

# Guideline on CHOLERA OUTBREAK MANAGEMENT Ethiopia



**Ethiopian Health and Nutrition  
Research Institute  
Federal Democratic Republic of Ethiopia**



**Guideline on  
CHOLERA OUTBREAK  
MANAGEMENT  
Ethiopia**

**Ethiopian Health and Nutrition Research Institute,  
Public Health Emergency Management Center**

**Federal Democratic Republic of Ethiopia**

**May 2011  
Addis Ababa  
Ethiopia**



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## ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
AR	Attack Rate
CFR	Case Fatality Ratio
CTC	Cholera Treatment Center
CTU	Cholera Treatment Unit
CHW	Community Health Worker
HIV	Human Immunodeficiency Virus
HTH	Calcium hypochlorite
IM	Intramuscular
IV	Intravenous
KCl	Potassium hydrochloride
MoH	Ministry of Health
MSF	Médecins Sans Frontières
NTU	Nephelometric Turbidity Unit
ORP	Oral Rehydration Point
ORS	Oral Rehydration Salt
PHEM	Public Health Emergency Management
RL	Ringer Lactate Solution
SODIS	Solar Disinfection of water
SSR	Slow Sand Filtration
UNICEF	United Nations Children Fund
WHO	World Health Organization
WASH	Water Sanitation and Hygiene
WIR	Weekly Incidence Rate



## ACKNOWLEDGEMENTS

Ethiopian Health and Nutrition Research Institute which is the technical arm of the Ministry of Health of the Federal Democratic Republic of Ethiopia would like to express its appreciation and gratitude to all those who are directly involved in or indirectly contributed to the preparation of this guideline.

EHNRI would like to thank, all the members of the Acute Watery Diarrhea Technical Working Group members from EHNRI, Regional Health Bureaus, WHO, UNICEF, MSF Belgium for realizing the preparation of this guideline.

Special thanks go to Dr. Daddi Jima, Deputy Director General, EHNRI and Process Owner of Public Health Emergency Management for leading the overall activity of the Technical Working Group and also for editing the guideline.

We thank UNICEF for financial contribution and facilitation of the printing of this guideline.



## FOREWORD

Cholera is an acute intestinal infection caused by ingestion of food or water contaminated with the bacterium *Vibrio cholerae* unless treated promptly it quickly leads to severe dehydration and death.

In Ethiopia one confirmed case of cholera is enough to declare an outbreak. Therefore, health workers at all levels have to clearly understand the case definitions of this disease and manage the outbreaks in a standardized manner. If the management, including treatment of patients, infection prevention and overall outbreak containment procedures do not follow standard procedures the effect of cholera outbreaks even becomes worse.

The purpose of this cholera outbreak management guideline is, therefore, to enable all the health professionals and partners involved in health manage cholera outbreaks in standardized way.

This guideline has eight basic components in it: Introduction to cholera, Outbreak investigation, Response to outbreaks, Cholera treatment centers, water, sanitation and hygiene (WASH), information, education and communication and monitoring and evaluation. This guideline sets standards down the structure with the aim of closely monitoring cholera interventions and their evaluation at last.

Based on the mandate given to the Federal Ministry of Health to prepare and distribute health and health related guidelines and standards, this guideline is prepared by Ethiopian Health and Nutrition Research Institute (EHNRI), Public Health Emergency Management (PHEM) Center, in collaboration with the acute watery diarrhea Technical Working Group members which represents all partners involved in Public Health Emergency Management. The technical working group includes members from the Public Health Emergency Management Center and Directorates of Infectious and Non-infectious

Diseases Research of EHNRI, Health Promotion and Disease Prevention  
General Directorate of MOH, , WHO, UNCEF, and MSF.

EHNRI hopes that this guideline meets the needs of health workers and  
the different partners who are participating in cholera outbreak  
management.

A handwritten signature in blue ink, appearing to read 'Amback', is centered on the page. The signature is written in a cursive style with a light blue background behind it.

A/Director General, EHNRI

# 1. INTRODUCTION TO CHOLERA

## Epidemiology

Cholera is a diarrheal disease caused by infection of the intestine with the gram-negative bacteria *Vibrio cholerae*, either type O1 or O139. Both children and adults can be infected. It is one of the key indicators of social development and remains a challenge to countries where access to safe drinking water and adequate sanitation cannot be guaranteed.

There are over 100 vibrio species known but only the “cholerae” species are responsible for cholera epidemics<sup>1</sup>. *Vibrio cholerae* species are divided into 2 sero groups:

- *Vibrio cholerae* O1, subdivided into Classical and El Tor biotypes,
- *Vibrio cholerae* O139 serogroup was first identified in 1992 in India. It has since been isolated in other Asian countries between 1993 and 1998.

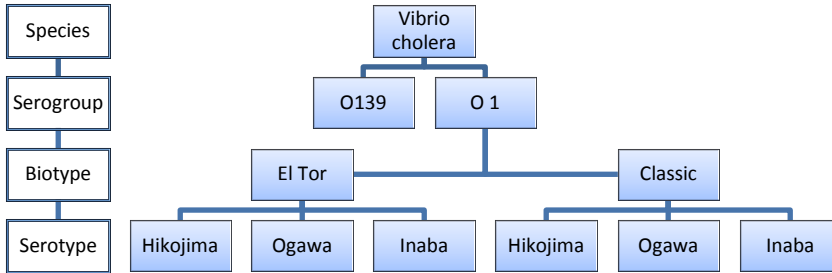
Both El Tor and Classic biotypes are divided into 3 serotypes: Ogawa, Inaba and Hikojima. The three serotypes can co-exist during an epidemic because the bacteria can mutate between serotypes. This does not affect the epidemic pattern:

- clinical features are similar, whatever the strain
- regardless of the strain, the response is the same.

About 20% of those who are infected develop acute, watery diarrhea – 10–20% of these individuals develop severe, watery diarrhea with vomiting. If these patients are not promptly and adequately treated, the loss of such large amounts of fluid and salts (more than 10-20 liters/day in severe forms) can lead to severe dehydration and death within hours. The case-fatality rate in untreated cases may reach 30–50%. Treatment is straightforward (basically rehydration) and, if applied

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<sup>1</sup> Note: The word outbreak and epidemic are used interchangeably. For the purpose of this guideline there is no difference between a “cholera outbreak” or “cholera epidemic”.



appropriately, should keep the case-fatality rate below 1%. Cholera is usually transmitted through fecal contamination of water or food and remains an ever-present risk in many countries. New outbreaks can occur sporadically in any part of the world where water supply, sanitation, food safety, and hygiene are inadequate. The greatest risk occurs in over-populated communities and refugee settings characterized by poor sanitation, unsafe drinking-water, and increased person-to-person transmission. As the incubation period of cholera is very short (2 hours to 5 days), the number of cases can rise extremely quickly.

Vibrios grow easily in saline water and alkaline media. They survive at low temperatures but do not survive in acid media; they are destroyed by gastric acid in the stomach, by chlorine disinfectant solutions or by boiling during at least one minute.

### Mode of Transmission

Cholera is transmitted by the fecal-oral route. A dose of more than one million organisms is usually needed to cause illness. Cholera is transmitted almost exclusively by contaminated water or food. Transmission by contact, such as touching patients, is rare.

Water may be contaminated at its source. Surface water and water from shallow wells are common sources of infection. In addition, *Vibrio cholerae* can live for years in certain aquatic environments. Water is also frequently contaminated at home when inadequately washed



hands come in contact with stored water. Bathing or washing cooking utensils in contaminated water can also transmit cholera.

Moist grains, such as rice, millet, or sorghum, when served at room temperature or lightly warmed, are common vehicles for cholera transmission. Moist foods lightly contaminated after cooking and allowed to remain at room temperature for several hours, provide an excellent environment for the growth of *Vibrio cholerae*. Other foods which can transmit cholera include raw or undercooked seafood, particularly shellfish, and raw fruits and vegetables.

Corpses of cholera patients are highly infectious through their excreta. Physical contact during funerals is also a major medium. Cholera treatment centers can become main sources of contamination if hygiene and isolation measures are insufficient.

Acidifying foods with lemons, tomatoes, yogurt, or fermented milk helps to inhibit *Vibrio cholerae* growth.

Humans are the main reservoir of *Vibrio cholerae*. Asymptomatic (healthy) carriers and patients carry huge quantities of vibrio in feces and in vomit; up to 100,000,000 bacteria can be found in 1 ml of cholera liquid. Other potential reservoirs are water, some molluscs, fish, and aquatic plants. The infective dose depends upon individual susceptibility, but in general a 1000,000 dose is needed to cause the illness.

### Summary of cholera transmission by a fecal-oral route:

- Drinking-water that has been contaminated at its source (e.g. by fecally contaminated surface water entering an incompletely sealed well), during transport and/or supply, or during storage (e.g. by contact with hands soiled by feces).
- Ice made from contaminated water.
- Cooking utensils washed in contaminated water.
- Food contaminated during or after preparation. Moist foods (e.g. milk, cooked rice, lentils, potatoes, beans, eggs, and chicken), contaminated during or after cooking/preparation and allowed to remain at room temperature for several hours, provide an excellent environment for the growth of *V. cholerae*.
- Seafood, particularly crustaceans and other shellfish, taken from contaminated water and eaten raw or insufficiently cooked or contaminated during preparation.
- Fruit and vegetables grown at or near ground level and fertilized with night soil (human excreta), irrigated with water containing human waste, or “freshened” with contaminated water, and then eaten raw, or contaminated during washing and preparation.
- Corpses of cholera patients are highly infectious through their excreta. Physical contact during funerals is also a major medium. If possible funeral should be held within hours of death and corps should be enclosed in plastic bag to prevent spread of *V. cholerae*.
- Cholera treatment centers can become main sources of infection and contamination if hygiene and isolation measures are insufficient.

### Risk Factors

- Poor social and economic environment, precarious living conditions associated with:
  - Insufficient water supply (quantity and quality)
  - Inappropriate and poor sanitation and hygiene practices
  - Inadequate food safety - this includes cultural influences on food preparation and storage at home, poor food safety during preparation and storage, inadequate/lack of food

safety in markets and restaurants and by street vendors. During outbreak peel it, cook it or leave it.

- High population density: camps and slum populations are highly vulnerable.
- Underlying diseases such as malnutrition, chronic diseases and AIDS are thought to increase susceptibility to cholera, but this has not been proven.
- Environmental and seasonal factors.  
Cholera epidemics often start at the end of the dry season or at the beginning of the rainy season, when water sources are limited. This pushes people to accumulate at the fewer water sources available and increasing risks of contamination and transmission. Furthermore, the salinity can increase during the dry season and favors the growth of vibrio. Heavy rains can also provoke the emergence of cholera: flooding of contaminated water from sewage systems, latrines or septic tanks may contaminate wells or other water sources and thereby increase the concentration of organic nutrients in the water.

**In summary, the risk factors for Cholera are:**

- Overcrowding (internally displaced people, refugee, camps, population gatherings, etc.)
- Inadequate quantity and/or quality of water
- Inadequate personal hygiene
- Poor washing facilities
- Inappropriate or poor sanitation
- Inadequate food safety
- Inappropriate funeral services for cholera victims

## Clinical Features

### *Pathogenesis*

The large majority of ingested bacteria are destroyed by stomach acidity; surviving bacteria colonize intestinal cells, where they multiply and produce a very powerful enterotoxin that causes profuse watery diarrhea by a secretion mechanism. In general vibrio does not cross the intestinal barrier and do not provoke septicemia. The toxin adheres to intestinal cells and causes an excretion of isotonic fluid in the intestinal lumen: it is the enterotoxin that causes fluid loss and diarrhea.

### *Incubation Period and Period of Infectivity*

The incubation period is usually 1 to 3 days but can range from several hours to 5 days. Symptoms usually last 2 to 3 days, although in some patients they can continue up to 5 days.

Infected persons whether they are symptomatic or not, can carry and transmit vibrios during 1 to 4 weeks; a small number of individuals can remain healthy carriers for several months. Antibiotic therapy can decrease the duration of symptoms and the period of infectivity.

### *Signs and Symptoms*

- In general cholera is an acute enteric disease characterized by the sudden onset of profuse painless watery diarrhea or rice-water like diarrhea, often accompanied by vomiting, which can rapidly lead to severe dehydration and cardiovascular collapse.
- Approximately 75% of people infected with *Vibrio cholerae* have no symptoms at all.
- Another 20% develop a diarrheal illness that is indistinguishable from diarrhea caused by other organisms.
- Small proportions (2% - 5%) of infected people develop severe watery diarrhea, vomiting, and dehydration without fever or abdominal cramps.

- The stool of cholera patients typically becomes a clear liquid flecked with white mucus, known as "rice-water" stool. It is usually odorless or has a mild fishy smell.
- Other symptoms include painful leg cramp. For severe cases, patients may have cramps in the stomach, arms, or legs.
- Severely ill cholera patients can lose up to 10% of their body weight in diarrhea and vomitus. In extreme cases, fluid losses can reach up to 1 liter per hour during the first 24 hours of illness. Patients who are severely dehydrated may develop hypovolemic shock. Such patients have a low blood pressure and a weak or absent radial pulse. They may appear drowsy or be unconscious. These patients must be rehydrated rapidly using intravenous fluids in order to prevent kidney failure or death.

The typical presentation of cholera is a sudden onset of profuse painless watery stools, sometimes rice-water like, often accompanied by vomiting. There is no fever. Dehydration appears within 12 to 24 hours.

## 2. CHOLERA SURVEILLANCE

Surveillance is the collection, analysis, and interpretation of information about public health. Health officials use the information to plan, to implement and to evaluate public health interventions and activities. An effective surveillance system helps public health personnel to:

- detect outbreaks of cholera early;
- estimate how many people become sick or die;
- assess the size and extent of the outbreak;
- determine if an outbreak is spreading, and where ;
- plan the best allocation of resources (e.g. personnel and supplies);
- decide whether control measures are working;
- plan additional epidemiologic investigations to target control efforts

It is therefore important to improve the detection capacity of the surveillance system by involving all stakeholders (health facilities, private clinics, traditional healers, etc.) that deliver health services within the country's health system in the notification process.

In Ethiopia, cholera is a mandatory, notifiable disease. All suspected cases of cholera must be reported immediately to the appropriate authority. Therefore, continuous surveillance of the disease should be carried out year round, at all levels.

## Cholera Case Definition

**Suspected case** A case of cholera should be suspected when:

- in an area where the disease is not known to be present, a patient aged 5 years or more develops severe dehydration or dies from acute watery diarrhoea;
- In an area where there is a cholera epidemic, a patient aged 5 years or more develops acute watery diarrhoea, with or without vomiting.

At the health post and at community levels, a suspected cholera case can be defined as follows:

Any person 5 years of age or more with profuse acute watery diarrhea and vomiting.

**Confirmed case:** A suspected case in which *Vibrio cholerae* O1 or O139 has been isolated from their stool.

*Note: Children under 5 years of age are excluded from the surveillance case definition because the majority of diarrhea due to any cause occurs in this age group. Including these patients in the reporting system would lead to many false reports of cholera. However, in terms of case management during cholera epidemics, persons aged 2 years or more should be treated for cholera when they develop acute, watery diarrhea.*

## Case Detection and Notification

Based on the case definition, a health worker should suspect cholera upon encountering a single case of profuse, acute, watery diarrhea. This must be reported to the surveillance focal point or person in charge immediately for further investigation.

### 3. OUTBREAK INVESTIGATION

#### Prepare for Field Work

Upon receipt of a report of a suspected outbreak, activate the multidisciplinary outbreak investigation team (rapid response team) and initiate outbreak investigation within 3 hours.

The rapid response team might consist of:

- a clinician who will both verify patients' clinical symptoms and train health care workers in good case management;
- a lab technician who will take stool samples (and environmental samples) for laboratory confirmation of cholera and train health care workers in correct sampling procedures;
- an expert in information, education and communication who will assess how the community reacts to cholera and define and disseminate key health education messages;
- an epidemiologist who will initiate data collection and assess surveillance procedures;
- an environmental health expert to investigate the possible sources of contamination and provide appropriate treatment of potentially contaminated sources.

Before departure to the field, the team needs to secure relevant supplies such as the following:

- Required formats
- Guideline on Cholera Outbreak Management
- Supplies (ORS, intravenous fluid, water purification chemicals, etc. - if not certainly available on site)
- Laboratory equipment needed to take samples
- Communication equipment
- Data analysis tools (laptop, etc.)



## Conduct Field Assessment

### The main objectives of the field assessment are to:

- verify the reported cholera cases
- determine magnitude and characteristics of the outbreak
- collect specimens to confirm cholera
- decide whether additional help is needed by assessing the local capacity to respond to an outbreak, that is,
  - review case management protocols
  - assess local human and material resources for treatment of cases
  - assess ability to implement / cooperate with control measures
- create an investigation register which contains a line listing of ill persons, including their identifying and risk factor information
- identify high-risk groups and possible contaminated sources
- implement simple, on-site control measures
- provide emergency treatment supplies
- communicate findings to decision makers.

With these objectives in mind, the team should do the following activities at the health facility and community levels:

- At the health facility level:
  - collect the names and identifying information for
    - a. patients meeting the case definition and
    - b. patients treated for acute, watery diarrhea;
  - ask staff to describe the illness and their treatment protocols;
  - take an inventory of local supplies.
- In the community level:
  - interview patients and their families regarding identifying information, risk factor information, and ill contacts;
  - interview any other ill persons identified by these interviews.
- Collect up to 5-10 rectal swabs (if health facility has not already done so).

- Analyze information:
  - create a line listing, map location of cases, and graph the number of cases by date of onset of illness, identify clustering of cases;
  - determine the number of cases and deaths, attack rate, case fatality rate, potential high risk groups and sources of infection, and whether the outbreak is increasing.
- Perform treatment and control measures:
  - ensure all ill persons are treated;
  - leave a small supply of treatment materials and replace specimen collection kits at the health facility;
  - review patient management with staff (especially if treatment protocols or a high case fatality rate suggests need for improvement);
  - establish method to provide treatment if community is in a remote area and leave a small supply of Oral Rehydration Salt (ORS) with the community health worker;
  - target on-site control measures against any sources of infection identified;
  - provide simple health education messages targeted at high risk groups.
- Arrange transport of rectal swabs to laboratory.
- Report investigation results and actions taken to decision makers.
- Perform follow-up surveillance visit(s); Collect any unused treatment materials when there are no further cases.

### **Verify the Diagnosis**

Several organisms, including some serogroups of *V. cholerae*, can produce an acute, dehydrating diarrheal illness which is clinically impossible to differentiate from cholera. These organisms can occasionally cause a number of illnesses within a community, but only *V. cholerae* O1 and O139 are capable of causing widespread outbreak disease.

To confirm the presence of *V. cholerae* it is important that laboratory tests are done.

Bacteriological confirmation is compulsory on the first few suspected cases, in order to:

- Confirm cholera
- Identify the strain, biotype and serotype
- Assess antibiotic sensitivity

Confirmation of 5 to 10 stool or vomit samples is sufficient per outbreak/woreda. The confirmation of the samples will be done at Regional reference laboratories as well as at the National laboratory of Ethiopian Health and Nutrition Research Institute.

The samples should be transported using the following transport methods:

#### ***Cary-Blair Medium***

- Half-liquid gel in which a swab is planted after being soaked into the suspect stools.
- Before use: storage in cold chain
- After sampling, transport at normal temperature to the laboratory within 2 days maximum.

#### ***Peptonic Water***

- Hyper salted liquid medium in which the swab is put after being soaked into the suspect stools.

#### ***In case there is no medium***

- If Cary-Blair transport medium is not available, and the sample can reach a laboratory within 2 hours, liquid stool can be placed in a sterile screw-cap bottle and transported immediately to a laboratory.

Alternatively, strips of blotting paper can be soaked with liquid stool. These strips should be placed in carefully sealed plastic bags to prevent drying. If possible, put the plastic bags in a refrigerated box for transport.

Note that if the laboratory does not identify an organism in the first set of samples and suspected cases are still occurring, further samples should be collected until the laboratory identifies a causative organism. Afterwards, patient samples need not be collected unless the outbreak continues for several months. In a prolonged outbreak, collection of a few samples every 3-6 months should be considered in order to identify any changes in the antibiotic resistance pattern of local *V. cholerae* strains.

### **Steps in collecting rectal swabs**

Do not delay treatment of dehydrated patients to collect samples, as they can easily be obtained after oral or intravenous fluid therapy has begun. However, obtain specimens before antibiotic therapy has begun. Ideally, samples should be taken from patients within 5 days of onset of their illness (when *Vibrio cholerae* organisms are still being excreted in the stool).

To obtain fecal specimens:

- Insert a clean cotton-tipped swab into the patient's rectum or into freshly passed stool.
- Inspect the swab to verify that the cotton tip is moist and stained with feces
- Place the swab in a tube of Cary-Blair transport medium. Insert the tip of the swab well into the Cary-Blair medium.
- Place the tube in a sealed, plastic bag along with the patient's identifying information (name, age, sex, address, clinical symptoms and date).
- Send it immediately to the laboratory.

## Describe the outbreak

### **Data Collection**

#### **Health Facility or Treatment Center**

Review the patient register to verify that reported cases met the surveillance case definition. Also review the register to see if there were new patients admitted during the current week and during the 2-3 weeks preceding the investigation. Collect the following information from the register: name, age, sex, address, symptoms, date of onset of illness, date treated, treatment given, outcome (alive, dead, referred), whether sample is taken and other information related to risks. Trace the first case to mark the start of the outbreak; this is especially important in open settings.

Interview the health facility staff and the patients in case you need more information. Also conduct an inventory of the facility's amount of rehydration supplies, antibiotics and specimen collection kits used and available.

Population numbers by age group and location are also essential to specify the number of persons at risk and to calculate rates. For age it is enough to have age groups under-five years and five years and older.

#### **At the Community Level**

Visit the community where suspected cholera patients live to interview them and their families. Ask whether there are additional persons meeting the community investigation case definition (i.e., persons aged five years or older who developed acute, watery diarrhea within the past 2-3 weeks). Collect identifying information that was not found in the patient register. Ask questions concerning *potential risk factors* and record them in the investigation line listing; ask about:

- recent travel history
- contact with other persons ill with diarrhea

- recent attendance at a funeral (and the cause of death of deceased)
- water sources for drinking, bathing, and cleaning kitchen utensils
- food history: raw fruits or vegetables; fruit drinks, room-temperature foods from street vendors; cooked foods containing grains, such as rice, millet, or sorghum, eaten at room temperature; undercooked fish or shellfish
- occupation

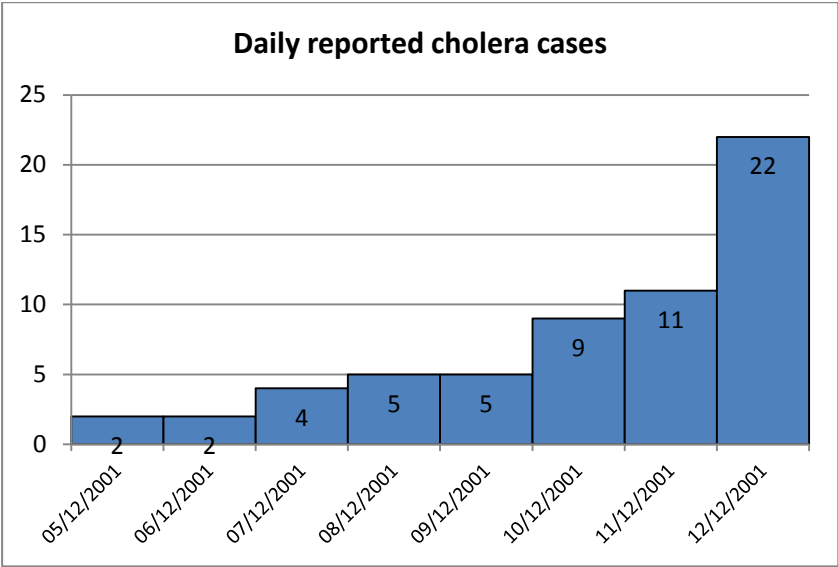
### ***Data analysis and interpretation***

The team should analyze data while still in the field, so that control measures can be targeted toward any high risk groups or sources of infection identified.

Arrange the total number of cases seen (cases plus deaths) by date of onset. Use an excel spreadsheet to enter the data.

Date of onset	5/12	6/12	7/12	8/12	9/12	10/12	11/12	12/12
Total cases	2	2	4	5	5	9	11	22

Graphing the number of cases by illness onset date will help determine whether the outbreak is increasing or decreasing and how rapidly. Draw an epidemic curve (bars) to show the evolution and amplitude of the outbreak over time with the number of cases and deaths together and separately on daily basis. If the outbreak has affected a large area, make separate graphs for each community affected.



Data collection, reporting, and analysis are done on daily and weekly basis. Consistently use reporting weeks that are the same as the surveillance week (i.e. Monday to Sunday) for all data collected during the outbreak.

Also do the following calculations and their interpretations:

**Case fatality rate (CFR):** The case fatality rate is the proportion of cases which resulted in death. To find the case fatality rate, divide the number of deaths by the number of cases, and multiply by 100. CFR can be calculated on weekly, monthly or yearly bases. While in field and investigating the outbreak calculate weekly case fatality rate.

$$CFR = \frac{\text{Total number of cholera deaths during the week}}{\text{Total number of cholera cases during the same week}} \times 100$$

Note: total number of cases is equal to total cases alive plus total deaths.

A high case fatality rate (over 5%) suggests a problem with patient management – review treatment routines and / or supply the health

facility with treatment materials. It may also be necessary to increase the community's access to care.

**Attack Rate (AR):** The outbreak attack rate, which can be expressed in percentages, is calculated by dividing the number of cases by the population at risk, and multiplying by 100.

$$AR = \frac{\text{Total number of cholera cases seen}}{\text{Total number of at risk population in the area}} \times 100$$

**Weekly Incidence Rate (WIR):** Incidence shows the rate at which new cases occur within a given period of time (usually one week). WIR can be expressed per hundred persons (percentage) or per 1000 persons.

$$WIR = \frac{\text{Total number of new cholera cases during the week}}{\text{Total number of at risk population during the same week}} \times 1000$$



### Interpreting the data

CFR is an indicator of adequate case management; WIR indicates the extent of the epidemic and the rapidity of its spread.

#### By place

**In densely populated scenarios:** In refugee camps (closed situation) or slums, when adequate response is provided, the epidemic is characterized by a *high* AR, a *short* duration of outbreak, a *rapid* peaking and a *low* CFR. AR is higher in a closed situation or in slums because of the high population density that facilitates person-to-person transmission. CFR is low because access to medical care and rehydration is quicker.

**In open situations:** In rural areas, epidemic patterns are: *low* attack rate, *longer* duration of outbreak, *later* appearance of peak and *higher* CFR.

#### By time

CFR is often higher at the beginning of the outbreak due to a time-lapse in setting-up adequate response. It can also be high at the end of the epidemic due to staff exhaustion.

**Incidence:** A common source of contamination (contaminated water source or food) is frequent at the beginning of an epidemic; in such cases the peak is rapidly reached. Person-to-person transmission then takes over and progression slows down. Common infection source and person-to-person infection can occur one after another or at the same time.

**Risk factors:** Make a line listing of patients and their identifying information. List the patients' occupations, water sources, and other potentially important risk factors shared by a number of cases, such as address, recently attended public gatherings, etc. Review each category on the line listing to identify characteristics that many cases share. A characteristic that is common to many cases may be associated with risk of illness or it may simply be common in the local population.

Characteristics that occur more frequently among patients than among people who are not ill (the local population) are likely to be associated with illness. These characteristics can identify high risk groups and sources of infection.

If the weekly incidence rate is high in a specific area, investigate for any event leading to population gatherings: funeral, religious event, etc. This can explain a sudden outbreak in a specific place, followed by person-to-person transmission and by secondary dissemination of cholera when people go back to their homes. Contamination of point sources such as water supply would also show a clustering of cases in particular areas.

**Maps:** Indicate the location of cases on a map, by date of onset of illness, if possible. Mapping the location of cases helps to establish the geographical extent of the outbreak and can assist in suggesting potential sources of infection, such as a contaminated water site.

Describe the place and draw a map focusing on places that represent a specific risk. Locate on the map key areas such as settlements, gathering places (markets, schools), water sources, health facilities, and major transportation routes. Indicate whether water sources are of good or poor quality (treated or not, protected or not).

Indicate latrine coverage (number of latrines per person) and/or sewage system and drainage facilities. Maps can be drawn by hand. Sophisticated techniques are also available (software, geographical information systems) but their use can be time consuming, therefore they are not recommended at field level except when they have been set up in advance.

### ***Implement Control and Preventive Activities***

Before leaving the field, the investigation team should undertake the following activities to ensure proper patient care:

- Ensure that all ill persons have received treatment.

- Provide the health facility with a small supply of rehydration materials and antibiotics to treat patients while the laboratory determines whether *Vibrio cholerae* O1 or O139 is present. Cary-Blair specimen collection kits should also be replaced.
- Review patient management, especially if the case fatality rate is high, or if interviews with the staff suggest that improvement is needed.
- Establish temporary Cholera Treatment Centers in an area separate from health facilities or where established health facilities cannot adequately take care of patients;
- In small communities that lack rapid access to medical care, leave a supply of ORS to hydrate patients in transit to the health facility; educate community health workers or leaders in ORS use.

The investigation team should undertake the following control activities before leaving the site:

- Treat or close any obvious sources of infection implicated by the outcome of the investigation. If this is not possible, advise the community about the contaminated source and about possible alternatives to it.
- Advise people about home chlorination.
- Provide simple health messages to community

### **Reporting and Formulating Recommendations**

The team should report the findings of the investigation immediately to decision makers, including the Woreda Epidemic Committee, as well as the Regional and National levels, and community leaders. The report must be able to answer the following questions:

- Is it cholera? Was it confirmed-how, where? Which strain is it?
- Is it an outbreak?
- When was the last outbreak?
- What case definition is used or proposed?

- How many cases and how many deaths?
- What is the geographic distribution of cases?
- What is the setting? Is it a rural, urban or closed (refugee/displaced camp)?
- What population is at risk?
- What are the WIR, CFR and AR? What is the age distribution?
- How is the epidemic curve? Is the outbreak spreading?
- Is the case decreasing or increasing?
- Can health services cope (human, material, logistic resources, access)?
- Where are the areas at highest risk? Why?
- What measures are being taken?
- Are the first steps of the response adequate (human resources, protocols, supplies)?
- What is the suspected source of the outbreak, if any was identified?
- Recommended control measures, including any specific information needed to implement control measures?
- What is the best ways to communicate with the area?
- What additional assistance is needed?

Lastly, list the key recommendations based on investigation findings.

After returning from the field, make sure that there is a daily follow-up of the outbreak situation in order to see the progress of the outbreak.

## 4. RESPONDING TO OUTBREAKS

A system (from Federal level to health facility level) which is prepared beforehand will be able to respond to any suspected or confirmed cholera outbreaks more quickly and more effectively.

Medical and logistic teams must work in close collaboration to ensure adequate case management, staff training, supplies, and availability of safe water and sanitation measures.

Overall coordination and public information are also crucial for launching an adequate response but also to reduce panic and rumors leading to inadequate actions.

Response activities have two goals - to reduce the number of deaths and to prevent new cases. To decrease deaths, clinical management of patients must be optimized by mobilizing medical staff and treatment supplies, and by increasing access to care. To prevent new cases, spread of disease must be prevented by intensive public education campaigns and environmental sanitation programs.

### The goals of the response activities are:

1. **To reduce deaths**
  - good patient management
  - mobilize staff and supplies
  - increase access to care
2. **To prevent new cases**
  - intensive public education
  - environmental sanitation campaigns
  - ensure safe water.

### Determine Staff Responsibilities

An important first step is to determine responsibilities of woreda and health facility personnel. Try to assign specific people to specific responsibilities, and be sure that they are trained and prepared to assume them in the event of an epidemic. Suggested responsibilities for the central, Regional, Woreda and health facility level are in Annex 4.

## Convene the Epidemic Committee

An Epidemic Control Committee to control cholera should be immediately convened when an outbreak due to *V. cholerae* is suspected or confirmed. If the outbreak occurs near a national border, consider forming an inter-country committee to coordinate activities.

The epidemic committee should include representatives from all the sectors and partners that are relevant in prevention and control of the outbreak.

Some of the responsibilities of the epidemic committee include:

- Plan control strategies
- Assign specific responsibilities for epidemic detection and response
- Identify and stockpile resources needed for rapid epidemic response
- Estimate resources needed to control epidemic
- Establish procedure for accessing funds
- Coordinate education of the health care community and the general public
- Coordinate and monitor the implementation of control measures
- Report on epidemic
- Evaluate impact of control measures, adjust strategy, and review performance

During an epidemic, the committee should meet every day, if possible. The committee can meet less frequently (weekly) when response efforts have begun and surveillance data suggest that additional areas are not having increased numbers of cases. At each meeting, the members (or designated subcommittees) should review each of the responsibilities listed above, and be certain that there is progress in controlling the outbreak. The committees should also meet regularly during non-epidemic periods to evaluate epidemic preparedness and monitor cholera prevention activities.

## Cholera Case Management

When cholera cases are suspected or detected, health workers need to start treatment as early as possible to reduce potential death and contamination of the environment. Hospitalization with precautions is desirable for severely ill patients. Less severe cases can be managed on an outpatient basis with oral rehydration.

The only treatment needed is rehydration as soon as possible. It is essential that all cases be rehydrated. Dehydration, acidosis, and potassium depletion are due to loss of water and salts through diarrhea and vomiting. Therefore rehydration, which consists of replacing water and salts, is necessary.

### General Principles of Clinical Management of Cholera

- The goal of treatment is to rehydrate patients and replace electrolytes lost in stool and vomitus.
- 80% - 90% of cholera patients can be rehydrated with oral rehydration therapy alone.
- Severely dehydrated patients require rapid fluid replacement with intravenous fluids. Give ORS during and after intravenous (IV) therapy as soon as the patient can drink.
- Ringer's Lactate is the preferred intravenous solution because it contains an electrolyte composition appropriate for treating cholera patients.
- For the severely dehydrated patient, antibiotics can reduce the volume and duration of diarrhea, and shorten the period of infectivity.

The case-fatality rate in untreated cases may reach 30-50%. Treatment is straightforward (basically rehydration) and, if applied appropriately, should keep case-fatality rate below 1%.

Priority interventions to reduce CFR are:

- Setting up cholera treatment structures, multiply their numbers and decentralize them.

Cholera Treatment Centers (CTC) and Cholera Treatment Units (CTU) are structures (hospitals, health centers, health posts, or any others which can be modified and used for the same purpose) designated to isolate and treat cholera cases. CTCs are placed at central levels while CTUs are smaller decentralized inpatient facilities.

Oral rehydration points (ORP) are simple structures that provide oral rehydration to moderate cases. They must be decentralized and widespread in order to provide early rehydration for moderate cases and to identify severe cases for quick referral. CTC and CTU must function 24 hours. ORP can be open 12 hours/day.

The number of cases per location will determine priority areas where treatment centers will be set up. Other interventions will subsequently be put in place.

- Establishing case management protocols and train health personnel for implementation. Avail this guideline and any other simplified treatment protocols to all treatment centers. Train the health workers on its use.
- Organizing early case detection and referral of severe cases. Community workers must be trained and equipped in order to assess dehydration levels, start oral rehydration protocols, and organize quick referral of severe cases.
- Ensuring regular supplies. Continuous availability of all the supplies required for the treatment of cholera cases is critical. Planning and requesting for more supplies before they run-out of stock is one way of ensuring the availability.



**Effective case management requires systematic and stepwise approaches.**

**The steps are:**

- Assess the patient's level of dehydration.
- Rehydrate the patient according to the level of dehydration (no, some, or severe dehydration).
- Monitor the patient frequently, and reassess their hydration status at intervals recommended by the guideline. Follow treatment guidelines for the newly assessed level of dehydration.
- Collect a rectal swab sample from the first 5 suspected cholera patients seen at the health facility.
- Give an oral antibiotic to patients with severe dehydration.
- Allow the patient to resume feeding if vomiting has stopped.
- Continue monitoring the patient and replacing fluid losses until the diarrhea stops.
- Give the patient a 2-day supply of ORS for home use and instructions on homecare.
- Advise the family on follow up and preventive actions from cholera

**Assessment for Level of Dehydration**

The severity of dehydration in patient with acute watery diarrhea is detected by using the following Key Signs:

The degree of dehydration is graded according to symptoms and signs that reflect the amount of fluid lost. The table below shows the clinical signs and symptoms useful for detecting dehydration and assessing its degree.

Status	No Dehydration	Some Dehydration	Severe Dehydration
<b>Check for pulse</b>	Present	Rapid, weak (Thready)	None pulse
<b>General condition of the patient</b>	Well, alert	Restless, irritable <sup>‡</sup>	Lethargic or unconscious <sup>‡</sup>
<b>Eyes sunken</b>	No	Yes (sunken)	Yes (very sunken and dry)

Status	No Dehydration	Some Dehydration	Severe Dehydration
<b>Mouth &amp; tongue</b>	Moist	Dry	Very dry
<b>Thirst*</b>	Drinks normally	Thirsty, drinks eagerly <sup>‡</sup>	Drinks poorly or Not able to drink <sup>‡</sup>
<b>Skin pinch**</b>	Goes back quickly	Goes back slowly <sup>‡</sup>	Goes back very slowly (> 2 seconds) <sup>‡</sup>
<b>Decide</b>	The patient has no signs of dehydration	If the patient has 2 or more signs, including at least 1 major sign, there is some dehydration	If the patient has 2 or more signs, including at least 1 major sign, there is severe dehydration
<b>Treat</b>	Maintain Hydration PLAN A	Oral Rehydration PLAN B	IV + ORS + Antibiotic PLAN C

\*Patient should be offered fluid to observe for this sign

\*\* Abdominal skin has to be pinched and released to observe for this sign

<sup>‡</sup> Major signs

Note: In adults and children older than 5 years, other signs for severe dehydration are absent radial pulse<sup>‡</sup> and low blood pressure<sup>‡</sup>. The skin pinch may be less useful in patients with marasmus (severe wasting) or kwashiorkor (severe malnutrition with edema), or obese patients.

### **Treatment of Dehydration**

#### **Plan A: Oral rehydration therapy for patients with no dehydration**

Patients should receive oral rehydration solution after each loose stool to maintain hydration until diarrhea stops. Because clinical status may deteriorate rapidly, these patients may initially need to be kept under monitoring, especially when they live far from the treatment center or when correct home treatment cannot be guaranteed. These patients may be sent home with a 2-day supply of ORS and instruct them to take ORS solution according to the schedule in the table.

**Table 1. Plan A: The amount of the oral rehydration solution that should be given to a patient for two days.**

Age	Amount of solution to take after each loose stool	ORS Sachets needed
Less than 2 years	50 – 100 ml	1 sachet per day for 2 days
2 to 9 years	100 – 200 ml	1 sachet per day for 2 days
10 years and above	As much as wanted	2 sachets per day for 2 days

Instruct the patient or caregiver to prepare the ORS solution with clean water. Also advise patients or caregivers to come back immediately if condition deteriorates, if there is repeated vomiting, if the number of stools increased or if the patient is drinking or eating poorly.

If the patient starts vomiting or develops abdominal distension, he should be given Ringer's Lactate, 50 ml/kg over 3 hours. Afterwards, ORS may be restarted. The patient's hydration status should be assessed every four hours.

***Plan B: Oral rehydration therapy for patients with moderate dehydration***

Patients must be admitted to the treatment center, receive oral rehydration solution as indicated below and be monitored until diarrhea/vomiting stops. Cholera patients with some dehydration do not need IV fluid replacement. The amount of ORS required in 4 hours depends on the weight of the patient (75ml/kg in 4 hours).

**Table 2. Plan B: The amount of the oral rehydration solution that should be given to a patient during the first 4 hours.**

Age*	<4 months	4-11 months	12-23 months	2-4 years	5-14 years	15 years or older
Weight	< 5 kg	5-7.9 kg	8-10.9 kg	11-15.9 kg	16-29.9kg	30 kg or more
ORS solution in ml	200-400	400-600	600-800	800-1200	1200-2200	2200-4000

*\*Use age only when the patient's weight is not known. If the weight is known, calculate the amount of ORS by multiplying the patient's weight in kg by 75.*

Monitor the overall response to the treatment. Some of the issues you need to look at are:

- Monitor the patient frequently to ensure that ORS solution is taken satisfactorily.
- If the patient vomits, wait 10 minutes, and continue slowly.
- Check signs of dehydration as indicated in the assessment chart, at least every hour in the first 2 hours, or more frequently if the clinical condition requires
- If there are no signs of dehydration after the first 4 hours of treatment, then follow Treatment Plan A.
- If there are still signs of moderate dehydration after the first 4 hours, then repeat Treatment Plan B for 4 hours and reassess.
- If at any time signs of severe dehydration appear or if the patient becomes confused or disorientated or if frequent, severe vomiting occurs, and then shift immediately to Treatment Plan C (IV therapy).
- If patient cannot drink and IV therapy not possible at the facility, then rehydrate the patient using nasogastric tube.

***Plan C: Intravenous rehydration for patients with severe dehydration***

Start the intra-venous treatment immediately, to restore normal hydration within 3 to 6 hours. Hang the infusion bag as high as possible

to facilitate rapid flow. Large caliber catheters (16G, 18G) should be used. If large catheters cannot be placed, two parallel IV lines can be used, to ensure rapid administration of Ringer’s Lactate.

- Ringer’s lactate is the first choice out of all the IV fluids.
- If Ringer’s lactate is not available, normal saline or 5% glucose in normal saline can be used.
- Plain 5% glucose solution is not recommended.

On average, a severely dehydrated adult patient needs 8-10 liters of Ringer’s Lactate and 10 liters of ORS for a full course of treatment.

Give Ringer’s Lactate a total of 100ml/kg divided into 2 periods as indicated in the table below (estimate 1ml =18 drops). If the patient can drink, you can also give ORS 5ml/kg/ hour simultaneously with the IV drip.

If a patient is in severe dehydration and fluid cannot be given through intravenous route, give ORS through a nasogastric tube. The amount of ORS is 20ml/kg over 6 hours. Reassess every 1-2 hours: if there is repeated vomiting or increasing abdominal distention give the fluid more slowly.

**Table 3. Plan C: The amount of fluid required to rehydrate severely dehydrated patients**

Age	First give 30ml/kg IV in	Then give 70ml/kg IV in
Infants (<1year)	1 hour	5 hours
1year old and above	30 minutes	2 ½ hours

Monitoring the progress of the treatment:

Do the monitoring frequently and take measures as follows

- If after the first 30ml/kg pulse is not strong, then repeat 30 ml/kg IV one more time according the table shown above.

- After 6 hours (for infants) or 3 hours (one year or older), the patient should be completely reassessed and treated accordingly.

The patient's condition must be assessed every 30 minutes during the first 2 hours, then every hour for the next 6-12 hours. Monitoring is based on pulse and respiratory rates; and the frequency of urine, stool, and vomiting.

During treatment, the patient's respiratory rate and pulse rate should decrease. Regular urine output (every 3-4 hours) is a good sign that enough fluid is given. Increasing edema is evidence of over hydration. Continued fast breathing and a rapid pulse rate during rehydration may be early signs of heart failure. Rehydration should be immediately stopped if a patient exhibits any of these signs. Reassess after one hour.

***In severely malnourished patients:***

Assessment of hydration status in severely malnourished patients is difficult. Many classical signs of dehydration are unreliable. For example, a child with marasmus has loose, lax skin even when he is not dehydrated. On the other hand, skin pinch may go back quickly in a child with kwashiorkor, even when he is dehydrated.

Monitoring a patient's weight is a good tool to confirm dehydration as it is always associated with weight loss. Weigh the patient and compare to its previous weight. If there is no weight loss, there is no dehydration.

Eyes may be sunken because of loss of subcutaneous fat in the orbit. When the child presents with sunken eyes, it is important to ask the mother/caretaker if it started with the onset of diarrhea.

Dehydration is considered to be severe only if the patient shows signs of shock (rapid and thready pulse often only detected on major arteries or absence of pulse; low blood pressure with narrow pulse pressure or

blood pressure undetectable; cold extremities; altered consciousness, etc.).

Rehydration requires great caution as excessive and indiscriminate use of rehydration fluid may rapidly result in over hydration and fatal heart failure.

Give ORS in some dehydration (those with no signs of shock) cases as follows:

Child and adult: start with 20 ml/kg over the first 2 hours administered at the rate of 5 ml/kg every 30 minutes, followed by 50 ml/kg administered at the rate of 5ml/kg/hour for up 10 hours (up to 10 ml/kg/hour if needed, until dehydration is corrected). Breast-feeding and therapeutic milk shouldn't be interrupted during oral rehydration

Secure IV line and give IV fluid for severe dehydration and those with signs of shock as follows:

Use Ringer Lactate: 15 ml/kg/hour over 2 hours, then stop the infusion, and change to oral treatment with ORS: 10 ml/kg/hour until dehydration is corrected (for up to 10 hours if needed). At the same time that ORS treatment begins, re-start feeding.

If there are signs of fluid overload, temporarily stop all oral intake (food and fluid) and IV fluids, administer furosemide IV (1 mg/kg, maximum 20 mg/24 hrs.), and place the patient in a semi-sitting position with legs lowered.

### **Antibiotic Treatment**

Antibiotics should be given only to patients with severe dehydration, to reduce the duration of symptom and carriage of pathogen. Antibiotics are given after IV rehydration.

Mass chemoprophylaxis is not effective in controlling a cholera outbreak. Selective chemoprophylaxis (one dose of Doxycycline) may

be useful for members of a household who share food and shelter with a cholera patient and for closed population like prison.

**Table 4. Antibiotics: Commonly used antibiotic for treatments of severe cases of cholera patients**

Age*	< 4 months	4-11 months	12-23 months	2-4 years	5-14 years	15+ years
<b>Weight</b>	< 5 kg	5-7.9 kg	8-10.9 kg	11-15.9 kg	16-29.9kg	30 kg and above
<b>Doxycycline 100mg, single dose</b>	N/A	N/A	½ capsule	1 capsule	2 capsules	3 capsules
<b>Tetracycline 250mg</b>					For age 8 years and above	500 mg each time
<b>four times /day for 3 days</b>	N/A	N/A	N/A	N/A	250 mg each time	
<b>Amoxicillin 250mg/5ml 3 times /day for 3 days</b>	1 TSP	1 ½ TSP	2 TSP	250 mg capsule	250mg capsule	500mg
<b>Erythromycin 250mg</b>						
<b>adults: 4 times/day for 3 days</b>	½ TSP	1 TSP	1 TSP	1 ½ TSP	250 mg tab	250 mg
<b>children: 3 times/day for 3 days</b>						

- Doxycycline is antibiotic of choice for adults (except pregnant women) because only a single dose is required.
- Doxycycline is usually contra-indicated in pregnant or breast-feeding women and in children under 8 years of age. However, it can be used for treating cholera, as the administration of a single dose should not have any adverse effects.



- Amoxicillin syrup is mainly for children. But it may be used for adults when the other recommended antibiotics are not available, or where *V. cholerae* is resistant to them.
- Give Erythromycin for pregnant women. Erythromycin may be used when the other recommended antibiotics are not available, or where *V. cholerae* is resistant to them.

Do not use the following drugs in patients with cholera:

- anti-emetics such as chlorpromazine and promethazine
- anti-motility drugs
- anti-diarrheal drugs
- Nalidixic Acid

### Zinc supplementation for children

Zinc supplementation in the management of children with watery diarrhea (including cholera) reduces the frequency and severity of the episode as well as the frequency of subsequent diarrhea episodes over the following 2-3 months. In line with the diarrhea management protocol and essential drug list, all children aged 6-59 months of age should receive zinc supplementation for 10 days as soon as vomiting stops, according to the following schedule:

- Children 0-6 months: 10mg (½ tablet) daily for 10 days
- Children 6-59 months: 20mg daily for 10 days

### Identifying and Treating Complications

#### **Hypoglycemia**

After dehydration, hypoglycemia is the most common lethal complication of cholera in children. Hypoglycemia is the result of diminished food intake during acute illness.

Early intake of ORS and re-starting of feeding can prevent hypoglycemia. For patients under IV rehydration who can drink without difficulty, give ORS orally as soon as possible.

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

### ***Acute pulmonary edema***

Acute pulmonary edema is related to over hydration, due to excessive IV rehydration.

It is a common risk among elderly, young children and severely anemic patients. Use of sodium chloride 0.9% instead of Ringer Lactate can also contribute. Oral rehydration does not cause pulmonary edema.

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

Management:

- Put patient in a half-sitting position, legs hanging out of the bed.
- Slow down infusion rate as much as possible.
- Administer furosemide by slow IV injection:
  - Children: 1 mg/kg/injection
  - Adults: 40 mg/injection.
- If needed, repeat the same dose after 15 minutes, according to patient's condition (maximum dose in adults: 250 mg).

### ***Renal failure (anuria)***

This rare complication occurs when shock is not rapidly corrected. Urine output normally resumes within 6 to 8 hours after starting rehydration. If not, check that patient is correctly rehydrated and try furosemide 1 mg/kg IV under close medical supervision.

### ***Hypokalemia***

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

If cramps occur, try to correct with ORS. In patients with cramps who cannot drink ORS, add 1 or 2 grams of Potassium hydrochloride (KCl) in one liter of Ringer lactate if clearly needed, closely monitor the rate of infusion and reassess.

Do not administer KCl by intramuscular (IM) injection (due to risk of necrosis) or by rapid IV injection (due to risk of cardiac arrest). Do not administer KCl on the first day (the infusion rate is too high and hypokalemia is unlikely).

**Resumption of normal feeding:** Feeding with a normal diet should be resumed as soon as vomiting has stopped. There is no reason to stop cholera patient eating. Breast-feeding for infants and young children should continue. Mothers should wash their hands and breasts before feeding.

### ***Discharging the Patient***

If hospitalized, first transfer to recovery area and keep under observation and ORS for 6 hours.

From recovery area, discharge when there are no more signs of dehydration and less than 3 liquid stools during the past 6 hours.

Advise the patient or caregiver to come back to the treatment center immediately if:

- vomiting restarts,
- diarrhea worsens,
- patient is drinking or eating poorly

Discharge with enough ORS bags for 2 days at home and instruct the patient to prepare the ORS solution with clean water.

The number of ORS sachets to give to take to home are equal to the number you use while treating patients using Plan A (see Table 1above)

### ***Advise the family on follow up and preventive actions***

- Tell the patient when to return to health facilities: When a patient is ready to be discharged, be sure the patient and the family know when to return to the health facility. They have to return to health facility when they observe one the following symptom.
  - increased number of watery stools
  - eating or drinking poorly
  - marked thirst
  - repeated vomiting
  - fever
  - blood in stool
- Instruct the patients and the families to:
  - Resume normal diet as soon as vomiting stops
  - Continue breast-feeding if the patient is infant or young child
  - Keep personal hygiene (Wash your hands!)
  - Make sure food safety (Cook your food!)
  - Use only safe drinking water (Boil or chlorinate your drinking water!)
  - Ensure proper sanitation

### **Reducing the Spread of the Outbreak**

Cholera epidemics mainly develop in areas where access to clean water, personal and domestic hygiene, and the sanitation environment are poor.

Since the number of activities to implement at the same time is high, prioritization of interventions is needed: epidemiological findings,

assessment of risk factors, expected impact of each intervention and available resources must be taken into consideration.

For these reasons, access to safe water and hygiene promotion will be selected as priority interventions in most places while sanitation, although important in breaking some of the fecal-oral transmission routes, has limited feasibility in epidemics (timeliness, resources, immediate impact).

### *General hygiene in the case treatment centers*

- When patients arrive disinfect with 0.05% chlorine solution;
- During their stay vomits and feces should be collected in bed pans;
- Their waste must be left for 10 minutes in strong 2% solution (pour this solution in the bed pan before emptying them)
- Before they leave their clothes should be sterilized in boiled water, or dipped in 0.05% solution for 10 minutes;
- Patients and relatives plates and everything should be washed with 0.05% chlorine solution;
- All people entering and exiting from a CTC should walk through foot path to disinfect the bottom of their shoe;
- Patients relatives should minimize contact with the patients waste;
- In case of death the relatives must be advised to take care during funeral ceremonies;
- All persons handling the dead body should wash their hands effectively;
- Hand washing facilities should be located at all latrines and entrance points (0.05% chlorine solution) used every time having contact with patients and working materials;
- Promotion of hygiene among the staff, patients and caretakers;
- Cleaning contaminated surfaces with 0.2% chlorine solution;
- washing the latrine slab with 0.2% chlorine solution;
- Good dry waste management and sharps needles lancets and ampoules collected it in a safety box ;

- Disposed other wastes in a dug pit and back fill the pit up on closure of the CTC.

### *Sanitation and Hygiene precautions during Closure of CTCs*

A CTC structure can remain source of infection if not properly closed at the end of outbreak. Closure of a CTC is as important as opening one.

- Spray or wash all doors, floors, walls, beds, and equipment with 0.2% chlorine, and wash away after 10 minutes with clean water;
- Non-consumable items should be stored in a safe place (store in a health facility or woreda health office) to be ready for future outbreak;
- Wash carefully all buckets that have been used for excreta with 2% chlorine and dry them in the sun;
- Fill up waste pits;
- Fill up latrine pits and soak-away pits if they were made for outbreak;
- Linens and medical gowns are soaked in 0.2% chlorine for 10 minutes and washed as normal laundry.

## 5. CHOLERA TREATMENT CENTERS

During outbreaks of cholera, identification of cholera treatment centers (CTC) is a major problem especially in resource-limited areas. The purpose of CTC is to have strict infection control, to ensure close follow-up of the cases and to minimize cross contamination. The CTC can be established in health facilities, open secured space and any other separately constructed structures.

Oral rehydration points (ORP) are treatment sites (simple structures) at very lowest level of health care delivery such as health centers and health posts. They must be decentralized and widespread for immediate management of cases with ORS on arrival and decide for referral according to the level of dehydration.

### Locations of CTC

Mortality due to cholera is reduced by providing early rehydration through oral or intravenous therapy. The organization of CTC, their location, and staffing are based on principles that help to reduce mortality rate.

Treatments of cholera can be decentralized to the community level where ORS is provided to the patient by community health worker or health extension workers through establishing ORPs. The main objectives of decentralization of CTC to ORPs are:

- To treat patients promptly;
- To screen severely dehydrated patients for referral to CTC;
- They reduce pressure on overburdened CTCs.

### *In urban settings:*

- At least one CTC with several ORPs is required
- A CTC can be located inside the existing hospital or health centers by evacuating part of the wards and separating it from other

patients or can be established in the same compound as separate structure using tents or other materials.

- A CTC must be clearly separated and isolated from the other departments, to avoid contamination of non-cholera patients.
- If the hospital or health center compound is not suitable, another site must be found such as football ground, school, etc.
- When affected areas are too far from the CTC, access can become a problem. Ambulances can be provided for referral, or consider the establishment of other CTC.
- Use of taxis or buses for transportation of the patients should be discouraged given the high contamination risk during the journey. However, if the use of these means of transportation is inevitable, the vehicles have to be disinfected immediately after arrival of the patients.

### *In rural settings:*

- The priority is to increase coverage and access. Therefore, a CTC should be established where severe cases can immediately receive intravenous rehydration. Therefore, multiple CTCs and several ORP are required.
- A CTC can be located inside an existing hospital, health center, or health posts by evacuating part of the wards and separating it from other patients or can be established in the same compound as separate structure using tents or other materials.
- A CTC must be clearly separated and isolated from the other departments to avoid contamination of non-cholera patients.
- If the hospital or health center compound is not suitable, another site must be found such as football ground, school, etc.
- When affected areas are too far from the CTC, access can become a problem. Ambulances can be provided for referral, or consider the establishment of other CTC close to the affected area.



**Table 5. Summary of criteria for selecting a cholera treatment facility**

Facility character	List of criteria
<b>Position</b>	<ul style="list-style-type: none"> <li>✓ Avoid low ground or depressions. High ground with good drainage is the best option.</li> <li>✓ Consult local leaders about the most appropriate spot</li> </ul>
<b>Distances</b>	<ul style="list-style-type: none"> <li>✓ To market = 100 m</li> <li>✓ To water source = 40m on sandy soil, 15m if clay</li> <li>✓ To other buildings and especially dwellings = 100m</li> </ul>
<b>Floor and walls</b>	<ul style="list-style-type: none"> <li>✓ Concrete floor, or, if temporary structure, a plastic sheeting cover to facilitate cleaning</li> </ul>
<b>Ventilation</b>	<ul style="list-style-type: none"> <li>✓ Well ventilated</li> </ul>
<b>Access</b>	<ul style="list-style-type: none"> <li>✓ Trucks are needed for water, food, etc., therefore a good road is important</li> </ul>
<b>Space and surface</b>	<ul style="list-style-type: none"> <li>✓ The space should be adequate for future expansion if required</li> <li>✓ Ward capacity = 2.5 m<sup>2</sup> per patient + 1 attendant <ul style="list-style-type: none"> <li>• a 29m<sup>2</sup> tent can accommodate 10 patients + attendants</li> <li>• a 82m<sup>2</sup> tent can accommodate 30 patients + attendants</li> </ul> </li> </ul>
<b>Light</b>	<ul style="list-style-type: none"> <li>✓ Hospitalization wards need good light (placing an IV line with a flashlight is not easy!)</li> <li>✓ All available light sources are needed: kerosene lamps, solar lamps, generator, etc.</li> <li>✓ Ensure regular supplies of kerosene, fuel, etc.</li> <li>✓ For a CTC a generator is advised as a backup, even if there is local electricity.</li> <li>✓ For a CTU, electricity/generators can be replaced by kerosene lamps for general lighting and individual torches for the medical staff on night duty.</li> </ul>

### The Design of the CTC

There are principles and general requirements for a standard CTC that we need to implement in all CTCs. These include:

- Good design of CTC hygiene, sanitation and isolation
- Adequate staff and appropriate job description

- Safe and adequate water supply
- Health education
- Waste and environment management

Therefore, CTCs should be designed and constructed in such a way that it helps for:

- Easy screening, isolating, and treating patients -- isolated spaces for screening, observation, admission and recovery
- Easy isolation of stores, offices and kitchen as a neutral areas
- Safe excreta disposal (latrine)
- Waste disposal
- Safe washing places including laundry, hand-washing and footbath
- Comfortable bathing (shower) place

### ***Foot bath***

Feet, shoes, and boots need to be systematically disinfected in the compulsory foot bath.

At the first two entrances (staff entry and patient entry) as well as at the exit:

- Put a wide tray or other material at the gates and place a piece of blanket or sponge (same size as the tray) soaked with 0.2% chlorine concentration
- Every person entering or exiting the CTC should soak his feet in the foot bath.
- In addition the lower parts of legs should be sprayed.
- If there is no foot bath tray use any local materials or dig a hole 10 cm deep and cover with a plastic sheet before putting soaked blanket or sponge.

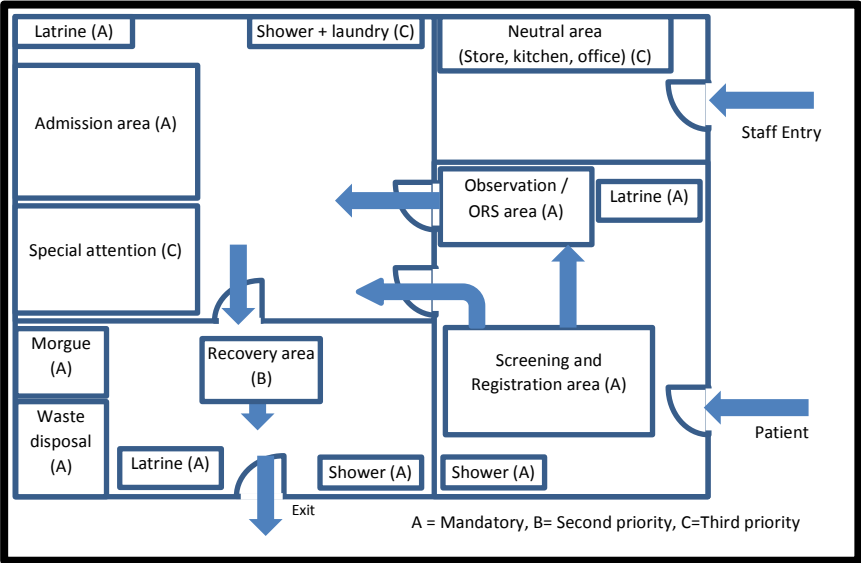
### ***Fence***

A fence must surround a CTC with a guard at the entrance / exit

- Serves as a physical barrier
- Restricts everyone from entering the CTC
- Helps to implement the hygiene rules in the CTC

**Latrine**

- The latrine should be located 15-40m away from any groundwater source and 5 to 10m from tents.
- Latrines should also be away from any channels where water flows during heavy rains.
- Provide separate the latrines for women and men and for staff and patients.
- Floor areas in the latrines should be cleanable.
- The latrine pit should be as deep as possible.
- Cover the side walls of superstructure of the latrine with thick plastic sheets or with locally available materials.
- Cover the door of the latrine with loose loopy material (thick plastic sheet).
- Use a 0.2% chlorine solution to clean the toilet regularly.



**Figure 1 Diagrammatical representation of CTC site**

***Bathing or Shower unit***

- Two bath (shower) rooms are required per CTC (one for females and one for males).
- The room should be big enough for two persons (patient and caregiver).
- The room can be located relatively near to the latrine but ensure that waste water flows away from the latrine pit, so as not to damage the pit.
- The shower should be constructed / screened with plastic sheet to allow people privacy during washing / bathing.
- The door should be away from the CTC and should be formed using a flap of plastic.
- The floor should be washable and on a slight slope falling in a direction towards a pit filled with stones to take the wastewater (remember that the wastewater will be contaminated and hence is dangerous). The slope can be formed by either digging slightly into the ground or using wood to elevate the base of the unit.
- If wooden planks are used to form the floor of the bathing unit, they should be covered with thick plastic sheeting nailed down to the wooden planks.
- The floor of the bathing unit should be washed regularly with 0.2% chlorine solution.

***Washing area or Laundry***

An isolated and safe area with good drainage is required in the compound of CTC for washing equipment and laundry. Materials should be immersed and disinfected first in 0.2% chlorine solution for 10 minutes, then washed as usual and hung to dry.

***Pit for solid waste disposal***

Solid waste must be properly disposed to prevent the transmission of *V. cholera* and other diseases related to medical waste (e.g. hepatitis B, tetanus, HIV). Waste can be divided for segregation and disposal purposes into 3 categories:

- **Soft items:** cottons, gauze, plastics, syringes, paper (waste – contaminated or uncontaminated that can be burned in drum burner).
- **Organic:** food residues, human tissue (waste that cannot be burned) should be disposed in organic pit with lid to prevent flies.
- **Sharps:** needles, lancets, ampoules, glass (waste that can cause injury and transmit disease if not disposed of appropriately).

### ***Morgue***

The morgue should be located in the CTC compound. A closed tent (plastic, material) should be used for corpses to prevent access to the body. The mortuary structure should enable effective cleaning inside, with drainage canals that flow into a soak-away pit (body fluids are likely to be highly contaminated). It should have an entrance from inside the CTC and a separate exit to allow collection of the body. If a CTC does not have the possibility to build a morgue, rapid burial should be promoted. In both situations, the body will be prepared following the same criteria (see Corpse (Dead Body) Management, below). The body should be moved as soon as possible to the mortuary as fluids will start to evacuate the body.

### ***Safe and adequate water supply***

- The adequate amount of water, at least for three days, should be stored in CTC;
- Water for consumption (for drinking and for ORS) should be chlorinated by using chlorine products;
- Make sure 60 liter/person /day water stock is prepared.

### **Hygiene, Sanitation and Isolation**

It is very important that basic hygiene, sanitation and isolation procedures are followed at all times in health facilities where patients with cholera are being treated. Failure to follow these procedures

could lead to cross-infection of other patients or infect people without cholera who come to the health center or its surroundings.

Essential principles that all health facilities and CTCs must follow:

- Isolate cholera cases from other cases and severe cases from non-severe cases.
- Contain all excreta (feces and vomit).
- Only one caretaker per patient is allowed.
- Wash hands with chlorinated water.
- Disinfect feet when leaving the center.
- Disinfect clothes of infected people before leaving the center.
- Provide hygienic and with private toilets and bathing areas for patients and caretakers.
- If patients arrive by public transport, the vehicle should be disinfected.

### *Preparation of Disinfectant at CTC*

In addition to the isolation and treating patients with cholera, cross contamination at the treatment center is prevented by using a proper concentration of chlorine disinfectant during cleaning. The concentrations of disinfectant vary according to the object to be disinfected. The presentation of commonly available chlorine concentration and preparation of different chlorine solutions for different purpose is summarized below.

**Table 6. Preparation of desired concentration of chlorine solution from commonly available chlorine sources**

Available chlorine forms	To prepare 2% Chlorine		To prepare 0.2% Chlorine		To prepare 0.05% Chlorine	
	Solution	Water	Solution	Water	Solution	Water
<b>Yellow container Birkina 5% solution</b>	1 liter	1.5 liter	400ml	10 liter	100ml	10 liter
<b>Blue container 10% solution</b>	500ml	2 liter	200ml	10 liter	50ml	10 liter

Available chlorine forms	To prepare 2% Chlorine		To prepare 0.2% Chlorine		To prepare 0.05% Chlorine	
	Solution	Water	Solution	Water	Solution	Water
Calcium hypochlorite (HTH) at 70% active chlorine	30g or 2 tbsl*	1 liter	30g or 2 tbsl	10 liter	30g or ½ tbsl	10 liter
Chlorinated lime at 30% active chlorine	60g	1 liter	60g	10 liter	1.5g	10 liter
Sodium hypochlorite concentrate at 15% active chlorine	166 ml	1 liter	16 ml	1 liter	33 ml	10 liter
Sodium dichloro-isocyanurate (NaDCC) at 1g active chlorine per tablet	20 tabs	1 liter	20 tabs	10 liter	5 tabs	10 liter
Aquatab (1g/tablet)	20 tabs	1 liter	20 tabs	10 liter	5 tabs	10 liter

\*tbsl = table spoon (1 tablespoon = 3 teaspoons)

**Table 7. Uses of different concentration of chlorine solutions**

Concentration of chlorine	Indication
0.05%	✓ Gloved hands, bare hands, and skin washing,
	✓ Rinsing dishes
	✓ washing of new patient on arrival
0.2%	✓ Disinfection of floors, spraying of homes of patients
	✓ Spraying of beds in CTC, foot spray and foot bath at entrance
	✓ disinfection of cloths by soaking for 10 minutes
	✓ Equipment
2%	✓ Disinfection of vomitus and excreta
	✓ Disinfection of corps

Note: The solutions should be freshly prepared every day, since light and heat weaken the solution. Never mix the solutions with the detergents, 0.05% and 0.2% solutions should be discarded after 24 hours. Exceptionally, a 2% solution can be prepared once a week.

If there is no chlorine available, use normal bleach that is locally available (5%) on the market.

### ***Hygiene***

- Wash hands with 0.05% chlorine water when entering and exiting CTCs. Nurses must wash their hands before, between and after attending to patients. Hand-washing is one of the most effective ways to prevent the transmission of cholera amongst patients, caretakers and staff (see Table 6 above).
- Staff must wear protective clothes (medical gowns, aprons, and boots) inside the CTC, and they should be removed before leaving the CTC.
- Properly disinfect feet when entering and leaving the CTC (foot bath).
- If food comes from outside, plates and cups should be washed in a 0.05% solution before leaving the CTC.
- After feeding the patients, the caretakers need to wash hands with 0.05% chlorine solution before eating.
- Provide hygiene education to patients and caretakers (the Behavior Change Communication materials need to be prepared in their local languages).

### ***Sanitation***

- Buckets should be placed under the hole in the CTC beds and at the bedside for vomit. The bucket can be raised on a block to prevent splashing of the surrounding area. A 2% chlorine solution should be put into the bucket before placement. Do not allow people to spit and vomit on the bare earth. Do not use these buckets for any other purposes even after properly disinfected.



- Patients' clothes are sterilized in boiling water or dipped in a 0.2% solution for 10 minutes and then washed as normal laundry. (Be careful the chlorine might bleach the clothes).
- Solid waste should be collected and burnt in the waste pit daily.
- Vehicles bringing patients should be cleaned and disinfected before leaving the CTC with a 0.2% chlorine solution.
- Local stretchers '*karezas*' used to carry and bring to the CTCs or health facilities should be disinfected with 0.02% chlorine solution or burnt.
- Needles and syringes should be disposed in appropriate sharp boxes.

### ***Disinfecting Transport and the Houses of the Infected People***

When people are transported to a health facility they may leave traces of cholera in the vehicle which may infect others. This needs to be disinfected to prevent cross-contamination. Disinfecting people's houses can also lead to opportunities for undertaking hygiene promotion or surveillance activities where new cases are identified.

- Disinfect immediately the car in which the patient was transported in such as Ambulance, Taxi, materials like bed, stretcher etc. on arrival before it leaves again. Use a 0.05 % chlorine solution for the car.
- Go immediately to the house of each patient instead of waiting until the patient is discharged and going home.
- Explain to the household that spraying of chlorine is done to disinfect and that is not poison.
- Use a 0.2% chlorine solution to do house spraying.
- Ask in which places the patient was vomiting and where there have been stools.
- Spray the latrine (if there is one), clothes, and the kitchen area (after removing food items).

- The visit of the affected household is a good opportunity to give extra hygiene promotion to the family members and the neighbors.
- At the same time, household visits are a way of active case detection, as you can detect new cases in the neighborhood.

### **Corpse (Dead Body) Management**

Keep the body separate from the patients.

- The body must be taken to the morgue immediately after death.
- All body openings (mouth, nostrils, ears, and anus) must be plugged with cotton dipped in a 2% chlorine solution and sprayed with a 2% chlorine solution.
- The body should be wrapped in a plastic sheet/bag before transporting the body. If not available, a cloth soaked in 2% chlorine can be used.
- The above procedures must be done without delay as contagious fluids will start to evacuate from the body. However, family consent must be well respected.
- Burial of the body should also be done as soon as possible. Families should be informed that dead bodies can still spread the disease. Educate community leaders and involve them to persuade family members to avoid funerals.
- If not avoidable, physical contact must be avoided with the dead bodies and provide chlorine to be used for hygiene during the ceremony.

### **Adequate Staff and Appropriate Job Description**

At CTC level at least five health workers and four support staff should be assigned. For the details of the overall staff required and job description see Annex 4.

- Senior nurse or medical doctor to serve as head of the CTC.
- Four nurses to run the CTC (2 per 12 hours).
- Two guards and two clears

One way of preventing cross contamination between cholera and non-cholera patients is to separate medical and support staff (cleaners, guards, etc.) who work in the CTC from those who work in normal clinics. Therefore, each CTC needs a minimum number of essential staff of the following categories to function independently.

- A minimum of one nurse per shift, however the number of staff depends on the number of patients.
- There should be 1 medical helper per shift that assists the nurse and prepares ORS (if possible).
- 1 cleaner / sprayer per shift– who deals with all of the cleaning and disinfecting of people’s clothes, disposal of waste etc.
- 1 guard per shift – to make sure that people follow the hand and foot washing procedures and that the isolation rules are followed. Guards need to be very strict about these rules!

## 6. WATER, SANITATION AND HYGIENE

Cholera usually affects areas that are lacking access to a safe source of drinking water, poor sanitation, and hygiene. In this situation, it is critical to communicate to the affected community that making water safer and proper sanitation and hygiene practices at household, community, and institutions level is critical.

Household water treatment is one of the cholera outbreak response activities that are effective, simple, and inexpensive. For example, if bleach is available, chlorine solution can be made easily and used to disinfect water. What is most important is to create awareness to the public to treat water using a method or technology that is available, applicable and affordable to the community affected by the outbreak. Treating water at all levels should continue on sustainable manner even after the outbreak is contained.

### Water Supply

Households need to take several actions in making water safer from the time of fetching water from the source till consumption i.e. collect, transport, store, and use. Safer water begins from the container used to collect, transport, and store and consume. Water for household, community and institution uses need to be handled properly, treated if collected from unprotected source, and stored properly to keep it safe.

There are many designs for water containers and safe water storage; it should have the following qualities amongst others:

- Locally available equipment for ease of replacement
- Tightly fitting lid or cover
- Tap or narrow necked opening
- Stable base so it does not tip over
- Opaque, it should not be transparent
- Easy to clean

## *Water Treatment Mechanisms*

Household, community, and institutions have many choices for treating water. This includes boiling, filtration, chlorination (chemical treatment), solar, ultra-violet lamp disinfection, and flocculation. Some of the water treatment options for use in Ethiopia during emergency and development occasions are described below:

### ***Boiling***

The aim of boiling is to destroy pathogens within suspended particulate matter in the water. It is an effective, traditional, physical method and more reliable than chemical disinfection or complete sterilization. In general, if done properly, boiling of water can provide safe water to a population that has no alternatives for other treatment methods. Boiling can be applied for small quantities of water. To achieve complete sterilization of water, it needs to follow the next processes:

- Boiling must continue for 5-10 minutes after reaching the boiling point.
- Immediately cool and safely store boiled water for consumption since it may be re-contaminated through poor handling and storage.

### ***Chlorination***

The aim of chlorination is to destroy the pathogens that cause diseases through chemical means. To achieve this, a chlorine dose must be sufficient to:

- Meet the chlorine demand of the water, that is, it must oxidize the contaminants (including reacting with any organic or inorganic substances).
- Leave a residual, in order to protect against further contamination by ensuring a free residual of 0.2-0.5 mg/l of chlorine in the disinfected water. If the residual chlorine is higher than 0.5mg/l, it may give an unpleasant taste.

- The chlorine dose is expected to be in the range of 1-5mg/l depending on the physical parameters of the water.

One of the pre-condition for effective chlorination is that the turbidity of the water must be low. In an emergency water supply the aim is to have a turbidity of less than 5Nephelometric Turbidity Unit (NTU). Chlorination will function relatively effectively up to 20 NTU, but measures should be taken to reduce turbidity to increase the ability to ensure proper chlorination.

You can chlorinate water from any water sources for drinking purpose using different chlorine forms or concentrations that are currently available in the market based on the information indicated below in table 8.

**Table 8. Commonly used chlorine chemicals and the amount of water treated.**

Available chlorine forms or concentrations	Amount of chlorine required	Amount of water to be treated
<b>Woha Agar (Waterguard) bottle of 150ml</b>	1 cup of the bottle or 3 ml	20 liters
<b>Aquatab (1g/tablet)</b>	1 tablet	20 liters
<b>PUR (1 sachet = 4gm)</b>	1 sachet	10 liters
<b>Bishangari (1 sachet = 2.5gm)</b>	1 sachet	20 liters

Follow the following procedures for the use of water purification chemicals:

#### ***Woha Agar (Water Guard)***

- Pour 20 liters of water into a jerry can.
- Use the cap of the bottle and pour 1 cap of water Guard and add it to the 20 liters of water.
- Close the jerry can and shake to mix the contents.
- Wait for 30 minutes until the germs die.

- The water is ready to be used after 30 minutes.
- If necessary pour the treated water into another container.
- To avoid contamination close the water container.
- Use separate jug to fetch water from the container

### ***Aquatab***

- Prepare 20 liters of water to be treated, if the water is not turbid, treat by adding one tablet. But if the water is turbid, filter through a cloth and then add 2 tablets
- After adding the tablets, mix the tablets with the water thoroughly
- Wait at least for 30 minutes and then use the water for intended purposes

### ***PUR (Purifier of Water)***

- Prepare 10 liters of water to be treated
- Open the sachet and add the contents to an open bucket containing 10 liters of water
- Stir for 5 minutes, let the solids settle to the bottom of the bucket
- Strain or filter the water through a cotton cloth into a second container and wait 20 minutes for the hypochlorite to inactivate the microorganisms.
- Use the water intended purposes.

### ***Bishangari***

- Prepare 20 liters of water to be treated
- Open the sachet and add the contents to an open bucket containing 20 liters of water
- Stir for 5 minutes, let the solids settle to the bottom of the bucket
- Strain or filter the water through a cotton cloth into a second container, and wait 20 minutes for the hypochlorite to inactivate the microorganisms.
- Use the water intended purposes.

### ***Solar disinfection of water (SODIS)***

The aim of solar disinfection is to destroy pathogenic germs that may be present in the water based on the principle of pasteurization. SODIS is a method of disinfecting water using only sunlight and plastic polyethylene bottles. The polyethylene bottles are bottles that are currently used to sell mineral water or soft drinks.

SODIS is a free and effective method for decentralized usually applied at the household level.

#### **Steps of implementing SODIS**

- Collect several colorless, transparent polyethylene water bottles with few surface scratches. Remove the labels on the bottle and wash the bottles before use.
- Fill the bottles with water from the source. To improve oxygen saturation, fill the bottles to three quarters, shake it for 20 seconds with the cap on, then fill it completely and recap. Very cloudy water with turbidity higher than 30 NTU must be filtered prior to exposure to the sunlight.
- Expose the filled bottles to the sun for a minimum of 6 hours on a sunny day. If it is a cloudy day expose it for 2 days. Bottles will heat faster and to higher temperatures if they are placed on a sloped sun-facing corrugated metal roof as compared to thatched roofs.
- Now the water is clean and it can be consumed directly from the bottle or poured into clean drinking cups.

Consider the following when using SODIS:

- The bottles must not hold more than 3 liters.
- Do not use old bottles with too many scratches on it.
- SODIS does not work satisfactorily during lengthy periods of rain, cloud cover.



### ***Slow sand filtration***

The aim of slow sand filtration (SSF) is to reduce bacteria, turbidity and organic levels, thus reducing the need for chemical treatment of the water. The process percolates untreated water slowly through a bed of porous sand, with the filtered water coming out the other side. When properly constructed, the filter consists of a bed of fine sand, a layer of gravel, a system of under drains to collect the filtered water on the other side, and a flow regulator to regulate the flow. SSF is relatively inexpensive to build and is useful in small scale water supply systems.

Removal efficiency for harmful organisms is not guaranteed in the SSF process. Therefore, treatment or boiling before consumption is recommended.

### ***Biological Filtration (Bio-sand Filter)***

The aim of a bio-sand filter is to make water suitable for households and is smaller version of the slow sand filter which is adapted for intermittent use. Key characteristics of a bio-sand filter include:

- Inlet reservoir zone – where water is poured into filter
- Stand water zone – this water keeps the sand wet while letting oxygen pass to the bio-layer.
- Biological zone - develops at the top 5-10cm (2-4”) of the sand surface. The filtration sand removes pathogens, suspended particles and other contaminants.
- In the slow sand filters, a biological layer of micro-organisms (also known as Schmutzedecke) develops at the top 1-2cm (0.4 - 0.8”) of the sand surface.
- Non – biological zone – contains virtually no living micro-organisms due to the lack of nutrients and oxygen.
- Gravel zone – holds the sand in place and protects the outlet tube from clogging

The filter container can be made of concrete or plastic and is filled with layers of specially selected and prepared sand and gravel. The filtration

process involves the pouring of contaminated water into the reservoir on an intermittent basis. The water slowly passes through the diffuser and percolates down through the bio-layer, sand and gravel. Then the treated water flows from the outlet tube and ready for consumption.

### ***Water Purification Chemicals Distribution Protocol***

The distribution of water purification chemical to the affected kebeles should start as soon as one case is reported from a kebele or villages.

#### ***Criteria for prioritization***

In times of shortage of water treatment/purifying chemicals, it is important to prioritize the distribution based on highest needs. The following areas/populations should be of priority:

- Pastoralist areas
- Daily laborers working in state farms and agro industries
- Areas with low latrine coverage and/or utilization:
- Bordering kebeles with potential risks of being affected. The distribution should be available to all, however, in times of severe shortage, distribution should again take into consideration additional criteria such as:
  - Villages sharing the common water sources with the affected kebele,
  - Kebeles located downstream from the affected kebele,
  - Camps having unsafe drinking water sources, i.e. refugee camps, military barrack, state farms etc. These areas will be of particular concern when there is one case reported or a neighboring kebeles is affected.

#### ***Quantification of the amount to be distributed and frequency***

This should be done based on the following assumptions:

- Daily water requirement for an individual is estimated to be 20liters for one day.

- An average of 5 individuals lives in a household; this can be adjusted if exact number is available.

*For example:*

*If a kebele has 1,000 households, the amount of water required is 100,000 liters (100 liters x 1,000 households) for one day. So the amount of the chemical you need for the kebele should treat 100,000 liters of water.*

*Then calculate the amount of chemical needed. Using water guard: 20 liters of water can be treated with 3ml, so 100,000 liters is treated with  $100,000 \times 3 / 20 = 15,000\text{ml}$  of water guard or 100 bottles of 150ml. If you decide to treat for a set number of days (D) you multiply 100 bottles with number of days (D), i.e.  $100 \times D$ .*

*This applies in areas where the water has relatively low turbidity. In areas where the water is visibly turbid double this amount of water guard is needed.*

### **When to stop distribution of water guard?**

In all areas the distribution of treatment chemicals should continue in order to assure supply of adequate supply of treated water for at least one month after the last case is reported. However, in areas where the risk is high, the distribution should ensure treated water supply for a minimum of two months. High risk areas include:

- Highly crowded areas
- Non flowing water sources, such as, ponds

## **Sanitation and Hygiene**

### **Prioritizing Sanitation Hygiene at Communities**

The following criteria can be used to prioritize communities for sanitation interventions:

- Communities where cholera cases are being reported and areas sharing a border with the affected localities;

- Communities with low coverage of protected water supply and areas frequently affected by drought.
- Communities with low latrine coverage, poor community sanitation, and poor hygiene practices;
- Areas frequently affected by water-borne disease outbreaks;
- Areas with a high population density (commercial farms, settlement areas, public institutions such as schools, prisons, camps, religious institutions; urban slums, peri-urban communities).

## **Sanitation Interventions**

### ***Maintain clean home and surroundings***

It is very important to maintain proper hygienic conditions in our house and surrounding because unhygienic environment increases many risks including cholera, dust induced diseases. Moreover, it is also very important to clean regularly because most of the risks develop when do not clean our home and surrounding for long time. It is very important for people to learn the importance of proper cleaning. Follow the community mobilization tips to address issues of clean home surroundings. Key tips are summarized as follows:

- Set clear objectives (understand what you need the community to do).
- Plan together, select community representatives and develop a plan that can be achieved in defined time frame.
- Indicate which activity is executed by whom and when.
- Organize the community for action.
- Conduct an intensive promotional campaign to bring all community members on board for the required act.
- Act together.
- Evaluate together.

***Construction and use of latrines:***

Conduct sanitation and hygiene promotion activities by targeting all households in the affected and high risk areas. The following issues should be considered during the construction of household latrines:

- The depth of the pit should not be less than 2 meters.
- The direction of wind should be from the house to the latrine site.
- The location of latrine from water source should not be less than 30 meters depending on the underground water table.
- The location of latrine from the living room, kitchen, from neighboring house and other facilities should be at least 6 meters.

In addition:

- Encourage all households in a village to construct and use latrines.
- Discourage open field defecation, even if you are outside in your home compound; in case of open field defecation, dig the soil to at least 30cm and cover it after defecation.
- Wash hands with soap/ash/sand/after visiting the toilet or defecation
- Encourage children to use latrines; clean immediately and bury children's feces if open defecation occurs.
- The floor of latrine pits should be sealed to prevent light from entering into the pit and prevent breeding of flies.

***Hygiene***

Food hygiene

- Wash hands with clean water and soap/ash/sand before preparing, eating, serving food to other family members, feeding a child.
- Avoid eating raw food items during cholera outbreak, such as vegetables and wash fruits thoroughly before eating.
- If possible, always eat fresh foods; reheat cooked thoroughly before eating or serving to other people. Always feed fresh food to children.

- Wash utensils used for preparation of food, eating of food and drinking of water (knives, pots, dishes, forks, spoons, etc.) thoroughly with detergents.
- Cover food items tightly to avoid contact of flies; put cooked foods in places where animals such as cat, dog, and rat cannot reach.

### ***Minimum hygiene standards for food and drink establishments***

Commonly, food and drinks are served in hotels, restaurants, schools, camps, abattoirs, butcher shops, prison, etc. In addition, festivals, traditional ceremonies, weddings, funerals, and other public gatherings provide food and drink that may be contaminated. The following guidelines should be followed wherever food and drink is served.

#### ***Food handlers***

- Ensure food handlers follow hygiene measures strictly (finger nails should be kept short; wash hands with clean water and soap after visiting latrine, before preparing food, before serving food to consumers).
- Food handlers should wear a clean gown and apron/hair cover when preparing and serving food; gowns used during food preparation and service should be removed when visiting toilet, cleaning rooms and during compound sanitation.
- Food handlers should not prepare or serve food to consumers if they feel symptoms of diarrheal disease; following a cholera outbreak handlers should be tested and certified free from disease causing organisms before resuming work.
- There should be separate latrine and shower facility for food handlers.

#### ***Hygiene precautions during preparation, transportation and storage of food***

- Clean water should be available for washing food utensils, for preparation of food, for drinking, and for personal hygiene; treat

water used for these purposes by using household water treatment chemicals if water from protected sources is not available.

- Food items should be kept in a tightly covered container in order to avoid contamination by flies, dust, insects, and rodents.
- Rooms, shelves and food storage equipment should be cleaned before starting preparation of food.

### **Latrine service in food and drink establishments**

- Ensure availability of latrines: floor and walls of latrines should be kept smooth with no cracks or holes; it should also be kept clean, open for customers use during service hours.
- Ensure availability of water and soap near the latrine for washing hands after visiting latrine (post messages to promote importance of hand washing)

### **Hand-washing practices**

Hand-washing with soap and safe water (water is only safe if has been boiled, or has been treated with a chlorine product) is one of the easiest ways to help prevent the spread of cholera. Soap helps remove dirt and cholera germs from hands. A person can help protect themselves and their family from cholera by washing their hands often. Unwashed (or poorly washed) hands can transfer cholera germs to food, water, and household surfaces.

When one should wash his/her hands? You should wash your hands often, especially:

- Before you eat or prepare food
- Before feeding your children
- After using the latrine or toilet
- After cleaning your child's bottom
- After taking care of someone ill with diarrhea

How to wash hands? Steps to follow while washing your hands are:

- Wet your hands with safe water

- Lather thoroughly with soap. If there is no soap, scrub your hands with ash or sand.
- Cover all surfaces with soap, including under nails.
- Rinse hands well with safe water.
- Dry hands completely with a clean towel, if available, or air dry

### *Sanitation and Hygiene at institutions*

During the previous cholera outbreaks, institutional settings (especially spiritual holy water sites; investment farms) were found to be the main risk areas from where cholera circulated. Hence, institutional sanitation and hygiene (schools, health institutions, prison, churches, mosques, and other public institutions) is crucial to be addressed during cholera outbreaks.

#### Minimum sanitation standards for institutions

- Construct separate latrines for male and female users; ensure availability of water and soap near the latrines for hand-washing.
- Always ensure that latrines are kept clean; there should be someone assigned to examine the cleanliness of latrines and clean immediately if needed.
- Maintain the floor and superstructure of latrines in good condition; undertake maintenance work if there are holes, cracks, etc.
- Post messages around latrines to promote the importance of latrines; proper use of latrines, hand-washing, etc.
- Organize hygiene education sessions in consultation with local health institutions; teach key hygiene messages before starting daily teaching, preaching program.

#### Management of liquid waste in food and drink establishments

- Liquid waste from kitchens, hand-washing, latrines, etc., should not be drained onto the ground; liquids should be connected by pipe to a septic tank or seepage pit.



- In case if the institution does not have septic tank, liquid waste should be kept in a plastic container away from the kitchen and disposed properly each day.
- Food preparation, storage, and service areas should always be kept clean.

## 7. INFORMATION, EDUCATION & COMMUNICATION

An epidemic of cholera can be more quickly controlled when the public understands how to help to limit the spread. Health education is crucial to ensure the participation of the community.

- Select the best way to disseminate messages to the community:
  - Communication through radio, posters, talks, etc.
  - In the local language.
- Give clear information – but not too many messages.
- Adapt messages to the social, cultural, and economic circumstances of the community and to its ability to cope with a change of behavior (for example, chlorine or soap may not be affordable in poor communities).
- Organize talks in places where people are usually waiting (health care facilities, hairdressers, etc.).

Informing the public is an integral and important part of cholera control strategies: the population must be informed of the epidemic and of the measures to be taken, including the importance of early case identification as well as knowledge that case management is free of charge (this is usually the case in most countries when an epidemic is declared).

Consult local authorities to adapt the messages to the local context and to know which media methods are most appropriate in each specific context. The local language should be used.

Rumors regarding sources of the disease and individual protection are frequent during cholera outbreaks, especially in areas not previously hit by cholera. Public information should clarify these rumors with specific, adapted messages – aimed both at those potentially spreading false information (e.g. religious leaders, traditional healers), and those who may receive it. For such rumors, it is important to coordinate with local authorities before discussing with target groups.

## Key messages to give to the community

- Come to the health care facility as soon as possible in case of acute watery diarrhea.
- Start drinking ORS at home and during travel to the health care facility.
- Wash your hands before cooking, before eating, and after using the toilet.
- Cook food.
- Drink safe water.
- Go immediately for treatment in (give location of CTC/CTU and ORPs)
- All treatment at the cholera structure is free of charge

### **SAFE = CONTAINED**

- If possible, use a latrine
- If no latrine:
  - bury it
  - cover it
  - put it in plastic, banana leaves
  - go to isolated area, away from water point and away from people

\*\* These apply to everyone, including children

\*\* Pay special attention when someone in your household is sick

### **RUB IT OFF!**

If you have soap and water – use it

- Or else, rub it off with:-
  - Ash
  - Sand
  - Leaves
- When?
  - before you eat

- before you prepare food
- before you feed children
- after caring for children
- after going to the toilet
- after handling bodies

### ***BEFORE DRINKING IT, TREAT IT***

Use the cleanest source you can find

- boil it
- filter it
- chlorinate it- use PUR, WuhaAgar, Aquatabs, Bishangari or other certified chemicals
- If you can't treat it:
  - avoid water you think could be contaminated
  - USE AN ALTERNATE SOURCE
- Storage
  - use narrow-mouthed container
  - clean your container

### ***NO RAW FOOD!***

Boil it, cook it, clean it, or forget it!

- Avoid undercooked or raw meat
- Cook all vegetables
- Clean and cover leftovers
- Use clean utensils and dishes

### ***WHAT GOES OUT MUST COME BACK IN!***

Treat / prevent dehydration

- replace lost fluids with
  - ORS
  - Soup
  - Water from cooked food
- Drink a glass of something for each episode

- As you walk to the nearest cholera treatment center (or health facility), rehydrate!

***CARE FOR YOURSELF AS YOU CARE FOR THE DEAD***

- Wrap your body in plastic
- Wrap your hands (or wear rubber/plastic gloves)
- Wash your hands
  - Especially after contact with the body
  - Make sure family members do the same

## 8. MONITORING AND EVALUATION

**Monitoring** is the ongoing collection and review of information on coverage and utilization on an on-going basis. The major reasons why we need to monitor the cholera intervention include:

- To improve intervention activities by identifying aspects that are working as planned and those that need correction.
- To modify interventions as per identified needs
- To track and demonstrate results at the program or community level

Thus monitoring is used to determine how well an intervention is being implemented

- At different levels
- At what cost
- Also tracks the changes occurring due to interventions being implemented (which could be negative or positive)

Monitoring of all aspects of a program should continue throughout the response period and as long as an intervention is active in the outbreak area.

**Evaluation:** is a process of data collection designed to assess the effectiveness of our intervention in attaining its originally stated objectives and the extent to which observed changes are attributable to the intervention.

In cholera outbreak some of the important monitoring and evaluation activities are:

### *Surveillance*

As outbreaks quickly evolve and for evidence based action timely reporting by all level is very crucial. Even before we send a written report, data should be transmitted by fastest means available like

radio, telephone, or internet. A copy of any declaration (written or oral) must be kept by the facility.

Data collection, reporting and analysis are done on daily and weekly basis. Use the same reporting week as used by the IDSR system (i.e. Monday to Sunday).

Sometimes, data need retrospective update, errors in collection or reporting can occur, or cases may be reported late. If late case reporting occurs, check that cases are registered in the week they occurred, not in the week they were reported. Zero reporting should be initiated when no new cases occur, taking care to distinguish between zero case and missing data.

Analysis by time, place and person should be done at each level and feedback provided. All staff involved in cholera outbreak response should receive regular updates.

### ***Treatment facility data and interpretation:***

#### ***Weekly/daily admission numbers and evolution over time***

The number of cases and deaths per site, per week supported with graphs needs to be monitored regularly. Whenever possible, attack, incidence rates should also be charted to allow better comparison between locations.

#### ***CFR and time of death***

The CFR and time of death provides an indication on quality of case management and access to appropriate care facilities. A low CFR indicates that case management efforts are adequate while a high CFR points to a need for further action. The target is to keep the CFR under 1% with zero deaths 4 hours after admission. If the CFR exceeds 5% urgent investigation is need to understand the reason.

If patient dies during first hours of arrival it reflects late arrival (e.g. access problem, awareness). In principle if case management is

adequate no death should occur more than 4 hours after admission, but even if late arrivals occur, rapid initiation of IV dehydration leads to quick recovery. In CTCs, always record date and hour of entry and exit (exits include death).

If the CFR is over 1%, it may indicate a case management problem.

Actions:

- Check protocols, including quantity and rapidity of Ringer's lactate administration.
- Check medical files: age, sex, address, and time of arrival. Review the files of dead patients as well as other patients. Check patient monitoring; how many times was the patient's condition checked after admission.
- Discuss the circumstance of each death with the staff.
- Assess for other concomitant disease: is there a high number of acute pulmonary edema, infections?
- If most deaths occur at night, check for staffing problems and patient monitoring; reorganize the night duty.

*If a death occurs within 4 hours of admission, it indicates an accessibility and/or case management problem.*

Actions:

- Check date and time of arrival, compare with date and time of death
- Assess delay before admission by checking address and location. If many patients come from the same area, discuss ability to form a new CTC or to organize an ambulance system. Confirm whether the local population has been well informed about existence of free treatment facilities.
- Monitor staff reactivity upon admission, rapidity of screening, rapidity of hospitalization of severe cases, rapidity of IV rehydration.



- Check if protocols are correctly implemented.
- Check for medical for any underlying chronic illness.
- If nocturnal deaths occur, supervise during several nights, if needed add staff during the night round.

### **Monitor consumption of supplies**

#### ***Ringer's Lactate***

The average needs per adult patient are 8-10 liters of ringer's lactate and 10 ORS sachets. In practice, there is a tendency to over-prescribe Ringer's lactate, by prescribing for non-severe cases. When there is shortage of IV fluids, under-dosing of IV fluids per patient can occur.

#### ***ORS***

Reduced ORS use means the rehydration started too late or the quantity administered is too little. Compare the quantity of Ringer's lactate used for the same patient.

#### ***Antibiotics***

Only severe cases require antibiotics. If consumption is high, check medical files and verify the quality of medical examinations.

### **Monitor caseload**

Calculate the weekly attack rate using the number of admissions and cases seen as outpatients. Its comparison is helpful to estimate the future caseload, balance of supplies, staff requirement etc...

#### ***Average duration of stay***

A normal patient stay is 2 days in a CTC and 3 days in a CTU. The following formula is used to estimate the average duration of stay.

$$\text{Average duration of stay} = \frac{\text{Total patient days}}{\text{Total number of discharges}} \times 100$$

If the average length of stay is over 2 (or 3) days:

When there is a high population of severe cases, improve active case finding and check the number of functioning ORPs. Check if admission criteria (screening) and treatment protocols are well followed. Check for other concomitant diseases.

### ***Bed occupancy rate***

Bed occupancy may indicate needs regarding the need and placement of the CTC. The following formula is used to estimate the occupancy rate, during the period assessed:

$$\text{Bed occupancy rate} = (\text{Total bed days}) / (\text{Total patient days}) \times 100$$

*If the bed occupancy rate falls below 80%:*

- Implies less needs = end of epidemic? Are there fewer cases in a specific geographical area while epidemic continues in another woreda? If yes, considering re-location of the CTC, staff, and supplies.
- Is it under-utilization due to lack of information, accessibility problem? Check for delays in arrival or time of death.

*If bed occupancy exceeds 100% there is an overload:*

- Increase number of beds or open another CTC and check the average length of stay

### ***Accessibility /acceptability***

Review the proportion of severe cases compared to total cases. A high proportion of severe cases indicate accessibility problems.

- Check if there are late arrivals and possible reasons:
  - Distance /transport problem
  - Lack of awareness
  - Insufficient confidence in care
  - Alternative treatment seeking behavior
  - Stigma

- Vulnerable population (malnourished/ exhausted /other illness)
- Review public information strategy and reinforce active case finding (strengthen home visit and community health workers network, seek traditional/religious leaders' support)

### ***Effectiveness of treatment network***

- Number of referrals to CTC from lower treatment units.
- Information from community leaders about cases and death occurring in the community without treatment contact.
  - Is information sharing and feedback sufficient?
  - Is input of community health worker clear?
  - Are public information messages correct?

### ***Resources /Inputs for epidemic control***

Review the overall level of resources provided:

- Numbers of CTC set up in each area /region
- Overall number of persons treated (cases & death)
- Consumption per patient: liters of Ringer's lactate, ORS sachets, water, chlorine
- Number of health education sessions, radio broadcasts, etc.
- Overall budget.

**Table 9. Summary of indicators and their interpretation in a CTC and higher levels (woreda, region, etc.)**

Indicator	Target	Interpretation	Analysis	Action
<b>CFR</b>	< 1%	Quality of care  Access to appropriate treatment	If > 1 %, check: <ul style="list-style-type: none"> <li>• Adherence to protocols</li> <li>• Medical file monitoring</li> <li>• Any other disease</li> <li>• Did death occur at night</li> <li>• Accessibility of CTC</li> </ul>	<ul style="list-style-type: none"> <li>• Review case management, protocols</li> <li>• Train staff</li> <li>• Review staff duties/roster</li> <li>• Check supplies</li> <li>• Referral mechanism</li> <li>• Location of CTC/CTU</li> </ul>
<b>Time of death</b>	No deaths 4 h after admission	Quality of care Accessibility	If many deaths during first 4 hours check: <ul style="list-style-type: none"> <li>• Delay between onset/ arrival</li> <li>• Address, location</li> <li>• Staff reactivity</li> <li>• If this happens during night</li> <li>• Protocol implementation</li> </ul>	<ul style="list-style-type: none"> <li>• Public information</li> <li>• Strengthen early case detection</li> <li>• Recognize staff if needed</li> <li>• Train staff</li> </ul>
<b>Consumption</b>	RL: 8–10 liters ORS: 8–10 liters (in adults)	Quality of care Effectiveness	<ul style="list-style-type: none"> <li>• RL low: under prescription</li> <li>• RL high: over prescription</li> </ul> Check shortage ORS low: check why more severe cases	<ul style="list-style-type: none"> <li>• Review supplies and protocols</li> <li>• Train staff</li> </ul>

Indicator	Target	Interpretation	Analysis	Action
<b>Bed Occupancy</b>	100%	Effectiveness Accessibility	If < 80%, check: <ul style="list-style-type: none"> <li>Decreasing AR = end of epidemic?</li> <li>AR remains high = under utilization</li> </ul>	<ul style="list-style-type: none"> <li>Check other worded areas and reorient</li> <li>Strengthen public information (check delay before admission)</li> </ul>
<b>Length of stay</b>	2 days in CTC 3 days in CTU	Effectiveness Quality of care	If longer, verify: <ul style="list-style-type: none"> <li>Active case finding</li> <li>Admission criteria</li> <li>Discharge criteria</li> <li>Treatment protocols</li> <li>Other diseases</li> </ul>	<ul style="list-style-type: none"> <li>Strengthen public information</li> <li>Review protocols and train staff</li> </ul>
<b>Proportion severe cases</b>	75% in treatment centers	Effectiveness Access	If higher, check: Number, type and distribution of treatment centers Late arrival? Check reasons Lack of information?	<ul style="list-style-type: none"> <li>Review location and distribution of structures</li> <li>Increase number of structures</li> <li>Increase public awareness</li> </ul>
<b>Resources/inputs</b>	List all resources utilized and needed		Compare with AR, CFR, and geographical information	

## 9. CHOLERA PREPAREDNESS

Preparedness is the range of deliberate, critical tasks, and activities necessary to build, sustain, and improve the operational capability to prevent, protect against, respond to, and recover from incidents. Cholera preparedness creates awareness, designs plans for intervention and prepares coordination in order to optimize the response when outbreak occurs. Cholera preparedness is appropriate in an area that is at risk of the outbreak. It is recommended in open settings and compulsory in camps. To be effective, it must be done before the start of the outbreak.

Preparedness should be organized at all level including health facilities, woredas, zones, regions, and Federal levels.

Preparedness includes some of the components listed here;

- Establishing or activation of public health emergency management taskforce
- Tasks distribution among different stakeholders
- Identification of coordination unit
- Identification of laboratories including reference laboratory
- Identification and training of staff at health facility and higher levels
- Planning of drugs and supplies required
- Identification of potential treatment sites
- Designing a public information strategy
- Setting aside emergency fund
- Installation of a suspected cases-detection and notification system through existing health reporting systems

## Cholera Preparedness Organization

### ***Create or reactivate a taskforce***

If there is an existing emergency or cholera taskforce, then reactivate. If no previous taskforce has been established, form the taskforce and include members from all departments and sectors such as health, water, education, administrative authorities, partners and the community (religions leaders, elders) etc.

### ***Prepare Cholera Preparedness Plan***

The taskforce should prepare a clear plan to be updated on a regular basis. In addition, each agency involved should prepare its own internal plan of action.

For a quicker response the taskforce will design a guide and develop training plan. This plan will include detailed steps on what will be done, where and by whom (with an alternate person if possible) and quantification of resources and supplies needed.

In addition the following specific issues will be also described:

- A single, standard case definition
- Means and flows of communication
- Investigation protocols
- Identification of a reference laboratory and media for transportation of samples
- Tables, graphs and maps
- Calculation of medical and nonmedical needs based on an expected number of cases
- Public information material
- Identification of high risk areas plus potential prevention programs
- Potential sites for setting up a CTC/CTU
- Identification and training of staff
- stock allocation in poor access areas
- Funding possibilities

In order to make sure the preparedness is functioning well, always do the following activities:

- Regularly check supplies and expiry date
- Organize refresher courses
- Hold regular meeting to ensure the role of everyone is well prepared.
- Include preparedness in the annual woreda plans
- Organize a meeting before expected /seasonal outbreak

### Identifying Resource Needs

The public health emergency management unit shall ensure adequate supplies for the management of cholera are available, as part of the preparedness plan. While doing preparedness, estimate needs based on the following assumptions. The table below gives an estimate of the amount of supplies needed according to the number of people in area at risk.

#### **General assumptions:**

- At risk population to be identified
- Attack rate = 0.2% (0.002) – or calculate and use the exact figure if you have previous data<sup>2</sup>
- Expected number of severe cases = 20% - or calculate the exact figure if you have previous data
- Pregnant mothers = 2%

**Table 10. Estimate of resource needs based on expected caseload**

Items	Assumptions	Formula
<b>ORS Sachets (for 1 liter each)</b>	650 sachets for 100 cases	Expected number of cholera cases x 6.5
<b>Ringer's lactate, 1 liter, with giving set*</b>	120 bag for 20 severe cases	Number of severe cases x 6

<sup>2</sup> In a rural community of 5,000 people or less, the attack rate might reach 2%.



Items	Assumptions	Formula
<b>IV cannula</b>	1 cannula for 1 severe case	Number of severe ADULT cases x 1
<b>Scalp vein sets</b>	1 cannula for 1 severe case, and 50% require it	50% of number of severe CHILD cases x 1
<b>Adult Nasogastric Tube</b>	1 tube for 1 severe case, and 15% require it	15% of number of severe ADULT cases
<b>Pediatric Nasogastric Tube</b>	1 tube for 1 severe case, and 15% require it	15% of number of severe CHILD cases
<b>Tetracycline, 250mg</b>	24 capsules for 1 severely ill case	Number of severe cases x 24
<b>Doxycycline, 100mg</b>	3 capsules for 1 severely ill case	Number of severe cases x 3
<b>Erythromycin, 250mg</b>	12 capsules for 1 severely ill PREGNANT case	2% of number of severe cases
<b>Amoxicillin, 250mg/5ml suspension, 100 ml/bottle</b>	1 bottle for 1 severely ill CHILD case	15% of number of severe cases
<b>Large water dispensers with tap (marked at 5 and 10 liter levels) for making ORS solution in bulk</b>	2 for every 100 patients	2 x number of patients expected/100
<b>Bottles (1 liter) for ORS (e.g. empty IV bottles)</b>	20 for every 100 patients	20 x number of patients expected/100
<b>Bottles (0.5 liter) for ORS</b>	20 for every 100 patients	20 x number of patients expected/100
<b>Tumblers, 200 ml</b>	40 for every 100 patients	40 x number of patients expected/100

Items	Assumptions	Formula
<b>Teaspoons</b>	20 for every 100 patients	20 x number of patients expected/100
<b>Cotton wool</b>	5 kg for every 100 patients	5 x number of patients expected/100
<b>Reels adhesive tape</b>	3 for every 100 patients	3 x number of patients expected/100

\*If Ringer's lactate is unavailable, normal saline can be substituted.

All other resources required should be calculated and kept in stock based on the assumption indicated in table 10 above.

Construct a simple excel spreadsheet (see the example below) to calculate the supplies that are required for your level.

#### Sample 'excel' worksheet to estimate required supplies

Locality (e.g. kebele, woreda , etc.)	Population of the locality	Expected number of cholera cases	Number of people with severe dehydration	ORS in sachets	Ringer's Lactate of 1000ml bag	...
A	B	C	D	E	F	...
<b>XXX</b>	000	B x attack rate	C x severe rate	C x 6.5	D x 6	...
<b>YYY</b>	0000	B x attack rate	C x severe rate	C x 6.5	D x 6	...
<b>ZZZ</b>	00000	B x attack rate	C x severe rate	C x 6.5	D x 6	...
...	...	...	...	...	...	...
<b>TOTAL</b>	Sum above	Sum above	Sum above	Sum above	Sum above	...

## **ANNEX 1. RESPONSIBILITIES IN DETECTION AND CONTROL OF CHOLERA OUTBREAK**

The following pages summarize the most important responsibilities of different levels of the health care system with regard to the detection and control of outbreaks of cholera.

The activities listed for each level are suggestions. Each level may decide to assign certain activities to other levels.

### **Responsibilities of Health Facilities**

1. Identify suspected cases.
2. Treat patients.
3. Collect and transport specimens.
4. Collect, use and report data to the next level.
5. Maintain an inventory of supplies needed to treat cholera patients and to collect specimens.
6. Educate the public (Play key role in infection prevention like disinfection).

### **Responsibilities of the Woreda level**

1. Maintain surveillance for cholera epidemics;
2. Investigate suspected epidemics;
3. Collect, use and report the data to relevant authorities;
4. Coordinate treatment and control;
5. Organize mobile teams and Temporary Treatment Centers;
6. Plan, avail and monitor resources required for the control of the disease;
7. Evaluate woreda preparedness and make needed improvements.

### **Responsibilities of the Zone/Regional level**

1. Convene Regional Epidemic Committee.

Alert committee members when a cholera outbreak is confirmed. Convene the Committee to coordinate resources, technical expertise, and emergency supplies. Convene the committee if a woreda requests assistance, if there are multiple confirmed outbreaks, or if there is one severe outbreak.

## 2. Organize Rapid Response Teams

Maintain a list of experts (clinicians and sanitarians with experience from previous cholera outbreaks) who could be sent as a rapid response team during outbreaks to train and supervise local staff in case management and community education at cholera outbreak sites. Deploy the teams as needed.

## 3. Undertake Surveillance

**Data Collection:** The zone/region should receive emergency reports of cholera outbreaks from affected woredas. Contact the woreda health office if weekly reports are not being received.

**Data Analysis:** Analyze cholera surveillance data and community investigation results to:

- review data for obvious high risk groups or modes of transmission;
- monitor the magnitude of woreda and zonal/regional attack rates;
- determine access to case management;
- monitor case fatality rates;
- map the location of outbreaks by town;
- graph the number of new outbreaks and new cases over time;
- monitor emergency supplies requested by woreda.

## 4. Investigate Suspected Outbreaks

Consult with woredas regarding community investigations via telephone and on-site visits. Review investigations with the woredas and advise them regarding data collection methodology, analysis, and actions taken, as well as the need for emergency

supplies, technical assistance, and/or assistance of expert teams in case management or community education activities.

Consider on-site field assessment if:

- requested by a woreda;
- there are confirmed outbreaks in multiple communities; or
- there is a particularly severe outbreak (an attack rate over 0.2% of village population or a case fatality rate over 5%).

The regional level should have a low threshold for involvement initially, using this as an opportunity to train and consult with woreda staff in case management, community education, and epidemiologic methods.

Arrange for immediate transport of rectal swab specimens with identifying information to a laboratory. Notify the PHEM/EHNRI level of suspect patients meeting the surveillance case definition.

Serve as the laboratory contact point. Report laboratory confirmation of *V. cholerae* in new sites by notifying both the woreda and PHEM/EHNRI levels whether *V. cholerae* 01 or 0139 was confirmed in stool specimens.

## 5. Epidemic Reporting

Report the status on a daily and weekly basis to the PHEM/EHNRI while there is an ongoing cholera outbreak. Report the results of on-site investigations, woreda and regional attack rates, case fatality rates, locations of new outbreaks, the number of new cases and new outbreaks over time, and the current inventory of cholera treatment supplies.

## 6. Resource Assessment

Maintain an inventory of the provincial reserve of cholera treatment supplies. Provide supplies to Woredas as needed.

Consult with the PHEM/EHNRI level regarding the need for additional technical, resource, or personnel support from the

Federal level. Request additional emergency supplies when regional reserves cannot supply woredas for more than one month during an outbreak.

## Responsibilities of the Federal Level

### 1. Notify

Report suspected cholera cases to the World Health Organization (WHO). Notify WHO when *V. cholerae* is confirmed by the laboratory.

### 2. Convene PHEM Task Force

Alert committee members when a cholera outbreak is reported. Convene the committee to coordinate resources, technical expertise, and emergency supplies if a region requests assistance, if there are multiple confirmed outbreaks, or if there is one severe outbreak.

### 3. Analyze Data

The PHEM/EHNRI should receive weekly collated reports from the regions of suspected cholera cases, deaths, and their locations.

Analyze the data and results of zonal/regional investigations to:

- monitor woreda and zonal/regional attack rates;
- monitor case fatality rates;
- determine access to appropriate case management;
- map the location of outbreaks by woreda;
- determine geographic spread; and
- graph the number of new outbreaks and new cases over time.

### 4. Assist in Field Investigations

Consult with regions regarding regional on-site investigations via telephone or on-site visits. Review outbreak investigations with regions and advice regarding data collection methodology, analysis, and actions to take.

## 5. Provide Assistance

Review regional surveillance data analysis and actions taken as well as needs for emergency supplies, technical, and personnel assistance. Provide on-site technical support to provinces as needed.

Factors suggesting the need for Federal support include:

- a request from the region for assistance;
- attack rate over 0.2% in a woreda;
- case fatality rate over 5%; and
- confirmed cholera outbreaks in multiple locations.

The Federal level should have a low threshold for involvement initially, using this as an opportunity to train and consult with regional staff in case management, epidemiologic studies, and community education.

## 6. Mobilize Additional Emergency Supplies

Mobilize emergency supplies from Federal or donor sources, if anticipated that regional reserves will not be enough.

## 7. Monitor Antibiotic Resistance

Confirm with the laboratory every 3 months during ongoing outbreaks that *V. cholerae* isolates are not resistant to antibiotics in use.

## 8. Conduct Epidemiologic Studies

Discuss with zone/region the need for additional analytical epidemiological studies, such as case control studies to identify risk factors for cholera or to guide control efforts. If needed, provide technical training in case control methods.

## **ANNEX 2. HEALTH FACILITY, WOREDA/REGIONAL DATA COLLECTION AND COMPILATION FORMATS**

- Health facility register and line listing Format
- Case based reporting format
- Daily outbreak reporting format



## Cholera (suspected, confirmed) Patient Register or Line List

Health Facility: \_\_\_\_\_ Type:  CTC  CTU  ORP

Woreda/zone/Region: \_\_\_\_\_

Serial number	Patient name	Sex (M, F)	Age*		Kebele / Address	Date of onset	Admission		Classification: (M) mild; (S) severe	Referral (Y/N)	Lab Tests		Discharge status / outcome			Comments
			Years	Months			Date	Time			Cured	Dead	Referred	Date	Time	
1																
2																
3																
4																
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10																
11																
12																

\*Age in years if more than 12 months, otherwise write age in months (e.g. 9m)

NOTE: Use the same format as a line list to report to the woreda, zone and health bureau as well as to central levels. : If more than 100 cases occur in a week at a health facility, line listing of cases is not required; instead use Daily Epidemic Report Form. If previously reported cases die, update the status by completing a new row with "died" in the status column and "update record" in the Comments column.

## Case based Reporting Format (CRF)

<b>Reporting Health Facility:</b>			
Woreda		Zone	Region
<b>Disease type</b> (put tick mark ✓ )			
Anthrax	Cholera	Measles	Meningitis
Neonatal Tetanus	Hemorrhagic Fever	Yellow Fever	Others/Specify
<b>Name of Patient:</b>			
<b>Date of Birth (DOB):</b> ____/____/____ Day Month Year (EC)		<b>Age (if DOB unknown):</b> Years: ____ Months: ____ (if under 12 mos.)	<b>Sex:</b> _____ <i>M = Male, F = Female</i>
<b>Patient's Address:</b>	Kebele:		House number:
Woreda:	Zone:	Region:	
<b>Locating Information</b>			
Location when symptom started:		Current location:	
If applicable or if the patient is neonate or child, please write full name of mother and father of the patient:			
<b>Date Seen at Health Facility:</b> ____/____/____ Day Month Year (EC)	<b>Date Health Facility notified</b> <b>Woreda/zone:</b> ____/____/____ Day Month Year (EC)	<b>Date of Onset:</b> ____/____/____ Day Month Year (EC)	
<b>Number of vaccine/TT doses received:</b>	For cases of NNT* , Measles, Yellow Fever, and Meningitis (For NNT, Measles, Yellow Fever – refer immunization card & for Meningitis - ask history)		
<b>Date of last vaccination:</b> ____/____/____ Day Month Year (EC)	*For NNT cases please complete the additional case investigation form (NNT, Measles, Yellow Fever and Meningitis only)		
<b>Associated with epidemics?</b>	1=YES	2= NO	
<b>In/Out Patient</b>	1=Inpatient	2=outpatient	
<b>Treatment given</b>	1=YES (specify)	2= NO	
<b>Outcome of the patient at the time of report:</b>	1=Alive	2=Dead	3=Unknown

**Fill only if specimen is collected and sent to Lab**

<b>Date of specimen collection:</b> ____/____/____ Day Month Year (EC)				<b>Date of specimen sent to lab:</b> ____/____/____ Day Month Year (EC)			
<b>Type of specimen:</b> (put tick mark ✓ )	Stool	Blood	Serum	CSF	Throatswab	Other/specify	

<b>Date form sent to worda:</b> ____/____/____ Day Month Year(EC)
<b>Name and signature of the person completing the form:</b> _____ Name Signature Telephone

**For official Use only**

<b>ID Number:</b>	<b>Date form received at National/Regional level:</b> ____/____/____ Day Month Year (EC)				
<b>Final classification of case</b>	1=Confirmed	2=Probable	3=Discarded	4=Suspect	
<b>Final Classification for Measles</b>	1= Laboratory Confirmed	2= Confirmed by Epidemiological linkage	3=Clinical Compatible	4=Discard	5=Suspect

<b>Name and signature of the official:</b> _____ Name Signature Telephone
---

\*use this form (CRF) if the numbers of cases are very few.



**Laboratory Investigation Result**

Lab specimen taken? <input type="radio"/> Yes <input type="radio"/> No	Type of specimen (specify)	Number taken	Result
When? ____/____/____ Day    Month    Year(EC)	For which Disease :		

Main determinant of the epidemic

Control measures taken

Name and signature of the reporter:

Name \_\_\_\_\_ Signature \_\_\_\_\_ Telephone \_\_\_\_\_



**Laboratory Investigation Result**

Lab specimen taken? <input type="radio"/> Yes <input type="radio"/> No	Type of specimen (specify)		Number taken	Result
When? ___/___/____ Day    Month    Year(EC)	For which Disease			

Main determinant of the epidemic
Control measures taken
Name and signature of the reporter:
_____ Signature      _____ Telephone

## ANNEX 3. SUPPLY REQUIREMENTS LIST(CTC KIT)

### Equipment

List of minimum requirements for equipment for hygiene, sanitation & isolation of the CTCs

Sn.	Item description	Qty.
1	Guideline for set-up and management of a CTC	1
2	Tent, Rectangular, 24m <sup>2</sup>	2
3	Plastic sheet (4x50 m) or equivalent	1
4	CTC beds	10
5	Fencing rope (bright colors if possible), roll 200m	1
6	Plastic sheet (4x6 m) or equivalent	20
7	Safety box, needles/syringes, 5L, for incineration	20
8	Stretchers	2
9	Plastic bucket RED (15L), with lid	15
10	Plastic bucket BLUE (15L), with lid	15
11	Plastic bucket GREEN (15L), with lid	15
12	Plastic bucket (30L), with lid	5
13	Plastic basin, for clothes washing	10
14	Water container BLUE (30-40L) with tap for hand-washing	6
15	Jerry can (20L)	10
16	Dustbin, plastic	3
17	Plastic broom, for cleaning	4
18	Plastic apron	10
19	Medical gown/ Fabric	10
20	Boots, rubber, size 39 (pair)	5
21	Boots, rubber, size 42 (pair)	10
22	Disinfectant - for cleaning/sterilizing (5% chlorine solution, 30L)	2
23	Woolen mat for foot bath	4
24	Heavy duty rubber gloves (not disposable), per pair	10
25	Ladle, 250ml, Aluminum	10
26	Plastic cup, 300 ml	50
27	Laundry soap, powdered, carton of 100g	100
28	Body soap, bar of 250g	200



Sn.	Item description	Qty.
29	Sprayer - large	2
30	Spare Gasket (sprayer large)	2
<b><i>For locations without a clean water source, ADD:</i></b>		
31	PUR water treatment sachets	10,000
32	Squatting slabs ( 2 F/M workers, 6 F/M patients + caretakers)	8

## Medical equipment and supplies

- Register
- 1 sprayer at entrance, containing a chlorine solution 0.2%.
- 2 buckets of 20 liter with cover for chlorine solutions 2% and 0.2 %
- 2 sprayers
- 1 drum 125 liter for washing hands
- Soap
- 1 broom, one floor cloth, 1 dustbin with cover
- 1 table, 1 chair
- 30 mats
- 2 pairs of rubber gloves
- 1 bucket of 20 liter with tap, for ORS
- 1 bucket of 20 liter with tap for drinkable water
- 60 cups, plates, spoons

## Medical equipment

- 1 calf for blood pressure
- 1 stethoscope
- Thermometers + disinfectant
- 1 pair of scissors.

## Hospitalization: for 20 patients (one double tent)

### **For the ward**

- Patients follow up forms
- Protocols
- 1 sprayer with chlorine solution 0.05% at central footbath
- 2 buckets of 20 l with cover for chlorine solutions 2% and 0,2 %
- 2 sprayers
- 1 table, 1 chair, 1 shelf
- Rope: for hanging infusion bags and medical files
- Hooks

- 1 broom, 1 floor cloth, 2 dustbins with cover
- 2 pairs of rubber gloves,
- 1 bucket of 20 liter with tap for ORS
- 1 bucket of 20 liter with tap for drinkable water
- 1 drum of 125 liter with tap for hand washing
- Soap
- 1 note book for transmission (shifts)
- Pens, 1 permanent marker
- 40 cups, plates, spoons.

***For each patient***

- 1 pierced bed
- 1 mat
- 2 bucket of 10 liter (1 for stool, 1 for vomit)
- 1 blanket
- 1 loincloth.

***Medical Material***

- 1 Blood Pressure Calf for adults, 1 pediatric Blood Pressure Calf
- 2 stethoscopes
- 1 tray, 1 bottle, 1pair of scissors, 1 Kocher, 1 small dish (cupules), 1 kidney dish
- 5 thermometers + disinfectant
- 2 containers for dirty needles,

***Medical – renewable: to replace***

- 1 box examination gloves for single use
- 40 IV catheters 16 G, 18G, 22 G
- 30 infusion sets
- 10 syringes 10 ml
- 20 needles 21 G
- Nasogastric tubes CH6, 8, 10, 16

- Syringes 60ml feeding (Luer and conical tip)
- 1 roll cotton wool 500g
- 20 gauze bandages
- 2 adhesive tape
- 1 bottle of polyvidone iodine 10% (200 ml)
- 200 liter Ringer lactate,
- 5 liter Dextrose 5%,
- 5 vials Glucose hypertonic 50%,
- 5 ampoule Furosemide 10mg/ml
- 5 ampoule Diazepam 5mg/ml
- 100 tablets Doxycycline 100mg
- 20 tablets Acetyl Salicylic Acid 500mg
- 20 tablets Paracetamol 500mg
- 200 bags of ORS.

### ***Recovery: for 40 persons (1 double tent)***

- 1 sprayer containing chlorine solution 0.2% at exit
- 40 mats
- 1 table, 1 chair
- 2 sprayers
- 2 buckets of 20 liter with a tap, for ORS
- 2 drums of 125 liter for hand washing containing 0.05 % chlorine solution
- soap
- 80 cups, plates, spoons

### ***Neutral area and kitchen***

- 1 store, shelves, 1 table, 1 chair, 1 register, pens
- Uniforms: 1 per worker
- Kitchen
- 3 cooking-pots of 50 liter
- 3 ladles

- Fuel
- 20 cups, plates, spoons
- 2 drums of 125 liter for hand washing contain 0.05% chlorine solution
- Showers
- 1 bucket of 20 liter with a tap in each shower
- Sprayer for insecticide for the whole center

## For a CTU of 10 patients / 3 days

### *Logistical materials*

#### ***Nonrenewable material***

- 1 tent of 10 places
- 1 tank (bladder) of 2 m<sup>3</sup> or 3 tanks of 125 liters (stock of chlorinated water, drinking water).
- 10 buckets of 10 liters each (stools).
- 10 buckets (vomits)
- 10 mats or cholera beds.
- Rope or hooks to hand up infusions
- 2 pairs of rubber gloves
- 2 plastic aprons
- 1 sprayer
- 2 buckets with cover (20 liters): 1 for ORS, 1 for drinking water
- 20 cups

#### ***Renewable material***

- 12 soaps
- 3 boxes of HTH
- Bleach at 33° (quantity to be checked)

#### ***Medical materials***

- Register
- Patients follow up forms

***Non-renewable items***

- 1 pair of scissors
- 5 pairs examination gloves
- 2 cotton pajamas suits
- Renewable items
- IV Catheter, 10 each: 16G, 18G, 22G
- 10 Scalp vein infusion set “Butterflies” 21G
- 15 infusion sets
- Nasogastric tubes CH6, 8, 10, 16
- Syringes 60ml feeding (Luer and conical tip)
- 1 roll cotton wool, 500g
- 10 gauze bandages
- 2 rolls adhesive tape
- 1 bottle polyvidone iodine 10%
- 50 tabs doxycycline 100mg
- 100 liters Ringer’s lactate
- 100 sachets of ORS

**For an ORP of 20 patients**

- 1 bucket with lid and cup (or tap) for hand washing
- 1 jug of 1 liter with lid to prepare ORS
- 5 cups (people can bring their own)
- Sodium dichloro- isocyanurate (NaDCC) (0.5mg) tablets to prepare portable water for ORS
- 1 piece of soap
- 200 ORS sachet

## ANNEX 4. HUMAN RESOURCES. SAMPLE JOB DESCRIPTIONS

These are examples of job descriptions for CTC, to be adapted to local context and specific needs.

Always precise on the job description: Job title, Place of work, Place within the organization (Organogram), List of tasks.

Jobs for assistants/helpers are not detailed here. For example, if a job description is made for a nurse helper, he/she should refer either to the doctor or to the nurse: adapt the following texts accordingly.

### ***Cholera treatment center coordinator/supervisor***

The position is designed for a person with medical or paramedical background (experienced).

*Place of work:* his/her permanent presence in the cholera treatment center is compulsory.

*Place within the organization:* Directly responsible to the medical coordinator.

*List of tasks:* Supervision of the functioning of the cholera treatment center.

- Supervision of the medical management of patients
  - Ensure that protocols are correctly followed and available at each level
  - Supervise availability of necessary treatments in each area
  - Ensure that staff is always present in each area.
  - Decide building new wards / organization according to needs (specific wards for pediatric cases, etc.)
- Surveillance and monitoring of epidemiological data
  - Collect the daily morbidity and mortality data

- Analyze and organize data on a weekly basis, using the weekly surveillance form (report)
- Update the graphs
- Analyze results in terms of additional needs
- Archive the data
- Management of human resources
  - Evaluation of staffing needs
  - Selection and hiring of local medical staff
  - Evaluation of needs in terms of training; organization and supervision of training
  - Planning, organization and supervision of the work (schedules, time off)
  - Organization of staff meetings
- Management of material resources in collaboration with the logistics supervisor
  - Evaluation of needs
  - Supervision of stocks and management of the orders.
  - Management of supply and transport problem

### **Administrator**

*Place of work:* CTC

*Place within the organization:* under the responsibility of CTC supervisor

*Lists of tasks:*

- Ensures administrative management of the staff: salaries, contracts, etc.
- Assists the CTC supervisor in all administrative tasks concerning staff, equipment, supplies, food, etc. including responsibility for money.



**Clinician**

*Place of work:* Admission, observation and hospitalization areas, as well as recovery

*Place within the organization:* directly under responsibility of cholera treatment center coordinator

(Some tasks can be common, others can be dispatched if several doctors)

*Lists of tasks:*

- Curative care of patients (patients management)
- Supervision of admissions done by nurses in screening
- Management of severe cases, following standard protocols
- Diagnosis and treatment of associated pathologies
- Ensures treatment in case of emergency
- Decides for discharge of the patients
- Follow-up of patients
- Controls that follow-up of patients is correctly done at each level
- Participates in training nurses and nurse helpers on case management
- If senior doctor available, he/she should be in charge of all protocols:
  - At screening level: medical examination
  - At observation level: ORS rehydration protocol
  - At hospital level: Ringer Lactate protocol + follow up
    - i. Training and supervision
    - ii. Of nurses (pharmacist if needed)

**Nurses**

- Screening and differentiation non cholera cases from cholera cases at the screening area of the CTC Categorize cholera cases according to their level of dehydrations (no, mild or severe)

- Case management according to the guideline
- Preparation of ORS according to the instruction
- Supervise supportive staffs (cleaner and guard) and ensure the implementation of proper hygiene, Isolation and sanitation
- Follow the implementation of the use of personal hygiene by staffs (use of separate toilet, gloves, boots and hand washing)
- Health education to patients and relative at CTC
- Health education to the community members outside CTC (this is done if the nurses are not overloaded by cases in CTC)
- Use safety boxes for sharp materials

### ***Cleaners***

- Make sure that bed pans should be frequently cleaned with 2% chlorine solution after it is soaked for ten minutes
- Clean the toilets and showers frequently with 0.2% chlorine solution
- Clean beds and floors twice a day (or when it becomes dirty) with 0.2% chlorine solution.
- Disinfect patients as soon as they arrive and while they are leaving with 0.05% chlorine solution. This can also be done by guard.
- Prepare 0.2% and 0.05% of chlorine solutions according to the guide line every day
- Prepare 2% chlorine solution every week according to the instruction in the table
- Refill hand washing containers with 0.05% chlorine solution and chlorinated drinking water containers
- Refill sprayers and footbaths with 0.2% chlorine solution.
- Collect waste bins and burn in an open pits
- Dispose buckets with excreta and put half a cup of 2% chlorine solution in empty buckets

***Guard***

- Make sure that only patient and one relative should enter the fenced area of CTC.
- Make sure that everyone ( patient, relatives, staffs and external supervisors) who enter or exit the CTC should wash their hands
- Make sure that everyone (patient, relatives, staffs and external supervisors) who enter or exit the CTC should get their feet and shoes disinfected with 0.2% chlorine solution. It is done by spraying the bottom of shoes.
- Protect himself / herself by implementing the principles of personal hygiene in CTC (use of separate toilet, gloves, boots and hand washing).

***Cooker***

- Cook for the patients and care givers, if the CTC has a plan of providing food for patients
- Cook for health and other staff who remain in the centers where it