PRACTICAL GUIDELINE FOR UN PEACEKEEPING MISSIONS ON THE HANDLING, STORAGE AND DISPOSAL OF COVID-19 INFECTED WASTES, INCLUDING PERSONNEL PROTECTIVE EQUIPMENT

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BACKGROUND

Although much is still being discovered with the onset of the novel COVID-19 pandemic, what is known is that the virus is transmitted through person to person contact via misting and tiny droplets of saliva, lung fluids, etc. or through exposure to objects (such as surfaces) that have been impacted with the virus. The likely role of the environment in transmission has not been established as of yet given the timing of this pandemic. Limited studies thus far under optimum conditions indicate that the virus can remain viable on solid surfaces for several hours with limited proven temperature impacts to date.\(^\text{1}\)

Given the high infectious rates at which the COVID-19 virus is advancing, higher levels of precaution are warranted to reduce the potential risk posed by contaminated surfaces in the patient care environment. Moreover, proper handling of waste materials that could potentially be impacted by the virus need to be properly managed to avoid the risk associated with disposal of these materials. In particular, it is paramount that such infected wastes are not disposed in unsecured open dumpsites subject to waste pickers which are commonplace in the environments where UN peacekeeping operations are prevalent. This is highlighted by the fact that waste pickers often specifically wait for UN wastes to arrive at such sites and therefore the potential for cross infection in these circumstances is high and should be avoided.

<table>
<thead>
<tr>
<th>Estimated residual surface times of COVID-19 on various materials(^\text{1})</th>
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<tbody>
<tr>
<td>Stainless steel &amp; plastics: door handles, push buttons, laminate surfaces</td>
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<tr>
<td>Cardboard: boxes, paper, books</td>
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<tr>
<td>Copper</td>
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<td>Aerosols</td>
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INTRODUCTION

Most current UN peacekeeping missions rely on (small) largely contingent owned biomedical incinerators that to date have been commonly used to destruct expired pharmaceuticals and/or smaller quantities of medical waste. With the conceivable onslaught of COVID-19 waste materials being generated as a result of this pandemic, this practical guideline provides step by step advice on how to safely handle, store and properly dispose of COVID-19 infected wastes to prevent respiratory and contact transmission of the COVID-19 virus. It should be emphasized that the lead agencies for advice for COVID-19 are WHO and UNICEF upon which this guidance is based.

1. All healthcare workers and support personnel (cleaners, waste service) in contact with COVID-19 infectious wastes should use full and appropriate personnel protective equipment (PPE) including N95, FFP2 or equivalent standard face mask, eye protection (goggles or face shield), long sleeved gowns and aprons, surgical cap, heavy duty gloves and closed footwear. For minimum specifications of appropriate PPE and use guidance please see:


   It should also be noted that addition to the advice in the above video link consideration should be given to the fact that continued mask use may be useful for protection for personnel in case of association with persons who may be asymptomatic that are not yet showing symptoms but are nevertheless infected by COVID-19.

   In addition, there may be circumstances where masks are in very short supply and under such constraints single use may not be possible and reuse may be considered. For this to be viable disinfecting the mask should ideally be conducted through fine spraying the outside of the mask with a sodium hypochlorite solution or equivalent disinfectant and then allowing the mask to dry. Similarly, dry heating, UV lights or even placement in extreme sunlight for a period could help to reduce potential infection on the mask.

2. Hand hygiene is extremely important for anybody in contact with COVID-19 patients, used or soiled materials or wastes. Hands should be thoroughly cleaned based on the WHO's '5 moments for hand hygiene' using soap and water or an alcohol-based hand rub/sanitizer for a minimum of 20 seconds and preferably 40-60 seconds using the appropriate technique. Please see the leaflet in Annex I to this document for clear instructions for hand hygiene.

3. All soiled or infected materials should be collected and placed into clearly labelled (see labels below) leak proof plastic bags or designated containers (e.g. puncture proof sharp boxes). Double bagging of these materials has been recommended by the WHO for extra safety especially if transporting of the wastes is required. For transportation all bagged materials should be placed inside a rigid properly labeled (e.g., English and host country language) container placed in the vehicle. It should be noted that any solid wastes produced by a suspected or proven quarantined COVID-19 case should also be managed as infectious waste and treated accordingly.
Types of biomedical hazardous wastes/materials

<table>
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<tr>
<th>Biohazard waste</th>
<th>Infectious waste, blood products, contaminated personnel protective equipment, iv tubing, cultures, stacks</th>
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<tbody>
<tr>
<td>Sharps</td>
<td>Needles, ampules, broken glass, blades, razors, staples, other sharps</td>
</tr>
<tr>
<td>Soiled materials</td>
<td>Soiled reusable bed linen or clothing</td>
</tr>
<tr>
<td>Trace chemical</td>
<td>Empty vials, ampules, empty IV's, gloves, gowns, tubing, wipes, packaging</td>
</tr>
</tbody>
</table>

4. For infected but reusable linens, machine washing should be conducted at 60–90°C with laundry detergent. Alternatively, manual washing using drums of water, soap and stirring by stick, avoiding splashing, may be used. Thereafter the drum should be emptied, and the linen soaked in a 0.5% chlorine solution for 30 mins followed by cold water rinsing and complete drying of the linen in the sun.


Chlorine generators, that are features of most water treatment plants availed through the global systems contracts, can be used to provide disinfectant where additional chlorine supplies may be needed. Each water treatment plant is equipped to generate chlorine from salt and water and this provides a practical solution across mission camps. Contact your mission Water & Sanitation focal point for support.

5. Wastes should not be allowed to accumulate at the point of production. A routine programme for their collection should be established.

6. A storage location for COVID-19 wastes should be designated inside each individual health care facility. The waste should be stored in a separate area, room, or building of a size appropriate to allow for waste production ideally for a maximum 48-hour period prior to collection and transfer. In the event of waste management service breakdown storage of COVID-19 wastes may be required for longer periods. COVID-19 waste storage areas should have the following minimum characteristics:
   a. Impermeable, hard-standing floors with good accessibility, security (e.g., lock) and drainage which can be easily cleaned and disinfected
   b. A nearby water supply is recommended
   c. Free of all vectors (e.g., rodents, insects, and birds)
   d. Adequate lighting and some form of passive ventilation
   e. Include a supply of cleaning equipment, PPE, and extra bags and containers in the event of a package be compromised.
   f. The storage area should be thoroughly disinfected daily using a spray of 0.5% (5 ppm) sodium hypochlorite solution (bleach) which is a product used for water treatment at missions so is available.
g. The site should have clear signage that infectious materials are stored at that location

7. All bags containing COVID-19 impacted materials should then be treated or disposed of preferably onsite using the following options in preferential order;

a. Properly sized commercial twin chamber biomedical incinerators are recommended as the safest and most efficient means for the destruction and reduction of COVID-19 waste materials and are the standard biomedical disposal method for peacekeeping missions. Biomedical incinerators can be both COE and UNOE units but should be certified as operable and ‘fit for purpose’. Care should be taken to preheat the incinerator empty (850°C for minimum of 20 mins) prior to loading wastes ensuring not to overload the incinerator. In addition, proper mixed feedstocks should be developed prior to use (e.g., combination of paper, plastic, garments, etc.). Proper hazardous bottom ash management is also necessary including temporary storage of ash in 200L steel drums followed by ash disposal at a designated hazardous ash monofill or entrainment of the ash through standard encapsulation or alternatively in a concrete foundation or sidewalk construction project for example.

b. The use of air induction barrel incinerators is also a recommended alternative although slightly less efficient means for the destruction and reduction of smaller volumes of COVID-19 waste materials. The advantage of these units is that they are versatile, relatively easy to obtain within a short timeframe, are cost effective, easy to operate and maintain and have very useful portability. Multiple units can be procured and utilized.

c. In resource constrained environments a cost effective and easy to build home-made standard for safe biomedical incineration can be achieved through the use of De-Montfort brick-built incinerators. Fabrication of these units will require the correct design and the purchase of various components (e.g., lids, ash removal hatch, exhaust stack) and the provision of cured bricks or heat resistant stone. These units can be built within 5-6 days once materials are obtained. They are however less efficient than commercial units so care should be taken to not overload the primary chamber and to provide a balanced feedstock mix. Placement should also consider prevailing wind direction and distance away from communities. A proper flat base or foundation is necessary for this installation and adequate operating space and security provisions as shown below.

![Completed incinerator](image1)

The gaps between the refractory bricks and outer wall can be filled with refractory cement. Paint to inhibit corrosion.


d. Autoclaving of reusable medical instruments is a standard practice for their sterilization. If small amounts of infected materials are produced autoclaving can be used to destroy the pathogens prior to the wastes being sent for final landfill/dumpsite disposal. It is more effective if the waste can be pre-shredded prior to autoclaving. If not, the waste material if in a bag should either be removed, or the bag opened or penetrated/holed so that the steam can penetrate all the internal contents of the bag. Ideally the material should be turned once during the autoclaving process and in many units, this is done automatically. The autoclaved waste will have to be rebagged prior to sending to landfill or dumpsite.
An example autoclave unit can be found at; https://tuttnauer.com/medical-autoclaves, https://celitron.com/en/biomedical-waste-disposal

e. Although less commonly available, sterilization using thermal or microwave processes followed by landfill disposal is also a proper biomedical waste management practice. Often sterilization units will shred the waste material as part of the process ensuring a reduced final volume of the waste material. The sterilized waste will have to be rebagged prior to sending to landfill or dumpsite.

f. A less suitable option but one that may be necessary at specific sites is the use of onsite pit burial protected from scavenging. The site should be clearly signed with biohazard signs that infectious waste is at that location. Prior to waste placement in the pit all infected materials can be thoroughly sprayed with a 0.5% solution of sodium hypochlorite (bleach) which is a product used for water treatment at missions so is available or an equivalent disinfectant. Ideally the pit should be lined with an impermeable material such as clay, plastic liner or even cow dung and should be located away from water sources, waterways and agricultural crops. Such sites cannot be used for more than 5-10 tonnes of waste and should have a daily application of soil cover to prevent vermin. If required more than one pit may be excavated.
g. **AT NO POINT SHOULD COVID-19 WASTE MATERIALS BE DISPOSED OF AT OPEN DUMPSITES** WHERE WASTE PICKING EXISTS NOR VIA OPEN BURNING GIVEN THE POTENTIAL EXPOSURE PATHWAYS IN ADDITION TO THE FACT THAT THE BURNING OF PLASTICS, RUBBER, ETC. HAS BEEN THOROUGHLY PROVEN TO HAVE HARMFUL CONSEQUENCES ON HUMAN HEALTH AND THE ENVIRONMENT.

**ANNEXES**

**Annex I:** Hand Hygiene: When and How leaflet