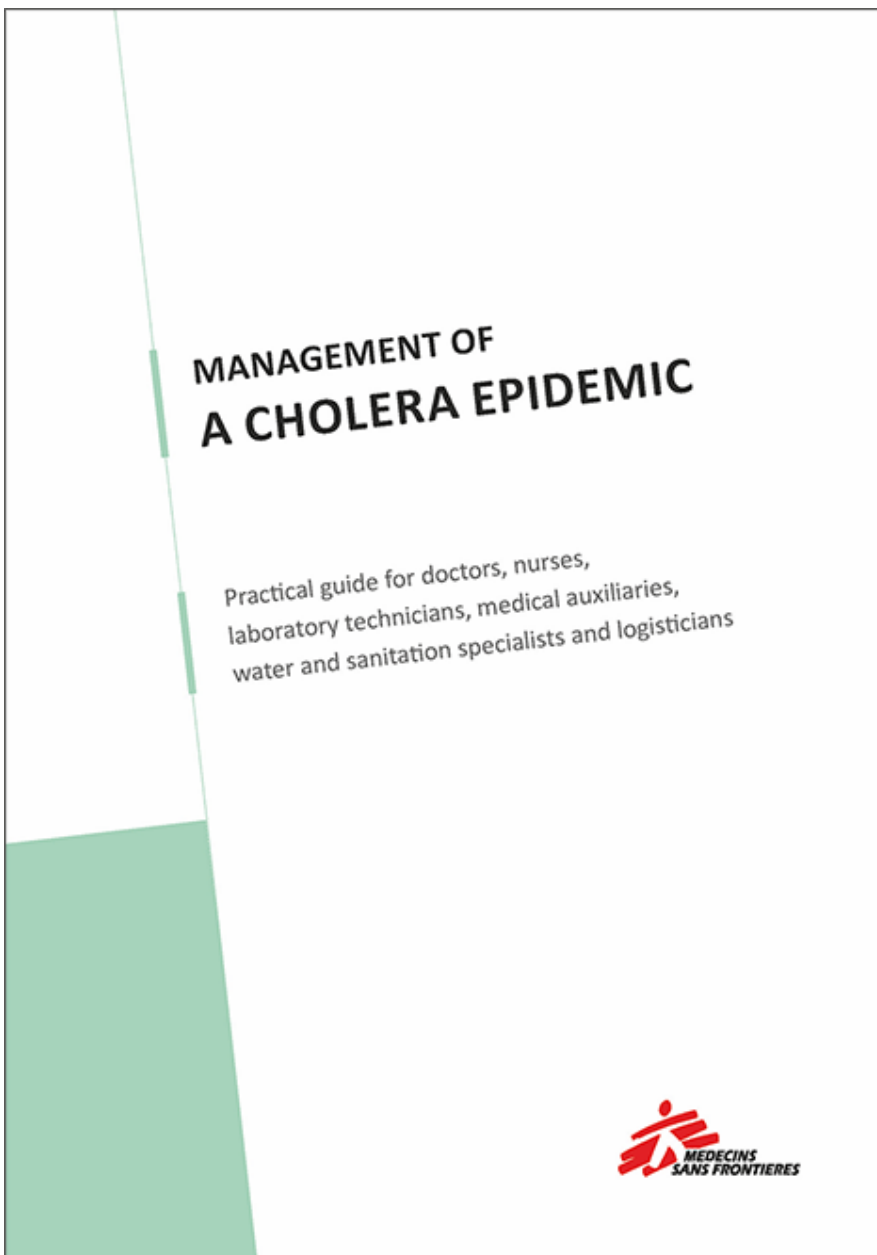




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# Management of A CHOLERA EPIDEMIC

Practical guide for doctors, nurses, laboratory technicians, medical auxiliaries, water and sanitation specialists and logisticians



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# Preface

Cholera is a transmissible diarrhoeal infection caused by *Vibrio cholerae*. Endemic and/or epidemic in over 40 countries (mainly in Africa and Asia), cholera continues to be a major global public health issue. The World Health Organization (WHO) estimates that the number of cases reported worldwide represents in reality only 5 to 10% of actual cases.

The guide *Management of a cholera epidemic* is intended for medical and non-medical staff responding to a cholera outbreak. It attempts to provide concrete answers to the questions and problems faced by staff, based on the recommendations of reference organisations, such as WHO and UNICEF, as well as Médecins Sans Frontières' experience in the field.

It is divided into 8 chapters. Chapter 1, *Cholera overview*, outlines the epidemiological and clinical features of cholera. Chapter 2, *Outbreak investigation*, explains the method and stages of a field investigation, from the alert to implementation of initial activities. Chapter 3, *Cholera control measures*, details measures and tools to prevent and/or control cholera transmission and mortality in populations affected, or at risk of being affected, by an epidemic (curative care, prevention means and health promotion activities). Chapter 4, *Strategies for epidemic response*, addresses the roll-out strategies of the measures described in Chapter 3 which depend on context (e.g. urban, rural, endemic, non-endemic setting, etc.), resources and particular constraints. Chapter 5, *Cholera case management*, details the different stages of cholera treatment, from diagnosis through to cure. Chapter 6, *Setting up cholera treatment facilities*, focuses on the installation of treatment facilities that vary in size and complexity according to operational requirements (treatment centres and units and oral rehydration points). Chapter 7, *Organisation of cholera treatment facilities*, describes the organisation of these specialized facilities in terms of human resources, supply, water, hygiene and sanitation, etc. Chapter 8, *Monitoring and evaluation*, presents the key data to be collected and analysed during an epidemic to facilitate a tailored response and evaluate its quality and effectiveness.

The guide includes various practical tools in the appendices to facilitate activities (e.g. water quality tests, job descriptions, documents, etc.). Moreover, the [toolbox](#) also contains additional tools in editable formats (individual patient file, cholera case register, pictograms).

Despite all efforts, it is possible that certain errors may have been overlooked in this guide. Please inform the authors of any errors detected.

To ensure that this guide continues to evolve while remaining adapted to field realities, please send any comments or suggestions.

As treatment protocols are regularly revised, please check the [updates](#).

## **Abbreviations and acronyms**

°C	Degree Celsius
CFR	Case fatality rate
CFU	Colony forming unit
CTC	Cholera treatment centre
CTU	Cholera treatment unit
FRC	Free residual chlorine
IO	Intraosseous
IV	Intravenous
MSF	Médecins Sans Frontières
NTU	Nephelometric turbidity unit
NGO	Non-governmental organization
OCV	Oral cholera vaccine
ORP	Oral rehydration point
ORS	Oral rehydration salts or solution
PPE	Personal protective equipment
RDT	Rapid diagnostic test
RL	Ringer lactate
UNICEF	United Nations Children's Fund
WHO	World Health Organization
WIR	Weekly incidence rate



# Chapter 1: Cholera overview

[1.1 Introduction and epidemiology](#)

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## 1.1 Introduction and epidemiology

### 1.1.1 Definition

Cholera is an acute, highly transmissible, intestinal infection caused by toxigenic bacteria *Vibrio cholerae* O1 and O139. In its severe form, cholera is characterized by a sudden onset of acute voluminous watery diarrhoea that can rapidly lead to dehydration and death if left untreated.

### 1.1.2 Frequency and distribution

Cholera cases occur in all regions of the world, but many countries, including highly endemic countries, do not report cholera cases to the World Health Organization (WHO). However, it has been estimated that 1.3 to 4 million cholera cases and 21 000 to 143 000 deaths occur every year worldwide<sup>[1]</sup>.

In 2015, Africa accounted for 40% of all cholera cases reported to the WHO (compared with 93% to 98% between 2001 and 2009), Asia reported 38% and the Americas 21% (principally Haiti, the Dominican Republic, and Cuba)<sup>[2]</sup>. The reduced proportion of African cases since 2010 is a consequence of the dramatic appearance of cholera in the Caribbean region in that year. From the onset of the outbreak in October 2010 until the end of 2016, almost 800 000 cases and over 9400 deaths have been reported<sup>[3]</sup>.

Latin America was hit with several large epidemics in the 1990's. Cases reported in Europe are almost all imported.

### 1.1.3 Aetiological agent

#### Characteristics

*Vibrio cholerae* is a gram-negative, curved rod-shaped, motile, non-invasive bacterium. It produces a toxin which is responsible for the voluminous diarrhoea characteristic of the illness.

*Vibrio cholerae* can survive one to two weeks in water, several days in moist alkaline food at ambient temperature, and longer when the food is refrigerated or frozen<sup>[4]</sup>.

On the other hand, *Vibrio cholerae* does not tolerate acid or dry conditions<sup>[5]</sup>. Boiling water assures complete killing.

Chlorine is effective against *Vibrio cholerae* under the following conditions: turbidity is sufficiently low, contact time is respected, and free residual chlorine level is achieved and maintained.

## Nomenclature

*Vibrio cholerae* strains are classified in serogroups based on differences in the O-antigen. Although many serogroups can cause individual cases of mild gastroenteritis or extra-intestinal infections, only toxin-producing strains of serogroups O1 and O139 are responsible for cholera epidemics.

**Serogroup O1** is divided into 2 biotypes: *classical* and *El Tor*.

- The *classical* biotype is thought to be responsible for the first 6 cholera pandemics (19<sup>th</sup> and 20<sup>th</sup> centuries).

- The *El Tor* biotype is responsible for the current 7<sup>th</sup> pandemic (since 1961).

Both biotypes are further divided into 3 serotypes: *Inaba*, *Ogawa*, and the rare *Hikojima*.

**Serogroup O139** emerged in 1992 in Bangladesh, most likely evolving from O1 *El Tor*. This strain has remained almost exclusively within south and south-eastern Asia.

## 1.1.4 Transmission

### Reservoirs

#### Aquatic environment

Vibrios are natural inhabitants of marine and freshwater aquatic environments. They survive by associating with plants, zooplankton and crustaceans and can be found in shellfish and certain fish.

They are able to enter into a quiescent survival state when environmental conditions are not favourable for growth and reproduction.

#### Humans

During periods of active transmission, humans are the principal reservoir for the pathogen.

Transmission is maintained by passage from infected individuals to others through the faecal-oral route.

The faeces of a symptomatic individual contain  $10^7$  to  $10^8$  vibrios/ml; i.e. a quantity sufficient to cause infection<sup>a[6]</sup>. As an individual may produce litres of diarrhoea while ill, the load of transmissible infectious material is enormous. The shedding of bacteria typically ends within 7 to 10 days. Chronic carriers are thought to be rare.

An asymptomatic infected individual can shed vibrios in the stool in low but potentially infectious concentrations ( $10^3$  to  $10^5$ /ml) for several days.

### Modes of transmission

Cholera is most commonly acquired from drinking water in which *Vibrio cholerae* is found naturally or that has been contaminated by the faeces of an infected individual.

Transmission may also occur by eating food that has come into contact with human faeces. Food may be contaminated when prepared with contaminated water or kitchen utensils, or mixed with other contaminated food, or handled by infected persons in unhygienic conditions. Low temperatures favour the survival of *Vibrio cholerae* in food. Foods including cold rice, raw vegetables, ice cream and fruits, have been implicated in cholera outbreaks.

Less commonly, undercooked or uncooked molluscs, shellfish and crustaceans contaminated in their natural environment have been implicated in cholera outbreaks.

Direct transmission from person-to-person (i.e. vibrios ingested via faeces-contaminated hands) is generally thought to be less common<sup>[7]</sup> but can occur, particularly within households.

## 1.1.5 Factors favouring infection

### Pathogen factors

The classical O1 biotype produces a cholera toxin that is qualitatively and quantitatively different than that of El Tor O1 biotype, with a higher proportion of infected individuals developing symptoms and severe disease, while El Tor O1 biotype tolerates a wider range of environmental conditions and is thought to persist longer in the environment.

Since the early 1990's, a variant strain of El Tor producing the classical cholera toxin has been circulating. This strain combining the "strengths" of both biotypes emerged on the Asian subcontinent and has spread to Africa and the Caribbean. Reviews of case data from outbreaks caused by this variant have shown a higher proportion of people with severe disease compared to the original El Tor strain<sup>[8]</sup>.

### Host factors

#### Specific host factors

- Patients with O blood type<sup>b</sup> have increased susceptibility to severe cholera infection<sup>[9]</sup>.
- Gastric acid acts as an important barrier against cholera infection. A decrease in gastric acidity due to pre-existing pathology or concurrent use of H2 receptor blockers or proton pump inhibitors increases susceptibility to infection.

*Note:* food also acts as an acid buffer and facilitates the passage of vibrios through the stomach.

#### Immune response induced by previous infection or vaccination

Introduction of vibrios into the intestinal tract stimulates both a local and systemic immune response. This provides natural immunity<sup>c</sup> which is limited in duration (from 6 months to several years) depending on the individual immune response.

Oral cholera vaccine induces immunity in the same manner.

In endemic areas, attack rates in infants and children are higher compared to other age groups as they have not yet developed the immunity that comes with repeated exposure. Where cholera occurs infrequently or is unknown, all age groups are equally susceptible.

## 1.1.6 Factors triggering epidemics

Depending on context, cholera epidemics are triggered by a variety of factors.

### Cholera endemic areas

The WHO defines a cholera endemic area as an area where bacteriologically confirmed cholera cases, resulting from local transmission, have been detected in the last 3 years<sup>[10]</sup>.

An area can be defined as any subnational administrative unit including state, district or smaller localities.

*Note:* any country that contains one or more subnational administrative units that are endemic, as defined above, is considered a cholera-endemic country.

In these areas, seasonal or sporadic epidemics (or “peaks” when cholera cases persist throughout the year) can occur with some degree of predictability if the initial source of *Vibrio cholerae* is the aquatic reservoir. Infections typically start after periods of increased sunlight and temperature coinciding with specific water characteristics (alkalinity, salinity, temperature). These conditions promote cholera-associated plant and zooplankton growth, generating sufficient concentrations of activated bacteria to serve as an infectious source. Persons infected from this environmental source introduce the pathogen into the population and an epidemic starts.

It has also been postulated that *Vibrio cholerae* can be maintained in an endemic zone between seasonal outbreaks by low level transmission from asymptomatic or mildly symptomatic carriers<sup>[11]</sup>.

### Cholera non-endemic areas

Cholera epidemics may also occur where *Vibrio cholerae* is not endemic. Such epidemics are initiated by the introduction of the bacteria through human activity, including importation by individuals infected elsewhere.

### Seasonal factors

In some regions, epidemics occur in dry seasons. In this context, the absence of water increases the likelihood that a single contaminated water source would contaminate many people.

Elsewhere, epidemics occur in rainy seasons, where run-off can disperse contaminated faeces left by open defecation into multiple water sources.

### Poor, overcrowded living conditions

In addition, the likelihood of an epidemic after the introduction of *Vibrio cholerae* into a population is enhanced by conditions favouring wide-spread transmission, i.e. poor living conditions (inadequate sanitation, potable water supply and hygiene) and high population density.

## 1.1.7 Major cholera outbreak characteristics according to context

	<b>Rural settings</b>	<b>Urban settings and slums</b>	<b>Closed situations (refugee camps)</b>
Population density	Low, scattered	High	High to very high
Population number	High	High	Small
Typical attack rate <sup>(a)</sup>	0.1 to 2%	1 to 5%	1 to 5%
Peak reached after	1 to 3 months	2 to 8 weeks	2 to 4 weeks
Epidemic duration	3 to 6 months	2 to 4 months	1 to 3 months
Case fatality ratio <sup>(b)</sup>	< 5%	2 to 5%	< 2%

(a) Attack rates (AR) can be higher in extreme cases (e.g. Goma, Haiti).

(b) Expected case fatality ratio (CFR) when treatment is available.

*Source: Review of MSF programs in cholera epidemics, 1990-1997 (Epicentre)*

In sparsely populated rural areas, epidemic patterns are: low AR, long duration of outbreak, late appearance of the peak and high CFR.

In urban setting, slums and refugee camps, the AR is high because population density facilitates transmission. In refugee camps, the duration of the outbreak and time to peak is shorter because the population is fixed, generally smaller, and prevention measures are usually more easily implemented. Similarly, the CFR tends to be lower because access to care is easier for the vast majority of the population.

## **Notas**

- (a) The infectious dose (i.e. the number of bacteria that need to be ingested to cause disease), ranges from  $10^3$  to  $10^8$  cells depending on mode of transmission and pathogen and host factors.
- (b) Individuals with O blood type are more likely to have severe symptoms if infected with O1 El Tor and O139 cholera strains. This relationship does not hold for infections with classical O1 cholera.
- (c) There is no cross protection between O1 and O139 infections. Infections with El Tor Inaba strain provides cross protection for subsequent infection by the Ogawa strain but Ogawa provides significantly less protection against Inaba infection.

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# 1.2 Disease presentation and clinical course

## 1.2.1 Clinical features

The incubation period ranges from a few hours to 5 days.

Depending on the strain involved, 60 to 75% of infections remain clinically unapparent. Among symptomatic patients, at least 25 to 30% have severe disease but this proportion may be higher.

The initial manifestation is diarrhoea. Stools quickly lose their faecal content, taking on a characteristic “rice water” appearance and contain no blood.

Symptoms can range from simple watery diarrhoea to massive watery diarrhoea with losses of up to 500 to 1000 ml/hour in severe disease<sup>a</sup>. The total stool output over 3 to 4 days of illness can reach 500 ml/kg.

Vomiting is often present, and is typically colourless without bile. Abdominal discomfort may be present but severe cramping is not a feature.

There is usually no fever; low-grade fever is possible, but as cholera does not induce a systemic inflammatory response, temperatures above 38 °C (axillary) should prompt a search for another cause of fever.

Continuing diarrhoea and vomiting cause volume depletion and further clinical signs and symptoms are those of increasing dehydration:

- Patients present with sunken eyes, dry mucous membranes and decreased skin turgor.
- The pulse becomes more rapid, then weak, and eventually non-palpable.
- Blood pressure drops progressively.
- Patients show deterioration in the level of consciousness (lethargy).
- Patients may arrive unconscious, in hypovolaemic shock.

In severe disease, cardiovascular collapse and death can occur within 12 to 72 hours without therapy<sup>[1]</sup>.

The large volume watery stools containing sodium, chloride, bicarbonates, and potassium contribute to acidosis and hypokalaemia.

Bicarbonate loss (40 mmol/litre of stool) and lactate production are responsible for a nearly universal metabolic acidosis in patients with severe dehydration. This acidosis is quickly corrected with appropriate rehydration fluid.

Potassium loss (20 mmol/litre of stool) also occurs and some degree of hypokalaemia is usually present. Clinical and biochemical evidence of hypokalaemia may be more apparent after 24 hours of rehydration therapy, particularly if ORS has not been used in rehydration.

## 1.2.2 Clinical diagnosis

At the beginning of the outbreak, laboratory investigations are performed in a group of patients presenting with compatible clinical signs of cholera, to confirm whether *Vibrio cholerae* is the causative pathogen and determine the sensitivity of the strain to antibiotics.

Once the cholera outbreak has been bacteriologically confirmed, diagnosis of subsequent cases relies on clinical case definition<sup>b</sup> and clinical assessment only. A sudden onset of severe watery diarrhoea during a cholera epidemic is highly predictive of cholera.

## 1.2.3 Prognosis and case fatality rate

Without treatment, the prognosis of severe cholera is poor, with up to a 50% mortality rate.

In contrast, the case fatality rate in cholera cases treated in a well-functioning treatment structure is typically 1% or less.

### Notas

- (a) After ingestion, vibrios pass through the gastric acid barrier and adhere to the mucosa of the upper small intestine without penetrating it. They secrete cholera toxin, which binds to mucosal receptors and is transported into the cell where it activates the enzyme adenylate cyclase, increasing cyclic adenosine monophosphate (cAMP). As a result, a shift in cell membrane ion transport occurs, with a net increase in ion concentration (mainly chloride and sodium) within the intestinal lumen. Water is drawn into the lumen in response to the increased ion concentration leading to the voluminous watery diarrhoea characteristic of cholera.
- (b) Cholera surveillance and early warning systems rely also on the standard clinical case definition for a presumptive diagnosis of cholera.

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# Chapter 2: Outbreak investigation

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# 2.1 Introduction

When suspected cholera cases trigger an alert in a given location, an on-site investigation should be carried out to determine if there is an outbreak and to describe the population and context in which the outbreak is occurring.

The key elements of the investigation are microbiologic confirmation in clinically relevant cases, assessment of case management, evaluation of the capacity of local institutions to manage an outbreak, and the description of the population, its cholera history, and the risk factors that will determine the type and scale of a response.

The final step of an investigation is to write a report describing the situation based on direct observation in the facility and the community and analysing the current and historical data to provide recommendations for action.

# 2.2 Cholera alerts

## 2.2.1 Alert definitions

An alert should be triggered when one of the following events occurs, as defined by the World Health Organization (WHO).<sup>[1]</sup>

### WHO suspect case definitions for a cholera alert

a) Two or more people aged 2 years and older (linked by time and place) with acute watery diarrhoea and severe dehydration or dying from acute watery diarrhea from the same areas within one week of one another.

OR

b) One death from severe acute watery diarrhoea in a person at least 5 years old.

OR

c) One case of acute watery diarrhoea testing positive for cholera by rapid diagnostic test<sup>a</sup> in an area (including those at risk for extension from a current outbreak) that has not yet detected a confirmed case of cholera.

Alerts may come from many sources, including a national surveillance system, supervisors and managers of health facilities or even the local media.

## 2.2.2 Alert verification

Regardless of source, alerts should be verified (by telephone, in general) and followed by an onsite investigation if the alert is credible.

### Notas

- (a) MSF does not use these cholera rapid diagnostic tests in its programmes as none of them are prequalified (see [Section 2.4.2](#))

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## 2.3 Initial on-site investigation

Once an alert has been verified, the on-site investigation should be undertaken within 24 hours.

### 2.3.1 Preparation of the investigation

Ideally the investigation team is composed of a doctor or nurse and a logistician and/or a water/sanitation specialist. Each team member should have determined tasks in the investigation. If creating such a team is not immediately possible, the investigation should not be delayed and a single person can conduct the investigation if s/he is experienced.

Prepare medical supplies for diagnosis ([Appendix 1](#)) and treatment of some cholera cases ([Appendix 2](#)).

Contact local Ministry of Health and governmental representatives. Explain the reason for the investigation and request authorization and assistance (access to all sites, persons and data necessary to complete the investigation).

Consider a visit to surrounding villages or health posts to help determine the extent of the problem.

### 2.3.2 Investigation inside the health facility

– Clinical examination ([Section 2.4.1](#)) and stool sample collection ([Section 2.4.2](#)) for diagnosis confirmation.

- Capacity of the health facility to respond immediately to the needs, and quality of care:
  - Number of current beds and potential bed capacity;
  - Available human resources (medical and non-medical) and prior experience with cholera case management;
  - Use of standard case definition and treatment protocols;
  - Hygiene practices (isolation, hand-washing, etc.);
  - Stock of drugs and medical supplies, logistic materials, and supply chain;
  - Water supply (quantity and quality, [Appendix 17](#));
  - Number of latrines and showers, solid waste and waste water management systems.
- Current data on cholera cases and deaths (and, if available, historical data; however these data may be available at the central level only).
- Accessibility of the treatment facility (location, transportation, security, fee for service, etc.).

### 2.3.3 Investigation outside the health facility

- Local demographic data (these data may be available at the central level only).
- Factors contributing to an epidemic:
  - High population density (camps and slums);
  - Gathering places (markets, transportation hubs, schools, and other congregate settings);
  - Sources of drinking water potentially contaminated (unprotected wells, surface water, street vendors, etc.);
  - Poor water quality (excessive turbidity and absence of free residual chlorine, see [Section 3.3.3](#) and [Appendix 17](#));
  - Poor sanitation (open defecation, poorly maintained public latrines, broken sewer pipes, etc.);
  - Current meteorological conditions (rain, flooding, drought, etc.).
- Presence, capacity and role of other actors (organizations, associations, etc.).

For each place visited, draw a map to locate settlements, health facilities, water sources (indicate whether they are treated/protected or not), gathering places, and major transportation routes.

### 2.3.4 Immediate actions

- If patients are deemed to be at risk due to gaps in:
  - Supplies:
 

Essential medical material should be provided: as a minimum Ringer lactate (RL), catheters, infusion sets and other infusion supplies (compresses, tourniquet, antiseptic, tape, etc.) and oral rehydration salts (ORS), as well as doxycycline for prescription in appropriate cases.
  - Case management:
 

The doctor or nurse of the investigation team should provide direct patient care and rapid bedside training.
- If suspected cases are not isolated, put them together in a separate area to prevent exposure to others.
- If there is no cholera-specific register, set one up ([Appendix 3](#)).

*Note:* as cholera outbreaks move with populations it is important to remain flexible. It will likely be necessary in most open settings to continue similar investigations in new neighbourhoods or villages throughout the epidemic.

## 2.4 Diagnosis confirmation

### 2.4.1 Clinical examination

The doctor or nurse of the investigation team should examine suspect cases and verify that the clinical signs are compatible with cholera: acute watery diarrhea (3 or more liquid stools in 24 hours) with no visible blood in the stool, with or without vomiting and/or dehydration.

Laboratory investigations are to be performed in those presenting with compatible clinical signs.

### 2.4.2 Laboratory investigations

At this stage, laboratory investigations are carried out to confirm the causative agent and determine the sensitivity of the strain to antibiotics.

#### Rapid diagnostic tests (RDTs)

RDTs are intended to screen suspect cases to determine if *Vibrio cholerae* O1 or O139 might be the causal agent. However, only culture can confirm the etiological diagnosis.

There is no evidence-based recommendation for the number of RDT to perform for optimal detection of cholera transmission. In addition, none of the currently available RDTs is pre-qualified by the WHO.

As long as there are no pre-qualified RDTs, this guide recommends collecting stool sample for microbiological diagnosis without prior RDT screening.

#### Culture of stool specimens

– Stool specimens ([Appendix 1](#)) are sent to a properly equipped microbiology laboratory to:

- Confirm cholera;
- Identify the strain (serogroup/biotype/serotype);
- Assess antibiotic sensitivity.

– 4 to 10 stool samples should be sent to the reference laboratory.

– Check with the laboratory for preferred transport media (filter paper or Cary-Blair).

#### Notes:

– Management of cases of acute watery diarrhoea should not wait for microbiologic confirmation of cholera.

– During an outbreak, cultures and antibiotic susceptibility testing on 3 to 5 patients should be repeated monthly to confirm the on-going presence of *Vibrio cholerae* and to determine any changes in antibiotic susceptibility patterns. When the number of cases decreases progressively and the end of the outbreak seems to be imminent, these tests should be performed each week.

# 2.5 Data collection and organization

## 2.5.1 Data collection

Several types of data will need to be collected:

### Current cholera data

- When suspect cases first began to arrive;
- Daily number of cases and deaths (children < 5 years and children  $\geq$  5 years and adults) up to the time of the visit.

If available, collect the number of cases by patient origin (e.g. neighborhood, city, district, and region) for case mapping.

This information can be found in a general activity register or a cholera-specific register.

If a cholera-specific register is already in place, ensure that it is up-to-date and all the required data are being recorded ([Appendix 3](#)).

### Historical cholera data

For each previous outbreak in the area:

- Total number of cases and deaths;
- Date of onset and the duration.

These historical data are useful at this initial stage to estimate the potential size, severity and duration of the current outbreak. They can also indicate whether specific neighbourhoods and cities/villages tend to be affected with every outbreak. These data can usually be found with the local health authorities or at the central level.

### Demographic data

Demographic data of the affected and at-risk population (number of people in the neighborhood, city or village) as well as from larger administrative areas (e.g. district and region) in the likelihood that cholera will extend to other populations in the vicinity.

## 2.5.2 Data organization

(by person, time and place)

### By person (individual characteristics)

The number of cases and deaths per age group (< 5 years and  $\geq$  5 years) for each health facility are the only essential data needed at this stage. With these figures, the overall case fatality rate (CFR) can be calculated.

### **By time**

The number of cases and deaths is reported each day. Draw an epidemic curve (bar graph) plotting the number of cases and the CFR per day up to the time of the investigation, then throughout the epidemic ([Section 2.7.1](#)).

If there is more than one local health facility reporting cases within the administrative area being investigated (city, district, region, etc.), a single graph combining the data from all these facilities will suffice for initial reporting purposes.

### **By place**

If information on patient origin is available, the total number of patients coming from each distinct location should be used for case mapping ([Section 2.7.1](#)).

## **2.6 Data analysis**

An analysis of the data collected at this point will be used to determine if a cholera outbreak is underway, to estimate the risk of a severe outbreak, to determine the potential benefit of vaccination against cholera, and to evaluate the treatment resource needs.

### **2.6.1 Defining an outbreak**

In general, a cholera outbreak is defined as any increase in the number of cholera cases compared to the expected number for a given place over a particular period of time.

#### **In areas with no history of cholera**

The appearance of any case or cluster of cases of acute watery diarrhoea meeting the cholera case definition, and subsequently confirmed by culture, can be considered an outbreak.

#### **In areas where cholera is known to occur**

The Ministry of Health usually has a national definition of a cholera outbreak.

If not, a definition can be established using current and/or historical data:

- If there are no historical data: for a given location, a doubling of the number of cases meeting the clinical case definition of cholera over 2 to 3 consecutive weeks can be considered an outbreak.
- If data from previous years are available (same calendar period and location): calculate the average number of expected cases per week in non-epidemic periods. An increase in the weekly average number of cases above this non-epidemic average indicates a developing outbreak.

In all cases, the definitive declaration<sup>a</sup> of an outbreak depends on culture confirmation.

### **2.6.2 Estimating outbreak severity**

Determine the level of risk an outbreak poses to the population in terms of morbidity, mortality, probability of extension.

Risk factors<sup>[1]</sup> to consider are:

- History of outbreaks with high attack rates, high case fatality rates, or large geographical extension.
- No outbreak in the preceding 2-3 years (loss of innate immunity from prior infection).
- Divergence from the pattern typical of previous outbreaks: onset prior to the usual season, location in an area where outbreaks were previously unknown, early involvement of a large number of individuals affected, early geographic extension, or outbreaks in multiple locations.
- Emergence in population-dense communities (e.g. slums, refugee camps) or in mobile populations, either coming from an area with no prior history of cholera (no natural immunity) or from a cholera-endemic area (importation of *Vibrio cholerae* by asymptomatic carriers).
- Current meteorological conditions outside the norm (either very rainy or very dry).
- Disruption of water and sanitation systems or access to care or lack of human resources to manage the outbreak due to economic collapse, natural disaster, conflict, etc.

The level of risk for a severe outbreak grows as the number of risk factors increases.

## 2.6.3 Evaluating the potential benefit of cholera vaccination

The use of cholera vaccines in response to an epidemic requires a rapid analysis of the current and historical data. The aim is to assess the likely benefit of a reactive vaccination campaign and to make a request to the International Coordination Group on vaccine provision if the campaign is presumed beneficial and feasible ([Section 3.6](#) and [Section 4.6](#)).

### Notas

- (a) In principle, it is the national authorities who officially declare an epidemic (or its end) in their country.

### Referencias

1. World Health Organization. Guidance on how to access the Oral Cholera Vaccine (OCV) from the ICG emergency stockpile, Geneva, 2013.  
[http://www.who.int/cholera/vaccines/Guidance\\_accessing\\_OCV\\_stockpile.pdf?ua=1](http://www.who.int/cholera/vaccines/Guidance_accessing_OCV_stockpile.pdf?ua=1)

# 2.7 Estimation of treatment resource needs

## 2.7.1 Number of patients expected

Estimate the number of cases that can be expected in the outbreak to determine the resources needed for case management.

The calculation requires applying a representative attack rate (AR) to the total population of the at-risk community. An appropriate AR can be obtained from previous outbreaks in the area.

If historical data are not available or are deemed to be incomplete or unreliable, an AR typical for the given context can be chosen ([Section 1.1.7](#)).

Keep in mind that an AR derived from historical data or selected as typical for the specific context is only an approximation.

An outbreak can be expected to be severe if it occurs earlier in the season than usual or if a large number of people or locations are affected during the first weeks.

For an example of calculation of the number of expected cases, see [Box 2.1](#).

## 2.7.2 Peak bed capacity

Sufficient bed capacity is essential, particularly at the peak of the epidemic. Estimating peak bed capacity while still in the early phase of an outbreak gives planners and logistic services an idea of the size and number of cholera facilities that will be required.

The calculation of peak bed capacity is based on the total number of patients expected and the following assumptions derived from previous experience:

- 25-30% of patients will have severe dehydration, 30-40% some dehydration, and 30-40% no dehydration.
- All patients with severe dehydration and approximately half of patients with some dehydration will need a bed for at least a night.

Based on these two first assumptions, approximately 50% of all cholera patients seeking medical care will need a bed.

- The combined average length of stay for patients hospitalized with some and severe dehydration is 2 days (length of stay can be shorter in settings with easy access to care and longer in settings with difficult access or more complicated patients such as the elderly or pregnant women).
- Approximately 15-20% of patients will seek medical care during the peak week (less for rural settings, more for crowded urban settings).

These estimated values can be adjusted to fit the local context if sufficiently reliable detailed data from prior outbreaks are available.

For an example of calculation of peak bed capacity required, see [Box 2.1](#).

**Box 2.1** - Number of expected cases and peak bed capacity required



## Examples of calculations according to the context

### Refugee camp

Population of 30 000. Attack rate: 5%. Proportion of caseload admitted during 1 week at the peak of the outbreak: 20%. Average length of stay: 2 days. Proportion of cases needing a bed: 50%.

$30\,000 \times 0.05 = 1500$  cases in total

$1500 \times 0.20 = 300$  cases during 1 week at peak

$300 \times 0.50 = 150$  cases requiring a bed during 1 week, or 21 cases per day (150/7)

$21 \times 2$  days = 42 total bed capacity at peak

==> 1 CTC with 50 beds

### Urban area

Population of 600 000. Attack rate: 2%. Proportion of caseload admitted during 1 week at the peak of the outbreak: 15%. Average length of stay: 2 days. Proportion of cases needing a bed: 50%.

$600\,000 \times 0.02 = 12,000$  cases in total

$12\,000 \times 0.15\% = 1800$  cases during 1 week at peak

$1800 \times 0.50 = 900$  cases requiring a bed during 1 week, or 128 cases per day (900/7)

$128 \times 2$  days = 257 total beds at peak

==> 250 beds distributed among 2 CTCs

### Rural area

Population of 200 000. Attack rate: 1%. Proportion of caseload admitted during 1 week at the peak of the outbreak: 15%. Average length of stay: 2.5 days. Proportion of cases needing a bed: 50%.

$200\,000 \times 0.01 = 2000$  cases in total

$2000 \times 0.15\% = 300$  cases during 1 week at peak

$300 \times 0.50 = 150$  cases requiring a bed during 1 week, or 21 cases per day (150/7)

$21 \times 2.5$  days = 52 total beds at peak

==> 50-60 beds distributed among 3-5 CTUs

## 2.7.3 Treatment supplies

### Items for curative care

The initial estimation of needs is based on the number of expected cases, taking into account known available existing stock, if any.

The calculations presented in the [Table 2.1](#) are based on the following standards: 10 litres of ORS per patient, 8-10 litres of RL per patient with severe dehydration, 1 infusion set for 2 litres of RL, 1 catheter for 3 litres of RL, an antibiotic therapy for patients with some (= moderate) and severe dehydration, zinc sulfate for all children under 5 years.

**Table 2.1** - Examples of calculations for determining medication supply needs

<b>Refugee camp</b>	<b>Estimated %</b>	<b>Number of cases (population 30 000)</b>	<b>Essential items for rehydration</b>
<b>Attack rate</b>	5%	$30\,000 \times 0.05 = 1500$	—
<b>No dehydration</b>	40%	$1500 \times 0.40 = 600$	10 l ORS x 600 cases = 6000 sachets ORS
<b>Some dehydration</b>	35%	$1500 \times 0.35 = 525$	10 l ORS x 525 cases = 5250 sachets ORS
<b>Severe dehydration</b>	25%	$1500 \times 0.25 = 375$	10 l ORS x 375 cases = 3750 sachets ORS 10 l RL x 375 cases = 3750 litres RL + 1900 infusion sets + 1300 catheters
			<b>Complementary treatments</b>
<b>Doxycycline</b>	60%	$1500 \times 0.60 = 900$	3 tab x 900 cases = 2700 tab
<b>Zinc sulfate</b>	20%	$1500 \times 0.20 = 300$	10 tab x 300 cases = 3000 tab
<b>Urban area</b>	<b>Estimated %</b>	<b>Number of cases (population 600 000)</b>	<b>Essential items for rehydration</b>
<b>Attack rate</b>	2%	$600\,000 \times 0.02 = 12\,000$	—
<b>No dehydration</b>	40%	$12\,000 \times 0.40 = 4800$	10 l ORS x 4800 cases = 48 000 sachets ORS
<b>Some dehydration</b>	35%	$12\,000 \times 0.35 = 4200$	10 l ORS x 4200 cases = 42 000 sachets ORS
<b>Severe dehydration</b>	25%	$12\,000 \times 0.25 = 3000$	10 l ORS x 3000 cases = 30 000 sachets ORS 10 l RL x 3000 cases = 30 000 litres RL + 15 000 infusion sets + 10 000 catheters
			<b>Complementary treatments</b>
<b>Doxycycline</b>	60%	$12\,000 \times 0.60 = 7200$	3 tab x 7200 cases = 22 000 tab

<b>Zinc sulfate</b>	20%	$12\ 000 \times 0.20 = 2400$	10 tab x 2400 cases = 24 000 tab
<b>Rural area</b>	<b>Estimated %</b>	<b>Number of cases</b> (population 200 000)	<b>Essential items for rehydration</b>
<b>Attack rate</b>	1%	$200\ 000 \times 0.01 = 2000$	—
<b>No dehydration</b>	30%	$2000 \times 0.30 = 600$	10 l ORS x 600 cases = 6000 sachets ORS
<b>Some dehydration</b>	40%	$2000 \times 0.40 = 800$	10 l ORS x 800 cases = 8000 sachets ORS
<b>Severe dehydration</b>	30%	$2000 \times 0.30 = 600$	10 l ORS x 600 cases = 6000 sachets ORS 10 l RL x 600 cases = 6000 litres RL + 3000 infusion sets + 2000 catheters
			<b>Complementary treatments</b>
<b>Doxycycline</b>	70%	$2000 \times 0.70 = 1400$	3 tab x 1400 cases = 4200 tab
<b>Zinc sulfate</b>	20%	$2000 \times 0.20 = 400$	10 tab x 400 cases = 4000 tab

### Buffer stock

A buffer stock of at least 2 weeks should be added from the start (and maintained for the duration of the epidemic). This period can be prolonged (e.g. 3 weeks) for zones that are difficult to access or in case of supply difficulties.

For example, in a refugee camp, 1500 patients are expected (21 patients per day at peak): add the treatment of 300 patients (21 cases x 14 days = 294 patients) or 20% of patients (300 = 20% of 1500). Among these 300 patients, 75% (225 patients) will be treated by oral route only and 25% (75 patients) by oral and IV route.

### Total estimated quantities

Thus it is estimated that in this refugee camp the following may be needed during the epidemic (rounded quantities):

	<b>For expected cases</b>	<b>Buffer stock</b>	<b>Total</b>
<b>ORS sachets</b>	15 000	3000	18 000 sachets of ORS
<b>RL litres</b>	3750	750	4500 litres of RL
<b>Infusion sets</b>	1900	375	2300 infusion sets
<b>Catheters</b>	1250	250	1500 catheters

## 2.8 Investigation report

The report will be composed in three parts: description, analysis and recommendations.

It should be short (2 to 3 pages) but sufficiently detailed to inform decisions on further action.

It must be dated and the name of the country and the region specified, as well as the author's (or authors') name and position.

### 2.8.1 Description

#### General context

- Dates and sites visited
- Type of setting: rural, urban, closed (internally displaced people or refugee camp)
- Current public health concerns in the population (malnutrition, concurrent non-diarrheal epidemic illnesses, etc.)
- Existing health facilities
- Conditions of access and travel times
- Security concerns and population movements

Add the map drawn during the on-site investigation.

#### Past cholera history and historical data at local and national levels

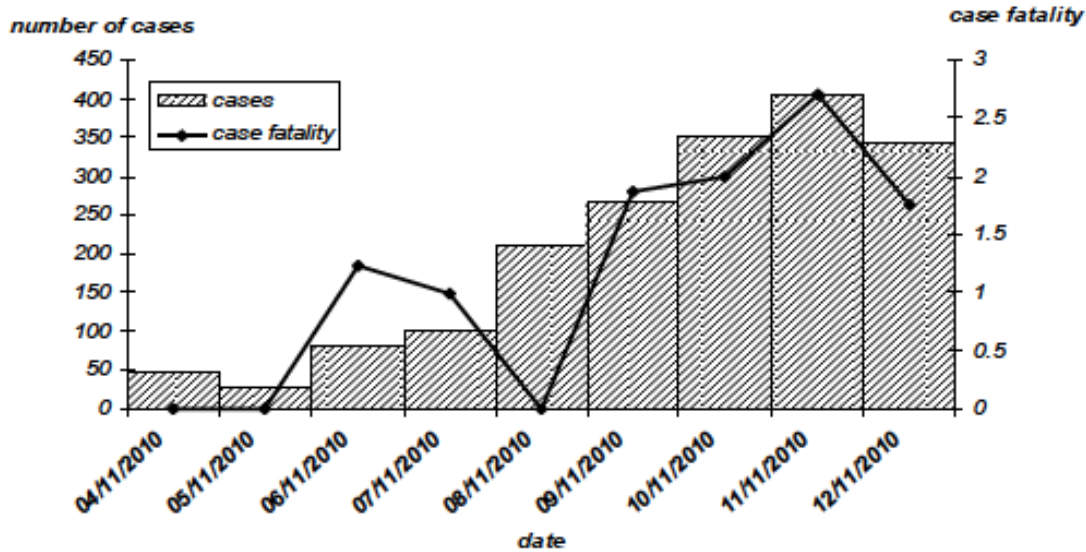
- No prior history of cholera
- Irregular outbreaks occurring every few years
- Seasonal (occurring in the rainy or dry season?) and current season

List locations typically affected and the attack rates (from several outbreaks, if available).

#### Current epidemiological situation

- Case definition used to identify the suspect cases
- Date when the first suspect case was identified
- Total number of cases and deaths to present
- Current attack rate and case fatality rate (include an epidemiologic curve)

**Figure 1** - Example - Daily cholera cases and CFR, Port au Prince, Haiti, November 2010.



Source: Ministry of Public Health and Population - Haiti/MSF

- Geographical distribution of cases (case mapping): if the current cholera data included patient origin, the number of cases coming from distinct populations (neighbourhood, village, or district) can be added to the map described in General Context. If cases are concentrated in a specific area, propose explanations as to why<sup>a</sup>.

### Confirmation of the diagnosis

Indicate:

- If suspect cases conform to standard clinical case definition for cholera;
- The number of stool samples collected for culture and to which laboratory samples were sent. If a culture result is known, indicate the strain and drug sensitivity.

### Health facility response capacity

- Indicate if:
  - The current number of beds (or the potential bed capacity) is sufficient with respect to the expected number of cases;
  - The current number of medical and non-medical staff is sufficient and if they have previous cholera experience;
  - The quality of medical care provided is acceptable and standardized treatment protocols are used;
  - Hygiene practices being observed (isolation of cholera patients from other patients; appropriate hand-washing) are acceptable;
  - The stock of RL and ORS is sufficient to cover the immediate needs and there is a functioning supply chain to efficiently renew stock;
  - Water is potable (include any water quality test results), the quantity available is sufficient (around 60 litres/person/day) and the water point(s) is on-site;
  - There is sufficient number of functioning and clean latrines (at least one latrine for 20 patients).
- Describe any site-specific problems or constraints encountered.

### **Response capacity outside the health facility**

- Indicate:
  - If there are other facilities capable of providing cholera case management (and the number);
  - The locations that could be used if current facilities are insufficient or poorly adapted;
  - If the local authorities have officially declared a cholera outbreak.
- Describe the principle water sources, if they are accessible, quantities available and water quality. Include any water quality test results.

## **2.8.2 Analysis**

- State whether a cholera outbreak is unlikely, probable (based on the number of patients fulfilling the case definition), or confirmed (based on culture results).
- Determine the level of risk of a severe outbreak, according to the risk factors described in [Section 2.6.2](#).
- Estimate the number of cases expected.
- Estimate the quantity of essential medical and logistic (tents, beds, equipment for water/sanitation, etc.) supplies needed.
- Determine the response capacity of the health system and other actors present and identify the gaps.
- Evaluate the potential place of reactive vaccination ([Section 4.7](#)).

## **2.8.3 Recommendations**

Propose the curative and preventive interventions to prioritize for each geographic area investigated based on the analysis. See [Chapter 3](#) and [Chapter 4](#).

*Note:* if there is no cholera outbreak, strengthen diarrhoeal disease surveillance and establish cholera preparedness plan if not yet done.

## Notas

- (a) Mapping of cases may give an indication of the likely source of *Vibrio cholerae*. For example, the sudden appearance or augmentation of cases in a single location may indicate that individuals were infected at the same place at approximately the same time such as, for example, the same water point.

# Chapter 3: Cholera control measures

## [3.1 Introduction](#)

## [3.2 Case identification and management](#)

## [3.3 Supply of safe water](#)

## [3.4 Hygiene](#)

## [3.5 Sanitation activities](#)

## [3.6 Vaccination against cholera](#)

## [3.7 Antibiotic prophylaxis](#)

## [3.8 Health promotion](#)

## 3.1 Introduction

The aim of cholera control measures is to reduce mortality amongst affected populations as well as the transmission of cholera in at risk or affected populations.

Actions and activities implemented to specifically reduce mortality are the rapid detection and early effective treatment of cases.

Actions and activities implemented to reduce transmission are the supply of safe water, the improvement of sanitation and hygiene and, in certain cases, the vaccination against cholera.

The means all these activities require are described in this chapter.

Major infrastructure engineering work on sanitation and water distribution networks are the only long lasting solution to avoid cholera and other waterborne diseases. However, these works cannot be carried out in emergency situations and are not addressed in this guide.

All the activities described in this chapter involve the simultaneous implementation, at various levels, of health promotion activities.

The strategy for deploying cholera control measures is developed in [Chapter 4](#).

## 3.2 Case identification and management

### 3.2.1 Standard clinical case definition of cholera

Cholera diagnosis is based on a standardised clinical case definition. Once established, this definition remains constant over the affected territory for the entire duration of the outbreak.

The World Health Organization (WHO) defines a cholera case as follows<sup>[1]</sup>:

#### WHO cholera case definition

In areas where a cholera outbreak is declared: any person presenting with or dying from acute watery diarrhoea<sup>a</sup>.

The case definition should be disseminated to all health facilities (hospitals, health centres, health posts) and community health workers to improve case detection.

### 3.2.2 Implementation of cholera treatment facilities

Treatment is delivered in facilities specifically organized to manage cases of cholera. There are 3 types of facilities:

#### Cholera treatment centre (CTC)

The CTC is the most central in-patient facility with the largest patient treatment capacity (as a rough guide, 50 to 200 beds<sup>b</sup>).

A CTC operates 24 hours a day and can manage any case of cholera, including severe cases requiring IV rehydration and less severe cases requiring oral rehydration only.

Patients requiring close follow up (e.g. pregnant women, infants) are preferably treated in a CTC.

Thus, a CTC is both:

– A referral facility for cases from peripheral facilities,  
and

– A local treatment facility for people who live in the immediate vicinity, whatever the severity of their case.

#### Cholera treatment unit (CTU)



The CTU is a smaller, often decentralized, in-patient facility (as a rough guide, less than 30 beds). It operates 24 hours a day and treats patients requiring IV or oral rehydration.

### **Oral rehydration point (ORP)**

ORPs are small decentralized facilities that provide out-patient care and operate only during daylight hours (8 to 12 hours/day).

They are mainly intended to:

1. Provide oral rehydration therapy: it is estimated that 70% of cholera cases develop mild to moderate diarrhoea and require oral treatment only. Early oral therapy helps avoid the appearance or aggravation of significant dehydration that would require hospitalization.
2. Arrange for transfer of severe or complicated cases to a CTC or CTU.

ORPs are not intended to provide care to severe cases however depending on the context (e.g. isolated setting or particularly long transport time) and human resources available (nurse present), they may organize the stabilization of severe cases (initiate IV rehydration) while transportation to the referral CTU or CTC is arranged.

The type, number, and location of treatment facilities to be deployed in response to the outbreak depend on the number of patients expected and beds needed ([Section 2.7](#)), the capacity of existing health facilities and partner organizations and the physical setting (e.g. refugee camp, urban or rural areas) in which the outbreak occurs ([Chapter 4](#)).

For the setting up of CTCs, CTUs and ORPs, see [Chapter 4](#) and [Chapter 6](#).

For the case management of patients, see [Chapter 5](#).

### **Notas**

- (a) Diarrhoea is defined as 3 or more loose stools in a 24-hour period, with or without dehydration.
- (b) A CTC should not exceed 200 beds. Above this number it becomes very difficult to manage the facility.

### **Referencias**

1. World Health Organization. Global Task Force on Cholera Control. Surveillance Working Group. Interim Guidance to Document on Cholera Surveillance.  
[http://www.who.int/cholera/task\\_force/GTFCC-Guidance-cholera-surveillance.pdf?ua=1](http://www.who.int/cholera/task_force/GTFCC-Guidance-cholera-surveillance.pdf?ua=1)

## **3.3 Supply of safe water**

### 3.3.1 Quantity and quality

The most likely source of cholera transmission during an outbreak is water (used for drinking or food preparation) contaminated with faecal matter. Water may be contaminated at the point of access (river, well, municipal system, water vendors, etc.), during transport or at home, in storage containers.

Outbreaks often start after a failure in the water distribution system has forced people to use non-protected water sources (rivers, ditches, polluted wells). Poor access to water in sufficient quantity negatively affects hygiene practices, leading to the spread of cholera.

It is therefore essential to provide people with safe water in adequate quantity by repairing existing distribution systems or setting up temporary supply solutions.

#### Quantity

At least 15 to 20 litres of potable water should be provided per person and per day<sup>a</sup> for drinking, cooking and hygiene (personal and domestic).

During a cholera outbreak however, water needs increase (more frequent hand washing, laundry and cleaning of surfaces; ORS preparation, etc.). It is recommended to provide as much water as people need, also taking into account other factors such as hot climate, cultural practices (e.g. water for ablutions), etc.

#### Quality

There are no widely available rapid tests to detect and quantify *Vibrio cholerae* in water. Common indicators, such as pH, turbidity, free residual chlorine (FRC) concentration and if available, presence of *Escherichia coli*<sup>b</sup>, provide an indication of the quality of water and if treatment is needed. For test techniques, see [Appendix 17](#).

### 3.3.2 Water chlorination for public distribution

Water chlorination is the best means to quickly provide large amounts of potable water.

Chlorine-generating products are widely available and the water remains protected during transport or storage by the presence of FRC. A high level of FRC at the point of delivery is essential to guarantee the water is potable and protected against recontamination during storage for 4 to 24 hours<sup>[1]</sup>.

However, users may dislike drinking water with a strong smell or taste of chlorine. An information campaign may be necessary to increase acceptability.

**Table 3.1** - Conditions for effective chlorination against *Vibrio cholerae*

<b>Turbidity</b>	< 5 NTU <sup>(a)</sup> (Sphere Project standard), nevertheless, during the initial stages of an emergency, turbidity < 20 NTU is acceptable.
<b>Contact time</b>	<ul style="list-style-type: none"> <li>• 30 minutes if pH ≤ 8</li> <li>• 60 minutes if pH &gt; 8</li> </ul>
<b>FRC level</b>	<p>At all distribution points (taps, standpipes, tanker trucks, etc.) and in recipients if bucket chlorination :</p> <ul style="list-style-type: none"> <li>• 0.5 mg/litre if pH ≤ 8</li> <li>• 1 mg/litre if pH &gt; 8</li> </ul>

(a) NTU = nephelometric turbidity unit

*Note:*

If turbidity is over 20 NTU (emergency situation) or 5 NTU (other context), the water needs to be treated to reduce turbidity before chlorination. For techniques (sedimentation, filtration), see [Public health engineering in precarious situations](#), MSF.

### **In line chlorination**

Where there is a functional water distribution network but water is poorly, insufficiently or not at all disinfected, determine the causes of the problem (e.g. shortage of chlorine, malfunction of chlorination system, chlorination protocol not respected) in order to remedy it.

The supply of chlorine and other chemicals<sup>c</sup> should be well organized to guarantee a constant production of potable water, at least for the duration of the outbreak.

### **Batch chlorination**

Where there is no water distribution network, water can be collected at central filling stations and transported, by water truck (or other vehicles equipped with a reservoir), to the distribution point.

Filling stations either pre-exist or are set up for the needs of the operation.

Once transported to the distribution point, the water is transferred into one or more water bladders to be distributed.

The water must be chlorinated before distribution. It can be chlorinated either:

- directly at the source (the water collected is already chlorinated),
- while filling the water truck,
- while filling the water bladder at the distribution point.

Distribution points should be located so as to provide everyone affected by the outbreak with access to clean water.

When chlorinating water in trucks or bladders, the water should be tested to determine the quantity of chlorine required to disinfect the volume of water in the truck or bladder. As the volume of water remains constant, the amount of chlorine to be added to the truck or bladder will be the same at each collection, provided the quality of the water does not change. A trained person, e.g. the truck driver, is responsible for chlorinating the water.

### **Bucket chlorination**

Bucket chlorination is usually implemented when in line or batch chlorination is not available or feasible. Water intended for human consumption is collected by the population from an unprotected or contaminated source (e.g. open well, river) and disinfected directly in the jerrycan or bucket by a trained person (a chlorinator) stationed at the source. Once the container is filled with water, the chlorinator adds the appropriate amount of chlorine solution according to the volume of the container<sup>d</sup>.

The population may have the choice between several sources used for different purposes (drinking, cooking, laundry, bathing). Priority is given to sources used for drinking and cooking, and identified as being contaminated or at the origin of point source or continuous outbreaks<sup>e</sup>.

Since one chlorinator is needed per source, a limited number of sources should be selected with local authorities: the most accessible, which can be treated effectively (pH, turbidity).

Ensure constant chlorine supply to all sites and proper supervision by experienced staff, who regularly visit each site, ensure the protocol is respected and check the level of FRC.

*Note:* direct chlorination of wells and other unprotected sources is not recommended as it is ineffective.

Water quality, whatever the chlorination system used, must be routinely monitored throughout the outbreak.

For more information on treatment methods, see [Public health engineering in precarious situations](#), MSF.

## **3.3.3 Household water treatment and storage**

### **Water disinfection**

There are different products, each designed to treat a specific volume of water.

– Chlorine generating products:

These can only be used with clear water (i.e. turbidity < 5 NTU; < 20 NTU in extreme emergencies).

- Tablets of sodium dichloroisocyanurate (NaDCC)
- Solutions of sodium hypochlorite (bleach)

As for all chlorination measures, the efficacy of the product (level of FRC) must be checked before each distribution and regularly throughout the operation.

– Products combining flocculent(s) and disinfectant:

These are designed for use in water with over 5 NTU. It is recommended to test them as they are not always effective in removing all particles or generating a high enough level of FRC. These products require more than one container and several steps (mixing, waiting and filtering) to produce clear and disinfected water.

## **Other methods**

– Boiling water:

Heating water to a rolling boil, and keeping it boiling for 1 minute, kills bacteria. However, it is not the preferred method (difficult to implement especially in emergency, requires a lot of energy) unless it has been promoted for a long time in the area by local authorities or if no other solution exists.

– Water filtration:

There are many household filtration systems. Their ability to remove *Vibrio cholerae* depends on the system itself, but mainly on the use and maintenance once in the home.

Boiled or filtered water is more easily re-contaminated than chlorinated water.

## **Household water storage**

Receptacles without lids or with a wide opening increase the risk of contamination. Potable water must be stored in containers with a narrow neck or with a tap. These containers must be regularly cleaned.

Boiled or filtered water or water from a non-contaminated source that has not been chlorinated must be chlorinated at household level if intended to be stored. Contamination of water during household storage is common and the presence of FRC in water prevents (re)contamination.

## **Household training and surveillance**

It is essential to carry out training sessions for households either before or during the first distribution of chemical water disinfectants or household water filters. The training sessions must also include information on water storage.

Afterwards it is important to regularly check the effectiveness as well as the correct and constant use of the products or filters.

## Notas

- (a) The Sphere project recommends 15 litres (minimum quantity of water to survive), the WHO a minimum of 20 litres.
- (b) When water is not chlorinated, *E. coli* count should not exceed 10 CFU (colony-forming units) per 100 ml. The presence of a greater number of *E. coli* indicates the water is contaminated with faecal matter, but is not proof of the presence of *Vibrio cholerae* or any other pathogen.
- (c) Products for the pre-treatment of water before chlorination (e.g. coagulants such as aluminium sulfate).
- (d) Other water treatment products (e.g. tablets of NaDCC, see [Section 3.3.3](#)) can be used instead of a traditional chlorine solution to simplify the process or as a step prior to general distribution so that users learn how to use it and adopt the product.
- (e) In point source outbreaks the population at risk is exposed to *Vibrio cholerae* at the same time within a short period. In continuous source outbreaks, exposure is prolonged over an extended period of time.

## Referencias

1. Centers for Disease Control and Prevention. The Safe Water System. Free Chlorine Testing. Page last reviewed: July 17, 2014.  
<http://www.cdc.gov/safewater/chlorine-residual-testing.html>

# 3.4 Hygiene

## 3.4.1 Hand hygiene

Faecal-oral transmission of *Vibrio cholerae* may be prevented by hand washing with soap and clean water<sup>a</sup>, at "critical times".

**Table 3.2** - Critical times when hand washing should be performed

BEFORE	AFTER
<ul style="list-style-type: none"><li>• preparing meals</li><li>• eating or smoking</li><li>• feeding a child or any other person</li></ul>	<ul style="list-style-type: none"><li>• using the latrines or toilet</li><li>• caring for someone with diarrhoea</li><li>• cleaning a child's bottom</li><li>• cleaning surfaces, objects or clothes soiled with a sick person's faeces or vomit</li><li>• handling a corpse</li></ul>

## 3.4.2 Food hygiene

The risk of transmission is associated with food that is contaminated during handling or with eating raw (or insufficiently cooked) fish products contaminated in the environment.

The risk of transmission through food can be reduced by ensuring that: food is well cooked, eaten hot, stored covered; fruit and vegetables are washed in potable water or peeled (by oneself just before eating); the area where food is prepared and the utensils used are cleaned and dried.

## 3.4.3 Household hygiene

Cleaning potentially soiled surfaces and materials (water storage receptacles, areas where food is prepared and served, latrines/toilets) with local dish detergent prevents transmission.

Soiled clothes, linens and other articles can be washed with local laundry detergent and then left to dry in the sun<sup>b</sup>. Items that cannot be washed (e.g. soiled unprotected mattresses) may be disinfected by drying in the sun<sup>[1]</sup>. Turn the mattress often on both sides.

If floors or surfaces are soiled by patient faeces or vomit, faeces or vomit should first be wiped away and disposed of in the latrines or buried. Then, the area should be cleaned with local household detergent<sup>c</sup>.

*Notes:*

- Clothing and other articles of cholera patients should not be washed in a source of drinkingwater (stream, river, or water hole).
- Wearing household cleaning gloves does not replace the need for handwashing.

## 3.4.4 Disinfection of affected households by mobile sprayer teams

Chlorine spraying at households of cholera patients for addressing environmental contamination is still a common practice.

This practice requires considerable logistical resources and staff time, however:

- There are no studies on the impact of chlorine spraying of households of cholera patients on disease spread;
- Most surfaces within a household are not exposed to cholera faeces and are not the main source of contamination;
- The effect of chlorine is limited in duration and recontamination is possible within hours as the chlorine solution evaporates;
- Spraying teams usually only reach the household several days after the onset of cholera in the index case, and other members of the household have likely already been contaminated by the index case or another source;
- Household spraying runs the risk of stigmatizing patients and their families, and being such an ordeal for the households affected that other households become reluctant to report their cases.

Therefore, to reduce the spread of cholera to household contacts, it is recommended to prioritize activities that might have a higher impact such as provision of household hygiene kits<sup>d [2]</sup>: the material is given to a family member when the patient is admitted to a cholera treatment facility. The kit should be used that same day to clean the objects and surfaces contaminated by the patient at home, and during the following weeks to avoid new cases among the household contacts<sup>e</sup>.

### 3.4.5 Corpses and funerals

Like for any other gathering such as weddings, religious festivals, etc., the funerals for those who have died from cholera, or of any other cause, in a population affected by cholera, may contribute to the spread of cholera infection.

Transmission typically occurs in the context of a prolonged funeral, where large numbers of people share community meals prepared or served in unhygienic conditions (e.g. prepared by people who handled the body without washing their hands and/or eaten from the hand without prior hand washing).

People who come in contact with corpses of people who have died from cholera are exposed to *Vibrio cholerae* through fluids leaking from the digestive tract. Proper hand washing after contact with the corpse and before preparing or serving food or eating, drinking, smoking is the key to preventing contamination.

In addition, the WHO recommends:

- To hold funerals quickly, within 24 hours of death, near the place of death if possible;
- To bury dead bodies more than 50 meters away from water sources, at least 1.5 meters above the water table, with at least 1 meter of covering soil.

Authorities may discourage holding funerals for people who have died from cholera, contact between the family and the corpse, providing food at funerals, etc. However, such restrictions may lead to reluctance to report deaths. It is preferable to allow people to conduct funerals according to their custom while advising basic hygiene precautions. Designated health workers and/or religious leaders present at the funerals may help to improve compliance with hygiene practices.

During a cholera outbreak, authorities may establish team(s) to manage the bodies of people who have died from cholera at home. These teams perform the post-mortem treatment of the corpse using materials and techniques used in cholera treatment facilities and morgues.

### Notas

- (a) Hands thoroughly washed with soap and water do not need to be disinfected with 0.05% chlorine solution or alcohol based solutions afterwards.
- (b) *Vibrio cholerae* does not survive in dry conditions.
- (c) If bleach is a known and widely available product and there is no risk it will be used incorrectly, the surfaces can be disinfected after cleaning with a 0.2% chlorine solution.



- (d) The list of articles in the kit depends on the context and needs of the population, for example: a bucket, broom, floorcloth, jerrycan, soap for hand washing and laundry, detergent for floors and surfaces (and bleach, but only if people are used to using it).
- (e) If a patient arrives to the centre alone, they are given the kit on discharge.

## Referencias

1. UNICEF Cholera Toolkit, 2013.  
<https://www.unicef.org/cholera/Cholera-Toolkit-2013.pdf>
2. M. Gartley, P. Valeh, R. de Lange, S. DiCarlo, A. Viscusi, A. Lenglet and J. F. Fesselet. Uptake of household disinfection kits as an additional measure in response to a cholera outbreak in urban areas of Haiti. *J Water Health* 2013 Dec; 11(4):623-8.

# 3.5 Sanitation activities

## 3.5.1 Safe excreta disposal

Symptomatic and asymptomatic carriers shed large numbers of *Vibrio cholerae* in their stools for several days ([Section 1.1.4](#)). Thus, open defecation, defecation near water sources, or poorly constructed, situated or maintained latrines, can become sources of infection, particularly during the rainy season.

When there is a large concentration of people and no or few latrines, emergency measures should be implemented, taking into account the context and habits of the population (see also [Section 4.6.3](#)):

– Defecation fields

These provide a very short term (first few days) solution that can be set up in hot dry climates if there is enough space available and the population accepts them.

– Trench latrines

Trench latrines require less space and contain the faecal matter better (the stools are covered by soil located alongside the trench).

– Defecation in plastic bags

This option can only be considered if the following is organised: distribution of bags specifically designed for this purpose (biodegradable, single use, adapted size); information campaign on how to use them correctly; effective and safe collection, transport and disposal of bags by burial in an appropriate place.

These provisional measures should rapidly be replaced by less rudimentary solutions: improved trench latrines, simple pit latrines, improved pit latrines (public, shared or private), etc.

*Note:* toilets and latrines must have hand washing points that are constantly maintained and supplied.

For more information, see [Public health engineering in precarious situations](#), MSF.

## 3.5.2 Waste water disposal

### Prevention of cross contamination

Domestic waste water contaminated with human faeces may get in direct contact with potable water and lead to point source outbreaks.

These outbreaks are often caused by waste water leaking from septic tanks (or improper emptying of septic tanks) or from sewers, then contaminating the potable water system. Such water systems often work intermittently, allowing waste water flowing into the system via broken pipes at times of low pressure in the system.

It is imperative to determine the source of the contamination in order to remedy it (e.g. repair pipes) and disinfect the potable water networks polluted by the leaks.

### Water drainage

Stagnant, undrained waste water is a permanent source of environmental contamination. Water pooling often happens in low lands or along coastal areas where waste water naturally collects and is difficult to evacuate. In urban areas, water pooling is often aggravated by discharge of domestic waste water by households, absent or obstructed drainages and, during rainy season, a raise in standing water levels.

There is usually no short-term solution for these situations due to the scale of the problem, the technical complexity of an intervention, the time and resources required, and the often illegal nature of the settlements (slums).

For more information, see [Public health engineering in precarious situations](#), MSF.

## 3.6 Vaccination against cholera

Vaccination against cholera should complement other prevention and control measures described in this chapter.

### 3.6.1 Oral cholera vaccines

To date, there are three WHO pre-qualified oral cholera vaccines (OCVs):

SHANCHOL® is a killed whole-cell bivalent vaccine containing *Vibrio cholerae* O1 (classical and El Tor) and O139.

It is administered in 2 doses to everyone over 12 months, with an interval of at least 14 days between each dose. In a clinical trial, it has shown 65% efficacy up to 5 years after vaccination<sup>[1]</sup>.

EUVICHOL®/EUVICHOL-PLUS® is a killed whole-cell bivalent vaccine containing *Vibrio cholerae* O1 (classical and El Tor) and O139.

It is administered in 2 doses to everyone over 12 months, with an interval of at least 14 days between each dose.

EUVICHOL®/EUVICHOL-PLUS® has the same formulation, immunogenicity and safety profile as SHANCHOL®. No field efficacy or effectiveness data are yet available.

*Note:* in certain contexts, the vaccine is given as a single dose, see [Section 4.7.5](#).

DUKORAL® is a killed whole-cell monovalent vaccine containing *Vibrio cholerae* O1 (classical and El Tor) and purified recombinant B-subunit of cholera toxin (WC/rB).

The vaccine suspension must be mixed with a buffer solution.

The vaccine is administered in 3 doses to children 2 years to < 6 years of age and in 2 doses to children ≥ 6 years of age and adults. Each dose should be administered minimum 1 week to maximum 6 weeks apart.

This vaccine is not currently used for mass vaccination campaigns.

For more information, see [Appendix 9](#), the manufacturer's instructions, and the list of WHO prequalified vaccines<sup>a</sup>.

## 3.6.2 Oral cholera vaccine stockpile

A global stockpile of OCV has been created for use during an outbreak or humanitarian emergency. A formal request to the International Coordinating Group on vaccine provision (ICG) is required, using forms available on the WHO website<sup>b</sup>.

### Notas

(a) [https://extranet.who.int/gavi/PQ\\_Web/](https://extranet.who.int/gavi/PQ_Web/)

(b) [http://www.who.int/cholera/vaccines/ocv\\_stockpile\\_2013/en/](http://www.who.int/cholera/vaccines/ocv_stockpile_2013/en/)

### Referencias

1. Sujit K Bhattacharya, Dipika Sur, Mohammad Ali. 5 year efficacy of a bivalent killed whole-cell oral cholera vaccine in Kolkata, India: a cluster-randomised, double-blind, placebo-controlled trial, *Lancet*, Published Online October 18, 2013.  
[http://dx.doi.org/10.1016/S1473-3099\(13\)70273-1](http://dx.doi.org/10.1016/S1473-3099(13)70273-1)

## 3.7 Antibiotic prophylaxis

## 3.7.1 Mass chemoprophylaxis

Treatment of an entire population with antibiotics is currently not recommended by the WHO<sup>[1]</sup>: at the level of an entire population, exposure to *Vibrio cholerae* will occur unpredictably over time rather than entirely within the window of the few days in which the antibiotic would be protective.

## 3.7.2 Selective chemoprophylaxis

Targeted antibiotic prophylaxis is recommended for closed institutional settings, such as prisons or orphanages, where, given the nature of the facilities, significant exposure is likely to occur over a short period of time.

Chemoprophylaxis should be given simultaneously to all individuals as soon as possible after the first case is recognized. The prophylactic dose of antibiotic is the same as the therapeutic dose ([Section 5.3.1](#) and [Appendix 7](#)).

Selective chemoprophylaxis can be considered as an additional mean to control cholera for these settings, but does not replace the other control measures described in this chapter.

## Referencias

1. World Health Organization. Cholera outbreak: assessing the outbreak response and improving preparedness, Geneva, 2004. WHO/CDS/CPE/ZFK/2004.4.  
[http://whqlibdoc.who.int/hq/2004/WHO\\_CDS\\_CPE\\_ZFK\\_2004.4\\_eng.pdf](http://whqlibdoc.who.int/hq/2004/WHO_CDS_CPE_ZFK_2004.4_eng.pdf)

# 3.8 Health promotion

Health promotion activities accompany the prevention measures described in this chapter at different levels.

## 3.8.1 Target population

- Patients and attendants in cholera treatment centres and/or
- Urban and rural populations. Among general population, specific groups may also be targeted depending on the context such as people with an activity associated with a high risk of transmission (water or street food vendors), an activity that promotes early case detection (e.g. healers, often the first people the sick go to see when they fall ill), etc.

## 3.8.2 Means

Mass media used by national authorities (radio, television, press, posters in towns, text messages) does not reach everyone (e.g. rural populations or deprived urban population). Other means should be considered such as presentations/discussions in village or neighbourhood meetings, organised by dedicated mobile health promotion teams that speak the local language or by people that can relay the information and influence practices amongst local authorities, religious or traditional leaders, associations, community health workers, teachers, etc. Mobile teams can also carry out home visits or carry out activities at water points, schools, markets, etc.

Any means adapted to the context can be used to inform the population.

All distributions, including soap distributions, are an opportunity to carry out health promotion activities.

## 3.8.3 Messages

Key messages must specifically focus on cholera and the current outbreak. They must be simple, clear and consistent.

People must at least be made familiar with:

- the symptoms of the disease
- what to do in the event of watery diarrhoea
- individual prevention measures
- the outbreak control measures set up (location of CTC, ORP, safe water points, etc.).

See [Appendix 4](#) for key public information messages.

Stick to basic messages. Sometimes additional information or discussions are necessary, e.g. in the event of mass cholera vaccination, an organised distribution, a problem specific to the context (e.g. rumours, community rejection of CTC).

## 3.8.4 Demonstrations

Any distribution of products that present a health risk if used incorrectly (e.g. ORS, all water disinfectants) must be accompanied by a demonstration to ensure the product is correctly handled.

# Chapter 4: Strategies for epidemic response

[4.1 Introduction](#)

[4.2 Organization of the network of curative services](#)

[4.3 Organization of curative services in refugee camps](#)

[4.4 Organization of curative services in urban settings](#)

[4.5 Organization of curative services in rural settings](#)

[4.6 Strategies for water, hygiene and sanitation](#)

[4.7 Vaccination strategies](#)

[4.8 Health promotion strategies](#)

[4.9 Outbreak response committees](#)

## 4.1 Introduction

In a cholera outbreak response, providing effective care to prevent death is usually the priority, while measures are taken to reduce the number of new infections.

Most or all of the means described in [Chapter 3](#) must be deployed to achieve the goals of reducing mortality and transmission.

The manner in which this deployment occurs varies depending on the context: setting (e.g. urban, rural, endemic, non-endemic), allocated resources and response capacity, concurrent crises, profile of previous epidemics, etc.

An analysis of the situation ([Chapter 2](#)) is required before developing any response strategy.

All actors involved in the cholera response must be coordinated to ensure that the key interventions are carried out while avoiding duplication and gaps. Typically, the Ministry of Health is responsible for coordinating the response and implementing an outbreak response committee (or crisis cell). Any intervention must be in agreement with the Ministry of Health.

A strategy can change as the outbreak evolves. For example, the number of people affected and the spatial spread of the outbreak can be different to that initially expected. Constant monitoring of epidemiologic data and evaluation of the response ([Chapter 8](#)) permit strategies to be adapted.

## 4.2 Organization of the network of curative services

### 4.2.1 Access to care

**Decentralization of care**

Care should be decentralized to shorten the time between the onset of symptoms and the start of treatment.

Care is usually provided in cholera-specific treatment facilities ([Section 3.2.2](#)). These facilities should be distributed so that they are accessible to the entire population affected by the epidemic. The setting in which an epidemic occurs - refugee camp, urban or rural area - is key for deciding on the type, number, and location of treatment facilities ([Section 4.3](#) and [Section 4.4](#)). Their number and location are not necessarily static. As the epidemic evolves, affecting new populations, treatment facilities, particularly cholera treatment units (CTUs) and oral rehydration points (ORPs), may be created or redeployed to provide adequate coverage.

In addition to cholera-specific treatment facilities - or instead of, when such facilities cannot be implemented - home-based care (distribution of sachets of oral rehydration salts (ORS) to the population) is a way to treat patients rapidly. Starting ORS therapy in the home at the first symptoms of cholera can prevent dehydration or reduce the risk of severe dehydration and hospitalization.

### **Prepositioning of treatment supplies**

In areas at risk of cholera but not yet affected, basic treatment supplies, such as ORS and Ringer lactate (RL), should be prepositioned in health facilities so that proper therapy can be immediately provided to the first cases of an outbreak.

### **Referral system between facilities**

Even in situations where ORS is widely available, some patients will need emergency care. An efficient referral system (ambulance or a vehicle adapted for this purpose) should be organized or reinforced so that severe or complicated cases can be readily transported to a facility where IV treatment can be given. When the transport time is longer than 15 minutes and for severe cases, treatment should be provided for the trip<sup>a</sup>. Presence in the vehicle of an accompanying health worker is recommended for patients receiving an infusion.

### **Affordability of care**

To guarantee access to care, diagnosis, treatment, transfer and hospitalisation must be free of charge.

### **Active case finding**

In areas where community health workers are implicated in detecting and treating other common diseases (e.g. malaria), active case finding facilitates early treatment.

## **4.2.2 Quality of care**

The benefits of improving access to care are limited if the quality of care is inadequate. Standardized protocols must be used to ensure that case management follows accepted principles and practice. Adequate supply of treatment supplies must be maintained without interruption. Healthcare workers, in sufficient number to give proper therapy, should be correctly trained and constantly supervised.

### **4.2.3 Organization of response teams**

The setting up of cholera treatment facilities requires experience and knowledge across a range of domains: medical, logistics, water/sanitation, supply, surveillance, etc.

In most situations, the response team is multi-disciplinary, meaning that it is composed of all the specialists required to manage the entire range of activities in the specific location for the duration of the outbreak.

In large regional or country-wide outbreaks with a substantial rural component, different approaches can be considered.

For example, one or more multi-disciplinary team(s) can set up a fully-functioning treatment facility in a given area then, move to another affected area where another treatment facility is needed.

Alternatively, several task-specific teams can be deployed successively, each performing a dedicated task (i.e. investigation team, implementation team, supervision and supply team). See also [Section 4.5.1](#).

#### **Notas**

(a) Always have 1-litre bottles of water to prepare ORS for transport.

## **4.3 Organization of curative services in refugee camps**

Cholera treatment services in refugee (or internally displaced people) camps are relatively straightforward to organize.

The entire population is concentrated and contained within a limited geographical area (“closed setting”).

Distances to access care are usually short. The referral system is easy to organize.

There is often enough space to create all the necessary facilities. In addition, a network of community health workers may already exist or can be established quickly to facilitate active case finding.



A single central CTC is usually all that is necessary to manage severe cases and several ORPs are implemented across the camp to care for less severe cases.

Depending on the size of the camp, one or more ambulances should circulate between the ORPs, bringing severely ill patients to the CTC.

## 4.4 Organization of curative services in urban settings

While cholera outbreaks in urban settings share several features with those occurring in refugee camps, several important distinctions affect how treatment services are organized.

Urban areas (including slums) are open settings, where the risk of cholera transmission can vary from one neighbourhood to another. Some are intense hotspots<sup>a</sup> for transmission while others experience few or no cholera cases.

High risk neighbourhoods are often affected one after another as inhabitants circulate freely between affected and non-affected areas, and the outbreak and its response can shift from one area to another.

Travel distances may be relatively short in urban settings, but congestion and poor transportation infrastructure can significantly impact travel times.

The space necessary to set up cholera treatment facilities (with sufficient surface area, sufficient distance from private dwellings) is often limited in urban settings.

Furthermore, the population may not readily accept a cholera treatment facility where they live and negotiations may be required.

In urban settings, one or more CTCs located as close to the affected neighbourhood(s) as possible are usually required. Several ORPs are necessary to supplement the CTC(s) with at least one ORP in each of the affected neighbourhoods.

If site options are limited or the focus of high transmission shifts to another neighbourhood, several CTUs can be implemented in place of a CTC.

It is recommended to identify potential sites where additional CTCs or CTUs can be set up as the outbreak evolves.

A referral system should be set up to transport severe cases from ORPs or non-cholera facilities to the nearest CTC or CTU with provision of care during transport if transport time is long.

### Notas

- (a) A cholera hotspot is a geographically limited area (e.g. city, administrative level 2 or health district catchment area) where environmental, cultural and/or socioeconomic conditions facilitate the transmission

of the disease and where cholera persists or re-appears regularly. Hotspots play a central role in the spread of the disease to other areas (WHO definition).

## **4.5 Organization of curative services in rural settings**

In rural settings, the affected population is scattered over a large geographical area in numerous small communities that are often hard to reach due to transportation challenges.

In addition, there are fewer health system resources (treatment facilities and staff) with which to provide treatment.

Difficult access to treatment is further exacerbated when the outbreak expands to areas beyond the reach of existing treatment facilities.

### **4.5.1 Facility-based approach**

In an outbreak that affects a village and surrounding communities within a radius of around 5-10 kilometres, a central CTC or CTU with supporting ORPs is sufficient. A multi-disciplinary team can manage the setup of the necessary treatment facilities.

Some epidemics, however, are so rapidly evolving that a single CTC linked to surrounding ORPs and CTUs is insufficient to respond to the numerous alerts of newly affected populations.

Treatment facilities should be more numerous and less permanent. It is preferable to implement several CTUs (rather than a single CTC) and/or several ORPs with, when possible, the capacity to treat 1 or 2 severely dehydrated patients.

In such a setting, a different team deployment strategy should be considered with small mobile teams able to cover a large geographic area while maintaining reactivity to further cholera alerts.

Teams can be organized as follows:

- At least two mobile multi-disciplinary teams are available to respond to alerts, perform the initial on-site investigation, set up the site, train local staff, set up data collection, donate supplies and drugs, and treat the first patients. The team may remain on site (or return daily) for several days until the facility is functioning independently. Frequent supervision visits are required to reinforce training, assure adequate stock levels, and collect data.

or

- Task-specific teams are sent successively to a new site to perform defined tasks over a limited period before moving to the next location:

- The investigation team (doctor or nurse plus logistician or water-sanitation specialist) responds to new alerts and assesses the situation and needs for a given location. This team should be capable of setting up a simple ORP if that is all that is required based on the assessment.
- The implementation team (doctor or nurse, logistician and/or water-sanitation specialist, and if needed, one person for administrative support) is deployed to the site to set up a CTU or ORP, provide the necessary supplies and drugs, treat the first patients, manage and train staff, and set up a cholera register.
- The supervision and supply team (nurse and logistician or water-sanitation specialist) circulates routinely among the sites to gather data, evaluate quality (of care, of water, etc.), reinforce training, and provide the required medications and material.

There are occasions when the scale of an outbreak is beyond the capacity of outbreak responders to provide access to treatment within reasonable reach of all affected populations. Patients have to spend considerable time trying to reach a treatment facility. “ORP relays” may be implemented at regular intervals<sup>a</sup> along major travel routes to dispense ORS to patients traveling to a CTC or CTU. These are not full-scale ORP’s but less-formal sites where patients can drink ORS and take some to drink along the way (similar to water stations in endurance running races). In this way, incapacitating or life-threatening dehydration may be avoided during travel. The ORP relays are managed by local community workers or trained volunteers.

## **4.5.2 Home-based approach**

Distribution of ORS sachets to isolated communities is another way to insure that treatment is available even in the absence of cholera treatment facilities. ORS distribution can be organized from a fixed site or door-to-door. A single person should be in charge, whether a community health worker or village chief.

Distribution should be accompanied by clear instructions on proper preparation, use, and storage.

Such distribution may also serve as a means to provide other prevention items, such as soap and water treatment products. However, if a chemical agent for water disinfection is distributed together with ORS, the risk of confusion between the two products at home should be taken into account.

## Notas

(a) ORP relays are positioned every 3-4 kilometres or at an hour's walk from one to the next, for example.

# 4.6 Strategies for water, hygiene and sanitation

## 4.6.1 Improving access to potable water

Absence or failure of a water supply system, the cost of water, distance from a safe water point or waiting time to fill a container, a context of insecurity and/or drought, encourage the use of potentially contaminated but more accessible or affordable sources of water (e.g. rivers, ditches or shallow wells).

To provide or improve access to potable water, there are several possible options, depending on the situation:

- Implementing temporary potable water transport, storage and distribution in densely populated areas where there is no water supply system, as long as required.
- Repairing or improving a failing system when this can be done easily and quickly.
- Protecting (and disinfecting) the most regularly used unprotected water sources, on condition that they are not constantly exposed to (re)contamination.
- Negotiating temporary reduction or elimination of user fees with local authorities, public or private companies or the owner of the water source.
- Up-grading preferred protected water sources to improve distribution capacity and reduce waiting lines (if possible less than 15 minutes, less than 30 minutes maximum<sup>[1]</sup>).
- Distributing larger containers to families in order to increase the quantity of potable water stored at home and decrease the number of trips per day to water sources (however, these containers must not be too big to carry).

If the authorities decide to close a contaminated water source, ensure that another source of potable water is accessible.

In densely populated settings, bulk water chlorination ([Section 3.3.2](#)) is the best means to quickly provide large amounts of potable water. Household water chlorination is not recommended as first choice in these settings, unless this method has started to be implemented before the beginning of the outbreak.

In scattered or difficult-to-reach rural populations, bucket chlorination ([Section 3.3.2](#)) or household water treatment ([Section 3.3.3](#)) are often the only options. Information on water disinfectants, practical demonstrations of use, constant supply and monitoring of appropriate and consistent use are essential.

If water disinfectants are not available, and no alternative can be offered, water intended for drinking and cooking should be boiled.

## 4.6.2 Improving hygiene practices

### Hand-washing facilities

Hand-washing facilities with water and soap (or only 0.05% chlorine solution) must be available at key locations:

- Latrines (public and familial);
- Areas used for food preparation/consumption (kitchens, markets, restaurants, etc.).

Public hand-washing facilities must be maintained for the duration of the outbreak.

### Soap and other hygiene products

An important barrier to hand hygiene in low-income populations is the high cost of soap relative to household income. Mass or targeted distributions of soap should be organized when necessary and as long as required (minimum 500 g of soap/person/month for personal hygiene and laundry). Regular distributions of soap are systematic in refugee or internally displaced populations.

Information about the time and place of the distribution must be communicated to the population and associated with the promotion of hand-washing at critical times ([Section 3.4.1](#)).

In addition, “household hygiene kits“ can be provided in treatment centres (all levels) to ensure routine domestic hygiene in patients’ homes ([Section 3.4.4](#)). It is important not to include treatment (sachets of ORS) or water disinfectant products in the kit in order to avoid confusion and accidental ingestion of chemical products.

### Street food

Food sold by street vendors and in restaurants is a risk if it is contaminated. The health authorities can decide to stop street food sales during an outbreak. Otherwise, an awareness raising campaign to educate vendors on food safety should be set up<sup>a</sup> .

## 4.6.3 Improving sanitation

### Refugee camps

During the early phase of an emergency, when sanitation facilities are absent, defecation fields or trenches should be set up for the first few days ([Section 3.5.1](#)).

At the same time, plans must be made for the construction of permanent latrines. Early on, it is difficult to ensure each family constructs a latrine. Depending on the means or space available, alternatives include the construction of public latrines (used by all) or shared or cluster latrines (used by 3-4 households, around 20 people). Nevertheless, individual family latrines should be provided as soon as possible, as the population will probably remain in the camp far longer than the duration of the epidemic.

## **Urban areas**

The number of latrines needed in urban areas is high. However the large-scale construction of these during an epidemic is not usually feasible given the difficulty and delays inherent in obtaining the appropriate administrative authorization and construction material, organizing community participation, etc.

Building public latrines (or repairing existing ones) is often the only option in the immediate term. Public latrine placement should be prioritized in those areas where the risk of transmission is very high: markets, train and bus stations, etc.

Public latrines in good condition are usually those that are fee-for-use. Negotiating the free use of these latrines (by offering to pay the owner a daily fee) makes them more widely accessible to the population.

In all events, it is essential to organize the regular cleaning and maintenance of these public latrines and associated hand-washing points for the duration of the epidemic.

In certain situations (e.g. lack of space in flooded urban areas, or difficulties in digging through debris after an earthquake), defecation into plastic bags, if common prior to the epidemic, can be continued during the first phase of the emergency ([Section 3.5.1](#)).

## **Rural areas**

The rapid construction of latrines in rural areas is even less feasible than in urban areas. Repairing public latrines, if they exist, is a short term option. Awareness raising campaigns can be set up to encourage the population not to defecate in or near safe water sources and/or to cover excreta after defecation. Nevertheless these actions may not necessarily be sufficient to change habits, even in the short term.

## **Notas**

(a) For more information see:

[http://www.who.int/foodsafety/fs\\_management/No\\_03\\_StreetFood\\_Jun10\\_fr.pdf](http://www.who.int/foodsafety/fs_management/No_03_StreetFood_Jun10_fr.pdf)

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1. Water supply standard 1: Access and water quantity. The Sphere Project handbook. 2011. <http://www.spherehandbook.org/en/water-supply-standard-1-access-and-water-quantity/>

## 4.7 Vaccination strategies

### 4.7.1 General considerations for oral cholera vaccine (OCV) use

Vaccination against cholera is carried out in three contexts:

- In response to cholera outbreaks (reactive vaccination);
- During humanitarian emergencies when the risk of an outbreak is high (pre-emptive vaccination);
- In endemic areas, prior to the cholera season (preventive vaccination).

The decision to vaccinate will rely on a risk assessment (risk of an outbreak or outbreak extension, or high morbidity in the event of an outbreak), and an estimation of the feasibility of a vaccination campaign<sup>a</sup>.

Vaccinating entire populations is not feasible and not necessary unless the population is small and the risk of exposure is uniformly high. Priority should be given to areas with a history of, currently experiencing, or at risk of high attack and case fatality rates.

When a target population has been identified, everyone 12 months of age and over should be vaccinated. The use of OCV in pregnant women should be discussed with health authorities. The WHO recommends the vaccination of pregnant women as the benefits greatly outweigh the risks<sup>[1] . [2]</sup>.

Check with health authorities that the cholera vaccination campaign will not take place within 2 weeks of a mass vaccination campaign against poliomyelitis. More information is needed on coadministration of OCV with oral polio vaccine.

Vaccination should be preceded by a community information and awareness raising campaign, directed at the target population, paying specific attention to groups usually underrepresented in vaccination campaigns such as adult males.

### 4.7.2 Vaccination in response to an outbreak

#### Evaluation of the potential impact of reactive vaccination

The potential impact of vaccination should be estimated by using the demographic and epidemiologic criteria established by the International Coordinating Group (ICG) on vaccine provision (Table 4.1).

**Table 4.1** - Considerations for OCV stockpile deployment during an on-going epidemic (adapted from the WHO<sup>[3]</sup>)

Criteria	Indicators	Decision threshold	Potential impact of vaccination campaign	
			High	Low
<b>Susceptibility of the population</b> in the affected area(s)	Number of cases reported during the past 2-3 years	No or few cases <sup>(a)</sup>	X	
		High number of cases		X
	Attack rate (AR) of previous outbreaks	High AR	X	
		Low AR		X
<b>Vulnerability of the population</b> in the affected area(s)	Case-fatality rate (CFR) of previous outbreaks	High CFR	X	
		Low CFR		X
	Refugee camp, internally displaced people, or slums	Yes	X	
		No		X
	Area(s) with large movements of population (border, market hub, etc.)	Yes	X	
		No		X
	Population density	High density	X	
		Low density		X
	Access to water, sanitation, hygiene, and curative care	Poor access	X	
		Good access		X
<b>Risk of spatial extension</b>	Time elapsed since first case reported	Few weeks	X	



		Few months		X
	Attack rate since the start of the current outbreak (cumulative cases)	Low attack rate <sup>(b)</sup>	X	
		High attack rate		X
	Proportion of health units in the district reporting cases	Low proportion	X	
		High proportion		X
	Time at which first cases were notified during the epidemic season	Early in the season	X	
		Late in the season		X

(a) Less natural immunity through recent exposure.

(b) More susceptible people may benefit from vaccination.

If the assessment indicates that a campaign is likely to achieve a reasonable reduction in morbidity and mortality and if this campaign is feasible ([Section 4.7.3](#)), the next step is to decide who to vaccinate. Two groups may be targeted for a vaccination campaign: the population currently affected by cholera and the population highly vulnerable to an expansion of the outbreak. These two groups are not necessarily mutually exclusive.

### **Selection of the target population(s)**

Several factors will influence the choice of the target population(s) for vaccination:

– Risk of mortality

The main factor in guiding selection of a target population for vaccination is the risk of cholera mortality (whether in the currently affected or at-risk populations), particularly when there is less vaccine available than required. Analysis of current and historic data may indicate that vaccination of an unaffected population which is at high risk of a severe epidemic and high mortality is potentially more beneficial than vaccination of a currently affected population that is at less risk of poor outcome.

#### – Phase of the outbreak

As an outbreak evolves, the proportion of people in the affected population who remain susceptible and at risk of exposure will decrease, as will the proportion benefitting from reactive vaccination. Ideally, then, vaccination of an affected population should occur in the early phase of the outbreak, when the number of cases is still rising. However, experience to date has demonstrated that rapidly achieving vaccine-induced immunity in a population early in an outbreak is challenging. Prompt decision-making, vaccine acquisition, and campaign implementation considerably reduces the delay. Vaccinating late in the epidemic would likely add little to the preventive measures already being implemented in water, sanitation and hygiene. In this context, vaccinating populations still at risk of outbreak extension is preferable. Vaccination of the affected population near or after the peak can be the right strategy in the following scenarios:

- Severe epidemic with attack rate and/or mortality rate clearly above the norm;
- Epidemic likely to be prolonged (i.e. starting prior to the typical season);
- Prolonged epidemic, presenting ongoing risk of outbreak extension to other vulnerable populations

#### – Access to treatment and clean water/sanitation/hygiene

Morbidity and mortality will likely be low if the health system and partners are able to provide treatment facilities, clean water and improve sanitation and hygiene within a reasonable time frame. Greater benefit may be realized by vaccinating populations which will not have such support, whether currently affected or not.

#### – Population movement

Vaccinating non-affected populations may be a priority when there is a large influx of people coming from an area with a cholera outbreak.

There are no completed field studies which show strong evidence for prioritizing one target population over another. Currently, these recommendations are made based on observations of cholera epidemics and the relatively limited experience of vaccinating in the outbreak setting. In the end, the guidance here is only a subset of the considerations that local and national health authorities may use in a final decision on the strategy of vaccination.

### **4.7.3 Vaccination in humanitarian emergencies<sup>b</sup>**

During natural or man-made disasters, the disruption in water supply, sanitation and health care services and displacement of populations create conditions for an epidemic in areas where the cholera is endemic or introduced.

Vaccination is aimed at protecting a vulnerable population when the key elements of cholera control are lacking and unlikely to be established at sufficient scale within a reasonable time frame. However, vaccination does not lessen the need for protection against water-borne diseases and should not replace provision of clean water and proper sanitation.

The decision to vaccinate will be based on an analysis of:

1. The actual risk of cholera based on the current and historical epidemiological situation;
2. The capacity to control a possible outbreak and provide adequate care to prevent high mortality;
3. The feasibility of, and the capacity to organize, a vaccination campaign.

## 1. Actual risk of an outbreak

The risk of a cholera outbreak in humanitarian emergencies is high when several of the following risk factors are combined.

**Table 4.2** - Risk factors for cholera outbreak in a humanitarian emergency

Criteria	Risk factors
<b>Epidemiology</b>	<ul style="list-style-type: none"> <li>• In an endemic area:               <ul style="list-style-type: none"> <li>▫ annual cholera outbreak or cholera outbreak in at least 3 out of the last 5 years (with incidence of at least 1 case/1000 in each year that cholera occurred)</li> <li>▫ no cholera outbreak within the 5 previous years<sup>(c)</sup></li> </ul> </li> <li>• In the event of population movements:               <ul style="list-style-type: none"> <li>▫ people from an endemic area move to a non-endemic area (risk of introduction)</li> <li>▫ people from a non-endemic area move to an endemic area (no natural immunity)</li> </ul> </li> <li>• Uncontrolled outbreak in a neighbouring country</li> </ul>
<b>Water Sanitation Hygiene</b>	<ul style="list-style-type: none"> <li>• Unprotected water sources; unchlorinated or contaminated water</li> <li>• Water quantity/person/day &lt; 15-20 litres</li> <li>• Ongoing water-borne outbreak (e.g. hepatitis E)</li> <li>• Lack of adequate equipment for transporting, storing and handling water at home</li> <li>• Open defecation in water or other open spaces</li> <li>• Insufficient number of latrines (&gt; 20 persons/latrine) or unused latrines due to poor construction, poor maintenance, any reason</li> <li>• Lack of adequate hygiene facilities and equipment</li> </ul>
<b>Demography</b>	<ul style="list-style-type: none"> <li>• Overcrowding (refugee population beyond the camp's intended capacity, high urbanization, detention centre, etc.)</li> </ul>
<b>Other</b>	<ul style="list-style-type: none"> <li>• Specific characteristics that increase the probability of cholera outbreak: climatic (floods or droughts), socio-economic, cultural, etc.</li> </ul>

(c) 5 years with no or few cases = low population immunity.

For example:

- In a non-endemic area, the risk is high if sanitation and water conditions have seriously deteriorated and cholera is present in a neighbouring country.
- In an area where cholera occurs regularly, the risk is high if a large number of people move to an unorganized, overcrowded refugee camp or slum.

## 2. Capacity to control a possible outbreak and/or limit cholera mortality

Outbreak and/or mortality control is difficult to achieve if some of the following factors are present.

**Table 4.3** - Main challenges for adequate cholera control

<b>Criteria</b>	<b>Examples</b>
<b>Context</b>	<ul style="list-style-type: none"><li>• Open setting with sustained population movements</li><li>• No knowledge of cholera in the population</li></ul>
<b>Surveillance</b>	<ul style="list-style-type: none"><li>• Cholera clinical case definition missing or not applied</li><li>• Reporting and analysis of data poor or non-existent</li></ul>
<b>Case management</b>	<ul style="list-style-type: none"><li>• Inability to set up accessible cholera treatment facilities due to extreme conditions (flooding)</li><li>• Significant difficulty to deliver medical and logistic supplies to cholera treatment facilities (disruption of distribution services)</li><li>• Insufficient or under-trained medical staff to provide appropriate care</li></ul>
<b>Water Sanitation</b>	<ul style="list-style-type: none"><li>• Significant difficulty to scale up potable water and sanitation to all at risk populations</li></ul>

## 3. The feasibility of and the capacity to organize a vaccination campaign

Challenges for organizing an OCV vaccination campaign in humanitarian emergencies – and also in response to an outbreak – include:

- Limited global stock of OVC with respect to the number of people who might benefit from vaccination.

- Long time interval between the decision to vaccinate until the completion of the second round:
  - 1 week to complete ICG proposal with required context, epidemiologic, and demographic information and receive the initial ICG response (48 hours maximum after receiving complete request);
  - 1 to 2 weeks for transportation of OCV and clearance through customs and completion of campaign organization: cold chain, transport, staff recruitment and training, information campaign, site set up, etc.;
  - 4 weeks for the vaccination campaign itself with 2 rounds (plus a 3rd catch-up round in some cases) with a minimum interval of two weeks between the rounds;
  - 1 week to obtain long-lasting immunity following the second dose.
- Other high priority public health interventions limiting resource capacity for OCV campaign.
- Difficulty to achieve adequate coverage with a two-dose regimen in a highly mobile population.
- Large capacity of cold chain required for OCV.

However, if a single-dose strategy is used ([Section 4.7.5](#)), twice as many people can be vaccinated even with a limited stock of vaccines and the time required for vaccinating is significantly shortened.

## 4.7.4 Preventive vaccination in endemic settings

OCV is useful for populations for whom cholera is a significant persistent public health matter. The principal targets for vaccination are populations at high risk, as determined by analysis of historical data. If vaccine availability is limited, only specific sub-populations at highest risk of symptomatic disease and poor outcome (pre-school or school children, pregnant women, those with HIV-infection and the elderly) can be targeted<sup>[4]</sup>.

Vaccination of populations living in locations known for the propagation of epidemics may serve to prevent more regional spread and the need to vaccinate more widely. These populations are those living close to natural reservoirs of cholera (lakes, etc.) and transportation or trade centers.

Vaccination should be planned at a time of year where there is little or no cholera transmission.

Re-vaccination might be required after vaccine immunity decreases if definitive measures to improve access to safe water and sanitation have not been implemented.

## 4.7.5 Single dose strategy

In epidemic and humanitarian emergency contexts, the priority is to provide rapid protection to as much of the at-risk population as possible. With a vaccine given in 2 doses at least 2 weeks apart, and that is in limited supply with respect to needs, a single dose strategy has been employed.

Systemic immune response studies have shown that OCV stimulates a strong response after one week with the first dose in a significant majority of individuals in an endemic setting<sup>[5]</sup>,<sup>[6]</sup>,<sup>[7]</sup>.

In a clinical trial, a single dose protocol demonstrated significant protection (compared to placebo) over a short period (6 months), principally against severe cholera in the adult population<sup>[8]</sup>. A case-control study performed following a single dose reactive vaccination campaign confirmed substantial short term protection<sup>[9]</sup>.

Thus, a vaccination with a single dose is possible when long term protection is not the immediate priority. Twice as many people can be vaccinated with the same quantity of vaccines thus herd protection is enhanced when coverage is high. However, in a context requiring long-term protection the two-dose regimen is preferable.

For practical points for oral cholera vaccination campaign, see [Appendix 10](#).

## 4.7.6 Vaccination campaign strategies

Vaccination can be accomplished by fixed teams, mobile teams, and door-to-door. Depending on the context, a mix of the three may be necessary.

A rapid time frame is desirable for each round when vaccinating in response to an outbreak. A catch-up round may be implemented to vaccinate those who have missed the first or second dose.

### Fixed sites

Fixed sites are appropriate when an entire village or city is targeted. The size and number of the teams depend on the number of people expected per day. The first day of the round is often when the most people will attend.

### Mobile teams

Mobile teams can be used when small populations are targeted and the number of expected people can be vaccinated within a few hours (e.g. children in schools) or to target people unable to get to the fixed vaccination points during the day (e.g., men at the workplace).

### Door-to-door

Door-to-door vaccination may be appropriate where there is local experience with this approach (e.g. polio).

This strategy may be particularly useful when vaccinating a specific sub-population (i.e. a neighbourhood at particularly high risk) without needing to vaccinate an entire city.

Knowing the number of residents or households within the target area is helpful. Keeping track of those absent during each round facilitates targeting during catch-up rounds.

With this approach, people unable to walk to the fixed vaccination points (e.g. the elderly or disabled) can be vaccinated as well.

## 4.7.7 Post vaccination assessment

After any vaccination campaign, two types of studies should be performed. These studies should be planned from the beginning and conducted by specialized study teams.

– A vaccination coverage survey, as calculating the proportion of people vaccinated among the total target population (administrative coverage) does not permit an accurate determination of vaccine coverage.

– A vaccine effectiveness study, to determine how the vaccine protects against cholera in the specific context and population (e.g., background immunity, HIV prevalence). Effectiveness studies require that cholera transmission occurs during the planned period of study. This may not always be the case, particularly for vaccination in humanitarian emergencies.

## Notas

- (a) The WHO provides a tool for assessing risk and feasibility: Oral cholera vaccines in mass immunization campaigns: guidance for planning and use. 2010, Annex 1.  
[http://whqlibdoc.who.int/publications/2010/9789241500432\\_eng.pdf](http://whqlibdoc.who.int/publications/2010/9789241500432_eng.pdf)
- (b) For more information, see Vaccination in acute humanitarian emergencies: a framework for decision making. Geneva, Switzerland: World Health Organization; 2017.  
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<http://www.nejm.org/doi/full/10.1056/NEJMoa1510330>

9. Andrew S Azman, Lucy A Parker, John Rumunu et al. Effectiveness of one dose of oral cholera vaccine in response to an outbreak: a case-cohort study. *The Lancet Global health*. Volume 4, No. 11, e856–e863, November 2016.  
<http://www.thelancet.com/journals/langlo/article/PIIS2214-109X%2816%2930211-X/fulltext>

## 4.8 Health promotion strategies

### 4.8.1 General considerations

Health promotion activities are an integral part of outbreak control measures. As with other interventions, they target individuals directly affected by, or vulnerable to, cholera.

The key messages to convey as part of outbreak control are found in [Section 3.8.3](#) and [Appendix 4](#). The form and channels of communication depend on the context, mainly the type of setting (endemic/epidemic; urban/rural, etc.) and the sociocultural characteristics of the population (language, customs, habits, beliefs, education skills, etc.).

Household resources and living conditions must be taken into account when implementing health promotion activities. In terms of prevention, access to potable water and hygiene remain a priority. Health promotion activities complement these interventions but do not replace them. Distributions should be organized whenever necessary.

Health promotion activities are maintained throughout the duration of the epidemic. Strategy, target and/or messages may change according to the evolution of the epidemic or if the messages are not heeded or the impact of activities is not satisfactory.

### 4.8.2 Facility-based interventions

Health promotion activities are conducted in cholera treatment facilities for patients and attendants. They are usually carried out by a dedicated health promoter(s) in large facilities, and by the medical staff in smaller facilities.

All patients and attendants in a CTC, CTU or ORP should receive before discharge information on how to manage diarrhoea at home, use ORS and avoid new cases within the household. The patient should be given a few sachets of ORS, as well as some soap, on discharge so that he can follow the recommendations given.

If the household hygiene kits are given to the person accompanying the patient on admission ([Section 3.4.4](#)), the relevant instructions and recommendations must be explained to her/him.

### 4.8.3 Health promotion within the population



Health promotion activities are also conducted outside cholera treatment facilities by health promoters, under the responsibility of a health promotion manager ([Appendix 20](#)). In addition to their routine activities to prevent cholera and deaths due to cholera, these teams also participate in specific activities such as distributions (e.g., of soap in neighbourhoods or villages), mass vaccination campaigns, etc.

In rural areas where communities are widely dispersed it can be difficult, or even impossible, to set up centralised prevention and treatment (e.g. distribution of clean water, cholera treatment facilities) in the short or long term. Community or family management of prevention measures and treatment may be the best, or only, strategy possible. In these contexts, key messages on prevention of the illness and patient care also include explanations, and demonstrations, of measures to be used: home water treatment with or without extra resources (i.e. disinfection with chlorine tablets or boiling water) and in the absence of a treatment facility, the preparation, use and storage of ORS distributed.

## 4.9 Outbreak response committees

Outbreak response committees (or crisis cells) are formed at the national, regional and/or district level depending on the extent of the outbreak and health system structure. These committees coordinate the outbreak response at their respective levels.

The committees meet on a regular basis: daily at the start of the outbreak, and then weekly until operations are over. The meetings are short and have clear agendas.

The minutes are distributed to managers at each level and to the partners. Feedback can also be given via a weekly report relaying the essential information.

### 4.9.1 Composition of the committees

At each level, the committee is composed of representatives from:

- Ministry of Health;
- Hospitals, cholera treatment structures;
- Water and sanitation services;
- Administrative authorities;
- Support agencies (WHO, UNICEF, bilateral cooperation) and non-governmental organizations.

Outbreak response requires close coordination with other sectors, which may participate in specific meetings on an as-needed basis. These sectors include:

- Laboratories;
- Media: radio, newspapers and television disseminate information on the existence of an outbreak, the symptoms of the disease, treatment locations, free care, etc.;
- Customs: can facilitate the importation of drugs and equipment;
- Public safety: the police can help maintain order during large mass vaccination campaigns.

### 4.9.2 Role of committees

The Terms of Reference (responsibilities and decision-making level) are drawn up on a case-by-case basis.

## **National committee**

The national committee defines the strategy for surveillance, patient management, vaccination, public information and health promotion. It must provide appropriate solutions for the implementation of outbreak response (Table 4.4).

The national committee defines roles and responsibilities of descending-level committees (region, district). It also supervises activities, mobilizes the necessary resources, and coordinates and informs partners at the national level.

As evaluation is a component of any operation, the committee must ensure regular reviews of implementation. The aim is to improve operations by formulating recommendations with regard to what is being done in practice.

**Table 4.4** - Objectives and key responsibilities of the national committee

	<b>Objectives</b>	<b>Responsibilities</b>
<b>Epidemiological surveillance</b>	<ul style="list-style-type: none"> <li>• To provide daily or weekly data for decision-making.</li> <li>• To define the priority areas for interventions.</li> </ul>	<ul style="list-style-type: none"> <li>• Select and diffuse a standard case definition.</li> <li>• Strengthen or establish a simple, regular and reliable data collection and analysis system.</li> </ul>
<b>Patient management</b>	<ul style="list-style-type: none"> <li>• To shorten the time between the first symptoms of cholera and treatment.</li> <li>• To reduce the CFR.</li> <li>• To make free treatment available at all times and at all levels.</li> </ul>	<ul style="list-style-type: none"> <li>• Define and diffuse treatment protocols.</li> <li>• Assess needs in terms of: <ul style="list-style-type: none"> <li>▫ cholera facilities;</li> <li>▫ treatment supplies;</li> <li>▫ staff and training.</li> </ul> </li> <li>• Define the supply strategy (timetable and priorities).</li> <li>• Set up a monitoring system for quantities distributed.</li> </ul>
<b>Public information Health promotion</b>	<ul style="list-style-type: none"> <li>• To provide the public clear, practical information on the outbreak, patient care and if relevant, vaccination.</li> </ul>	<ul style="list-style-type: none"> <li>• Determine: <ul style="list-style-type: none"> <li>▫ message contents;</li> <li>▫ target audience;</li> <li>▫ means for transmission.</li> </ul> </li> <li>• Provide support for health promotion (production of material, provision of staff, transport, etc.)</li> </ul>
<b>Vaccination</b>	<ul style="list-style-type: none"> <li>• To quickly protect the at-risk population.</li> <li>• To limit the spread of the outbreak.</li> </ul>	<ul style="list-style-type: none"> <li>• Decide whether or not to conduct a mass vaccination campaign.</li> </ul> <p>If yes:</p> <ul style="list-style-type: none"> <li>• Define and prioritize the target populations.</li> <li>• Decide approach and planning of activities.</li> <li>• Validate ICG vaccine supply request.</li> <li>• Assess cold chain and storage capacity and needs.</li> <li>• Follow-up of vaccination implementation.</li> </ul>

- |  |  |  |
|--|--|--|
|  |  | <ul style="list-style-type: none"><li>• Determine timing of post-vaccination assessment (see <a href="#">Section 4.7.7</a>).</li></ul> |
|--|--|--|

## Local committees

The other levels (regional and district) are involved in surveillance and alerts, data management, and response implementation.

They transmit information to the national level daily or weekly according to the phase of the outbreak.

# Chapter 5: Cholera case management

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## 5.1 Principles of case management

### 5.1.1 Triage and admission

#### Diagnosis of cholera

Individuals presenting with clinical features corresponding to the clinical case definition are considered (and registered) as cholera cases.

Individuals presenting with clinical features not corresponding to this definition (no diarrhoea, bloody diarrhoea, etc.) are referred to the appropriate health facility.

## Initial assessment of hydration status

The objective of the clinical evaluation is to determine whether dehydration is present and if so, its severity<sup>a</sup>. After this rapid evaluation, patients are placed into one of the following three categories:

- Severe dehydration (including shock)
- Some dehydration
- No dehydration

Hydration status on admission determines the initial treatment (oral or IV, volumes to be administered, etc.).

## 5.1.2 Elements of therapy

1. The first priority is to correct or prevent dehydration with the appropriate rehydration fluids.
2. Complementary therapies (antibiotic, zinc sulfate) are useful in reducing the duration and severity of diarrhoea but do not replace fluid therapy, which remains indispensable.
3. Cholera is associated with some degree of emesis, anorexia and malabsorption which can all impact on nutritional status, especially in children. Once the patient is capable of oral intake, feeding should resume (usually 3 to 4 hours after starting rehydration).

## 5.1.3 Fluid therapy

### Dehydrated patients

Treatment consists of two phases: a rehydration phase and a maintenance phase.

- The *rehydration phase* is aimed at correcting the estimated initial fluid deficit over a defined time period.
  - Severe dehydration: a volume of Ringer lactate (RL) corresponding to 10% of the patient's body weight (i.e. 100 ml/kg), is administered by IV route. This corresponds to "Treatment Plan C".
  - Some dehydration: the patient receives a volume of oral rehydration solution (ORS) corresponding to 5-9% of their body weight. By convention, 7.5% is used (i.e. 75 ml/kg). This corresponds to "Treatment Plan B".



During the oral or IV rehydration phase, fluid losses will continue due to significant ongoing diarrhoea<sup>b</sup>. If these losses are not compensated by an additional volume of ORS or RL, dehydration will persist, even if the volume initially required has been administered.

Once dehydration has been corrected, i.e. when there are no longer signs of dehydration, the patient enters the maintenance phase.

- The *maintenance phase* is aimed at preventing a relapse of dehydration. It is directed at continuing the systematic oral replacement of ongoing fluid losses as they occur until diarrhoea ceases. This corresponds to "Treatment Plan A".

### Non-dehydrated patients

Patients with no dehydration do not need rehydration by definition, so they begin directly with the maintenance phase (Treatment Plan A) to prevent dehydration. Some of these patients can be treated at home depending on the context and their ability to drink ORS. In these cases, patients and/or attendants must be given clear instructions on treatment administration and the signs requiring medical attention.

## 5.1.4 Clinical evolution and impact of therapy

The initial treatment protocol prescribed (Treatment Plan C, B, or A) corresponds to the dehydration level at the moment of admission.

- In patients with *severe dehydration*, treatment should rapidly correct danger signs and progressively reduce signs of dehydration. A favourable clinical evolution allows a reduction in the intensity of treatment: at the end of Plan C, the patient can pass to Plan B (if only signs of some dehydration remain) or even Plan A (if there are no remaining signs of dehydration).
- In patients with *some dehydration*, treatment should eliminate signs of dehydration. At the end of Plan B, the patient can pass to Plan A.
- In *non-dehydrated patients*, treatment Plan A should avoid the appearance of signs of dehydration.

However, the initial clinical state can rapidly deteriorate (or not improve) if:

- The volume of fluid prescribed on admission is insufficient: degree of dehydration underestimated or error in calculation.
- The volume is not administered within the correct time frame: rehydration too slow or too fast, interruptions in treatment (empty IV bags or ORS cups).
- On-going fluid losses (continued diarrhoea) are not adequately compensated by additional ORS or RL.
- Frequent vomiting persists: IV therapy may be needed for those who systematically vomit all ORS, even in patients with some dehydration.

If the patient's state deteriorates during therapy, a change in protocol must be rapidly considered (switching from Plan A to Plan B; from Plan B to Plan C or re-administering a bolus if necessary) without waiting for the completion of a failing therapy.

## 5.1.5 Patient surveillance

To evaluate the efficacy of treatment, to react when a patient's condition deteriorates or does not improve, to change treatment plan or make a decision on patient discharge, surveillance is indispensable. Surveillance is based on observation of:

1) Clinical evolution:

- Improvement or the (re-)appearance of signs of dehydration or danger signs.
- Ability to drink ORS (frequency of vomiting, level of consciousness, etc.).
- Appearance of complications (symptomatic hypokalaemia, fluid overload, etc.).
- Patient-specific surveillance (e.g. blood pressure in pregnant women).
- Resumption of food intake after 3-4 hours of admission.

2) Intake (“Ins”, fluid received) and output (“Outs”, diarrhoea and vomiting):

– “Ins”:

- Count and record the volume (in ml or litres) of RL infused or cups of ORS drunk.
- Verify that fluids are given in the prescribed quantity and time frame (e.g. X litres of RL in 3 hours, X ml of ORS in 4 hours).

– “Outs”:

- Record the number of stools (so as to be able to replace this lost volume).
- Record the number of emesis (so as to be able to evaluate the capacity to drink and retain ORS).

Surveillance of patient fluid loss has the following objectives:

- Reinforce surveillance in the event of profuse diarrhoea or repeated vomiting (i.e. identify patients whose rehydration therapy will be longer or more complex).
- Determine if fluid replacement compensates the on-going losses (is the patient receiving sufficient, too much or not enough additional fluid to replace losses?) and to adjust therapy if necessary.
- Monitor the evolution of the patient’s illness (the number of stools should decrease over time).

While all cholera patients need regular surveillance, certain patients require closer observation:

- Patients with severe dehydration or hypovolaemic shock until they are stabilized.
- Infants, the elderly, pregnant women, malnourished children, as the risk of complications is higher.
- Patients with co-morbidities.
- Patients receiving oral therapy who have difficulty drinking or who vomit repeatedly, as their condition can rapidly deteriorate.

## 5.1.6 Complementary therapy

### Antibiotic therapy

Antibiotics can reduce the volume and duration of diarrhoea and decrease the period of *Vibrio* shedding<sup>o</sup>. They are indicated in patients with some or severe dehydration and should be administered in the first 4 hours.

The choice of antibiotic should be based on drug-resistance patterns from cholera cultures performed early in an outbreak. While awaiting results of drug sensitivity testing, patients can be given doxycycline. If drug sensitivity testing shows doxycycline resistance, these patients do not need to be retreated with a different antibiotic.

In the context of a cholera epidemic, the usual contraindications for certain antibiotics (e.g. doxycycline in children and pregnant women) are relative, particularly in light of their use in single dose. In any cases, follow national recommendations.

## **Zinc supplementation**

In children under 5 years, diarrhoea causes a significant loss of zinc which must be replaced. Zinc sulfate shortens the duration and severity of diarrhoea, and if taken for 10 days, may prevent other diarrheal illnesses for up to 2 to 3 months.

Zinc is indicated for children under 5 years presenting with diarrhoea, regardless of dehydration status. It can be given when the child is able to tolerate oral intake (usually on the first day).

## **5.1.7 Feeding**

Children and adults should resume an unrestricted normal diet as soon as possible.

For breast-fed infants, breast-feeding should continue, even during the rehydration phase.

## **5.1.8 Management of specific populations**

In pregnant women, young children, children with severe malnutrition (defined by anthropometric or clinical criteria) or severe anaemia, the case management principles remain the same. However, the clinical assessment and/or treatment protocols may or must be adapted.

## **5.1.9 Unnecessary treatments**

Antispasmodics, antidiarrhoeals, antiemetics, plasma expanders and IV fluid containing only glucose (e.g. 5% glucose) are not indicated in the treatment of cholera and should not be used.

## **5.1.10 Patient discharge**

### **Severe dehydration**

Patients admitted with severe dehydration can be discharged once the following 3 criteria have been achieved:

- No signs of dehydration.
- 3 or less liquid stools and no vomiting in the last 4 to 6 hours.
- The patient (or the person taking care of her/him) has demonstrated that maintenance therapy can be taken at home without supervision.

### **Some dehydration**



Patients admitted with some dehydration can be discharged once the following 3 criteria have been achieved:

- No signs of dehydration.
- No vomiting in the last 4 hours.
- The patient (or the person taking care of him) has demonstrated that maintenance therapy can be taken at home without supervision.

## **No dehydration**

Patients with no dehydration on admission need not remain under observation for 4 to 6 hours and can be discharged within 1 to 2 hours if they are able to drink sufficient ORS after each stool, do not vomit, and are easily able to return if their condition deteriorates.

## **Notas**

- (a) Dehydration is expressed as a percentage of lost body weight. An absence of signs of dehydration corresponds to a deficit of < 5% of body weight. Clinical signs of “some dehydration” appear when fluid loss is 5-9% of body weight and signs of “severe dehydration” occur when losses equal 10% or more.
- (b) The volume of diarrhoea is around 10-15 ml/kg/hour during the first 4-6 hours, diminishing progressively over time as the illness resolves and with effective complementary therapy (antibiotic and zinc).
- (c) Antibiotics begin to decrease stool volume within 12-24 hours and can reduce the duration of significant diarrhoea down to 48-72 hours. Stool culture for *Vibrio cholerae* typically becomes negative over 2-3 days compared to 5-7 days without antibiotics.

# **5.2 Initial clinical assessment**

For assessment in pregnant women, see [Section 5.7](#) and in severely malnourished children, see [Section 5.8](#). For children with severe anaemia, see also [Section 5.9](#).

## **5.2.1 Definition of a clinical case**

In an epidemic context, a patient with acute watery diarrhoea (3 or more liquid stools per day) with or without vomiting, with or without dehydration, is a clinical case of cholera.

## **5.2.2 Clinical examination**

### **1) Recognize danger signs**

The first step is to determine whether there are signs of hypovolaemic shock.

- Loss of consciousness (coma) or decreased level of consciousness (lethargy)
- Absent pulse or weak pulse difficult to palpate
- Very rapid breathing or gasping or cyanosis

*Notes:*

- Lethargy: a lethargic patient is a somnolent patient who cannot be fully awakened, even with stimulation.
- Pulse: routinely counting the pulse rate is unnecessary. Verify if the pulse is palpable or not and if the pulsations are strong (readily palpable) or weak (difficult to palpate).

**In the presence of a single danger sign, it is urgent to establish intravenous access and begin the protocol for severe dehydration. The remainder of the clinical examination can be competed once rehydration has commenced.**

In children under 5 years, additional danger signs should be specifically assessed, when a trained examiner is available. The presence of one of these danger signs also justifies treatment for severe dehydration:

- Temperature gradient between the body and the extremities (cold hands and feet) AND a capillary refill time > 3 seconds.
- Heart rate (HR) outside the normal range for age, in the absence of another pathology explaining the anomaly.
- Respiratory rate (RR) outside the normal range for age, in the absence of another pathology explaining the anomaly.

**Table 5.1** – Abnormal heart and respiratory rates in children 0-5 years

Parameters	0 to < 2 months	2 to < 12 months	1 to < 3 years	3 to 5 years
HR	> 180 < 100	> 180 < 90	> 150 < 90	> 140 < 80
RR	> 60	> 50	> 40	> 40

**2) Complete the evaluation of dehydration**

In the absence of danger signs (or after having urgently started IV infusion in patients with danger signs), continue the evaluation using the table below:

**Table 5.2** – Evaluation of dehydration (adapted from the WHO)

<b>Mental status</b>	Normal, awake	Agitated, irritable	Lethargic or unconscious
<b>Radial pulse</b>	Easily palpable	Palpable (possibly rapid)	Difficult to palpate (weak) or absent
<b>Eyes</b>	Normal	Sunken	Sunken
<b>Skin pinch</b>	Disappears rapidly	Disappears slowly (< 2 seconds)	Disappears very slowly (> 2 seconds)
<b>Thirst</b>	Drinks normally	Thirsty, drinks avidly	Incapable or drinks very little
<b>DIAGNOSIS</b>	↓ <b>NO DEHYDRATION</b>	↓ <b>SOME DEHYDRATION</b>	↓ <b>SEVERE DEHYDRATION</b>

*Notes:*

– Sunken eyes are a sign of dehydration (loss of soft tissue volume causing eyes to sink into their orbits) but may be a normal feature in some children. Ask the mother if the child’s eyes are the same as usual or are more sunken than usual.

– Skin pinch: this test evaluates the loss of skin elasticity due to a decrease in water content. The slower the skin pinch disappears, the greater the degree of dehydration. Skin pinch is assessed by pinching the skin of the abdomen between the thumb and forefinger, without twisting.

In the elderly, this sign is not as reliable, as normal aging diminishes skin elasticity. In these patients, checking skin pinch can be done on the chest below the clavicle.

– Thirst is not always a good indicator of dehydration. Severely dehydrated patients and the elderly may not feel thirsty, even in the presence of clear signs of dehydration. The objective is to determine if the patient is able to drink, rather than the level of thirst. If the patient drinks normally or avidly, then oral rehydration is indicated and is likely to succeed. Those who have difficulty drinking will require close surveillance as they risk failing oral therapy, necessitating a change in protocol (e.g. switching to IV rehydration).

**3) Decide which treatment to give**

**Table 5.3** – Therapeutic decision

Signs/symptoms	Diagnosis	Decision
<ul style="list-style-type: none"> <li>• One or more danger signs</li> </ul> OR <ul style="list-style-type: none"> <li>• At least 2 of the following signs<sup>a</sup> :               <ul style="list-style-type: none"> <li>– very sunken eyes</li> <li>– skin pinch very slow to disappear (&gt; 2 sec.)</li> <li>– the patient drinks very little</li> </ul> </li> </ul>	Severe dehydration	<b>Treatment plan C</b>
<ul style="list-style-type: none"> <li>• No danger signs</li> </ul> AND <ul style="list-style-type: none"> <li>• At least 2 of the following signs<sup>a</sup> :               <ul style="list-style-type: none"> <li>– eyes lightly sunken</li> <li>– skin pinch disappears slowly (&lt; 2 sec.)</li> <li>– the patient is very thirsty and drinks avidly</li> </ul> </li> </ul>	Some dehydration	<b>Treatment plan B</b>
No signs of some or severe dehydration	No dehydration	<b>Treatment plan A</b>

#### 4) Weigh the patient

Weigh the patient if possible (at least children under 5 years) to decide the quantity of fluid to be administered or use an age-based weight estimate.

#### 5) Look for concomitant illnesses

In the event of fever in a patient who meets the definition of a cholera case, look for co-infection (malaria, respiratory infection, etc.) and treat accordingly. See [Clinical guidelines](#), MSF. Relevant tests should not delay rehydration therapy.

The rehydration protocols may be modified and closer monitoring required in the event of a concomitant pathology in patients at particular risk ([Section 5.9](#)).

#### Notas

(a) The diagnosis is based on the association of at least two signs due to the lack of specificity of each sign taken individually.

## 5.3 Severe dehydration

Severe dehydration is a medical emergency. The patient must be treated immediately with IV fluid according to the following protocol.

For pregnant women, see [Section 5.7](#), for severely malnourished children, see [Section 5.8](#), for children with severe anaemia, see also [Section 5.9](#).

## 5.3.1 Treatment protocol (Plan C)

### Intravenous rehydration

#### Children 5 years and over and adults

**30 ml/kg of Ringer lactate (RL)<sup>a</sup> over 30 minutes**

Repeat once if danger signs are still present

then

**70 ml/kg of RL over 3 hours**

One-third of the volume is given as a very rapid infusion (bolus) in 30 minutes. This is intended to re-establish a circulating volume sufficient to correct tissue hypoperfusion. The remaining two-thirds are given slowly, over 3 hours.

#### *Example:*

An adult (60 kg) will receive 6 litres (100 ml x 60 kg) of RL as follows:

2 litres (30 ml x 60 kg) in 30 minutes then, if s/he has improved (conscious, palpable pulse), 4 litres (70 ml x 60 kg) over the next 3-4 hours (1 litre every 45 minutes or more simply 1 litre per hour).

If, however, after the initial bolus, the patient continues to have a weak pulse and/or remains lethargic, a second bolus of 2 litres over 30 minutes should be given before moving on to 4 litres over 3-4 hours.

For volumes to prescribe, see [Appendix 5](#).

#### Children under 5 years

**20 ml/kg of RL over 15 minutes**

If danger signs still present, repeat bolus up to 2 times

then

**70 ml/kg of RL over 3 hours**

#### *Example:*

A child (11 kg) should receive approximately 1 litre (90 ml x 11 kg) of RL as follows:

250 ml of RL (20 ml x 11 kg) in 15 minutes, and if s/he has improved (no danger signs), then 750 ml (70 ml x 11 kg) over 3 hours.

If, however, any danger signs are present after the initial bolus, repeat up to 2 times, assessing for danger signs after each bolus. Then, give 750 ml over 3 hours.

For volumes to prescribe, see [Appendix 5](#).

If the patient is able to tolerate oral treatment, ORS should be started immediately.

## Compensation for on-going losses

During the rehydration phase, the losses from on-going diarrhoea must be compensated. As soon as the patient can drink:

Give after each loose stool:

- 50-100 ml of ORS for children under 2 years
- 100-200 ml of ORS for children between 2 and 10 years
- 200-250 ml of ORS for children over 10 years and adults

The number of cups of ORS consumed must approximate the number of stools produced.

If the patient cannot drink or is vomiting all oral intake, on-going losses can be replaced intravenously using RL ([Section 5.3.3](#)) until oral intake is possible.

## Complementary therapy

These treatments should be administered as soon as the patient is haemodynamically stable and can tolerate oral treatment.

– Antibiotic therapy

Depending on the drug-sensitivity testing, administer one of these antibiotics:

**Table 5.4** – Antibiotic therapy

Antibiotic	Children	Adults
doxycycline PO	4 mg/kg single dose	300 mg single dose
azithromycin PO	20 mg/kg single dose	1 g single dose
ciprofloxacin PO <sup>b</sup>	20 mg/kg single dose	1 g single dose

– Zinc supplementation

Start a 10 day course of **zinc sulfate** PO:

Children under 6 months: 10 mg once daily

Children 6 months–5 years: 20 mg once daily

Show the attendant how the treatment is given so that the 10-day course can be completed at home ([Section 5.6.1](#)).

For dosage charts, see [Appendix 7](#).

## 5.3.2 Patient supervision

## During the first 30 minutes

- Observe closely until a strong radial pulse is present and mental status improves.
- Check the volume of fluid infused. Ensure that the infusion rate is sufficient to administer the prescribed quantity within the correct time frame.
- If there is no improvement with the first bolus, administer a second bolus (in total, children under 5 years may receive up to 3 boluses max.).
- If after the second bolus, the mental status has not improved, consider hypoglycaemia, measure blood glucose and/or administer glucose empirically ([Section 5.10.1](#)).

## During the next 3 hours

- Assess every 30 minutes:
  - That the prescribed volume of infusion will be administered in the correct time frame (correct infusion rate, functional catheter).
  - That danger signs are absent.
- Note the amount of fluid given (RL and ORS).
- Note the number of stools and vomiting episodes (mark a cross for each stool or vomiting).
- Check more frequently patients with abundant diarrhoea and vomiting, children under 5 years and elderly patients.
- If any danger signs reappear, repeat bolus therapy until resolution, and then continue prior fluid therapy. For children under 5, assess for hypoglycaemia. In the event of hypoglycaemia, see [Section 5.10.1](#).
- If the patient develops an onset of extremity or peri-orbital oedema or difficulty breathing, consider fluid overload ([Section 5.10.4](#)).

## End of the rehydration phase

After the prescribed amount of RL has been given, reassess the hydration status; if there are no signs of dehydration, the patient can then move to the maintenance phase. Stop the infusion but leave the catheter in place.

However, if a patient was more dehydrated than initially assessed or if on-going losses have not replaced, signs of dehydration may still be present at this point.

- If signs of severe dehydration are still present, repeat the 3-hour IV rehydration treatment, including bolus.
- If signs of some dehydration are present, continue the rehydration phase with 75 ml/kg of ORS over 4 hours ([Section 5.4](#)). Stop the infusion but leave the catheter in place. In these patients, continue the clinical evaluation hourly until the signs of dehydration have resolved and the patient can switch to maintenance therapy.

## 5.3.3 Practical tips

### IV rehydration

#### – Venous access<sup>c</sup>

- Use 18G for adults (20G in adults with small veins) and 22G or 24G for children.
- The veins of the forearm or antecubital fossae are preferred. Hand and foot veins do not permit the needed infusion rate and catheters placed there are easily dislodged.
- In adults, a second catheter may initially be placed in the other arm to deliver the full bolus volume in the correct time frame (2 litres in 30 minutes). It must be removed once a strong pulse has returned, keeping a single catheter in place.
- Always have an intra-osseous needle kit available at hand in case of failure to establish IV access.
- Failure to quickly place an IV catheter in a peripheral vein after 90 seconds should prompt the use of the external jugular or intra-osseous route ([Appendix 6](#)). Scalp veins can also be used temporarily in infants when a peripheral IV catheter cannot be rapidly inserted, but an intra-osseous catheter is preferred.

#### – Infusions

- Raise the IV pouch as high as possible above the catheter insertion site to increase flow rate.
- In children, keeping the arm straight can be achieved by taping a piece of cardboard or a tongue depressor across the posterior aspect of the elbow.
- Mark each pouch of IV fluid with a marker, indicating the current pouch number and the total prescribed (i.e. 1/6, 2/6, 3/6, etc.). In young children, use a paediatric infusion set with a burette (150 ml). In older children, draw a line on the bag corresponding to the volume prescribed.
- Record in the patient's file the volume of IV fluid administered (in litres or ml).
- Assess the IV catheter insertion site. The catheter must be replaced in the event of dislodgment, infiltration, local inflammation, or unexplained fever. Catheters do not need to be changed systematically if they remain clean and function properly.

#### – End of the infusion

Once IV therapy has been completed, leave the catheter in place and disconnect the infusion bag. If after 4 to 6 hours of oral therapy, the patient has 1) no profuse diarrhoea or severe vomiting, 2) can compensate the losses by consuming ORS and 3) no longer has signs of dehydration, the catheter can be removed to minimize risks of complications. This decision should take into account the possible difficulties in re-establishing IV access if needed in young children, the elderly, and the obese.

### **ORS administration**

Often the patient attendant is left to administer ORS to the patient. However, it is the responsibility of the medical personnel to ensure that the correct amount is being consumed.

### **Estimation of on-going losses**

#### – Diarrhoea and vomiting

Do not try to measure the volume of diarrhoea and vomiting, but note each episode of diarrhoea or vomiting over time.

The number of stools is used to estimate the volume to be replaced.

Vomiting is not counted as fluid to be replaced, but must be followed to know if the patient can (or cannot) retain ORS.



– Urine

Urine output is not counted as fluid loss as such. However, it is necessary to check that the patient has urinated at least once during or by the end of the rehydration phase.

### **Compensation for on-going losses**

It is roughly estimated that each stool should be compensated by 50-100 ml of ORS for children < 2 years; 100-200 ml of ORS for children 2-10 years; 200-250 ml of ORS for children > 10 years and adults.

If the patient is incapable of drinking, on-going losses must be compensated via the IV route. Two techniques are possible:

– Compensate losses progressively over time (hour by hour): attach a second bag of IV fluid by a Y-connector to the principal IV line, open this “supplemental fluid IV line” to administer the estimated volume (e.g. 4 stools passed by a child < 2 years = 200 ml of RL in one hour) and then close the line. An hour later, total the number of stools passed during that time and administer the desired quantity, etc. This set-up permits administration of a volume of RL corresponding to that lost in diarrhoea without interrupting the principal infusion (for rehydration). This option requires well-trained staff.

– Compensate the total number of stools lost at the end of the 3-hour rehydration phase over a time period appropriate for the amount of volume to be replaced (do not exceed 25 ml/kg/hour).

For example, for a 3-year old child, 8 stools were passed during the 3-hour rehydration, thus give 800 ml (8 x 100 ml) over 3 hours at the end of rehydration.

### **Notas**

- (a) The fluid of choice is Ringer lactate. If RL is not available, 0.9% sodium chloride, with or without glucose, can be used. IV fluid containing only glucose (e.g. 5% glucose) should not be used.
- (b) Ciprofloxacin should not be used unless there is resistance to doxycycline and azithromycin and demonstrated sensitivity to ciprofloxacin. Recently, cholera strains are showing increased resistance to ciprofloxacin and its widespread use may worsen the problem. In addition, ciprofloxacin is the drug of choice for other bacterial diarrhoea (*E. coli*, salmonella, shigella) and its widespread single-dose use during cholera outbreaks might lead to resistance in these pathogens.
- (c) A nasogastric tube should not be used in the treatment of severe dehydration or shock as it does not permit rapid fluid replacement in the quantities required.

## **5.4 Some dehydration**

Patients with some dehydration are not as critically ill as those with severe dehydration, but are at high risk of becoming so. Thus, these patients should be admitted and have their rehydration and clinical evolution supervised.

## 5.4.1 Treatment protocol (Plan B)

### Oral rehydration

The volume of oral rehydration solution (ORS) to be given is 75 ml/kg over 4 hours.

*Examples:*

- An adult ( $\geq 50$  kg) receives 4 litres of ORS over 4 hours, i.e. 1 litre per hour.
- A 3 year old child ( $\pm 14$  kg) receives 1 litre (75 ml x 14 kg) of ORS over 4 hours, i.e. 250 ml per hour.

For volumes to prescribe, see [Appendix 5](#).

### Compensation for on-going losses

During the rehydration phase, the losses from on-going diarrhoea must be compensated. As soon as the patient can drink:

Give after each loose stool:

- 50-100 ml of ORS for children under 2 years
- 100-200 ml of ORS for children between 2 and 10 years
- 200-250 ml of ORS for children over 10 years and adults

The number of cups of ORS consumed must approximate the number of stools produced during the rehydration phase.

### Complementary therapy

Antibiotic therapy and zinc supplementation ([Section 5.3.1](#) and [Appendix 7](#)).

## 5.4.2 Patient supervision

ORS must be provided to the patient in the correct quantity like any other medication during hospitalisation. Rehydrating a patient is not simply prescribing ORS and returning to evaluate after 4 hours.

### During the rehydration phase

- Every hour:
  - Verify that signs of dehydration are regressing.
  - Note the amount of ORS given and check if hourly consumption is sufficient to complete prescribed quantity within the correct time frame.
  - Note the number of stools and episodes of vomiting.
- Closer monitoring is required for patients who are not capable of drinking without assistance (e.g. young children), those with abundant, continuing diarrhoea or frequent vomiting or those having trouble drinking (e.g. the elderly who may have altered sensation of thirst).

– On the other hand, strict surveillance is not necessary for those who are thirsty, capable of drinking without assistance and with little or no vomiting.

– At any time:

- If it becomes obvious that oral therapy will fail due to uncontrolled vomiting, switch to IV route and give the amount that would have been given orally, i.e. 75 ml/kg over 4 hours.
- If signs of severe dehydration appear, switch immediately to the treatment of severe dehydration, starting with the initial bolus ([Section 5.3.1](#)).

### **End of the rehydration phase**

After the prescribed amount of ORS has been given, reassess the patient's hydration status. If there are no signs of dehydration, the patient can then move onto the maintenance phase.

However, if a patient was more dehydrated than initially assessed or if on-going losses were not replaced, signs of dehydration may still be present at this point.

- If signs of some dehydration are still present, repeat the oral rehydration protocol over 4 hours.
- If signs of severe dehydration are present, start the severe dehydration protocol, including bolus ([Section 5.3.1](#)) then, continue the clinical evaluation hourly until the signs of dehydration have regressed and the patient can switch to maintenance therapy.

## **5.4.3 Practical tips**

### **Administration of ORS**

Difficulties in oral rehydration are due to the large volume of ORS to be consumed. Adherence can be poor if the patient is not encouraged by the medical staff. Successful completion of oral rehydration should not be left solely to the patient or attendant.



Assure that cups of ORS are systematically refilled. Do not simply note the number of cups provided to the patient; ensure that they are being fully consumed. ORS consumption must be observed by medical personnel.

In children under 2 years, use a teaspoon or a 10-20 ml syringe to administer ORS.

Vomiting, if not repetitive, is not a contraindication to oral rehydration, but it complicates it.

Demonstrate how to administer ORS to a child who is vomiting:

- Children under 2 years: give a teaspoon of ORS every minute
- Children 2 years and over: give ORS by small sips from a cup every minute

If the child vomits, wait 10 minutes and try again, taking smaller, less frequent sips (or spoonfuls) every 5 minutes.

If the patient is thirsty and wants to drink more than prescribed, give more ORS.

### **Compensation for on-going losses**

*Example:* a 3 year old child ( $\pm$  14 kg) should receive 1 litre of ORS in 4 hours, i.e. 250 ml per hour, according to Treatment Plan B and at least 100 ml of ORS each time he has a stool.

Time	In	Out
1 <sup>st</sup> hour	At least 250 ml of ORS	3 liquid stools
2 <sup>nd</sup> hour	At least 250 ml of ORS + 300 ml (3 x 100 ml) for on-going loss In total the child must drink 550 ml within the 2 <sup>nd</sup> hour.	2 liquid stools
3 <sup>rd</sup> hour	At least 250 ml of ORS + 200 ml (2 x 100 ml) for on-going loss In total the child must drink 450 ml within the 3 <sup>rd</sup> hour.	2 liquid stools
4 <sup>th</sup> hour	At least 250 ml of ORS + 200 ml (2 x 100 ml) for on-going loss In total the child must drink 450 ml within the 4 <sup>th</sup> hour.	2 liquid stools
<i>After 4 hours, the child has no signs of dehydration, s/he switch to Plan A.</i>		
5 <sup>th</sup> hour	At least 200 ml to replace on-going loss	2 liquid stools
Etc.	.....	.....

## 5.5 No dehydration (or maintenance therapy)

Maintenance therapy is used for both:

- Patients dehydrated on admission who have been rehydrated and present no further signs of dehydration;
- Patients with no dehydration on admission.

### 5.5.1 Treatment protocol (Plan A)

#### Maintenance therapy

Administer ORS after each loose stool, until diarrhoea stops, as indicated below:

**Table 5.5** – Quantity of ORS to maintain hydration (WHO)

Age	Amount of ORS after each loose stool	ORS quantity per day
Under 2 years	50-100 ml (10-20 teaspoons of 5 ml)	500 ml/day
2 to 10 years	100-200 ml (½ to 1 glass of 200 ml)	1000 ml/day
Over 10 years	at least 200-250 ml (at least 1 glass of 200 ml)	2000 ml/day

## Complementary therapy

Zinc sulfate PO for 10 days for children under 5 years ([Appendix 7](#)). See also [Section 5.6](#) for instructions for home therapy.

## 5.5.2 Patient supervision

### Patients who have completed rehydration

Patients who commence maintenance therapy after having completed oral or IV rehydration should be observed for 4 to 6 hours before discharge.

### Patients with no dehydration on admission

Patients with no dehydration, though counted as a case of cholera, do not necessarily require hospitalisation to receive maintenance therapy.

However, patients who are at risk (of deterioration or complications) should be observed over 4 to 6 hours:

- Children under 1 year of age;
- Patients who vomit;
- Malnourished children (malnutrition suspected or known);
- Patients who live far away from the treatment facility.

Non-dehydrated patients who do not fall into these risk categories can have the 4 to 6 hour observation period shortened (e.g. 1 to 2 hours) if they:

- Can drink ORS without vomiting;
- Can easily return to the treatment site if their condition deteriorates;
- Have received and understood the instructions for therapy at home.

### Surveillance

Verify that the patient consumes ORS correctly after each stool. Every hour:

- Check on the patient's state of hydration.
- Record on the patient file the amount of ORS consumed and the number of episodes of diarrhoea and vomiting.

Give particular attention to patients who are not autonomous (e.g. young children, the elderly), have abundant diarrhoea or vomiting, or who have difficulty drinking as these patients are at an increased risk of becoming dehydrated.

Spend more time with those who are vomiting or have difficulties in following the treatment plan.

Vomiting (that is not repetitive or systematic with each intake of ORS) is not a contraindication to oral therapy. Vomiting can be induced or aggravated by rapid consumption of more ORS than the stomach can tolerate. Show how to administer ORS in smaller quantities to avoid vomiting ([Section 5.4.3](#)). IV therapy is not indicated in patients who vomit but continue to have no signs of dehydration.

At any time, if signs of dehydration appear, switch to the protocol best adapted to the degree of dehydration.

## 5.6 Discharge instructions

Instruction must be given to all discharged patients, regardless of their duration of stay or the type of facility in which they received treatment (CTC, CTU, and ORP).

### 5.6.1 Treatment

The goal of home therapy is to avoid dehydration and malnutrition. Thus, treatment consists of providing ORS for the patient to drink and regular meals.

#### Oral rehydration solution

– Explain that patients lose a lot of fluid with cholera and ORS serves to replace that fluid. Explain that ORS does not stop the diarrhoea (which the patient may view as a failure of treatment) and that ORS must be given as long as the diarrhoea persists.

– Demonstrate how to prepare ORS, how much to give, and when.

**Table 5.6** – Amount of ORS after each stool

Age	Amount of ORS
Under 2 years	50-100 ml (10 to 20 teaspoons) after each loose stool
2 to 10 years	100-200 ml (½ to 1 glass) after each loose stool
Over 10 years	at least 200-250 ml (at least 1 glass) after each loose stool

– WHO/UNICEF ORS sachets are packaged to provide a 1 litre of solution. In some countries, ORS sachets are designed for less than 1 litre. Check packaging information.

- Indicate that patients who want more ORS than prescribed should receive as much as they want.
- Explain that vomiting may occur if ORS is given too rapidly. Demonstrate how to give ORS to avoid vomiting and what to do if vomiting occurs ([Section 5.4.3](#)).
- Indicate that once prepared, ORS can be kept for 24 hours in a covered container. After that, a new solution must be prepared.

## **Feeding**

Patients should be given a normal, non-restricted diet. For breast-fed children increase the frequency of feedings. Breast milk does not replace ORS, which is given between feedings.

## **Zinc supplementation**

- Instruct the mother on how to give zinc and demonstrate:
  - Place a whole or half tablet (depending on age) in a teaspoon. Add a little ORS or clean water to dissolve it and give the entire content of the spoon to the infant.
  - For older children tablets can be chewed.
- Tablets are to be given daily until there are no more tablets in the blister pack, even if the diarrhoea ends.

## **5.6.2 Follow-up**

Instruct the patient or the attendant regarding signs of dehydration or failure of treatment require returning immediately to the health facility:

- Refusal to drink
- Repeated vomiting preventing ORS intake
- Increased frequency of diarrhoea leading to signs of dehydration:
  - Dry mouth, intense thirst;
  - New appearance of sunken eyes;
  - Change in behaviour: irritable (persistent crying/fussing), or the contrary, listless and difficult to awaken.

## **5.6.3 Additional advice**

- Encourage the patient to send family members or neighbours to the treatment facility if they present with symptoms of cholera.
- Provide instructions on hygiene (hand-washing, use of potable water, and food preparation, etc.).

## **5.6.4 Practical tips**

### **Preparation of one litre of ORS**

1. Wash your hands with soap and water.
2. Pour the entire packet of ORS into a clean container (mixer bowl or jar).
3. Measure 1 litre of clean water.
4. Pour the water into the container.
5. Mix well until the salts completely dissolve.

### **Number of ORS sachets**

Give enough ORS for 2 days of treatment. Depending on the age, 1 to 2 sachets of ORS will suffice per patient and per day. It is helpful to add 2 additional sachets in case of loss or to start treatment for a family member, particularly if access to a treatment facility is difficult.

### **Volume for dilution**

Patients do not always know how to measure one litre, and under- or over-dilution of ORS is common. Ensure that the family has the means to measure a litre of water to correctly prepare ORS at home.

*For example:*

- Indicate on a bottle used locally the quantity representing 1 litre
- or
- Provide a 1-litre bottle together with ORS sachets
- or
- Provide a cup of known volume (e.g. 250 or 500 ml), explaining that 1 sachet of ORS is mixed in two 500 ml cups of water or four 250 ml cups of water.

Depending on the context, sachets of ORS and blister-packs of zinc can be accompanied by illustrative leaflets.

## **5.7 Cholera and pregnancy**

### **5.7.1 Features of cholera in pregnant women**

Pregnant women are not at any greater risk of being infected by *Vibrio cholerae*, nor developing symptoms than the general population. Cholera may affect women at any stage of pregnancy.

The symptoms and complications of cholera (mild to severe dehydration, hypovolaemic shock, etc.) are identical to those of other patients, but dehydration can also lead to foetal complications in a significant proportion of cases (spontaneous abortion, pre-term labour, intra-uterine foetal death).

Objectives of treatment are to:

- Prevent or correct maternal dehydration using the fluid volume needed for effective rehydration.
- Protect the foetus by maintaining the maternal systolic blood pressure above 90 mmHg to ensure adequate uterine blood flow.

### **5.7.2 Initial clinical evaluation**



- In the first trimester, the initial evaluation is the same as for all other patients.
- In the second and third trimester, place the woman in the supine position on her left side<sup>a</sup> and:
  - Use the standard criteria to determine the degree of dehydration ([Section 5.2](#)); perform the skin pinch under the clavicles, rather than the gravid abdomen.
  - Measure the systolic blood pressure (SBP).
  - Measure body weight, whenever possible (on admission or as soon as the patient is able to stand safely).

## 5.7.3 Treatment

In the first trimester, rehydration and clinical surveillance are standard.

In the second or third trimester: see [Table 5.7](#).

**Table 5.7** – Treatment and surveillance in the second or third trimester

Initial diagnosis	Treatment and surveillance
<p>Severe dehydration (regardless of SBP) OR SBP <math>\leq</math> 90 (regardless of the degree of dehydration)</p>	<p><b>Treatment</b></p> <ul style="list-style-type: none"> <li>• Immediate: <ul style="list-style-type: none"> <li>Bolus of 30 ml/kg<sup>(a)</sup> of RL over 30 minutes</li> <li>Repeat the bolus if: <ul style="list-style-type: none"> <li>– the pulse remains weak, or</li> <li>– SBP remains <math>\leq</math> 90, or</li> <li>– consciousness remains altered</li> </ul> </li> </ul> </li> <li>• Once the patient has stabilized: <ul style="list-style-type: none"> <li>Continue with 70 ml/kg of RL over 3-4 hours</li> <li>+</li> <li>If little or no vomiting<sup>(b)</sup> : <ul style="list-style-type: none"> <li>– at least 250 ml of ORS after each stool</li> <li>– single dose antibiotherapy within 4 hours or as soon as possible</li> </ul> </li> </ul> </li> </ul> <p><b>Surveillance</b></p> <p>Standard surveillance (<a href="#">Section 5.3.2</a>) + SBP every 30 minutes during the first 4 hours.</p> <p>If the SBP is again <math>\leq</math> 90 or danger signs reappear, repeat boluses of 30 ml/kg over 30 minutes until the SBP is <math>&gt;</math> 90 and/or danger signs resolve then, resume the previous infusion of 70 ml/kg.</p> <p>Subsequently, adapt the surveillance of maternal SBP, according to the severity of fluid loss from diarrhoea.</p>
<p>Some dehydration AND SBP <math>&gt;</math> 90</p>	<p><b>Treatment</b></p> <p>Oral rehydration: 75 ml/kg ORS over 4 hours</p> <ul style="list-style-type: none"> <li>+ at least 250 ml of ORS after each stool</li> <li>+ single dose antibiotherapy</li> </ul> <p>If the patient has difficulty drinking ORS, pass rapidly to IV rehydration (75 ml/kg of RL).</p> <p><b>Surveillance</b></p> <p>Standard surveillance (<a href="#">Section 5.4.2</a>) + SBP every 30 minutes.</p> <p>If the SBP is <math>\leq</math> 90 or signs of severe dehydration appear, start IV therapy for severe dehydration.</p>
<p>No dehydration AND SBP <math>&gt;</math> 90</p>	<p>At least 250 ml of ORS after each stool under observation for 4-6 hours</p> <ul style="list-style-type: none"> <li>+ single dose antibiotherapy</li> </ul>

(a) If the patient cannot be weighed on admission, administer a bolus as for a 60 kg adult (2 litres in 30 minutes). Once stable, measure the patient's weight if possible to adjust the fluid volume for the remainder of the IV infusion.

- (b) If the patient is vomiting frequently or is otherwise unable to retain ORS, on-going fluid losses can be replaced via the IV route (add at least 250 ml of RL for each stool).

## **Antibiotic therapy**

A dose of antibiotic will be given to all pregnant women, regardless of the stage of pregnancy or the degree of dehydration.

The goal of antibiotic therapy is:

1. Shorten the duration of diarrhoea, thus the period during which the pregnant woman could become dehydrated;
2. Reduce the duration of vibrio excretion in stools (to 48-72 hours in most cases) which will facilitate their admission to a maternity ward in the event of serious obstetrical complications.

Azithromycin PO (1 g single dose) is the antibiotic of choice.

## **Hypoglycaemia and hypokalaemia**

There is no evidence that systematically adding glucose or potassium to rehydration fluid is beneficial for the foetus.

If the mother presents with clinical signs of hypoglycaemia or hypokalaemia, then appropriate therapy should be given ([Section 5.10.1](#)).

## **5.7.4 Obstetrical evaluation**

Once the patient's state of dehydration has been evaluated and the SBP measured (and after the initial bolus in the event of IV rehydration)

– A simple obstetrical evaluation can be performed:

1. Estimate the gestational age by measuring the fundal height.
  2. Listen for foetal heartbeat (using a Pinard stethoscope or Doppler, if available).
- Take a history to determine if there has been any bleeding, pain, contractions, loss of foetal movements. Check for these signs daily to determine if there has been any intervening change.

For more information, see [Essential obstetrics and newborn care](#), MSF.

## **5.7.5 Responding to obstetrical complications of cholera**

### **Intra-uterine foetal death**

Intra-uterine foetal death (suspected in case of loss of foetal movements and absence of foetal heart sounds on auscultation) does not require an emergency transfer. In the absence of any complications that threaten the life of the mother (e.g. eclampsia), transfer to a maternity ward for confirmation of foetal demise and delivery of the stillborn can be organized at discharge from the CTC.

### **Spontaneous abortion**

- There is no urgency to transfer the patient to a maternity ward in the absence of persistent significant bleeding.
- At discharge from the CTC, refer the patient to a maternity ward to verify if expulsion is complete and evacuate the uterus if the expulsion was incomplete.

### **Threatened premature delivery**

- Between 26 and 34 weeks of gestation:
  - If the cervix is dilated, transfer to a maternity unit for tocolysis, lung maturation, and neonatal care. Prior to transfer, stabilize the patient haemodynamically with RL (SBP > 90).
  - If the cervix is closed, the contractions will likely stop as cholera resolves. If contractions persist after rehydration is completed, transfer to a maternity unit for possible treatment of premature labour.
- Allow the labour to continue if gestational age is > 34 weeks, intra-uterine foetal death, or the life of the mother is in danger (e.g. severe pre-eclampsia), or labour has progressed too far.

### **Post-partum haemorrhage<sup>b</sup>**

- Organize a rapid transfer to an obstetrical centre. Haemorrhage imposes an immediate threat to the life of the mother and must be managed in a maternity unit with the necessary means (surgery, transfusion, resuscitation).
- Depending on the context, arrange for family members who are willing to donate blood to accompany the patient.
- Prior to transfer:
  - Stabilize the patient haemodynamically with RL.
  - Depending on the available means and clinical experience of the medical staff: administer a uterotonic agent (oxytocin if available and kept refrigerated<sup>c</sup> or misoprostol); insert Foley catheter to promote uterine contractions, perform uterine massage to expel any clots and aid uterine contraction. For more information, see [Essential obstetrics and newborn care](#), MSF.

There are other severe complications of pregnancy that are not linked to cholera which could occur during the admission of a pregnant woman to a CTC. Certain pathologies such as severe pre-eclampsia or ante-partum haemorrhage are in general too complex to be managed in a standard CTC. These justify a rapid transfer to an obstetrical centre.

In case of premature rupture of membranes, there is not an immediate need of transfer; antibiotics should be started first and transfer arranged when possible. Choice of antibiotic depends on timing of rupture and presence or absence of active labour or infection. For more information, see [Essential obstetrics and newborn care](#), MSF.

If the patient has had no complications during hospitalisation in the cholera facility, direct her when discharged, to ante-natal care if she is not already enrolled.

## **5.7.6 Managing a normal delivery**

For normal delivery, see [Essential obstetrics and newborn care](#), MSF. Wait as long as possible before assisting in the rupture of membranes just prior to delivery.

If the neonate comes into contact with faeces, wash with soap and water (do not use a chlorine solution or other antiseptic solution).

Administration of antibiotic prophylaxis to the neonate for prevention of cholera is unnecessary.

For breast-feeding, the mother should wash her breasts (and hands) with soap and water before putting the neonate to feed (do not use a chlorine solution or other antiseptic solution).

At discharge from the CTC, refer the mother and neonate for post-natal consultation.

## Notas

- (a) Avoid positioning the patient on her back: as pregnancy progresses, the increasing weight and positional rotation of the uterus will compress the inferior vena cava reducing blood flow to the heart and decreasing cardiac output.
- (b) Loss of more than 500 ml (normal volume) of blood within the first 24 hours following delivery.
- (c) Oxytocin can only be used if it is kept refrigerated, between 2 °C and 8 °C. When it is kept at room temperature, there is a loss of efficacy of the active ingredient and therapeutic effectiveness. Misoprostol has the advantage of being thermostable.

# 5.8 Cholera and acute malnutrition

Typically, in a cholera treatment facility, two situations will be encountered:

## 1 - Malnutrition is certain

– Either severe acute malnutrition has been already diagnosed by a feeding centre that subsequently refers the child for cholera care;

or

– The child presents with bilateral leg oedema typical of severe acute malnutrition that is detected on admission<sup>a</sup>.

Children referred from a feeding centre with a diagnosis of moderate malnutrition receive the standard protocol for rehydration based on the degree of dehydration, as for non-malnourished children ([Section 5.4](#)).

Children suffering from severe acute malnutrition, diagnosed by a feeding centre or determined on admission by the detection of nutritional oedema, are treated using the protocols below.

## 2 - Malnutrition is suspected

The child presents with signs and symptoms that are common to both cholera with dehydration and severe malnutrition (diarrhoea, persistent skin fold, sunken eyes, lethargy, and shock) where it is difficult to distinguish the two conditions, particularly as they can be present simultaneously in the same patient.

Since weight is significantly affected by hydration status, weight-for-height (W/H) cannot be measured on admission but only once the dehydration has been corrected.

MUAC is less affected by dehydration and can be used to identify children with possible malnutrition. Children with MUAC < 115 mm on admission should be treated according to the protocols below. Once the child has been fully rehydrated, MUAC should be reassessed in order to confirm the diagnosis of malnutrition.

## 5.8.1 Management of cholera in severe acute malnutrition

### Initial clinical assessment

<p>Altered consciousness (lethargy, coma) OR Very rapid or very slow pulse or difficult to palpate or absent  OR Cold extremities (hands/feet) AND Capillary refill time &gt; 3 seconds  OR Very rapid breathing or gasping or cyanosis</p> <p style="text-align: center;">↓</p> <p style="text-align: center;"><b>SEVERE DEHYDRATATION OR SHOCK</b></p>	<p>Agitated, irritable</p> <p>Palpable pulse, may be rapid</p> <p>Sunken eyes</p> <p>Skin pinch disappears slowly</p> <p style="text-align: center;">↓</p> <p style="text-align: center;"><b>SOME DEHYDRATATION</b></p>	<p>Awake, not agitated</p> <p>Pulse easily palpable</p> <p>Normal eyes</p> <p>Skin pinch disappears immediately</p> <p style="text-align: center;">↓</p> <p style="text-align: center;"><b>NO DEHYDRATATION</b></p>
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#### Notes:

– The clinical assessment of dehydration in severely malnourished children may be difficult. In particular, skin pinch and recently sunken eyes should be interpreted with caution as they may occur with malnutrition even if no dehydration is present.

– Children referred from a feeding centre may have weight data that pre-dates the onset of diarrhoea. The severity of dehydration can be estimated by comparing this weight from that measured on admission to the cholera facility (this does not apply to children with nutritional oedema). If the weight lost is  $\geq 10\%$  of the pre-cholera weight, the patient has severe dehydration. Weight loss between 5-9% indicates some dehydration, weight loss of  $< 5\%$  means mild or no dehydration.

This method of estimation is complementary to the clinical evaluation, particularly if the signs of dehydration are ambiguous, but it does not replace the clinical evaluation. In addition, it is accurate only if the child was weighed daily prior to the onset of cholera.

## **Severe dehydration or shock**

Severely malnourished children receive the same volume of RL as non-malnourished children with an equivalent degree of dehydration, but the rate of administration is slower (twice as slow). The child should be closely monitored during rehydration.

Given the lack of data on optimal treatment of severe dehydration in severely malnourished children, until robust data becomes available, this recommendation aims to avoid complications related to excessive or insufficient rehydration.

### **20 ml/kg of RL over 30 minutes**

If danger signs still present, repeat the bolus up to 2 times  
then

### **70 ml/kg of RL over 6 hours**

Immediate therapy:

– Rehydration begins with a rapid bolus infusion of RL in 30 minutes.

For volumes to prescribe to severely malnourished children, see [Appendix 5](#).

– Once the IV infusion is in place, measure the blood glucose and administer glucose if blood glucose level is  $< 60$  mg/dl ( $< 3.3$  mmol/litre) or give glucose empirically ([Section 5.10.1](#)).

– During the first 30 minutes:

- Closely monitor the child until the danger signs resolve, with a clinical assessment every 10 to 15 minutes.

- Observe the volume infused, making sure that the rate of infusion is sufficient to deliver the prescribed volume in the appropriate time.

- If there is no improvement, repeat the bolus of RL up to 2 times.

If the clinical state has improved (danger signs resolved after 1 to 3 boluses of RL):

- Begin the continuous infusion (70 ml/kg of RL) over 6 hours.
- Continue glucose by adding 100 ml of 50% glucose to each litre of RL.
- Repeat the clinical examination every 30 minutes and verify that signs of dehydration are regressing. Note the quantity of on-going fluid losses (diarrhoea and vomiting) and volume of fluid intake (RL and ORS), while ensuring that the IV rate will allow the prescribed volume be infused over the duration prescribed.
- If danger signs reappear, re-administer a bolus of RL, repeating up to 2 times as necessary.
- If during rehydration the respiratory rate begins to increase, pulmonary crepitations are heard on auscultation, or lower extremity or peri-orbital oedema appear or worsen, suspect that over-hydration has occurred.
- As soon as the child is haemodynamically stable and can drink without excessive vomiting:
  - Use standard hypo-osmolar ORS to compensate for on-going fluid losses. Do not use ReSoMal, as its sodium content is not sufficient to replace that lost in cholera.
  - Give an antibiotic as a single dose ([Appendix 7](#)).
  - Start therapeutic feeding as soon as possible (within 4 hours).
  - Give zinc sulfate to children under 5 years.
- At the end of the rehydration phase, re-evaluate the clinical degree of rehydration:
  - If there are no longer signs of dehydration, start the maintenance phase ([Section 5.5.1](#)). Stop the infusion but leave the catheter in place.
  - If there are signs of some dehydration, then start treatment for some dehydration (see below). Stop the infusion but leave the catheter in place.

If the clinical state does not improve after the 3<sup>rd</sup> bolus of RL, consider sepsis:

- Administer a broad-spectrum antibiotic (**ceftriaxone IV**: 50-80 mg/kg once daily + **cloxacillin IV** infusion 25-50 mg/kg every 6 hours).
- Administer maintenance fluid of continuous RL using the Holliday-Segar method:

For the first 10 kg	4 ml/kg/hour
For each kg between 11-20 kg	2 ml/kg/hour
For each kg above 20 kg	1 ml/kg/hour

For example, to calculate the hourly maintenance fluid rate for a child weighing 14 kg: (4 ml x 10 kg) + (2 ml x 4 kg) = hourly rate: 40 ml + 8 ml = 48 ml per hour.

- Administer therapeutic milk by nasogastric tube.

*Note:* during the treatment for cholera, monitor temperature. Co-infections are common in severely malnourished children and can be manifested as hypothermia as well as fever.

## Some dehydration

The total volume of ORS to administer is 75 ml/kg over 4 hours. Use standard ORS. Do not use ReSoMal as its sodium content is too low to replace that lost in cholera.



If the child is unable to drink, use a nasogastric tube (under strict surveillance, avoiding improper tube placement),

- + Surveillance and compensation of on-going fluid losses,
- + Antibiotic as a single dose ([Appendix 7](#)),
- + Therapeutic feeding as soon as possible (within 4 hours),
- + Zinc sulfate for children under 5 years.

Once dehydration has been corrected, administer ORS after each liquid stool until diarrhoea ceases, as for other children.

### **No dehydration**

See the standard protocol ([Section 5.5.1](#)). Use standard hypo-osmolar ORS. Do not use ReSoMal. Give zinc sulfate to children under 5 years.

## **5.8.2 Approach to suspected malnutrition in cholera patients**

If, once the dehydration has been corrected, the child fills the anthropometric criteria for malnutrition, start therapeutic food and refer the child to a feeding centre once discharged from the CTC.

### **Notas**

- (a) The diagnosis is to be confirmed by a doctor who must exclude other causes of oedema.

## **5.9 Other comorbidities**

Patients may have symptoms (e.g. fever) unrelated to cholera for which the cause must be determined (malaria, respiratory infection, etc.) and appropriate treatment provided. For management of these diseases, see [Clinical guidelines](#), MSF.

### **Severe anaemia**

In children under 5 years who present with signs of severe dehydration and severe anaemia (i.e. signs of cardiorespiratory distress), haemoglobin (Hb) should be measured.

- If Hb is  $\geq 6$  g/dl, follow the Treatment Plan C.
- If Hb is  $< 6$  g/dl, follow the Treatment Plan C but without giving the bolus (90 ml/kg of RL as a continuous infusion over 4 hours; over 8 hours in severely malnourished children). In a separate IV line, start a blood transfusion<sup>a</sup>. The blood volume administered should be deducted from the total volume of Plan C.

If Hb measurement and/or blood transfusion are not immediately available, follow the Treatment Plan C without giving the bolus (90 ml/kg of RL as a continuous infusion over 4 hours; over 8 hours in severely malnourished children). Anaemia will worsen temporarily due to dilution but it remains critical to re-establish an effective circulating volume.

### **Chronic cardiovascular diseases**

In adult patients with chronic cardiovascular disease, the rehydration protocol does not change but closer monitoring for signs of fluid overload is required.

### **Diabetes**

In diabetic patients, measure blood glucose every 6 hours, with a target of 140 to 180 mg/dl (7.8 to 10 mmol/litre). The standards of “tight control” in normal diabetic care are not necessary during cholera treatment, as long as potentially dangerous high or low levels of blood glucose are avoided.

Consumption of ORS should not be limited in an effort to control blood glucose level in both insulin- and non-insulin dependent diabetic patients.

### **Notas**

(a) Packed red blood cells 15 ml/kg or whole blood 20 ml/kg administered over 3 hours.

## **5.10 Management and prevention of complications**

### **5.10.1 Hypoglycaemia**

Hypoglycaemia is a potential complication in patients who start drinking ORS (which contains glucose) late and/or do not quickly resume nutrition. Those most at risk are the malnourished and children under 5 years.

#### **Clinical signs**

- Suspect hypoglycaemia:
  - On admission: in patients with decreased levels of consciousness or hypotonia persisting after 2 boluses of RL.
  - During rehydration therapy: if neurologic signs (lethargy or coma) appear when signs of dehydration are resolving.
  - In case of hypothermia.
- A blood glucose level < 60 mg/dl (< 3.3 mmol/litre) indicates hypoglycaemia.

## Treatment

– Administer glucose by slow IV injection:

Children: 5 ml/kg of **10% glucose<sup>a</sup>**

Adults: 1 ml/kg of **50% glucose**

– Reassess glucose level after 30 minutes and repeat the same dose if necessary.

– To prevent relapse, give ORS under observation. If ORS consumption is delayed or reduced: add 100 ml of 50% glucose per litre of RL to be used for rehydration (giving a 5% glucose solution) until sufficient ORS intake is possible.

## Prevention

Start ORS therapy as soon as possible for patients receiving IV treatment and resume rapidly nutrition for all patients.

## 5.10.2 Hypokalaemia

The patients most at risk to develop symptomatic hypokalaemia are:

- Patients treated by RL but who receive little or no ORS and do not resume early feeding;
- Malnourished children, who tend to suffer from chronic potassium depletion.

### Clinical signs

Hypokalaemia causes the dysfunction of skeletal muscles, smooth muscles (intestines, bladder), and cardiac muscle (conducting system). Typically, symptoms appear in a patient who has been under IV rehydration for at least several hours.

- Moderate hypokalaemia: generalized fatigue, muscle cramps and weakness, abdominal distention, or urinary (bladder) obstruction.
- Severe hypokalaemia: breakdown in skeletal muscle, tetany, ascending paralysis, respiratory difficulties, and cardiac arrhythmias (irregular heart rate, palpitations).

At admission, it is common that a dehydrated patient complains of muscle cramps. It is more likely that these are due to dehydration rather than hypokalaemia. The cramps should normally resolve with rehydration, and there is no need to treat them other than giving ORS.

Only the rare patients who arrive with obvious clinical signs of hypokalaemia should be treated immediately.

If the symptoms of hypokalaemia appear several hours after admission, treatment should be based on the severity of the symptoms.

## Treatment

The objective of treatment is not to normalize serum potassium (it will correct with resumption of a normal diet) but to minimize the systemic effects of hypokalaemia.

– Moderate hypokalaemia

Use 7.5 % **potassium chloride** syrup (1 mmol of K<sup>+</sup>/ml) PO<sup>b</sup> :

Children under 45 kg: 2 mmol/kg (2 ml/kg) daily

Children 45 kg and over and adults: 30 mmol (30 ml) 3 times daily

For dosage charts, see [Appendix 7](#).

The duration of treatment depends on clinical evolution. The decision whether to continue treatment should be re-evaluated after clinical examination. Treatment of 1 to 2 days is usually sufficient if the patient can drink ORS and eat.

– Severe hypokalaemia

IV potassium is given by medical prescription, under medical supervision ([Appendix 8](#)) and only after a clinical examination has confirmed signs of severe hypokalaemia.

## Prevention

ORS is designed to replace the potassium lost in diarrhoea. In the absence of dehydration or in patients with some dehydration, ORS is sufficient to prevent symptomatic hypokalaemia if it is taken in sufficient quantity to rehydrate the patient. In those patients being rehydrated by the IV route, giving ORS at the same time reduces the risk of symptomatic hypokalaemia.

## 5.10.3 Renal failure

Acute renal failure may occur when severe dehydration results in kidney under-perfusion. Patients with diabetes and hypertension, as well as the elderly, are at greater risk.

### Clinical signs

Persistent oliguria or anuria despite adequate rehydration.

### Treatment

The main goal is to prevent further kidney injury by maintaining a normal fluid balance and avoiding other nephrotoxic drugs (e.g. acid acetylsalicylic, ibuprofen, aminoglycosides), while allowing time for renal function to improve, which can take hours to days.

It has not been proven that furosemide can restore kidney function. It is recommended only if renal failure results in volume overload causing pulmonary oedema.

If oliguria or anuria persists after the diarrhoea has ended, further hospitalisation may be needed where more specialized care can be provided.

## 5.10.4 Fluid overload

Fluid overload is a complication of IV rehydration, usually resulting from an error in administration (too much fluid, overly rapid infusion).

However, fluid overload can occur even with normal rehydration treatment in infants, the elderly, and patients with severe malnutrition or cardiovascular disease.

Patients receiving ORS alone do not develop signs of over-hydration.

## Clinical signs

- Peripheral oedema: the appearance of peri-orbital or lower limb oedema may indicate fluid overload.
- Pulmonary oedema: rapid breathing, dyspnoea, cough (first dry, then wet), and crepitations on lung auscultation.

Pulmonary oedema may be preceded by peripheral oedema but this is not always the case.

## Treatment

- Peripheral oedema
  - Do not take out the catheter; reduce the infusion rate to a minimum (keep vein open).
  - Re-evaluate the level of dehydration and the necessity of continuing IV rehydration (signs of dehydration no longer present? able to switch to oral rehydration?).
  - Auscultate the lungs.
  - If the patient still needs IV rehydration therapy, resume the infusion at a slower rate and observe more closely, assuring that dehydration does not worsen.
  - Peripheral oedema alone does not require treatment with furosemide. The oedema will resolve spontaneously within 24 to 48 hours.
- Acute pulmonary oedema
  - Do not take out the catheter; reduce the infusion rate to a minimum (keep vein open).
  - Have the patient sit upright with their legs over the edge of the bed.
  - Auscultate the lungs.
  - If the patient is dyspnoeic, administer **furosemide IV**:

Children: 1 mg/kg

Adults: 40 mg

These measures should lead to an improvement in clinical signs over 30 to 60 minutes.

Examine the patient for other contributing factors such as cardiovascular (severe hypertension) or renal (anuria) disease and rule out pulmonary infection.

Once the patient is stabilized, reassess the level of dehydration. Based on the clinical signs, change to oral therapy or continue the IV therapy at one-half the previous rate, while maintaining close observation and stopping IV treatment as soon as possible

## Precautions/prevention

- Avoid unnecessary IV infusions.
- Avoid prolonging IV infusions in patients who are no longer in need.
- In at-risk patients (chronic hypertension, cardiac disease), pay particular attention to IV volume and infusion rate as well as the clinical evolution while under IV therapy.

## Notas

- (a) If 10% glucose is not available, use 50% glucose (1 ml/kg) diluted in 4 ml/kg of RL or 0.9% sodium chloride. Undiluted 50% glucose solution is too viscous to be injected to children.
- (b) For adults, an alternative is to give the IV preparation of potassium chloride (KCl) by oral route: 26.8 mmol (two 10 ml ampoules of 10% potassium chloride, 13.4 mmol/ampoule) 2 to 3 times in one day. This treatment is only for adults. The taste is rather offensive, mix in cool water or flavoured drink (e.g. juice).

# Chapter 6: Setting up cholera treatment facilities

[6.1 Cholera treatment centres \(CTC\)](#)

[6.2 Cholera treatment units \(CTU\)](#)

[6.3 Oral rehydration points \(ORP\)](#)

## 6.1 Cholera treatment centres (CTC)

A CTC is an autonomous inpatient facility which has its own general services (latrines, showers, kitchen, laundry, morgue and waste area), stocks and resources (medical and logistics, water and electricity). It operates 24 hours a day.

### 6.1.1 Choice of site and premises

CTCs should preferably be set up within the grounds of existing health facilities (if the configuration of the site allows for patient isolation) or on an adjacent site. These sites are preferred as patients are familiar with them. They may also already have certain installations (e.g. water, showers, and latrines) which can be used for the CTC, which saves time.

If it is not possible to set up a CTC in or beside a health facility, a community building (hangar, sports hall, etc.) can be transformed into a CTC or a new facility can be built.

A CTC site must imperatively:

- Be centrally located, in order to allow access to the largest possible number of patients.
- Be accessible by road at all times (ambulances and deliveries).

If the Ministry of Health imposes a site, ensure these conditions are met.

Furthermore:

- The ground must be able to absorb waste water and allow the digging of latrines.
- The site must not be prone to flooding (must not lie in a basin); a slight incline facilitates the drainage of rainwater.
- There must be a distance of at least 1.5 metre between the water table and the bottom of the latrines, waste pit, excreta pit, etc.
- The site must be less than 30 metres from a water point (spring, well, borehole, river, lake) and at least 100 metres away from public places (market, housing).

Available sites may be limited. If one or more of the above conditions are not met, the specific constraints and risks involved must be carefully analysed, as well as the problems to be resolved.

If a CTC is to be built:

- In emergency situations, tents are usually used as they are quick to set up and allow the facility to be modified according to needs.
- Installing semi-permanent buildings takes longer (local purchasing of materials, recruitment of qualified workers, construction time) but has the advantage of lasting several years. These are better designed for endemic zones where treatment facilities are regularly re-opened during outbreak periods.

If transforming existing facilities into a CTC:

- Hangars and sports halls are large open spaces which can be transformed into a CTC.
- Schools are sometimes used. Often the building is divided into classrooms which will influence the layout of the CTC. Using a school as a CTC implies that teaching will be suspended during the outbreak; this should therefore only be envisaged as a last resort. Strictly avoid rooms that are too small (3 or 4 beds) where staff cannot be permanently present to observe patients as they are responsible for several rooms.



- In all events:
  - Obtain authorisation to use the site (land, stadium, building, public or private property) and draw up a written contract that complies with local legal requirements.
  - Existing requisitioned installations (latrines, showers, and kitchen) must be reserved for exclusive use by the CTC.
  - Check water supply possibilities (source that is nearby with reliable, sufficient flow).
- The population may reject the installation of a cholera facility for fear of the disease, particularly if there has never been a cholera outbreak in the area. Ask the health promotion team to help deal with this type of problem.

## 6.1.2 Area required

### Total surface area

The total surface area required is calculated on the basis of approximately 30 m<sup>2</sup> per patient. This area takes into account all the required services (hospitalisation, technical services, etc.). Nevertheless a larger surface area than required should be considered in order to expand the CTC if necessary.

For example: for a CTC of 100 beds about 3000 m<sup>2</sup> are immediately required, but if the site is 3800 m<sup>2</sup> at least 25 more beds can be added if needed.

**Surface area per patient**

A bedridden patient requires about 4 m<sup>2</sup> and a seated patient about 2 m<sup>2</sup>. For example: in a 75 m<sup>2</sup> room, 17 beds (maximum 18) + one nurse station can be set up.

If tents are being used, a 45 m<sup>2</sup> tent can hold 10 beds + one nurse station. 45 m<sup>2</sup> tents can be put up in pairs if necessary.

The space available or allocated by authorities may not be big enough to build a CTC with the required number of beds. In this event set up several CTUs at strategic points.

**6.1.3 Layout and plan**

**Isolation**

In a CTC patients are isolated from other hospitalised patients (if the CTC is within hospital grounds) and from the population. The CTC is separated from the exterior by a fence.

**Separation of “contaminated” and “clean” zones**

The CTC is composed of two distinct, separate areas:

<b>CONTAMINATED ZONE</b>	<b>CLEAN (or “neutral”) ZONE</b>
<ul style="list-style-type: none"> <li>• Triage/Emergency</li> <li>• Observation</li> <li>• Hospitalisation</li> <li>• Morgue</li> <li>• Washing areas (dishes, laundry)</li> <li>• Waste area</li> </ul>	<ul style="list-style-type: none"> <li>• Stock/Administration</li> <li>• Areas for staff only</li> <li>• Water storage</li> <li>• Kitchen + wood store</li> <li>• Preparation of chlorine solutions</li> </ul>

The “contaminated” zone is where the vibrio is usually present in large quantities because of the presence of patients, corpses (morgue) and objects contaminated by patients (laundry, surfaces, dishes and waste).

The “clean” or “neutral” zone is reserved for administration, staff (offices, changing rooms, etc.) and stock (medical, logistics, food, water storage). Meals are prepared in this area. Chlorine solutions are also prepared in this area. Patients and attendants are not allowed to enter the clean zone.



Clearly separate the two zones with an interior barrier. Leave a passage between the two zones through which staff can enter and circulate in the contaminated area to treat patients and supply the wards with drugs, water, chlorine solutions, meals, etc.

See [Appendix 11](#) for an example of a CTC layout.

## **6.1.4 Circulation of patients, attendants and staff**

See also [Chapter 7](#).

### **Set up entry/exit points to the exterior**

The CTC compound has 4 points of entry/exit:

#### **For patients**

- A guarded door reserved for the entry of patients. All patients enter through this door and are directed to triage.
  - A guarded door reserved for the exit of patients. All patients who have completed treatment (cured) or who are not admitted (e.g. illness other than cholera), leave by this door.
- Depending on the context, it is not always possible to have a separate entrance and exit but this remains the best option, especially in large CTCs.

#### **For staff and suppliers**

A guarded gate, opening into the clean zone, reserved for the entry and exit of staff and supply vehicles.

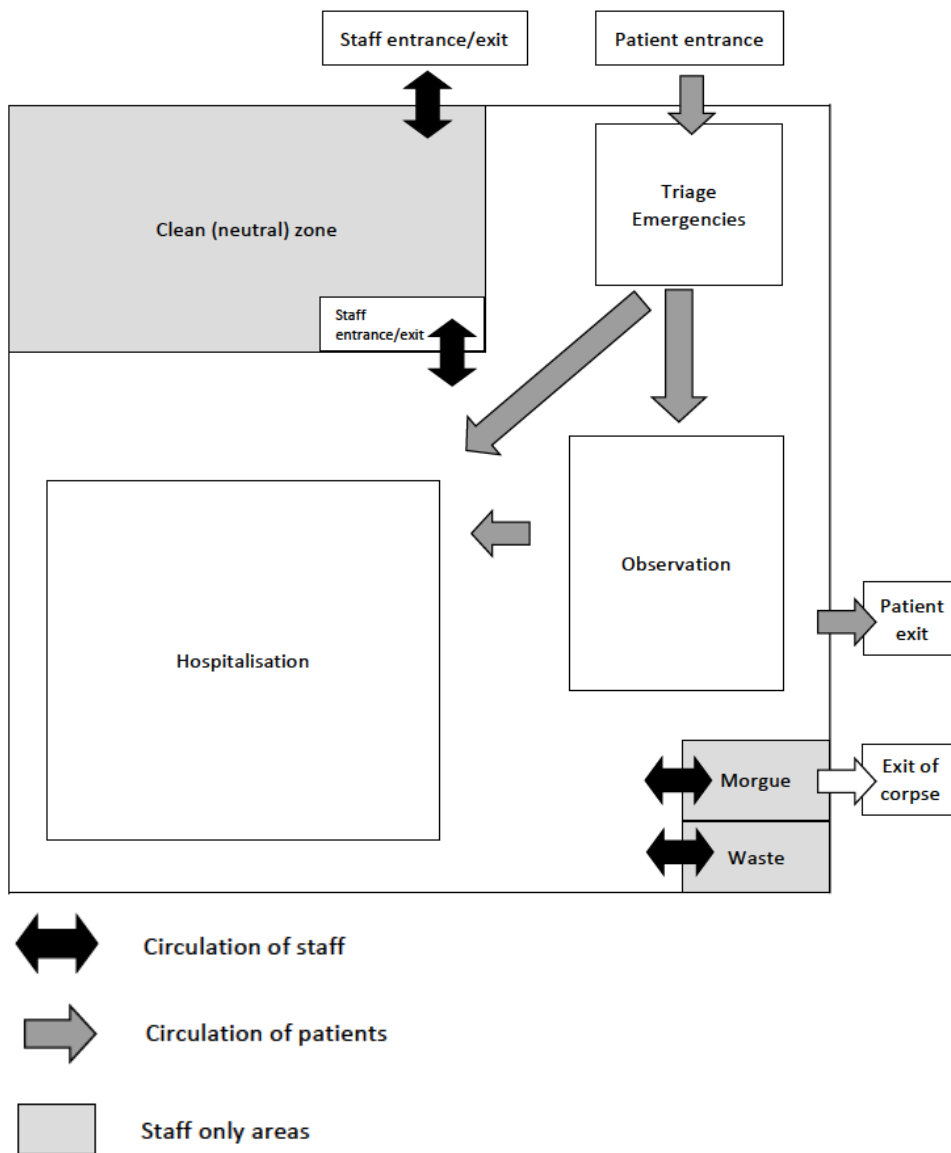
#### **For deceased patients**

A locked door (not guarded) to the morgue for the collection of corpses.

### **Delimit sectors within the contaminated zone**

- Delimit each healthcare sector (triage, observation, hospitalisation, etc.). Patients and attendants must not be allowed to circulate freely on their own initiative.
- Delimit sectors forbidden to patients: morgue and waste area.

### **Circulation of patients, attendants and staff in the CTC**



## 6.1.5 Equipment

### Cholera kits

Cholera kits are designed to facilitate operations, especially at the beginning of an outbreak. They contain medical and logistic materials to set up a CTC<sup>a</sup>.

### Other equipment

Not everything needed to set up a CTC is contained in the kits (or there is not a sufficient amount of certain articles). Supplementary materials need to be ordered at the same time as the kit or bought, or made, on-site (e.g. tents, plastic sheeting, cholera beds or chairs, staff clothing, etc.).

## 6.1.6 Signage

Put up clear signage for patients (signs, posters, symbols, pictures, text in the local language):

– Near the entrance to the CTC

If the CTC is within hospital grounds, put up signs giving directions to the CTC so as to avoid cholera patients entering other services.

– At the entrance of the CTC

- Put up a Patient Entrance sign.
- Put up a Staff and Suppliers Entrance sign.

– Inside the CTC

- Put up a No Entry sign (staff only) at the entrance to the clean zone, morgue and waste area.
- Label containers: ORS, potable water, 0.05% chlorine solution for hand-washing.
- Put up a sign indicating men's/women's showers and the latrines.
- Put up a No Entry sign to excreta pits (they must not be used by patients).

## 6.1.7 Setting up a CTC

The example below is of a CTC built from scratch using tents, in order to describe all the installations required. If a CTC is installed in a ready-built, partially equipped site then adaptations are needed, but the layout principles and order of priorities remain the same.

### In the first 24 hours

The priority actions are presented in a list below. This list however does not imply an order of implementation; these activities must be carried out simultaneously by different teams, in efficient coordination.

#### a) Isolate the CTC and organize the sectors

##### **Demarcate the outer boundaries of the CTC**

To begin with, use barrier netting. This provisional measure is sufficient while waiting to build a fence that may take several days.

##### **Demarcate the sectors of the CTC**

To begin with, use barrier netting. The first priority is to demarcate the zones forbidden to patients (clean zone, morgue and waste storage area), then the different treatment zones (triage, hospitalisation, etc.).

The barrier netting can later be replaced by permanent barriers, but this is not essential as long as the netting stays intact and patients respect it.

#### b) Set up the tents

### **Put up patient tents**

It is usually not necessary to put up all the estimated number of patient tents. For example, for a CTC with a capacity of 100 beds, start by putting up 5 tents then add further tents as/when admissions increase.

Number the tents.

Set up a hand-washing point in front of each tent.

In each tent install:

- A container with a tap for ORS (+ bucket underneath).
- A cholera bed (or chair) + 2 buckets per patient (1 for stools, 1 for vomit). See [Appendix 13](#).
- Infusion stands or ropes tied above the beds to hang infusion bags.

### **Put up one or two tents for stock**

It is essential to put away in storage all articles essential for patient treatment: Ringer lactate (RL) and infusion materials, oral rehydration salts (ORS), cups, buckets, lamps, 120-litre containers, jerrycans, electric lamps, chlorine-releasing compounds.

### **Put up a tent to isolate deceased patients**

Mortality is often high at the beginning of an outbreak. For obvious psychological reasons, remove deceased patients which are near other patients as quickly as possible.

## **c) Install initial stocks**

Pallets (for boxes of ORS and RL) and shelves (for drugs and medical supplies/equipment) should be set up as quickly as possible.

## **d) Provide potable water**

Initially potable water must be provided at least for drinking, preparing ORS and hand-washing.

Water must be chlorinated.

- If the site has a water supply system, check the free residual chlorine levels and adjust if necessary ([Appendix 17](#)).

- If there is no water supply system:

Water needs to be supplied by water truck or a vehicle with a water bladder, then stored in one or several bladders (or, if not possible, in containers of 120 litres) in the clean zone.

Water can be transported manually to the different sectors while waiting for a water distribution system to be set up.

## **e) Set up hand-washing points**

To begin with: a hand-washing point for each patient tent, one in the morgue and one in the clean zone for staff.

Waste water can be collected in buckets and transported manually to an excreta pit until a waste water evacuation system is set up.

Other hand-washing points (at the entrance and exit of the CTC) can be set up the next day if they cannot all be installed on the same day.

## **f) Provide lighting**

Lighting is essential for the continuity and safety of night care. Install a generator and lightbulbs as soon as possible if an electricity network does not exist. Lighting is first installed in sectors where patients are treated, then in the rest of the CTC if it cannot all be done on the same day. If there is no lighting the first night, work can always be carried out using lamps (headlamps, torches, kerosene lamps, etc.) but this should not be for long.

#### **g) Dig latrines**

To begin with, dig at least an excreta pit ([Appendix 14](#)), various latrines (male/female) for mobile patients and 2 latrines (male/female) for staff in the clean zone.

#### **h) Set up waste storage area**

While waiting to set up a proper waste treatment area, demarcate a protected site to store waste.

For sharps, use a drum that will later be filled with cement.

### **In the following days**

Finish or complete installations: potable water distribution system, latrines, hand-washing points, showers, laundry point, rainwater drainage, soakaway pits, grease traps, zone for preparing chlorine solutions, stock storage, morgue, changing rooms, waste treatment area, kitchen, permanent fencing, etc. until the entire CTC is completely functioning.

It is important to differentiate the potable (chlorinated) water distribution system from the evacuation of waste water system. In order to avoid the risk of contamination of potable water in the event of a leak, these networks must not overlap.

Install or complete signage to help the increasing number of patients, attendants and staff to get around and correctly use the facilities ([Section 6.1.6](#)).

*Note:* the decision to open a CTC that is not yet 'finished' (i.e. not all the installations are complete) is up to the medical coordinator who is responsible for the treatment provided. It is he/she who decides if the minimum requirements are in place to start providing treatment.

### **Notas**

(a) For the MSF kit, see the MSF kit catalogue.

## **6.2 Cholera treatment units (CTU)**

Like CTCs, CTUs are designed to treat both simple cases of cholera (oral treatment) and severe cases (IV treatment) and function 24 hours a day.

CTUs are, however, much smaller than CTCs. The capacity of a CTU varies according to the context and needs. In certain situations, a CTU may have only 2 beds, but a CTU can have 10 and up to 30 beds<sup>[1][2]</sup>.

A CTU is a simpler facility than a CTC in terms of installations.

## 6.2.1 Choice of site and premises

The criteria for choosing a site are the same as for a CTC ([Section 6.1.1](#)).

## 6.2.2 Area required

A bedridden patient requires about 4 m<sup>2</sup> and a seated patient about 2 m<sup>2</sup>.

## 6.2.3 Layout and equipment

The main layout principles (isolation, entry/exit restrictions, and separation of “clean” and “contaminated” zones) are the same as for a CTC ([Section 6.1](#)) but, because of the fewer number of patients treated:

1) The facility is simpler than a CTC:

- Different patients (oral or IV treatment, adults or children, etc.) can be installed in the same space, whereas they would be in separate areas in a CTC. The sectorisation principle is however the same as in a CTC, e.g. children are preferably grouped together in the same area of the room or tent to facilitate surveillance.
- Infrastructures such as the kitchen or laundry can be reduced to a minimum, for example:
  - The CTU provides dry rations or a space for attendants to cook for patients and attendants, or families may bring meals every day for patients depending on the context.
  - The CTU provides a washing area equipped with a water point and the attendants wash the laundry or dishes.
- Besides these minimum provisions, the CTU must have its own latrines, showers, waste area and morgue.

2) The equipment is adapted to needs, for example:

- The storage of potable water can consist in a small water bladder (2000 litres) or 120 litres containers.
- For lighting, a small generator can be used (800 VA - 3.3 KVA) or solar or kerosene lamps and medical staff can be provided with headlamps.

## 6.2.4 Signage

– Near the entrance to the CTU

If the CTU is within the grounds of a hospital, post signs giving directions to the CTU so as to avoid cholera patients entering other services.

- Inside the CTU
- Put up signs indicating the zone forbidden to patients.
- Label contents of containers: ORS, potable water, 0.05% chlorine solution for hand-washing.
- Put up signs indicating men's/women's showers and latrines
- Put up a No Entry sign to the excreta pit (it must not be used by patients).
- Put up signs indicating the laundry or dish washing area, if applicable.

## Referencias

1. UNICEF Cholera Toolkit, 2013.  
<https://www.unicef.org/cholera/Cholera-Toolkit-2013.pdf>
2. Haiti cholera training manual: a full course for healthcare providers. Ministry of Health and Population in Haiti/ U.S. Centers for Disease Control and Prevention. January 2011.  
[https://www.cdc.gov/cholera/pdf/haiticholera\\_trainingmanual\\_en.pdf](https://www.cdc.gov/cholera/pdf/haiticholera_trainingmanual_en.pdf)

# 6.3 Oral rehydration points (ORP)

ORPs are outpatient health facilities that only function during the day. They are usually designed to treat simple cases only (on oral treatment) and to refer severe cases to CTCs or CTUs.

## 6.3.1 Choice of site and premises

Depending on the context, ORPs can be set up within a health facility or an adjacent site or in any strategic place that can be easily reached by the affected population (e.g. beside a rail track or main road).

An empty building, tent or temporary shelter can be used. In the absence of, or while waiting for, a facility, an ORP can be set up under a tree or parasol, if circumstances require and climate allows. The characteristics of the site (ground, etc.) are the same as those required for the other treatment facilities ([Section 6.1.1](#)).

## 6.3.2 Area required

An ORP is generally a small facility with space to treat patients and one or several latrines. For example, the space required per patient is usually 2 m<sup>2</sup>, but in practice the space occupied by a patient varies depending on age (child or adult) and clinical status (patient seated or lying down).

## 6.3.3 Layout and equipment

See [Appendix 12](#).

## 6.3.4 Setting up an ORP

An ORP can receive patients within a few hours once a site has been identified and the materials collected. The construction of a latrine can take longer (one day or more).

If the ORP is set up within a health facility, it should preferably be isolated (barrier netting or plant fencing) to restrict access to cholera patients only and avoid them entering other services. If the ORP is in a building standing apart in the village and people know only cholera cases are treated there, this precaution is usually unnecessary.

Put up a sign indicating opening hours. Label all containers (ORS, potable water, 0.05% chlorine solution for hand-washing) as in the other facilities.

# Chapter 7: Organisation of cholera treatment facilities

[7.1 Management of patients and attendants in a CTC](#)

[7.2 Human resources](#)

[7.3 Drug supply and management](#)

[7.4 Potable water supply](#)

[7.5 Infection prevention and control in a CTC](#)

[7.6 Patient meals](#)

[7.7 Sanitation](#)

[7.8 Management of deaths](#)

## 7.1 Management of patients and attendants in a CTC

### 7.1.1 Patient flow and distribution

The organization presented in this chapter corresponds to the CTC layout suggested in [Appendix 11](#) with 3 main sectors for patient case management: triage, hospitalisation, observation.



## TRIAGE

- All patients that arrive at a CTC go through triage. They are admitted<sup>(a)</sup> (or not) according to the criteria described in [Chapter 5](#).

- Priority is given to emergency cases that are treated within minutes of arrival.

For less severe cases, it is essential to maintain visual contact while they await triage (the patient's condition may deteriorate while waiting). These patients should not wait more than 10 minutes between arriving and being attended to.

- For **patients without danger signs**

The doctor/nurse opens an individual patient file and registers patients (cholera case register).

Patients are then accompanied by an auxiliary nurse to the appropriate sector for treatment (hospitalisation or observation), with their individual patient file.

- For **patients with danger signs** (emergencies)

The doctor/nurse immediately inserts an IV line and starts rehydration. The interview, registering and transfer to the appropriate sector are carried out once patients are stabilised.

## HOSPITALISATION

- All patients with **some or severe dehydration** are admitted to this CTC area, which is divided into two sectors: sector for oral treatment only (OT) or sector for IV + oral treatment (IVT).

Patients are treated in OT or IVT sector depending on the triage prescription.

- In OT or IVT sector, pregnant women and children < 5 years are preferably grouped together rather than mixed with the other patients to improve monitoring.

- Patients with **severe dehydration** that finish IV treatment and switch to maintenance therapy ("recovering patients") can stay in the same bed, even if their IV treatment has ended: relapse is possible; it is easier to continue patient monitoring if they stay in the same bed. Nevertheless, rapid transfer to the OT sector should be considered to free up the IVT sector when the CTC experiences a high influx of patients (on condition that the patient drinks well and has had the catheter removed). In this situation, it is advisable to consider setting up a post IV treatment sector from the outset (called "Recovery", see below).

- A patient with **some dehydration** admitted to the OT sector and whose condition deteriorates is transferred to the IVT sector. The OT sector should not manage patients with infusion.

## OBSERVATION

Patients with **no dehydration** are admitted to this sector and receive treatment under observation for a few hours. As in the hospitalisation sector, pregnant women and children < 5 years are grouped together to improve monitoring.

(a) If a patient fills admission criteria but decides not to stay ("leaving against medical advice"), s/he must at least leave with ORS for home-based treatment.

This distribution of patients covers all treatment needs (treatment of dehydration and prevention of dehydration or maintenance therapy) while paying specific attention to the most vulnerable or complex cases (e.g. young children, pregnant women).

Note that patient sectors can be divided in other ways. Another model could be:

<b>TRIAGE</b>
As above.
<b>OBSERVATION</b>
<p>All patients on oral treatment only are oriented in this CTC area. In this event, the area is divided into 2 sectors:</p> <ul style="list-style-type: none"> <li>• Patients on Plan A (prevention of dehydration), and</li> <li>• Patients on Plan B (oral treatment of some dehydration).</li> </ul> <p>Do not mix these patients to ensure correct monitoring.</p> <p>Or</p> <p>Only patients on Plan B (oral treatment of some dehydration) are treated in this area, patients with no dehydration are treated as outpatients (in an ORP or at home<sup>(b)</sup>). Nevertheless it is important to remember that clinical surveillance, however brief, is strongly recommended for children &lt; 5 years on Plan A, and that in all events a certain number of patients with no dehydration will be admitted for observation.</p>
<b>HOSPITALISATION</b>
All patients on IV treatment are treated in this area.
<b>RECOVERY OR CONVALESCENCE</b>
<p>Patients that have finished IV rehydration switch to oral maintenance therapy under observation, but no longer need a bed. They stay in the recovery area a few hours (for the night if their IV treatment finishes late) until being discharged. This organization makes beds available quicker. However convalescent patients are not yet fully cured and the administration of ORS and fluid loss should be monitored as closely as in “observation”.</p>

(b) In the event of home-based care, set up an efficient information service (how to prepare ORS, how to take it, when to return, etc.).



The decision of which setup to choose depends on the context, particularly the national model of CTC organization, the size of the population covered, the number of severe cases in proportion to the total number of cases admitted, the overall response capacity (number of facilities available, capacity of ORPs to handle cases requiring oral treatment only, etc.), capacity of the CTC itself (space, maximum number of beds), etc.

*Notes:*

- In CTUs, there are fewer numbers of patients but the principle of grouping patients by age and category of treatment remains the same (on one side of the room, patients on IV treatment, on the other side, patients on oral treatment, and on each side, children < 5 years together).
- In ORPs it is better to separate dehydrated patients and patients with no dehydration if the premises allow it, and to group together children < 5 years in each treatment category.

## **7.1.2 Attendants**

Adult, autonomous patients can be admitted unaccompanied to the CTC. Often, this can only be applied to adult males and adult women should preferably, or must imperatively, be admitted with an attendant.

Children and adolescents (all minors), pregnant women and anyone that requires assistance (the elderly, disabled individuals, etc.) or is in a serious condition are admitted with an attendant that stays with them throughout their stay.

Allow only one attendant per patient. This same person remains throughout the patient's stay, in order to limit comings and goings and to avoid exposing more people than necessary to the vibrio. It may be useful to issue attendants authorised to stay in the CTC with a bracelet.

The attendant takes an active role in treatment, e.g. administration of ORS, comfort and monitoring of the patient. S/he can, and should be encouraged to, alert staff in the event of accidental interruption of IV treatment (catheter pulled out, empty infusion bag, etc.) or other situations that do not seem normal. Nevertheless medical staff remains responsible for medical care: monitoring of clinical evolution and treatment should not be delegated to attendants.

As for patients, attendants' needs are covered by the facility. Logistics officers should take into account attendants' needs: shelter, blankets, food, water, hygiene, sanitation, etc.

Means should be set up to avoid the attendant being contaminated (hand-washing points, showers, hygiene promotion, etc.).

## **7.1.3 Communication with patients and attendants**

The patient and attendant should receive the following information:

### **On admission**

– Patient’s problem and treatment required:

The explanation will vary depending on the knowledge and concepts of the population and the condition of the patient, but it should be simple and concrete. The aim of treatment is to give the patient the same quantity of water that s/he is losing (or has lost) through diarrhoea, by drinking ORS or IV treatment, depending on the case. The administration of ORS must be explained and understood.

– Description of the installations (potable water, showers men/women, latrines men/women, off-limit areas, etc.) and hygiene rules in the CTC:

- Hand-washing, shower and laundry.
- Dishes (cups, meals) must not be shared between patients and attendants.
- Breastfeeding women: hand-washing and washing of breasts with soap and water (do not apply chlorine solution) before breastfeeding.
- Collection of stools and vomit in buckets.

## **On discharge**

- Maintenance therapy to be continued at home ([Section 5.6](#)).
- Means of avoiding cholera at individual and family level.

Depending on the setup and for all facilities (CTC, CTU, ORP), communication is entrusted to health promoters or nursing auxiliaries supervised by nurses, or to the nurses themselves.

# **7.2 Human resources**

## **7.2.1 Staff needs and task distribution**

The list of staff required and job descriptions in [Appendix 18](#) and [Appendix 19](#) are given as an example. They should be adapted to the context (resources, size and organisation of the facility, etc.). CTCs and CTUs operate 24 hours/day, 7 days/week. Plan the necessary staff to cover these needs (day/night/rest periods).

## **7.2.2 Staff training and supervision**

**Common core training** (medical and technical staff)

All CTC, CTU and ORP staff must be trained before opening a treatment facility, particularly if they have little or no cholera experience. Common core training focuses on:

- Cholera: symptoms, mode of transmission, means of prevention;
- Rules in the facility (hygiene, protective clothing, circulation, etc.) and their aims.

In areas affected by cholera for the first time, staff may be afraid of cholera, it is therefore important to reassure as well as train.

**Specific training** (depending on the position)

The job descriptions in [Appendix 18](#) and [Appendix 19](#) outline what staff needs to know to fulfil their position.

### **Refresher course**

A refresher course is necessary if the outbreak lasts several months or in the event of recurring or persistent problems in case management or other activities, especially if staff have received only basic training due to the urgency of the situation.

*Note:* apart from cholera treatment facilities, medical staff in regular health facilities needs to be trained to recognise cholera cases and refer them to the cholera facility.

### **Supervision**

It is essential to carry out an initial visit of cholera treatment facilities in the affected zone at the beginning of the intervention. The aim is to check that staff is familiar with and understand case definition, data collection, treatment protocols, referral criteria, etc.

Regular visits are later necessary to supervise stock and supply management, evaluate the quality of case management, check that registers are kept up to date and generally answer any of the staff's practical questions.

## **7.3 Drug supply and management**

### **7.3.1 Supply**

The medical stock must always be sufficient to guarantee continuous care, including in the event of a sudden influx of patients and/or supply difficulties. Ringer lactate (RL), catheters and infusion sets, and oral rehydration salts (ORS) are the most important articles as they are essential to the treatment of cases. A shortage of these articles could result in an increased case fatality rate.

Supplies are provided in kits<sup>a</sup>. Cholera kits do not contain all articles; certain articles need to be ordered apart.

### **7.3.2 Calculation of treatment needs**

Using one of the examples given in Chapter 2 ([Box 2.1](#) and [Table 2.1](#)), in a refugee camp, 1500 cases are expected over the course of the outbreak. Of these 1500 patients, 75% (1125 patients) will receive oral treatment only and 25% (375 patients) will receive IV + oral treatment. A 50 bed CTC is set up.

#### **First order for the CTC**

An initial order for treatment supplies is made to the central store. It includes treatment supplies for all patients (no/some/severe dehydration), including for facilities such as ORPs that are linked to the CTC.

Decide how long the initial stock will need to last (1 or 2 weeks) and add a buffer stock (20-25%). This buffer stock must be maintained throughout the outbreak.

In the example of the refugee camp, 20% of cases are expected during the peak week of the outbreak. To simplify ordering and have sufficient stock, without being excessive, use the following rules of thumb:

- If the order is to cover 1 week, order sufficient supplies to cover one quarter of patients expected during the peak week (i.e. 5% of total expected patients).
- If the order is to cover 2 weeks, order sufficient supplies to cover half the patients expected during the peak week (i.e. 10% of total expected patients).

It is estimated that the following quantity (rounded) of supplies will be needed for e.g. 2 weeks:

	<b>For expected cases</b>	<b>Buffer stock (20%)</b>	<b>Total</b>
<b>Sachets of ORS</b>	1500	300	2000 sachets of ORS
<b>Litres of RL</b>	400	80	500 litres of RL
<b>Infusion sets</b>	200	40	250 infusion sets
<b>Catheters</b>	150	30	200 catheters
<b>Doxycycline</b>	300	60	400 tablets
<b>Zinc sulfate</b>	300	60	400 tablets

This calculation is based on the following standards: 10 litres of ORS per patient, 10 litres of RL per patient with severe dehydration, 1 infusion set for 2 litres of RL, 1 catheter for 3 litres of RL<sup>b</sup>, one antibiotic therapy per patient with some or severe dehydration and pregnant women (in total, around 60% of patients), one blister of zinc sulfate per child under 5 (20% of patients).

For example for 10% of 1500 expected cases i.e. 150 patients:

150 patients x 10 litres of ORS = 1500 sachets

150 patients, of which 25% on IV treatment i.e. 38 patients x 10 litres of RL = 380 litres of RL rounded to 400.

Do not forget to add the buffer stock.

#### *Notes:*

- Part of the ORS sachets are for on-site patient treatment, the others are to give to patients on discharge to finish treatment at home and/or treat family members that develop symptoms.
- For orders and stock, count RL in litres not in bags or pouches.
- It is not necessary to have as many infusion sets and catheters as litres of RL. Always have 2 sizes of adult catheters and 2 sizes of child catheters.
- Antibiotics (depending on the antibiotic sensitivity test and national protocol):
  - doxycycline: 3 tab of 100 mg/patient
  - azithromycin: 4 tab of 250 mg/patient + oral suspension for children < 5 years (20%)
  - ciprofloxacin: 4 tab of 250 mg/patient
- Zinc sulfate: one blister of 10 tablets per child < 5 years

### **Subsequent orders**

For subsequent orders, others elements need to be taken into account e.g. an increase or decrease in the number of cases per week depending on the evolution of the outbreak and consumptions.

## **7.3.3 CTC pharmacy management**

### **Range of articles**

The range of articles used should be limited and focused on:

- The treatment of dehydration, and
  - The main complications related to cholera treatment (hypokalaemia, fluid overload).
- Nevertheless treatment for some of the most common comorbidities (e.g. malaria, respiratory infections) must be available. These articles must be ordered in addition to the kits.

*Note:* IV potassium is a dangerous drug and must be used in one presentation only (volume and concentration) in the CTC. Recommended presentation is 10 ml-ampoule containing 10% potassium chloride (13.4 mmol/ampoule).

### **Organisation of stock**

Articles are classed by category, to be found easier:

- Oral drugs: antibiotics, zinc sulfate, potassium chloride syrup, etc.
- Specific drugs, in small quantities, for the treatment of complications (e.g. injectable potassium, furosemide, glucose).

Ampoules of injectable potassium must be stored in a specific place away from water for injection, or any other drugs that look similar.

- Medical materials (infusion materials, sharp containers, etc.).
- Boxes of ORS, RL, kits and modules.

Drugs and medical materials are put away on shelves as quickly as possible, and boxes of ORS, RL and kits on palettes. This organization makes visual evaluation of available stock easier and protects materials from deterioration.

## Drug storage

ORS powder and dispersible zinc tablets are extremely sensitive to humidity.

ORS can be used as long as it remains a white powder. Humidity transforms it into a compact, tinted, insoluble mass. In this condition it is unfit for consumption and must be discarded, even if it has not reached its expiry date.

### 7.3.4 Stock management in treatment wards

Each ward (or each tent) has a limited stock of essentials items (ORS/RL, basic drugs) sufficient for 12 or 24 hours, depending on the setup and activity (1 or 2 deliveries to the ward/24 hours).

This stock is managed by the nurse, with the help of the pharmacy manager, and under the supervision of the CTC coordinator or the healthcare supervisor that checks wards' stocks several times a day.

### 7.3.5 ORS management in treatment wards

Oral rehydration solution must be available at all times for patients. This implies appointing staff specifically responsible for ORS management: preparation and elimination if applicable (ORS only keeps for 24 hours).

Depending on the context (size, resources, organization), staff in charge of ORS must be supervised either by the pharmacy manager (if ORS preparation is centralised for the entire CTC) or by the unit's nurse (if ORS is prepared in each unit by the nurse auxiliary).

## Notas

- (a) For the contents of the *001 Cholera Kit, 625 treatments, MSF*, see the *MSF kit catalogue*. The 001 Cholera Kit can be divided into smaller kits for a given number of patients (10, 20, 50, etc.) in order to supply small facilities that are linked to a CTC or to pre-position treatments in areas at risk, including during on-site investigations.
- (b) Or alternatively, 3 catheters per patient, which is almost equivalent.

## 7.4 Potable water supply

### 7.4.1 Quantity

#### CTCs and CTUs



A large amount of water is required for:

- The preparation of ORS and human consumption (drinking, cooking).
- Hand-washing and personal hygiene of patients and attendants.
- Cleaning and disinfection of objects, floors, surfaces and laundry.

60 litres per day per patient<sup>[1]</sup> are needed to cover patient, attendant and staff needs as well as cleaning the facility. This volume is given as an indication. Re-evaluate real needs depending on the context (e.g. climate, culture) and the number of patients (the lower the number of patients in proportion to the facility's total capacity, the greater the quantity of water necessary per day per patient).

It is recommended to have a reserve supply on-site to cover at least 3 days of activity.

For example, for a CTC with 50 patients present:

$60 \text{ (litres)} \times 50 \text{ (patients)} = 3000 \text{ litres of water/day} \times 3 \text{ (days)} = 9000 \text{ litres of water}$

The CTC needs to have at least 9000 litres of water available every day.

## **ORPs**

Water is needed to prepare ORS and for human consumption (drinking), hand-washing, cleaning and disinfection of objects, floors, surfaces.

Approximately 10 litres of water per patient<sup>[2]</sup> are required. This volume is given as an indication; as for other facilities, needs must be re-evaluated depending on the context.

It is also recommended to have a 3-day reserve supply.

For example, for an ORP with 20 patients present:

$10 \text{ (litres)} \times 20 \text{ (patients)} = 200 \text{ litres of water/day} \times 3 \text{ (days)} = 600 \text{ litres of water}$

The ORP needs to have at least 600 litres of water available every day.

## **7.4.2 Quality**

Water is chlorinated in all treatment facilities (including CTUs and ORPs).

Turbidity should be under 5 NTU. The FRC concentration at all distributions points should be 0.5 mg/litre for a contact time of 30 minutes if the pH is < 8 (and 1 mg/litre for a contact time of 60 minutes if the pH is > 8).

## **7.4.3 Distribution**

### **CTCs and CTUs**

Water is distributed by gravity from a water tower or elevated reservoir via a distribution network equipped with distribution ramps or tapstands placed in each sector.

If electricity is available at all times, a surface pump equipped with an automatic system keeps the distribution network pressurised and distributes water without using gravity (i.e. there is no need to build a water tower or an elevated platform).

It is also possible to organise an entirely manual distribution system. Water is transported in buckets by water carriers that fill 120 litre containers equipped with a tap. These containers serve as distribution points. This system is simple and quick to set up but requires a lot of staff and supervision and should be quickly replaced.

## **ORPs**

The water distribution system is usually manual.

## **7.4.4 Maintenance and monitoring**

### **Distribution network**

The distribution network should be inspected at least twice a month to check there are no leaks and that the valves and taps are working correctly.

### **Reservoirs (including safety reserve)**

Reservoirs should be inspected at least twice a month to check there are no leaks, no deposits (calcium, sand, etc.), that the valves and taps work correctly, and the condition of protective coverings (shade net, roofs) and support frames (platforms, water tower).

For the safety reserve, preferably rotate between the different reservoirs so that the water in reserve is always used and quickly renewed. Before each use, check the FRC level, that tends to disappear within 24 hours. If necessary, re-chlorinate.

Water consumption, water quality control checks, and actions and consumption related to water production should all be recorded in a register of water and sanitation activities ([Appendix 3](#)).

## **Referencias**

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2. Oral rehydration points (ORPs): Planning and Guidance. Centers for Disease Control and Prevention 2010. Haiti Cholera Training Resources: Community Health Worker Materials.  
[https://www.cdc.gov/cholera/pdf/ORP\\_GuidancePlanning\\_finalcleared.pdf](https://www.cdc.gov/cholera/pdf/ORP_GuidancePlanning_finalcleared.pdf)

# 7.5 Infection prevention and control in a CTC

Hygiene measures implemented in a CTC are designed to reduce the spread of *Vibrio cholerae* inside and outside the CTC. The probability of spreading or acquiring cholera through frequenting a CTC is low if these measures are respected.

These measures are, in principle, also valid in CTUs and ORPs, although they need to be adapted to the specific characteristics of the facility concerned.

## 7.5.1 Isolation

From the start of the outbreak, patients should be isolated to avoid the spread of cholera in hospitals and other general health facilities that usually receive the first cases.

## 7.5.2 Hand hygiene

Hand hygiene avoids the transmission of *Vibrio cholerae* and other pathogenic micro-organisms in the CTC.

The UNICEF recommends routine hand-washing with 0.05% chlorine solution in cholera treatment facilities<sup>[1]</sup>. Hand-washing with soap and water is an alternative.

Visibly soiled hands should be washed with soap and water.

**Table 7.1** - Critical times for hand-washing

<b>STAFF</b>	
• On entering the CTC	• On leaving the CTC
<b>And before<sup>(a)</sup> :</b> <ul style="list-style-type: none"> <li>• An aseptic procedure (e.g. inserting a catheter, intra-osseous needle).</li> <li>• Preparing ORS solution or food.</li> <li>• Feeding a patient.</li> <li>• Giving a patient ORS to drink.</li> <li>• Eating or smoking.</li> </ul>	<b>And after:</b> <ul style="list-style-type: none"> <li>• Contact with stool, vomit, blood or other body fluids.</li> <li>• Going to the toilet.</li> <li>• Preparing a corpse.</li> <li>• Handling soiled laundry, waste or emptying excreta buckets, etc.</li> </ul>
<b>PATIENTS/ATTENDANTS</b>	
• On entering the CTC	• On leaving the CTC
<b>And before:</b> <ul style="list-style-type: none"> <li>• Feeding a patient.</li> <li>• Giving ORS to drink.</li> <li>• Eating or smoking.</li> <li>• Preparing food for a patient.</li> </ul>	<b>And after:</b> <ul style="list-style-type: none"> <li>• Contact with stools, vomit.</li> <li>• Going to the toilet.</li> <li>• Handling soiled laundry.</li> </ul>

(a) Medical staff can use an alcohol based handrub (ABHR) before inserting an IV catheter or intraosseous needle. Hand rubbing with an alcohol solution eliminates bacteria, including *Vibrio cholerae*, but these solutions are not detergents. It is imperative to wash visibly soiled hands with soap and water.

*Note:* only patients without danger signs, conscious and capable of walking without assistance, are asked to wash their hands on entering the CTC.

Guards should not delay the treatment of serious cases (patients that have difficulty standing up or with altered consciousness) because of this systematic hygiene measure that is not a priority in patients in life-threatening condition.

## **7.5.3 Personal protective equipment (PPE)**

### **Basic PPE**

Staff protective clothing should be supplied and washed by the CTC. It should preferably be made or bought locally.

All staff must have at least:

- 1 short-sleeved top and 1 pair of trousers (OT scrubs)

AND

- 1 pair of boots: essential for staff in contact with patients, corpses, excreta, waste and chlorine solutions. For staff not exposed to projections (administration, kitchen), rubber clogs are sufficient if the ground is not muddy.

It is compulsory to wear protective clothing. Staff change on entering and leaving the CTC. Staff must neither leave the CTC in their protective clothing nor work in the CTC in their personal clothes.

### **Additional PPE**

During certain activities, staff should wear the following extra protection:

<b>Additional PPE</b>	<b>Activities</b>
Disposable <b>examination gloves</b> in latex or nitrile	<ul style="list-style-type: none"><li>• Insertion of an IV catheter, IO needle, gastric tube.</li><li>• Collection of stool samples or stool tests.</li><li>• Contact with patient mucous membranes or skin lesions.</li><li>• Medical staff with a skin lesion on hands.</li></ul>
Reusable <b>rubber gloves</b> Reusable <b>plastic apron</b>	<ul style="list-style-type: none"><li>• Collection of soiled laundry and dishes.</li><li>• Transport of soiled laundry and dishes.</li></ul>
Reusable <b>rubber gloves</b> Reusable <b>plastic apron</b> Reusable <b>face shield</b>	<ul style="list-style-type: none"><li>• Preparation of chlorine solutions.</li><li>• Washing/disinfection of laundry and materials (e.g. dishes).</li><li>• Transport and elimination of wastewater, faeces, vomit and waste.</li><li>• Cleaning.</li><li>• Preparation of corpses.</li></ul>
<b>Work overalls</b> Reusable <b>nitrile gloves</b> <b>Heat resistant gloves</b> (incinerator) <b>Long leather apron</b> Reusable <b>face shield</b> Disposable <b>FFP2 respirators</b>	Elimination of waste

*Notes:*

- Respiratory protection devices (FFP 1, 2 or 3 respirators) protect against dust (e.g. removing ashes, sweeping the waste storage area) but not against gases or vapours.
- Cholera is not transmitted by the inhalation of droplets. It is pointless to wear a surgical mask or FFP2 respirator to protect oneself against cholera.

## 7.5.4 Laundry

A CTC laundry room handles 3 categories of laundry:

- Staff PPE (clothing, rubber gloves, boots etc.);
- Hospital laundry (sheets, blankets);
- Patients'/attendants' laundry.

PPE is changed every day and each time it is soiled.

Hospital laundry is changed when soiled and on patient discharge.

Patient and attendant clothing is changed when soiled. Patient/attendant clothing must not be sprayed with chlorine before being taken to the laundry room.

Soiled PPE, hospital laundry and patient/attendant laundry are:

- collected by staff wearing plastic aprons and rubber gloves;
- transported in reusable containers, separated by category or if not available, in disposable plastic bags;
- washed separately with soap and water or with detergent available on the local market, rinsed in clear water, soaked in 0.05% chlorine solution for 15 minutes, rinsed in clear water again and hung out in the sun until completely dry.

*Notes:*

- During the first days while setting up the CTC, if the disinfection of laundry has not yet be organised, washing laundry with soap and water and leaving it to dry completely outside in the sun eliminates the vibrio as it cannot survive in dry environments.
- In small peripheral CTUs where there are less patients and staff, patient laundry is often washed by attendants. The CTU provides a laundry washing area with water, basins, soap, and an area to hang out washing to dry.

## 7.5.5 Soiled materials

### **Disposable materials**

- Disposable materials should be eliminated after use.
- Sharps (i.e. needles, catheter guidewires, lancets, drug ampoules and other objects that may cause injury) must be discarded immediately after use into a sharps container. The container is replaced when it is three quarters full (check the level every day).

### **Reusable materials**

- Immersible material (e.g. tourniquet, tray) should be washed with soap and water, rinsed then disinfected with 0.2% chlorine solution.
- Non-immersible material (e.g. sphygmomanometer) should be wiped or sprayed with 0.2% chlorine solution.

## 7.5.6 Hygiene of premises and vehicles

The cleaning of premises includes all patient zones, all areas of the “clean” zone (administration, changing rooms, stock rooms, etc.) and the outside areas of the CTC.

### **Cleaning of floors, surfaces and sanitation facilities (showers, toilets, washing areas)**

These must be cleaned at least twice a day with detergent available on the local market, rinsed (change soapy solution and rinse water when saturated) then disinfected with 0.2% chlorine solution.

Do not mix detergent and 0.2% chlorine solution.

After applying 0.2% chlorine solution, do not rinse (except stainless steel surfaces that must imperatively be rinsed), leave to completely dry.

### **Vehicles**

Ambulances should be cleaned with detergent at least once a day and every time they are soiled (e.g. spilt stools or vomit), rinsed, then disinfected with 0.2% chlorine solution, then rinsed again to protect the metal surfaces.

## **7.5.7 Preparation and storage of ORS <sup>[2]</sup>**

The following precautions must be respected:

- Rinse the containers and utensils to be used with 0.05% chlorine solution and leave to dry.
- Wash hands immediately before preparation.
- Dissolve sachets in potable water.
- Store prepared solution in containers equipped with lids and a tap for distribution.
- Keep prepared solutions 24 hours maximum.

*Note:* drinking water is stored under the same conditions to avoid contamination.

## **7.5.8 Food hygiene**

The following precautions should be respected:

- Access to the kitchen and food stores, as well as the handling of food and distribution of meals, is reserved to kitchen staff only.
- Hand-washing before preparing food and serving meals.
- Use of potable water stored in containers with lids and taps.
- After meals: discard leftovers, do not keep prepared food, do not let food out of the CTC.
- Meals are served hot and well cooked, and fruit and vegetables well washed.
- Surfaces and utensils should be cleaned with detergent, rinsed then disinfected with 0.2% chlorine solution (and rinsed again if stainless steel surfaces).

## **7.5.9 Chlorine solution preparation**

Chlorine solution should be available at all times.

See [Appendix 15](#) for preparation and use.

Display the protocol on the preparation of chlorine solutions in all facilities.

## 7.5.10 Disinfection of shoes

### Interest

Shoe disinfection points are traditionally placed at the entrance and exits of CTCs, and sometimes at the passage between the different sectors within the CTC.

The effectiveness of this measure in stopping the spread of vibrio in and outside the CTC has not been demonstrated. Its pertinence in controlling infection has long been contested.

Shoe disinfection points can serve to raise awareness among patients/attendants on the need for exceptional measures related to the contagious nature of cholera. However they are not considered essential if the CTC implements effective control measures<sup>[1]</sup>: isolation, hand-washing (including at the entrance and exit of CTC and at the passage between the contaminated and clean zone), patient education, control of waste waters, etc.

### Methods

If shoe disinfection points are set up, there are 2 methods. Spraying is preferable over foot baths.

#### **Spraying with 0.2% chlorine solution**

This method requires the presence of a foot sprayer at each disinfection point. The measure should be limited to disinfection points at the entrance and exit of the CTC, as well as the passage between the contaminated and clean zone.

Only the soles of shoes should be disinfected. The feet, body or clothes of patients and attendants must not be sprayed, even if they are soiled.

#### **Foot baths containing 0.2% chlorine solution**

Foot baths are awkward to maintain (e.g. changing the solution in the baths) and their effectiveness is even more doubtful (rapid deterioration of chlorine due to various mechanisms such as: frequent deposit of mud and other organic matter; prolonged exposure to sun; dilution of chlorine solution with rainwater, etc. They will be bypassed by users if they are not acceptable (dirty, too deep or too small, slippery, etc.).

In all events, shoe disinfection must not hinder the circulation of staff and patients/attendants.

Providing treatment to serious cases remains the priority, e.g. patients that need to be carried or who are in shock. Urgent treatment must not be delayed because of a disinfection measure of limited interest.

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## 7.6 Patient meals

### 7.6.1 Hospitalised patients

#### CTCs

A CTC provides 3 meals per day. Meals are usually prepared on-site. The number of meals to be prepared is calculated before each meal, by counting the number of patients and multiplying the number by two to take attendants into account. A margin should be added for example if a patient on oral treatment during the day stays in the end overnight.

The calculation of quantities per person and per meal is based on 2100 kcal/person/day, whatever the age of the patient.

While setting up CTC, provide meals that do not require preparation (e.g. tea and biscuits or dry rations, fruit) until the kitchen is set up.

In certain contexts, meals are prepared and delivered by an external service. In this event, ensure that preparation is correct (hygiene) and that rations are sufficient.

#### CTUs

A CTU is generally less well equipped than a CTC. Options include meals that do not require preparation, meal deliveries or food provided by the CTU but prepared by attendants in a dedicated area ("cooking area").

Sometimes all meals are provided by patients' families that deliver them several times a day. This option should not be encouraged. It is too precarious, as it depends on the support and economic possibilities of families, particularly for children's diets. Treatment facilities should preferably guarantee patients' food.

In all events, ensure that patients eat or that they are fed by attendants or auxiliary nurses if they cannot feed themselves.

### 7.6.2 Patients observed for a few hours

A snack (e.g. dry ration, biscuits or fruit) should be offered to patients that stay over 4 hours under oral treatment in a CTC, CTU or ORP.

*Note:* also provide a meal for staff that work 8 to 12 hours without a break, day or night.

# 7.7 Sanitation

## 7.7.1 Management of faeces and vomit

Stools and vomit are collected in buckets as patients cannot go to latrines due to the intensity of their often uncontrollable diarrhoea and vomiting. This is valid for all facilities (CTCs, CTUs and ORPs).

Usually 1 cm of 2% chlorine solution is poured into each bucket (125 ml into a 10 to 15 litre bucket). This precautionary measure is recommended to reduce the risk of contamination while handling the buckets, despite the absence of data on the volume of chlorine required, the contact time and the necessary concentration of chlorine to effectively disinfect the contents. Do not pour more than 1 cm of chlorine into the bottom of buckets, especially those reserved for vomit (risk of chlorine splashing the patient's face).

Buckets need to be monitored and replaced when they are at most one third full. They must imperatively be replaced between each patient.

Stools and vomit are poured into excreta pits ([Appendix 14](#)) or latrines. The empty buckets are rinsed in clear water and disinfected with 0.2% chlorine solution.

Before returning the bucket to the patient, pour 1 cm of 2% chlorine solution again into the bucket.

If possible, use different coloured buckets for stools and vomit or label buckets indicating what they are to be used for. Do not use these buckets for clean activities (e.g. preparation of ORS, transport of potable water).

## 7.7.2 Management of waste

Waste should be evacuated every day, or as often as necessary, and destroyed on-site in a specifically designed and protected area.

### Sharps

Sharps containers should be eliminated when they are three-quarters full. They should not be emptied or reused.

### Soft waste

Each ward should have a covered 20 to 60 litre waste bin reserved for soft waste: empty ORS sachets, infusion bags, IV infusion set, used compresses, etc.

If possible, waste bins for soft waste should all be the same colour. They should be emptied when they are three-quarters full. Soft waste is burned. The waste bins are washed with a detergent available on the local market, rinsed, and disinfected with 0.2% solution.

### Organic waste

In the event of a birth during hospitalisation, use a plastic bucket to transport the placenta to the organic waste pit. The bucket is washed with detergent, rinsed, and disinfected with 0.2% solution. Food waste should also be emptied into this pit. Do not discard plastic bags into this pit.

## **Mats**

If patients are placed on mats, burn them on discharge of the patient. Do not reuse them.

Staff responsible for the transport and elimination of waste must wear appropriate personal protective equipment ([Section 7.5.3](#)).

For more information, see [Public health engineering in precarious situations](#), MSF.

## **7.7.3 Management of wastewater**

All wastewater (showers, sinks, laundry, hand-washing points, ORS preparation, and kitchen) must be collected in a grease trap then infiltrated via a soak away pit.

If it is not possible to build a soak away pit (e.g. lack of space, nature of the soil), wastewater requires specific treatment before being discarded. Technical solutions must be discussed on a case by case basis with water and sanitation specialists.

For more information, see [Public health engineering in precarious situations](#), MSF.

## **7.7.4 Vector control**

Flies or mosquitos (attracted by waste, stagnant water or wastewater, food, ORS sugar) can be abundant and become a nuisance.

Waste and wastewater management may be enough to control vectors, but sometimes insecticides are required.

For more information, see [Public health engineering in precarious situations](#), MSF.

# **7.8 Management of deaths**

## **7.8.1 Investigation of deaths**

A death in a CTC or CTU must be recorded by the ward or on-call doctor or the facility coordinator as soon as possible.

All deaths must be investigated. This consists of a brief analysis of the individual patient file, treatment conditions and circumstances of death. This investigation should determine the probable cause of death and whether the death was avoidable or not ([Section 8.4.8](#)).

## **7.8.2 Registration of deaths**

Anyone who arrives alive but dies in a treatment facility, even if the death occurs within minutes after arrival, even if the patient dies of a co-morbid condition (e.g. malaria), must be registered both as a case and as a death.

Individuals who die before having been brought to the treatment facility must not be registered as a death in the facility. They are reported separately as “community deaths”.

The CTC coordinator should check the number of deaths every day.

## 7.8.3 Preparation of corpses

Once the death has been recorded, the corpse should be transported to the morgue as quickly as possible. The corpse should not be prepared on the ward (and in all events, never in view of other patients).

The corpse should be washed with 2% chlorine solution, using a sponge. Sprayers should not be used to “disinfect” a corpse.

The corpse should be placed in a non-porous body bag with two disposable underpads (one placed under the head, the other under the buttocks) to absorb possible leaks through the mouth and anus. The bag is closed until burial or cremation that should be held as soon as possible.

If the corpse cannot be buried within 24 hours, natural orifices (i.e. mouth and anus<sup>[1]</sup>) can be plugged with cotton. This technique can limit the leak of excreta but should not be routinely used. The plugging of orifices should be carried out by health staff (usually auxiliary nurses) or specifically trained staff. It should be avoided if it is not essential or acceptable to the population or if staff has not been trained in this practice.

Staff preparing corpses should wear personal protective equipment ([Section 7.5.3](#)) and carefully wash their hands after this operation.

## Referencias

1. UNICEF Cholera Toolkit, 2013. Annex 9D - Safe care of the dead.  
[https://www.unicef.org/cholera\\_toolkit/Cholera-Toolkit-2017.pdf#page=255](https://www.unicef.org/cholera_toolkit/Cholera-Toolkit-2017.pdf#page=255)

# Chapter 8: Monitoring and evaluation

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# 8.1 Introduction

All cholera treatment facilities should collect and report a basic set of well-defined data, in a standardized format, and on a pre-determined schedule. The set of data, the format, and reporting schedule is usually decided upon by the Ministry of Health or the cholera outbreak response committee.

Data collection at each treatment facility is intended:

1. To describe the outbreak at the local level, to monitor the quality of care and management and to assess the on-going needs of the facility (supply, human resources, number of beds, etc.).
2. To describe the outbreak at the district-, regional-, and national-level, after being compiled across multiple treatment sites, to monitor its evolution over time, and to adapt the response accordingly.

At central level, health authorities should assign a person or team in charge of information management who compile data, draft reports and share data in a timely manner with partners. Rapid information sharing is crucial to ensure a coordinated response that is adjusted to the evolution of the epidemic over time.

## 8.2 Data collection and organisation at the cholera facility level

### 8.2.1 Data collection

#### **Epidemiologic data**

The epidemiologic data are collected from cholera case registers and sometimes from individual patient files.

Required	Recommended	Optional
Number of admissions and deaths <sup>(a)</sup> : <ul style="list-style-type: none"> <li>• per 24 hours</li> <li>• for each epidemiologic week<sup>(b)</sup></li> <li>• since the beginning of the current outbreak</li> </ul>	<ul style="list-style-type: none"> <li>• Age group<sup>(c)</sup></li> <li>• Dehydration level on admission<sup>(d)</sup></li> <li>• Geographic origin of patient<sup>(e)</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Length of stay</li> <li>• Sex</li> <li>• Cholera vaccination status</li> <li>• Pregnancy</li> <li>• Transfers in<sup>(f)</sup></li> </ul>

- (a) Any person who arrives alive but dies in a cholera treatment facility should be counted both as a case and a death. Other outcomes (cured, transferred out, leaving against medical advice) should also be recorded. Persons who die before arriving at the treatment facility can be recorded by this facility as “brought in dead” but should be counted as a community case and death.
- (b) Epidemiologic week: typically Monday through Sunday or Sunday through Saturday.
- (c) Age groups < 5 years and ≥ 5 years are usually sufficient.
- (d) Dehydration level: none/some/severe.
- (e) According to the smallest administrative level possible, i.e. to the 4<sup>th</sup> level (e.g., neighbourhood, city, district, and region).
- (f) Double counting may occur if a transferred patient is reported as a case by both the initial and receiving facility. All actors should agree on which facility will count the case, based on the decision of the national surveillance system.

*Note:* authorities are in charge of collecting, organizing and analysing data of presumptive cholera cases and deaths that occur outside of cholera treatment facilities. These data are reported by private clinics, community health workers, morgues, etc.

### Consumption data

Consumption and stock of essential items (i.e. ORS sachets and litres of RL) are taken from pharmacy stock cards.

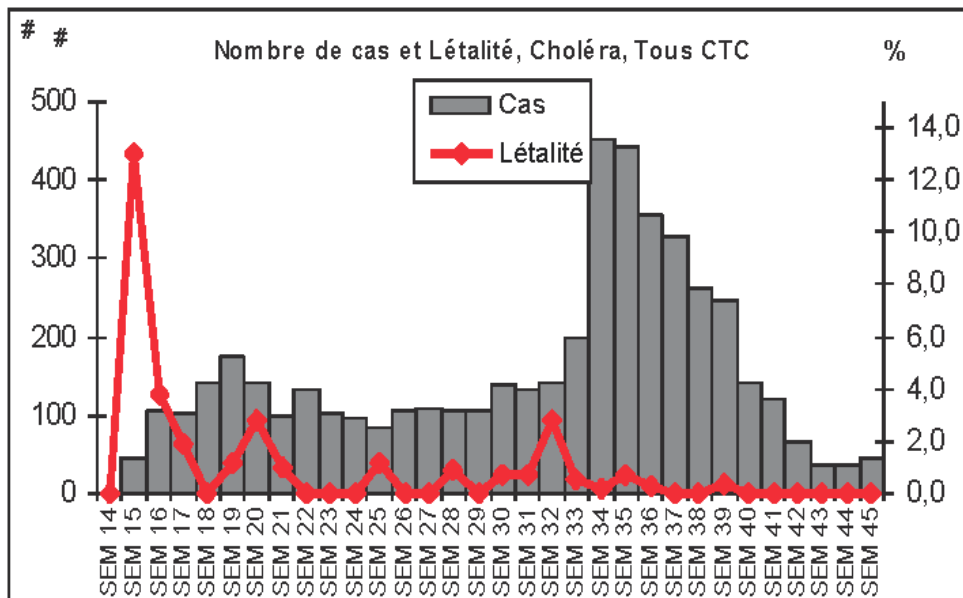
## 8.2.2 Graphing cholera case and death data

As the data is collected and tabulated usually in an electronic database, daily or weekly totals of cases and deaths, expressed as case fatality rate, can be graphed as an epidemic curve.

When data from all reporting treatment facilities from a city, district, or country are combined, the global evolution of the epidemic can be visualized ([Figure 2](#)).

Presenting daily totals of cases and deaths may be useful at the beginning of the outbreak to aid in decision making, however, by convention, weekly tallies are used throughout the epidemic.

**Figure 2** - Weekly number of cholera cases and CFR, Ndjamena, Chad, 2011.



When patient origin is being recorded on the cholera registers, the weekly tally of cases and deaths can be compiled for each location.

## 8.3 Key epidemiologic indicators

The two key epidemiologic indicators used during a cholera outbreak are the attack rate and the case fatality ratio or rate. These indicators are standard measures of epidemic intensity and impact. They allow for comparisons between different locations and previous outbreaks.

### 8.3.1 Attack rate

The attack rate (AR) is the cumulative incidence of cholera since the start of the outbreak. As the AR is population-based, knowing the total number of people in the affected area is essential ([Section 2.5.1](#)).

The AR is more informative when using population figures that match the specific administrative areas reporting cholera cases. For example, the intensity of an outbreak affecting 3 neighbourhoods in a city is more accurately described when the total population for those 3 neighbourhoods is used in the calculation, rather than the population of the entire city.

AR is usually expressed as a percentage. The formula for calculating AR is as follows:

$$AR = \frac{\text{Number of cases during a time period}}{\text{Population exposed to cholera during the same period}} \times 100$$

The AR will increase rapidly during initial phase of the outbreak and then reach a plateau as it ebbs. It never goes down.

### 8.3.2 Case fatality rate

The case fatality rate (CFR) is the proportion of cholera cases dying from cholera or its complications in treatment facilities and/or in the community<sup>a</sup>.

CFR is expressed as a percentage. The formula for calculating CFR is as follows:

$$\text{CFR} = \frac{\text{Number of deaths due to cholera during a time period}}{\text{New cases of cholera during the same period}} \times 100$$

In treatment facilities, the CFR is calculated on a weekly and cumulative basis. It is used for assessing the quality of case management. The standard indicator for adequate case management is a CFR < 1%. All facilities must monitor the CFR and quality of care, particularly if the CFR is > 1%.

Global CFR which combines facility and community deaths is tracked for the duration of the epidemic and indicates the overall adequacy of the response in preventing avoidable deaths.

### 8.3.3 Examples of calculation

An outbreak of cholera has started in a city with a population of 300,000. Since the start of the outbreak, 455 cases total have been reported, including 150 new cases recorded during the last week. Among these 150 cases, 6 die during the same reporting week.

AR =  $455 \div 300,000 \times 100 = 0.15\%$  since the start of the outbreak

CFR =  $6 \div 150 \times 100 = 4\%$  for the last week

By the end of the epidemic, a total of 3313 cholera cases and 25 deaths have been reported.

Population at risk is the same: 300,000 persons

Cumulative AR =  $3313 \div 300,000 \times 100 = 1.1\%$

Cumulative CFR =  $25 \div 3313 \times 100 = 0.75\%$

#### Notas

(a) As the number of community cholera cases reported (denominator) is often less reliable than that reported in cholera facilities, it is difficult to calculate an accurate community CFR.

## 8.4 Analysis and evaluation at the cholera facility level

### 8.4.1 Weekly number of admissions



The number of cases admitted each week gives an indication of the evolution of the epidemic and the intensity of transmission in the catchment area of the facility.

The follow-up of weekly number of cases also guides facility management in terms of treatment supplies, beds, and human resource needed.

Early in the outbreak, if the trend in weekly admissions shows that the number of expected cases was underestimated, a prompt adjustment of supply stocks, bed capacity and human resources should be undertaken.

Late in the outbreak, as the admissions begin to diminish, a decision can be made to close a certain number of beds and assign staff elsewhere.

## 8.4.2 Weekly case fatality rate

At the start and end of an outbreak, the CFR may be higher than 1%, as there is a relatively small number of patients and one single death represents a high proportion of cases admitted.

At the start of an outbreak, the CFR may be higher in a CTC for 1 to 2 weeks if the overall functioning of a CTC is not yet optimal.

*Note:* there is evidence that the overall reported cholera mortality during an epidemic can be significantly underestimated when only treatment facility deaths are counted<sup>[1]</sup>. Adding community cases and deaths to facility data gives a more representative view of the overall situation.

At the very least, high CFR is associated with inadequate treatment access and/or public information about available care (facility location, gratuity of services, etc.).

## 8.4.3 Age group

During an outbreak in a non-endemic setting, all age groups are equally at risk for symptomatic cholera. Thus, the proportion of patients in each age group is similar to the overall representation of this age group in the population (i.e., for children < 5 years of age: 17 to 20%).

During an outbreak in an endemic setting, natural immunity accrues as people are repeatedly exposed to *Vibrio cholerae* over time and cholera cases in the < 5 age group are proportionally more common (roughly 25 to 35%).

Toward the end of an outbreak, as the overall number of cases declines, the proportion of cases in children < 5 years of age admitted typically increases (e.g., to above 50%) because watery diarrhoea in children from common non-cholera causes again begins to predominate.

If the proportion of children under 5 years is much less than expected, look for problems of access to care for this age group.

## 8.4.4 Geographic origin of patients

It is recommended to register and analyse geographic origin of patients so as to follow the evolution of the epidemic and allocate resources to the populations most affected.

A concentration of cases in a particular location suggests that there is a common source for cholera infection (i.e., river or contaminated well). Once the source is identified, appropriate control measures can be implemented.

If the analysis of patient origin shows that populations are being affected successively along a river or transportation route, prevention measures may be implemented to protect those that are not yet affected.

An increasing number of patients coming from outside the catchment area for a given CTC may indicate that the current cholera facility should be relocated or that additional treatment site(s) should be established in the area where these patients live.

## **8.4.5 Sex**

Biologically, men and women are equally susceptible to cholera infection and symptomatic disease.

At the onset of an outbreak, men or women may be more affected due their occupation. This provides information on the source and/or mode of transmission of *Vibrio cholerae*. However, as the epidemic evolves, the number of men and women tends to equalize.

If the proportion of female adults and children is much less than that of males, look for problems of access to care for this group.

## **8.4.6 Cholera vaccine status**

If there has been cholera vaccination in the years preceding the current outbreak, recording the vaccination status of patients admitted in a treatment facility helps investigators and public health officials in evaluating the effectiveness of the vaccine and vaccine strategy.

## **8.4.7 Pregnancy**

Pregnant women normally represent 2 to 6% of the general population and should represent a similar proportion of the admissions to a CTC.

## **8.4.8 Circumstances of patient death**

A small number of patients who arrive at a CTC/CTU with hypovolaemic shock or a significant comorbidity may die even with appropriate management. The vast majority of patients, even the most severely dehydrated or fragile should be successfully treated.

### **For all death**

- Systematically review the patient file, taking into account time since admission (see below).
- Look for erroneous or inadequate:
  - diagnosis
  - prescription
  - procedures
  - patient surveillance

Specifically:

- Look for missed diagnosis or mismanagement of concomitant severe acute infections (e.g. severe malaria) or cholera complications (e.g. hypokalaemia, hypoglycaemia).
- Check if individual risk factors (e.g. extreme of age, severe acute malnutrition, or known cardiovascular disease) were taken into account.
- Determine if death directly results from a specific error in care (e.g. fluid overload, rapid administration of parenteral potassium, airway obstruction from incorrect nasogastric tube placement) or from an overall lack of proper care (untreated dehydration).
- Check for a lack of essential medical supplies, personnel, technical competencies, etc.

### **Deaths within the first 4 hours of admission**

As for all death (see above) and in addition:

- Look specifically for:
  - inappropriate waiting time in triage;
  - inadequate critical care management (e.g. hypovolaemic shock).
- If the patient was transferred from an ORP, determine if the duration of transport and/or a lack of care during transportation played a role in deterioration of the patient's condition.
- If patients arrived by their own means, check patient geographic origin with respect to the location of the treatment facility. Distance, lack of transportation, and/or insufficient public information on how to seek care, can result in critical delays in treatment.

According to the problems identified, the following measures should be taken:

- Reinforce training and technical skills, particularly where severe patients are treated.
- Ensure that sufficient staff and medical supplies are present day and night, particularly where severe patients are treated.
- Ensure that protocols are properly displayed in all wards.

In addition, for deaths within the first 4 hours of admission:

- At CTC level:
  - Assign staff experienced in rapid resuscitation to triage.
  - Review patient transfer procedures and care prior to or during transfer.
- Outside the CTC:
  - Consider establishing an ORP or even CTU in distant location from where new patients are beginning to arrive. Consider home-based treatment when the above option is not feasible.
  - Reinforce health promotion activities.

## **8.4.9 Dehydration level on admission**

## **CTC**

In a “referral” CTC, i.e. a CTC that receives patients referred by ORPs or CTUs, cases with severe dehydration can represent 70 to 80% of the total number of cases.

If the CTC is not a referral CTC, but a local CTC receiving all types of patients, the distribution of cases with the most common circulating cholera strain should be the following: approximately 25 to 30% of cases with severe dehydration, 30 to 40% with some dehydration and 30 to 40% with no dehydration.

If proportions differ greatly from these averages, check the case management and/or response system set up e.g.:

If the proportion of “no dehydration” is higher than expected, ORPs are needed to free up the CTC.

If over 30% of patients are diagnosed with “severe dehydration” on admission:

– Check diagnostic accuracy in the CTC:

- Staff may not be sufficiently trained and therefore over diagnose the degree of dehydration.
- Dehydration may be overestimated to justify IV treatment that is perceived as more effective.

Overuse of IV treatment exposes patient to complications, lengthens hospital stay and increases the cost of treatment.

In this event, reinforce staff training and competencies.

– If patients have been referred by an ORP: check triage effectiveness and the accuracy of prescriptions at ORP level, as well as the transfer system (delay due to dysfunction e.g., vehicle breakdown, communication means).

– Check the geographical origin of patients and the rate of severe dehydration in those that come from a zone that is not covered by the CTC. Individuals may have to travel long distances to receive treatment and their dehydration may get worse on the way. In this event, consider setting up an ORP or even a CTU in the distant area where the patients are coming from; consider home-based treatment if it is not possible to set up an ORP.

## **ORP**

When a CTC/CTU exists in the affected area, ORPs should have few cases of severe dehydration.

If this is not the case:

– Check diagnostic accuracy. If there is over-diagnosis of severe dehydration, reinforce staff training and competencies.

– If diagnosis is correct, a high number of cases of severe dehydration indicates at the very least people do not seek medical care enough. Analyse the causes (CTC too far away, cost of transport, etc.) and try to improve access. Reinforce health promotion activities.

## **8.4.10 Length of stay**

The average length of stay in a CTC is 2 to 3 days. Usually, a patient without dehydration remains under observation a few hours. A patient with some dehydration and no complications stays in general one day and a patient with severe dehydration or complications may remain hospitalised 4 to 5 days. If average length of stay exceeds 3 days, review case management. Insure that prescriptions and surveillance are adequate. If patient monitoring does not track on-going fluid loss, prolonged dehydration or cycling between hydration and dehydration occurs, resulting in increased length of stay. Also check that patients are not mistakenly kept hospitalised until diarrhoea has resolved<sup>a</sup>. The length of stay can be longer if the patient has serious comorbidity. When certain comorbidities are frequent, e.g. numerous cases of acute malnutrition among children under 5 years, consider other interventions such as implementation of therapeutic feeding centre.

## 8.4.11 Leaving against medical advice

The number of patients who leave prior to the completion of their rehydration therapy should be very small. The reason for leaving should be for personal reasons only (e.g. unattended children at home or fear of losing their job).

If there are more than a few patients leaving against medical advice, assess the conditions in the treatment facility. Physical discomfort (e.g. extremes of temperature, mosquito or fly infestation), unpleasant staff, lack of information on the disease and the necessary treatment or overall facility dysfunction may provoke patient departure before completion of therapy.

## 8.4.12 Consumption of RL and ORS

On average, a patient needs 8 to 10 sachets of ORS and a patient on IV treatment needs, in addition, 8 to 10 litres of RL.

By calculating the average real consumption of ORS and RL per patient, it is possible to estimate how many patients can be treated with available stock and how long available stock will last.

Furthermore, analysis of consumption identifies possible over or under consumption of ORS and RL.

In general, under-consumption usually concerns ORS and over-consumption RL. In both cases it is important to identify the reasons. For example:

### **The number of ORS sachets per patient is under 6**

- Check for possible prescription errors (volume of ORS prescribed insufficient).
- Check if IV treatment is incorrectly prescribed in patients that should receive oral treatment.
- Compare the volume of ORS prescribed and the quantity actually drunk, to check whether there is a problem in the monitoring of patients.
- Check that prepared solution is available at all times on the ward.
- Check patients on IV treatment are drinking ORS (early introduction of ORS to patients on IV treatment is often neglected).
- Check that discharged patients are leaving with 2 to 4 ORS sachets to take home.
- Check that preparers use one sachet of ORS per litre of water, that sachets are not being overdiluted.

## **The number of litres of RL in patients on IV treatment is over 12**

– Check that IV treatment is not administered too long in patients that could come off IV treatment and switch to oral treatment.

## **Notas**

- (a) The goal of hospitalisation is to ensure patient rehydration until vomiting ceases, the diarrhoea has clearly decreased and that the patients can safely treat themselves at home until diarrhoea resolves ([Section 5.1.10](#)).

## **Referencias**

1. Luquero FJ, Rondy M, Boncy J, et al. Mortality Rates during Cholera Epidemic, Haiti, 2010-2011. *Emerg Infect Dis.* 2016 Mar;22(3):410-6.

# **8.5 Determining the end of an outbreak**

These definitions can be used at a local, regional, or national level depending on the area intended to be covered by the declaration.

## **8.5.1 Non-endemic areas and endemic areas with sporadic epidemics**

In non-endemic countries and endemic areas with sporadic epidemics (i.e., not annual or year-round), the WHO considers that the end of an epidemic occurs when *Vibrio cholerae* are no longer detected in stool cultures of patients presenting with acute watery diarrhoea for 2 consecutive weeks.

## **8.5.2 Endemic areas with annual or sustained transmission**

In endemic areas with annual or year-round transmission, the WHO considers that the end of an epidemic occurs when the number of cases of cholera returns to its pre-outbreak level for 2 consecutive weeks (sporadic cases may continue to occur but do not indicate that an epidemic is still ongoing).

# **8.6 Intervention report**

When the intervention is over, write an accurate, concise and structured report.

The report must be dated and the name of the country specified, as well as the author's (or authors') name and position.

It should contain the following elements:

## **1. Context**

- General demographic data.
- Natural disaster, war, security concerns, displaced populations, mass gathering (e.g. pilgrimage).
- Organization of the health system, existing cholera emergency plan of action, quality of early warning system and surveillance before the outbreak.
- Other public health concerns (malnutrition, concurrent epidemic illnesses, etc.).
- Involvement of national and international partners.
- Any relevant information.

## **2. Epidemiologic overview**

- Cholera situation in the country (past cholera history and historical data).
- Description of the current outbreak (epidemic start date (and end date if achieved), origin and means of spread, geographical distribution of cases, total number of cases and deaths, attack rate and case fatality rate, etc.).
- Results of laboratory testing.
- Any relevant information.

## **3. Outbreak response overview**

- Initial evaluation/investigation.
- Response strategy.
- Case management (number of CTC, CTU, ORP set up, overall number of persons treated including cases and deaths).
- Water, sanitation, hygiene and logistics interventions.
- Health promotion interventions.
- Vaccination campaign.
- Training.
- Any other relevant activity.

## **4. Evaluation of the response**

- Interaction/coordination with the different actors, outbreak response committee.
- Quality of early warning system and surveillance during the outbreak.
- Performance of investigation and rapid response.
- Performance of laboratory services.
- Adequacy of chosen response strategy.
- Quality of care, reason to explain a CFR > 1%.
- Difficulties encountered during the intervention (e.g. supply chain, population opposition).
- Cost per activity.
- Any other relevant information.

## 5. Recommendations

- For short, medium and long term.

## 6. Appendices

- Map, tables, graphs.
- Questionnaires and/or other survey forms.
- Protocols.
- Any document of interest.

# Appendices

[Appendix 1. Stool specimens for culture](#)

[Appendix 2. Example of kit for initial investigation, 10 patients](#)

[Appendix 3. Documents](#)

[Appendix 4. Example of public information](#)

[Appendix 5. Volumes of RL and ORS for rehydration](#)

[Appendix 6. Intraosseous \(IO\) needle insertion in children](#)

[Appendix 7. Administration of oral drugs](#)

[Appendix 8. Administration of IV potassium \(KCl\)](#)

[Appendix 9. Oral cholera vaccine O1 and O139](#)

[Appendix 10. Practical tips for cholera mass vaccination campaigns](#)

[Appendix 11. Layout of a CTC](#)

[Appendix 12. Layout and equipment of an ORP](#)

[Appendix 13. Cholera beds and chairs](#)

[Appendix 14. Excreta pit \(stools and vomit\)](#)



Appendix 15. Preparation and use of chlorine solutions

Appendix 16. Batch chlorination

Appendix 17. Essential water quality measurements

Appendix 18. Job descriptions CTC

18.1 Medical (and medical support) staff

Coordinator (CTC)

Nurse (CTC)

Auxiliary nurse (CTC)

Doctor (CTC)

Pharmacy manager (CTC)

Cleaner (CTC)

Stretcher bearer (CTC)

Health promotor (CTC)

18.2 Logistics, water and sanitation staff

Logistics, water and sanitation supervisor (CTC)

Water and sanitation assistant (CTC)

Potable water and chlorine solution preparer (CTC)

Waste treatment area operator (CTC)

Laundry staff (CTC)

Water carrier (CTC)

Logistics assistant (CTC)

Store keeper (CTC)

Cook and assistant (CTC)

Guard (CTC)

18.3 Administrative staff

Administrator (CTC)

Appendix 19. Job descriptions ORP

19.1 ORP staff

Nurse or health worker (ORP)

[Health promotor \(ORP\)](#)

[Logistics, water and sanitation aide \(ORP\)](#)

[Cleaner \(ORP\)](#)

### [19.2 Supervision](#)

[Appendix 20. Job descriptions – Health promotion at community level](#)

# Appendix 1. Stool specimens for culture

Before collecting stool specimens for culture, make sure that:

- Suspect cases have had diarrhoea for less than 4 days (high bacterial load) and have not received antibiotics;
- Stools have not been disinfected (do not collect stool from buckets as they often contain chlorine solution or other disinfectants).

## 1.1 Cary-Blair transport medium

- Open the tube, which already contains the swab and Cary-Blair transport medium.
- Soak the swab well in stool.
- Immerse the swab in Cary-Blair transport medium.
- Cut off the top part of the swab stick and reseal the tube tightly.
- Label the tube: code or name and surname, age, date and place of sampling.
- Complete the laboratory request form.

Transport at room temperature after inoculation. Protect the sample from direct light and excessive heat. The sample should reach the reference laboratory within 24 hours.

*Note:* before use, conserve Cary-Blair transport medium per manufacturer's recommendations.

## 1.2 Filter paper method

- Open the tube, which already contains a disc of filter paper.
- Take hold of the paper with clean tweezers ('sterilize' the tweezers in a flame before each sample). Single use needles can be used as an alternative (one needle per sample).
- Soak the paper in stool and replace it in the tube.
- Add 2 to 3 drops of 0.9% sodium chloride to prevent the specimen from drying.
- Reseal the tube tightly.
- Label the tube: code or name and surname, age, date and place of sampling.
- Complete the laboratory request form.

Transport at room temperature. If the tube is closed tightly, the sample can be stored for up to 2 weeks from the time of collection. Protect the sample from direct light and excessive heat.

*Note:* for both methods, create a register to record the date and place of sample collection and date of shipment as well as results as they become available.

## **Appendix 2. Example of kit for initial investigation, 10 patients**

The small kit contains a limited number of items. The objective is to treat the first patients, not to set up an entire facility. The rest of the material may be sent over the following days.

Among the 10 patients: 30% severe dehydration (3 cases), 40% some dehydration (4 cases), 30% no dehydration (3 cases).

For supplies required to collect stool specimens, see [Appendix 1](#).

Articles	Qty	Remarks
ORS (sachets)	100	10 sachets/patient
Ringer lactate (litres)	30	10 litres/patient on IV treatment
Polyvidone iodine, 200 ml	1	
Zinc sulfate 20 mg (tab)	20	2 blisters of 10 tab for 2 children < 5 years (20%)
Doxycycline (tab)	25	3 tab/patient; 7 patients with dehydration (70%)
Infusion sets	15	1 infusion set for 2 litres of RL
Catheters, 20G (pink)	6	
Catheters, 22G (blue)	3	3 catheters per patient on IV treatment (9) + 3 extra as a precaution, in case there are 2 children among the 3 patients requiring an infusion
Catheters, 24G (yellow)	3	
Tourniquet	1	
Medical adhesive tape (roll)	1	
Gauze bandages	100	
Scissors (pair)	1	
Disposable gloves	100	
Sharps container	1	
Bodybag	1	
NaDCC (kg)	5	





An individual patient file must be opened for every patient admitted to a cholera treatment facility. It contains:

- Patient admission number
- Patient's identity: last name, first name, age, sex, address or place of residence
- Date of admission
- Clinical status on admission:
  - Level of dehydration on admission (none/some/severe)
  - Essential observations (weight if children under 5 years, pregnancy, known acute malnutrition, co-morbidity)
- Prescriptions:
  - Rehydration protocol on admission (e.g. 4 litres of ORS over 4 hours)
  - Other prescriptions (antibiotics, zinc, etc.)
- Surveillance:
  - Clinical observation: mental status, pulse, etc.; blood pressure for pregnant women
  - Details of fluid given (RL and/or ORS) and fluid lost (stools, vomiting)
- Date and discharge status (cured/deceased/transferred/leaving against medical advice)
- In the event of death, probable cause of death

The file should always be visible (e.g. hung above the patient) and must accompany the patient if s/he changes sector in the CTC/CTU.

Surveillance data and treatments administered are recorded as and when carried out.

If a patient has various files, the patient's name must be marked on each file and the files stapled together.

The coordinator collects the files of discharged patients every day and archives them when all the data are compiled.

### **3.3 Water and sanitation register**

CTCs and CTUs must set up a register monitoring water quality checks, the consumption of potable water, actions and materials used in relation with the production of potable water and chlorine solutions.

This register includes:

- Quantity of water used per day in m<sup>3</sup>
- FRC in distributed water (twice per day)
- Quantity of NaDCC or calcium hypochlorite used per day to treat potable water and prepare chlorine solutions
- Quantity of chlorine solutions (0.05%, 0.2%, 2%) prepared per day
- Dates of bladder and distribution system inspections (once a month)
- Dates and results of chlorine quality controls (Wata test®)

### **3.4 Stock cards**

CTCs, CTUs and ORPs should have stock cards for medical and non-medical materials (one card per article). These cards help to prepare orders and monitor consumption.

**Note:** all these documents are used to collect data for surveillance and evaluation purposes ([Chapter 8](#)).

# Appendix 4. Example of public information

The examples in italics are possible variations of information depending on the context.

## 4.1 General information

### What is cholera?

Cholera is watery diarrhoea that looks like water in which rice has been cooked.

Together with diarrhoea there may be vomiting, which also looks like cloudy rice water.

The illness lasts several days.

Diarrhoea can cause dehydration (feeling of intense thirst, a dry mouth then sunken eyes).

A patient may die within hours if not treated. Children and the elderly are particularly at risk of dying quickly.

### How does a person get cholera?

By drinking water or eating food that has been in contact with stool or touching your mouth with dirty hands.

There is little risk of getting cholera when caring for a sick person if you wash your hands properly just after attending to them.

### How is cholera prevented?

1. Drink only safe water: bottled water with an unbroken seal or water that has been treated with chlorine (*or boiled for one minute, depending on the context*). Store your treated water in a clean, covered container.
2. Wash hands with soap and water at "critical times" ([Table 3.2](#), Chapter 3).
3. Cook food well, keep it covered, eat it hot, and peel fruit and vegetables. Clean food preparation areas and kitchenware with soap and safe water and leave to dry completely before reuse.
4. Use latrines or bury faeces. Do not defecate in water or on the ground. Keep latrines clean and well-maintained. Place dirty diapers in a plastic bag before disposal.

### What to do in the event of diarrhoea?



- Go immediately to the nearest CTC/CTU/ORP (*or start taking ORS immediately at home, depending on the context*).
- Continue to breastfeed frequently, even if you or your child have diarrhoea.
- Avoid preparing food for others.

### **Practical information**

- Cholera treatment is free of charge.
- Locations of treatment sites and operating hours.
- Distribution points to obtain clean water, water storage containers, chlorine-releasing compounds for home use, soap, ORS, *according to the context*.

## **4.2 Information for a vaccination campaign**

### **General information**

- According to the strategy chosen, inform the public that the vaccination against cholera will be done either as:
  - *2 doses (given 2 weeks apart or 4 weeks apart, depending on how the vaccination campaign is organised)*
  - *A single dose*
- The cholera vaccine is taken by mouth.
- It is safe for everyone over 12 months and can be administered to pregnant women. The vaccine will not be administered to infants less than 12 months of age.
- Being vaccinated is not a guarantee that everyone will be protected against the disease and some people who were vaccinated may get cholera but it will probably be less severe. In children, particularly those less than 5 years of age, the vaccine is somewhat less effective than in adults.
- Protection against cholera lasts at least 3 years<sup>a</sup> after 2 doses (up to 6 months after one dose, according to current data)<sup>[1]</sup>.
- The cholera vaccine does not protect against other forms of diarrhoea (e.g. bloody diarrhoea).

### **Practical information**

- Vaccination against cholera is free of charge.
- Date and time of vaccination.
- Location of vaccination sites

### **Notas**

- (a) The vaccine efficacy in a clinical trial is 65% at 5 years, but in field effectiveness studies, effectiveness starts to wear off at 4 years.

### **Referencias**

1. Protection Against Cholera from Killed Whole Cell Oral Cholera Vaccines: A Systematic Review and Meta-analysis. Qifang Bi, Eva Ferreras et al. Oral Cholera Vaccine Working Group of The Global Task Force on Cholera Control.

# Appendix 5. Volumes of RL and ORS for rehydration

These tables are designed to:

- Simplify the prescription of standard rehydration protocols on admission, according to the degree of dehydration and age or weight if weight is known;
- Facilitate implementation and monitoring of the protocol, by describing standard treatment procedures for severe dehydration or hypovolaemic shock (IV route, Plan C) and some dehydration (oral route, Plan B).

5.1 Severe dehydration in children 5 years and over and adults (RL, Plan C)

5.2 Severe dehydration in children under 5 years (RL, Plan C)

5.3 Severe dehydration in children under 5 years with severe malnutrition (RL, Plan C)

5.4 Some dehydration in children and adults (ORS, Plan B)

This appendix gives an overview of what the patient should receive, how, and over what length of time it should be delivered for correctly administered, effective rehydration.

These tables should not be seen as an extremely rigid framework, they are to be used as a guide, following as closely as possible the protocol as administered in ideal conditions.

The quantities of RL and ORS are rounded off (to the nearest lower or higher whole number) to facilitate practical administration, as the quantity of liquids lost is always an estimation (approximately 10% for severe dehydration and 7.5% for some dehydration).

RL is administered through:

- a standard infusion set (1 ml = 20 drops) in children 5 years and over and adults;
- a “precision” paediatric infusion set (1 ml = 60 drops; 150 ml chamber; dead volume: approximately 15 ml) in children under 5 years.

The flow rates are given in ml/minute or ml/hour as they are too high to be given in drops/minute. During rapid fluid replacement time (“bolus”), the infusion set clamp should be opened without trying to count the number of drops. The bolus is administered **in the presence of a nurse or doctor** that closely monitors the patient and the volume being delivered. The infusion rate is then lowered to administer the rest of the RL, monitoring the volume delivered and to be delivered over 3 hours (4 hours maximum), except for specific cases requiring slower rehydration (such as severe malnutrition). Once rehydration has been completed, the catheter is not removed. Further treatment depends on the patient’s clinical evolution and capacity to drink ORS.

## **5.1 Severe dehydration in children 5 years and over and adults (RL, Plan C)**

RL is administered through a standard infusion set (1 ml = 20 drops).

<b>Age Weight</b>	<b>Total volume of RL</b>	<b>30 ml/kg<sup>(a)</sup> RL (bolus) in ± 30 minutes</b>	<b>70 ml/kg RL in ± 3 hours</b>
<b>5 to &lt; 6 years</b> 19-20 kg	2000 ml	<b>600 ml</b> in 30 minutes <i>(approx. 20 ml/minute)</i>	<b>1400 ml</b> in 3 hours <i>400 ml in 1h + 1000 ml in 2h</i>
<b>6 to &lt; 7 years</b> 21-23 kg	2200 ml	<b>700 ml</b> in 30 minutes <i>(approx. 25 ml/minute)</i>	<b>1500 ml</b> in 3 hours <i>1000 ml in 2h + 500 ml in 1h</i>
<b>7 to &lt; 8 years</b> 24-26 kg	2500 ml	<b>800 ml</b> in 30 minutes <i>(approx. 25 ml/minute)</i>	<b>1700 ml</b> in 3 hours <i>1000 ml in 2h + 700 ml in 1h</i>
<b>8 to &lt; 9 years</b> 27-29 kg	2800 ml	<b>800 ml</b> in 30 minutes <i>(approx. 25 ml/minute)</i>	<b>2000 ml</b> in 3 hours <i>1000 ml in 1h30 x 2</i>
<b>9 to &lt; 10 years</b> 30-31 kg	3000 ml	<b>1000 ml</b> in 30 minutes <i>(approx. 35 ml/minute)</i>	<b>2000 ml</b> in 3 hours <i>1000 ml in 1h30 x 2</i>
<b>10 to &lt; 11 years</b> 32-34 kg	3300 ml	<b>1000 ml</b> in 30 minutes <i>(approx. 35 ml/minute)</i>	<b>2300 ml</b> in 3 hours <i>1000 ml in 1h + 1000 ml in 1h + 300 ml in 1h</i>
<b>11 to &lt; 12 years</b> 35-38 kg	3500 ml	<b>1000 ml</b> in 30 minutes <i>(approx. 35 ml/minute)</i>	<b>2500 ml</b> in 3 hours <i>1000 ml in 1h + 1000 ml in 1h + 500 ml in 1h</i>
<b>12 to &lt; 13 years</b> 39-43 kg	4000 ml	<b>1200 ml</b> in 30 minutes <i>1000 ml in 20 minutes (50 ml/min)</i> <i>+ 200 ml in 10 minutes (20 ml/min)</i>	<b>2800 ml</b> in 3 hours <i>800 ml in 1h + 1000 ml in 1h + 1000 ml in 1h</i>
<b>13 to &lt; 14 years</b> 44-49 kg	4500 ml	<b>1500 ml</b> in 30 minutes <i>1000 ml in 20 minutes</i> <i>+ 500 ml in 10 minutes</i>	<b>3000 ml</b> in 3 hours <i>1000 ml in 1h x 3</i>

<b>14 to &lt; 15 years</b> 50-54 kg	5000 ml	<b>1500 ml</b> in 30 minutes <i>1000 ml in 20 minutes</i> <i>+ 500 ml in 10 minutes</i>	<b>3500 ml</b> in 3 hours 30 <i>500 ml in 30 minutes</i> <i>+ 1000 ml in 1h x 3</i>
<b>≥ 15 years</b> ≥ 55 kg	6000 ml	<b>2000 ml</b> in 30 minutes <i>1000 ml in 15 minutes x 2</i>	<b>4000 ml</b> in 4 hours <i>1000 ml in 1h x 4</i>

(a) Bolus may be repeated once if necessary.

## 5.2 Severe dehydration in children under 5 years (RL, Plan C)

RL is administered through a “precision” paediatric infusion set (1 ml = 60 drops; 150 ml chamber).

<b>Weight Age</b>	<b>Total volume of RL</b>	<b>20 ml/kg<sup>(b)</sup> RL (bolus) in ± 15 minutes</b>	<b>70 ml/kg RL in ± 3 hours</b>
<b>3 to &lt; 4 kg</b> 0-1 month	270 ml	<b>60 ml</b> in 15 minutes	<b>210 ml</b> in 3 hours <i>70 ml in 1h x 3</i>
<b>4 to &lt; 5 kg</b> 1-2 months	350 ml	<b>80 ml</b> in 15 minutes	<b>270 ml</b> in 3 hours <i>90 ml in 1h x 3</i>
<b>5 to &lt; 6 kg</b> 2-3 months	450 ml	<b>100 ml</b> in 15 minutes	<b>350 ml</b> in 3 hours <i>120 ml in 1h x 3</i>
<b>6 to &lt; 7 kg</b> 3-4 months	550 ml	<b>120 ml</b> in 15 minutes	<b>430 ml</b> in 3 hours <i>145 ml in 1h x 3</i>
<b>7 to &lt; 8 kg</b> 4-7 months	650 ml	<b>150 ml</b> in 15 minutes	<b>500 ml</b> in 4 hours <i>125 ml in 1h x 4</i>
<b>8 to &lt; 9 kg</b> 7-10 months	750 ml	<b>150 ml</b> in 15 minutes	<b>600 ml</b> in 4 hours <i>150 ml in 1h x 4</i>
<b>9 to &lt; 10 kg</b> 10-12 months	800 ml	<b>200 ml</b> in 20 minutes <i>100 ml in 10 minutes x 2</i>	<b>600 ml</b> in 4 hours <i>150 ml in 1h x 4</i>
<b>10 to &lt; 13 kg</b> 1-2 years	1000 ml	<b>250 ml</b> in 20 minutes <i>125 ml in 10 minutes x 2</i>	<b>750 ml</b> in 3 hours <i>150 ml in 40 minutes x 5</i>
<b>13 to &lt; 15 kg</b> 2-3 years	1200 ml	<b>300 ml</b> in 20 minutes <i>150 ml in 10 minutes x 2</i>	<b>900 ml</b> in 3 hours <i>150 ml in 30 minutes x 6</i>
<b>15 to &lt; 17 kg</b> 3-4 years	1500 ml	<b>300 ml</b> in 20 minutes <i>150 ml in 10 minutes x 2</i>	<b>1200 ml</b> in 3 hours <i>150 ml in 20 minutes x 8</i>
<b>17 to &lt; 19 kg</b> 4 to < 5 years	1700 ml	<b>400 ml</b> in 15 minutes <i>130 ml in 5 minutes x 3</i>	<b>1300 ml</b> in 3 hours <i>150 ml in 20 minutes x 9</i>

(b) In total, up to 3 boluses if necessary.

## **5.3 Severe dehydration in children under 5 years with severe malnutrition (RL, Plan C)**

RL is administered through a “precision” paediatric infusion set (1 ml = 60 drops; 150 ml chamber).

<b>Weight</b>	<b>Total volume of RL</b>	<b>20 ml/kg<sup>(c)</sup> RL (bolus) in 30 minutes</b>	<b>70 ml/kg RL in 6 hours</b>
<b>3 to &lt; 4 kg</b>	270 ml	<b>60 ml</b> in 30 minutes	<b>210 ml</b> in 6 hours <i>35 ml in 1h x 6</i>
<b>4 to &lt; 5 kg</b>	350 ml	<b>80 ml</b> in 30 minutes	<b>270 ml</b> in 6 hours <i>45 ml in 1h x 6</i>
<b>5 to &lt; 6 kg</b>	450 ml	<b>100 ml</b> in 30 minutes	<b>350 ml</b> in 6 hours <i>60 ml in 1h x 6</i>
<b>6 to &lt; 7 kg</b>	550 ml	<b>120 ml</b> in 30 minutes	<b>430 ml</b> in 6 hours <i>70 ml in 1h x 6</i>
<b>7 to &lt; 8 kg</b>	650 ml	<b>150 ml</b> in 30 minutes	<b>500 ml</b> in 6 hours <i>85 ml in 1h x 6</i>
<b>8 to &lt; 9 kg</b>	750 ml	<b>150 ml</b> in 30 minutes	<b>600 ml</b> in 6 hours <i>100 ml in 1h x 6</i>
<b>9 to &lt; 10 kg</b>	800 ml	<b>200 ml</b> in 30 minutes <i>100 ml in 15 minutes x 2</i>	<b>600 ml</b> in 6 hours <i>100 ml in 1h x 6</i>
<b>10 to &lt; 11 kg</b>	900 ml	<b>200 ml</b> in 30 minutes <i>100 ml in 15 minutes x 2</i>	<b>700 ml</b> in 6 hours <i>120 ml in 1h x 6</i>
<b>11 to &lt; 12 kg</b>	1000 ml	<b>220 ml</b> in 30 minutes <i>110 ml in 15 minutes x 2</i>	<b>780 ml</b> in 6 hours <i>130 ml in 1h x 6</i>
<b>12 to &lt; 13 kg</b>	1100 ml	<b>240 ml</b> in 30 minutes <i>120 ml in 15 minutes x 2</i>	<b>860 ml</b> in 6 hours <i>140 ml in 1h x 6</i>
<b>13 to &lt; 14 kg</b>	1250 ml	<b>250 ml</b> in 30 minutes <i>125 ml in 15 minutes x 2</i>	<b>1000 ml</b> in 6 hours
<b>14 to &lt; 15 kg</b>	1300 ml	<b>300 ml</b> in 30 minutes <i>150 ml in 15 minutes x 2</i>	<b>1000 ml</b> in 6 hours

(c) In total, up to 3 boluses if necessary.

# 5.4 Some dehydration in children and adults (ORS, Plan B)



<b>Weight</b>	<b>Age</b>	<b>Total volume of ORS</b>	<b>Volume of ORS per hour</b>
<b>3 to &lt; 4 kg</b>	0 to < 1 month	230 ml	60 ml per hour for 4 hours
<b>4 to &lt; 5 kg</b>	1 to < 2 months	300 ml	75 ml per hour for 4 hours
<b>5 to &lt; 6 kg</b>	2 to < 3 months	400 ml	100 ml per hour for 4 hours
<b>6 to &lt; 7 kg</b>	3 to < 4 months	480 ml	120 ml per hour for 4 hours
<b>7 to &lt; 8 kg</b>	4 to < 7 months	550 ml	140 ml per hour for 4 hours
<b>8 to &lt; 9 kg</b>	7 to < 10 months	600 ml	150 ml per hour for 4 hours
<b>9 to &lt; 10 kg</b>	10 to < 12 months	700 ml	180 ml per hour for 4 hours
<b>10 to &lt; 13 kg</b>	1 to < 2 years	800 ml	200 ml per hour for 4 hours
<b>13 to &lt; 15 kg</b>	2 to < 3 years	1000 ml	250 ml per hour for 4 hours
<b>15 to &lt; 17 kg</b>	3 to < 4 years	1200 ml	300 ml per hour for 4 hours
<b>17 to &lt; 19 kg</b>	4 to < 5 years	1400 ml	350 ml per hour for 4 hours
<b>19 to &lt; 21 kg</b>	5 to < 6 years	1600 ml	400 ml per hour for 4 hours
<b>21 to &lt; 24 kg</b>	6 to < 7 years	1600 ml	400 ml per hour for 4 hours
<b>24 to &lt; 27 kg</b>	7 to < 8 years	1800 ml	450 ml per hour for 4 hours
<b>27 to &lt; 30 kg</b>	8 to < 9 years	2000 ml	500 ml per hour for 4 hours
<b>30 to &lt; 32 kg</b>	9 to < 10 years	2200 ml	550 ml per hour for 4 hours
<b>32 to &lt; 35 kg</b>	10 to < 11 years	2400 ml	600 ml per hour for 4 hours
<b>35 to &lt; 39 kg</b>	11 to < 12 years	2800 ml	700 ml per hour for 4 hours
<b>39 to &lt; 44 kg</b>	12 to < 13 years	3200 ml	800 ml per hour for 4 hours
<b>44 to &lt; 50 kg</b>	13 to < 14 years	3600 ml	900 ml per hour for 4 hours

≥ 50 kg	≥ 14 years	4000 ml	1000 ml per hour for 4 hours
≥ 75 kg		6000 ml	1500 ml per hour for 4 hours



If the patient wants to drink more than prescribed, give more ORS.

# Appendix 6. Intraosseous (IO) needle insertion in children

IO needle insertion should be performed by a physician trained in the technique or by a trained nurse working under the supervision of a physician.

In a CTC, the supplies needed for insertion of an IO needle and staff skilled in the insertion should be available at all times of day or night.

The procedure described in this appendix applies to children from birth (or 3 kg) to less than 40 kg as in a CTC the IO route is primarily used in children<sup>a</sup>.

## 6.1 Overview

### Indications

An IO access is indicated if a peripheral IV catheter cannot be inserted within 90 seconds in a seriously ill patient.

### Contraindications

- Fractured or infected limb
- IO needle insertion in the previous 24 hours in the same site
- Recent surgical procedure near the insertion site

### Risks

- Fracture of the bone during insertion
- Growth plate injury
- Dislodging of the IO needle
- Extra medullary infusion with risk of compartment syndrome
- Infection (the risk is minimal if aseptic technique is followed; caution in children with oedematous malnutrition).

### Precautions

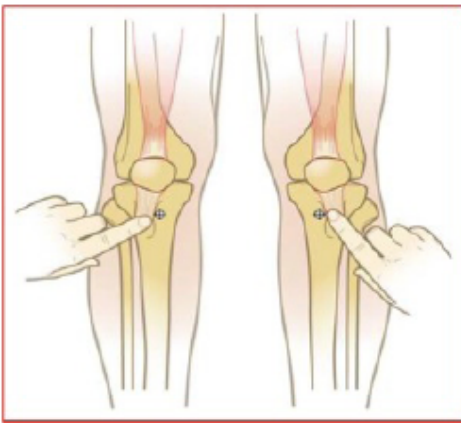
- Follow aseptic procedure during placement: hand hygiene<sup>b</sup>, disposable equipment, disinfection of the insertion site, etc.
- Limit attempts at placement to one attempt per site.
- Insert a peripheral IV as soon as possible. The IO needle should not remain in place for more than 24 hours.

## Monitoring

- Colour of the limb.
- Position and fixation of the needle, patency of the IO, appearance of the insertion site.
- Presence of subcutaneous oedema, increasing limb size (extravasation).
- Time elapsed since placement.

## 6.2 Insertion sites

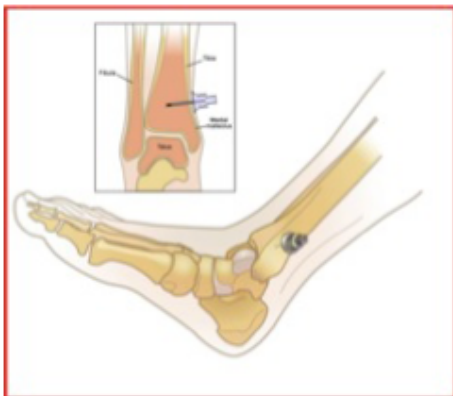
### Proximal tibia



Insert the needle in the proximal tibia about 2 cm below the patella and on the flat surface located distal and medial to the tibial tuberosity (not on the tibial ridge).

OR

### Distal tibial



The malleoli sites are approximately 3 cm proximal to the medial malleolus in the midline. Place a finger directly over the medial malleolus, move up to 3 cm, palpate the anterior and posterior edges of the tibia to make sure that the IO needle is inserted in the central portion where the bone is flat.

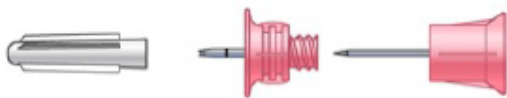
## 6.3 Method using a mechanical intraosseous insertion device

The EZ-IO is a battery powered medical drill fitted with a trocar and IO needle used to pierce the bone and insert the IO needle.

### Equipment

- EZ-IO battery powered medical drill
- EZ-IO paediatric needle set, single-use, sterile, 15 mm, pink, 3 to < 40 kg
- EZ-infusion set extension, sterile, single-use
- Non-sterile, disposable gloves
- Sterile compresses, 10% polyvidone iodine
- 5 or 10 ml syringe of Ringer lactate
- Adhesive, sterile, single-use dressing
- Infusion set + Ringer lactate bag

*Note:* there are adult size needles which are not suitable for children under 40 kg. Do not use in children (increased risk of traumatic complications).



EZ-IO paediatric needle



EZ-IO drill

### Insertion of the EZ-IO needle

1. Prepare the patient, stabilize the leg (e.g. using a rolled towel under the knee), in slight external rotation.
2. Determine the insertion site.
3. Wear disposable gloves (after hand-washing or disinfection with ABHR).
4. Disinfect the insertion site with 10% polyvidone iodine.
5. Open IO kit and needle's sterile packaging, place needle on the EZ-IO drill.

*Concurrently, prepare and flush the EZ-Connect extension tubing using a syringe (preferably a luer lock ie screw-top) filled with Ringer lactate.*

6. Take the cap off the needle. Position the needle on the insertion site at 90° to the bone (perpendicular).
7. Start the drill by pressing the trigger. Proceed gently, do not use force. Stop the drill as the needle passes through the cortex and into the marrow cavity; there will be a «give» (release of resistance is felt).
8. With one hand, securely hold the needle in place. With the other, take the drill off of the needle, unscrew the stylet and connect the flushed extension tubing.
9. Check for a flash (small amount of blood) in the catheter to confirm the proper placement of the needle. If the flash is not seen proceed as in step 10 to check IO needle placement.
10. Confirm correct needle placement by injecting a rapid flush of 5 to 10 ml of Ringer lactate with a syringe. The rapid flush is essential. No flush = no flow. Repeat flush if the rate does not seem sufficient. If the IO needle is functional the flush should flow freely without excessive pressure on the syringe.
11. Secure the catheter (EZ sterile adhesive bandage or sterile gauze and adhesive tape). Beware of sudden movements, as for a peripheral IV.
12. Start the infusion.
13. Indicate the date and time of placement of the IO on the patient file. If available, also attach the IO identification bracelet (supplied with the IO kit) with date and time of placement of the IO needle.
14. Monitor the infusion at least every 15 minutes during the first hour.

If the attempt at IO needle placement is unsuccessful, remove the needle and try on the other leg.

### **IO needle removal**

1. Stop infusion.
2. Wear disposable gloves (after hand-washing or disinfection with ABHR).
3. Remove the EZ stabilizer (fixation device).
4. Remove the extension tubing.
5. Fit a luer lock syringe to the IO needle and pull the needle out with a twisting motion. In the absence of luer lock syringe, unscrew by hand.
6. Dispose of the needle in a sharps container.
7. Disinfect the site with 10% polyvidone iodine.
8. Apply pressure to the insertion site for a few minutes if necessary.
9. Cover the insertion site with a sterile dressing (sterile gauze).

## **6.4 Manual insertion method**

### **Equipment**

- Sterile, disposable IO needle, 16G or 18G according to age and weight
- Non-sterile, disposable gloves
- Sterile compresses, 10% polyvidone iodine
- Syringe with 5 or 10 ml of Ringer lactate
- Adhesive, sterile, single-use dressing
- Infusion set + Ringer lactate bag



### **Insertion of the IO needle**

The procedure is the same as when using a mechanical drill in terms of preparation, skin cleansing, patient positioning and verification of needle placement, flow and needle fixation, but:

- Grasp the needle in the palm of the hand, index and middle fingers approximately 2 cm from the tip.
- Insert the needle at 90° to the entry site using downward pressure and a twisting motion until resistance decreases as the needle passes through the cortex of the bone.

### **IO needle removal**

As above when using the mechanical device but gently rotate the needle and remove it slowly.

### **Notas**

- (a) IO insertion is possible in children over 40 kg and adults. Technique and anatomic landmarks are the same but use an adult IO needle (blue, 25 mm, 40 kg and above)
- (b) Wash with soap and water or disinfect with an alcohol-based handrub (ABHR).

# **Appendix 7. Administration of oral drugs**

## **7.1 Antibiotics**

### **doxycycline PO**

Child: 4 mg/kg single dose

Adult: 300 mg single dose

<b>Age</b>	<b>Weight</b>	<b>100 mg tab</b>
< 1 year	< 10 kg	Do not administer <sup>a</sup>
1 to < 3 years	10 to < 15 kg	½ tab
3 to < 9 years	15 to < 30 kg	1 tab
9 to < 12 years	30 to < 39 kg	1½ tab
12 to < 15 years	39 to < 55 kg	2 tab
Adult	≥ 55 kg	3 tab

### **azithromycin PO**

Child: 20 mg/kg single dose

Adult: 1 g single dose

<b>Age</b>	<b>Weight</b>	<b>250 mg/5 ml susp.</b>	<b>250 mg tab</b>	<b>500 mg tab</b>
< 1 month	< 4 kg	1.5 ml	–	–
1 to < 3 months	4 to < 6 kg	2 ml	–	–
3 months to < 1 year	6 to < 10 kg	3.5 ml	–	–
1 to < 2 years	10 to < 13 kg	5 ml	–	–
2 to < 5 years	13 to < 19 kg	8 ml	–	–
5 to < 7 years	19 to < 24 kg	10 ml	2 tab	1 tab
7 to < 11 years	24 to < 35 kg	–	3 tab	–
≥ 11 years and adult	≥ 35 kg	–	4 tab	2 tab

### **ciprofloxacin PO**

Child: 20 mg/kg single dose

Adult: 1 g single dose

Age	Weight	250 mg/5 ml susp.	250 mg tab	500 mg tab
< 1 month	< 4 kg	Do not administer		
1 to < 3 months	4 to < 6 kg	2 ml	–	–
3 months to < 1 year	6 to < 10 kg	3.5 ml	–	–
1 to < 2 years	10 to < 13 kg	5 ml	–	–
2 to < 5 years	13 to < 19 kg	8 ml	–	–
5 to < 7 years	19 to < 24 kg	10 ml	2 tab	1 tab
7 to < 11 years	24 to < 35 kg	–	3 tab	–
≥ 11 years and adult	≥ 35 kg	–	4 tab	2 tab

## 7.2 Zinc sulfate

Child under 6 months: 10 mg once daily for 10 days

Child 6 months to 5 years: 20 mg once daily for 10 days

Age	Weight	20 mg dispersible tab
< 6 months	< 7.5 kg	½ tab
≥ 6 months to 5 years	≥ 7.5 kg to 19 kg	1 tab

## 7.3 Oral potassium (immediate-release)



This drug is not administered routinely but on medical prescription only.

Child under 45 kg: 2 mmol/kg (2 ml/kg) daily (see table below) for 1 to 2 days

Child 45 kg and over and adult: 30 mmol (30 ml) 3 times daily for 1 to 2 days



Age	Weight	7.5% syrup
< 2 months	< 5 kg	4 ml x 2
2 months to < 1 year	5 to < 10 kg	6 ml x 2
1 to < 3 years	10 to < 15 kg	12 ml x 2
3 to < 5 years	15 to < 19 kg	20 ml x 2
5 to < 7 years	19 to < 24 kg	25 ml x 2
7 to < 9 years	24 to < 30 kg	20 ml x 3
9 to < 13 years	30 to < 45 kg	25 ml x 3
≥ 13 years and adult	≥ 45 kg	30 ml x 3

## Notas

(a) The tablets contain too high a dosage to be used in children under 1 year or 10 kg.

# Appendix 8. Administration of IV potassium (KCl)

## 8.1 Indications

Potassium by IV infusion should only be used for the treatment of severe hypokalaemia as it cannot be rapidly corrected via the oral route. It is prescribed by, and administered under the supervision of, a doctor physically present.

## 8.2 Dosage

- Adult: 40 mmol (= three 10 ml ampoules of 10% KCl, containing 13.4 mmol/ampoule) in one litre of RL over 4 hours. Do not exceed 10 mmol/hour.
- Child over 1 month: 0.2 mmol/kg/hour over 3 hours. Each mmol of KCl is diluted in 25 ml of RL.  
*Example for a child weighing 10 kg:*  $0.2 \text{ (mmol)} \times 10 \text{ (kg)} = 2 \text{ mmol/hour} \times 3 \text{ (hours)} = 6 \text{ mmol}$   
6 mmol (= 4.5 ml of 10% KCl solution) in 150 ml of RL (6 x 25 ml of RL) administered over 3 hours.

## 8.3 Prescription and monitoring

- For the prescription, the doctor must write clearly on the patient's file the dose of potassium in mmol and in ml and the number of ml in which to dilute the potassium as well as the length of infusion.  
*Example for a child weighing 10 kg:* 6 mmol (= 4.5 ml of 10% KCl) in 150 ml of RL to be administered over 3 hours
- During the infusion, monitor the radial pulse every 15 minutes. In the event of bradycardia or tachycardia, call the doctor immediately and measure the blood pressure. If the potassium causes pain at the infusion site, check that the catheter is functional and slow down the infusion rate (risk of necrosis if the fluid infiltrates outside the vein).
- In parallel, start ORS if the patient is still exclusively receiving RL.
- After the infusion of potassium has been completed, re-evaluate the patient for signs of hypokalaemia. Check the patient is drinking sufficient ORS. The same dose can be repeated once during the same day if necessary, by medical prescription, under medical supervision and only after a clinical examination.

IV potassium must NEVER be given by direct IV injection. It must always be **diluted in infusion fluid** (RL or 0.9% sodium chloride). It must never be administered subcutaneously or intramuscularly.

MSF provides ampoules of 10 ml of 10% potassium chloride. Each ampoule contains 13.4 mmol of  $K^+$ . The nurse preparing the infusion must always check the concentration in each ampoule.

Always use a separate bag of IV fluid and infusion line from those used for RL rehydration. Never add potassium to the bottle being used for rapid bolus infusions as the perfusion rate is far too fast.

Be careful to dilute the potassium after it has been added to IV fluid by inverting the bag or paediatric burette several times to achieve full mixing.

Respect the prescribed infusion rate. Use a paediatric burette and infusion set in children. Frequently check that the infusion rate is not too rapid so as to avoid the risk of cardiac arrest.

# Appendix 9. Oral cholera vaccine 01 and 0139

## Indications

- Prevention of cholera in epidemic, endemic or humanitarian emergency contexts

## Composition, forms and strengths, route of administration

- Inactivated whole cell bivalent vaccine containing *Vibrio cholerae* O1 (serotypes Inaba and Ogawa, and biotypes classical and El Tor) and *Vibrio cholerae* O139
- Oral suspension, 1.5 ml in monodose vial. DO NOT ADMINISTER BY PARENTERAL ROUTE.

## Dosage and vaccination schedule

- Child 1 year and over and adult: 2 doses of 1.5 ml administered at least 14 days apart
- In certain contexts, a single dose of 1.5 ml is administered.
- Shake the vial, squirt the entire contents of the vial into the mouth.

For young children, the contents of the vial can be drawn up in a syringe and squirted into the mouth.

## Contra-indications, adverse effects, precautions

- Do not administer to children less than one year.
- Do not administer in the event of hypersensitivity to any component of the vaccine or history of an allergic reaction to a previous dose.
- Vaccination should be postponed in the event of severe acute febrile illness (minor infections are not contra-indications).
- May cause: nausea, vomiting, abdominal cramping, diarrhoea.
- Drinking water after swallowing the vaccine may reduce its unpleasant taste and prevent vomiting. If the patient vomits the dose of vaccine, wait for 10 minutes and re-administer the same dose and follow with a larger volume of water.
- **Pregnancy:** can be administered (the benefits outweigh the risks)
- **Breast-feeding:** no contra-indication

## Remarks

- Immunity develops *one week after administration and lasts up to 6 months after a single dose and at least 3 years after 2 doses.*

## Storage

☞ – Between 2 °C and 8 °C. Do not freeze.

Discard if vaccine has been frozen.

# Appendix 10. Practical tips for cholera mass vaccination campaigns

This appendix only presents the specific elements to be taken into account for a cholera mass vaccination campaign.

For the general organization of a mass vaccination campaign, see [Management of a measles epidemic](#), MSF.

## 10.1 Needs estimation

### Number of vaccines required

– Two-dose strategy:

To calculate the number of vaccines required, multiply the total population in the area targeted for vaccination by 2 (for 2 doses).

It is unnecessary to include a wastage factor or a buffer stock, even though there may be a small loss of vaccines (around 1%) or more people than anticipated to vaccinate. The quantity of vaccines should still be sufficient as infants under 1 year of age will not be vaccinated and the dropout rate between the 2 rounds is estimated at 10-15%<sup>[1]</sup>.

– Single dose strategy:

The number of vaccines is equal to the size of the total population in the area targeted for vaccination + 10% buffer stock.



It is crucial not to underestimate the size of the total population in the area targeted for vaccination

### Vaccine storage capacity

The single dose vaccine vial requires a large storage volume:

– The SHANCHOL<sup>®</sup> vaccine is currently packaged in boxes of 35 monodose vials. Each 35-dose box has a volume of approximately 590 cm<sup>3</sup> and measures 14 cm x 10.5 cm x 4 cm. The storage volume per vial is significantly greater (16.8 cm<sup>3</sup>/packaged vial) than the storage volume per measles vaccine (1.3-2.6 cm<sup>3</sup>).

– The EUVICHOL<sup>®</sup> vaccine is currently packaged in boxes of 10 monodose vials. Each 10-dose box has a volume of approximately 110 cm<sup>3</sup> and measures 9 cm x 3.5 cm x 3.5 cm. The volume of one vial is 11 cm<sup>3</sup>.

– The EUVICHOL-PLUS<sup>®</sup> vaccine is currently packaged in boxes of 50 monodose vials. Each 50-dose box has a volume of approximately 392 cm<sup>3</sup> and measures 11.1 cm x 4.7 cm x 6.2 cm. The volume of one vial is 7.85 cm<sup>3</sup>.

## Other needs

- Potable water and cups should be provided<sup>a</sup> :
  - to give a sip of water (particularly to children) after administering the vaccine that has an unpleasant taste (does not have to be given to each person vaccinated);
  - so that people in the queue can drink if there is a long wait.
- Make sure pliers are available to take the metallic caps off the vaccine vials.

## 10.2 Transport and storage of vaccines

During international transport and central storage in the country of use, the vaccine should be stored under cold chain conditions between +2 °C and +8 °C. As the volume of vaccines needed during mass vaccination campaigns is very large, in addition to refrigerators, cold rooms and refrigerated lorries or containers should be used for storing vaccines.

SHANCHOL<sup>®</sup> vaccine has been prequalified by the WHO for use in "controlled temperature chain". It may be kept for a single period of time of up to 14 days at temperatures up to 40 °C. This excursion outside the usual cold chain (+2 to +8 °C) is permitted immediately prior to administration, provided the vaccine has not reached its expiry date and the vaccine vial monitor has not reached discard point. In practice, this means that the vaccine can be transported and stored at the site of vaccination in passive cold chain conditions without icepacks.

Vaccines used in controlled temperature chain must not be returned to the cold chain at the end of the day and must be discarded after 14 days. As per usual practice, vaccines that have been in the controlled temperature chain the longest are used first.

OCVs are cold-sensitive vaccines. They must never be stored in a freezer, even for long-term storage. In a refrigerator, always use the storage baskets provided, keeping vaccines away from the walls and floor of the refrigerator. Do not put frozen ice packs in the isotherm boxes or vaccines carriers when sending vaccines to vaccination sites.

## 10.3 Composition and performance of vaccination teams

As OCVs are administered orally (not injected) and do not usually cause serious adverse effects, mass cholera vaccination campaigns do not require a large number of medical staff.

### Fixed teams

A core team consists of one vaccinator, one (or two) vaccine preparer(s) and one tally keeper. The number of staff can be doubled, depending on the number of people expected.

People ("support staff") are also needed for social mobilization, crowd control, setting up the site, waste management, etc.

A medical supervisor can supervise one or more sites and assess anyone with immediate adverse reactions to the vaccine.

Experience has shown that a core team can vaccinate around 150 people per hour (1000 people per day) and up to 250 people per hour during particularly busy periods.

## Mobile teams

A core team of one vaccinator, one vaccine preparer, one tally keeper, and one logistician is sufficient if support staff can be hired on-site.

A single mobile team can vaccinate more than one site per day.

## Door-to-door

A core team is composed of one vaccinator and one tally keeper.

A medical supervisor can manage 3 to 6 teams.

Depending on the context, a core team can vaccinate 150 to 600 people per day.

## 10.4 Team member tasks

Who	Task
<b>Vaccine preparer</b> <i>(when teams expect a large number of people to vaccinate)</i> or <b>Vaccinator</b>	<ul style="list-style-type: none"><li>• Open the boxes of vaccine vials.</li><li>• Remove the metallic caps of the vials.</li><li>• Discard waste into the waste bins (sorted by type of waste).</li></ul>
<b>Vaccinator</b>	<ul style="list-style-type: none"><li>• Screen for eligibility (any individual 1 year of age and over).</li><li>• Check the VVM of each vial.</li><li>• Shake the vial vigorously before opening.</li><li>• Squirt the vaccine into the person's mouth (vaccine can also be self administered under observation).</li><li>• Check ingestion, particularly for children.</li><li>• Discard waste into the waste bins (sorted by type of waste).</li></ul>
<b>Tally keeper</b>	<ul style="list-style-type: none"><li>• Fill the vaccination card.</li><li>• Record people vaccinated by gender and age.</li><li>• Recall people to come for the second round (if 2 rounds).</li><li>• Provide drinking water (especially to children).</li></ul>

## 10.5 Data recording

### Vaccination cards

Vaccination cards should be used wherever feasible. They provide information for vaccination coverage surveys and vaccine effectiveness studies ([Section 4.7.7](#)).

*Note:* individuals presenting during the second round with no vaccination card (not vaccinated during the first round or card lost) should receive a dose of vaccine.

### **Tally sheets and daily summary reports**

Tally sheets are used for recording the number of people vaccinated per day, by age group (< 5 years and ≥ 5 years, or 1-4 years, 5-15 years, and > 15 years depending on monitoring/ evaluation needs) and gender, in each vaccination site and per team. The data compiled from tally sheets are sent to the higher level every day to be analysed and to adapt the vaccination strategy if required.

## **10.6 Waste management**

The volume of waste generated for a cholera mass vaccination campaign is higher than for other vaccination campaigns as the vaccines come as single dose-vials.

Waste should be collected in plastic containers with lids and treated separately.

**Packaging and vaccine vial rubber stoppers** should be burnt in an open pit, a drum burner, or an incinerator depending on the situation. Ashes should be covered with back filling if using an open pit or disposed of in an ash pit.

**Metallic caps** should be either discarded directly into a temporary pit which is later encapsulated or discarded into a sharps pit in an existing waste area.

**Empty vials** should be either discarded directly into a temporary pit which is later encapsulated or crushed with a glass crusher for final disposal in a sharps pit in an existing waste area.

Alternatively, waste can be transported to an existing facility for treatment and final disposal.

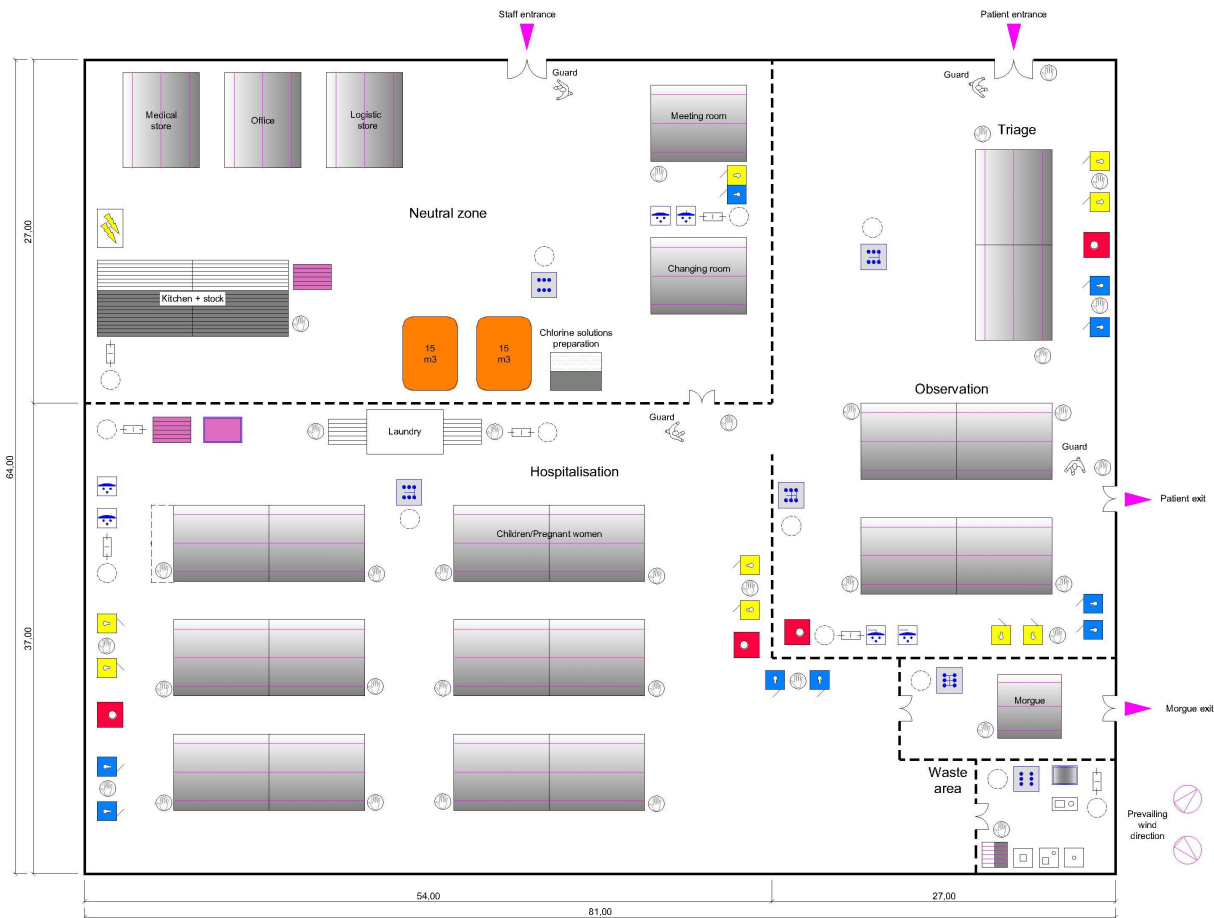
### **Notas**

- (a) Use reusable cups (wash cups with washing-up liquid and water after each use) rather than disposable plastic or paper cups (more hygienic and practical but not always available, more expensive, large quantity of waste).

### **Referencias**



1. World Health Organization. Oral cholera vaccines in mass immunization campaigns guidance for planning and use, 2010, Geneva.  
[http://apps.who.int/iris/bitstream/10665/44448/1/9789241500432\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/44448/1/9789241500432_eng.pdf)

# Appendix 11. Layout of a CTC







## BARRIERS

	<p><b>Fences</b></p>	<ul style="list-style-type: none"> <li>• Solid materials: wooden or bamboo posts; between the posts a barrier made of corrugated iron, branches, woven plant materials or plastic sheeting, depending on the context.</li> <li>• 2 m high to keep patients out of view and to prevent intrusions.</li> <li>• Placed at least 2 m away from shelters/buildings/tents.</li> </ul>
	<p><b>Delimitation of sectors</b></p>	<p>Barrier netting is usually sufficient to separate the different sectors.</p>

## SHELTERS

	<p><b>Tents</b></p>  <p><b>Floors</b></p>	<p>Whatever the purpose of the tents (patients, stock, morgue, etc.):</p> <ul style="list-style-type: none"> <li>• Set up on a 15-20 cm thick platform on compacted earth to protect the tents from runoff.</li> <li>• Dig a trench approx. 20 cm x 20 cm to collect and evacuate rain water out of the CTC. If possible, try and connect to an existing external drainage system.</li> <li>• For safety reasons (fire), leave a space of at least 3 m between each tent.</li> <li>• Lay a PVC ground sheet on the floor.</li> </ul> <p><i>Note:</i> if the facilities are buildings (not tents), ensure - as for tents - drainage ditches and smooth washable floors (cement, concrete or plastic depending on the context).</p>
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## LIGHTING

	<p><b>Generator</b></p>	<p>Electricity must be available 24 hours a day. Even if electricity is provided by a distribution network, install a 5 to 6 kVA generator (in the clean or “neutral” zone) and a lighting network.</p>
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## POTABLE WATER

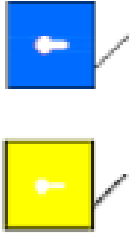
<p><b>Central reserve of chlorinated water</b></p>	<ul style="list-style-type: none"> <li>• Build platforms for bladders (at least 1.5 m high).</li> <li>• Install at least 2 bladders to ease batch chlorination and connect them to the water points.</li> <li>• Provide at least 60 litres of water per patient per day.</li> <li>• Have enough water in reserve to operate at least for 3 days.</li> </ul>
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**Distribution points**

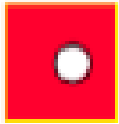
Set up at least one potable water point per sector, on an apron slab to collect waste water and evacuate it to an infiltration system.

**SANITATION**



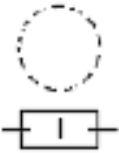
**Latrines**

- Build latrines (separate latrines for men/women) in each patient sector, for attendants and patients that can move around.
- Ensure they are lit at night.
- Minimum of one latrine for 20 people, adjust if necessary.
- Build at least one latrine for men and one latrine for women in the clean zone for staff.



**Excreta pits for faeces and vomit**

Build 1 or 2 excreta pits in each patient sector to avoid emptying buckets in the latrines.  
See [Appendix 14](#).




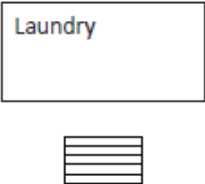
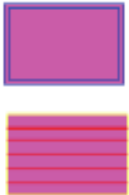
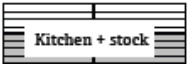
**Infiltration of wastewater<sup>a</sup>**

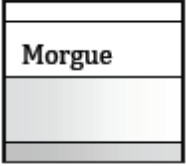
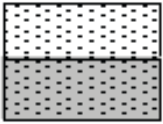
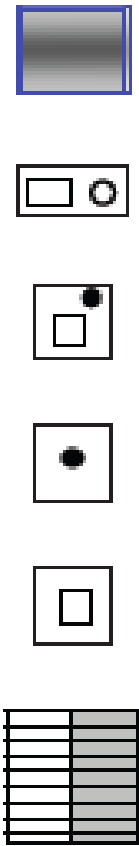
- Infiltration is the preferred technique.
- Build either soak away pits or infiltration trenches, depending on the nature of the ground, the amount of space available, the depth of the water table below the surface.
- Water containing soap must first pass through a grease trap. Connection to an existing drainage system must be considered on a case by case basis (authorisation by local authorities, condition)



**Hand-washing point**

- Set up a hand-washing points:
  - At patient entrance/exit,
  - At the passage between the clean and contaminated zones,
  - In front of each tent or each ward (several, if the wards are large and there is space),
  - Next to the latrine blocks,
  - In the morgue,
  - In the waste storage and treatment area.
- A hand-washing point consists of:
  - A 120 litre container of 0.05% chlorine solution, with a tap, on a stand;
  - A bucket under the tap to collect wastewater. Depending on the nature of the ground, for the points outside in the open,

		<p>the buckets to collect wastewater may be replaced by soakaway pits.</p>
	<p><b>Showers</b></p>	<ul style="list-style-type: none"> <li>• Set up showers (men and women) for attendants and patients capable of moving around.</li> <li>• At least one shower for 40 people, adjust if necessary.</li> <li>• One shower for men and one for women in the clean zone for staff.</li> <li>• Ensure wastewater (containing soap) passes through a grease trap before entering the infiltration system.</li> <li>• Lighting for the evening, to be considered on a case by case basis.</li> </ul>
	<p><b>Area for washing/drying laundry</b></p>	<ul style="list-style-type: none"> <li>• Place the laundry area in the contaminated zone but near the clean zone so that it is near the water reserve.</li> <li>• Preferably install concrete laundry sinks (available locally). If laundry sinks are not available, use plastic basins/containers. In this event, build an apron slab (or plastic sheeting if not possible) to collect waste water.</li> <li>• Ensure wastewater (containing soap) passes through a grease trap before entering the infiltration system.</li> <li>• Put up washing lines nearby, on which to dry the laundry.</li> <li>• A shelter is necessary in case of continuous or frequent rain.</li> </ul>
	<p><b>Dish washing/drying area</b></p>	<ul style="list-style-type: none"> <li>• Place this area in the contaminated zone but near the clean zone so that it is near the water reserve.</li> <li>• Preferably install a concrete sink.</li> <li>• If using basins, build an apron slab to collect wastewater.</li> <li>• Ensure wastewater (containing soap) passes through a grease trap before entering the infiltration system.</li> <li>• Set up racks nearby to dry the dishes.</li> </ul>
	<p><b>Kitchen</b></p>	<ul style="list-style-type: none"> <li>• Place the kitchen in the clean zone.</li> <li>• Set up a sheltered facility consisting of: <ul style="list-style-type: none"> <li>– A cooking area with industrial type stoves,</li> <li>– A sink,</li> <li>– A rack for drying kitchen utensils,</li> <li>– A work table with a washable surface,</li> <li>– A store with a lock for food and equipment.</li> </ul> </li> <li>• Install a hand-washing point.</li> <li>• Ensure wastewater (containing soap) passes through a grease trap before entering the infiltration system.</li> </ul>

	<p><b>Morgue</b></p>	<ul style="list-style-type: none"> <li>• Set up the morgue away from the other sectors, in the contaminated zone, with a fence around it to limit access.</li> <li>• Can be a tent or a temporary shelter.</li> <li>• Install a hand-washing point and a water point.</li> <li>• Set up an apron slab to collect the wastewater from washing bodies and evacuate into the infiltration system.</li> </ul>
	<p><b>Chlorine solution preparation point</b></p>	<ul style="list-style-type: none"> <li>• Set up: <ul style="list-style-type: none"> <li>– A covered, well ventilated shelter, or possibly a tent, in the clean zone,</li> <li>– Strong stands for the 120 litre containers used for the preparation of chlorine solutions,</li> <li>– Palettes to store, under dry conditions, chlorine for the daily preparation of solutions.</li> </ul> </li> </ul>
	<p><b>Waste storage and treatment zone</b></p>	<ul style="list-style-type: none"> <li>• To be set up away from the other sectors, in the contaminated zone, with a fence around it to limit access.</li> <li>• Take into account the direction of the main winds for the release of smoke.</li> <li>• An estimated 20 to 25 m<sup>2</sup> is required for the following installations: <ul style="list-style-type: none"> <li>– A shelter to store waste before it is treated,</li> <li>– A metal drum to burn waste,</li> <li>– A pit for ashes,</li> <li>– A pit for organic waste: mainly food, but also sometimes placentas and foetuses,</li> <li>– A pit in concrete or "watertight" masonry work for sharps containers + a safety box reducer,</li> <li>– An area to wash and disinfect waste bins,</li> <li>– A hand-washing point,</li> <li>– A water point.</li> </ul> </li> <li>• Ensure wastewater (containing soap) passes through a grease trap before entering the infiltration system.</li> </ul>

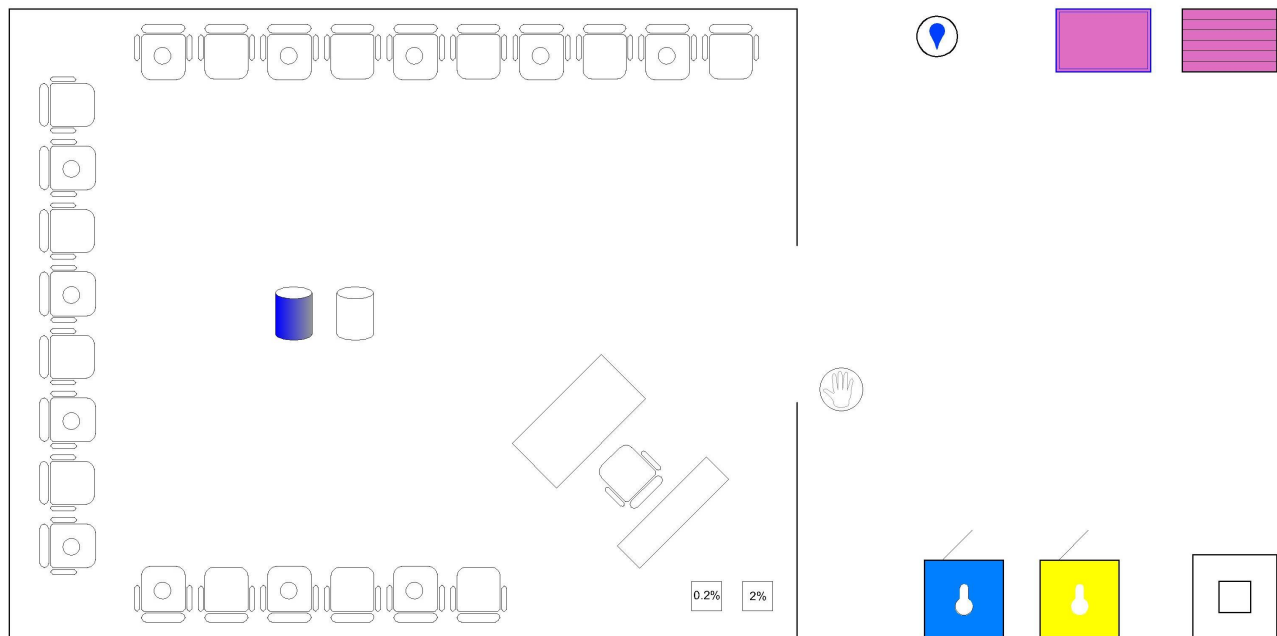
## Notas

- (a) Wastewater is water that has been used to wash people (hands, shower, cleaning of corpses) and contaminated objects (dishes, laundry, floors and surfaces, buckets and basins, etc.).










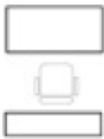
# Appendix 12. Layout and equipment of an ORP

The following layout, along with the list of equipment and articles necessary for a standard ORP (i.e. that only provides oral treatment during the day) to function, are only given as an example and must always be adapted according to the context.

## 12.1 Layout of facility and installations



*Note:* if the ORP is set up within the grounds of a health facility, put up a fence (posts + barrier netting or reed screens (or similar) depending on the context) to isolate the unit. One entry/exit point for patients and staff is sufficient.

Symbols	Installations	Remarks
	<b>Potable water point</b>	A jerrycan or bucket or container with a tap, placed on a stand.
	<b>ORS point</b>	A jerrycan or bucket or container with a tap, placed on a stand.
	<b>Potable water reserve</b>	A 120 litre container with a tap, placed on a stand. Adjust if insufficient.
	<b>Latrines</b>	2 latrines (men/women), adjust if insufficient (at least one latrine in a PRO).
	<b>Hand-washing point(s)</b>	At least one hand-washing point with 0.05% chlorine solution (120 litre container with a tap, placed on a stand + bucket under the tap to collect wastewater, to be regularly emptied). Adjust if insufficient.
	<b>Dish washing area</b> (cups and spoons)	If using basins, build an apron slab to drain wastewater. A draining board to dry dishes in the open air.
	<b>Waste pit</b>	A waste pit, protected by a fence to limit access.
	<b>Stock of chlorine solutions</b>	A jerrycan or bucket with a tap, placed on a stand, for 0.2% and 2% chlorine solutions (out of patients' reach).
	<b>Chairs for patients and attendants</b>	One cholera (pierced) chair per patient. One normal chair per caregiver.
	<b>Nurse's post</b>	A table, chair and shelf.

# 12.2. Supplies and equipment

Basic equipment	Remarks
<b>Tent</b>	A 27.5 m <sup>2</sup> tent for 11 patients + 1 nursing post A 45 m <sup>2</sup> tent for 20 patients + 1 nursing post
<b>Plastic sheeting</b>	To cover the ground (if the ground is not smooth, washable, concrete). To protect the inside of the ambulance.
<b>Wooden stands for containers</b>	Jerrycans, containers or buckets with a tap must not be placed on the ground.
<b>Table + chair + shelves</b> (nursing post)	Drugs and supplies must not be stored all mixed up (difficult to find and inventory) or placed in a box on the floor.
<b>Chairs for cholera patients<sup>a</sup></b> <u>Appendix 13</u>	Number depends on the ORP's capacity. Take into account chairs for both children and adults.
<b>Chairs for attendants</b>	Number depends on the ORP's capacity (one attendant per patient).
<b>Buckets<sup>b</sup></b>	<ul style="list-style-type: none"> <li>• To prepare chlorine solutions + mixing utensils</li> <li>• For wastewater (placed under hand-washing points)</li> <li>• 2 buckets per patient (stools and vomit)<sup>c</sup></li> <li>• 1 bucket with lid (waste bin)<sup>c</sup></li> <li>• 1 bucket for cleaning</li> <li>• A few buckets in stock</li> </ul>
<b>Jerrycans, buckets or containers with tap<sup>b</sup></b>	<ul style="list-style-type: none"> <li>• For distribution of ORS to patients</li> <li>• For distribution of potable water to patients</li> </ul>
<b>Recipients for covered storage + tap</b>	<ul style="list-style-type: none"> <li>• 1 x 120 litre container for potable water</li> <li>• 1 x 120 litre container for 0.05% chlorine solution</li> <li>• 1 jerrycan or bucket for 0.2% chlorine solution</li> <li>• 1 jerrycan or bucket for 2% chlorine solution</li> </ul>
<b>Basins</b>	To wash cups and spoons.



<b>1 litre measuring glass</b>	To prepare ORS.
<b>Cups/small spoons</b>	Number of cups depending on the ORP's capacity. Double the number (1 cup for the attendant). Take also staff into account.
<b>Personal Protective Equipment (PPE)</b>	<ul style="list-style-type: none"> <li>• 2 basic PPE per person (tunic, trousers, boots)</li> <li>• 2 additional PPE for staff in charge of cleaning and waste management ( <a href="#">Section 7.5.3</a>)</li> </ul>
<b>Cleaning equipment</b>	Broom, floor cloth, detergent, etc.
<b>Communication</b>	Mobile phone + credit or VHF radio
<b>Other</b>	<ul style="list-style-type: none"> <li>• Lighting: if the ORP is open after daylight hours, electric lamps or kerosene lamps + kerosene.</li> <li>• Barrier netting/posts: if the ORP is within the grounds of a health facility.</li> </ul>
<b>Documents and record keeping</b>	<ul style="list-style-type: none"> <li>• Pens, markers, cholera register, patient files, stocks cards or register</li> <li>• Protocol on preparation and administration of ORS</li> <li>• Protocol on preparation and use of chlorine solutions</li> <li>• Basic hygiene rules in an ORP</li> <li>• List of contacts (supervisor, ambulance, etc. depending on the set up)</li> </ul>
<b>ORS, sachet for 1 litre</b>	<p>Depending on the expected number of cases and/or consumption + buffer stock (15%<sup>d</sup>).</p> <p>For example, 10 patients/day for a week: 10 (patients) x 10 (sachets of ORS) x 7 days = 700 sachets + 15% buffer stock (+ 100 sachets).</p> <p>The buffer stock may need to be increased (e.g. supply difficulties, area difficult to access).</p>
<b>Antibiotic</b>	Depending on the expected number of cases (+ buffer stock 15%)
<b>Zinc sulfate</b>	1 blister of 10 tab/patient under 5 years (+ buffer stock 15%)
<b>Soap</b>	One per patient + soap for the staff
<b>Chlorine-</b>	NaDCC or HTH (start with 50 g/patient/day, and later readjust according to

<b>releasing compound</b>	consumption).
<b>Disposable examination gloves</b>	<p>If the patient has soiled him/herself and needs to be changed by staff or if risk of accidental exposure to blood or carrying out stool tests or cut or lesion on hands.</p> <p>If the ORP is intended to stabilise severe cases before transfer it must have 1 or 2 cholera beds (depending on needs) + means to hang infusion sets along with the necessary materials (RL, infusion sets, catheters, 10% polyvidone iodine, compresses/cotton wool, tourniquet, plasters, tray, sharps containers).</p>

## Notas

- (a) Pierced chairs are enough in a standard ORP. Nevertheless it may be useful to have 1 or 2 cholera beds if possible, for patients who need to lie down even if they do not present serious diarrhoea (elderly patients, pregnant women, etc.).  
If the ORP is intended to stabilise severe cases before transfer it must have 1 or 2 cholera beds (depending on needs) + means to hang infusion sets along with the necessary materials (RL, infusion sets, catheters, 10% polyvidone iodine, compresses/cotton wool, tourniquet, plasters, tray, sharps containers).
- (b) The buckets should be different colours to differentiate contents and use (e.g. white for chlorine solutions, red for patient excreta, green or blue for ORS, etc.). The designated use (ORS, chlorine solution and %, patients) should always be marked on the bucket (or any container).
- (c) Buckets for stools/vomit and waste bins must be cleaned/rinsed and disinfected when they are emptied. Taking into account the turnover of material, double the number of buckets for organic and inorganic waste.
- (d) The buffer stock (15%) needed is less than in a CTC or CTU given that the number of sachets of ORS/person (10) is probably higher than actual consumption as the ORP, in theory, receives mostly patients following Plan A.

# Appendix 13. Cholera beds and chairs

## 13.1 Characteristics

Patients with cholera may have massive diarrhoea and often vomit.  
They must be placed on a pierced bed or chair.

Stools are collected in a bucket positioned under the patient, to improve comfort and avoid the pathogen spreading into the environment.

A second bucket is positioned near the bed or chair to collect vomit.

The beds and chairs must be waterproof, washable, easy to disinfect between two patients and, if possible, easy to store when the outbreak is over<sup>a</sup> .

The size of the hole in the bed or chair depends on the age of the patient: 20 cm for adults; 10 cm for children.

The bed should be high enough to position a bucket underneath to collect the stools. However, if the bed is over 70 cm high there is a risk of the excreta splashing. The buckets should not be covered while they are in use: nevertheless they should preferably be covered when transporting the stools and vomit to the dedicated excreta pit.

## 13.2 Use

All patients receiving infusion therapy or severely ill (e.g., with a concomitant infection such as malaria) or who spend the night in a CTC/CTU, need a bed.

Patients on short term oral treatment (a few hours or one day) and who are doing well (conscious, cooperative, have no serious problems) can be placed on a chair.

When a bed is not needed, it is always better to place a patient on a pierced chair than on a normal, unpierced chair or on the floor.

Pierced chairs are sufficient in ORPs.

CTCs/CTUs can have pierced chairs for patients on oral treatments (Plan A or B) and in recovery phase, as long as treatment is given during the day. Where there is little space, it is better to use pierced chairs to save space and to monitor patients until treatment is completed rather than send patients home too early because of a lack of beds.

## 13.3 Examples





## **Notas**

- (a) If this is not possible, mats can be used but they must be changed between each patient and burned as they are not washable.

# **Appendix 14. Excreta pit (stools and vomit)**

## **14.1 Choice of location**

- At least 30 metres away from all wells, boreholes and water sources
- At least 5 metres away from all facilities
- Easy access and ground that allows liquids to infiltrate into the soil

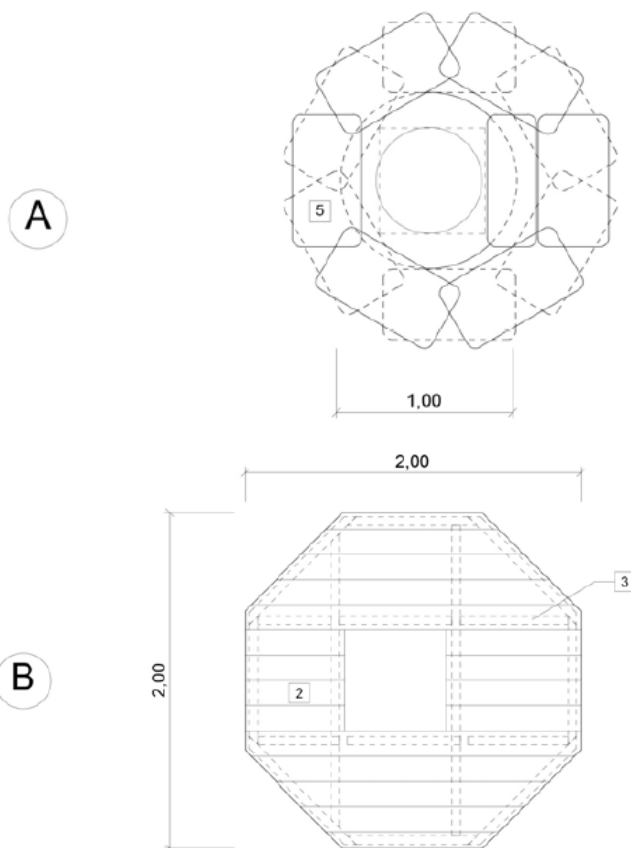
## **14.2 Materials**

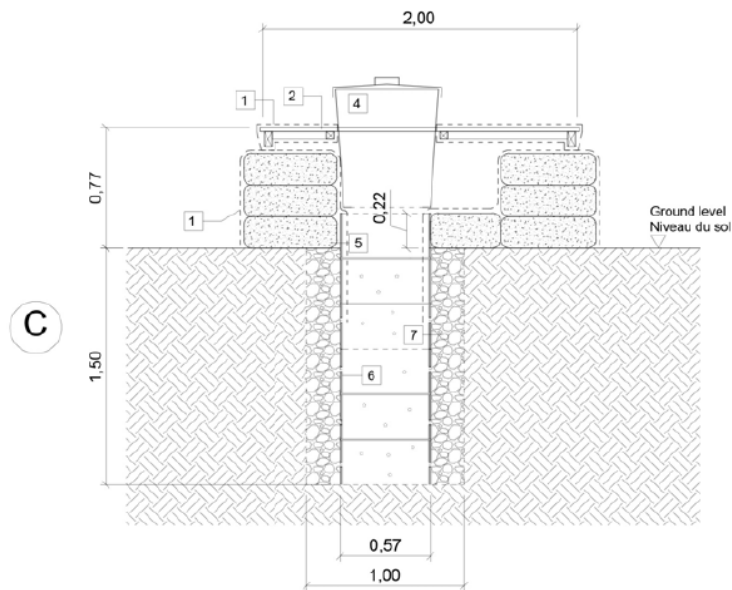
- Material to temporarily delimit the worksite (tape and posts)
- Plastic sheeting
- 1 or 2 x 200 litre metal drum(s) (if 2 drums, weld them together to form a cylinder), with top and bottom removed and perforated all over to let liquids infiltrate
- 120 litre plastic container with a lid, with a hole cut in the bottom to let liquid pass through, leaving a rim of 5 cm
- Wood to construct the platform (frame and platform)
- Sand bags (stabilised sand)
- Gravel
- Hammer, nails, wood saw, string, tape measure, shovel, pick and crowbar

## **14.3 Clearing the site**

- Remove all plants and debris. Level the ground. Delimit to ensure safety of the worksite.
- Mark the perimeter of the pit on the ground (1 metre in diameter).
- Dig the pit: minimum of 90 cm deep and maximum of 1.50 metres. The bottom of the pit must be 1.5 metres above the water table.
- Insert the 1 or 2 metal drum(s).
- Fill the empty space between the vertical walls of the pit and the drums with gravel.
- Stack up 3 layers of sandbags, in staggered rows (the bags should not be placed one directly on top of another, they must overlap) and leaving the pit off-centre (A).
- Place a sandbag to fill the empty space between the side of the 120 litre container and the supporting structure formed by the other sand bags.
- Cover the sandbags with plastic sheeting and spread it at least 60 cm into the first drum (C).
- Place the wooden platform (B) on the sandbags covered in plastic sheeting (C).
- Insert the 120 litre container into the wooden platform (C).

*Note:* if the water table is too high to dig at least 90 cm into the ground, raise the supporting structure or choose another method of treating faeces and vomit.





## Key

1. Plastic sheeting
2. Wooden platform (25 x 100 mm)
3. Wooden structure (50 x 50 mm)
4. 120 litre plastic container
5. Sand bags (stabilised sand)
6. 200 litre metal drums
7. Gravel

# Appendix 15. Preparation and use of chlorine solutions

## 15.1 Preparation

- Work in a well ventilated room or, better still, outside in the shade but protected from the wind.
- Wear personal protective equipment ([Section 7.5.3](#)).
- Prepare solutions with clean, cold (or room temperature) water, in plastic containers only (corrosion of metal, inactivation of chlorine).
- Respect the recommended dilutions (an over-diluted product is less active; an over-concentrated product can cause irritation and corrosion).
- Use a clean, dry, plastic or glass receptacle to measure the dose of product or the measurer (e.g. measuring spoon) provided by the manufacturer.
- Pour the amount of water required into a container then add the product (and not the other way round) without splashing. Mix well using a clean stirrer used only for this purpose.
- Do not add any other product (e.g. a detergent) to chlorine solutions.
- For calcium hypochlorite, leave the solution to rest for a few minutes and only use the supernatant. Transfer the supernatant into another receptacle and discard the calcium residue into a waste pit after each preparation.
- Label the containers, specifying the chlorine concentration.

## 15.2 Use

Chlorine solutions are inactivated by the presence of organic matter (such as blood and other biological liquids, secretions or excreta, or dirt).

The WHO and CDC recommend cleaning objects, floors, surfaces, laundry with detergent and water before applying chlorine solution. This helps prevent the inactivation of chlorine.

Chlorine is also a bleaching agent. Use 0.05% chlorine solution to disinfect laundry and not a 0.2% solution which discolours it.

The disinfection of objects, floors and surfaces requires 15 minutes of contact time. Laundry must also be soaked for 15 minutes, but not longer.

Do not rinse afterwards objects, floors and surfaces disinfected with chlorine solutions, except stainless steel surfaces that must be imperatively rinsed (risk of corrosion).

## 15.3 Storage

### Solid products

- Store in air-tight non-metallic containers, away from heat, light and humidity in a ventilated area.
- Carefully close containers after use.
- Never place them in contact with water, acid, fuel, detergents, organic or inflammable materials (e.g. food, paper or cigarettes).
- Never mix NaDCC with calcium hypochlorite (risk of toxic gas or explosion).
- NaDCC is more stable than calcium hypochlorite.

### Prepared solutions

Change solutions every day. Do not prepare too much solution at a time (to avoid wasting unused solution).



	<b>Products</b>	<b>0.05% solution</b>	<b>0.2% solution</b>	<b>2% solution</b>	<b>1% solution</b>
<b>Use</b>		<b>Hand washing Disinfection of laundry (after cleaning)</b>	<b>Floors, surfaces, materials, aprons, boots, dishes (after cleaning)</b>	<b>Preparation of corpses Excreta and vomit buckets</b>	<b>Mother solution for chlorinating water</b>
<b>Preparation</b>	<b>Sodium dichloroisocyanurate</b> (NaDCC) granules, 55% active chlorine	18 g/20 litres 1 level 20 ml measuring spoon per 20 litres of water (110 g in 120 litres of water)	72 g/20 litres 4 level 20 ml measuring spoons per 20 litres of water (430 g in 120 litres of water)	720 g/20 litres 40 level 20 ml measuring spoons per 20 litres of water	18 g/litre 1 level 20 ml measuring spoon per 1 litre of water
	<b>Sodium dichloroisocyanurate</b> (NaDCC) tablet, 1 g of active chlorine/tablet	10 tablets per 20 litres of water	40 tablets per 20 litres of water (2 tablets per litre)	400 tablets per 20 litres of water (20 tablets per litre)	10 tablets per 1 litre of water
	<b>Calcium hypochlorite</b> (HTH <sup>®</sup> ) granules, 65-70% active chlorine	15 g/20 litres 1 level 20 ml measuring spoon per 20 litres of water (90 g in 120 litres of water)	60 g/20 litres 4 level 20 ml measuring spoons per 20 litres of water (360 g in 120 litres of water)	600 g/20 litres 40 level 20 ml measuring spoons per 20 litres of water	15 g/litre 1 level 20 ml measuring spoon per 1 litre of water

If preparing large quantities (e.g. 120 litre containers), preferably use a receptacle marked with a graduation corresponding to the necessary quantity of product (e.g. a cup with a mark corresponding to 110 g of NaDCC to prepare a 120 litre container of 0.05% chlorine solution).

*Note:*

Liquid bleach (sodium hypochlorite solution) should be reserved for domestic use only (e.g. homes, collective facilities like schools or orphanages where a case has been declared), when the population is familiar with the product. There are various commercial forms of bleach under different names, different concentrations and different packaging.

To prepare a 0.2% chlorine solution the concentration of the bleach to be used, expressed in “active chlorine” on the commercial product, must be taken into account. The following formula is used to calculate the amount of water per quantity of bleach:

$\% \text{ of chlorine in liquid bleach} \div \% \text{ chlorine desired} - 1.$


<b>% chlorine in liquid bleach</b>	<b>0.2% chlorine solution to disinfect (after cleaning) floors, surfaces, materials contaminated by a patient</b>
2.6%	1 volume of bleach in 12 volumes of water
3.5%	1 volume of bleach in 16 volumes of water
4%	1 volume of bleach in 19 volumes of water

The volume can be a litre, a gallon, a glass or any other recipient used to measure a dose. These solutions must be prepared just before use.

## **Appendix 16. Batch chlorination**

### **16.1 Determination of the amount of chlorine required for a given volume**

- Prepare 1 litre of 1% chlorine solution or “mother solution” ([Appendix 15](#)).
- Measure the pH of the water to be treated.
- Take 4 non-metallic containers of known volume (e.g. 20 litre plastic buckets with lids or jerrycans) labelled 1 to 4. Rinse them 3 times with the water to be treated. Fill all 4 containers with the same amount of water to be treated.

- Add a dose of 1% mother solution to each bucket using a syringe, progressively increasing the dose:
    - Container 1: 1 ml
    - Container 2: 1.5 ml
    - Container 3: 2 ml
    - Container 4: 2.5 ml
  - Mix with a clean stirrer and cover the buckets or close the jerrycans.
  - Wait for the chlorine to react: 30 minutes if the pH is < 8 and 60 minutes if the pH is > 8. Then measure the FRC concentration ([Appendix 17](#)) in each bucket.
  - Choose as reference the container with a FRC concentration of 0.5 mg/litre if the pH is < 8 and 1 mg/litre if the pH is > 8<sup>a</sup> .
  - Calculate the dose of mother solution necessary to chlorinate the total volume of water to be treated in the reservoir.
-  • If the FRC concentration is below the recommended level, start the test again from the beginning increasing the dose of mother solution to obtain the required level of FRC (e.g. 2.5 ml, 3 ml, 3.5 ml, and 4 ml).
- Higher or lower doses of mother solution may be necessary if the volume of water used for the test is over or under 20 litres.
  - Pre-treatment may be necessary to reduce the turbidity if it is > 5 NTU.

## 16.2 Water treatment

- Prepare 1% chlorine mother solution ([Appendix 15](#)).
- Pour the necessary volume of mother solution to chlorinate the volume of water to be treated into the reservoir while it is being filled, so that it mixes well with the water.
- Wait the required amount of time (30 or 60 minutes depending on the pH) then check the FRC concentration before distributing the water.

### Example: 2000 litre reservoir of water

FRC concentrations recorded in four 20 litre buckets of water (pH < 8) after 30 minutes were:

Bucket	Volume of 1% solution	FRC
1	1 ml	0 mg/litre
2	1.5 ml	0.1 mg/litre
3	2 ml	0.5 mg/litre
4	2.5 ml	1 mg/litre

Bucket 3 has therefore desired FRC concentration. 2 ml of mother solution were necessary to chlorinate 20 litres of water.

100 times more mother solution are necessary to chlorinate 2000 litres, i.e. 200 ml of mother solution (100 x 2 ml).

*Note:* check pH and water turbidity once a week. If these parameters change then the dose of mother solution to be added to the water in the reservoir to obtain the desired FRC concentration needs to be re-determined.

### Notas

- (a) The standard recommended values for FRC levels are 0.2-0.5 mg/litre if the pH is < 8 and 0.4-1 mg/litre if the pH is > 8. As a precaution, it is better to take the highest concentration levels of these ranges.

# Appendix 17. Essential water quality measurements


Carry out these measurements in daylight (but not in direct sunlight, nor wearing sunglasses).

## 17.1 Turbidity measurement with a turbidity tube

- Rinse the tube 3 times with the water to be tested.
- Fill the tube completely up to the 5 TU (turbidity unit) level.

- Wait a few seconds for the water to stabilise and the air bubbles to disappear.
- With the tube in vertical position, look down over the tube and try to see the circle (or cross, depending on the model) at the bottom of the tube:
  - If the circle is visible, the water turbidity is below 5 TU.
  - If the circle is not visible, empty out some water, and if it is still not visible empty out some more and repeat again until the circle is visible. For example, if the level is just above the 20 TU mark, the water turbidity is below 20 TU. If the level is just under the 20 TU mark, the water turbidity is higher than 20 TU.

## 17.2 Measuring free residual chlorine (FRC) and pH with a ‘pool tester’

- Remove the lid of the pool tester and rinse the pool tester (including the lid) 3 times with the water to be tested.
  - Fill the 3 compartments up to the top with the water to be tested. Do not dip the pool tester into the water to be tested. If the water is from a tap, leave the tap running a few seconds before taking the sample.
  - Add one phenol red tablet into the left hand compartment (to measure the pH).
  - Add one white DPD1 tablet into the right hand compartment (to measure the FRC, “Cl”).
-  Do not touch the tablets as this will modify the results.
- Only use whole intact tablets. Discard tablets that break or crumble while removing from packaging.
- Do not use tablets that have changed colour (dull grey instead of white for DPD1 and brown instead of bright orange for phenol red).
- ‘DPD1’ and ‘Phenol red’ should be marked in green on the packaging. There are other tablets that are labelled in black writing: do not use these tablets.
- Replace the lid, close tightly making sure the arrows are pointing towards you.
  - Shake the tester until the tablets have completely dissolved (approx. 20 seconds).
  - Read the results comparing the colour in the sample compartments (outer compartments) with the colour of the reference compartment (central compartment). Read the results within 60 seconds of the tablets completely dissolving: after this the results are no longer reliable.

# Appendix 18. Job descriptions CTC

- [18.1 Medical \(and medical support\) staff](#)
- [18.2 Logistics, water and sanitation staff](#)

- [18.3 Administrative staff](#)

# 18.1 Medical (and medical support) staff

## Coordinator/supervisor

A nurse or doctor experienced in cholera management, in charge of the overall operation of the CTC, training, staff information and management, safety of staff and patients.

Present every day (either physically or on telephone standby).

Depending on the size of the CTC and other factors, an assistant (e.g. a healthcare supervisor) may be necessary. Someone should be designated and trained to replace him/her in the event of absence (accident, illness, etc.).

## Nurses

Responsible for nursing care and the supervision of patients, management of their unit's pharmacy, implementation of hygiene measures in their unit, training and management of auxiliary nurses.

Day and night: one nurse for triage, one nurse per 10-15 patients in the IV treatment units, one nurse per 20 patients in oral treatment units.

*Note:* in a small decentralised CTU, a nurse may fill the role of the doctor or coordinator.

## Auxiliary nurses or medical ward helpers

Responsible for the hygiene and comfort of patients, preparation and distribution of ORS in their unit.

Day and night: one auxiliary nurse per nurse.

## Doctors

Responsible for admissions and discharges, the treatment and supervision of patients (application of protocols), training and management of medical staff, management of complicated cases.

Day: one doctor per 100 beds; one doctor for triage, however triage may be entrusted to a welltrained nurse.

Night: one on-duty doctor for the entire CTC.

## Pharmacy manager

A pharmacist or nurse responsible for the stock and supply of the CTC as well as possible dependant peripheral facilities, like ORPs (day post).

## Cleaners

Staff responsible for cleaning (clean and contaminated zones), managing patient buckets and the collection and transport of waste to the waste treatment area.

### Stretcher bearers

Staff responsible for transporting patients incapable of moving alone.

Day and night: at least 2 stretcher bearers.

### Health promoters

Staff responsible for promoting hygiene in the CTC and in homes, information and demonstrations on how to prepare ORS to continue treatment at home. Health promoters are not essential if another category of staff covers this work (e.g. auxiliary nurses or nurses). If the latter do not have time to give patients all the instructions they need, it is better to train health promoters.

# Coordinator (CTC)

## **Organisation and supervision of care**

- Ensures that:
  - the installations and equipment are suitable;
  - treatments are available (in the pharmacy and at the patient's bedside);
  - protocols (degree of dehydration, case management, etc.) are available and applied;
  - patient supervision is effective, constant and good quality;
  - patient meals are adequate (quantity, calorie intake, etc.).
- Participates in investigations into the causes of death and accidents related to treatment.
- Decides on the expansion or reduction of the CTC depending on outbreak evolution.

## **Staff management**

In collaboration with the administrator:

- Evaluates the number of staff required for the entire CTC.
- Selects healthcare staff.
- Draws up job descriptions for medical staff.
- Participates in the selection of technical (logistics, water and sanitation) staff if necessary.
- Establishes the planning for medical staff (timetables, shifts, and rest periods).
- Checks that scheduled staff are present in each sector day and night.
- Draws up schedule of staff meetings (general, by sector of activity).
- Chairs certain meetings.
- Evaluates needs, organises and supervises initial and in-service training.
- Ensures staff safety (appropriate PPE for the activity and correctly worn, manipulation of chlorine-releasing compounds, accidental exposures to blood, etc.).

## **Management of material resources (drugs, consumables, food, etc.)**

In collaboration with the logistics, water and sanitation supervisor, the pharmacist and the administrator:

- Evaluates needs and consumption.
- Supervises supply and stock management.
- Deals with possible problems (supply, transport, etc.).
- At the end of the outbreak, supervises the closure of the site.

### **Monitoring<sup>a</sup>**

- Collects morbidity and mortality data every day, as well as entry and discharge figures.
- Organises and analyses data weekly.
- Transmits aggregate data.
- Archives patient monitoring files.
- Updates epidemiological curves.
- Analyses results, evaluate if extra resources are needed.

### **Other tasks**

Writes activity report (weekly and/or monthly) and final intervention report.

### **Notas**

- (a) Depending on the context, data processing may be done by a data manager. In this event, the coordinator ensures the monitoring of this process and analyses and transmits the aggregate data.

# **Nurse (CTC)**

Reports to: CTC coordinator (or healthcare supervisor depending on the organisation)

### **Triage**



- Carries out a rapid evaluation of all patients on arrival:
  - determines if the patient is a cholera case;
  - evaluates the degree of dehydration.
- Decides treatment plan (oral or IV rehydration).
- Provides initial emergency care (e.g. inserts IV line), until the patient is stabilised.
- Carries out admission of patients (register).
- Initiates an individual patient file (parameters, observations, etc.).
- Writes the systematic prescriptions (e.g. antibiotics and zinc sulfate if indicated).
- Alerts the doctor in the event of a problem: e.g. associated pathology (e.g. fever, cough), suspicion of acute malnutrition, pregnancy.

### **Oral rehydration**

- Receives the patient and attendant and explains the treatment procedure.
- Administers the correct volume of ORS according to the protocol.
- Monitors the administration of ORS, the patient's stools and vomit and his/her clinical evolution during treatment.
- Alerts the doctor in the event of a problem: e.g. increased dehydration, infectious complications (e.g. fever, cough), treatment complication.
- Administers antibiotic and/or zinc sulfate if indicated and any further drug prescribed by the doctor.
- Records parameters, observations, treatments, on the individual patient file.
- Ensures the dossier is transferred (if transfer to IV rehydration).

### **IV rehydration**

- Receives the patient and attendant and explains the treatment procedure.
- Administers IV fluid according to the protocol.
- Monitors infusions, the administration of ORS, the patient's stools and vomit and his/her clinical evolution during treatment.
- Alerts the doctor in the event of a problem: e.g. clinical deterioration, infectious complications (e.g. fever, cough).
- Administers antibiotic and/or zinc sulfate if indicated and any further drug prescribed by the doctor.
- Records parameters, observations, treatments, on the individual patient file.

### **Transfer/decease of patients**

Calls the stretcher bearers in the event of the transfer of a bedridden patient to another sector or the removal of a corpse to the morgue.

### **Patient discharge**

- Records patient's discharge, archives the individual patient file.
- For maintenance therapy at home: gives ORS for maintenance therapy at home and instructions on how to prepare ORS, the administration of treatment at home (ORS, zinc sulfate if indicated), to return to the CTC if symptoms reappear<sup>a</sup>.

## Other tasks

- Supervises the work of auxiliary nurses.
- Manages the ward's stocks: requests and takes delivery of drug and consumable product orders for a period of 24 hours.
- Checks the level in the sharps containers daily and replaces them when they are three-quarters full.
- Sorts and discards medical waste in his/her unit into the appropriate containers.
- Participates in certain team meetings.
- Attends certain in-service training courses.

## Notas

- (a) Depending on the work organisation, these tasks are carried out by auxiliary nurses or competent health promoters specifically trained to communicate with patients.

# Auxiliary nurse (CTC)

Reports to: CTC coordinator (or healthcare supervisor depending on the organisation)

- Accompanies patients to the relevant treatment sector (oral or IV rehydration) once their treatment has been prescribed.
- Settles the patient (chair or bed, blanket, cup, etc.).
- Explains to the patient where the latrines, showers, hand-washing points are.
- Prepares and distributes ORS, ensures that ORS is always available for patients, that cups of ORS are always filled, checks that ORS is drunk.
- Alerts the nurse in the event of a problem.
- Distributes meals to patients and attendants; checks that patients are eating.
- Ensures patient hygiene (changes soiled clothes or blankets, etc.).
- Collects and transports dirty laundry (patients'/attendants' clothes and hospital linen) to the laundry.
- Collects clean clothes and returns them to the patients/attendants.

## Patient discharge<sup>a</sup>

- Gives ORS for maintenance therapy at home.
- Gives instructions on how to prepare ORS, the administration of treatment at home (ORS, zinc sulfate if indicated), to return to the CTC if symptoms reappear.
- Gives ORS for maintenance therapy at home.

## Other tasks

- Sorts and discards medical waste in his/her unit into the appropriate containers.
- Participates in certain team meetings.
- Attends certain in-service training courses.

## **Notas**

- (a) Depending on the work set up, these tasks are carried out by nurses or competent health promoters specifically trained to communicate with patients.

# **Doctor (CTC)**

Reports to: CTC coordinator (or healthcare supervisor depending on the organisation)

## **Triage**

- Carries out a rapid evaluation of all patients on arrival:
  - determines if the patient is a cholera case;
  - evaluates the degree of dehydration.
- Decides treatment plan (oral or IV rehydration).
- Provides initial emergency care (e.g. inserts IV or intraosseous), until the patient is stabilised.
- Carries out admission of patients (cholera register).
- Initiates an individual patient file (parameters, observations, etc.).
- Writes prescriptions.
- Supervises triage nurses.

*Note:* in a small CTU, these tasks may be performed by a nurse responsible for referring complicated cases to the CTC.

## **IV and oral rehydration**

- Visits all admitted patients daily and monitors complicated cases (young children, pregnant women, comorbidity cases, treatment complications, etc.).
- Responds to nurses' requests and alerts: insertion of intraosseous needle, concomitant infection, treatment complications, etc.
- Records monitoring and observation parameters on the individual patient file.
- Writes prescriptions (drugs, daily dose, number of times a day, duration).

## **Patient discharge**

- Validates patient discharge.
- Gives patients « discharge slips » that they show the watchman on exit.
- Writes referral letters if needed (e.g. feeding centre, maternity).

### **Deceased patients**

- Confirms death.
- Participates in investigation into cause of death.

### **Other tasks**

- Supervises and participates in in-service training of medical staff.
- Participates in the management of workplace accidents (accidental exposure to blood or other).
- Participates in certain team meetings.
- Attends certain in-service training courses.

# **Pharmacy manager (CTC)**

Reports to: CTC coordinator

### **Medical stock management**

- Plans and submits orders for drugs, medical devices, equipment, consumables.
- Tracks orders and takes delivery of articles, checks them and puts them away.
- Updates all in/out movements on each article stock card.
- Checks expiry dates and storage conditions (humidity, temperature, etc.).
- Monitors weekly consumption.
- Carries out a physical inventory at the end of every week.
- Re-evaluates, together with the coordinator, the buffer stock in light of the outbreak's evolution.
- Informs the coordinator in the event of a problem (e.g. risk of shortage, delivery errors, transport problems) and ensures management of these problems.

### **Supply for treatment sectors**

- Prepares orders for each sector, for 24 hours.
- Supervises supply (orders/deliveries/consumption) of peripheral ORP when applicable.

### **Supervision of staff responsible for preparing ORS<sup>a</sup>**

- Trains staff responsible for preparing ORS.
- Ensures that support materials describing how to prepare ORS are available.
- Supervises preparation of ORS (dilution, hygiene, production flow).

### **Other tasks**

- Sorts and discards medical waste into the appropriate containers.
- Participates in certain team meetings.
- Attends certain in-service training courses.

## Notas

- (a) This is the pharmacist's task if the preparation of ORS is centralised. If ORS is prepared at unit level by auxiliary nurses, the preparation is supervised by the corresponding unit's nurses.

# Cleaner (CTC)

Reports to: CTC coordinator (or healthcare supervisor depending on the organisation)

## Cleaning of the "clean" zone

- Sweeps, then washes the floors (staff changing rooms, latrines and showers; stock room, pharmacy, meeting room, etc.) with detergent, rinses and disinfects them with 0.2% chlorine solution once a day (or more often if necessary e.g. in the event of heavy rainfall).
- Washes surfaces (tables, desks, chairs, etc.) with detergent, rinses and disinfects them with 0.2% chlorine solution once a day.
- Collects and transports waste to the waste treatment area at least once a day (several times if necessary), leaves the full waste bins there and brings empty clean waste bins back from the waste area.
- Collects and transports organic waste from the kitchen to the waste treatment area 3 times a day, leaves the full waste bins there and brings empty clean waste bins back from the waste area.
- Ensures outside areas of the CTC are clean.

## Cleaning of the "contaminated" zone

- Cleaning and disinfection of floors, surfaces and objects
  - Washes with detergent, rinses and disinfects floors, patient latrines and showers with 0.2% chlorine solution at least twice a day, or more often if necessary.
  - Washes with detergent, rinses and disinfects surfaces (tables, desks, chairs etc.) with 0.2% chlorine solution once a day.
  - Washes with detergent, rinses and disinfects dishes after meals and when patients are discharged.
  - Washes with detergent, rinses and disinfects the morgue with 0.2% chlorine solution after each death.
  - Washes with detergent, rinses and disinfects beds with 0.2% chlorine solution once a day (if the patient can get up) and when patients are discharged<sup>a</sup>.
- Ensures outside areas are clean.

- Management of excreta buckets
- Empties patient excreta (vomit, stools) buckets when they are a third full into the dedicated pit (excreta pit), rinses and disinfects the buckets with 0.2% chlorine solution.
- Replaces the bucket after having poured 1 cm of 2% chlorine solution into the bucket.
- Collects and transports waste
- Collects and transports waste to the waste treatment area several times a day, leaves the full waste bins there and brings empty clean waste bins back from the waste area.
- Transports sharp containers to the waste area when they are  $\frac{3}{4}$  full, at the request of the nurse, without opening the container.

### **Other tasks**

- Informs the coordinator in the event of a problem (e.g. accidental exposure, PPE problem).
- Participates in certain team meetings.
- Attends certain in-service training courses.

### **Notas**

- (a) If mats are used: transports mats to the waste treatment area for elimination.

## **Stretcher bearer (CTC)**

Reports to: CTC coordinator (or healthcare supervisor depending on the organisation)

### **Patient transport**

- Transports patients incapable of walking:
  - from the ambulance to the triage;
  - from triage to the IV treatment unit.
- Transports deceased patients to the morgue.

### **Other tasks**

- Cleans with detergent, rinses and disinfects with 0.2% chlorine solution the stretcher when soiled and once a day at the end of his/her shift.
- Participates in certain team meetings.
- Attends certain in-service training courses.

## **Health promotor (CTC)**

Reports to: CTC coordinator

### **On admission**

- Explains hygiene rules and the functioning of the CTC to patients and attendants:
- Isolation (no coming and going in and out of the CTC);
- Hand-washing, shower and laundry;
- Dishes (cups, meals) must not be exchanged between patients and attendants;
- For breastfeeding women: hand-washing and washing of breasts with soap and water before breastfeeding;
- Collection of stools and vomit in buckets.
- Checks the instructions are understood and followed.
- Answers patient's questions.

### **Distribution of home hygiene kits to a family member (if this provision has been set up)**

- Explains home hygiene rules to avoid new cases in the entourage.
- Hands out home hygiene products and asks a family member to clean all the house, clothes, linen, etc.

### **On discharge**

- Explains to the patient how to continue maintenance therapy at home, until diarrhoea has stopped.
- Shows how to prepare ORS.
- Gives sachets of ORS to continue treatment at home.
- Explains home hygiene rules to avoid new cases in the entourage.

### **Other tasks**

- Reports possible problems with patients to the coordinator and participates in their resolution.
- Participates in certain team meetings.
- Attends certain in-service training courses.

## **18.2 Logistics, water and sanitation staff**

[Logistics, water and sanitation supervisor](#)

A specialist experienced in cholera management, in charge of the setting up and maintenance of facilities, monitoring supply of logistics, water and sanitation materials, and the management, training and supervision of technical staff.

Present every day (either physically or on telephone standby).

Depending on the size of the CTC, s/he will have an assistant logistics supervisor and/or an assistant water and sanitation supervisor. One of these two assistants should be designated and trained to replace him/her in the event of absence (accident, illness, etc.).

### **Water and sanitation assistant**

A technician experienced in cholera management, responsible for the installation and maintenance of the potable water distribution system (including water quality tests, etc.), sanitation equipment, the supply of relevant materials (chlorine-releasing compounds, etc.) and the management and supervision of technical staff.

### **Potable water and chlorine solution preparers**

Staff responsible for the treatment, storage and distribution of potable water and the preparation of chlorine solutions (day posts).

### **Waste area operator**

Person responsible for operation of the waste area (day post).

### **Laundry staff**

Staff responsible for washing staff uniforms, the CTC's laundry and patient and attendant's laundry (day posts).

### **Water carriers**

If the CTC does not have a water distribution network, staff responsible for carrying water (to drink, for hygiene purposes, etc.) to the different sections of the CTC (e.g. small peripheral CTC or CTC in the process of being set up).

### **Logistics assistant**

A technician experienced in cholera management, responsible for setting up and maintenance of the CTC, logistics supply (equipment, food, energy, etc.), management of the vehicle fleet, and management, training and supervision of logistics staff.

### **Store keeper**

Person in charge of running the logistics and food store (day post).

### **Cook and assistant**

People responsible for the preparation of meals for patients, attendants and staff (day posts).



## Guards

Staff responsible for watching the CTC's entrances/exits and general security in the CTC.

Day and night: one at each staff and patient entrance and exit.

## **Ambulance staff**

If the CTC has its own ambulances: staff responsible for the transfer of patients from ORPs or basic health facilities to the CTC.

Minimum of one person per ambulance per day

# **Logistics, water and sanitation supervisor (CTC)**

Reports to: CTC coordinator

## **Supervision of logistics, water and sanitation activities**

– During the outbreak:

- Participates in and supervises the setting up of the CTC: construction, equipment, implementation and follow up, extension/reduction of CTC (in accordance with the coordinator).
- Inspects installations and equipment to check they are suitable for any event, function correctly and are maintained, including the fleet of vehicles.
- Ensures protocols/procedures (chlorination of water, chlorine solutions, waste management, etc.) are available, familiar to all and implemented.
- Ensures uninterrupted availability of stocks (particularly chlorine-releasing compounds).
- Ensures that the water supply is adequate in terms of quantity (finds out number of patients present every day) and quality.
- Ensures safety of materials and facilities (watchmen, etc.).

– At the end of the outbreak:

- Organises and supervises the disinfection of the site and materials and the reconditioning of the site.
- Supervises the inventory, the conditioning and storage of reusable materials and the correct disposal of non-reusable materials.
- Supervises the setting up of associated peripheral ORPs when applicable.

## **Management of logistics, water and sanitation staff**

- Evaluates number of staff needed.
- Organize staff selection (with the administrator).
- Draws up staff planning schedules (timetables, shifts, and rest periods).
- Provides staff job descriptions.
- Checks that scheduled staff are present in each sector day and night.
- Chairs certain meetings.
- Organises and supervises initial and in-service training courses.
- Ensures staff safety (adequate PPE for the activity and correctly worn, manipulation of chlorinereleasing compounds, etc.).

## **Management of material resources**

In collaboration with the logistics assistant and the administrator:

- Evaluates needs and consumption.
- Supervises the management of orders (chlorine, materials, consumables, food, etc.) and local purchases.
- Supervises stock management.
- Re-evaluates, together with the coordinator, the buffer stock in light of the outbreak's evolution.
- Informs the coordinator in the event of a problem (e.g. risk of stock shortage, delivery errors, transport problems) and ensures management of these problems.

## **Outreach activities (zone covered by the CTC)<sup>a</sup>**

- Identifies, from the CTC data, the neighbourhoods in the town or sections in the camp where there are problems; evaluates the needs on site in order to determine priority actions.
- Sets up emergency actions (bucket chlorination, excreta control, collection and elimination of market waste, health promotion) and ensures the monitoring of necessary supplies, purchases, human resources, transport, etc.
- Evaluates the impact of water and sanitation activities and adapts them if necessary.

## **Other tasks**

- Writes logistics, water and sanitation activity reports (weekly, monthly and final).
- Participates in certain team and coordination meetings.

## **Notas**

- (a) Depending on the workload in the CTC or outside the CTC or for other reasons in relation to the context, the activities external to the CTC may be covered temporarily or on a longer term basis by another water and sanitation officer.

# **Water and sanitation assistant (CTC)**

Reports to: Logistics, water and sanitation supervisor

### **Sets up and maintains water and sanitation installations**

- During the outbreak:
  - Recruits labourers and organises the construction of water and sanitation installations (water network, showers, waste water evacuation system, latrines, waste area, etc.) in close collaboration with the logistics assistant.
  - Inspects water and sanitation installations and equipment, checks that they function and ensures maintenance.
- At the end of the outbreak:
  - Carries out the disinfection of the site and materials and the reconditioning of the site.
  - Carries out, together with the store keeper, the inventory, the conditioning and storage of reusable materials and the disposal of non-reusable materials.

### **Supply and treatment of water**

- Ensures that there is enough water available in the CTC to function for 3 days.
- Checks that the water chlorination protocol is correctly applied.
- Checks that water quality control tests are carried out:
  - systematically on arrival of water at the CTC (e.g. water trucks, water from a network);
  - when a new water reservoir is put into use and water has been stored for over 24 hours;
  - at least twice a day at one or more water points in the CTC.
- Organises the rotation of reservoirs so that the reserve is renewed quickly.
- Inspects the reservoirs and the water distribution network at least twice a month (absence of leaks, deposits; functioning of valves, taps, pumps; condition of protections and stands).
- In the event of manual water distribution: checks that all the water points are supplied.

### **Preparation and distribution of chlorine solutions**

- Ensures that the protocols regarding the preparation of 0.05%, 0.2% and 2% chlorine solutions are correctly applied.
- Checks the storage and distribution of chlorine solution procedures.
- Checks the level in the containers; ensures that they are always more than half full of chlorine solution.
- Checks chlorine solutions are renewed every day.
- Ensures safety of preparers (PPE, ventilation, etc.).

### **Management and supervision of water and sanitation staff**

- Ensures work schedule is respected and directly supervises chlorine solution preparers, water carriers, waste area operator and laundry staff.
- Fills out the staff attendance form and sends it to the logistics, water and sanitation supervisor.
- Participates in the in-service training of staff.

## **Hygiene**

- Checks the following procedures daily:
  - waste water elimination,
  - collection and elimination of waste,
  - vector control,
  - washing and disinfection of laundry.

## **Management of material resources**

- Checks the quality of articles related to water and sanitation activities (chlorine-releasing compounds, quality control tests, etc.).
- Checks condition of PPEs.
- Calculates the daily consumption of potable water and chlorine-releasing compounds.
- Fills out the order and consumption forms, has them validated by the logistics, water and sanitation supervisor, then sends them to the store keeper.

## **Other tasks**

- Informs the logistics, water and sanitation supervisor of any problems (stock shortages, breakdowns, workplace accidents, etc.) and participates in their resolution.
- Participates in certain team meetings.
- Attends certain in-service training courses.

# **Potable water and chlorine solution preparer (CTC)**

Reports to: Logistics, water and sanitation supervisor

## **Water treatment (batch chlorination)**

- Calculates the quantity of chlorine needed in the water reservoirs according to the protocol (at the start of the intervention and whenever necessary).
- Prepares the “mother solution” every day (1% chlorine solution).
- Chlorinates water every day according to defined procedure.
- Checks water quality (measures and records FRC levels):
  - at least twice a day at one or more water points in the CTC;
  - when a new water reservoir is put into use and water has been stored for over 24 hours;
  - at every delivery if water is delivered pre-treated by water truck.
- Regularly checks water turbidity and pH level.
- Discards 1% mother solution over 24 hours old and cleans the jerrycan with clean water at least once a day.

### **Preparation, distribution and disposal of chlorine solutions**

- Prepares 0.05%, 0.2% and 2% chlorine solutions every day.
- Checks levels in the containers every 2 hours in all the CTC’s sectors.
- Fills the containers when they are half empty.
- Fills the guard’s’ sprayers with 0.2% chlorine solution.
- Discards chlorine solutions over 24 hours old and cleans the jerrycan with clean water at least once a day.

### **Other tasks**

- Informs the water and sanitation assistant in the event of a problem (e.g. risk of stock shortage, handling errors, adverse effects).
- Participates in certain team meetings.
- Attends certain in-service training courses.

# **Waste treatment area operator (CTC)**

Reports to: Logistics, water and sanitation supervisor

### **Waste management**

- Receives waste brought by the cleaning staff and eliminates it according to the defined protocol.
- Cleans with detergent, rinses then disinfects dirty waste bins with 0.2% chlorine solution.
- Inspects waste bins when they are cleaned and informs the water and sanitation assistant if they are damaged and need to be replaced.
- Redistributes clean waste bins.
- Cleans, at the end of the day, the wheelbarrow or trolley used to transport waste.
- Monitors consumption (detergent, chlorine-releasing compounds, fuel, PPE, etc.) and submits orders to the water and sanitation assistant.
- Cleans the waste area (sweeps, ash disposal, etc.).
- Ensures the waste treatment area is always closed.

### **Other tasks**

- Informs the water and sanitation assistant in the event of a problem (e.g. burn or injury, accidental exposure, PPE problem, breakdown of incinerator, non-respect of waste segregation).
- Participates in certain team meetings.
- Attends certain in-service training courses.

# **Laundry staff (CTC)**

Reports to: Logistics, water and sanitation supervisor

### **Collection and reception of dirty laundry**

- Collects and transports staff laundry (uniforms) from the changing room every day (morning and afternoon) to the laundry area.
- Takes delivery of dirty laundry (hospital linen as well as patients' and attendants' laundry) collected and transported to the laundry area by the auxiliary nurses, at a set time of day.

### **Laundry washing**

- Washes the different types of laundry separately.
- Immerses dirty laundry in soapy water and scrubs it.
- Rinses laundry with clean water.
- Immerses clean laundry in 0.05% chlorine solution for 15 minutes.
- Rinses laundry with clean water.
- Hangs out clean laundry to dry.
- Empties dirty water into the waste water circuit.

### **Distribution of clean laundry**

- Folds clean laundry when it is completely dry.
- Takes staff uniforms to the clean zone every day (changing rooms).
- Takes hospital linen to the clean zone every day (stock).
- Returns clean laundry to patients and attendants<sup>a</sup>.

### **Other tasks**

- Washes containers that have been used to transport soiled laundry.
- Monitors consumption (soap, PPE, etc.) and submits orders to the water and sanitation assistant.
- Informs the water and sanitation assistant in the event of a problem (e.g. accidental exposure, PPE problem).
- Participates in certain team meetings.
- Attends certain in-service training courses.

### **Notas**

(a) Depending on the organisation, this may be done by auxiliary nurses at a set time of day.

# **Water carrier (CTC)**

Reports to: Logistics, water and sanitation supervisor

### **Transport of water**

- Fills containers with treated water when the container is half empty.
- Transports water for consumption in dedicated recipients that are covered in order to avoid contamination during transport.
- Checks level in the all the CTC's water containers (clean zone, observation, hospitalisation, etc.).
- Ensures the containers are correctly labelled as containing potable water.
- Cleans containers once a week with 0.05% chlorine solution.
- Ensures all the water containers are full to the maximum before leaving the CTC (end of work shift).

### **Other tasks**

- Participates in certain team meetings.
- Attends certain in-service training courses.

# **Logistics assistant (CTC)**

Reports to: Logistics, water and sanitation supervisor

### **Setting up and maintenance of infrastructure and equipment**

- At the end of the outbreak:
  - Recruits labourers and organises the construction/installation of the CTC (shelters, stocks, lighting, fences, etc.) in close collaboration with the Water and sanitation assistant.
  - Inspects installations and equipment (generators, pumps, radios), checks that they function and ensures maintenance.
- At the end of the outbreak:
  - Reconditions the site.
  - Carries out, together with the store keeper, the inventory, the conditioning and storage of reusable materials and the disposal of non-reusable materials.

### **Management and supervision of logistics staff**

- Ensures work schedule is respected and directly supervises watchmen, cooks, stock controller(s), driver(s) and ambulance staff.
- Fills out the staff attendance form and sends it to the Logistics, water and sanitation supervisor.
- Participates in the in-service training of staff.

### **Security and safety of premises and stock**

- Checks guards control entrances and exits, and ensures the security of the premises.
- Checks warehouse safety rules are implemented (fire extinguishers, storage of chlorinereleasing compounds and fuel, etc.).
- Checks hygiene rules are respected during the preparation and distribution of meals.
- Ensures food is protected (rodents and other pests).

### **Stock management**

- Checks consumption (every day for fuel and food, every week for other articles).
- Checks order forms, has them validated by the logistics, water and sanitation supervisor.
- Ensures buffer stock is sufficient to meet possible increase in activity.

### **Management of vehicle fleet**

- Organises and supervises the maintenance and repair of vehicles.
- Organises and ensures the respect of compulsory vehicle checks (technical checks).
- Analyses the use of vehicles (consumption, kilometres, maintenance, accidents, and damage).

### **Other tasks**



- Informs the logistics, water and sanitation supervisor of any problems (stock shortages, breakdowns, workplace accidents, etc.) and participates in their resolution.
- Participates in certain team meetings.
- Attends certain in-service training courses

# Store keeper (CTC)

Reports to: Logistics, water and sanitation supervisor

## Management of logistics stocks

- Arranges stock according to category (stationary, food, etc.), keeps stock clean and tidy.
- Keeps management tools up to date (stock cards, balance of entry and exits).
- Prepares orders, records weekly consumption, presents these to the logistics supervisor.
- Takes delivery of materials and checks them (including that chlorine containers are not damaged).
- Checks expiry dates and storage conditions (humidity, temperature, etc.).
- Carries out a physical inventory every week.
- Informs the logistics, water and sanitation supervisor in the event of a problem (risk of stock shortage, delivery errors, theft or attempt of, etc.).

## Other tasks

- Participates in certain team meetings.
- Attends certain in-service training courses.

# Cook and assistant (CTC)

Reports to: Logistics, water and sanitation supervisor

## Cook

- Evaluates needs (food, fuel) every day depending on the number of meals to prepare (patients + attendants + staff).
- Submits orders every day. Takes delivery of orders and checks them, signs delivery slip.
- Prepares 3 meals per day for patients and attendants and one meal per day for staff.
- Supervises the kitchen assistant.
- Sorts and discards waste into the appropriate waste bins.
- Participates in certain team meetings.
- Attends certain in-service training courses.

## **Kitchen assistant**

- Ask for the number of patients present in each unit before each meal.
- Counts the number of staff present (planning).
- Ensures supply of water (kitchen and cleaning).
- Helps the cook prepare meals.
- Distributes meals to patients, attendants and staff.
- Collects dishes at the end of the meal, cleans them, puts them away.
- Cleans the kitchen.
- Sorts and discards waste into the appropriate waste bins.
- Participates in certain team meetings.
- Attends certain in-service training courses.

# **Guard (CTC)**

Reports to: Logistics, water and sanitation supervisor

## **Patient entrance**

- Controls patient and attendant entrances, checks that patients enter with one attendant only (the same person throughout the patient's stay).
- Does not allow patients and attendants to leave by the entrance gate.
- *If patients are in a serious condition* (e.g. a patient that cannot stand up, cannot talk, needs a stretcher, is unconscious):
  - Calls the stretcher bearers and directs the patient immediately to triage without handwashing or disinfecting their feet (emergency takes priority).
- *If patients are not in a serious condition:*
  - Asks patients and attendants to wash their hands.
  - Disinfects the soles of patient and attendant's shoes using a sprayer (0.2% chlorine solution).

## **Patient exit**

- Controls patient and attendant exits (checks discharge slip).
- Asks patients and attendants to wash their hands.
- Disinfects the soles of patient and attendant's shoes using a sprayer (0.2% chlorine solution).

## **Clean zone entrance (entrance and exit of staff, suppliers and materials)**

- Checks that people or vehicles that arrive at the entrance are authorised to enter and leave the CTC. Directs suppliers if necessary.
- If patients or family members arrive at this door, directs them to the patient entrance.

## **Other tasks**

- Cleans his/her sprayer with clean water once a day.
- Participates in certain team meetings.
- Attends certain in-service training courses.

## 18.3 Administrative staff

### Administrator

Person responsible for contact with suppliers, the contracts and salaries of CTC staff as well as dependant peripheral facilities if the CTC has associated ORPs, under the responsibility of the CTC coordinator (day post).

As a guide, a CTC receiving approx. 100 admissions/day, with a capacity of 200 beds, will need 120 staff to operate.

## Administrator (CTC)

Reports to: CTC coordinator

### **Administration**

- Draws up contracts, issues receipts, etc. and handles contract terminations of all staff at the end of the outbreak.
- Draws up contracts with third parties (transport companies, vehicle hire, sub-contractors, etc.).
- Ensures payment of salaries and invoices.
- Keeps accounting records up to date, archives receipts.
- Helps the coordinator calculate or evaluate the CTC's budget.
- Checks official documents are valid: training diplomas or certificates, driving licenses, etc.
- Checks vehicle documents are valid and renewed (vehicle registrations documents, insurance, etc.) in collaboration with the logistics assistant.
- Manages pre-paid calling cards or contracts with telephone operators.
- Identifies and obtains local authorisations necessary for use of radio communication frequencies.

### **Other tasks**

- Participates in certain team meetings.
- Attends certain in-service training courses.

## Appendix 19. Job descriptions ORP

- [19.1 ORP staff](#)
- [19.2 Supervision](#)

# 19.1 ORP staff

Depending on the size of the ORP, the number of hours it is open per day, the number of patients attending, etc. 2 to 4 staff must always be present. This appendix describes 4 job profiles that can be covered by 2 people if the ORP is a small unit. For example, a health promoter is not essential if the nurse or health worker can carry out these tasks. If this is not the case, if there are a lot of patients, it is better to train one health promoter.

## Nurse or health worker

Person responsible for the healthcare and supervision of patients, supply and management of the medical stock, preparation of ORS, patient information on treatment and prevention of cholera. May be in charge of the overall operation of the ORP.

## Health promotor

Person responsible for promoting hygiene in the ORP and in homes, and information and demonstrations on how to prepare ORS to continue treatment at home.

## Logistics and water/sanitation aide

Person in charge of setting up and maintenance of the ORP, logistics supply and stock, potable water supply and sanitation.

## Cleaner

Staff responsible for cleaning (inside and outside areas), managing patient excreta buckets and waste.

# Nurse or health worker (ORP)

## Admission and treatment of patients

- Carries out a rapid evaluation of all patients on arrival:
  - determines if the patient is a cholera case;
  - evaluates the degree of dehydration.
- Decides treatment plan (Plan A or Plan B).
- Carries out admission of patients (register).
- Settles in the patient.
- Prepares, prescribes and monitors the administration of ORS. Ensures ORS is available at all times.
- Administers other treatments: antibiotics and/or zinc sulfate if indicated, according to the protocol.
- Initiates an individual patient monitoring file and records observations and systematic prescriptions if indicated (antibiotics and zinc sulfate).
- Communicates information to the patient and/or family: explains the treatment procedure and/or the continuation of treatment at home, to return to the ORP if symptoms reappear, prevention measures.

### **Transfer of serious cases**

- Calls the ambulance to transfer to the CTC/CTU patients that need IV treatment or that need to be referred, whatever the reason.
- Provides care before transfer<sup>a</sup>.
- Provides prepared ORS, to be taken during the transfer if transport time takes over 15 minutes.

### **Patient discharge**

- Gives sachets of ORS to continue maintenance therapy at home.
- Records patient's discharge, archives individual monitoring file.

### **Other tasks**

- Records admissions/discharges every day and sends data to the supervisor.
- Prepares orders and takes delivery of drugs (ORS, antibiotics, zinc) and materials, and ensures stock management.
- Informs the supervisor in the event of a problem (e.g. risk of stock shortage, delivery errors, etc.).
- Supervises ORP staff (e.g. cleaners, health promoters).
- At the request of the supervisor:
  - Participates in certain team meetings;
  - Attends certain in-service training courses.

### **Notas**

- (a) Including starting IV treatment if staff is qualified to do so, depending on the organization of the healthcare provision.

# **Health promotor (ORP)**

## **On admission**

- Explains hygiene rules and the functioning of the ORP to patients and attendants:
- No comings and goings during treatment;
- Hand-washing at critical moments;
- Cups must not be exchanged between patients and attendants;
- For breastfeeding women: hand-washing and washing of breasts with soap and water before breastfeeding;
- Collection of stools and vomit in buckets.
- Checks the instructions are understood and followed.
- Answers patients' questions.

## **On discharge**

- Explains to the patient how to continue maintenance therapy at home, until diarrhoea has stopped.
- Shows how to prepare ORS.
- Gives sachets of ORS (2 to 4) to continue treatment at home.
- Explains home hygiene rules to avoid new cases in the entourage.

## **Distribution of home hygiene kits to a family member (if this provision has been set up)**

- Explains home hygiene rules to avoid new cases in the entourage.
- Hands out home hygiene products and asks a family member to clean all the house, laundry, etc.

## **Other tasks**

- Reports possible problems with patients to the person in charge of the ORP and participates in their resolution.
- At the request of the supervisor:
- Participates in certain team meetings;
- Attends certain in-service training courses.

# **Logistics, water and sanitation aide (ORP)**

## **Setting up and maintenance of the facility**

- During the outbreak:
  - Participates in setting up the ORP: construction, equipment, implementation and follow up, extension/reduction of ORP (at the request of the supervisor);
  - Inspects installations and water/sanitation equipment to check they function correctly and ensures necessary maintenance.
- At the end of the outbreak:
  - Implements the disinfection of the site and materials and the reconditioning of the site;
  - Carries out the inventory, the conditioning and storage of reusable materials and the disposal of non-reusable materials.

## **Supply and treatment of water**

- Ensures there is enough water available (checks the number of patients present every day).
- Prepares the “mother solution” every day (1% chlorine solution).
- Chlorinates water every day according to defined protocol.
- Checks water quality (measures and records FRC levels):
  - at least twice a day;
  - when a new water reservoir is put into use and water has been stored for over 24 hours.
- Regularly checks water turbidity and pH level.
- Discards 1% chlorine solution over 24 hours old and cleans the jerrycan with clean water at least once a day.
- Inspects the water reservoirs at least twice a month (absence of leaks, deposits; functioning of valves, taps, pumps; condition of protections and stands).

## **Preparation, distribution and disposal of chlorine solutions**

- Prepares 0.05%, 0.2% and 2% chlorine solutions every day.
- Checks the level in the 0.05% chlorine solution containers used for hand-washing.
- Refills the containers when they are half empty.
- Discards chlorine solutions over 24 hours old and cleans the jerrycan with clean water at least once a day.

## **Management of material resources**

- Evaluates needs and calculates consumption (particularly of chlorine), manage the stock.
- Participates in preparing orders to be submitted (chlorine, materials, consumables, etc.) and buys local purchases.
- Informs person in charge of the ORP in the event of a problem (e.g. risk of stock shortage, delivery errors, transport problems) and ensures management of these problems.

## **Outreach activities (area around the ORP)**

Participates if necessary in emergency actions (bucket chlorination, excreta control, collection and elimination of market waste, health education).

## **Waste management**

- Ensures the elimination of waste according to the defined protocol.
- Ensures the waste treatment area is always closed.

### **Other tasks**

- Submits a weekly report to the person in charge of the ORP and the supervisor on logistics and water and sanitation activities and problems encountered (e.g. accidents, PPE problem, nonrespect of waste segregation).
- At the request of the supervisor:
  - Participates in certain team meetings;
  - Attends in-service training courses.

# **Cleaner (ORP)**

### **Hygiene of premises and materials**

- Washes floors with detergent, rinses and disinfects them with 0.2% chlorine solution twice a day (or more often if necessary, e.g. in the event of heavy rainfall).
- Washes surfaces (tables, desks, chairs etc.) with detergent, rinses and disinfects them with 0.2% chlorine solution at the end of the day.
- After each discharge, washes patient chairs, cups and spoons with detergent, rinses and disinfects them with 0.2% chlorine solution<sup>a</sup>.
- Ensures outside areas are clean.

### **Excreta buckets**

- Empties patient excreta (vomit, stools) buckets when they are a third full into the dedicated pit (excreta pit) or the latrine.
- Rinses the buckets with clean water and disinfects them with 0.2% chlorine solution.
- Replaces the bucket after having poured 1 cm of 2% chlorine solution into the bucket.

### **Waste management**

- Collects and transports waste to the waste treatment area at least once a day, leaves the full waste bins there and brings empty clean waste bins back from the waste area.
- Washes the dirty waste bins with detergent, rinses and disinfects them with 0.2% chlorine solution.
- Eliminates waste according to the defined protocol.
- Cleans the waste area (sweeps, ash disposal, etc.).

### **Other tasks**



- Informs the person in charge of the ORP in the event of a problem (e.g. accidental exposure, PPE problem).
- At the request of the supervisor:
  - Participates in certain team meetings;
  - Attends certain in-service training courses.

## **Notas**

- (a) If mats are used: transports mats to the waste treatment area and eliminates them (do not reuse).

# **19.2 Supervision**

A medical supervisor (e.g. the coordinator of the CTC or his/her assistant) is responsible for several ORPs and rotates between them. The supervisor is in charge of the overall operation of all the ORPs, training, staff information and management, safety of staff and patients, the collection and transmission of data. S/he visits (or can be reached by telephone) every day. Someone should be designated and trained to replace him/her in the event of absence.

# **Appendix 20. Job descriptions – Health promotion at community level**

## **Health promotion manager**

- Analyses the situation and the context:
  - Socioeconomic and cultural aspects: e.g. standard of living, sources of income, religion, local customs (particularly hygiene habits), knowledge and perception of cholera (mode of transmission, treatment), attitude towards sick persons, usual treatment used, perception of cholera treatment facilities, handling of corpses and organisation of funerals;
  - Activities already set up by other organisations: by whom (e.g. ministries, NGOs), where, how;
  - Meetings with religious, traditional and administrative authorities and the community;
  - Exploration of the area and observation (water points, markets, defecation areas, etc.).
- Defines the strategies and objectives (with the medical teams, the water and sanitation teams, the Ministry of Health, partners) according to the context, including in case of specific concerns (e.g. rumours, community rejection of a CTC project).

- Plans and organises the setting up of activities: human resources, choice of intervention sites depending of the evolution of the outbreak, schedule and transport of teams, etc.
- Recruits, trains and supervises health promotion teams.
- Makes or gathers together health promotion tools (messages and materials) and ensures they are used and distributed.
- Monitors daily activities.
- Drafts the teams' monthly activity reports.
- Evaluates activities.

Depending on the size of the project, the manager may be assisted by a health promotion supervisor.

## **Health promoters**

- Explains to the public basic general information on cholera:
  - Prevention measures (e.g. hand-washing, food hygiene, water treatment methods; precautions concerning defecation);
  - Symptoms of cholera and action to be taken in the event of “rice water” diarrhoea;
  - Measures to control the outbreak and use of services: location of nearest CTC/CTU/ORP, opening times, free care, water points, organisation of funerals, etc.
- Explains to the public targeted information depending on the context:
  - Place and date of distributions (soap, jerrycans, water disinfection products, ORS, etc.);
  - How to use distributed products (e.g. water disinfection products, ORS);
  - Place and date of vaccination in the event of a mass vaccination campaign and information on the vaccination (who? how? advantages and limits, etc.).
- Demonstrates the use of products:
  - Preparation of oral rehydration solution;
  - Disinfection of water using a water disinfection product.
- Listens and answers the public's questions and concerns. Depending on the context:
  - Sensitive subjects (e.g. changing funeral rites);
  - Rumours that complicate the measures set up to eradicate the outbreak;
  - Other general or specific concerns of the population (e.g. implementation of a new cholera facility in a neighbourhood).
- Manages materials for health promotion activities.
- Regularly reports to the health promotion manager on routine activities carried out and the difficulties encountered.
- Participates in health promotion team meetings.
- Attends certain in-service training courses at the request of the health promotion manager.

# Toolbox

[Individual patient file](#)

[Cholera case register](#)

[Pictograms](#)

[Arabic](#)

[English](#)

[French](#)

[Portuguese](#)

[Picto blank](#)

## Individual patient file

[Individual patient file.pdf](#)

[Individual patient file.docx](#)

## Cholera case register

[Cholera case register.pdf](#)

[Cholera case register.docx](#)

## Pictograms

- [Arabic](#)
- [English](#)
- [French](#)
- [Portuguese](#)
- [Picto blank](#)

# Arabic

[Access forbidden.pdf](#)

[Exit.pdf](#)

[Entry.pdf](#)

[Staff changing rooms-men.pdf](#)

[Staff changing room-women.pdf](#)

[Chlorine solution 0.2%.pdf](#)

[Chlorine solution 0.05% handwashing.pdf](#)

[Chlorine solution 2%.pdf](#)

[Shower women.pdf](#)

[Shower men.pdf](#)

[Potable water.pdf](#)

[Oral rehydration solution.pdf](#)

[Kitchen.pdf](#)

[Toilet men-women.pdf](#)

[Toilet men.pdf](#)

[Toilet women.pdf](#)

# English

[Access forbidden.pdf](#)

[Exit.pdf](#)

[Entry.pdf](#)

[Staff changing rooms-men.pdf](#)

[Staff changing room-women.pdf](#)

[0.2% chlorine solution.pdf](#)

[0.05% chlorine solution - handwashing](#)

[2% chlorine solution.pdf](#)

[Shower women.pdf](#)

[Shower men.pdf](#)

[Drinking water.pdf](#)

[Oral rehydration solution.pdf](#)

[Kitchen.pdf](#)

[Toilet men-women.pdf](#)

[Toilet women-Toilet men.pdf](#)

# French

[Accès interdit.pdf](#)

[Entrée.pdf](#)

[Sortie.pdf](#)

[Vestiaire du personnel-hommes.pdf](#)

[Vestiaire du personnel-femmes.pdf](#)

[Solution chlorée 0,2%.pdf](#)

[Solution chlorée 0,05% - lavage des mains.pdf](#)

[Solution chlorée 2%.pdf](#)

[Douche-femmes.pdf](#)

[Douche-hommes.pdf](#)

[Eau potable.pdf](#)

[Solution de réhydratation orale.pdf](#)

[Cuisine.pdf](#)

[Toilettes hommes-femmes.pdf](#)

[Toilettes femmes-Toilettes hommes.pdf](#)

# Portuguese

[Acceso prohibido.pdf](#)

[Entrada.pdf](#)

[Saída.pdf](#)

[Vestiário homens.pdf](#)

[Vestiário mulheres.pdf](#)

[Solução de cloro a 0,2%.pdf](#)

[Solução de cloro a 0,05% - lavagem das mãos.pdf](#)

[Solução de cloro a 2%.pdf](#)

[Chuveiro mulheres.pdf](#)

[Chuveiro homens.pdf](#)

[Água potável.pdf](#)

[Solução de rehidratação oral.pdf](#)

[Cozinha.pdf](#)

[Casa de banho homens-mulheres.pdf](#)

[Casa de banho mulheres-Casa de banho homens.pdf](#)

# Picto blank

[Access forbidden.pdf](#)

[Exit.pdf](#)

[Entry.pdf](#)

[Staff changing rooms-men.pdf](#)

[Staff changing room-women.pdf](#)

[0.2% chlorine solution.pdf](#)

[0.05% chlorine solution - handwashing](#)

[2% chlorine solution.pdf](#)

[Shower women.pdf](#)

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