

Ministry of Health and Population in Haiti/U.S. Centers for Disease Control and Prevention

Haiti Cholera Training Manual: A Full Course for Healthcare Providers

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Acknowledgments

The purpose of this training manual is to serve as a quick reference for the treatment and management of acute watery diarrhea in response to the recent cholera outbreak in Haiti. It is not meant to be exhaustive. It relies heavily on information from pre-existing documents, in particular, *Guidelines for Operating Makeshift Treatment Centers in Cholera Epidemics (ICDDR)*, *Guidelines for Setting Up Diarrhea Treatment Centers(DTCs) in the Flood Affected Areas of Pakistan (WHO/MOH)*, *Cholera Guidelines, 2nd Edition 2004 (MSF)*, *Cholera Outbreak Training and Shigellosis program (COTS): David Sack (Johns Hopkins University), Joachim Pelikan (Swiss Tropical Institute), Robert deLeeuw (Holland), Danielle Nelson, Eric Nelson (Stanford University), Lars Henning (Inselspital, Bern),Mark Petrioni and Alejandro Cravioto (ICDDR)*.

Introduction

The death toll in the three months since the cholera outbreak was confirmed in Haiti on October 21, 2010 was more than 3,800, a number that has continued to grow weekly. More than 190,000 others have been infected in all of the country's 10 districts, and cases have been confirmed in the neighboring Dominican Republic. The rapid death and transmissability associated with cholera make health-related training and compliance with recommendations critical to treating and preventing the spread of cholera in Haiti. In doing so, being aware of some key facts can make a difference in understanding and controlling the disease:

- Cholera is not ordinary diarrhea and can be very severe.
- Death can come very quickly.
- Early medical care saves lives.
- Oral rehydration solution is key to cholera treatment.
- Adding chlorine to drinking water and cooking water can prevent cholera.

Cholera is living testimony to the consequences of poor sanitation. The Pan-American Health Organization (PAHO) is concerned that cholera may last for years because of the poor sanitary conditions in various districts. This will make training and community outreach on the most effective ways to treat the disease and prevent its spread priorities of ever-growing importance in cholera containment efforts.

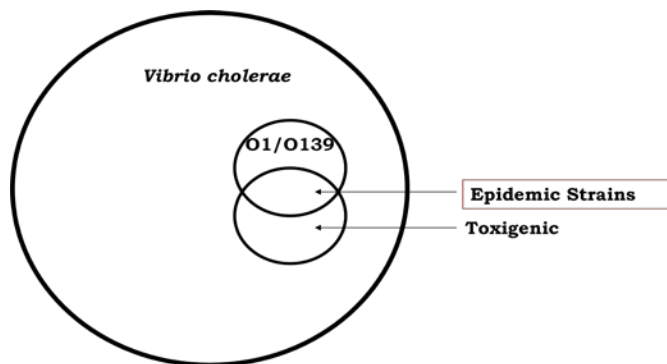
Epidemiology of Cholera

Etiology

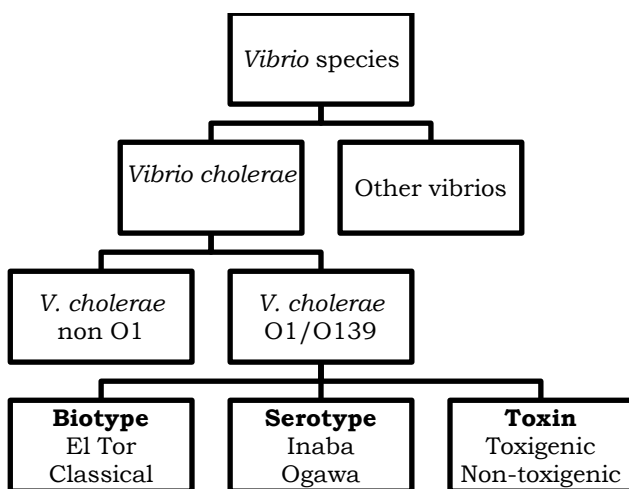
Cholera is an intestinal infection caused by *Vibrio cholerae* O1 and related strains.



Vibrio cholerae: gram-negative, curved rod with a single polar flagellum that makes it highly mobile.



There are many different strains within the species *Vibrio cholerae*, represented on this diagram by the large circle. Many of these can cause illness, but only a subset have caused epidemic cholera. Some strains have the O antigen 1, and some strains produce cholera toxin. Strains that are both O1 and toxigenic produce epidemic cholera. Recently, a related strain with the O antigen 139 caused epidemics of cholera in Asia.



V. cholerae is divided into more than 70 serogroups, defined by the O antigen. Strains that agglutinate in O1 antiserum are of great interest, whereas other strains are referred to collectively as "non-O1" *V. cholerae* strains. Strains in serogroup O1 or O139 are further characterized by biotype, serotype, and whether or not they produce cholera toxin.

There are two biotypes, El Tor, which has been dominant since 1961, and Classical biotype, which was dominant before then. There are also two serotypes, Inaba and Ogawa. Most O1 strains are toxigenic. A few non-toxigenic O1 strains have been found, but they do not cause cholera. Of note, all eight combinations of biotype, serotype, and toxin status exist. The *V. cholera* strain in the current Haiti outbreak is toxigenic *Vibrio cholerae* O1, serotype Ogawa, biotype El Tor.

Mode of Transmission

Vibrio cholerae is transmitted through contaminated water and food. The source of contamination in epidemics is usually the feces of cholera patients. Because *V. cholerae* O1 has an environmental reservoir, particularly in warm coastal brackish waters, water or food from those reservoirs may also be contaminated. Person-to-person spread through direct contact, as by shaking hands, or by touching or taking care of a patient, has not been shown to occur.

The specific vehicle of transmission in a cholera outbreak is determined by thorough epidemiologic, environmental, and laboratory investigation. Below are examples of modes of transmission in cholera outbreaks.

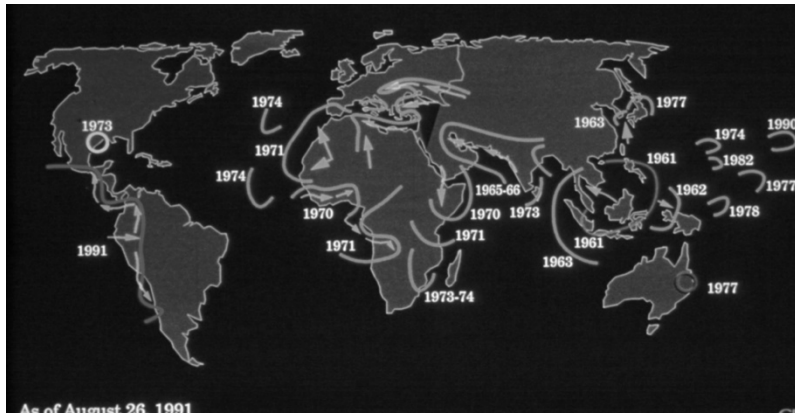
Some Modes of Cholera Transmission Identified in Outbreaks Worldwide

Waters	Seafood	Others
Municipal	Raw mussels	Millet gruel
Shallow wells	Raw oysters	Leftover rice
River water	Raw conch (“concha”)	Rice with peanut sauce
Bottled water	Raw clams	Leftover peas
Ice	Raw fish	
	Partly dried fish	Frozen coconut milk
	Undercooked crab	Raw vegetables
	Street-vended squid	Leftover corn porridge

Global Burden of Cholera

Cholera has swept around the world in seven massive waves, or pandemics, since 1800. The most recent wave of epidemic cholera to occur in the Western hemisphere was in 1991, when it spread widely throughout Latin America.

Global Spread of Cholera, 1961–1991



This figure shows the spread of the current seventh pandemic of cholera around the globe. It began in 1961, when an epidemic caused by the El Tor biotype of *V. cholerae* O1 appeared in the Celebes Islands of Indonesia. It rapidly spread to the Philippines and Southeast Asia, and traversed Asia. Scattered epidemics occurred in Europe, but cholera did not persist there. In 1971, cholera was introduced into both East and West Africa, and in 18 catastrophic months affected 29 African countries. In some remote areas, the death-to-case ratio exceeded 30%, and in many parts of Africa cholera has persisted as a recurrent or endemic problem ever since. Despite concern that cholera would spread to Latin America in the 1970s, it did not do so until 1991.

Two foci of endemic cholera unrelated to the seventh pandemic have been discovered: one on the U.S. Gulf Coast, and one in Northeastern Australia. In 1973, cholera was diagnosed in a shrimp fisherman in Port LaVaca, Texas. As of 1991, 65 cases of cholera acquired in the United States had been identified that were related to this focus. Most were in persons eating undercooked crabs, shrimp, and oysters from the Gulf Coasts of Louisiana and Texas. In 1977, cholera was identified in someone who drank water from a river in Northeastern Australia; since then several more cases have occurred, and *V. cholerae* O1 has been isolated from more than a dozen slightly brackish rivers there. Strains from these two foci are toxigenic *V. cholerae* O1, biotype El Tor, like the seventh pandemic, but can be distinguished from each other and from major epidemic strains using molecular typing methods.



This graph shows the number of countries reporting cholera to the World Health Organization (WHO) by year since 1951. The increase caused by the seventh pandemic can be seen in 1961–1965. The number of countries still affected dropped later in that decade. The countries in Africa are represented by the dark line. After its introduction into Africa in 1971, cholera has persisted in many African countries and has swiftly become a predominant problem in that continent. In May 1991, five South American countries reported cholera. By the end of 1991, the number had increased to 13 countries. In 1991, more cases of cholera were reported from the first 10 months of the Latin American epidemic than from the entire world in the preceding 5 years. Unlike Africa and Latin America, introductions of cholera to Europe during the most recent pandemic did not result in endemic disease. Will this outbreak in Haiti follow the European pattern, disappearing quickly, or the African pattern, persisting for decades?

Countries reporting cholera in 2009



The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement. © WHO 2010. All rights reserved.



Cholera Clinical Presentation and Management

The signs and symptoms of cholera are produced by cholera toxin, which causes profound loss of fluid and electrolytes. The incubation period of cholera is typically 1–3 days. After vibrios are ingested and survive passage through gastric acid, they reach the intestine. There they produce cholera toxin, which binds to the epithelial surface of the bowel. The active portion of the toxin (subunit A), enters mucosal cells and activates cyclic AMP. This causes active secretion of chloride, and blocks the normal absorptive function of the cells. Water, potassium, and bicarbonate follow chloride into the lumen of the intestine, and less sodium is absorbed, producing secretory diarrhea.

Loss of sodium, chloride, and water leads to dehydration and vascular collapse. Acute tubular necrosis with transient renal failure may occur as a result of profound shock. Loss of potassium leads to painful muscle cramps, and occasionally to arrhythmias and focal myocardial necrosis. Loss of bicarbonate causes acidosis with hyperventilation, vomiting, and clouded mental status.

Clinical Features

Cholera is a dehydrating diarrheal illness. The symptoms and signs are caused by rapid and profound loss of fluid and electrolytes in watery diarrhea and vomitus. Infection with cholera is associated with a range of clinical symptoms:

- Of total persons with infection, 75% are asymptomatic.
- Most of the 25% with symptomatic infections have mild illness.
- Approximately 2% of those infected will have severe cholera (sometimes called "cholera gravis").
- Another 5% will have moderate illness that brings them to medical attention, but does not require hospitalization.

After the initial intestinal purge, diarrhea becomes very watery with flecks of mucus and has the appearance of "rice water stool." The person with a severe or moderate case presents with profuse watery diarrhea leading to dehydration and electrolyte loss, vomiting because of acidosis, and having leg cramps because of hypokalemia. Severe diarrhea can be nearly continuous and can exceed 1 liter per hour. Persons most likely to have severe infection are those who ingest a high dose of organisms, those whose gastric acid production has been diminished by gastrectomy or antacid therapy, and those who have blood group O. It is not known why blood group O is a risk factor.



Patient with **cholera gravis**: severe dehydration, sunken eyes, dry mouth and lips, poor skin turgor, "Washerwoman's hands," decreased blood pressure, poor or absent pulses.

Assessment of Hydration Status (Severity)

Adequate Hydration	Moderate Dehydration	Severe Dehydration
• No thirst • Skin goes back normally when pinched • Passing urine • Pulse strong	• Restlessness and irritability • Sunken eyes • Dry mouth and tongue • Increased thirst • Skin goes back slowly when pinched • Decreased urine • Infants: decreased tears, depressed fontanel	• Lethargy or unconsciousness • Very dry mouth and tongue • Skin goes back very slowly when pinched (also known as “tenting”) • Weak or absent pulse • Low blood pressure • Minimal or no urine



Child with **severe dehydration**: sunken eyes, scaphoid abdomen, poor skin turgor, and tenting.

Case Management

Case management of cholera requires:

- Assessment of hydration status
- Rehydration therapy
- Antimicrobial therapy

Rehydration Therapy

Successful treatment of cholera depends on rapid replacement of fluid and electrolyte losses, for which oral rehydration solution (ORS) is recommended. Before discovery of rehydration therapy, 30–50% of patients with typical severe cholera died; now, with proper treatment, mortality is 1% or less. Approximately 80–90% of patients can be treated with ORS, and patients who initially require IV therapy usually can eventually switch to ORS.

Oral rehydration therapy for patients with no dehydration

Patients who have diarrhea and no signs of dehydration should receive ORS after each loose stool to maintain hydration until diarrhea stops, as indicated below. Because clinical status may deteriorate rapidly, these patients may initially need to be kept under monitoring, especially when they live far from a health facility or treatment center, or when correct home treatment cannot be guaranteed.

ORS amounts to prevent dehydration (WHO recommendation)

Age	Amount of ORS after each loose stool	ORS quantity needed
Less than 24 months	50 to 100 ml	Enough for 500 ml/ day (1 sachet)*
2 to 10 years	100 to 200 ml	Enough for 1000 ml/ day (1 sachet)*
Over 10 years	as much as wanted	Enough for 2000 ml/ day (2 sachets)*

(*) ORS bags are usually for 1 litre. In some countries, ORS bags are conditioned for less than 1 litre.

If the treatment is administered at home, give enough ORS sachets for 2 days' treatment and instruct the patient (or caregiver) to prepare the ORS with safe water. (Safe water is water that is bottled with an unbroken seal, has been boiled, or has been treated with chlorine.) Advise patients or caregivers to come back immediately if condition deteriorates (e.g., repeated vomiting, increased number of stools, drinking or eating poorly).

Guidelines for treating patients with some dehydration

The approximate amount of ORS to give in the first 4 hours to patients with some dehydration is primarily determined by the weight of the person. Use the patient's age only when you do not know the weight:

Age	<4 mo.	4–11 mo.	12–23 mo.	2–4 yr.	5–14 yr.	≥15 yr.
Weight (kg)	<5	5–7	8–10	11–15	16–29	≥30
ml	200–400	400–600	600–800	800–1,200	1,200–2,200	2,200–4,000

The approximate amount of ORS (in milliliters) can also be calculated by multiplying the patient's weight in kg by 75.

A rough estimate of oral rehydration rate is 100cc ORS every 5 minutes, until the patient stabilizes.

If the patient requests more than the prescribed ORS, give more.

For Infants:

- Encourage the mother to continue breast-feeding.

Notes:

1. The volumes and time intervals shown are guidelines provided on the basis of usual needs. If necessary, amount and frequency can be increased, or the ORS can be given at the same rate for a longer period to achieve adequate rehydration. Similarly, the amount of fluid can be decreased if hydration is achieved earlier than expected.
2. During the initial stages of therapy, while still dehydrated, adults can consume as much as 1,000 ml of ORS per hour, if necessary, and children as much as 20 ml/kg body weight per hour.
3. Reassess the patient after 1 hour of therapy and then every 1 to 2 hours until rehydration is complete. Ensure adequate intake of ORS and count the number of cups consumed. Record the number and nature of stools and vomitus.
4. Resume feeding with a normal diet when vomiting has stopped.

Oral rehydration therapy for patients with moderate dehydration

Dehydrated patients who can sit up and drink should be given ORS immediately and encouraged to drink it. It is important to offer ORS frequently, measure the amount drunk, and measure the fluid lost as diarrhea and vomitus. Patients who vomit should be given small, frequent sips of ORS, or ORS by nasogastric tube. ORS should be made with safe water.

Guidelines for treating patients with severe dehydration

Intravenous Rehydration

Patients with severe dehydration, stupor, coma, uncontrollable vomiting, or extreme fatigue that prevents drinking should be rehydrated intravenously.

Intravenous solutions

Best	Ringer's Lactate Solution
Acceptable*	Normal saline*
Unacceptable	Plain glucose (dextrose) solution

*Acceptable in emergency, but does not correct acidosis and may worsen electrolyte imbalance.

Start intravenous fluids (IV) immediately. Hang infusion bags high and use two IV lines, if necessary. If the patient is conscious and can drink, give ORS by mouth while the IV drip is set up. Give 100 ml/kg Ringer's Lactate Solution, divided as follows:

Age	First give 30 ml/kg IV In:	Then give 70 ml/kg IV In:
Infants (≤ 12 mos.)	1 hour*	5 hours
Older (>1 yr.)	30 minutes*	2 ½ hours

* Repeat once if radial pulse is still very weak or not detectable.

- Reassess the patient every 1–2 hours and continue hydrating. If hydration is not improving, give the IV drip more rapidly. As much as 200ml/kg or more may be needed during the first 24 hours of treatment. Check for rapid respiratory rate, which can be a sign of possible overhydration.
- Also give ORS (about 5 ml/kg per hour) as soon as the patient can drink.
- Record liters of IV fluids and cups of ORS administered. Mark quantity consumed per hour on each IV fluid bag. Record the volume and nature of the stool and the presence of urine output.
- After 6 hours (infants) or 3 hours (older patients), perform a full reassessment. Switch to ORS if hydration is improved and the patient can drink.

Antimicrobial Therapy

Antimicrobial therapy is very helpful, though not required, in the treatment of cholera –hydration is the mainstay of treatment. Antimicrobials reduce the total volume of fluid lost, shorten the duration of diarrhea, and reduce the length of carriage of cholera in the feces – all of which optimize resource utilization in an outbreak setting.

Antibiotics

An antibiotic given orally will reduce the volume and duration of diarrhea. Treatment with antibiotics is recommended for: 1) **moderately and severely dehydrated** patients, 2) patients who **continue to pass large volume of stools** during rehydration treatment, and 3) **all hospitalized patients**. Do not give antibiotics to asymptomatic persons. The use of antibiotics as prophylaxis for cholera has been shown to increase the risk of antibiotic resistance and has not been effective in preventing cholera transmission. Zinc given orally, though not an antibiotic, can reduce the duration of most infectious diarrhea in children. No drugs besides antibiotics and zinc for treatment of diarrhea or reduction of duration of symptoms and carriage of vibrio should be given.

Appropriate Oral Antibiotics (give one of these) ** ALL BY MOUTH**

Patient classification	First choice	Second choice
Adults (non-pregnant)	Doxycycline: 300 mg by mouth in one dose	• Azithromycin: 1 gram in a single dose • Tetracycline: 500 mg 4 times a day for 3 days • Erythromycin: 500 mg 4 times a day for 3 days
Pregnant women	Azithromycin: 1 gram in a single dose	• Erythromycin: 500 mg 4 times a day for 3 days
Children ≥ 12 months old and capable of swallowing pills or tablets	Azithromycin: 20 mg/kg in one dose • Erythromycin: 12.5 mg/kg 4 times a day for 3 days • Doxycycline: 2–4 mg/kg in a single dose**	• Tetracycline: 12.5 mg/kg 4 times a day for 3 days
Children <12 months old and others unable to swallow pills or tablets	• Azithromycin oral suspension: 20 mg/kg in a single dose • Erythromycin oral suspension: 12.5 mg/kg 4 times a day for 3 days • Doxycycline oral suspension: 2–4 mg/kg in a single dose**	• Tetracycline oral suspension: 12.5mg/kg 4 times a day for 3 days

** Doxycycline is safe for treatment of cholera in children at the recommended dose. The Pan American Health Organization recommends doxycycline as a second-line choice because of limited regional availability and to avoid future overuse in children.

- These recommendations are based on the antibiotic resistance profile of *V. cholerae* isolates from the Haiti cholera outbreak, as reported on October 28, 2010, and local drug availability.
- Multiple first choice and second choice options are presented. Selection of antibiotics should be based on individual case consideration and available medications.
- While ciprofloxacin has been used effectively in prior cholera outbreaks, the *V. cholerae* isolates from the Haiti cholera outbreak have a resistance profile that may rapidly lead to ciprofloxacin resistance if ciprofloxacin is widely used for cholera treatment in Haiti.

Zinc Supplementation

Zinc supplementation significantly reduces the severity and duration of cholera in children and other childhood diarrheal illnesses. A recommended dosage of 10–20 mg zinc per day by mouth should be started immediately, if available, and continued as long as the diarrhea lasts.

Identifying and treating complications

Complications from rehydration therapy for cholera are unusual, and more so rare. Clinicians should be aware of these complications and of the proper approach to management. The possibility of complications should not prevent aggressive rehydration therapy in cholera patients.

Hypoglycemia

Second to dehydration, hypoglycaemia is the most common lethal complication of cholera in children. Hypoglycaemia is the result of diminished food intake during acute illness.

Drinking ORS early and restarting feeding can prevent hypoglycaemia. For patients under IV rehydration who can drink without difficulty, give ORS orally as soon as possible.

If hypoglycaemia is suspected (e.g., lethargy, convulsions, eyes rolled back) give 1ml/kg of glucose 50% by slow IV injection.

Acute pulmonary edema

Acute pulmonary edema is related to overhydration from excessive IV rehydration. It is a risk among elderly, young children, and severely anemic patients. Use of sodium chloride 0.9% instead of Ringer's Lactate Solution can also contribute to this condition.

Oral rehydration does not cause pulmonary edema.

Signs of IV fluid overload include dry cough, dyspnea, puffy eyelids in children, bulging fontanelle in infants, edema of the lower limbs, and crepitations on auscultation.

Management of edema

- Put patient in a half-sitting position, legs hanging out of the bed.
- Slow down infusion rate as much as possible.

- Administer furosemide (if available) by slow IV injection in the following dosages:
 - o Children: 1 mg/kg per injection
 - o Adults: 40 mg per injection
- If needed, repeat the same dose after 15 minutes, according to the patient's condition (maximum dose in adults: 250 mg).

Renal failure (anuria)

This rare complication occurs when shock is not rapidly corrected. Urine output normally resumes within 6 to 8 hours after starting rehydration. Patients should be checked for urine output before discharge from the cholera treatment center (CTC). If urine output has not resumed, check that the patient is correctly rehydrated and try furosemide (if available) in 1 mg/kg IV under close medical supervision.

Hypokalemia

Hypokalaemia should be suspected if repeated episodes of painful cramps occur. This may happen after the first 24 hours of IV rehydration if patients do not eat or do not drink ORS (ORS provides enough potassium).

If cramps occur, try to correct with ORS.

Assessment and Treatment of Cholera Among Malnourished Children 6–59 Months Old

The treatment of cholera in severely malnourished children is similar to cholera treatment for other patients, but with several key differences. Children with severe malnutrition are at high risk for complications from heart, kidney, and electrolyte abnormalities, and typical signs of dehydration are often unreliable. Except in cases of circulatory shock, IV hydration should be avoided because of a high risk of fluid overload. Children receiving oral rehydration must also be monitored carefully for signs of cardiac failure. As soon as possible after rehydration is complete, these children should be sent to a specialized malnutrition center. See Appendix I.

Guidelines for assessing baseline malnutrition in children with cholera

Before beginning treatment for cholera in children, it is important to first assess for baseline malnutrition to determine the appropriate course of treatment. A child is severely malnourished if the answer is “yes” to any of the following questions:

- Is weight-for-height Z-score more than 3 standard deviations below expected?

- Is mid-upper arm circumference <115 mm?
- Is there bilateral edema of legs or feet?

If anthropometric measurements are not possible, the child is likely to be severely malnourished if the answer is “yes” the following questions:

- Are the ribs prominent?
- Is there visible wasting, particularly of gluteal muscles?

If the child is not severely malnourished, caregivers should follow standard rehydration procedures as outlined in the Cholera Clinical Guidelines Brochure (page 11).

Once it is determined that a child with cholera is severely malnourished, the appropriate course of treatment should be quickly assessed and determined and rehydration started. There are two main treatment plans to consider based on severity of dehydration: severe dehydration where the child shows signs of shock, and moderate or mild dehydration.

Guidelines for treating severely malnourished children with severe dehydration

The most severe cases of children who are both malnourished and ill with cholera will present with evidence of **circulatory shock** and should receive intravenous or IV hydration immediately. One should suspect shock when the child:

- Is unresponsive
- Is vomiting uncontrollably
- Has a weak, “thready” or difficult to detect pulse
- Has very cold hands or feet
- Has stopped producing urine

Intravenous rehydration for severely malnourished children in circulatory shock

***The appropriate course of treatment for a severely malnourished child in shock is immediate IV fluid.** Children should be given 10 milliliters per kilogram per hour for 2 hours.

Intravenous solutions for malnourished children	
Best	Acceptable
Ringer’s Lactate Solution with 5% glucose	Ringer’s Lactate Solution
Half-Normal Saline with 5% glucose	

Every 10 minutes, caregivers should check for heavy or labored breathing and reassess hydration.

- If breathing status **worsens**, stop IV infusion and refer to a physician immediately.

- If hydration **does not improve**, transfuse whole blood or packed red blood cells at 10 milliliters per kilogram over 3 hours, and begin feeding F-75 through nasogastric tube.
- If hydration **has improved**, continue IV fluids at 5 milliliters per kilogram per hour until the child is rehydrated or until the child can drink ORS adequately. Then begin treatment plan for moderate or mild dehydration, which we will discuss next.

Guidelines for treating severely malnourished children with mild to moderate dehydration

Moderate or mild dehydration may be difficult to assess because many of the typical signs used to assess hydration status are unreliable in this situation. At baseline, children with marasmus (severe wasting) may have poor skin turgor (elasticity) and sunken eyes. Children with kwashiorkor, which is caused by a lack of protein in the diet, may have turgid skin from edema.

One should suspect dehydration when any of the following is present:

- Current or recent diarrhea
- Thirst, which may seem like restlessness in an infant
- Recent appearance of sunken eyes

Oral rehydration for severely malnourished children with mild to moderate dehydration

Malnourished and moderately or mildly dehydrated children with cholera should be given **oral rehydration** using low-osmolarity ORS.

If the child **can drink** adequately, low-osmolarity ORS should be frequently offered to the child in small sips or by spoon and breastfed children should continue breastfeeding. If the child **cannot drink** adequately, low-osmolarity ORS should be administered by nasogastric tube.

Low-osmolarity ORS should be given in the following dosing:

- 70–100 ml/kg over 12 hours, delivered as
 - 5 ml/kg every 30 min for 2 hours, then
 - 5–10 ml/kg/hour for 4–10 hours, as needed, to complete rehydration

Continued assessments should be done at least **hourly** because of the high risk for cardiac failure and pulmonary edema, and to estimate ongoing losses. **Caregivers should stop oral rehydration if signs of cardiac failure develop**, including increased respiratory rate, engorged jugular veins, or increasing edema.

Caregivers should consider rehydration complete when the child is no longer thirsty, their urine production has normalized, and other signs of dehydration have resolved. Once hydration is reestablished, caregivers should continue with treatment for non-dehydrated children with diarrhea.

Oral rehydration therapy for severely malnourished children with diarrhea but no dehydration

For severely malnourished children without dehydration and for children whose dehydration has been corrected, caregivers should administer low-osmolarity ORS to replace ongoing losses as follows:

Age	Amount of ORS after each loose stool
<2 years	50–100 ml
≥2 years	100–200 ml

Additionally, caregivers should administer F-75 formula, per World Health Organization (WHO) recommendations (see Appendix II). This will help meet basal fluid and nutritional needs. If F-75 is unavailable, feed age-appropriate foods until the child can be taken to a specialized center. Breastfed children should continue breastfeeding throughout the course of treatment.

Additional considerations for severely malnourished children with diarrhea

Because concomitant infections are common among severely malnourished children with diarrhea, caregivers should also assess for signs of infection. Some signs of infection are:

- Fever
- Respiratory compromise
- Hypothermia
- Hypoglycemia

****If the child has concomitant infection, treat quickly****

Severely malnourished children with cholera also should be given supplemental treatments in addition to rehydration. Caregivers should give Vitamin A and zinc during the first 1 to 2 days of rehydration treatment in the following dosing:

Vitamin A: if not given in the previous month			
Age	Dose	Route	Frequency/Duration
6–12 months	100,000 IU	Mouth	Single dose
≥12 months	200,000 IU		

Zinc			
Age	Dose	Route/Frequency	Frequency/Duration
<6 months	10 mg	Mouth	Daily for 10–14 days

≥6 months	20 mg		
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As soon as possible after the child is stable, caregivers should transfer the child to a center specializing in management of malnutrition.

Laboratory Diagnosis

Laboratory diagnosis of cholera is done to establish the cause of individual sporadic cases. At the beginning of a large outbreak, laboratory diagnosis is important to verify the presence of cholera in a region, and to determine the antimicrobial resistance of the strain that is circulating. Once that is established, there is no need to culture each case. At the end of the outbreak, laboratory testing can be helpful in establishing that the diarrheal illnesses still being seen are not cholera. A rapid diagnostic field test can help to identify patients to sample for definitive diagnosis.

Definitive diagnosis of cholera depends on isolating the organism in the microbiology laboratory, or measuring specific antibodies to the organism. Once the presence of cholera is established in a region, there is no need to continue testing all patients. Following confirmation of cholera in a region, public health officers may direct clinicians at certain facilities to obtain periodic culture of a small number of cases, which can show whether there are changes in the resistance pattern.

Specimen collection for bacteriological diagnosis

A stool specimen or rectal swab should be cultured. The specimen should be obtained before the patient has received antibiotics. If a stool specimen is collected, it should be fresh stool, not from a bucket or bedpan, where it may be mixed with disinfectant. At least 25 grams is sufficient, collected in a sterile cup with a screw top lid. If the laboratory is more than 30 minutes away, dip a sterile cotton swab into the stool and place it firmly down into Cary-Blair transport medium for transport to the laboratory. Snap off the top of the swab stick, screw the top off of the Cary Blair tube, and label the tube with the patient's name, date of collection, and facility name. For rectal swab samples, insert the sterile cotton swab into the anus, rotate it, be sure that it has fecal matter, and insert into Cary-Blair, and label as above. Transport at room temperature or below. Using a cooler for transport will prevent it from overheating.

Laboratory professionals

Laboratorians need to be aware that cholera is suspected, so that they will use an appropriate selective agar, such as TCBS, which greatly improves the chance of recovering the organism. **TCBS** stands for **T**hiosulfate, **C**itrate, **B**ile salts, and **S**ucrose.



This figure shows the translucent colonies of *V. cholerae* O1 growing on TCBS agar. Characteristic colonies can be selected, regrown on standard nutrient agar, and agglutinated in polyvalent O1 antiserum to make a rapid presumptive identification of *V. cholerae* O1.

Rapid diagnostic tests (RDTs) for cholera are available that detect *Vibrio cholerae* antigen from stool specimens. Fresh liquid stools collected in clean containers with tight-fitting, leak-proof lids can be transferred to a test tube into which the test dipstick is inserted. Test results are available in 15–20 minutes. RDTs for cholera can be used in the early stages of a cholera outbreak to confirm the etiology.

Diagnosis can also be made serologically by measuring vibriocidal antibodies in specialized laboratories, though it would usually not be done in an outbreak setting where diagnosis has already been confirmed by culture. A specimen drawn in the first 5 days of illness can be compared to one drawn at 14 days, by which time the vibriocidal antibodies will be present in high titer, or a peak specimen can be compared with one drawn 2 months after onset of illness, by which time titers will have fallen again to low levels. Clinicians do not need to collect blood for serology because it is unlikely to be needed in most outbreak settings.

Surveillance

Surveillance consists of systematically collecting, analyzing, and interpreting information. An adequate surveillance system makes it possible to detect outbreaks of cholera early, so they can be quickly controlled and lives saved.

Surveillance allows health workers to:

- Detect outbreaks early
- Estimate how many people become sick and die
- Know when and where the disease occurs
- See if the disease is spreading and where
- Estimate supplies and staff needed
- Evaluate whether control measures are successful

Case Definitions

A case definition is a standard description of a disease. When “all” health workers use the “same” description of a disease, counting the number of cases of the disease that occurs is easier, and detecting outbreaks is easier. Cholera should be considered when a patient 5 years or older develops acute watery diarrhea, with or without vomiting. A case of cholera is confirmed when *Vibrio cholera* O1 is isolated from any patient with diarrhea. Case definitions for surveillance purposes in Haiti are as follows:

- **Suspect case:** acute watery diarrhea in a person in a non-affected department
- **Case:** acute watery diarrhea in a person in an affected department
- **Cholera-affected department:** a department where one or more cholera cases have been confirmed by laboratory testing
- **Cholera non-affected department:** a department where no cholera cases have been confirmed by laboratory testing.

Designation of affected and non-affected departments in Haiti is ultimately determined by the Ministry of Health and Population in Haiti (MSPP).

Guidelines for determining if a department is affected by cholera

- In an unaffected department, if any patient presents with acute watery diarrhea and severe dehydration, or death from acute watery diarrhea, health workers should inform MSPP/Direction d'Epidemiologie de Laboratoire et de Recherches, also known as the Directorate of Laboratory Epidemiology and Research (DELR), and collect stool specimens from up to 10 patients that meet these criteria.
- For hospitals equipped with the rapid diagnostic test (RDT), perform RDT on 10 specimens.
- If 30% or more of RDTs are positive for cholera, send liquid stool samples, and if possible, swabs from all stool samples in Cary-Blair transport media, to Laboratoire National de Santé Publique, also known as the National Public Health Laboratory (LNSP), with completed information and identification for each sample and swab.
- For hospitals not equipped with RDTs, stool samples may be sent to LNSP for culture testing.
- While awaiting results from LNSP, manage all patients clinically, as if they had cholera.
- If *Vibrio cholera* O1 is isolated from one or more patients, the location will be considered one where cholera has been confirmed.

Data Collection and Reporting

(These instructions are based on current MSPP guidelines.)

All health facilities should maintain records daily on the new number of cases and deaths at the health facility.

It is strongly recommended that the daily number of suspected cholera cases and deaths be recorded in each health facility. Please use the institution report form issued by MSPP to access the severity of diarrhea at Oral Rehydration Points (ORPs) (see Appendix III). This form has three categories: hospital cases, hospital deaths, and community deaths. Counts within these categories of cases are divided into two age groups: persons under the age of 5 years and persons 5 years and older.

Use Register

- Use your hospital register to assist with collection of data. The register will be needed if more in-depth investigations are conducted onsite.
- Registers for each case with acute, watery diarrhea should include name, age, sex, residence, symptoms, date of admission, treatment, given, severity of disease, and outcome.
- Recording the location of suspect cholera cases will help to identify new areas at risk.

Flow of Information

Health facilities should report surveillance data from the institution report form on acute, watery diarrhea patients to the Unite Communale de Sante or the departmental epidemiologist. The Unite Communale de Sante or the departmental epidemiologist will compile the daily number of suspect cases and deaths recorded at CTCs and report cumulative numbers of cases and deaths to MSPP.

The role of clinic level health professionals in surveillance is to:

- Collect information
- Fill out and send forms to MSPP promptly

The surveillance information you provide will be used by health authorities to locate new cholera-affected areas and quickly control outbreaks in areas already affected. **Remember: surveillance means collecting and also using the data.**

Prevention of Cholera in the Household

The following recommendations outline prevention of cholera transmission within a household once one family member has been diagnosed with the illness.

Educate family members to follow these important cholera prevention measures:

- Drink and use safe water. (Safe water is water that is bottled with an unbroken seal, has been boiled, or has been treated with chlorine.)
- Wash hands with soap and safe water.
- Use latrines or bury your feces; do not defecate in any body of water.
- Cook food thoroughly (especially seafood), keep it covered, eat it hot, and peel fruits and vegetables.
- Clean up safely—in the kitchen and in places where the family bathes and washes clothes.

- If diarrhea develops, drink ORS and go to a clinic quickly.

Chemoprophylaxis of family members:

- Not recommended.

Vaccines

Two oral cholera vaccines are currently commercially available. Both vaccines are killed, whole-cell, two-dose vaccines. The Dukoral vaccine is manufactured in Sweden and is prequalified by WHO. The Shanchol vaccine is manufactured in India and is not WHO pre-qualified. (WHO prequalification is required to purchase vaccine using United Nations, US Government, and possibly other donor funds.) Cholera vaccines have been primarily used for travelers visiting places where cholera is common; use in outbreak settings has been limited. WHO updated their recommendations on use of cholera vaccine in March 2010, which recommended the use of a decision tool for use of cholera vaccine in crisis situations. Previous experiences of conducting mass cholera vaccination in Sudan and Indonesia have highlighted the substantial logistical and operational challenges with using the vaccine in disaster settings (see list below). During the early response phase of the outbreak, WHO/Pan American Health Organization (PAHO) had not recommended vaccination for the current outbreak in Haiti. However, cholera vaccination maybe be considered in Haiti in the future.

Vaccine concerns

- Require cold chain (refrigeration)
- Need to be given in 2 doses administered 7 to 14 days apart (3 doses of Dukoral are needed in children 2 – 5 years old)
- Protective effectiveness of 67-85% immunity is achieved 1 week after the second dose
- Duration of protection is limited (~ 2 years)
- Does NOT decrease severity of disease in persons who do develop cholera
- May give a false sense of security to those vaccinated, so they may ignore more important and effective preventive measures
- Vaccination of family contacts of cholera cases does NOT prevent infection from being transmitted because it takes 2–3 weeks for cholera vaccine to take effect

Cholera Treatment Center (CTC)

When to Open a CTC

During an outbreak of cholera, most patients can be treated in existing health facilities. However, during some outbreaks, particularly cholera, health officials may decide to set up a temporary Cholera Treatment Center (CTC) , either in part of the existing facility or as a separate areas. The

purpose of a CTC is to provide rapid and efficient treatment for many patients. A CTC is **not** used to quarantine patients.

There are no rigid rules to follow in deciding when to set up a CTC and what the ideal location for such a center would be. However, experience suggests that a temporary treatment center is usually needed when:

1. A large number of patients with acute watery diarrhea accompanied with deaths are reported from an area where transportation to the nearest health facilities is difficult.
2. An epidemic of acute watery diarrhea involves a large area and is spreading.
3. Natural disasters and diarrhea outbreak occur simultaneously in many areas, such as in post-hurricane epidemics.

Establishing a CTC necessitates identification of suitable sites, organization of patient flow, pre-position of supplies, stocks of drugs and other material, and infection control.

Location

How to choose a site for a CTC

A CTC should be in a place where patients can be adequately treated, and that patients can reach easily; the nearer the patients, the lower the case fatality rate (CFR) can be. The specific objective of operating a CTC is to bring emergency health care services as close as possible to patients who otherwise would be at risk of death during cholera epidemics. The CTC may be in an existing health facility, or other existing building, such as a school or community hall. If there is no suitable building, the CTC could be set up in a tent in a field. **Health authorities and communities should be involved in the selection of sites and their preparation. The CTC should not be close to a water source or any other functioning public structures (e.g., schools, dispensaries, markets).**

When planning, consider the following characteristics (or where they can be arranged quickly):

- Good drainage away from the site (Do not select low ground or depressions.)
- Good access for patients and supplies (Consider the distance and availability of transport.)
 - To market = 100 m
 - To water source = 40 m on sandy soil, 15 m, if clay
 - To other buildings and dwellings = 100m
- Easy to clean
- Ventilation
- Light (ideally electricity), especially in hospital wards
- Provisions for disposal of excreta, vomit, or medical and other waste
- Convenient hand-washing and toilet facilities
- Concrete floor, or, if temporary structure, a plastic sheeting cover
- Adequate space
 - Ward capacity = 2.5m^2 per patient + 1 attendant

- o A 29m² tent can accommodate 10 patients + attendants
- o A 82m² tent can accommodate 30 patients + attendants

CTCs can be opened and closed very quickly, based on epidemiological findings. Do not hesitate to move a CTC from one place to another, if necessary. Flexibility must be maintained throughout the course of the epidemic.

CTUs

If cholera-affected areas are too far from a CTC, access to care can be problematic. In these circumstances, a cholera treatment unit (CTU) can be established. A CTU is designed as an intermediate step, at which severe cases can receive IV hydration. Typical CTUs have 20-30 beds, and many are staffed with few or no physicians, 2-3 nurses, 2-3 nurse auxiliaries and some ancillary support staff. CTUs are most often equipped to treat cholera via oral or IV hydration for mild to moderately ill patients – however, severe or complicated cases should be transferred (after stabilization) to a CTC.

CTUs follow the same organizational structure, patient flow rules, and hygiene practices as CTCs. CTUs can be opened and closed quickly – and can be moved from one place to another based on epidemiologic findings. In large rural areas, several CTUs may be needed – particularly when there are long distances or difficult terrain between CTCs.

Oral Rehydration Points (ORPs)

ORPs are satellite stations wherein the simplest forms of cholera are treated. Many medical facilities, especially in rural areas, do not have the capacity to deal with a large number of patients.

ORPs have two objectives:

1. To reduce pressure on overburdened CTCs
2. To screen severely dehydrated patients for referral to a CTC

They can be decentralized to the community level and be the first point of contact in areas where CTCs or temporary care health facilities do not exist. These are usually manned by community health workers (CHWs) who should receive training and regular supplies to be able to achieve given objectives (see Appendix V).

It is preferable to have one single CTC and several ORPs rather than multiple CTCs. A CTC operates 24 hours a day; whereas ORPs can operate 12–24 hours a day.

Organization

The layout of a building probably cannot be changed, but plans can be made for making the best use of the space available (see Figure 1). The CTC is organized into separate areas, following two key principles:

1. Isolation of the entire facility from other public structures (dispensary, school, market)
2. Separation of patients (contaminated area) from the “neutral area” (not contaminated)

Patient and staff flow should accommodate the following:

- *Patient care*
 - An entry/observation ward
 - Provision for administering ORS
 - A ward for patients who are very ill and require intensive care
 - A ward for patients who are recovering
- *Storeroom(s), staff room*
- *Prevention and hygiene*
 - Washing and cleaning areas, laundry area
 - Convenient hand-washing stations
 - Water treatment, preparation of chlorine solution
 - Kitchen (where feasible)
- *Environment and waste*
 - Toilets (latrines)
 - Safe waste disposal (incinerator, dustbins)
 - Morgue
- *Security*
 - Watchman for information and patient flow control
 - Fences
 - Protection of stocks (food, drugs, supplies)

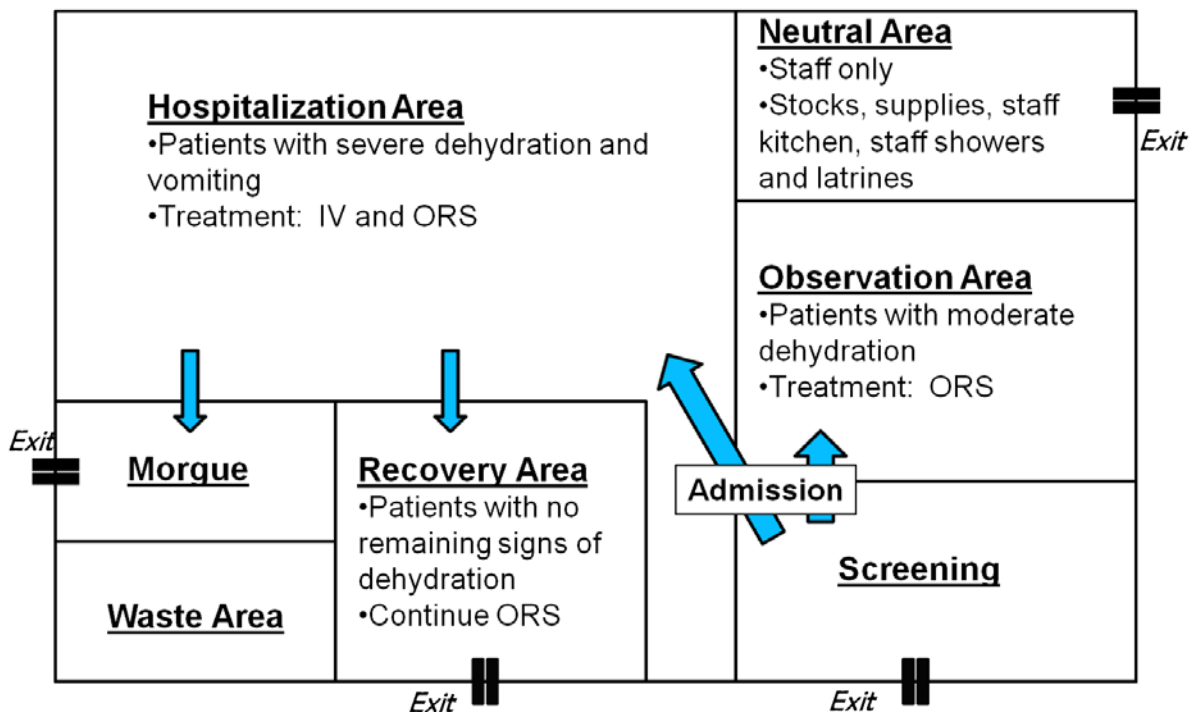


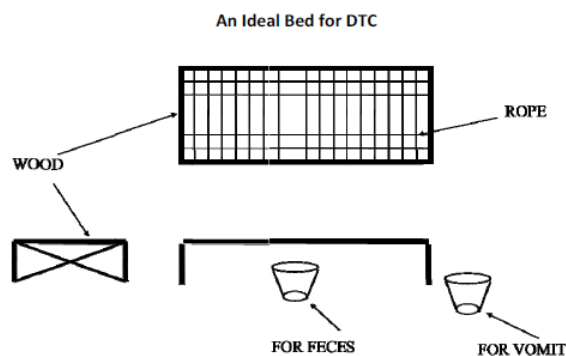
Figure 1: Layout of CTC (Guidelines for Setting Up a CTC)

See Appendix IV for additional CTC layout schemes.

Functions to be ensured in the CTC

The design may be adapted to the situation, but **five areas** have to be well defined and restricted for their intended use to respect the clean flow of air and limit the spread of infection:

1. **Admission and screening area** where all the new arrivals have to go through for triage and registration
2. **Observation area** where patients with moderate dehydration receive oral rehydration therapy
3. **Hospitalization area** where patients with severe dehydration or vomiting are treated with IV and oral rehydration
4. **Neutral area** for the kitchen, stocks, changing room, and rest room for the personnel
5. **Recovery area** where hospitalized patients proceed from the hospitalization area for continued oral rehydration after being upgraded from severe dehydration to mild or moderate dehydration



Cholera Cot: A bed with a hole for passage of stool. Cover the bed with plastic sheeting or reinforced plastic mats. It is possible to use natural mats, but they would be difficult to clean after each patient. One bucket should be placed underneath the bed to collect stool and another bucket by the patient's side to collect vomit. (When impossible to obtain or make beds, reinforced mats could be placed directly on the ground, over a hole (20 x 30 cm). Dig one hole for stools and one for vomit.

Supplies and Resources

The key principle is to avoid any shortage. Determine a detailed list of supplies per patient load to obtain estimates for your facility. Expected number of cases and delays in supply accessibility should be considered in this estimate. A supply of excess essential supplies or contingency supplies, also known as buffer stock, (for 3-14 days) in case of surges of cases or re-supply issues should be on-site at all times. Supplies include medical material for rehydration and other treatments, water facilities, chlorine for disinfection, and all logistic material needed to equip a CTC (see Appendix V). In addition, stationery, registers, and other supplies are needed, as well as bags and linen for the bodies of deceased patients.

Initial Supply

One diarrheal disease kit provides treatment for 100 severe cases of cholera (IV fluids and antibiotics for initial treatment and ORS for the recovery phase); 400 mild or moderate cases of cholera in a CTC/CTU or an oral rehydration point (ORP); and 100 adults and 100 children affected by other infectious causes of diarrhea (**Appendix V**).

The kit contains four separate modules. For preparedness, a full kit should be ordered, although each module can also be ordered separately, depending on the local availability of the different components.

1. Basic module:

- Drugs
 - o ORS, as well as Ringer's lactate for 10 severe cases only (with an average of 8 liters per patient)
 - o Cholera: doxycycline (65 adults), erythromycin (60 children), Ciprofloxacin; zinc tablets (250 children)
 - o Disinfectant
- Renewable supplies, including culture swabs
- Equipment
- Documents on diarrheal disease management in emergencies

2. ORS module:

- ORS for 400 cholera patients with no or moderate dehydration. This material covers the needs for two ORPs.

3. Infusion module:

- Ringer's lactate with IV giving sets for 90 severe cholera cases (with an average of 8 liters per patient)
- In case of local purchase, infusion AND giving set have to be ordered.

4. Support module:

- Non-medical items necessary for running a CTC

Maintaining supplies beyond the initial kit

To avoid supply shortages, there are several key principles:

1. Assessing storage capacity: The physical space that is available for storage determines the CTC/CTU storage capacity. When building/designing a CTC/CTU, keep in mind the amount of space needed to store supplies (including the initial stock, re-supply, and a buffer stock for 3-14 days). Storage areas must be kept secure from crime and weather.
2. Monitoring inventory (i.e. counting supplies periodically): Personnel to regularly perform an inventory of supplies, especially critical supplies, are necessary. Tracking sheets of critical supplies in storage and dates the supplies were used will help the CTC/CTU maintain adequate supplies.
3. Rate of consumption: The rate of consumption (i.e. the number of key supplies used per day) should be determined on a regular basis. Important information to monitor includes:
 1. Number of inpatients seen per day
 2. Number of outpatients seen per day
 3. Number of ORS packets used per day
 4. Number of lactate ringer bags used per day
 5. Number of antibiotic doses used per day
4. Time needed to re-supply: The time required for a supply order to arrive at the CTC/CTU after an order is requested is referred to as the 'time needed to resupply'. This time varies by supplier and/or the type of supply needed and also may vary during times of political unrest, bad weather conditions, or nation-wide stock-outs. Supply ordering and communication protocols with suppliers should be understood by the logistician/person in charge of supply.
5. Surge capacity: CTCs/CTUs should anticipate that they may have sudden increases (surges) in the number of patients seeking care. Monitoring trends over time of the number of patients seen daily and the rate of consumption of critical supplies may help the CTC/CTU identify patient surges. If the trends suggest that the CTC/CTU is treating more patients, then supply ordering can be adjusted.
6. Critical Supplies: Critical supplies - without which the medical care of patients will be significantly impaired - should be monitored closely. Ideally, a CTC/CTU should not run out of critical supply items. All critical supplies can be stored at room temperature for 2 years. Critical supply items include:
 1. Ringer's lactate
 2. IV infusion sets
 3. IV cannulae
 4. Oral Rehydration Solution
 5. Doxycycline
 6. Azithromycin

7. Zinc
8. Aquatabs
9. HTH
10. Disinfectant (i.e. iodine)
11. Soap
12. Latex/Nitrile gloves
13. Naso-gastric (NG) tubes
14. Tape
15. Body bags
16. Cotton balls

7. **Buffer stock:** Buffer stock is an excess of essential supplies or contingency supplies stored at the CTC/CTU. The buffer stock assures that the CTC/CTU can provide adequate care for patients in the event of a sudden patient surge or a problem with delivery or acquisition of critical supplies. The amount of buffer stock necessary ranges from supplies for 3-14 days, depending on the frequency of re-supply, time needed to re-supply, and storage capacity.
8. **Dependent units (e.g. ORPs):** A CTC/CTU must account for the supply needs of ORPs or other facilities nearby that will depend on that CTC/CTU for supplies. Logisticians/stock-keepers should receive inventory and rate of consumption data from ORPs frequently. A buffer stock and stock in case of patient surge should be maintained for these facilities at the CTC/CTU.

Human resource needs

The CTC should be staffed by health workers (physicians, nurses, and auxiliary nurses) who have been trained in the case management of diarrhea. In addition to clinical staff, the CTC will need non-clinical staff such as clerks, cleaners, watchmen, sprayers, health educators, and stock-keepers. Planning to have enough staff to cover several shifts per day (e.g. three eight-hour shifts daily) and occasional rest days is very important.

A CTU should also be staffed with health workers and non-clinical staff. Many CTUs are not staffed by physicians – and clinical care is delivered by nurses, nurse auxiliaries, and community health workers.

For community health workers (CHWs) working at CTCs, CTUs, and ORPs: Although many CHWs think of their role as mainly “treating” patients with cholera, CHWs also have important responsibilities in prevention and control activities. CHWs, environmental health and laboratory staff and health educators form a team that prepares for and responds to epidemics. If a health facility is well prepared, the staff can continue to provide the usual services of the health facility when an outbreak occurs. During an outbreak situation, some staff may be reassigned from their regular duties to treat patients at the health facility or may be sent to a CTC, CTU or ORP.

Staffing Guidance:

	<u>CTC Model 1</u> (Inpatient Only)	<u>CTC Model 2</u> (In & Outpatient)	<u>CTU Model</u> (Outpatient)
<i>Designed to Treat</i>	50 patients	50 beds + ORS/obs for 50 patients	20 patients*
<i>% Inpatients</i>	100%	50%	10%
CTC Coordinator/supervisor	1	1	
Doctor	3 †	4 ‡	*
Nurse	15 ††	20 ††	3 ††
Auxiliary Nurse (Med Assistant)	15 ††	20 ††	3 ††
Cleaner	3 †††	4 ‡	3 †††
Health Educator	1	2 ‡	
Logistics	1	1	1
Sprayer/Watchman	3 †††	4 ‡	3 †††
Laundry	2	2	
Water/Sanitation	3 †††	4 ‡	
Stock-keeper	1	1	
Record keepers/Clerks	2	3	1
Driver	1	1	
Misc Support staff (Optional)*	4	8	2
Total	55	75	16
Range of Needed Personnel	50-55	65-75	14-16

*some CTUs may care for inpatients and should modify personnel as required

**may include extra clinical staff, cooks, water/stretchers carriers, or clerks

†1 day, 1 night, 1 off duty

††1 nurse per 10 patients per 8 hour shift

†††1 per 8 hour shift

‡ 1 additional staff during daytime

‡‡ 1 nurse per 20 outpatients per 8 hr shift

Infection Control

At the Entry/Exit Point

The most important time for spraying of feet is upon entrance to and exit from the center to avoid contamination in and out of the center. It also makes staff and visitors aware of the contamination they are potentially bringing into the different areas.

Footbaths are inefficient as disinfectants, as they become dirty very quickly. Therefore, spraying is preferred. If footbaths are installed, they should be trays with cloth or sponge soaked in 0.5 % chlorine solution and changed twice per day or when the cloth appears dirty. Spraying and footbaths also can be important barriers between the outside and the center.

It is important to note that after chlorine solution preparation, the calcium deposits at the bottom of the container should not be used, particularly in the sprayers, as this will cause blockages. Sprayers adapted to resist strong concentrations of chlorine should be used.

At Admission

- Patients and caregivers should enter through the patient entrance area where their feet and shoes will be disinfected with a 0.5 % chlorine solution by a sprayer preferably, or footbath.
- They will then be asked to wash their hands upon entry using the container provided.
- Disinfect the mean of transport of the patient with the 0.05% solution for stretchers and beds or 0.5% for moving vehicles.
- Dip the clothes of the patient into a 0.05% solution for 30 minutes, then rinse with clean water and dry under the sun.
- Restrict and control movements into and within the wards as much as possible.
- Establish hand-washing stations with chlorine-treated water and soap.
- Restrict admission and care to one caretaker per patient.

During Hospitalization

- Wash hands with soap or chlorine solution (0.05%) before and after examining each patient.
- Gloves should also be made available for those manipulating blood, chlorine, and the chlorinated solutions.
- Disinfect the shelters, beds, and floor at least twice daily with the 0.5% solution.
- Disinfect the showers, latrines, and washing areas with the 0.5% solution.
- Dispose of stools of patients in a specific, regularly disinfected (2%) latrine.
- Wash and disinfect (0.05%) the clothes and bed linens of cholera patients frequently and separately.

- Those caring for patients should not be allowed to prepare or serve food.

At Discharge

- Spray or wash the person, his hands, and his clothes with the 0.05% solution.
- In case of death, wash the body of the deceased with a 2% solution in a reserved area, close the orifices of the body with chlorinated cotton wool (2%), and wrap the body in a sheet or place in a body bag, if available.
- The burial must be done immediately.

Visitors

If a family member will stay with the patient to provide general nursing care and feed the patient, fewer staff may be needed. Clinical staff should concentrate on the treatment of patients, and look for others who can temporarily take over routine or clerical work. However, professional staff and community health workers must teach and closely supervise nonprofessional caretakers.

Water, Hygiene, and Sanitation

Water

Water supply

- Patients: Approximately 10–15 gallons (40–60 liters) of treated water per patient per day is needed for drinking, cleaning, bathing, and washing clothes.
- Caregivers: At least 4 gallons (15 liters) of treated water per caregiver per day is needed.
- Estimated daily CTC water needs:

Water quality

- All drinking-water is treated (levels of chlorine are tested regularly—see Appendix VI for chlorine solutions)
- Water for consumption in a CTC should be chlorinated to give a residual of either/or:
 - 0.2–0.5 mg/l where pH <8
 - 0.4–1 mg/l where pH is ≥8
- Water can only be effectively chlorinated if turbidity (cloudiness of fluid) is <5 Nephelometric Turbidity Units (NTU) and up to 20 NTU for minimum periods in times of emergency (NTUs are measured by a calibrated nephelometer).
- Quantity of chlorine per patient per day for all needs (including storage/preparedness) is approximately 100 g of HTH/patient/day.

Drinking water storage

- Drinking water is stored separately from water for other uses.
- If drinking water is stored in containers, only safe containers should be used. The following characteristics of a water storage container will provide physical barriers to recontamination and render the container safe to store water:
 - Contains a small opening with a lid or cover that discourages users from placing potentially contaminated items such as hands, cups, or ladles into the stored water.
 - Has a spigot or small opening to allow easy and safe access to the water without requiring the insertion of hands or objects into the container.
 - Is a size appropriate for the water treatment method, with permanently attached instructions for using the treatment method and for cleaning the container.
 - If containers with these characteristics are not available, efforts should be made to educate health care workers to access the water by pouring from the containers rather than dipping into it with a possibly contaminated object

Chlorine solution storage

- Only one person should be in charge of preparing the different chlorine solutions per shift.
- Often 125 liter containers with taps are used in the centers. These should be clearly marked with the solution that it is used for, to avoid accidents.
- Different colored containers can also be used to call attention to the different concentrations.
- Additional quantities of all the solutions are stored in a neutral area.

Estimated daily CTC water needs. (In principle, the quantity of water stored in a CTC should be sufficient for 3 days.)

Number of Patients	Daily Needs	3 Day Storage	Type of Tank
10	600L	1,800L	2m ³ bladder
50	3,000	9,000	15m ³ bladder
100	6,000	18,000	15m ³ bladder + 5m ³ bladder
200	12,000	36,000	2 x 15m ³ bladder + 5m ³ bladder

Hygiene

Hygiene should be promoted among staff to keep everyone aware of the rules related to hygiene and the dangers of not adhering to them. Promotion should concentrate on:

- How to clean the patient bed that has been soiled with excreta or vomit
- Hand-washing after dealing with each patient or after handling contaminated items
- Hand-washing after defecation
- Hand-washing before handling or eating food

- Changing into protective clothing when entering the area. When leaving, protective clothing should be removed in the CTC for washing on site and not taken home.
- Only kitchen staff should be allowed into the kitchen area

Protective clothing

Protective clothing should be made available for all staff working in the center, including boots and protective clothing that can be easily removed before leaving the center. Gloves should also be made available for those manipulating blood, excreta, chlorine, and chlorinated solutions.

Food hygiene

For CTCs or health facilities with kitchens, strict rules should be set for preparing and serving food including:

- Upon entering the kitchen (each time), hands must be washed.
- Food must be stored so that it is only handled by kitchen staff.
- Only kitchen staff is allowed inside the kitchen.
- Only kitchen staff is to serve food.
- Disinfect plates and cutlery by soaking them for 5 minutes in a basin filled with 0.2% chlorine solution.
- Food provided by relatives should be handled following the same hygiene criteria.

Laundry

The laundry area should be located close to the area producing the most contaminated waste; soiled materials from the entire CTC including blankets, gowns, and protective clothing should be washed. Where laundry machines or designated laundry sinks are not available, large plastic tubs will need to be made available.

- Soiled bedding and clothes should be taken to the laundry area and washed in 0.05% chlorine solution (Source: WHO Cholera Outbreak Response, 2004).
 - If chlorine is not available, patient's bedding and clothing can be disinfected by stirring them for 5 minutes in boiling water and drying them in the sun.
 - Bedding including mattresses can also be disinfected by washing with soap and thoroughly drying in the sun.
- In order to minimize contamination of the washing area, the patient's clothing and other articles can be disinfected by drying them in the sun before washing.

Cleaning the facility

Floors of the center should be made of concrete or covered with plastic sheeting for easier cleaning. Squeeze-mops or similar equipment should be used with 0.5 % chlorine solution to disinfect the ward floors up to four times per day, depending on the movement through the wards.

Walls around patients, where not solid, can be cleaned, as necessary, using 0.5 % chlorine solution in a sprayer, taking care to clean preferably when patients are not around. Cholera beds should be sprayed with 0.5 % chlorine solution, as appropriate, and between each occupant.

Latrines should be cleaned several times a day with 0.5 % chlorine solution with mops and/or sprayed. This includes the slabs and the walls up to 1 m (or height of splashes). Additional chlorine does not need to be poured into the latrine.

Ambulance/vehicle cleaning

Transport vehicle should be cleaned by center staff with a 0.5 % chlorine solution. Be aware that if the inside of the vehicle is not plastic or similar, there may be effects (chlorine residue) on the material.

Sanitation

The goal of a sanitation program is to develop physical barriers against the transmission of disease, in order to protect the health of the emergency-affected population. These barriers include both engineering measures and personal hygiene measures. Providing latrines and developing methods of waste disposal are essential to the sanitation program.

Showers

- There should be one shower area for every 25 people (male and female).
- There should be a minimum of two shower rooms (male and female) for staff in neutral areas.
- Bathing areas should be connected to a grease trap and a soakaway that is contained inside the CTC. Soakaways (for most soils) must be located at least 30 meters from any groundwater source and the bottom of any latrine is at least 1.5 meters above the water tables.
- The patient shower areas should be big enough for a minimum of two people (caregiver and patient). Using a sprayer and initially soaking clothes on arrival may aid in the effectiveness of cleaning patients. Care must be taken to preserve the dignity of patients during this process.

Hand-washing area

- Located at all latrines, all tents (patient and administrative), kitchen, mortuary, waste area
- Concentration: 0.05% chlorine solution
- Soakaways (for most soils) must be located at least 30 meters from any groundwater source and the bottom of any latrine is at least 1.5 meters above the water tables
- All staff, patients and caretakers and visitors have convenient, visible facilities for washing their hands with soap, or special chlorine solution

- All patients, caretakers, and visitors are taught and encouraged to wash their hands
- All staff must wash their hands before and after examining patients
- Staff and patients must wash their hands when exiting the latrines and treatment areas

Latrines

- There should be one for every 20 persons, plus one or two in the neutral area for the staff.
- All liquid human waste is disposed of in a toilet, flush pit, latrine, or is buried.
- Soakaways (for most soils) must be located at least 30 meters from any groundwater source and the bottom of any latrine is at least 1.5 meters above the water tables.
- Semi-solid waste is incinerated where possible.
- Plastic slabs are useful in an emergency because installing them is quick and they are easy to clean.
- Toilets should be independent and not connected to the main sewer system, which helps contain the cholera.

Buckets for cholera beds

Because most of the hospitalized patients will not be able to use a latrine, buckets (10–15 liters) should be placed under the hole in the cholera bed and at the bedside for vomit. The bucket can be raised on a block to prevent splashing of the surrounding area. A number of buckets should also be provided for the Observation area. Approximately 1 cm of 2 % chlorine solution should be put into the bucket before it is placed under the bed. The bucket may be emptied into the toilet/latrine, as long as while being transported for disposal it does not go thru a “safe” area and risk infection to other areas of the site.

Waste Management

Segregation and storage

Different types of waste are produced in the CTC that need to be disposed of correctly in order to reduce transmission of cholera and other diseases related to medical waste. Waste can be divided for segregation and disposal purposes into three categories:

- *Softs*: cottons, gauze, plastics, syringes, paper (waste—contaminated or uncontaminated that can be burned)
- *Organic*: food residues, human tissue (waste that cannot be burned)
- *Sharps*: needles, lancets, ampoules, glass (waste that can cause injury and transmit disease if not disposed of properly)

There should therefore be three different types of containers assigned and labeled for the different type of waste:

- *Soft waste* can be discarded in a bin or drum.
- *Organic waste* can be disposed in a waste bin with a lid that is washable.
- *Sharp waste* should be disposed in a puncture-proof plastic container.

- The lid, with a V shaped opening is glued (e.g., empty tablet plastic container). The container, once full, is disposed directly into the pit and replaced by a new one.
- Safety boxes can also be used to collect sharps and syringes with needles (no need to separate). The safety box, when full, should be incinerated on top of a grill, placed on the sharp pit to allow all remaining metals and ashes to fall through into the pit. Safety boxes should not be incinerated into a drum burner.

Waste zone

A waste area is planned within the CTC and comprises:

- A drum burner (with a dry area to store the bins)—to burn soft waste
- An organic pit (with a lid to prevent flies/mosquitoes)—for organic waste and the ash produced from the burner. Check that access to pit is restricted.
 - Care must be taken to ensure that the pit (for most soils) must be located at least 30 meters from any groundwater source and that the bottom of any latrine is at least 1.5 meters above the water tables.
 - Drainage around the pit must be adequate to ensure that no contamination of surface water occurs.
- A sharps pit to receive the containers collecting the needles, lancets, ampoules, and similar items.
 - The pit ideally should be lined so that it is fully enclosed. If safety boxes are used, a grill should be placed on the top of the pit.

Upon closure of the CTC, the organics pit should be backfilled and the sharps filled with concrete or similar material to encapsulate the sharps and to protect future users of the land.

Waste water

The most contaminated waste water will come from the mortuary, showers, laundry, and kitchen washing area. Waste water from this area must, therefore, be disposed of in soak pits after first going through grease traps (so that the soak pit does not become clogged). Soakaways (for most soils) must be located at least 30 meters from any groundwater source and the bottom of any latrine is at least 1.5 meters above the water tables.

Site drainage

If possible, the CTC should be located on a slight incline, so that rainfall can be easily drained from the area. Drains should be constructed around the outside of each of the structures in the center to canalize rainfall and drain out of the CTC. Although rainwater run-off may contain some contamination, it is considered to be of low risk.

It is not usually feasible to dispose of all water from a rainfall event; therefore arrangements must be made to collect rainwater from the CTC and drain out, where possible, to an existing drainage system.

Handling Bodies of Deceased Cholera Patients

Bodies of deceased cholera patients must be disinfected with a 2% chlorine solution.

People who wash and prepare the body of a deceased patient must:

- Wear gloves, an apron, and a mask.
- Clean the body with chlorine solution inside the mortuary with 2% chlorine solution.
- Fill the mouth and anus of the body with cotton wool soaked with 2% chlorine solution as soon as possible.
- Bandage the head to keep the mouth shut.
- Do not empty the intestines.
- Where many bodies must be stored, quicklime (calcium oxide, CaO) can be used to dry up and neutralize liquids and reduce the odors produced.

If possible, physical contact between the family and the body should be prevented. If this is not possible, the family must be made aware of the need to:

- Wash hands with soap after touching the body.
- Avoid putting hands in the mouth after touching the body.
- Disinfect the deceased patient's clothing and bedding by stirring in boiling water for 5 minutes or by drying them thoroughly in the sun before and after normal washing.
- Avoid conducting a wake.
- Recommend immediate burial.
- Family members who handle the body should not prepare food for 24 hours.

For transporting bodies

- Body-carriers should wear gloves.
- Bodies should be carefully wrapped.
- The body should be moved as soon as possible to the mortuary because fluids will start to evacuate the body.
- Where body bags are available, they should be used to transport the body for burial. If not available, the body can be wrapped in a cloth sheet soaked in 2% chlorine.

Mortuary

The mortuary should be located alongside the waste zone. A closed tent (plastic, material) should be designated for deceased persons' bodies to prevent access to bodies. The mortuary structure should enable effective cleaning inside, with drainage canals that flow into a soak pit (body fluids are likely to be highly contaminated). It should have an entrance from inside the CTC and an exit to allow collection of the body. If a CTC is not able to build a morgue, rapid burial is recommended. The body should be prepared following the same criteria as above.

The following table summarizes the water, hygiene, and sanitation needs of any cholera control facility and gives the example of a 100-bed (160 patient) CTC.

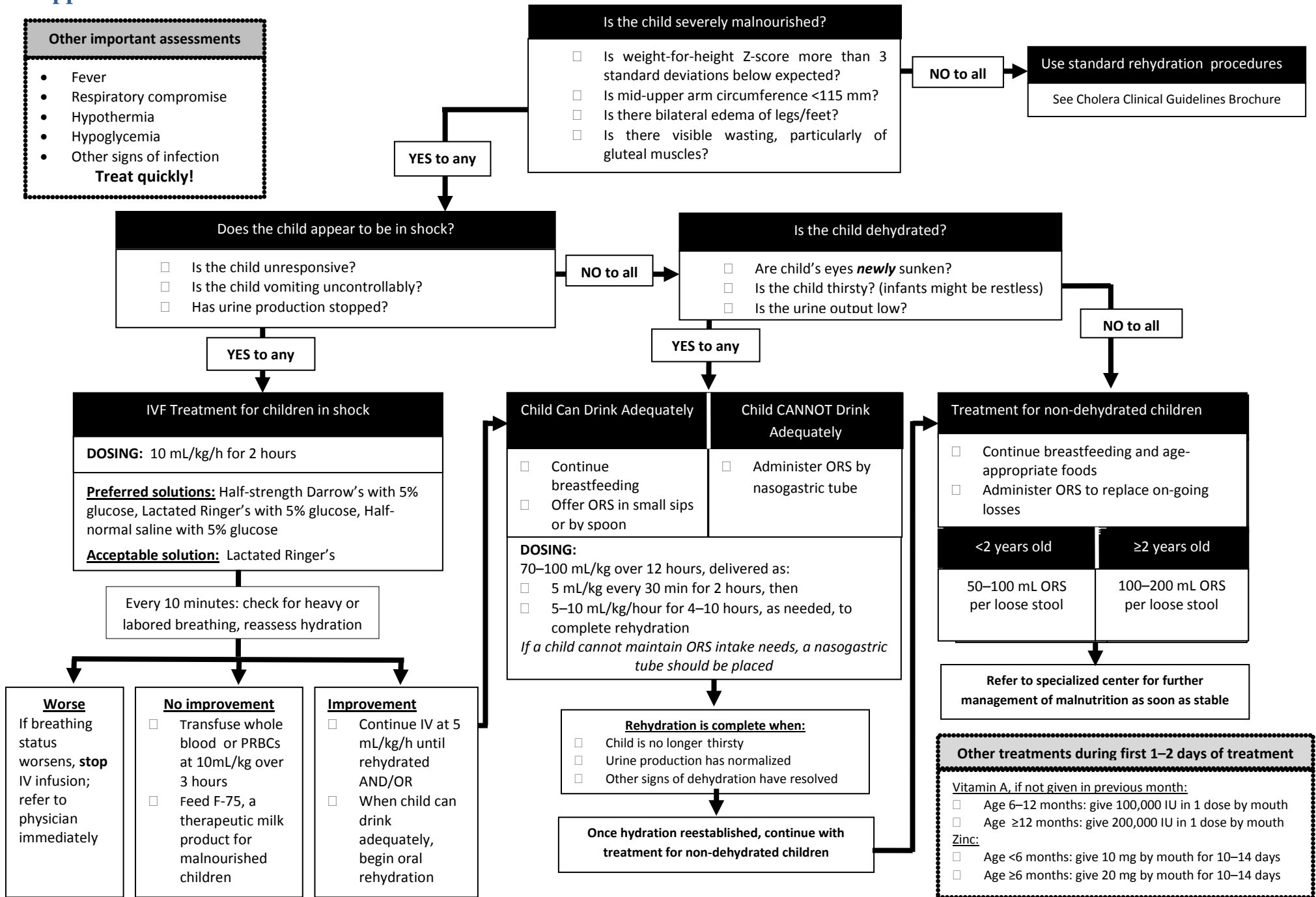
9.7. Table of Water, Hygiene and Sanitation Needs in a 100 Beds CTC (160 patients)

30 patients in Observation, 100 patients in Hospitalisation, 30 patients in Recovery, 1 care - giver/patient (160)

Facilities	Patient Area 1 Screening Observation	Patient Area 2 Hospitalisation Isolation	Patient Area 3 Recovery	Neutral Area	Mortuary	Waste Zone	Total
Water							
Containers for drinking water (typically 125 l container)	2 (1 / tent)	5 (1 / tent)	2 (1 / tent)	1 (1 / tent for staff)			10
Containers of ORS (typically 125 l container)	2 (1 / tent)	5 (1 / tent)	2 (1 / tent)				9
Taps (supplying drinking water)	1 (at showers)	2 (at laundry, shower)	1 (at showers)	1 (at kitchen)			5
Storage capacity (typically in bladders)				28.8 m ³ (2 x 15m ³)			
Bathing							
Showers (Minimum 2, 1 for male, 1 for female)	2	4	2	2 (for staff)			10
Hygiene							
Containers for hand washing with 0.05% chlorine solution (typically 125 l container)	4 (entrance, latrine area + 1 / tent)	7 (entrance, latrine area + 1 / tent)	4 (entrance, latrine area + 1 / tent)	4 (latrine, dish rinsing, 2 in chlorine prep. area)	1 (outside tent)	1 (for bin rinsing)	21
Containers for 0.2 % chlorine solution (typically 125 l container)		2 (chlorine solution area)		2 (chlorine prep. area)			4

Appendix I.

Assessment and Treatment of a Severely Malnourished Child 6–59 Months Old with Watery Diarrhea



Version 2.1. Last updated Jan 24 2011

Stop rehydration if signs of cardiac failure develop. Signs are: heavy, labored breathing; engorged jugular veins; increased edema.

Appendix II: F-75 Feeding Guidelines for Malnourished Children

F-75 Reference Card – Volume of F-75 to give for children of different weights

See reverse for adjusted amounts for children with severe (+++) oedema.

Weight of child (kg)	Volume of F-75 per feed (ml) ^a			Daily total (130 ml/kg)	80% of daily total ^a (minimum)
	Every 2 hours ^b (12 feeds)	Every 3 hours ^c (8 feeds)	Every 4 hours (6 feeds)		
2.0	20	30	45	260	210
2.2	25	35	50	286	230
2.4	25	40	55	312	250
2.6	30	45	55	338	265
2.8	30	45	60	364	290
3.0	35	50	65	390	310
3.2	35	55	70	416	335
3.4	35	55	75	442	355
3.6	40	60	80	468	375
3.8	40	60	85	494	395
4.0	45	65	90	520	415
4.2	45	70	90	546	435
4.4	50	70	95	572	460
4.6	50	75	100	598	480
4.8	55	80	105	624	500
5.0	55	80	110	650	520
5.2	55	85	115	676	540
5.4	60	90	120	702	560
5.6	60	90	125	728	580
5.8	65	95	130	754	605
6.0	65	100	130	780	625
6.2	70	100	135	806	645
6.4	70	105	140	832	665
6.6	75	110	145	858	685
6.8	75	110	150	884	705
7.0	75	115	155	910	730
7.2	80	120	160	936	750
7.4	80	120	160	962	770
7.6	85	125	165	988	790
7.8	85	130	170	1014	810
8.0	90	130	175	1040	830
8.2	90	135	180	1066	855
8.4	90	140	185	1092	875
8.6	95	140	190	1118	895
8.8	95	145	195	1144	915
9.0	100	145	200	1170	935
9.2	100	150	200	1196	960
9.4	105	155	205	1222	980
9.6	105	155	210	1248	1000
9.8	110	160	215	1274	1020
10.0	110	160	220	1300	1040

^aVolumes in these columns are rounded to the nearest 5 ml.

^bFeed 2-hourly for at least the first day. Then, when little or no vomiting, modest diarrhoea (<5 watery stools per day), and finishing most feeds, change to 3-hourly feeds.

^cAfter a day on 3-hourly feeds: If no vomiting, less diarrhoea, and finishing most feeds, change to 4-hourly feeds.

Source: World Health Organization (2002). *Training Course on the Management of Severe Malnutrition: Feeding*, page 57. Retrieved on December 1, 2010 from http://whqlibdoc.who.int/hq/2002/WHO_NHD_02.4_Module4_eng.pdf

Volume of F-75 for Children with Severe (+++) Oedema

Weight with +++ oedema (kg)	Volume of F-75 per feed (ml) ^a			Daily total (100 ml/kg)	80% of daily total ^a (minimum)
	Every 2 hours ^b (12 feeds)	Every 3 hours ^c (8 feeds)	Every 4 hours (6 feeds)		
3.0	25	40	50	300	240
3.2	25	40	55	320	255
3.4	30	45	60	340	270
3.6	30	45	60	360	290
3.8	30	50	65	380	305
4.0	35	50	65	400	320
4.2	35	55	70	420	335
4.4	35	55	75	440	350
4.6	40	60	75	460	370
4.8	40	60	80	480	385
5.0	40	65	85	500	400
5.2	45	65	85	520	415
5.4	45	70	90	540	430
5.6	45	70	95	560	450
5.8	50	75	95	580	465
6.0	50	75	100	600	480
6.2	50	80	105	620	495
6.4	55	80	105	640	510
6.6	55	85	110	660	530
6.8	55	85	115	680	545
7.0	60	90	115	700	560
7.2	60	90	120	720	575
7.4	60	95	125	740	590
7.6	65	95	125	760	610
7.8	65	100	130	780	625
8.0	65	100	135	800	640
8.2	70	105	135	820	655
8.4	70	105	140	840	670
8.6	70	110	145	860	690
8.8	75	110	145	880	705
9.0	75	115	150	900	720
9.2	75	115	155	920	735
9.4	80	120	155	940	750
9.6	80	120	160	960	770
9.8	80	125	165	980	785
10.0	85	125	165	1000	800
10.2	85	130	170	1020	815
10.4	85	130	175	1040	830
10.6	90	135	175	1060	850
10.8	90	135	180	1080	865
11.0	90	140	185	1100	880
11.2	95	140	185	1120	895
11.4	95	145	190	1140	910
11.6	95	145	195	1160	930
11.8	100	150	195	1180	945
12.0	100	150	200	1200	960

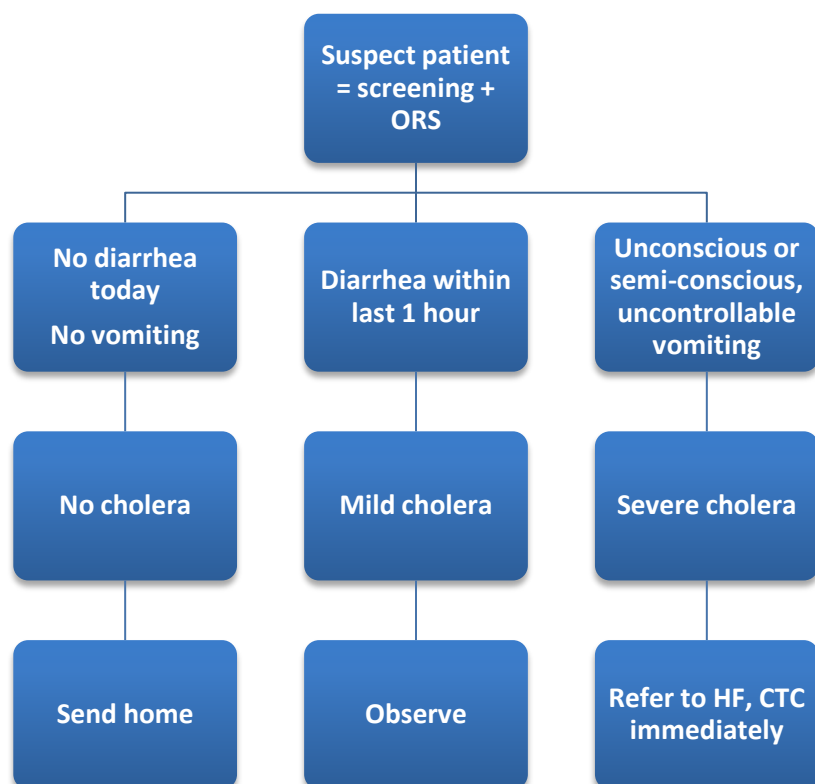
^aVolumes in these columns are rounded to the nearest 5 ml.

^bFeed 2-hourly for at least the first day. Then, when little or no vomiting, modest diarrhoea (<5 watery stools per day), and finishing most feeds, change to 3-hourly feeds.

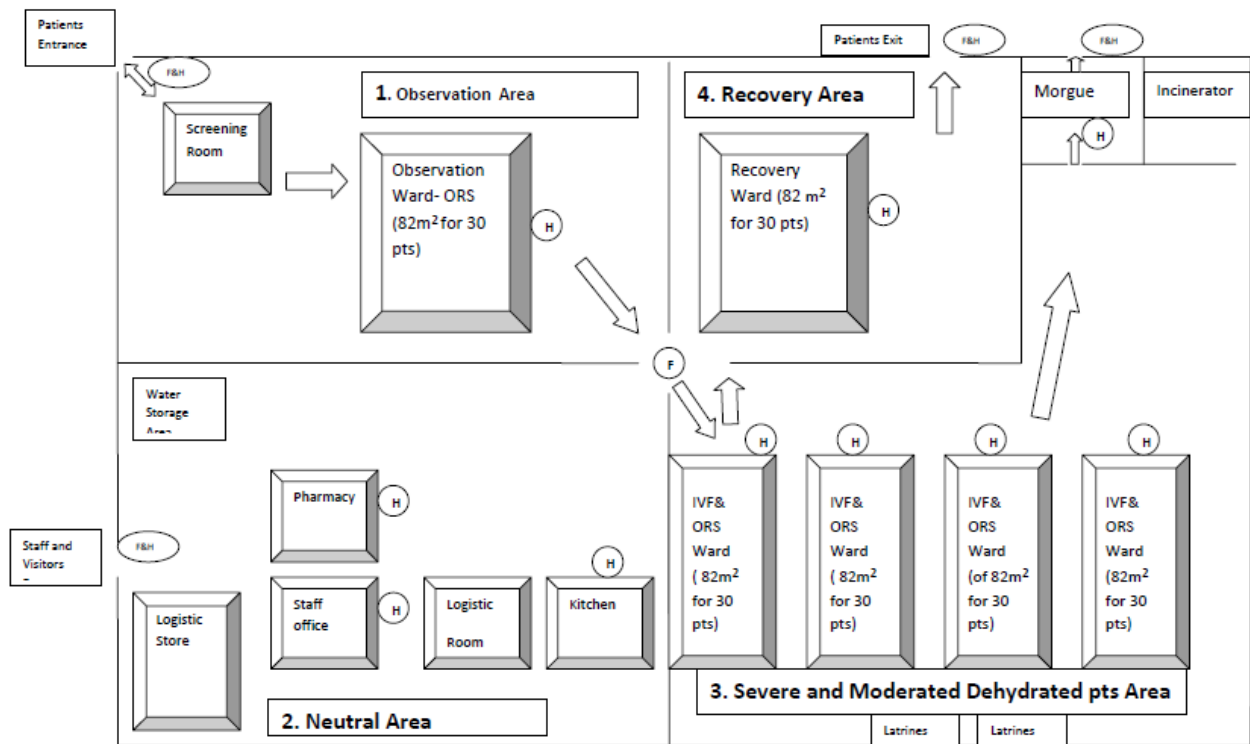
^cAfter a day on 3-hourly feeds: If no vomiting, less diarrhoea, and finishing most feeds, change to 4-hourly feeds.

Source: World Health Organization (2002). *Training Course on the Management of Severe Malnutrition: Feeding*, page 58. Retrieved on December 1, 2010 from http://whqlibdoc.who.int/hq/2002/WHO_NHD_02.4_Module4_eng.pdf

Appendix III: Patient Triage at Oral Rehydration Points



Appendix IV: Alternative Layout for Cholera Treatment Center



Appendix V: MODIFIED Interagency Diarrheal Disease Kit

(Each kit consists of 4 modules: Basic, ORS, Infusion, and Support.)

For 100 severe cholera cases (cholera treatment unit), plus 400 moderate cholera cases (oral rehydration unit), and 100 adults plus 100 children affected by other severe diarrheal infections. ***Antimicrobial drug recommendations altered for Haiti Response: doxycycline oral suspension added***

Basic module		
Code	Item	Quantity
	1. Drugs	
	Oral rehydration salts (for 1 liter each)	700
	Ringer's lactate , 1 liter bag/pouch, with infusion set*	80
	Doxycycline 100mg tablets, box of 1000	1
	Doxycycline oral suspension, 10mg/ml 473 ml bottle	5
	Erythromycin 250mg tablets, box of 1000	1
	Ciprofloxacin 500 mg tablets	1000
	Zinc 20mg tablets, blister of 10	350
	NaDCC 1.67g "multipurpose" tablets**, box of 200	6
	Cetrimide 15% + Chlorhexidine 1.5%, 1 liter bottle	5
	2. Renewable supplies	
	Cannula,IV short,16G,sterile,disposable	50
	Cannula,IV short,18G,sterile,disposable	100
	Cannula,IV short,22G,sterile,disposable	50
	Cannula,IV short,24G,sterile,disposable	50
	Needle,scalp vein,21G,sterile,disposable	25
	Needle,scalp vein,25G,sterile,disposable	25
	Safety box for used syringes/needles 5lt/BOX-25	1
	Bandage,gauze,8cmx4m,roll	24
	Cotton wool,500g,non-sterile,roll	5
	Tape,adhesive,zinc oxide,2.5cmx5m,roll	20
	Compress,gauze,10x10cm,non-sterile/PAC-100	3
	Gloves,examination,latex,large,disposable/BOX-100	200
	Gloves,examination,latex,medium,disposable/BOX-100	200
	Gloves,examination,latex,small,disposable/BOX-100	200
	Gloves,surgical,7.5,sterile,disposable,pair	100
	Gloves,surgical,8.5,sterile,disposable,pair	100
	Apron,protection,plastic,disposable	100
	Tube,feeding,CH08,L40cm,luer tip,sterile,disposable	10
	Tube,feeding,CH05,L40cm,luer tip,sterile,disposable	10
	Tube,feeding,CH10,L125cm,conical tip,sterile,disposable	10
	Tube,feeding,CH12,L125cm,conical tip,sterile,disposable	10
	Tube,feeding,CH16,L125cm,conical tip,sterile,disposable	10
	Syringe,feeding,50ml,luer tip,sterile	10
	Syringe,feeding,50ml,conical tip,sterile	10
	Culture swab, Cary Blair, pure viscose tip, peel pouch	10

	3. Equipment	
	Scissors, Deaver, 140mm, straight, s/b	5
	Forceps, artery, Kocher, 140mm, straight	5
	Basin, kidney, stainless steel, 825ml	5
	Tray, dressing, stainless steel, 300x200x30mm	5
	Tourniquet, rubber band, 1.8cmx1m	10
	Stethoscope, binaural, complete	2
	Sphygmomanometer, (adult), aneroid	2
	Thermometer, clinical, digital 32-43C	10
	Brush, hand, scrubbing, plastic	5
	Soap, toilet, bar, approx. 100g, wrapped	2
	Bag, body, plastic, 220cm, zipped	5
	Blanket, survival, 220x140cm	10
	4. Documents	
	Information Note (1 French and 1 English)	2
	First steps for managing an outbreak of acute diarrhea (10 French and 10 English)	20
	Critical steps in decision making for preparedness and response (5 French and 5 English)	10
	Assessment of cholera outbreak (1 French and 1 English)	2
	ORS Module	
Code	Item	Quantity
	Information Note (1 French and 1 English)	2
	Oral rehydration salts, sachet for 1 liter	1600
	Jerrican, plastic, 20 liters, with tap	4
	Ladle, 250ml	4
	Cup, 250ml, plastic, graduated	100
	Soap 100g, bar	2
	First steps for managing an outbreak of acute diarrhea (2 French and 2 English)	4
	Infusions Module	
Code	Item	Quantity
	Information Note (1 French and 1 English)	2
	Ringer's lactate, 1 liter bag/pouch, with infusion set*	720
	Support Module	
Code	Item	Quantity
	Information Note (1 French and 1 English)	2
	Bucket, plastic, 15 liters, graduated	40
	Jerrican plastic with tap, 20 liters	5
	Ladle, 250ml	4
	Container, plastic, 125l	10
	Cup, 250ml, plastic, graduated	40
	Chlorine test kit, range 0.1–2.0 mg/l for 100 tests	4
	Gloves, cleaning, reusable, large	100

Appendix VI: Preparation of Chlorinated Solution

Making chlorine solution			
Chlorine Product	Hands, Skin, Bedding and Laundry	Floors, surfaces, equipment.	Corpses and Body fluids** (Diarrhea, Vomit in large containers)
	Final concentration: 0.05% active chlorine	Final concentration: 0.5% active chlorine	Final concentration: 2% active chlorine. Wait at least 2 hours before dumping
Household bleach (5% active)	0.1 liters of bleach to 9.9 liters of water (WRITE: 0.05%)	1 liter of bleach mixed with 10 liters of water (WRITE: 0.5%)	4 liters of bleach mixed with 6 liters of water (WRITE: 2%)
Household bleach (30% active chlorine)	Add 16 grams or 1 tablespoon to 10 liters of water (WRITE: 0.05%)	16 grams or 1 tablespoon to 1 liter of water (WRITE: 0.5%)	64 grams or 4 tablespoons to 1 liter of water (WRITE: 2%)
Calcium hypochlorite powder or chlorine granules (70% active chlorine)	7 grams or 1/2 a tablespoon to 10 liters of water (WRITE: 0.05%)	7 grams or 1/2 a tablespoon to 1 liter of water (WRITE: 0.5%)	28 grams or 2 tablespoons to 1 liter of water (WRITE: 2%)

* ALWAYS label the solutions with a permanent marker.

** Note that if chlorine is limited, body fluids can be treated with a final concentration of 0.5% chlorine, but the fluids must be held and occasionally stirred for at least 6 HOURS before dumping.