoxic waste is managed safely according to the regulations.
- The radiation officer must also ensure that additional regulations on the storage and safeguarding of radioactive wastes are followed strictly.

4.4.7 Procurement Officer Responsibilities

- Liaise with the Environment Expert / officer to ensure a continuous supply of the healthcare waste management commodities (plastic bags and containers of the right quality, spare parts for onsite health-care waste-treatment equipment).

- Investigate the possibility of purchasing environmentally friendly products e.g.:
    - PVC–free products
    - Mercury free equipment
    - Recycled materials
    - LEDS

4.4.8 Hospital Engineer

- Installing and maintaining waste-storage facilities and handling equipment.
- Accountable for adequate operation and maintenance of any on-site waste treatment equipment
- Responsible for ensuring that the staff operating on-site waste-treatment facilities are trained in their operation and maintenance.

4.4.9 Waste Handlers

Waste handlers have principal duties and responsibilities: the waste handler is responsible for collecting, segregating, labelling, temporal storage, transporting, infectious waste and other medical waste in accordance with relevant healthcare facilities, Isolation / quarantine areas, and blood transfusion centers approve procedures and regulatory requirements. Specific roles include:

- Collects, separates, contains, labels and transports solid waste, medical waste & recyclable goods from generation points to specified collection location and incinerator,
- Tracking and maintaining records of wastes generated from each health facilities/quarantine/isolation centers and laboratories;
- Empties, relines, & cleans solid & medical waste containers according to procedures,
- Segregates waste for containment prior to transporting off-site for incineration,
- Separates, contains, seals, labels, weighs, & stores high-risk infectious (red bag) waste to be incinerated,
- Cleans and disinfects medical waste carts,
- Maintains waste area facility in a clean and orderly condition; sweeps and cleans area at the end of each shift,
- Assures safe working conditions at all times as designated by the SOP; utilizes safety equipment and/or protective equipment as directed (i.e. safety gloves and eye protection), follows defined safety procedures, and
- Follow waste management procedure during waste handling transportation, storage, treatment and disposal including infection control.

4.4.10 Incinerator Operator

An incinerator operator is a skilled attendant assigned the duties of ensuring that the waste has been properly treated through incineration and the ash properly disposed. The operator should always be provided with the minimum required personal protective equipment (PPE) and ensure appropriate use, the equipment is maintained and kept clean. The PPE should be properly maintained, kept clean and not taken home; it must remain at the health facility to avoid possible spread of infection to the community. The incinerator operator should:

1. Follow the incinerator operations procedure.
2. Use protective equipment when handling waste.
3. Ensure an adequate supply of fuel is available.
4. Record the weight and type of waste received.
5. Follow the regular maintenance schedule for incinerator operation.

The operator should at minimum have the following PPEs for use:

i. Gloves: Always wear gloves when handling health care waste.
ii. Boots: Safety boots or leather shoes provide extra protection to the feet from injury by sharps or heavy items that may accidentally fall. Boots must be kept clean.
iii. Overalls: Overalls should be worn at all times.
iv. Aprons: Heat-resistant aprons should be worn when operating the incinerator.
v. Goggles: Clear, heat-resistant goggles can protect the eyes from accidental splashes or other injury.
vi. Nose and Mouth respirators / mask (N95), and
vii. Helmet: Helmets protect the head from injury and should be worn at all times during the incineration process.

The operation and maintenance procedures including type of waste not for incineration is elaborated in the Health Care Waste Management Incinerator Operator Manual.

4.4.11 Laboratory Manager

The laboratory manager is responsible for ensuring appropriate laboratory techniques, safety procedures, and hazards associated with handling biohazards and associated wastes are appropriately implemented. Responsibilities of the Laboratory Manager in regard to health care waste include:

- Accept direct responsibility for the health and safety of those working with bio-hazardous materials and/or select agents and toxins associated with COVID 19,
- Adhere to approved emergency plans for handling accidental spills and personnel contamination,
- Ensure compliance by laboratory personnel with relevant regulations, guidelines, and policies,
- Ensure all appropriate personal protective equipment is provided and used. Ensure proper training, including refresher training, and instruction for laboratory personnel in safe practices and protocols, including, at a minimum, training in aseptic techniques and characteristics of the material(s) used.
- Tracking and maintaining records of wastes generated from laboratory.
- Ensuring that individuals working in the facility are experienced and proficient in handling the biological agents at the appropriate level of containment.
- Ensure compliance by waste handler, waste water treatment and incinerator personnel with relevant regulations, guidelines, and policies of infection control and waste management.

- Ensuring that all the relevant staff including; waste handler, waste water treatment plant and incinerator personnel are adequately trained in waste management and risk management in waste water treatment plant and incinerator facility respectively.

4.4.12 Medical Waste Autoclave / Microwave Operators

- Follow the equipment's operations procedure.
- Use protective equipment when handling waste.
- Monitoring and timely report on fuel use and supply status.
- Record the weight and type of waste received.
- Follow a regular maintenance schedule and quality assurance testing procedures.
- Ensure treated waste is safely transported to a collection point for final disposal.

4.4.13 Healthcare Facility cleaners

Under the supervision of the facility waste management and environmental / IPC officer, these individuals perform different washing and cleaning activities within and outside the main Quarantine, Isolation and Treatment centers, Blood services and Laboratories these includes

- Cleans laboratory equipment, such as glassware, metal instruments, sinks, tables, and test panels, using solvents, brushes, and rags:
- Mixes water and detergents or acids in container to prepare cleaning solution according to specifications.
- Washes, rinses, and dries glassware and instruments, using water, acetone bath, and cloth or hot-air drier.
- Scrubs walls, floors, shelves, tables, and sinks, using cleaning solution and brush.
- May sterilize glassware and instruments, using autoclave.
- The HCF cleaners should be provided with the minimum required PPE (medical mask, gown, heavy duty gloves, boots or closed shoes) according to the WHO guidelines on Covid-19 Personal Protective Equipment (PPE) for Healthcare Workers

4.4.14 Other COVID-19 Healthcare Service Providers

When a hotel, institution, stadium, PoE is selected as a quarantine / isolation area for COVID -19 cases, the in charge of the facility becomes the manager to ensure compliance with health and safety legislation and licensing laws. At the same time the facility is assigned a qualified medical doctor who will be monitoring of the implementation of the infection preventive measures for the people in the quarantine centers. He/she takes the overall responsibility, leads an intra-departmental team and regularly reviews issues and performance of the infection control and waste management practices at the facility including but not limited to:

- Follow and implement waste management policies;
- Follow the colour-coded waste segregation system while carrying out waste segregation;
- Safely contain sharps in a safety box;
- Provide on-the-job training for new staff with regard to ICWMP; and
- Ensure sound treatment and disposal of waste generated in the facility.

4.4.15 Health Care Waste Treatment and Disposal Facilities staff

Healthcare waste treatment and disposal Facilities (those separate from a HCF but providing services to HCF) are essential in the managing healthcare waste for the healthcare facilities without waste treatment and disposal options. Key elements in improving health-care waste management are:

- Timely waste collection, treatment and disposal of the generated healthcare waste,
- Raising awareness of the risks related to health-care waste, and of safe practices including (i) safety and health hazards (ii) aesthetic damage (iii) environmental issues and pollution,
- Train their respective clients (health facilities) in appropriate healthcare waste segregation, collection and storage practices,
- Developing strategies and systems along with strong oversight and regulation to incrementally improve waste segregation,transportation, destruction and disposal practices with the ultimate aim of complying with EMCA (Waste Management Regulations, 2006) and international standards (WHO guidelines on healthcare waste management);
- Where feasible, favouring the safe and environmentally sound treatment of hazardous health care wastes (e,g, by autoclaving, microwaving, steam treatment integrated with internal mixing, and chemical treatment) over medical waste incineration;
- Building a comprehensive system, addressing responsibilities, resource allocation, handling and disposal;
- Selecting safe and environmentally-friendly management options, to protect workers at the waste treatment facilities involved in the treating or disposing of waste.

4.5 External Supervision and Support Implementation

4.5.1 The Role of National Environmental Management Authority

The National Environment Management Authority (NEMA) is the oversight authority on environmental issues in Kenya. Its role will be of monitoring environment indicators as identified in this ICWMP. The role of NEMA includes: - regulatory oversight monitoring: as the regulatory agency responsible for the protection of environment in Kenya, NEMA plays the leading regulatory role of monitoring for compliance of the project activities according to the EMCA ACT 1999 amended in 2015 and its functions. - site inspection visits: NEMA will undertake site visits to inspect project activities the nature and extent of the impacts and the extent to which the mitigation measures proposed in this ICWMP are being complied. They will then be expected to make viable recommendations based on their findings to the PMT.

4.5.2 Project Implementation Support by World Bank

The Bank will conduct regular support implementation mission and ensure that compliance is achieved as per the requirements of the ICWMP.

The World Bank's Task Team will also provide regular Project implementation support to the PMT and other relevant implementing partners as follows:

a) Monitor progress in all substantive aspects of the Project implementation against the targets, development objectives, and performance monitoring indicators/targets for the ICWMP,
b) Monitor procurement implementation and disbursement, recommending ways to ensure that procurement activities and financing disbursements for components Waste management proceed smoothly in line with the planned schedule; and
c) Ascertain the extent of compliance with financing covenants, including those related to environmental and social due diligence compliance commitments in the ICWMP.

5.0 Infection Control and Waste Management Plan (ICWMP)

5.1 Plan for mitigation of risks associated

The plan for mitigation of risks associated for the HCFs, Labs, PoE, Isolation and Quarantine, Blood Centers, Waste disposal facilities will operate within the confines of the Infection Control and Waste Management Plan and seek ways and means to operationalize the action plan. Each entity will be required to prepare, receive approval, and implement a specific ICWMP for their facility/operation. This specific plan should be based upon their specific characteristics and conditions and meet the requirements stated in this ICWMP. The Infection Control and Waste Management Plan (ICWMP) identifies the indicators to be tracked, specific tasks to be executed and assigns responsibility for waste collection to specific departments/agencies. For the plan to be effectively implemented, the beneficiary facilities (referral hospitals, referral laboratories and healthcare facilities quarantine, isolation and treatment centres will develop site specific ICWMP standardized plans based on its existing needs and set-up. The plan should design a mitigation strategy for potential risk associated with; laboratory activities, medical equipment and supplies, infection prevention and control healthcare waste collection, handling, storage, transportation, treatment, and disposal. The potential risks include among others the following:

- Improper health care waste collection, storage and segregation that have a potential risk to health care facility professionals/ health workers, society and environment,
- Risks of increased disease transmission from poor waste treatment & disposal systems,
- Air pollution due to utilization of poor quality of incinerator technology,
- Environmental pollution due to poor ICWM practices,
- Risk of disease transmission to waste scavengers and neighboring communities,
- Shortage of equipment and supplies on ICWM and PPE and
- Poor management systems for infection control and emergency response in case of any incidents/accidents on site.

5.2 Monitoring Plan for the ICWMP Implementation

During the operation period, the environmental issues will be monitored by the Ministry of Health PMT, in conjunction with the National Environment Management Authority or its counterpart at Counties the County National Environment Management Authority, County Department of Water and Environment and the County Public Health Department.

Monitoring will verify if predicted impacts have actually occurred and check that mitigation actions recommended in the ICWMP are implemented and their effectiveness. Monitoring will also identify any unforeseen impacts that might arise from project implementation. Monitoring will be undertaken by Ministry of Health (MoH) Environment & Social Experts, County Biomedical & Laboratory Coordinators, NEMA County Environment Officers and County Public Health Officers.

Monitoring by NEMA in this case can be considered “third party monitoring” but this is its regulatory mandate according to EMCA 1999 (Amended 2015). Another government agency that may undertake “third party monitoring” is the Directorate of Occupational Safety and Health Services at the Ministry of Labour and Social Protection; it has authority to inspect any facility for compliance with national requirements on safety in workplaces. Monitoring will be done through site inspection, review of

grievances logged by stakeholders and ad hoc discussions with potentially affected persons (residents near the project beneficiary health facilities, patients and healthcare staff).

The ***Table 5-1*** on the ICWMP of the HCF (hospitals, PoE, Isolation & quarantine centers, blood centers and laboratory provides the risks / impacts and baseline mitigation measures associated with waste management that will be monitored during project implementation; the environmental parameters to be measured include air emission, waste water quality, and volumes of waste generated and disposed of. It identifies parties responsible for monitoring actions, associated costs, indicators and training or capacity building needs and reporting. Various aspects of the ICWMP are detailed in sub-sections below.

Monitoring will consist of checking to see if the proposed measures are being adequately implemented, It is required to follow-up on decisions made to intervene in various activities of infection prevention and control and medical waste management to minimize risks to people, animals, and the environment. To ensure that objectives of the ICWMP are achieved, the implementation of the plan shall be monitored on a regular basis internally through the following ministries including the Ministry of Health (MoH), County Environment and Water Department and Public Health Department, whereas the external bodies will include NEMA, DOSHS and World Bank. These institutions will determine their respective monitoring tools and will work jointly within the monitoring and evaluation mechanism of the proposed project.

5.2.1 Frequency for monitoring

During operational phase, the monitoring of implementation of ICWMP will be handed over to the counties.The monitoring frequency for ICWMP will be undertaken on monthly basis during the operation phase. Scheduled environment and social audits (ESA) will be conducted annually as well; this can be conducted internally by Environment and Social Experts or by external auditor hired by the Ministry of Health in line with the Environmental (Impact Assessment and Audit) Regulations (2003) and Environmental Management and Co-Ordination Act, (2015). World Bank will as well do periodic implementation support mission biannually.

5.2.2 Reporting System

Currently, there is no common in-country monitoring and reporting tool for the infectious waste management. Each specific Health Care Facility, Blood transfusion centers, ports of entry quarantine/ isolation areas or Lab, have their customized waste monitoring tools or waste tracking logs that are used. Monthly monitoring reports of ICWMP (whose format and content of these monthly reports will be developed by the Project PMT, with approval of WB, in order to provide consistent and relatively complete/representative data and status) would be compiled by Biosafety and Biosecurity Committee / Biosafety and Biosecurity officer, Port Health manager, medical superintendent/facility in-charge at the health facility and MoH Environment and Social Experts from the Project Implementation Unit and reports shared with MoH and the Bank.

During the operational phase environmental and social audits to ascertain compliance with both National Legislation, NEMA project Approval Conditions (once the specific project facilities are approved by NEMA) and international best practices as well as WBG EHS guidelines and World Bank ESF requirements will be undertaken for medical waste treatment Facilities installed under the project and report submitted to NEMA.

On the other hand, due diligence of the contracted services of waste treatment and disposal will be carried out by the respective health facilities public health officers with support from the PMT Environment and social specialists.

As part of its focus to strengthen healthcare system in the country, the project will stimulate the need to establish and institutionalize in country infectious waste management monitoring system.

Table 5- 1 Presents the Infection Control Waste Management baseline mitigation measures:

Table 5- 1: Infection Control and Waste Management Baseline Mitigation Measures for HCF / Laboratory / Isolation Areas

Activities	Potential E&S Issues and Risks	Proposed Mitigation Measures	Responsibilities	Timeline
General HCF operation – Environment	- General wastes	Use of waste receptacles that encourage segregation to hold waste on site before its collection, Use of durable, long-lasting materials that will not need to be replaced often, Contract NEMA Registered waste handler to dispose of hazardous waste and have waste destruction certificate and waste transfer notes. Designate temporal waste / garbage holding areas at site. General waste in the case of handling COVID-19 patients should be treated as infectious waste	MoH E&S Officers, DOSH NEMA-CDE, CPHO, HCF-MS, PH/QF-M, KNBTS-D, MS, and Lab Managers.	Quarterly
	- Waste water	All infectious effluents should be discharged into the public sewer system or soak pits only after being pre-treated according to WHO standards / EMCA (Water Quality Regulations, 2006.)	MoH E&S Officers, DOSH NEMA-CDE, CPHO, HCF-MS, PH/QF-M, KNBTS-D, MS, and Lab Managers	Quarterly
	- Air emissions (dioxins, furans, arsenic, lead, cadmium, chromium, mercury, etc. - Risks by direct exposure (inhalation) or in-direct exposure (deposited in soil, water, plants, etc.	-Controlled procurement process to ensure quality and efficient incinerators, -Prohibit open burning of medical waste on site, - Siting of the incinerators should be away from the health facilities wards , residential areas and farms -Ensure the incinerators used in the health facilities are fitted with scrubbers to reduce on release of pollutants to be in compliance with EMCA (Air Quality regulations) 2014. Incinerator chimney installed should be of the recommended height as stipulated in the Waste Management regulations Improved operation, process monitoring and emission controls will be necessary to meet standards for dioxins, furans and particulate matter release to the environment.		Biannual
General HCF operation OHS issues	- Physical hazards; - Chemical use; - Ergonomic hazard;	All workers should be provided with appropriate PPE against exposure to hazards, Training for all staff should be given on safe work practices /OHS and guidelines and ensure that they adhere to it, The medical facilities and equipment should be regularly maintained to correct any electrical faults, Strategic display on OHS Policy and regular review of the policy by the manager,	MoH E&S Officers, DOSH NEMA-CDE, CPHO, HCF-MS, PH/QF-M, KNBTS-D, MS, and Lab Managers.	Biannual

Activities	Potential E&S Issues and Risks	Proposed Mitigation Measures	Responsibilities	Timeline
		Proper maintenance of PPE, including cleaning when dirty and replacement when damaged or worn out, Proper use of PPE should be part of the recurrent training programs for employees, Emergency eye-wash and shower facilities should be equipped with audible and visible alarms to summon aid whenever the eye-wash or shower is activated by the worker and without intervention by the worker, Ensure adequate provision of safety systems which should cover fire, electrical emergencies with First-aid areas or rooms suitably equipped and readily accessible should be available, Provision of first aid kits and first aiders trained the relevant personnel on first aid, and Materials safety data sheet for all chemicals used especially at the lab should be hanged on notice boards.		
	- Electrical and explosive hazards;	All electrical repair activities should be done by competent electrician, Ensure the Biomedical department in the health facility has a qualified electrician to address the electrical faults, Prepare and implement Emergency response plan-Emergency Contacts, Periodic maintenance of electrical equipment, and Consider safe storage of supplies and undertake precaution with respect to explosives.	MoH E&S Officers, DOSH NEMA-CDE, CPHO, HCF-MS, PH/QF-M, KNBTS-D, MS, and Lab Managers.	Annually
	- Fire	Prepare and implement Fire emergency response plan Training of fire marshals in the facilities, Early identification of risks (Job Risk Assessment) and instituting proactive measures to avoid. Provide fire extinguishers to healthcare facilities during their renovation Ensure servicing and inspection of the firefighting equipment Fire emergency telephone numbers should be displaced in communal areas. Undertake fire drills at healthcare facility, at a minimum once quarterly.	MoH E&S Officers, DOSH NEMA-CDE, CPHO, HCF-MS, PH/QF-M, KNBTS-D, MS, and Lab Managers.	Quarterly
	- Radioactive hazard.	All radioactive materials should be handled safely to prevent harm to people and environment. HCF operators should develop a comprehensive plan to control	MoH E&S Officers, Radiation Protection Board,	Quarterly

Activities	Potential E&S Issues and Risks	Proposed Mitigation Measures	Responsibilities	Timeline
		radiation exposure in consultation with the affected workforce, Radioactive waste should be stored in containers that prevent dispersion behind lead shielding. Waste that is stored during radioactive decay should be labelled with the type of radionuclide, the date and details of the required storage conditions, Radioactive hazard plan should be refined and revised as soon as practicable on the basis of assessments of actual radiation exposure conditions, and radiation control measures should be designed and implemented accordingly, and Places of work involving occupational exposure to ionizing radiation should be provided with requisite protection (PPE) in accordance with recognized international safety standards and guidelines[16].	DOSH NEMA-CDE, CPHO, KNBTS-D, MS, and Lab Managers.	
Waste minimization, reuse and recycling	- Potential increased generation of waste - Risk in spread of COVID-19	-Procure medical supplies & equipment from accredited suppliers preferably in small quantities, -Waste generated from care of COVID-19 patient should not be re-used	MoH E&S Officers, DOSH NEMA-CDE, CPHO, HCF-MS, PH/QF-M, KNBTS-D, HCF-MS, and Lab Managers, HCFs WMO/IPC.	One time
HCF operation - Infection control and waste management plan	- Possible risks of infection	Provide appropriate PPE against exposure to infectious pathogens, hazardous chemicals in accordance with recognized international safety standards and guidelines. Orientation for all staff would be given on safe work practices and guidelines and ensure that they adhere to it. Provide relevant vaccine program for all health workers and supportive staffs Adopt or utilize WHO, CDC & NIH guidelines, standards, practice and procedures especially WHO Laboratory biosafety guidance related to coronavirus disease 2019 (COVID-19). Initial processing of all specimens should take place in a validated biological safety cabinet (BSC) or primary containment device. All technical procedures should be performed in a way that minimizes the generation of aerosols and droplets. Use of appropriate disinfectants with proven activity against enveloped viruses should be used (for example, hypochlorite [bleach], alcohol, hydrogen peroxide, quaternary ammonium compounds, and phenolic		Quarterly
Delivery and storage of specimen, samples, reagents, pharmaceuticals and medical supplies	- Infection to lab attendants - Expiry of medical supplies and pharmaceuticals		MoH E&S Officers, NEMA-CDE, DOSH, PHO, KNBTS-D, HCF-MS, and Lab Managers.	Quarterly
Storage and handling of specimen, samples, reagents, and infectious materials	- Infection to lab attendants		MoH E&S Officers, NEMA-CDE, DOSH, PHO, KNBTS-D, HCF-MS, and Lab Managers.	Quarterly

[16] International Basic Safety Standard for protection against Ionizing Radiation and for the Safety of Radiation Sources and its three interrelated Safety Guides

Activities	Potential E&S Issues and Risks	Proposed Mitigation Measures	Responsibilities	Timeline
		compounds).		
Waste segregation, packaging, color coding and labeling	- Increased generation of infectious waste due to poor segregation practices	Segregation of wastes into different categories—for control of quantities and disposal methods Waste containers should be of the same colour as the bags and fitted with lids.	MoH E&S Officers, NEMA-CDE, DOSH, PHO, KNBTS-D, HCF-MS, and Lab Managers., HCFs WMO/IPC	Quarterly
Onsite collection and transport	- Infection to the waste handlers - Non segregation of waste - Increased generation of infectious waste due to contamination	Ensure proper waste management practices as recommended by the WBG EHS guidelines, WHO Safe waste management guidelines for improvement waste management and Health care waste management plan 2016-2021. The collection of waste would be made at least once in 24 hours, and it would be done in such a way to minimize nuisance of smell and dust during collection and all the waste collected must be carried away from the storage site to an approved disposal point. Provide appropriate waste bins for the different types of waste generated in the laboratory to allow segregation and collection at the point of generation.		Quarterly
Waste storage	- Littering of waste - Contamination of surfaces	Segregation of wastes into different categories for control of quantities and disposal methods. Provision of color coded waste bins with lid, Provision of appropriate PPEs for waste handlers and incinerator operators Decontamination of surfaces	MoH E&S Officers, NEMA-CDE, DOSH, PHO, KNBTS-D, HCF-MS, and Lab Managers. HCFs WMO/IPC	Quarterly
Onsite waste treatment and disposal Incineration	- Pollution to environment discharges of contaminated waste water - Emissions from the incinerator	Adopt the suggested design for the waste treatment facility, if an incinerator, see section 1. Waste segregation at point of origin to reduce on waste generated, Ensure operator of incineration unit is adequately trained to ensure efficient operation. Provide the required PPE to operators and waste handlers Periodic maintenance of the incinerator through cleaning of combustion chamber and de-clogging the air flows Routine inspection of furnace and air pollution system by the regulatory authority Have a well-established audit and reporting system on waste treatment operations	MoH E&S Officers, NEMA-CDE, DOSH, PHO, KNBTS-D, HCF-MS, and Lab Managers, HCFs WMO/IPC	One tine

Activities	Potential E&S Issues and Risks	Proposed Mitigation Measures	Responsibilities	Timeline
Waste transportation to and disposal in offsite treatment and disposal facilities	- Littering of wastes - Disposal in non-permitted waste sites -	Offsite transportation of waste should comply with the national regulations EMCA (Waste Management Regulations), 2006 Use of NEMA licensed Waste transporters, Keeping record of waste transfer notes as well as waste destruction certificates at the point of disposal facility. Use the appropriate vehicle type for transportation of HCW off site Staff should be aware of emergency procedures for dealing with accidents and incidents of spillage during transportation on public roads Due diligence should be undertaken for all the waste treated off site to ensure waste is transported through the required routes (non-busy route) and safely treated and disposed	MoH E&S Officers, NEMA-CDE, DOSH, PHO, KNBTS-D, HCF-MS, and Lab Managers. HCFs WMO/IPC	Weekly
HCF operation – trans boundary movement of specimen, samples, reagents, medical equipment, and infectious materials	- Importation of substandard medical supplies and equipment - Illegal importation - Classes of dangerous goods without clear G - Improper handling and stowage	Procure medical supplies & equipment from accredited supplier Proper handling of equipment use, and methods of storage from cradle to crave, Cross-boundary transport of specimens of the virus responsible for COVID-19 should follow the United Nations model regulations, Technical instructions for the safe transport of dangerous goods by air (Doc 9284) of the International Civil Aviation Organization.	MoH Procurement Officer & DOSH,	On need basis
Emergency events	- Spillage, Fire & others	Emergency response plan(s) for specific emergencies, -Regular drills would constantly follow on various possible incidences. This will test the response of the involved stakeholders. Such drills will keep them alert and they will become more responsive to in the case of incidences. -Train relevant staff on response in risk management and emergency procedures in-case of accidents and spillages.	MoH E&S Officers, NEMA-CDE, DOSH, PHO, KNBTS-D, HCF-MS, and Lab Managers.	Quarterly
	- Failure of solid waste and wastewater treatment facilities;	All HCFs should prepare waste management procedures in accordance with the national requirements that outline waste segregation procedures, on site handling, collection, transport, treatment and disposal, and training of the staff.		
	- Accidental releases of infectious or hazardous substances to the environment;	Train relevant staff on response in risk management and emergency procedures in-case of accidental releases of infectious or hazardous substances, and Provision of receptacles for timely response of accidental releases.	MoH E&S Officers, NEMA-CDE, DOSH, PHO, KNBTS-D, HCF-	Quarterly

Activities	Potential E&S Issues and Risks	Proposed Mitigation Measures	Responsibilities	Timeline
	- Occupational exposure to infectious;	Ensure the provision of safe water, sanitation, and hygienic conditions, which is essential to protecting human health during all infectious disease outbreaks, Health facilities shall establish and apply good practices line with WHO guidance on water, sanitation and waste management for COVID-19 and National guidelines for Infection Prevention and Control in the healthcare facilities.	MS, and Lab Managers.	
	- Exposure to radiation;	Refer to earlier section above on radiation		
	- Medical equipment failure;	Provide requisite training during equipment installation. Carry out regular supervision, ensure only trained authorized personnel operate equipment, The manual containing information on how the medical facilities and equipment should be safely handled should be made available to the relevant staff, and Equipment's should be sanitized and disinfected before use to minimize risks of infections.		
Operation of acquired assets for holding potential COVID-19 patients	- Nonuse of the equipment due to lack of technical know how - Risk of misuse of the equipment - Poor maintenance leading to breakdown	Ensure equipment purchased is of the required standard and specifications, Ensure good control measures in purchase of medical equipment, Equipment's should be disinfected before use to minimize risk of infections Provide requisite training during equipment installation, The equipment's manual should be made available to the medical workers for safe routine procedures Prepare maintenance plan for all equipment	MoH E&S Officers, NEMA-CDE, DOSH, PHO, KNBTS-D, HCF-MS, and Lab Managers.	Quarterly
Blood Collection Storage and delivery	- Unsuitable for transfusion	Blood units found to be unsuitable for transfusion should be promptly removed from the blood stock, Place the blood units in a steel container with a lid or in an autoclavable polythene bag as the bags may burst while being autoclaved and cause blood to spray out, Autoclave the blood bags under a pressure 2 bar (200 kPa) at a temperature of 121°C for a minimum of 20 minutes, Treated blood units can be disposed of by burying in a secured landfill	MoH E&S Officers, NEMA-CDE, DOSH, PHO, KNBTS-D, HCF-MS, and Lab Managers.	Quarterly
	- Injuries from sharps	Disinfect infectious liquid waste (e.g. blood samples used for testing, infectious effluent from test procedures) by chemical treatment using at	MoH E&S Officers, NEMA-CDE,	Quarterly

Activities	Potential E&S Issues and Risks	Proposed Mitigation Measures	Responsibilities	Timeline
	- Risk of infectious waste - Exposure to harmful toxins like dioxin and furans	least 1% sodium hypochlorite solution. Only after 30 minutes or more of exposure to the disinfectant, may the inactivated liquid waste be discharged into drains/ sewers for safe dispersal.	DOSH, PHO, KNBTS-D, HCF-MS, and Lab Managers, HCFs WMO/IPC.	
Handling of dead bodies in the case of COVID-19	- Risk of spread of the disease	Use full PPEs (disposable gown with long sleeves, water proof apron, disposable gloves, surgical mask, eye protection, rubber gloves and boots, surgical masks to safely handle; No washing, spraying/ embalming the dead body; Register contact(s) at the HCF, Notify the HCF Director / Medical Superintendent Follow up on health status of the staff	HCF Director / Medical Superintendent/ CPHO/Forensic pathologist/Morgue Attendant, Bereaved Persons	

HCF-MS: Health Care Facility – Medical Superintendent/Facility in-charge, PH/QF-M: Port Health / Quarantine Facilities –Manager, KNBTS-D – Kenya National Blood Transfusion Service: Director, NEMA-CD: NEMA County Director, CPHO: County Public Health Officer, DOSH: Director Occupational Health & Safety, LM: Laboratory Manager, WMO/IPC – Waste Management Officer/Infection Prevention and Control.

6.0 Capacity Building and Training

Capacity building and training is mainly structured around seven key areas, focusing on required Infectious Control Waste Management baseline mitigation measures at all levels of the beneficial healthcare facilities (hospitals, PoE, isolation & quarantine areas and laboratories. The focus will be but not limited to:

1. Infection prevention and control measures,
2. Standard precautions for COVID-19 patients,
3. Infectious HCW management procedures,
4. Environment, Safety and Health while handling COVID-19 cases including handling the dead,
5. Specimen collection and shipment, and Laboratory biosafety guidance for the labs carrying out analysis of COVID-19 samples,
6. Training on emergency preparedness and response
7. Community health and safety in relation to hygiene and other standard precautions for COVID 19 at the community level through community health workers.

The targeted audience for the ICWMP is all healthcare workers (hospitals, isolation, quarantine, PoE and laboratories) waste handlers, local communities near the healthcare facility and personnel from private sector operators of the waste transportation and disposal service providers. The MOH's training activities shall be oriented towards the quality of healthcare services and prevention of infections from COVID-19.

Whilst it is necessary to reinforce the knowledge of medical professionals in these sectors, it is also important to improve their practices in infection prevention and control as well as on HCW handling and management. Training should also involve private operators and technicians active in maintenance work, cleaning and the management of solid wastes. Promotion of the appropriate handling and disposal of medical waste is important for community health, and every member of the community should have the right to be informed about potential health hazards. The objectives of training on health-care waste and infection control are as follows:

a. To prevent exposure to COVID-19 health-care waste and related health hazards; this exposure may be voluntary or accidental, because of unsafe disposal methods.

b. To create awareness and foster responsibility among hospital patients and visitors to healthcare establishments regarding hygiene and health-care waste management.

c. To inform the public about the risks related to COVID-19 health-care waste, focusing on people living or working near, or visiting, health-care establishments and scavengers on waste dumps.

It is necessary to develop awareness-raising programs for populations providing healthcare, as well as people using recycled objects or living in proximity of garbage dumps as well, as garbage collectors.

There is a need to educate the public in general about community health and safety on the risks associated with improper management of HCWM and the use of recycled objects. Public education will include developing and broadcasting monthly televised messages destined for the public on the dangers linked to infectious HCW; developing and broadcasting weekly radio messages, notably in English and Kiswahili; initiating a poster campaign in healthcare structures directed towards visitors, and patient caretakers; making information and awareness raising banners; and holding monthly neighborhood public information sessions. Particular attention will be towards leaving no one behind including those not able to access such common communication channels.

It is imperative to train administrative personnel, doctors, nurses, public health officers, lab personnel, phlebotomists, cleaners and waste handlers at national and county level, managerial staff of the technical departments, and waste handlers (orderlies, cleaning personnel and other hospital workers, municipal garbage collectors).

In order to implement the ICWMP, all relevant parties in the MoH participating in the COVID19 ERP (as identified above) would be trained to be aware of good practices and procedures of infection control and waste management that are stipulated under this plan. The technical support and capacity building training plan is shown on ***Table*** 6- 1:

Table 6- 1: Trainings Plan and Budget for Staff and Support Staff

Capacity Needs	Target Participants	Cost (USD)
Training on Infection control and waste management procedures and the roles and tasks for all actors from cradle to grave	• Professionals and non-professional staff working in the HCF (hospitals, PoE, Blood Centers, isolation and quarantine areas, and in the Laboratories. • Cleaners, morgue attendants waste transporters and handlers, incinerator operators, liquid waste treatment facility operators and other staff of the laboratories. • Staff for waste reporters service providers	15,000
Training on Environment, Health and Safety, MSDS and emergency preparedness and response	• Professionals and non-professional staff working in the HCF (hospitals, PoE, Blood Centers, isolation and quarantine areas and in the Laboratories, • Cleaners, waste transporters and handlers, incinerator operators, liquid waste treatment facility operators and other staff of the laboratories.	10,000
Training on biosafety and biosecurity	• Professionals working in the Laboratory Staffs • Cleaners, waste transporters and handlers, incinerator operators, liquid waste treatment facility operators and other staff of the laboratories.	15,000
Community health and safety in relation to hygiene and other standard precautions for infectious disease (i.e. COVID 19).	• Community members and community health workers within the HCF zone of influence.	10,000
Training of HCF on proper implementation of their specific ICWMP and ESMP during operations	• Professionals working in the Laboratory, HCF, Isolation, quarantine and treatment Centre, blood services.	10,000
Training of the medical waste handlers on their HCF specific ICWMP during operations;	• Professionals working in the Laboratory, HCF, Isolation and treatment Centre, blood services.	10,000
Training on comp 3 and 4 contractors and workers on the sub-project specific ESMP and C-ESMP	• Construction company workers for component 3 and component 4	10,000
Total		**80,000**

7.0 Annex I-A: Risk Assessment Template for Laboratories handling COVID-19 Samples

This risk assessment template has been provided using a qualitative approach of combining likelihood and severity parameters in a risk matrix is provided as a method for risk evaluation here, it is important to note that quantitative (for example, from simple numerical scoring schemes to complex mathematical models) and hybrid (semi-quantitative) methods can also be used for risk evaluation. Laboratories should use a risk-evaluation / assessment method that best meets their unique needs, without excluding the possibility of developing customized evaluation approaches, scoring methods, and definitions of the parameters.
Although this template was primarily developed for biosafety risk assessment, it can also be used for general safety risk assessment of laboratory activities, especially when the biosafety and general safety risks are interlinked, for example, sample collection and transport,Preparation of sub- specific ICWMP for HCF where appropriate and applicable.[17]

Institution/Facility name	
Laboratory name	
Laboratory manager/Supervisor	
Project titles/Relevant standard operating procedures (SOPs)	
Date	

If using this template, complete all sections following the instructions in the grey boxes. The instructions and bullet points in the grey boxes can be copied into the text boxes beneath the instructions and used as prompts to gather and record the necessary site-specific information. The grey instruction boxes can then be deleted, and the text remaining will form a risk assessment draft. This draft must be carefully reviewed, edited as necessary, and approved by the members of the risk assessment team.

STEP 1. Gather information (hazard identification)

Instructions: Provide a brief overview of the laboratory work and summarize the laboratory activities to be conducted that are included in the scope of this risk assessment.	
Describe the biological agents and other potential hazards (for example, transmission, infectious dose, treatment/preventive measures, pathogenicity).	
Describe the laboratory procedures to be used (for example, culturing, centrifugation, work with sharps, waste handling, and frequency of performing the laboratory activity).	
Describe the types of equipment to be used (personal protective equipment [PPE], centrifuges, autoclaves, biological safety cabinets [BSCs]).	
Describe the type and condition of the facility where work is conducted.	
Describe relevant human factors (for example, competency, training, experience and attitude of personnel).	
Describe any other factors that may affect laboratory operations (for example, legal, cultural, socioeconomic).	

[17] Laboratory biosafety guidance related to coronavirus disease 2019 (COVID-19), issued on March 18, 2020

STEP 2. Evaluate the risks

Instructions: Describe how exposure and/or release could occur.	
What potential situations are there in which exposure or release could occur?	
What is the likelihood of an exposure/release occurring? • Unlikely: not very possible to occur in the near future. • Possible: feasible to occur in the near future • Likely: very possible to occur in the near future.	
What is the severity of the consequences of an exposure/release (negligible, moderate, severe)?	

Instructions: Evaluate the risk and prioritize the implementation of risk control measures. Circle the initial (inherent) risk of the laboratory activities before additional risk control measures have been put in place.

Note:

- When assigning priority, other factors may need to be considered, for example, urgency, feasibility / sustainability of risk control measures, delivery and installation time and training availability.
- To estimate the overall risk, take into consideration the risk ratings for the individual laboratory activities/procedures, separately or collectively as appropriate for the laboratory.

		Likelihood of exposure/release		
		Unlikely	Possible	Likely
Consequence of exposure / release	Severe	Medium	High	Very high
	Moderate	Low	Medium	High
	Negligible	Very low	Low	Medium
Laboratory activity/procedure		Initial risk (very low, low, medium, high, very high)	Is the initial risk above the tolerance level? (yes/no)	Priority (high/medium / low)
Select the overall initial risk.		☐ Very low	☐ Low	☐ Medium	☐ High	☐ Very high
Should work proceed without additional risk control measures?		☐Yes ☐No		

STEP 3. Develop a risk control strategy

Instructions: List any requirements that have been prescribed by international and national regulations, legislation, guidelines, policies, and strategies on biosafety and biosecurity.	
Describe the measures required by national legislation or regulations (if any).	
Describe the measures advised by guidelines, policies and strategies (if any).	

Instructions: Describe the resources available for risk control and consider their applicability, availability, and sustainability in the local context, including management support.	
Are resources sufficient to secure and maintain potential risk control measures?	
What factors exist that may limit or restrict any of the risk control measures?	
Will work be able to proceed without any of the risk control measures; are there alternatives?	

STEP 4. Select and implement risk control measures

Instructions: Describe where and when risk control measures are needed, the level of residual (remaining) risk when these risk control measures are in place, and an assessment of the availability, effectiveness, and sustainability of the risk control measures.				
Laboratory activity/procedure	Selected risk control measure(s)	Residual risk (very low, low, medium, high, very high)	Is the residual risk above the tolerance level? (yes/no)	Are risk control measures available, effective, and sustainable? (yes/no)

Instructions: Evaluate the residual risk that remains after risk control measures have been selected, to determine whether that level of risk is now below the tolerance level and whether work should proceed.
Circle the residual risk of the laboratory activities after risk control measures are in place.

		Likelihood of exposure/release		
		Unlikely	Possible	Likely
Consequence of exposure/release	Severe	Medium	High	Very high
	Moderate	Low	Medium	High
	Negligible	Very low	Low	Medium

Overall residual risk:	☐Very low	☐ Low	☐ Medium	☐ High	☐ Very high

If the residual risk is still above the risk tolerance level, further action is necessary, such as additional risk control measures, based on the initial risk evaluated in STEP 2, redefining the scope of work such that it falls below the risk tolerance level with existing risk control measures in place, or identifying an alternative laboratory with appropriate risk control strategies already in place that is capable of conducting the work as planned.

Should work proceed with selected risk control measures?	☐Yes ☐No
Approved by (name and title)	
Approved by (signature)	
Date	

Instructions: Describe how to communicate risks and risk mitigation strategies to personnel. Provide a mechanism of communication within the laboratory. Describe the process and timeline for ensuring all identified risk control measures and that associated SOPs and training have been completed before starting the laboratory work.	
Communication of the hazards, risks, and risk control measures	
Purchase (and budgeting) of risk control measures	
Operational and maintenance procedures	
Training of personnel	

STEP 5. Review risks and risk control measures

Instructions: Establish a periodic review cycle to identify: changes in laboratory activities, biological agents, personnel, equipment or facilities; changes in knowledge of biological agents or processes; and lessons learnt from audits/inspections, personnel feedback, incidents, or near misses.	
Frequency of the review	
Person to conduct the review	
Describe updates/changes	
Personnel/procedures to implement the changes	
Reviewed by (name and title)	
Reviewed by (signature)	
Date	

Annex I-B: Health workers exposure risk assessment and management in the context of COVID-19 virus

WHO Health workers exposure risk assessment and management in the context of COVID-19 virus, Interim guidance 4 March 2020 asserts that, the available evidence is that the COVID-19 virus is transmitted between people through close contact and droplets. People most at risk of infection are those who are in contact with a COVID-19 patient and/or who care for COVID-19 patients. This inevitably places health workers at a high risk of infection. Target audience: This tool is to be used by health care facilities that have either cared for or admitted COVID-19 patients. This form is to be completed for all health workers who have been exposed to a confirmed COVID-19 patient in a health care facility. It is intended to be an operational tool used by health care facilities once a COVID-19 patient has been identified within the facility. This tool will help determine the risk of COVID-19 virus infection of all HCWs who have been exposed to a COVID-19 patient and then provides recommendations for appropriate management of these HCWs, according to their infection risk.
Objectives:

1. To determine the risk categorization of each HCW after exposure to a COVID-19 patient (see below Part 1: COVID-19 virus exposure risk assessment form for HCWs);
2. To inform the management of the exposed HCWs based on risk (see below Part 2: Management of health worker exposed to COVID-19 virus).

Part 1: COVID-19 virus assessment of risk of exposure for health workers in health care facilities

Protecting HCWs is of paramount importance to WHO. Understanding HCW exposure to COVID-19 virus and how this translates into risk of infection is critical for informing infection prevention and control (IPC) recommendations. The data that will be captured using this data collection form and risk assessment tool can be used to identify IPC breaches and define policy to mitigate health worker and nosocomial infection. As such, health care facilities using the following risk assessment are encouraged to share deidentified data with WHO to inform discussions about WHO guidance related to IPC. That is, any data shared with WHO should not include any personably identifiable information (Questions 2A, 2B and 2G).

1. Interviewer information	
A. Interviewer name:	
B. Interviewer date (DD/MM/YYYY):	___/___/_____
C. Interviewer phone number:	
D. Does the health worker have a history of staying in the same household or classroom environment with a confirmed COVID-19 patient?	□ Yes □ No
E. Does the HCW have history of traveling together in close proximity (within 1 meter) with a confirmed COVID-19 patient in any kind of conveyance?	□ Yes □ No

If the HCW answers yes for questions 1 D – 1E it is considered a community exposure to COVID-19 virus and health workers should be managed as such. The management recommendations in Part 2: Management of health workers exposed to COVID-19 virus apply only to health care-related exposure.

2. Health worker information	
A. Last name:	
B. First name:	

C. Age	
D. Sex:	□ Male □ Female □ Prefer not to answer
E. Health Care Facility:	
F. County:	
G. Contact details:	
H. Type of health care personnel:	□ Medical doctor □ Physician assistant □ Registered nurse (or equivalent) □ Assistant nurse, nurse technician (or equivalent) □ Radiology /x-ray technician □ Phlebotomist □ Ophthalmologist □ Physical therapist □ Respiratory therapist □ Nutritionist/dietitian □ Midwife □ Pharmacist □ Pharmacy technician or dispenser
	□ Laboratory personnel □ Admission/reception clerk □ Pa ent transporter □ Catering staff □ Cleaner □ Other (specify):
I. Health care facility unit type in which the health worker works?	Tick all that apply: □ Outpatient □ Emergency □ Medical unit □ Intensive care unit □ Cleaning services □ Laboratory □ Pharmacy □ Other, specify:
3. Health worker interactions with COVID-19 patient information	
A. Date of health worker first exposure to confirmed COVID-19 patient:	Date (DD/MM/YYYY): ___/___/_____ □ Not known
B. Name of health care facility where case received care:	
C. Type of health care setting:	□ Hospital □ Outpatient clinic □ Primary health centre □ Home care for mild cases □ Other:
D. Health Care Facility :	
E. County:	

F. Multiple COVID-19 patients in health care facility	□ Yes □ No □ Unknown Number of patients (approximate if exact number not known):

4. Health worker activities performed on COVID-19 patient	
A. Did you provide direct care to a confirmed COVID19 patient?	□ Yes □ No □ Unknown
B. Did you have face-to-face contact (within 1 meter) with a confirmed COVID-19 patient in a health care facility?	□ Yes □ No □ Unknown
C. Were you present when any aerosol generating procedures (AGP) was performed on the patient? See below for examples	□ Yes □ No □ Unknown
- If yes, what type of AGP procedure?	□ Tracheal intubation □ Nebulizer treatment □ Open airway suctioning □ Collection of sputum □ Tracheostomy □ Bronchoscopy □ Cardiopulmonary resuscitation (CPR) □ Other, specify:
D. Did you have direct contact with the environment where the confirmed COVID-19 patient was cared for? E.g. bed, linen, medical equipment, bathroom etc.	□ Yes □ No □ Unknown
E. Were you involved with health care interaction(s) (paid or unpaid) in another health care facility during the period above?	□ Other health care facility (public or private) □ Ambulance □ Home care □ No other health care facility

Exposure of health workers to COVID-19 virus

If the health worker responds 'Yes' to any of the Questions 4A – 4C, the health worker should be considered as being exposed to COVID-19 virus

5. Adherence to infection prevention and control (IPC) during health care interactions	
For the following questions, please quantify the frequency you wore PPE, as recommended: 'Always, as recommended' should be considered wearing the PPE when indicated more than 95% of the time; 'Most of the time' should be considered 50% or more but not 100%; 'occasionally' should be considered 20% to under 50% and 'Rarely' should be considered less than 20%.	
A. During the period of a health care interaction with a COVID-19 patient, did you wear personal protective equipment (PPE)?	□ Yes □ No
- If yes, for each item of PPE below, indicate how often you used it:	

- 1. Single gloves	□ Always, as recommended □ Most of the time (50% or more but not 100%) □ Occasionally 20% to under 50%) □ Rarely (less than 20% of the time)
- 2. Medical mask	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
- 3. Face shield or goggles/protective glasses	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
- 4. Disposable gown	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
B. During the period of health care interaction with the COVID-19 patient, did you remove and replace your PPE according to protocol (e.g. when medical mask became wet, disposed the wet PPE in the waste bin, performed hand hygiene, etc)?	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
C. During the period of health care interaction with the COVID-19 case, did you perform hand hygiene before and after touching the COVID-19 patient? NB: Irrespective of wearing gloves	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
D. During the period of health care interaction with the COVID-19 case, did you perform hand hygiene	□ Always, as recommended □ Most of the time
before and after any clean or aseptic procedure was performed (e.g. inserting: peripheric vascular catheter, urinary catheter, intubation, etc.)?	□ Occasionally □ Rarely
E. During the period of health care interaction with the COVID-19 case, did you perform hand hygiene after exposure to body fluid?	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
F. During the period of health care interaction with the COVID-19 case, did you perform hand hygiene after touching the COVID-19 patient's surroundings (bed, door handle, etc)? Note: this is irrespective of wearing gloves	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
G. During the period of health care interaction with the COVID-19 case, were high touch surfaces decontaminated frequently (at least three times daily)?	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely

6. Adherence to infection prevention and control (IPC) when performing aerosol generating procedures (e.g. Tracheal intubation, nebulizer treatment, open airway suctioning, collection of sputum, tracheostomy, bronchoscopy, cardiopulmonary resuscitation (CPR) etc.)	
For the following questions, please quantify the frequency you wore PPE, as recommended: 'Always, as recommended' should be considered wearing the PPE when indicated more than 95% of the time; 'Most of the time' should be considered 50% or more but not 100%; 'occasionally' should be considered 20% to under 50% and 'Rarely' should be considered less than 20%.	
A. During aerosol generating procedures on a COVID-19 patient, did you wear personal protective equipment (PPE)?	□ Yes □ No
- If yes, for each item of PPE below, indicate how often you used it:	
- 1. Single gloves	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
- 2. N95 mask (or equivalent respirator)	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
- 3. Face shield or goggles/protective glasses	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
- 4. Disposable gown	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
- 5. Waterproof apron	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
B. During aerosol generating procedures on the COVID-19 patient, did you remove and replace your PPE according to protocol (e.g. when medical mask became wet, disposed the wet PPE in the waste bin, performed hand hygiene, etc)?	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
C. During aerosol generating procedures on the COVID-19 case, did you perform hand hygiene before and after touching the COVID-19 patient? NB: Irrespective of wearing gloves	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely

D. During aerosol generating procedures on the COVID-19 case, did you perform hand hygiene before and after any clean or aseptic procedure was performed (e.g. inserting: peripheric vascular catheter, urinary catheter, intubation, etc.)?	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
E. During aerosol generating procedures on the COVID-19 case, did you perform hand hygiene after touching the COVID-19 patient's surroundings (bed, door handle, etc)? Note: This is irrespective of wearing gloves	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely
F. During aerosol generating procedures on the COVID-19 case, were high touch surfaces decontaminated frequently (at least three times daily)?	□ Always, as recommended □ Most of the time □ Occasionally □ Rarely

7. Accidents with biological material	
A. During the period of a health care interaction with a COVID-19 infected patient, did you have any episode of accident with biological fluid/respiratory secretions? See below for examples	□ Yes □ No
- If yes, which type of accident?	□ Splash of biological fluid/respiratory secretions in the mucous membrane of eyes □ Splash of biological fluid/respiratory secre ons in the mucous membrane of mouth/nose □ Splash of biological fluid/respiratory secretions on non-intact skin □ Puncture/sharp accident with any material contaminated with biological fluid/respiratory secretions

Risk categorization of health workers exposed to COVID-19 virus

High risk for COVID-19 infection
The health worker did not respond 'Always, as recommended' to Questions:

- 5A1 – 5G, 6A – 6F
- AND/OR responded 'Yes' to 7A.

All other health workers should be considered low risk for COVID-19 virus infection.

Part 2: Management of health workers exposed to COVID-19 virus

The management of health workers exposed to COVID-19 virus will vary according to the Risk categorization of health workers exposed to COVID-19 virus, as determined in Part 1.

Recommendations for health workers with high risk for infection:

- Stop all health care interaction with patients for a period of 14 days after the last day of exposure to a confirmed COVID-19 patient;
- Be tested for COVID-19 virus infection;
- Quarantine for 14 days in a designated setting.[18]

Health care facilities should:

- Provide psychosocial support to HCW during quarantine, or duration of illness if HCW becomes a confirmed COVID-19 case;
- Provide compensation for the period of quarantine and for the duration of illness (if not on a monthly salary) or contract extension for duration of quarantine/illness;
- Refresher infection prevention and control training for the health care facility staff, including HCWs at high risk for infection once he/she returns to work at the end of the 14-day period.

Recommendations for health workers with low risk for COVID-19 infection:

- Self-monitor temperature and respiratory symptoms daily for 14 days after the last day of exposure to a COVID-19 patient. HCWs should be advised to call health care facility if he/she develop any symptoms suggestive of COVID-19;
- Reinforce contact and droplet precautions when caring for all patients with acute respiratory illness[2] and standard precautions to take care of all patients;
- Reinforce airborne precautions for aerosol generating procedures on all suspect and confirmed COVID-19 patients;
- Reinforce the rational, correct and consistent use of personal protective equipment when exposed to confirmed COVID-19 patients;[19]
- Apply WHO's "My 5 Moments for Hand Hygiene" before touching a patient, before any clean or aseptic procedure, after exposure to body fluid, after touching a patient, and after touching patient's surroundings;[20]
- Practice respiratory etiquette at all times.

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[18] WHO Considerations for quarantine of individuals in the context of containment for coronavirus disease (COVID-19): Interim guidance 28 February 2020 (https://www.who.int/publications-detail/considerations-forquarantine-of-individuals-in-the-context-of-containment-for-coronavirus-disease-(covid-19). [2] WHO Infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected: Interim guidance 25 January 2020 (https://www.who.int/publications-detail/infection-preventionand-control-during-health-care-when-novel-coronavirus-(ncov)-infection-is-suspected-20200125).

[19] WHO Infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected: Interim guidance 25 January 2020 (https://www.who.int/publications-detail/infection-preventionand-control-during-health-care-when-novel-coronavirus-(ncov)-infection-is-suspected-20200125).

[20] WHO guidelines on hand hygiene in health care: first global patient safety challenge – clean care is safer care. Geneva: World Health Organization; 2009 (https://apps.who.int/iris/handle/10665/44102).

8.0 Annex II: MoH Principles of IPC strategies associated with healthcare for suspected COVID-19 infection

To achieve the highest level of effectiveness in the response to a COVID-19 outbreak using the strategies and practices recommended in this document, an IPC program with a dedicated and trained team, or at least an IPC focal point, should be in place and supported by national and facility senior management. In facilities where IPC is limited or non-existent, it is critical to start by ensuring that at least minimum requirements for IPC are in place as soon as possible.

IPC strategies to prevent or limit transmission in health care settings include the following:

1. Ensuring triage, early recognition, and source control (isolating patients with suspected COVID infection);
2. Applying standard precautions for all patients;
3. Implementing empiric additional precautions (droplet and contact and, whenever applicable, airborne precautions) for suspected cases of COVID-19 infection;
4. Implementing administrative controls; and
5. Using environmental and engineering controls.

9.1 Ensuring triage, early recognition, and source control

Clinical triage includes a system for assessing all patients to allow early recognition of possible COVID19 infection and immediate isolation of patients with suspected COVID-19 infection in an area separate from other patients (source control).

To facilitate early identification of cases of suspected COVID-19 infection, health care facilities should:

- Encourage HCWs to have a high level of clinical suspicion;
- Establish a well-equipped triage station at the entrance of health care facility, supported by trained staff;
- Institute the use of screening according to the updated case definition and
- Post signs in public areas reminding symptomatic patients to alert HCWs
- Promote hand hygiene and respiratory hygiene as essential preventive measures

9.2. Applying standard precautions for all patients

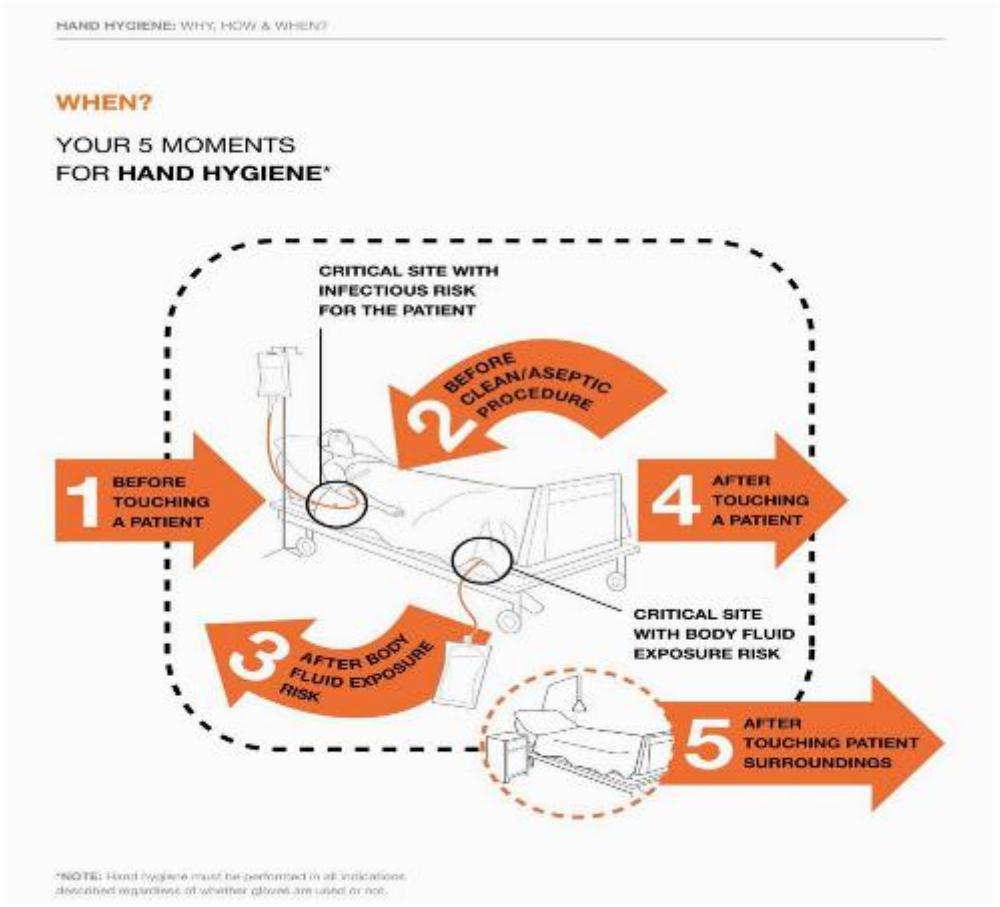
Standard precautions include hand and respiratory hygiene, the use of appropriate PPE according to risk assessment, injection safety practices, safe waste management, proper linens, environmental cleaning and sterilization of patient-care equipment.

Ensure that the following respiratory hygiene measures are used:

- All patients cover their nose and mouth with a tissue or elbow when coughing or sneezing;
- Offer a surgical mask to patients with suspected COVID 19 infection while they are in waiting/public areas or in cohorting rooms;
- Perform hand hygiene after contact with respiratory secretions.

HCWs should apply the WHO's 5 Moments for Hand Hygiene approach before touching a patient, before any clean or aseptic procedure is performed, after exposure to body fluid, after touching a patient, and after touching a patient's surroundings.

- Hand hygiene includes either cleansing hands with an alcohol-based hand rub (ABHR) or with soap and running water;
- Alcohol-based hand rubs are preferred if hands are not visibly soiled;
- Wash hands with soap and water when they are visibly soiled



1	BEFORE TOUCHING A PATIENT	WHEN?	Clean your hands before touching a patient when approaching him/her.
		WHY?	To protect the patient against harmful germs carried on your hands.
2	BEFORE CLEAN/ ASEPTIC PROCEDURE	WHEN?	Clean your hands immediately before performing a clean/aseptic procedure.
		WHY?	To protect the patient against harmful germs, including the patient's own, from entering his/her body.
3	AFTER BODY FLUID EXPOSURE RISK	WHEN?	Clean your hands immediately after an exposure risk to body fluids (and after glove removal).
		WHY?	To protect yourself and the health-care environment from harmful patient germs.
4	AFTER TOUCHING A PATIENT	WHEN?	Clean your hands after touching a patient and her/his immediate surroundings, when leaving the patient's side.
		WHY?	To protect yourself and the health-care environment from harmful patient germs.
5	AFTER TOUCHING PATIENT SURROUNDINGS	WHEN?	Clean your hands after touching any object or furniture in the patient's immediate surroundings, when leaving – even if the patient has not been touched.
		WHY?	To protect yourself and the health-care environment from harmful patient germs.

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Figure 9- 1: Hand Hygiene why, how and when

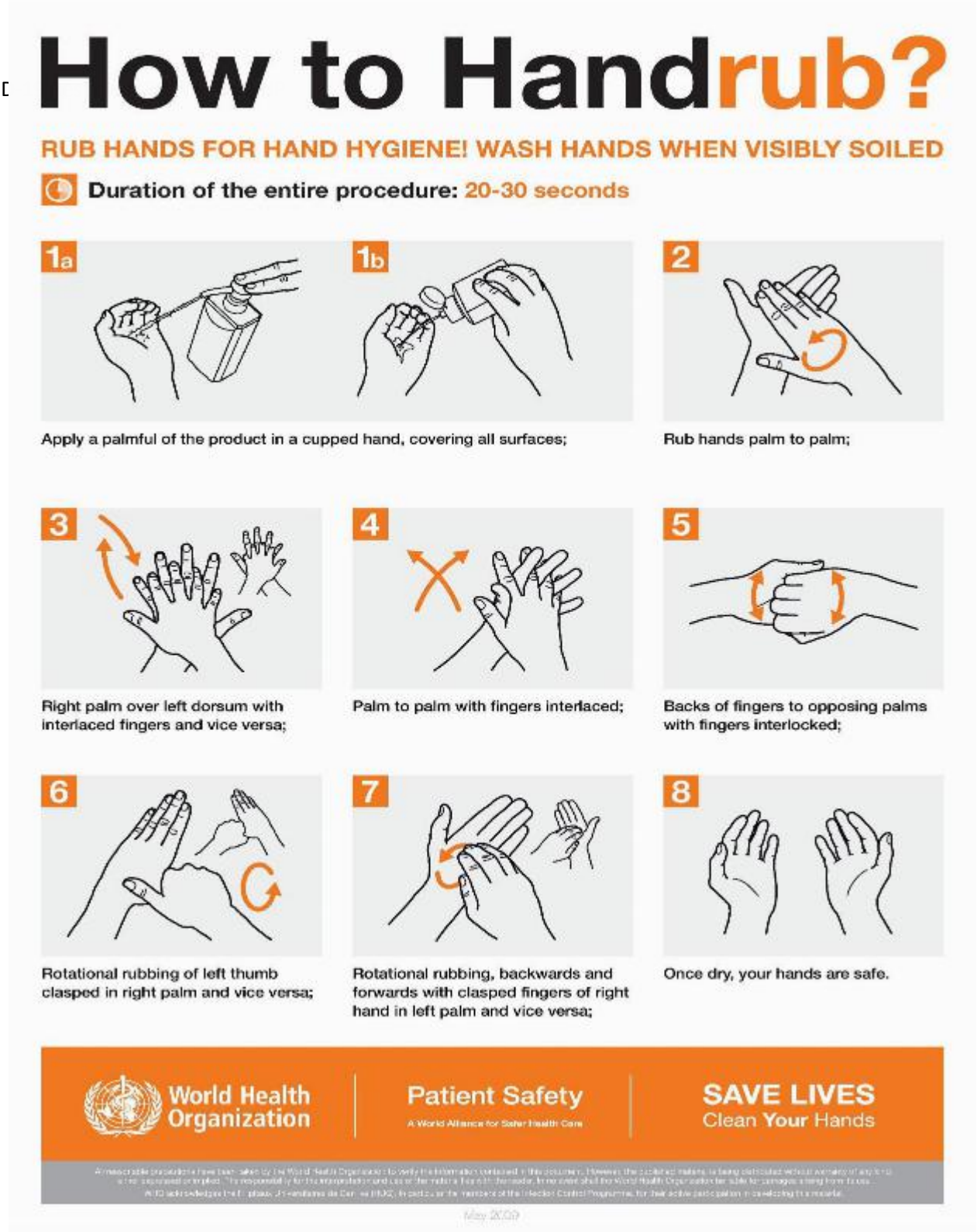

Figure 9- 2: How to Hand Rub

Figure 9- 3: How to Hand Wash

9.3 Rational Use of PPE

The rational, correct, and consistent use of PPE also helps to reduce the spread of pathogens. The use of PPE effectiveness strongly depends on adequate and regular supplies, adequate staff training, appropriate hand hygiene and specifically appropriate human behavior.

It is important to ensure that environmental cleaning and disinfection procedures are followed consistently and correctly. Thoroughly cleaning environmental surfaces with water and detergent and applying commonly used hospital-level disinfectants (such as sodium hypochlorite) are effective and sufficient procedures. Medical devices and equipment, laundry, food service utensils and medical waste should be managed in accordance with safe routine procedures.

Figure 9- 4: Sequence for Putting Personal Protective Equipment

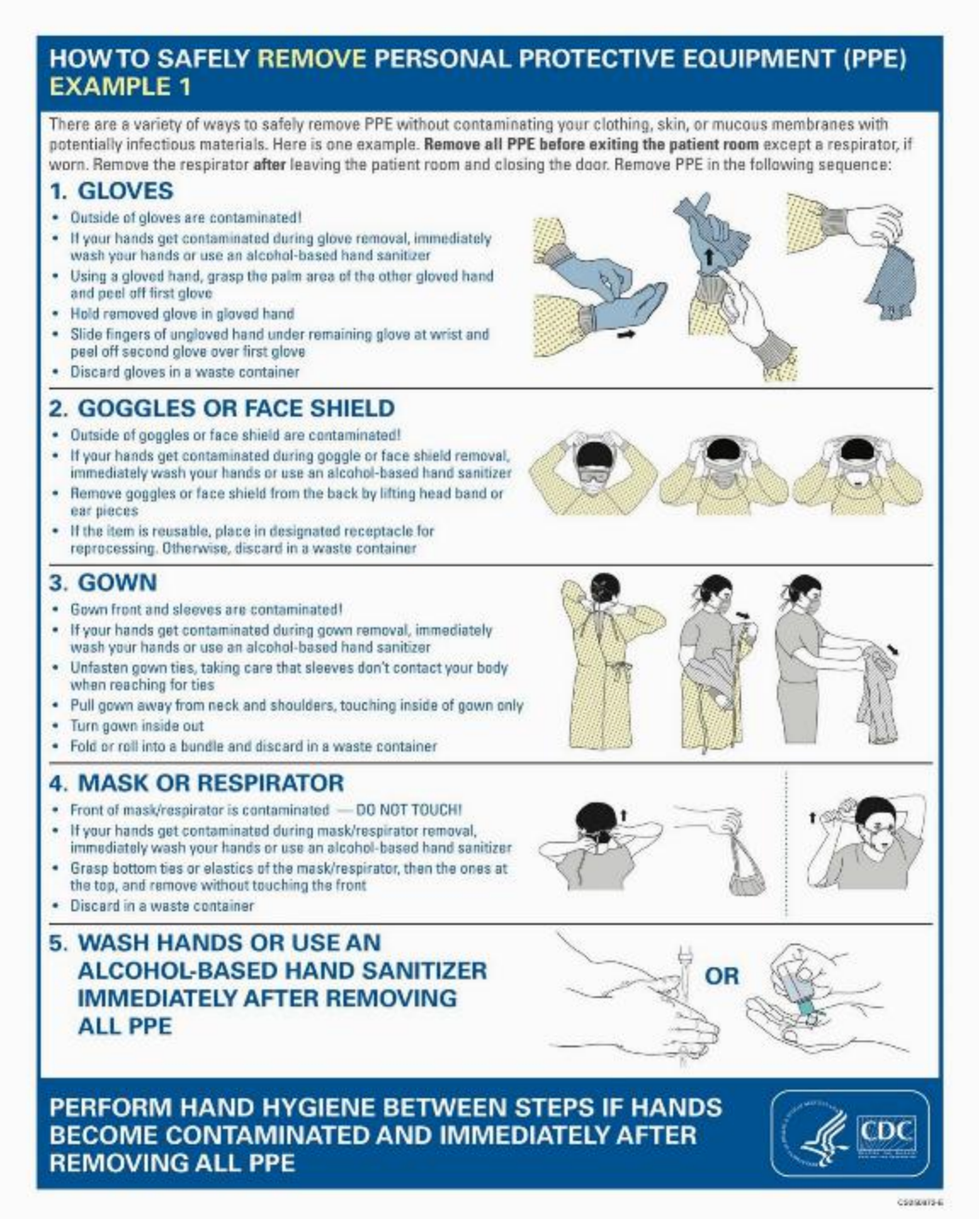

Figure 9- 5: How to Safely Remove Personal Protective Equipment

9.4. Implementing empiric additional precautions

9.4.1 Contact and droplet precautions

- In addition to using standard precautions, all individuals, including family members, visitors and HCWs, should use contact and droplet precautions before entering the room where suspected or confirmed COVID-19 patients are admitted;
- Patients should be placed in adequately ventilated single rooms. For general ward rooms with natural ventilation, adequate ventilation is considered to be adequate
- When single rooms are not available, patients suspected of being infected with COVID-19 should be grouped together;
- All patients' beds should be placed at least 1 m apart regardless of whether they are suspected to have COVID-19 infection;
- Where possible, a team of HCWs should be designated to care exclusively for suspected or confirmed cases to reduce the risk of transmission;
- HCWs should use an N95 mask
- HCWs should wear eye protection (goggles) or facial protection (face shield) to avoid contamination of mucous membranes;
- HCWs should wear a clean, non-sterile, long-sleeved gown;
- HCWs should also use gloves;
- The use of boots, coverall and apron is not required during routine care;
- After patient care, appropriate doffing and disposal of all PPE's and hand hygiene should be carried out. Please note that a new set of PPE's is needed, when care is given to a different patient;
- Equipment should be either single-use or disposable or dedicated equipment (e.g., stethoscopes, blood pressure cuffs and thermometers).

If equipment needs to be shared among patients, clean and disinfect it between use for each individual patient (e.g., by using ethyl alcohol 70%).

- HCWs should refrain from touching eyes, nose or mouth with potentially contaminated gloved or bare hands;
- Avoid moving and transporting patients out of their room or area unless medically necessary. Use designated portable X-ray equipment and/or other designated diagnostic equipment. If transport is required, use predetermined transport routes to minimize exposure for staff, other patients and visitors, and have the patient using a medical mask;
- Ensure that HCWs who are transporting patients perform hand hygiene and wear appropriate PPE as described in this section;
- Notify the area receiving the patient of any necessary precautions as early as possible before the patient's arrival;
- Routinely clean and disinfect surfaces which the patient is in contact;
- Limit the number of HCWs, family members and visitors who are in contact with a suspected and confirmed COVID-19 patient;

- Maintain a record (name and contacts) of all persons entering the patient's room, including all staff and visitors.

9.4.2 Airborne precautions for aerosol-generating procedures

Some aerosol-generating procedures have been associated with an increased risk of transmission of coronaviruses (SARS-CoV and MERS-CoV), such as tracheal intubation, non-invasive ventilation, tracheotomy, cardiopulmonary resuscitation, manual ventilation before intubation, and bronchoscopy.

Ensure that HCWs performing aerosol-generating procedures:

- Perform procedures in an adequately ventilated room – that is, natural ventilation with air flow of at least 160 L/s per patient or in negative pressure rooms with at least 12 air changes per hour (ACH) and controlled direction of air flow when using mechanical ventilation;
- Use a particulate respirator at least as protective as a US National Institute for Occupational Safety and Health (NIOSH)-certified N95, European Union (EU) standard FFP2, or equivalent. When HCWs put on a disposable particulate respirator, they must always perform the seal check. Note that if the wearer has facial hair (i.e., a beard) it may prevent a proper respirator fit;
- Use eye protection (i.e., goggles or a face shield); wear a clean, non-sterile, long-sleeved gown and gloves. If gowns are not fluid resistant, HCWs should use a waterproof apron for procedures expected to have high volumes of fluid that might penetrate the gown;
- Limit the number of persons present in the room to the absolute minimum required for the patient's care and support.

9.5. Implementing administrative controls

Administrative controls and policies for the prevention and control of transmission of COVID-19 infections within the health care setting include, but may not be limited to: establishing sustainable IPC infrastructures and activities; educating patients' caregivers; developing policies on the early recognition of acute respiratory infection potentially caused by COVID 19; ensuring access to prompt laboratory testing for identification of the etiologic agent; preventing overcrowding, especially in the emergency department; providing dedicated waiting areas for symptomatic patients; appropriately isolating hospitalized patients; ensuring adequate supplies of PPE; ensure the adherence of IPC policies and procedures for all facets of health care.

9.5.1 Administrative measures related to HCWs

- Provision of adequate training for HCWs;
- Ensuring an adequate patient-to-staff ratio;
- Establishing a surveillance process for acute respiratory infections potentially caused by COVID-19 among HCWs;
- Ensuring that HCWs and the public understand the importance of promptly seeking medical care;
- Monitoring HCW compliance with standard precautions and providing mechanisms for improvement as needed.
- Workflow processes should be adjusted to ensure rapid triaging and separation of suspected COVID-19 patients.

9.6 Using environmental and engineering controls

These controls address the basic infrastructure of the health care facility. These controls aim to ensure there is adequate ventilation in all areas in the health care facility, as well as adequate environmental cleaning.

Additionally, spatial separation of at least 1 meter should be maintained between all patients. Both spatial separation and adequate ventilation can help reduce the spread of many pathogens in the health care setting.

Ensure that cleaning and disinfection procedures are followed consistently and correctly. Cleaning environmental surfaces with water and detergent and applying commonly used hospital disinfectants (such as sodium hypochlorite) is an effective and sufficient procedure. Manage laundry, food service utensils and medical waste in accordance with safe routine procedures.

9.0 Annex IIII: Guideline for COVID-19 Personal Protective Equipment (PPE) for Healthcare Workers

This guideline is informed by the World Health Organization interim technical guidance for Rational Use of Personal Protective Equipment for Coronavirus Disease 2019 (COVID-19) and the Guidance for wearing and removing personal protective equipment in healthcare settings for the care of patients with suspected or confirmed COVID-19 as summarized in the Table 10-1 below. In addition to using the appropriate PPE, frequent hand hygiene and respiratory hygiene should always be performed. PPE should be discarded in an appropriate waste container after use, and hand hygiene should be performed before putting on and after taking off PPE.

Table 10- 1: Guideline for COVID-19 Personal Protective Equipment (PPE) for Healthcare Workers

Setting	Target personnel or patients	Activity	Type of PPE or procedure
Healthcare facilities			
Inpatient facilities			
Patient room	Healthcare workers	Providing direct care to COVID-19 patients.	Respirator N95 or FFP2 standard, or equivalent
			Gown
			Gloves
			Eye protection (goggles or
			Face shield).
		Aerosol-generating procedures performed on COVID-19 patients.	Respirator FFP3 Standard, or equivalent.
			Gown
			Gloves
			Eye protection
			Apron
	Cleaners	Entering the room of COVID-19 patients.	Medical mask
			Gown
			Heavy duty gloves
			Eye protection (if risk of splash from organic material or chemicals).
			Boots or closed work shoes
	Visitors *(The number of visitors should be restricted. If visitors must enter a COVID-19 patient's room, they should be provided with clear instructions about how to put on and remove PPE and about performing hand hygiene before putting on and after removing PPE; this should be supervised by a healthcare worker.)*	Entering the room of a COVID-19 patient	Medical mask
			Gown
			Gloves
Other areas of patient transit (e.g., wards, corridors).	All staff, including healthcare workers.	Any activity that does not involve contact with COVID-19 patients.	No PPE required
Triage	Healthcare workers	Preliminary screening not involving direct contact i.e. the use of no-touch thermometers, thermal imaging cameras and limited	Maintain spatial distance of at least 1 m.
			No PPE required

Setting	Target personnel or patients	Activity	Type of PPE or procedure
		observation and questioning, all while maintaining a spatial distance of at least 1m	
	Patients with respiratory Symptoms.	Any	Maintain spatial distance of at least 1 m. Provide medical mask if Tolerated by patient.
	Patients without respiratory Symptoms.	Any	No PPE required
Laboratory	Lab technician	Manipulation of respiratory Samples.	Medical mask Gown Gloves Eye protection (if risk of splash)
Administrative areas	All staff, including healthcare Workers.	Administrative tasks that do not involve contact with	No PPE required
Outpatient facilities			
Consultation room	Healthcare workers	Physical examination of patient with respiratory Symptoms.	Medical mask Gown Gloves Eye protection
	Healthcare workers	Physical examination of patients without respiratory Symptoms.	PPE according to standard precautions and risk Assessment.
	Patients with respiratory Symptoms.	Any	Provide medical mask if tolerated.
	Patients without respiratory Symptoms.	Any	No PPE required
	Cleaners	After and between consultations with patients with respiratory symptoms.	Medical mask Gown Heavy duty gloves Eye protection (if risk of splash from organic material or chemicals). Boots or closed work shoes
Waiting room	Patients with respiratory Symptoms.	Any	Provide medical mask if tolerated. Immediately move the patient to an isolation room or separate area away from others; if this is not feasible, ensure spatial distance of at least 1 m from other patients.
	Patients without respiratory symptoms.	Any	No PPE required
Administrative areas	All staff, including healthcare workers.	Administrative tasks	No PPE required
Triage	Healthcare workers	Preliminary screening not involving direct contact i.e. the use of no-touch thermometers, thermal imaging cameras and limited observation and questioning,	Maintain spatial distance of at least 1 m. No PPE required

Setting	Target personnel or patients	Activity	Type of PPE or procedure
		all while maintaining a spatial distance of at least 1m	
	Patients with respiratory symptoms.	Any	Maintain spatial distance of at least 1 m.
			Provide medical mask if tolerated.
	Patients without respiratory symptoms.	Any	No PPE required
Community			
Home	Patients with respiratory symptoms.	Any	Maintain spatial distance of at least 1 m.
			Provide medical mask if tolerated, except when Sleeping.
	Caregiver	Entering the patient's room, but not providing direct care or assistance.	Medical mask
	Caregiver	Providing direct care or when handling stool, urine or waste from COVID-19 patient being cared for at home.	Gloves
			Medical mask
			Apron (if risk of splash)
	Healthcare workers	Providing direct care or assistance to a COVID-19 patient at home	Medical mask
			Gown
			Gloves
			Eye protection
Public areas (e.g., schools, shopping malls, train stations).	Individuals without respiratory symptoms	Any	No PPE required
Points of Entry			
Administrative areas	All staff	Any	No PPE required
Screening area	Staff	First screening (temperature measurement) not involving direct contact i.e. the use of no-touch thermometers, thermal imaging cameras and limited observation and questioning, all while maintaining a spatial distance of at least 1m	Maintain spatial distance of at least 1 m.
			No PPE required
	Staff	Second screening (i.e., interviewing passengers with fever for clinical symptoms suggestive of COVID-19 disease and travel history).	Medical mask
			Gloves
	Cleaners	Cleaning the area where passengers with fever are being screened.	Medical mask
			Gown
			Heavy duty gloves

Setting	Target personnel or patients	Activity	Type of PPE or procedure
			Eye protection (if risk of splash from organic materials or chemicals).
			Boots or closed work shoes
Temporary isolation area	Staff	Entering the isolation area, but not providing direct Assistance.	Maintain spatial distance of at least 1 m.
			Medical mask
			Gloves
	Staff, healthcare workers	Assisting passenger being transported to a healthcare Facility.	Medical mask
			Gown
			Gloves
			Eye protection
	Cleaners	Cleaning isolation area	Medical mask
			Gown
			Heavy duty gloves
			Eye protection (if risk of splash from organic material or chemicals).
			Boots or closed work shoes
Ambulance or transfer Vehicle	Healthcare workers	Transporting suspected COVID-19 patients to the Referral healthcare facility.	Medical mask
			Gowns
			Gloves
			Eye protection
	Driver	Involved only in driving the patient with suspected COVID-19 disease and the driver's compartment is separated from the COVID-19 patient.	Maintain spatial distance of at least 1 m.
			No PPE required
		Assisting with loading or unloading patient with suspected COVID-19 disease.	Medical mask
			Gowns
			Gloves
			Eye protection
		No direct contact with patient with suspected COVID-19, but no separation between driver's and patient's Compartments.	Medical mask
	Patient with suspected COVID-19 disease. Cleaners	Transport to the referral Health care facility.	Medical mask if tolerated
		Cleaning after and between transport of patients with suspected COVID-19 disease to the referral healthcare Facility.	Medical mask
			Gown
			Heavy duty gloves
			Eye protection (if risk of splash from organic material or chemicals).
			Boots or closed work shoes

All rapid response team members must be trained in performing hand hygiene and how to put on and remove PPE to avoid self-contamination. Special considerations for rapid response teams assisting with public health investigations are summarized in Table 10-2**:**

Table 10- 2: Special considerations for rapid response teams assisting with public health investigations

Setting	Target personnel or patients	Activity	Type of PPE or procedure
Anywhere	Rapid response team Investigators.	Interview suspected or confirmed COVID-19 Patients or their contacts.	No PPE if done remotely (e.g., by telephone or video conference).
			Remote interview is the preferred method.
		In-person interview of suspected or confirmed COVID-19 patients without Direct contact.	Medical mask
			Maintain spatial distance of at least 1 m.
			The interview should be conducted outside the house or outdoors, and confirmed or suspected COVID-19 patients should wear a medical mask if tolerated.
		In-person interview with asymptomatic contacts of COVID-19 patients.	Maintain spatial distance oft least 1 m.
			No PPE required
			The interview should be performed outside the house or outdoors. If it is necessary to enter the household environment, use a thermal imaging camera to confirm that the individual does not have a fever, maintain spatial distance of at least 1 m and do not touch anything in the household environment.

10.0 Annex IV: Infection Control and Waste Management Plan (ICWMP) Template for HCFs

1. Introduction

1.1 Describe the project context and components

1.2 Describe the targeted healthcare facility (HCF):

- Type: E.g. general hospital, clinics, inpatient/outpatient facility, medical laboratory, quarantine or isolation centers;
- *Special type of HCF in response to COVID-19: E.g. existing assets may be acquired to hold yet-to-confirm cases for medical observation or isolation;*
- Functions and requirement for the level infection control, e.g. biosafety levels;
- Location and associated facilities, including access, water supply, power supply;
- Capacity: beds

1.3 Describe the design requirements of the HCF, which may include specifications for general design and safety, separation of wards, heating, ventilation and air conditioning (HVAC), autoclave, and waste management facilities.

2. Infection Control and Waste Management

2.1 Overview of infection control and waste management in the HCF

- Type, source and volume of healthcare waste (HCW) generated in the HCF, including solid, liquid and air emissions (if significant)
- Classify and quantify the HCW (infectious waste, pathological waste, sharps, liquid and non-hazardous) following WBG EHS Guidelines for Healthcare Facilities and pertaining GIIP.
- *Given the infectious nature of the novel coronavirus, some wastes that are traditionally classified as non-hazardous may be considered hazardous. It's likely the volume of waste will increase considerably given the number of admitted patients during COVID-19 outbreak. Special attention should be given to the identification, classification and quantification of the healthcare wastes.*
- Describe the healthcare waste management system in the HCF, including material delivery, waste generation, handling, disinfection and sterilization, collection, storage, transport, and disposal and treatment works
- Provide a flow chart of waste streams in the HCF if available
- Describe applicable performance levels and/or standards
- Describe institutional arrangement, roles and responsibilities in the HCF for infection control and waste management.

2.2 Management Measures

- Waste minimization, reuse and recycling: HCF should consider practices and procedures to minimize waste generation, without sacrificing patient hygiene and safety considerations.
- Delivery and storage of specimen, samples, reagents, pharmaceuticals and medical supplies: HCF should adopt practice and procedures to minimize risks associated with delivering, receiving and storage of hazardous medical goods. Hampered

- Waste segregation, packaging, color coding and labeling: HCF should strictly conduct waste segregation at the point of generation. Internationally adopted method for packaging, color coding and labeling the wastes should be followed.
- Onsite collection and transport: HCF should adopt practices and procedures to timely remove properly packaged and labelled wastes using designated trolleys/carts and routes. Disinfection of pertaining tools and spaces should be routinely conducted. Hygiene and safety of involved supporting medical workers such as cleaners should be ensured.
- Waste storage: A HCF should have multiple waste storage areas designed for different types of wastes. Their functions and sizes are determined at design stage. Proper maintenance and disinfection of the storage areas should be carried out. Existing reports suggest that during the COVID-19 outbreak, infectious wastes should be removed from HCF's storage area for disposal within 24 hours.
- Onsite waste treatment and disposal (e.g. an incinerator): Many HCFs have their own waste incineration facilities installed onsite. Due diligence of an existing incinerator should be conducted to examine its technical adequacy, process capacity, performance record, and operator's capacity. In case any gaps are discovered, corrective measures should be recommended. For new HCF financed by the project, waste disposal facilities should be integrated into the overall design and ESIA developed. Good design, operational practices and internationally adopted emission standards for healthcare waste incinerators can be found in pertaining EHS Guidelines and GIIP.
- Transportation and disposal at offsite waste management facilities: Not all HCF has adequate or well-performed incinerator onsite. Not all healthcare wastes are suitable for incineration. An onsite incinerator produces residuals after incineration. Hence offsite waste disposal facilities provided by local government or the private sector are probably needed. These offsite waste management facilities may include incinerators, hazardous wastes landfill. In the same vein, due diligence of such external waste management facilities should be conducted to examine its technical adequacy, process capacity, performance record, and operator's capacity. In case any gaps are discovered, corrective measures should be recommended and agreed with the government or the private sector operators.
- Wastewater treatment: HCF wastewater is related to hazardous waste management practices. Proper waste segregation and handling as discussed above should be conducted to minimize entry of solid waste into the waste water stream. In case waste water is discharged into municipal sewer sewerage system, the HCF should ensure that waste water effluent comply with all applicable permits and standards, and the municipal waste water treatment plant (WWTP) is capable of handling the type of effluent discharged. In cases where municipal sewage system is not in place, HCF should build and properly operate on site primary and secondary waste water treatment works, including disinfection. Residuals of the on site waste water treatment works, such as sludge, should be properly disposed of as well. There're also cases where HCF waste water is transported by trucks to a municipal waste water treatment plant for treatment. Requirements on safe transportation, due diligence of WWTP in terms of its capacity and performance should be conducted.

3. Emergency Preparedness and Response

Emergency incidents occurring in a HCF may include spillage, occupational exposure to infectious materials or radiation, accidental releases of infectious or hazardous substances to the environment, medical equipment failure, failure of solid waste and wastewater treatment facilities, and fire. These emergency events are likely to seriously affect medical workers, communities, the HCF's operation and the environment.

Thus, an Emergency Response Plan (ERP) that is commensurate with the risk levels is recommended to be developed. The key elements of an ERP are defined in ESS 4 Community Health and Safety (para. 21).

4. Institutional Arrangement and Capacity Building

A clearly defined institutional arrangement, roles and responsibilities should be included. A training plan with recurring training programs should be developed. The following aspects are recommended:

- Define roles and responsibilities along each link of the chain along the cradle-to-crave infection control and waste management process;
- Ensure adequate and qualified staff are in place, including those in charge of infection control and biosafety and waste management facility operation.
- Stress the chief of a HCF takes overall responsibility for infection control and waste management;
- Involve all relevant departments in a HCF, and build an intra-departmental team to manage, coordinate and regularly review issues and performance;
- Establish an information management system to track and record the waste streams in HCF; and
- Capacity building and training should involve medical workers, waste management workers and cleaners. Third-party waste management service providers should be provided with relevant training as well.

5. Monitoring and Reporting

Many HCFs in developing countries face the challenge of inadequate monitoring and records of healthcare waste streams. HCF should establish an information management system to track and record the waste streams from the point of generation, segregation, packaging, temporary storage, transport carts/vehicles, to treatment facilities. The HCF is encouraged to develop an IT based information management system should their technical and financial capacity allow.

As discussed above, the HCF chief takes overall responsibility, leads an intra-departmental team and regularly reviews issues and performance of the infection control and waste management practices in the HCF. Internal reporting and filing systems should be in place.

Externally, reporting should be conducted as per government and World Bank requirements.

Table 11- 1: Template of the Infection Control and Waste Management Plan Matrix

Activities	Potential E&S Issues and Risks	Proposed Mitigation Measures	Responsibilities	Timeline	Budget
General HCF operation – Environment	General wastes, wastewater and air emissions				
General HCF operation – OHS issues	- Physical hazards; - Electrical and explosive hazards; - Fire; - Chemical use; - Ergonomic hazard; - Radioactive hazard.				
HCF operation - Infection control and waste management plan					
Waste minimization, reuse and recycling					
Delivery and storage of specimen, samples, reagents, pharmaceuticals and medical supplies					
Storage and handling of specimen, samples, reagents, and infectious materials					
Waste segregation, packaging, color coding and labeling					
Onsite collection and transport					
Waste storage					
Onsite waste treatment and disposal					
Waste transportation to and disposal in offsite treatment and disposal facilities					
HCF operation –					

Activities	Potential E&S Issues and Risks	Proposed Mitigation Measures	Responsibilities	Timeline	Budget
trans boundary movement of specimen, samples, reagents, medical equipment, and infectious materials					
Emergency events	- Spillage; - Occupational exposure to infectious; - Exposure to radiation; - Accidental releases of infectious or hazardous substances to the environment; - Medical equipment failure; - Failure of solid waste and wastewater treatment facilities; - Fire; - Other emergent events	Emergency response plan			
Operation of acquired assets for holding potential COVID-19 patients					
To be expanded					

11.0 Annex V: Resource List: COVID-19 Guidance

Given the COVID-19 situation is rapidly evolving, a version of this resource list will be regularly updated and made available on the World Bank COVID-19 operations intranet page (http://covidoperations/).

WHO Guidance and Advice for the public

- WHO advice for the public, including on social distancing, respiratory hygiene, self-quarantine, and seeking medical advice, can be consulted on this WHO website: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public

Technical guidance

- Infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected, issued on March 19, 2020
- Recommendations to Member States to Improve Hygiene Practices, issued on April 1, 2020
- Severe Acute Respiratory Infections Treatment Center, issued on March 28, 2020
- Infection prevention and control at health care facilities (with a focus on settings with limited resources), issued in 2018
- Laboratory biosafety guidance related to coronavirus disease 2019 (COVID-19), issued on March 18, 2020
- Laboratory Biosafety Manual, 3rd edition, issued in 2014
- Laboratory testing for COVID-19, including specimen collection and shipment, issued on March 19, 2020
- Prioritized Laboratory Testing Strategy According to 4Cs Transmission Scenarios, issued on March 21, 2020
- Infection Prevention and Control for the safe management of a dead body in the context of COVID-19, issued on March 24, 2020
- Key considerations for repatriation and quarantine of travelers in relation to the outbreak COVID-19, issued on February 11, 2020
- Preparedness, prevention and control of COVID-19 for refugees and migrants in non-camp settings, issued on April 17, 2020
- Coronavirus disease (COVID-19) outbreak: rights, roles and responsibilities of health workers, including key considerations for occupational safety and health, issued on March 18, 2020
- Oxygen sources and distribution for COVID-19 treatment centers, issued on April 4, 2020
- Risk Communication and Community Engagement (RCCE) Action Plan Guidance COVID-19 Preparedness and Response, issued on March 16, 2020
- Considerations for quarantine of individuals in the context of containment for coronavirus disease (COVID-19), issued on March 19, 2020
- Operational considerations for case management of COVID-19 in health facility and community, issued on March 19, 2020
- Rational use of personal protective equipment for coronavirus disease 2019 (COVID-19), issued on February 27, 2020

- Getting your workplace ready for COVID-19, issued on March 19, 2020
- Water, sanitation, hygiene and waste management for COVID-19, issued on March 19, 2020
- Safe management of wastes from health-care activities, issued in 2014
- Advice on the use of masks in the community, during home care and in healthcare settings in the context of the novel coronavirus (COVID-19) outbreak, issued on March 19, 2020
- Disability Considerations during the COVID-19 outbreak, issued on March 26, 2020

WORLD BANK GROUP GUIDANCE

- Technical Note: Public Consultations and Stakeholder Engagement in WB-supported operations when there are constraints on conducting public meetings, issued on March 20, 2020
- Technical Note: Use of Military Forces to Assist in COVID-19 Operations, issued on March 25, 2020
- ESF/Safeguards Interim Note: COVID-19 Considerations in Construction/Civil Works Projects, issued on April 7, 2020
- Technical Note on SEA/H for HNP COVID Response Operations, issued in March 2020
- Interim Advice for IFC Clients on Preventing and Managing Health Risks of COVID-19 in the Workplace, issued on April 6, 2020
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- IFC Tip Sheet for Company Leadership on Crisis Response: Facing the COVID-19 Pandemic, issued on April 6, 2020
- WBG EHS Guidelines for Healthcare Facilities, issued on April 30, 2007

ILO GUIDANCE

- ILO Standards and COVID-19 FAQ, issued on March 23, 2020 (provides a compilation of answers to most frequently asked questions related to international labor standards and COVID-19)

MFI GUIDANCE

- ADB Managing Infectious Medical Waste during the COVID-19 Pandemic
- IDB Invest Guidance for Infrastructure Projects on COVID-19: A Rapid Risk Profile and Decision Framework
- KfW DEG COVID-19 Guidance for employers, issued on March 31, 2020
- CDC Group COVID-19 Guidance for Employers, issued on March 23, 2020