



GLOBAL TASK FORCE ON
CHOLERA CONTROL

Technical Note:

**Water, Sanitation and Hygiene and Infection Prevention and Control
in Cholera Treatment Structures**

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Contents

Abbreviations.....	3
1. Introduction.....	4
2. Setting up a CTC/CTU.....	4
3. Organization of a CTC/CTU	4
4. Water, sanitation and hygiene	6
4.1 Water quantity	6
4.2 Water quality	6
4.3 Drinking water and oral rehydration solution	7
4.4 Latrines	7
4.5 Showers and bathing units	7
4.6 Special considerations	8
4.7 Waste water and drainage	8
4.8 Hygiene promotion	8
5. Infection prevention and control	9
5.1 Hand hygiene	9
5.2 Personal protective equipment.....	10
5.3 Food preparation and handling.....	10
5.4 Laundry	11
5.5 Waste management	11
5.6 Morgue	12
5.7 Preparation of corpses for burial	12
5.8 Safe and dignified burials	12
5.9 Cleaning and disinfection	13
5.10 Vector control	14
6. Human resources	14
7. Materials and equipment	14
8. Evaluation of the CTC/CTU	15
9. Closure of a CTC/CTU	15
References	16
Additional resources.....	16
Annex 1. Preparation of chlorine solutions	18

Abbreviations

CTC cholera treatment centre

ABHR alcohol-based hand rub

CTU cholera treatment unit

FRC free residual chlorine

IPC infection prevention and control

MSF Médecins Sans Frontières

NTU nephelometric turbidity unit

ORS oral rehydration solution

PPE personal protective equipment

UNICEF United Nations Children's Fund

WHO World Health Organization

WASH water, sanitation and hygiene

1. Introduction

Cholera treatment facilities provide inpatient care for cholera patients during outbreaks. Proper case management and isolation of cholera patients is essential to prevent deaths and help control the spread of the disease. Traditionally, these structures have been referred to as cholera treatment centres (CTCs) and cholera treatment units (CTUs). CTCs are usually large structures set up at central level (e.g. urban areas), while CTUs are smaller structures set up in the periphery (e.g. peri-urban or rural areas). CTCs/CTUs can be set up as independent structures in tents or within existing buildings or wards of health structures. Whatever the structure, the principles described in this document should be respected.

Adequate water, sanitation and hygiene (WASH) services are critical for patient care and for infection prevention and control (IPC) in CTCs/CTUs to help prevent disease transmission within the structure and to the surrounding area. This document describes the basic WASH and IPC requirements in CTCs/CTUs to support service provision within health structures.

2. Setting up a CTC/CTU

To set up a CTC/CTU, the following should be ensured for site selection.

- Patients can easily access the structure¹.
- The surrounding community and local authorities are involved in selection.
- There is sufficient space to set up the following areas: admission, observation, cholera ward(s)² (which should include a separate isolation area for the treatment of severe cases), recovery zone (for patients before discharge), neutral zone (for staff), kitchen, laundry, waste, morgue, latrines and showers and bathing units. There should also be consideration for potential expansion of the site. If a small number of patients are expected, multiple areas may be located within one tent or structure.
- The structure should be fenced to restrict access in and out, with one clearly defined entry and exit point, with personnel stationed to control traffic flow.
- There is access to electricity and lighting (24 hours per day), with potential for backup generators and fuel storage (as needed).
- There is access to on-site or nearby reliable and sufficient water source(s), which is located away from any potential sources of contamination (e.g. latrines, soak-away pits)³.
- The area poses no infectious risk to the surrounding community and is not exposed to any natural risk (e.g. flooding).
- The area has good drainage and ventilation.
- Easily accessible by road for water trucks, ambulances and other service vehicles.

3. Organization of a CTC/CTU

Although there is no standard design for CTCs/CTUs, the following key principles should be followed.

- Patient flow should be in one direction only. There should be one clearly defined common entry and exit point, with personnel stationed to control traffic flow, limit access and ensure that staff,

¹ For example, the CTC/CTU may be located near an existing health care structure where communities' members habitually access healthcare

² Ward capacity should be 2.5 m² per patient plus one caregiver. For example, a 29 m² tent can accommodate 10 patients plus caregivers; an 82 m² tent can accommodate 30 patients plus caregivers. Refer to UNICEF (2013)

³ Located 40 metres in sandy soils and 15 metres in clay. Refer to UNICEF (2013)

patients and caregivers wash their hands with soap and safe water at the hand-washing station(s) when entering and exiting.

- Only one caregiver present per patient permitted at a time.
- Although there is currently no evidence that demonstrates the benefits of footbaths or foot spraying in terms of infection control, these can serve as a barrier to those entering and exiting the structure⁴.
- Fencing is used to restrict access in and out and to mark the limits of the facility. Low fencing is recommended to allow people to see into the structure.
- Separate wards for each gender should be constructed to respect cultural practices. Wards for patients with other conditions should also be kept separate (if the CTC/CTU is located within an existing health structure); a single tent can also be divided for the same purpose.
- Pregnant women, especially if in labour, require additional privacy.
- Gender-separated sanitary facilities should be established for the different users (i.e. patients/caregivers and staff).
- Access to critical zones, such as the waste management area and morgue, is only allowed for authorized personnel.
- The morgue should be located close to the fence to allow for specific and discreet exit of dead bodies.
- An area should be designated for the cleaning and disinfection of all vehicles used to transport patients to the structure, with easy access to water and chlorine solutions.
- Floors should be made of materials that are easy to clean (i.e. concrete, tiles, plastic sheet cover, etc.).
- When possible, a kitchen should be built within the structure to prepare food for patients and staff.
- All the different zones should be clearly marked.

A simplified example of a CTC layout that can hold 100 beds in the hospitalization area, 30 beds in the observation area and 30 beds in the recovery area is highlighted in Fig. 1.

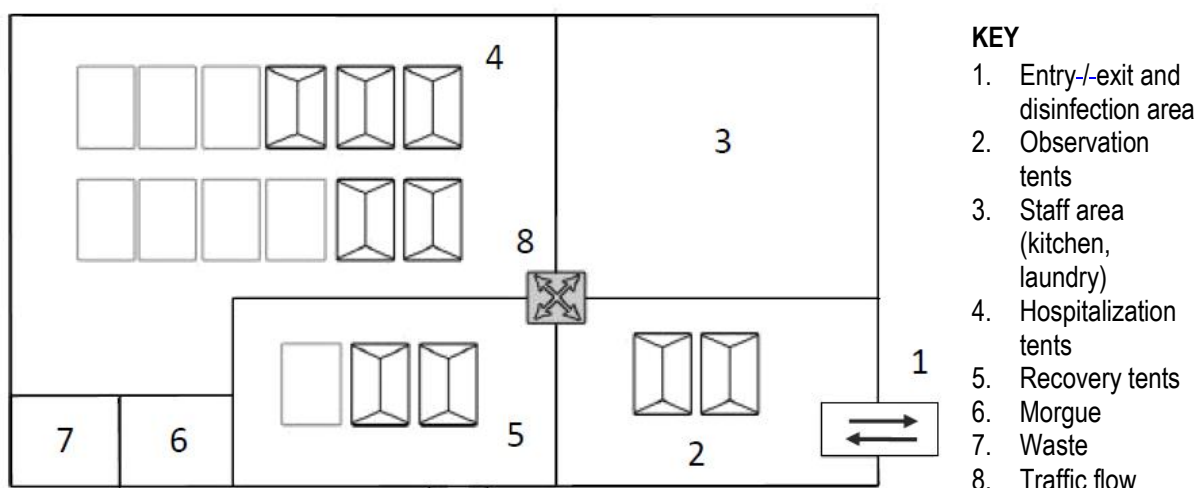


Fig. 1. Example of CTC (schematic)

Modified from MSF (2018) website (<http://ctc.msf.org/layout/en>)

⁴ If installed, footbaths should use trays with cloth or sponge soaked in a 0.2% chlorine solution and changed twice per day

4. Water, sanitation and hygiene

Access to safe water, sanitation and hygiene (WASH) in CTCs/CTUs is essential to prevent and control the spread of infection among patients, staff and caregivers. The reliable supply of sufficient and safe water, and the hygienic operation of all facilities are of critical importance to support effective patient care and infection control in CTCs/CTUs.

4.1 Water quantity

Within the CTC/CTU, water is needed to:

- drink
- prepare oral rehydration solution (ORS)
- wash hands
- shower or bathe
- clean and disinfect surfaces and equipment
- cook and wash dishes
- do laundry
- flush toilets
- prepare dead bodies for burial.

To cover all these needs, 60 litres of water per patient per day and 15 litres of water per caregiver per day should be provided. To ensure a continuous water supply, a three-day supply of water should be stored on site at all times. This is to cover the needs during any possible disruptions of the water supply. This might vary according to context (culture, climate); thus, consideration should be made for additional water as deemed necessary⁵. If possible, establishing a functional water source(s) and storage on-site within the structure will increase access to safe water.

4.2 Water quality

All drinking water, including water used for the preparation of ORS, should be treated. Water should be chlorinated, and it is recommended to ensure a free residual chlorine (FRC) level of at least 0.5 mg/L at pH < 8.0 after 30 minutes of contact time. At the water source, FRC is recommended to be 1.0 mg/L and, at point of delivery, the minimum residual should be 0.5 mg/L. The optimal pH range in which chlorine is effective is 6.5–8.5 pH⁶. FRC levels can be tested with a photometer/colorimeter. Regular testing of FRC and dose adjustment of free chlorine is essential.

⁵ Refer to WHO (2008)

⁶ Note: Effective dosage of chlorine may be affected by the parameters (temperature, pH, turbidity and total organic carbon) of the water to be treated. Highly turbid water will require more free chlorine to reach the recommended FRC levels than water with low turbidity. Recommendations are to dose with free chlorine at about 2 mg/L to clear water (< 10 Nephelometric Turbidity Units [NTUs]) and twice that (4 mg/L) to turbid water (> 10 NTUs)⁶, with a contact time of at least 30 minutes. However, even low-turbidity water can have high chlorine demand due to the total organic carbon load that is not detected by turbidity testing

4.3 Drinking water and oral rehydration solution

Drinking water and ORS should be easily accessible by patients and caregivers. These should be made available in separate, clearly marked containers. Each container should have a cover with the content accessible by a spigot or tap.

Ready-made sachets to prepare ORS should be used to make ORS. ORS should be prepared daily (make fresh daily) with safe water and should not be stored for more than 12 hours at room temperature (or up to 24 hours if kept refrigerated).

4.4 Latrines

Construction of latrine blocks with two cubicles, gender separated, with a roof, lockable doors and self-supporting slabs⁷ is required. Sanitary facilities should be adapted to the local culture and customs, in terms of type (i.e. dry or wet anal cleansing⁸) and average height of users. Consideration for a larger superstructure may be needed to support certain users⁹. The minimum latrine ratio is:

- one latrine for 20 persons in observation and recovery area (minimum of two, one for males and one for females);
- one latrine for 50 patients in hospitalization area (minimum of two, one for males and one for females);
- two latrines for staff in the neutral area (one for males and one for females);
- two latrines for visitors outside of the hospitalization area (one for males and one for females).

Newly-constructed patient latrines should not be connected to the main sewage system, as it may be inadequate and leak into water pipes or drain into an open water source. These should be connected to a protected pit or septic tank, located at least 30-metres away from any water sources. In the case of pre-existing patient latrines connected to the main sewage system (within existing health structures), pre-treatment of effluent between latrines and the sewage system is required.

The distance from the bottom of a pit or soak-away to a ground water source should be at least 1.5 metres at its highest point. This distance must be sufficient to maintain a distance of 1.5 metres between the bottom of the pit and the water table at the highest expected level during the wet season. If the area is prone to flooding or the water table is too high to allow sufficient distance from the bottom of a pit, alternatives should be considered¹⁰. When latrine pits fill up to 0.5 metres from the surface, they should be covered with soil and decommissioned.

4.5 Showers and bathing units

Construction of showers or bathing units¹¹ with two cubicles that are gender separated, with a roof and lockable doors is required. Shower and bathing units should be adapted to local culture and customs, in terms of type (i.e. bucket shower, overhead shower with running water) and average height of users.

⁷ When installing latrines is necessary, plastic latrine slabs are useful as they are quick to install and easy to clean

⁸ Where dry materials are used for anal cleansing, paper should be available. Where water is used for anal cleansing, a container of water and small pot should be provided in the latrine

⁹ It is recommended that superstructures measure 1.5 x 1.5 m with entrance and doors that are wide enough to allow for wheelchairs and/or support of a staff or caregiver (preferably outward closing doors for more room inside and so that a wheelchair can turn 180 degrees), with a minimum opening of 0.8 m. Refer to Jones and Reed (2005) for more information

¹⁰ Refer to Harvey (2007) for technical solutions for flood-prone areas

¹¹ Bucket showers are preferred to minimize the amount of waste water

Consideration for a larger superstructure may be needed to support certain users⁹. The minimum shower and bathing unit ratio is:

- one shower or bathing unit for 50 persons in observation and recovery area (minimum of two, one for males and one for females);
- one shower or bathing unit for 50 patients in hospitalization area (minimum of two, one for males and one for females);
- two showers or bathing units for staff in the neutral area (one for males and one for females);
- two showers or bathing units for visitors outside of the hospitalization area (one for males and one for females).

4.6 Special considerations

Special considerations should be made for vulnerable groups, such as disabled, elderly and pregnant women, when constructing latrines and showers and bathing units, including the following points.

- Paths should be firm and relatively smooth with good drainage.
- Access ramps should be constructed, as well as steps that have similar height and depth for individuals with limited mobility.
- Doors should be constructed with easily graspable handles and locks.
- Handrails should be constructed along all access ramps/steps and inside superstructures for latrines, showers and bathing units.
- Moveable and washable chairs should be provided.

4.7 Waste water and drainage

As water from showers and bathing units, hand-washing stations, laundry, kitchen and the morgue may be contaminated, these areas should be connected to a soak-away pit¹² that is contained inside the CTC/CTU compound. Soak-away pits must be located at least 30 metres from any groundwater source. The bottom of any un-lined pit should be at least 1.5 metres above any water table. Grease traps should be considered where soap is used, or when the CTC/CTU is likely to remain open over a long period.

Drainage channels should be constructed at the outside of each of the structures, to canalize rainfall and avoid standing water and flooding. These should be cleaned regularly and be covered to avoid the risks of disease from vector breeding. Although rainwater run-off may contain some contamination, it is considered to be of low risk and requires no further pre-treatment prior to disposal.

4.8 Hygiene promotion

Hygiene promotion sessions should be conducted on a regular basis at the CTC/CTU for patients and caregivers. Patients and caregivers should be advised on infection control practices in order to protect themselves and their families and friends from cholera. This includes essential hygiene behaviour practices while inside the CTC/CTU and at home. Key messages include the use of safe water supply; the use of latrines; hand-washing at critical times; the importance of ORS; breastfeeding practices and proper access and movement within the CTC/CTU. Hygiene can be promoted through information sessions, posters, demonstrations and leaflets. To further promote improved hygiene practices at home, soap, water treatment

¹² A soak-away pit is an excavation in the ground that facilitates the percolation of waste water into the surrounding soil. It includes a grease trap, which intercepts grease and solids before they enter the pit. Refer to Harvey (2007) for further guidance on design and construction of soak-away pits and grease traps (Chapter 10 Waste water management)

products and water storage containers can be distributed to patients. Further information regarding key messages for cholera preparedness, prevention and control is in UNICEF's Cholera Toolkit:

<https://reliefweb.int/sites/reliefweb.int/files/resources/UNICEF-Cholera-Toolkit-2013.pdf>¹³.

5. Infection prevention and control

Adequate infection control practices are essential to prevent the spread of cholera in the CTC/CTU, and should be applied in all situations by patients, caregivers and staff. Common infection control practices include hand hygiene; use of personal protective equipment (PPE); safe food preparation and handling; laundering of soiled linens; management of liquid and solid waste; safe and dignified preparation of corpses and burials; and vector control.

All medical and non-medical staff (cleaners, guards, etc.) must be trained in the IPC protocols relevant to their functions prior to working in the CTC/CTU. All protocols must be made readily available on-site at all times, as reference for staff working in the CTC/CTU (usually on laminated cards, posted clearly throughout the structure). The key infection control practices to be observed by patients, caregivers and staff in a CTC/CTU are included in: <https://reliefweb.int/sites/reliefweb.int/files/resources/UNICEF-Cholera-Toolkit-2013.pdf>¹⁴.

5.1 Hand hygiene

Hand-washing with soap is one of the critical interventions to prevent the spread of cholera. Hand-washing stations should be placed at the entry and exit to the CTC/CTU, at all latrines, in all patients' areas, in the kitchen, the laundry area, the waste management area and the morgue. Hand-washing stations should be located in places easy to access, clearly labelled, with instructions for use. WHO recommends hand-washing with soap and safe water. Where soap and safe water are not available, an alcohol-based hand rub (ABHR) should be used¹⁵. When neither is available, water treated with a 0.05% chlorine solution can be used. Regular monitoring of the hand-washing stations for adequate soap and safe water levels should be ensured. The frequency will depend on the number of users, but the hand-washing station must always be fully supplied.

Within the patient care areas of the CTC/CTU hand hygiene should be performed according to WHO's Five Moments¹⁶ for health care workers, as outlined in Table 1.

Table 1. WHO's Five Moments for Hand Hygiene

Moment	Action	Other important times
1	Before touching a patient	<ul style="list-style-type: none"> • Upon entering and exiting patient areas • After using a latrine (or handling a child's faeces) • After handling dead bodies • Before food preparation and handling
2	Before performing clean or aseptic procedures	
3	After body fluid exposure or risk (e.g. after handling any potentially contaminated equipment or material such as laundry, waste, dishes, vomit and stool buckets, etc.)	
4	After touching a patient	
5	After touching patient's surroundings	

¹³ Refer to Annex 8I

¹⁴ Refer to Annex 8E

¹⁵ For more details on the production of a low cost, effective ABHR: http://www.who.int/gpsc/5may/Guide_to_Local_Production.pdf

¹⁶ Refer to WHO (2018)

5.2 Personal protective equipment

As in all health care structures, it is preferable that staff do not wear personal clothing while on duty. Gloves must be worn whenever a direct contact with vomit, stool or other body fluids, as well as mucous membranes or non-intact skin is anticipated. Gowns should be worn to protect skin and prevent soiling of clothing during activities that are likely to generate splashes or sprays of vomit, stool or other body fluids. Gown selection depends on amount of fluid likely to be encountered. If the gown is not fluid-resistant, then a waterproof apron should be worn over the gown if splashing of infectious materials is anticipated.

Personal protective equipment (PPE) is particularly important for personnel involved in cleaning and disinfecting, including those managing cholera waste (i.e. stool and vomit), as well as those handling high-strength chlorine generating products and chlorine solutions. Staff involved in these activities should wear gloves, a mask and a gown (and an apron if gowns are permeable). Those who might handle incinerators should be equipped with anti-heat gear (i.e. suitable gloves, apron).

It is the responsibility of the CTC/CTU management to ensure the availability of PPE and provide training to staff on the proper use and maintenance of these items. Protective clothing should be washed with a 0.2% chlorine solution for 10 minutes. These should then be washed in water with detergent and air-dried in the sunlight, when possible. Staff should not be allowed to take any protective clothing out of the CTC/CTU. At least a one-month supply of disposable PPE items should be available on-site.

5.3 Food preparation and handling

The preparation and handling of food in the CTC/CTU requires adherence to food safety practices. Three meals a day should be provided to patients, caregivers and staff. Only kitchen staff should have access to kitchen and food stocks, handle food and distribute meals. All kitchen staff should be trained in basic food safety practices. Food handlers should practice hand hygiene at critical times using soap and safe water (which should be made available in the kitchen) or ABHR¹⁷ Surfaces used for food preparation should be washed with detergent and a 0.2% chlorine solution. Eating and cooking utensils should be washed regularly (between each use) with detergent and a 0.2% chlorine solution and air-dried in the sunlight, when possible¹⁸. Separate utensils should be used for raw and prepared foods.

All foods must be heated to 70°C to kill dangerous microorganisms. Food should be kept hot until eating (more than 60°C). Perishable foods should not be left at room temperature for more than two hours. Non-perishable foods should be stored safely in a closed, dry, well-ventilated area. Reheated foods should also be thoroughly heated and only once. Fruits and vegetables should be washed with safe water. No left-over food should be taken home by patients, caregivers or staff. All food waste should be collected and disposed of in the pit dug for organic waste management. Food containers should be washed with detergent and a 0.2% chlorine solution and air-dried in the sunlight, when possible.

¹⁷ Refer to Section 5.1 of this document, *Hand hygiene*. Critical times include before preparing or handling food, after using the latrine, etc.

¹⁸ Avoid the use of cloths for drying, as they can be easily contaminated

5.4 Laundry

Soiled materials including patients' clothes, staff uniforms, blankets, gowns and protective clothing should be separated and immersed in a 0.2% chlorine solution for 10 minutes. These should then be washed in water with detergent and air-dried in the sunlight, when possible. Drying lines should be constructed near the laundry area.

The laundry area should be located close to the area producing the most contaminated materials, such as bed linens and clothing. Where sinks are not available, large plastic tubs can be used on a concrete slab, installed to a soak-away pit, with a grease trap for disposal of waste water. The concrete slab of the washing area should be cleaned and disinfected daily with a 0.2% chlorine solution.

5.5 Waste management

All waste generated in a CTC/CTU, be it liquid or solid, is considered potentially infectious. Thus, no waste that is generated inside the CTC/CTU should leave the premises. All waste should be treated and disposed of in a designated, restricted waste zone within the CTC/CTU – except for liquid **cholera waste**, which should be disposed of in latrines (or preferably into a dedicated pit for this purpose). The waste zone should be marked and fenced off to avoid access by unauthorized people. The area should be well ventilated, and all waste should be labelled by type. Generally, storage time should be as short as possible, but should not exceed 24 hours, to reduce the risk of spread of infection. Waste should be separated into four categories¹⁹, as follows.

- **Sharps waste:** This includes all waste that can cause injury and transmit disease if not disposed of properly, such as needles, lancets, etc. These should be segregated into leak- and puncture-proof safety boxes. Sharps boxes can be incinerated or disposed of in a sharps pit, when incineration is not possible. Upon closure of the CTC/CTU, the sharps pit should be filled with concrete or similar material to ensure the materials remain buried.
- **Soft waste:** This includes waste that can be burned, such as cottons, gauze, plastics, syringes, paper, etc. The most common ways of burning soft waste include (in descending order of desirability):
 - dual chamber incinerator using auxiliary fuel to reach temperatures of 800°C/1100°C
 - low cost double chamber incinerator without auxiliary fuel
 - single chamber incinerator or a drum burner (with a dry area to store the bins)
 - burning in pits, followed by covering with a layer of soil
- **Organic waste:** This includes waste of organic origin that cannot be burned, such as food waste and ash from the incinerator or drum burner, which should be disposed of in pits specific for organic waste. The pit should have a lid to prevent flies/mosquitoes from entering. Upon closure of the CTC/CTU, the pits with organic waste should be backfilled to seal in the materials.
- **Cholera waste:** Stool and vomit from cholera patients should be collected in specific buckets under the cholera bed or next to the head of the bed. The cholera waste should be treated with a 2% chlorine solution. Buckets should be carefully transported and emptied preferably into a dedicated pit for this purpose. If a dedicated pit is not possible, a patient latrine can be used for cholera waste. However, as high concentrations of chlorine inhibit the natural biological

¹⁹ In the case of hazardous waste, this should be properly labelled and disposed of per national guidelines (i.e. sent to district hospital for specific treatment and disposal)

degradation of excreta²⁰, this method of waste disposal is not ideal. Care should be given to avoid any splashes and staff should wear appropriate PPE (i.e. apron, gloves, goggles and boots).

All waste containers and bags must be clearly labelled and should be filled to a maximum of three-quarters of their capacities to avoid spillage. Waste containers should be emptied daily, or as needed throughout the day. Upon being emptied, containers and covers should be washed and disinfected with a 0.2% chlorine solution.

5.6 Morgue

The morgue should have enough space for the storage of registration files and personal belongings of the deceased and for the preparation of the corpse. There should be no windows in the morgue building, only ventilation holes in the upper part of the walls covered with wire mesh. It should also include a door to allow for specific and discreet exit of dead bodies from the CTC/CTU. The floor should be made of concrete or covered with plastic sheets for ease of cleaning, with a slope of 1%, leading to a drainage channel. Use of tile-covered masonry tables with a gentle slope towards a channel in the centre is recommended because it serves multiple purposes: it keeps the corpse off the ground, increases the hygienic conditions and allows body fluids and waste water to drain into a bucket. A hand-washing station with soap and safe water should be provided close to the morgue (within 20 metres). The morgue should be kept clean and disinfected regularly with a 0.2% chlorine solution.

5.7 Preparation of corpses for burial

The handling of the bodies of patients who die of cholera is one of the critical tasks within a CTC/CTU. Once certification of death is completed, the body must be moved to the morgue. Families may be invited to view the body if there is sufficient space to ensure infection control.

Preparation of the deceased includes washing the body; disinfecting the body with a 2% chlorine solution; and plugging of all orifices with cloth soaked in a 2% chlorine solution. Intestines should not be emptied. Preparation of the corpse must be done by a trained staff member wearing appropriate PPE, that is, gloves, a mask and a gown (and apron if gowns are permeable). Family members can also prepare the body if provided with PPE and supervised by a knowledgeable staff member. Body bags, when available, should be used to transport the body for burial, and the body should be placed in a bag immediately after disinfection. If not available, an absorbent cloth or towel, soaked in a 2% chlorine solution, can be used to wrap the body (as needed). Whatever is used to wrap the body should particularly be placed under head and buttocks to absorb potential fluids during transport.

5.8 Safe and dignified burials

There is a heightened risk of transmission of cholera at funerals. Family members and funeral participants should be advised on the risks and how to protect themselves. As the bodies of deceased cholera patients are infectious, some of the traditional burial and ritual practices require adaptation, to ensure that family members and funeral participants can say goodbye to loved ones without being exposed to cholera. For example, kissing the corpse is a high-risk practice and an alternative should be discussed with cultural or religious leaders during cholera outbreaks. Staff should support the family to organize the funeral to ensure safe burial, in accordance with local laws and respecting cultural practices, while preventing the spread of

²⁰ Refer to Harvey (2007)

cholera. Any direct physical contact between the body of the deceased, family members and funeral participants must be avoided. If this is not acceptable, it should be done wearing PPE (gloves), to be disposed of once used²¹. Those in contact with the body should immediately wash hands with soap and safe water, or ABHR (and when neither is available, with a 0.05% chlorine solution).

To prevent the spread of cholera, handling of dead bodies should be kept to a minimum and burial should take place as quickly as possible (preferably within 24 hours after death). The body should be buried in a location situated as close as possible to the CTC/CTU, to reduce the time of transport. The body should be buried at least 50 metres from a water source and at least 1.5 metres deep.

Food hygiene during funerals is especially important. When possible, food should not be served. If food is served, it should be hot, and hand-washing with soap and safe water prior to eating should be enforced. Hand-washing stations and/or ABHR should be made available to family members and funeral participants (when neither is available, a 0.05% chlorine solution should be used).

5.9 Cleaning and disinfection

Daily cleaning and disinfection of all areas of the CTC/CTU is crucial to ensuring proper IPC. This includes the use of three chlorine solutions: 2%, 0.2% and 0.05% for different activities inside the CTC/CTU, as outlined in Table 2. Annex 1 provides details on preparation of chlorine solutions for cleaning and disinfection.

Table 2. Chlorine solutions and use for disinfection

Chlorine solution	Uses
2%	Disinfection of dead bodies, stool and vomit
0.2%	Disinfection of the entire cholera ward(s), toilets and showers/bathing units; laundry; kitchen and morgue. This solution should be used on all cholera beds or cots, bedding and linens; clothing; PPE (i.e. gloves, apron, goggles); waste containers and covers; food utensils, containers and dishes; and vehicles used for transporting patients
0.05%	Disinfection of hands (when neither soap and safe water nor ABHR is available)

Floors of the CTC/CTU should be made of concrete or covered with plastic sheets for ease of frequent cleaning²². In addition, latrines, showers and bathing units should be cleaned several times per day with a mop. This includes the slabs, doors and door handles, and the walls (up to one metre – or higher when necessary, i.e. to clean splashes). Note that the use of a 0.2% chlorine solution for these locations is sufficient and that no additional chlorine should be poured into the latrines.

Cholera cots require specific measures for cleaning and disinfection. As most of the hospitalized patients will not be able to use a latrine, cholera beds or cots have holes in the support fabric, so that patients' stool can pass directly into a 10- to 15-litre bucket placed under the hole²³. Accordingly, beds must be high enough for the bucket to be placed under the hole and low enough to prevent splashing out of the bucket. Another bucket of the same volume should be placed at the bedside for vomit. Approximately one

²¹ Should not be cleaned and disinfected for re-use

²² Recommended mopping up to four times per day, with wiping of walls when patients are not present

²³ These are included in the standard WHO cholera kits. Refer to Chapter 7 *Materials and equipment* and WHO (2018)

centimetre of a 2% chlorine solution should be put into the two buckets²⁴. Buckets can be raised on a block to prevent splashing; however, they must remain stable and not risk falling over. Cholera beds or cots should be cleaned and wiped with a 0.2% chlorine solution as needed, and between each patient.

All vehicles that are used to transport patients to the CTC/CTU should be washed in water with soap, followed by wiping of all surfaces with a 0.2% chlorine solution before departing.

5.10 Vector control

Cleaning and disinfection also reduces the risk of development of vectors, such as flies or mosquitoes, which can be attracted by waste, food and stagnant water. Ensuring general hygiene measures coupled with effective sanitation measures, solid waste management and proper waste water and drainage supports the reduction, prevention and elimination of breeding sites for vectors. If these measures are not sufficient, it may be necessary to consider specific vector-control measures (e.g. spraying insecticide, fly traps, etc.). In all cases, including in areas with malaria transmission, the use of individual mosquito bed nets is not recommended for patients being rehydrated, to avoid limiting access to the patient by staff and caregivers.

6. Human resources

When planning human resources for a CTC/CTU, sufficient staff must be hired to ensure all the above WASH and IPC functions can be properly carried out. Staffing should ensure time-off (particularly during prolonged outbreaks) and ensure that the CTC/CTU functions 24 hours per day (usually three, eight-hour shifts). All staff should have job descriptions, have received proper technical training according to their responsibility, and be provided with appropriate PPE while working in the structure, as well as materials and equipment to perform their tasks. Staffing numbers by size of CTC/CTU are included in the Cholera Toolkit: <https://reliefweb.int/sites/reliefweb.int/files/resources/UNICEF-Cholera-Toolkit-2013.pdf>²⁵.

7. Materials and equipment

To establish and maintain a CTC/CTU and implement proper infection control, a variety of materials and equipment are required, including: tents, fences, jerry cans, plastic cups, cholera beds and cots, buckets, mops and other cleaning supplies, latrine slabs, plastic sheeting, plastic drums and storage containers, body bags, cooking and eating utensils, PPE and incinerators. Disposable medical supplies, such as disinfectants (i.e. chlorine), plastic gowns and gloves are also critical, as is sufficient food to feed patients and staff. The quantity of materials and equipment required depends on the capacity of the CTC/CTU, however, storage of key disposable medical supplies and food should be sufficient for one month. WHO, UNICEF and partners have developed a standard cholera kit of the required material and equipment in a CTC/CTU, based on a capacity of 100 patients, for the first month of response: <http://www.who.int/cholera/kit/cholera-kit-item-list.pdf?ua=1>²⁶. An online Cholera Kit Calculator is also available to estimate needs for cholera response and planning purposes: http://www.who.int/cholera/kit/CholeraKit_Calculator.xlsm²⁶.

²⁴ Approximately half a cup or 100–125 millilitres. Refer to MSF (2004)

²⁵ Refer to Annex 8G

²⁶ Refer to WHO (2018)

8. Evaluation of the CTC/CTU

Evaluation of the CTC/CTU should be conducted on a regular basis to determine how effectively it is adhering to the guidance in this and related documents. This includes a detailed assessment of all activities and services provided, in all areas of the structure – for example, to determine entry and exit points are clearly marked and equipped with hand-washing stations stocked with clean water and soap or ABHR. The evaluation also includes water quality monitoring and testing. A standardized tool with scoring system²⁷, depending on the activity and service provided. Monitoring should occur on a frequent basis (daily, weekly and monthly)²⁸. Regular reporting is required to identify potential risks of infection transmission, so they can be mitigated.

9. Closure of a CTC/CTU

The following points detail the steps needed to close a CTC/CTU.

- **Cleaning and disinfection:** all doors, floors, walls, stairs, handles, beds, etc. should be cleaned with a 0.2% chlorine solution, and rinsed with water 10 minutes after cleaning. All buckets that have been used for stool or vomit should be thoroughly washed with detergent and a 2% chlorine solution and air-dried in the sunlight, when possible. It is important to make sure that there is absolutely no organic matter or residues remaining (which could still contain *Vibrio cholerae*).
- **Decommissioning:** all latrines and soak-away pits (if established specifically for the outbreak) should be decommissioned (including those used for showers and bathing units). Unless the CTC/CTU is located within the grounds of an existing health structure that will continue to use the waste zone, all pits should be filled – the pits for organic waste backfilled with soil, and the sharps pits filled with concrete (to enclose all sharps and protect future users of the land).

²⁷ Examples are shown in UNICEF (2013), Annex 8H

²⁸ Refer to UNICEF (2013), Annex 8H

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Additional resources

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Annex 1. Preparation of chlorine solutions

Chlorine solutions are used for cleaning and disinfecting in CTC/CTUs, with different strengths of solutions used for different purposes. Proper management of chlorine generating products is crucial, as chlorine can be dangerous if not properly stored and handled. Chlorine should be stored inside a storage facility that is protected from heat, light and moisture in non-metallic containers (raised slightly above the ground) tightly closed with lids. Ventilation of the storage facility must be ensured through installation of holes in the lower part of the walls of the structure. This is done because certain chlorine generating products, such as calcium hypochlorite (e.g. brand HTH) and sodium dichloroisocyanurate (NaDCC), can produce toxic gases heavier than air, especially in high humidity conditions. PPE is required when handling products used to make chlorine, as the process can cause burns.

Access to the stock of products used to make chlorine must be secure and restricted to authorized personnel only. One person in each shift should be responsible for the preparation of the chlorine solutions. Chlorine can corrode and damage metals; the use of plastic containers therefore is recommended for preparation of chlorine solutions and wooden spoons for measurement and stirring purpose²⁹. Once prepared, chlorine solutions should be clearly marked with the percentage chlorine solution to avoid any confusion. The use of different coloured plastic 125 millilitre (ml) containers should be used to differentiate between the chlorine solutions. Table A1.1 details the methods for making the chlorine solutions needed in the CTC/CTU.

Table A1.1: Preparation of chlorine solutions for cleaning and disinfection in the CTC/CTU

Product ³⁰	2%	1% ³¹	0.2%	0.05%
HTH <i>At 70% active chlorine³²</i>	30 grams in 1 litre of water or 2 level spoons in 1 litre of water	15 grams in 1 litre of water or 1 level spoon in 1 litre of water	3 grams in 1 litre of water or 2 level spoons in 10 litres of water	0.7 grams in 1 litre of water or 0.5 spoon in 10 litres of water
NaDCC <i>At 1g active chlorine per tablet</i>	20 tablets in 1 litre of water	10 tablets in 1 litre of water	2 tablets in 1 litre of water	5 tablets in 10 litres of water
Chlorinated lime <i>At 30% active chlorine</i>	60 grams in 1 litre of water or 4 level spoons in 1 litre	33 grams in 1 litre of water or 2 level spoons in 1 litre	6 grams in 1 litre of water or 4 level spoons in 10 litres	1.5 gram in 1 litre of water or 1 level spoon in 10 litres
Sodium hypochlorite (bleach) <i>At 5% active chlorine</i>	400 ml of bleach in 1 litre of water	250 ml of bleach in 1 litre of water	40 ml of bleach in 1 litre of water	10 ml of bleach in 1 litre of water
Sodium hypochlorite concentrate <i>At 15% active chlorine</i>	166 ml of concentrate in 1 litre of water	70 ml of concentrate in 1 litre of water	16 ml of concentrate in 1 litre of water	3.3 ml of concentrate in 1 litre of water

Source: UNICEF (2013) and MSF (2004)

²⁹ Never prepare chlorine solutions in metallic containers (unless they are properly enamelled or painted) or use metallic spoons for measurement or stirring purposes

³⁰ HTH loses about 2% of active chlorine per year. NaDCC is the most stable product. The remaining three products are unstable and should be used within three months of being manufactured (if stored in good conditions)

³¹ The preparation of a stock solution for chlorination of water supply is not covered in this document. Refer to UNICEF (2013), Annex 8E for more information regarding determining the dose required for water treatment

³² The quantity of chlorine necessary for all needs is approximately 100 to 110 g of HTH (65–70% active chlorine) per patient per day. HTH loses about 2% of active chlorine per year

