

Technical Guidelines

on the

Detection and Control of Cholera Epidemics

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Technical Guidelines on the Detection and Control of Cholera Epidemics

These *Technical Guidelines on the Detection and Control of Cholera Epidemics* were prepared by the Data for Decision Making Project of the International Branch / Epidemiology Program Office of the National Centers for Disease Control and Prevention, Atlanta, Georgia, USA. The goal of the Data for Decision Making Project is to increase the use of epidemiologic, economic, demographic, and other data in formulating and implementing public health policies and programs. The purpose of these Guidelines is to assist public health officials in Africa in using data more effectively for preparing for and responding to epidemics of cholera in order to prevent unnecessary morbidity and to reduce mortality. The Guidelines may also be useful to international, bilateral and non-governmental agencies which assist countries in cholera prevention and control efforts. Additional information may be obtained by contacting the Data for Decision Making Project.

The Guidelines are meant for the district level health team, and should help the team make their district ready to detect and control an epidemic of cholera. District team members who attend a training workshop based on these guidelines, and who work on the follow-up projects in their places of work, should be able to:

- detect and investigate an epidemic of cholera;
- arrange for confirmation of a suspected epidemic;
- collect and analyse the data needed to make essential decisions
- initiate treatment, control, and prevention measures;
- plan for financing the epidemic preparedness strategy; and
- make an epidemic preparedness action plan.

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1.0 ABOUT CHOLERA

1.1 Introduction

Cholera is a diarrheal disease caused by the bacterium, *Vibrio cholerae*. Patients with cholera typically develop acute, watery diarrhea and dehydration. Cholera can be successfully treated by rapid oral or intravenous fluid and electrolyte replacement. Cholera is usually transmitted through fecally contaminated water or food. New cases can be prevented by educating the public about food and water safety, the importance of handwashing, and the need to use latrines or toilets.

Because cholera can spread swiftly through a population, early detection of cases is necessary in order to start education and sanitation activities rapidly and to identify possible sources of infection. Training health care workers to recognize and treat cholera patients, maintaining a local reserve of rehydration supplies, and educating the public in ORS use and the need to seek treatment when diarrhea begins will avert many cholera deaths.

Although it is not possible to prevent cholera from being introduced into an area, its spread within an area can be controlled. In the long term, cholera will disappear with improvements in the provision of supplies of safe water, and with improvements in hygienic practices.

When an epidemic of cholera does occur, many cases and deaths can be prevented if the epidemic is detected *early*, and if effective control measures are begun *quickly*. Health authorities are expected to respond quickly and effectively when epidemics strike. To do so, they should have a plan for responding to a cholera epidemic which:

- outlines control measures
- disrupts the normal delivery of health services as little as possible; and
- provides for adequate resources to treat patients and control the spread of the disease.

Epidemic prevention, preparedness and control all involve decision-making on the part of health officials. To be effective and cost-effective, these decisions must be based on reliable and timely data.

1.2 Magnitude of the Problem in Africa

Since 1800, cholera has spread throughout the world in seven large waves, called pandemics. The seventh pandemic began in 1961 in Indonesia and has affected approximately 100 countries until now. Severely affected countries have reported national attack rates of over 1% of their population. In some areas with severe epidemics, attack rates of 20% have been recorded. Case fatality rates have been as high as 33% - 50% in areas where medical treatment is not available. However, in developing countries, where optimal treatment was provided, the case fatality rate has been reduced to less than 1%.

The seventh pandemic reached Africa in 1970 when cholera appeared in East, North, and West

Africa simultaneously. Epidemic cholera moved rapidly throughout the region, and by the end of 1971, 25 African countries were reporting cholera. More than 72,000 cases and 11,000 deaths occurred that year. The case fatality rate overall was 16%, but in some countries, rates exceeding 35% were reported.

Since the 1971 epidemic, cholera has persisted in many African countries as a recurrent, or endemic, problem. Between 3,000 and 43,000 cholera cases were reported in Africa every year until 1991. In that year a second large epidemic affected 14 countries and resulted in over 100,000 cases and 10,000 deaths.

1.3 Epidemiology

Modes of Transmission

Cholera is transmitted by the fecal-oral route. Because 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 direct person-to-person 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 in the 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. Acidifying foods with lemons, tomatoes, yoghurt, or fermented milk helps to inhibit *Vibrio cholerae* growth.

Conditions Favoring Cholera Epidemics

Environmental Conditions

Areas without a safe water supply and good sanitation are at risk for epidemic cholera. This includes municipal areas with inadequately chlorinated piped water, rural areas without access to tube or deep, protected wells, and areas where latrines or sewage systems are not commonly used.

The seasonality of cholera epidemics is not well understood. Near the equator, cholera epidemics are unpredictable and may recur in either the rainy or dry season. In a given locale, however, cholera epidemics tend to recur at roughly the same time of year. In temperate zones, cholera epidemics usually occur during the summer and fall months.

Host Factors

Host factors which protect against cholera include immunity due to previous infection with *Vibrio*

cholerae and, in endemic areas, breast-feeding of infants. Because *Vibrio cholerae* can not survive in an acidic environment, persons taking antacids or whose gastric acid production is reduced are more susceptible to cholera. Although the pathophysiology is not understood, persons with blood group O are more likely to develop severe symptoms of cholera.

***Vibrio cholerae* Serogroups**

Only *Vibrio cholerae* serogroup O1 and serogroup O139 are known to cause *epidemics* of cholera. Immunity due to previous *Vibrio cholerae* infection is serogroup specific. There are other serogroups of *Vibrio cholerae* which can cause isolated cases of watery diarrhea, but they do not cause epidemics. The current seventh pandemic of cholera is due to *Vibrio cholerae* O1.

Vibrio cholerae O139 was first discovered in 1992 in Bangladesh. It causes clinical illness indistinguishable from *Vibrio cholerae* O1. *Vibrio cholerae* O139 may have pandemic potential, as disease caused by this serogroup spread to several Asian and North American countries in less than a year. Although *Vibrio cholerae* O139 has not yet been reported in Africa, any population at risk for *Vibrio cholerae* O1 is also at risk for O139.

2.0 THE DISEASE

2.1 Incubation Period and the Duration of Symptoms and 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. Most people are infectious from the onset of illness until a few days after recovery. Rarely, a patient will excrete *V. cholerae* in the stool for several months. Antibiotic therapy can decrease the duration of symptoms and the period of infectivity.

2.2 Signs and Symptoms

Cholera has a broad clinical spectrum. 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. A small proportion (2% - 5%) of infected people develop severe watery diarrhea, vomiting, and dehydration.

Symptomatic cholera usually begins as a profuse, watery diarrhea 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. Vomiting, which can be severe, and painful leg cramps are common symptoms. 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.

Details on case management are found in Annex 1.

3.0 HOW TO DETECT AND CONFIRM AN EPIDEMIC OF CHOLERA

3.1 Surveillance for Cholera

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

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

Surveillance systems should:

- be appropriate for local conditions;
- collect and report only essential information;
- communicate information in a timely fashion;
- be able to verify the accuracy of reports;
- detect localized as well as widespread epidemics;
- detect epidemics early enough that control measures can prevent additional cases.

Surveillance in areas where cholera is not endemic

In areas where cholera is not endemic, surveillance can be based on reporting of severe, dehydrating diarrhea affecting persons aged 5 years or more. Diarrhea which causes severe dehydration, requiring IV therapy or causing death, is unusual in older children and adults, and has only a limited number of causes. Although this definition will miss some initial mild cases of cholera, public health personnel will not waste time investigating the many cases of mild diarrhea due to other causes.

Surveillance in area where cholera is endemic, or during an epidemic

During a cholera outbreak or in areas where cholera is endemic, a large proportion of the cases of acute, watery diarrhea in persons aged 5 years or more will be due to cholera. In this setting, the case definition should be broadened so that cholera surveillance includes the milder cholera cases as well.

These surveillance case definitions recommended by the World Health Organization can be used to detect cholera epidemics:

Cholera Case Definitions

Suspected Case:

In areas where cholera is not endemic, a case of cholera should be suspected when any person aged 5 years or more develops severe dehydration (WHO's plan C) or dies from acute watery diarrhea.

In areas where there is an epidemic of cholera or where cholera is endemic, a case of cholera should be suspected when any person aged 5 years or more develops acute watery diarrhea.

Confirmed Case:

A confirmed case is any person with diarrhea who has *V. cholerae* O1 or O139 isolated from their stool.

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 more should be treated for cholera when they develop acute, watery diarrhea.

3.2 Collecting Information about Patients

Health facilities should list patients suspected to have cholera in their general consultation register. The patient's identifying information, including name, age, sex, residence, date of consultation, outcome (alive, dead, referred) and whether a specimen was collected should also be recorded in the register.

If a health facility decides to create a special epidemic register during a cholera epidemic, cholera patients should be listed in both the general consultation register and the special epidemic register in order to ensure that at least one permanent record of the epidemic remains at the clinic.

3.3 Reporting Suspected Cases and Suspected Epidemics

Health facilities should report suspected cholera cases and deaths immediately to the district (details on how to decide if an epidemic is occurring are on page 17).

- *In areas where cholera is not endemic*, the district should report any suspected cholera case or death immediately to the provincial and central levels.
- *In areas where cholera is endemic*, districts should review the data and summarize the

health facility reports for the provincial and central levels on a weekly basis. A suspected epidemic must be reported immediately.

Every week, the central level should notify WHO of the number of suspected cholera cases and deaths.

During epidemics, daily reporting by health facilities should be considered. Health facilities should send a report even if they had no cases. This “zero” case reporting allows the district level to distinguish areas which do not have any cases from areas which are not reporting.

Cases should be reported by the most rapid and reliable means available. These can include telegram, telephone, fax, or courier. During epidemics, special, temporary methods of reporting, such as using police radios in remote areas, should be considered so that reports will arrive quickly.

Information gathered by the district through informal channels, such as travelers, should be investigated by contacting health care providers in the area of the suspected epidemic.

3.4 Reviewing Surveillance Data

Surveillance data must be analyzed and interpreted promptly if it is to be useful for detecting epidemics early or for planning control activities.

In areas endemic for cholera, the district level should analyze and interpret data concerning suspected and confirmed cholera cases each week. Weekly reports of acute, watery diarrhea in persons aged 5 years or older should be compared with reports from previous weeks to see if the number of suspected cholera cases is increasing. Graphing the weekly number of reported cases can make incidence changes more visible. Weekly attack rates of illness should be calculated for defined populations (see page 15) so that illness can be compared among political-administrative units and across time.

Regular feedback of surveillance data from central levels to more peripheral levels is important in promoting continued cooperation among health facilities.

3.5 Laboratory Confirmation of Cholera

The only way to confirm the presence of *V. cholerae* is through laboratory identification. Stools samples are sent to confirm the identity of the causative organism and to test its sensitivity to antibiotics. Several organisms, including some serogroups of *V. cholerae*, can produce an acute, dehydrating diarrheal illness which is clinically indistinguishable 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 epidemic disease.

Collecting Specimens to Confirm *Vibrio cholerae*

Rectal or stool swabs should be collected from approximately 5 ill persons whenever an outbreak of cholera is suspected. 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 epidemic continues for several months.

In a prolonged epidemic, 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.

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
- send it immediately to the laboratory.

Tubes of Cary-Blair transport medium can be stored at ambient temperature for approximately 1-2 years. As long as the medium does not appear dried out, contaminated, or discolored, it can be used.

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

Transporting Rectal Swabs

V. cholerae can survive in Cary-Blair medium only for a limited time, especially in warm ambient temperatures. Usually, enough organisms survive to identify *V. cholerae* if the sample reaches the laboratory within 7 days; however, the likelihood of detecting *V. cholerae* decreases as transit time increases.

Laboratory Evaluation of Specimens

When specimens reach the laboratory, they should be streaked onto an agar plate. The most frequently used medium for isolating *Vibrio cholerae* is thiosulfate citrate bile salts (TCBS) agar. These plates are incubated overnight at 35° - 37°C. Yellow, shiny colonies are suspicious for *Vibrio cholerae*. A small amount of bacteria from the suspicious colonies is tested for *Vibrio cholerae* O1 antigens using a latex agglutination test. Additional biotyping and serotyping tests can be done at reference laboratories to characterize the organisms further.

If the bacteria do not react with O1 antisera, and a cholera outbreak is strongly suspected, consider sending isolates to a reference laboratory for latex agglutination testing with newly developed O139 antisera.

Resistance of *Vibrio cholerae* to antimicrobials is becoming an increasing problem worldwide. Antimicrobial susceptibility testing should be done routinely to determine if strains are becoming resistant to antibiotics in use locally.

3.6 Investigation of Suspected Cholera Epidemics

Deciding When to Conduct an Investigation

When a suspected cholera epidemic is detected through the formal surveillance system or through informal sources (when the surveillance system is not working), send an investigation team immediately to the community to determine whether it is a true cholera epidemic.

In areas where cholera is not endemic, suspect an outbreak whenever a single patient meets the surveillance case definition. Illness is likely to be more widespread than just the single reported case, because patients with milder disease do not meet the case definition, and some ill people may not have gone to the health facility.

In areas where cholera is endemic, suspect an outbreak whenever the number of reported cases of acute watery diarrhea in persons aged 5 years and older increases above the baseline (endemic) level.

Ask the questions below to decide whether an increase in cases is due to normal reporting fluctuations or is an increase which deserves further investigation. Conduct a community investigation if there is a positive answer to one of the following questions:

- Is the increase *sudden and large*? For example, has the number of cases increased by 50% over the endemic rate?
- Is the increase *persistent*? Has the increase in reported cases continued for more than one week?
- Is the increase *localized*? Are the reported cases coming from one location, possibly suggesting exposure to a contaminated source?

How to Conduct the Investigation

Follow these steps to investigate a suspected epidemic of cholera:

- 1) Review the reports of suspected cases (be sure that patients meet the case-definition)

- 2) Contact health facilities that are near the reported case(s). Ask them for information and ask them to alert health workers in the area to be vigilant for cases.
- 3) Organize an investigation team and send it to the field. Make every effort to provide reliable transportation and essential resources for this team.
- 4) Send specimens to obtain laboratory confirmation of cholera.

Members of the Investigation Team

The investigation team should include a clinician and/or an epidemiologist and a hygienist and/or a health educator.

Responsibilities of the Investigation Team are listed in the box below.

Responsibilities of the Investigation Team

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

Community Investigation

1. At the health facility:
 - collect the names and identifying information for
 - (a) patients meeting the case definition and
 - (b) patients aged 5 years and older treated for acute, watery diarrhea;
 - ask staff to describe the illness and their treatment protocols;
 - inventory local supplies.
2. In the community:
 - interview patients and their families regarding identifying information, risk factor information, and ill contacts;
 - interview any other ill persons identified by these interviews.
3. Collect up to 5 rectal swabs (if health facility has not already done so).
4. Analyze information:
 - create a line listing, map location of cases, and graph the number of cases by date of onset of illness;
 - 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.
5. 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 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.
6. Arrange transport of rectal swabs to laboratory.
7. Report investigation results and actions taken to decision makers.
8. Perform follow-up surveillance visit(s); collect any unused treatment materials when there are no further cases.

Data Collection and Interpretation

Collecting data from health facilities

The investigation team should visit the health facilities that reported the suspected outbreak. Review the patient register to verify that reported cases met the surveillance case definition. Also review the register to see if there were additional patients during the current week and during the 2-3 weeks preceding the investigation. The case definition during a community investigation should include any patient aged 5 years or older who sought treatment for acute, watery diarrhea.

Collect the following information from the patient register: patient's name, age, sex, residence, date of consultation, date of illness onset, outcome (alive, dead, referred) and whether a rectal swab was taken.

Interview staff regarding their medical management of these patients.

Inventory the facility's supply of rehydration equipment, antibiotics, and specimen collection kits.

Collecting data and specimens 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 5 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

If the health facility has not collected 5 rectal or stool swab specimens from patients, collect them during the community investigation. Choose patients whose illness began most recently, and who are not on antibiotics.

How to Analyze and Report the Information Collected

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.

Determine and Interpret the Case Fatality Rate.

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.

$$\text{Case Fatality Rate} = \frac{\text{number of deaths}}{\text{number of cases}} \times 100$$

For example, if 100 cases are reported in an area during one week, and 10 of the cases died, the case fatality rate is 10%.

$$\frac{10}{100} = 0.1 \times 100 = 10\%$$

High case fatality rates (>10%) may suggest problems in 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.

Determine the Attack Rate

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.

$$\text{Attack Rate} = \frac{\text{number of cases}}{\text{population at risk}} \times 100 \quad (2)$$

Use maps to show where cases have occurred

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. Ideally, use maps that show the location of settlements, transport routes, water sources and health facilities. This helps identify at-risk areas, and their relation to available health services.

Make graphs

Graphing the number of cases by illness onset date will help determine whether the outbreak is increasing or decreasing and how rapidly. If the outbreak has affected a large area, make separate graphs for different communities affected.

Make and Interpret a Line-listing

Make a line listing of patients and their identifying information. List the patients' occupations, water sources, and other potentially important risk factors, such as those shared by a number of cases (see page 14 for a list of possible factors).

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.

Treatment and Control Activities

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

- ensure that all ill persons have received treatment;
- provide the health facility with a small supply of rehydration materials and antibiotics² 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 Treatment Centers in areas remote 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 data analysis. If this is not possible, advise the community about the contaminated source and about possible alternatives to it;
- advise people about home chlorination (see page 52)
- provide simple health messages to community (see page 47 for sample messages)

One possible guideline for estimating the amounts for interim treatment supplies is:

- if 10 or fewer cases are found during the investigation, leave enough supplies for 20-25 patients
- if more than 10 cases are found, leave supplies to treat twice the number of cases found.

Recommended supplies are listed in Annex 5.

Reporting Investigation Information

The team should report the findings of the community investigation immediately to decision makers, including the District Cholera (or Epidemic) Committee, the provincial and central levels, and community leaders. It is helpful to organize the analysis of the data into three categories: *person, place and time*. In the report, try to answer the questions listed below:

Person:

- How many cases and deaths have there been?
- Which groups are at highest risk?
- What is the case fatality rate?
- What is the attack rate?

Place:

- Where have the cases occurred? What is the geographic distribution of cases?
- Is the outbreak spreading? Where?
- Are there accessible health facilities in the affected areas?

Time:

- When did the cases occur?
- Is the number increasing or decreasing?
- Did many people become ill at the same time when the outbreak began?

The report should also include:

- a list of the activities of the team, especially any control measures undertaken
- an estimate of the size of the population at risk
- laboratory specimens submitted and results, if any
- the suspected source of the outbreak, if any was identified
- recommended control measures, including any specific information needed to implement control measures (e.g., information on water sources)
- information on the best ways to communicate with the area
- list of assistance needed.

How to Decide if an Epidemic is Occurring

It is important to have a way to decide whether an epidemic of cholera is occurring, because once an epidemic is confirmed or strongly suspected, a series of responses should begin immediately.

The person who makes this decision should be clearly designated and there should be a Cholera Response Plan which outlines what actions should be taken and who should do them.

Two criteria define a cholera epidemic:

1. laboratory confirmation of *Vibrio cholerae* O1 or O139 and
2. attack rates above the usual rate.

In areas where cholera is not endemic

In areas where cholera is not endemic, even one case of confirmed cholera constitutes an outbreak. This is because even one case is above the usual attack rate (the usual attack rate is “zero”). In addition, there are likely to be more people in the community infected with *Vibrio cholerae* who have asymptomatic or mild infections.

In areas where cholera is endemic

In endemic areas, it is considered an epidemic when the community investigation verifies that an increased number of cases has occurred and *V. cholerae* has been isolated from these cases.

Cholera can spread rapidly through populations, so even small numbers of cases require control activities to contain the disease before it spreads throughout the community or into new areas.

Follow-up to the Community Investigation

Visit the community again to identify any new patients meeting the surveillance definition according to the following schedule:

- case was found and it was not confirmed as cholera, schedule a visit within one month of the initial community investigation;
- if two or more suspect cases were found in the initial investigation, schedule a visit one week after initial community investigation;
- if one or more cases were found and cholera was confirmed, schedule a visit within one week of laboratory confirmation; and
- visit every week during a confirmed outbreak.

Record follow up visits in the community investigation register. If persons meeting the surveillance definition are identified, record patient identifying and risk factor information, take stool specimens from new cases (if the laboratory has not already confirmed cholera), treat patients, consider obvious sources and high risk groups for preventive action, notify the Province of new cases, and discuss findings and actions taken and possible assistance needed.

4.0 HOW TO RESPOND TO A SUSPECTED OR CONFIRMED EPIDEMIC OF CHOLERA

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.

Goal of Response Activities

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

Use this section as your guide to respond when a cholera epidemic has been confirmed (begin some of these actions when you strongly suspect cholera, and are waiting for confirmation). A district which is prepared will be able to respond more quickly and more effectively. The next chapter, *How to Prepare for an Epidemic of Cholera*, explains how to become ready for an outbreak.

Determine Staff Responsibilities

An important first step is to determine responsibilities of district 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, provincial, district and health facility level are in Annex 6.

4.1 Steps for Control of an Epidemic

Steps for the detection and confirmation of cholera epidemics

- 1) Receive reports of suspected cases from health facilities and maintain surveillance
- 2) Conduct field investigation and report the findings
- 3) Notify the designated level of suspected and confirmed cases

Steps to be taken when an epidemic of cholera has been confirmed (or is strongly suspected)

- 4) Convene the Epidemic Control Committee (see page 20)
- 5) Inform and educate the public (see page 21 and Annexes 2-4)
- 6) Provide case management (see page 22 and Annex 1, page 41)
- 7) Implement community control measures (see page 26)
- 8) Collect and report data on cases and deaths, and on control activities (see pages 21, 27)
- 9) Document the epidemic (see page 29)

- 10) When the epidemic has ended, evaluate the response and make plans for improving prevention and response in the future (see Chapter 5).

4.2 Convene the Epidemic Committee

An Epidemic Control Committee to control cholera³ should be immediately convened when an outbreak due to *V. cholerae* is confirmed. If the outbreak occurs near a national border, consider forming an intercountry committee to coordinate activities.

Members and Responsibilities of the Cholera Epidemic Committee

The epidemic committee may include representatives from:

- the Ministry of Public Health (including communicable diseases, the CDD programme, administration, as appropriate)
- the armed forces and / or police
- non-governmental organizations involved in health care

Responsibilities of the Cholera Epidemic Committee are listed in the box below.

³ An alternative to the Cholera Epidemic Control Committee is to establish a general crisis control committee that is responsible for all emergency preparedness activities and epidemic/disaster responses, regardless of the cause. If such a committee is formed, the manager of the CDD program should be appointed to the committee to provide input during cholera epidemics. CDD personnel also should be included in crisis committees formed at more peripheral levels as well. A committee at the national level is essential to eliminate duplication of efforts, coordinate appropriate distribution of personnel, and mobilize any additional resources from national and international sources. Similar committees at the provincial and al levels will help ensure that the epidemic response is rapid and well-coordinated at the more peripheral levels as well.

Responsibilities of the Cholera Epidemic Committee

- 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.

4.3 Report Cases and Inform Authorities

Suspected cases and suspected epidemics must be reported immediately. When an epidemic has been confirmed or is strongly suspected, health authorities in neighboring provinces, departments, or cities should be informed. Health-care personnel in the region should be kept informed of the extent of the epidemic, appropriate case management, changes in reporting procedures and plans for the implementation of control measures.

During an epidemic, health facilities should send a daily report which gives the number of cases and deaths. However, if communications are difficult, a health facility might report twice weekly, or weekly.

Every day during the epidemic, the district should prepare a summary report of health facility data and submit it to the provincial level. This report should include:

- the period of time covered by the report (the dates or the "epidemiologic week")
- number of health facilities that reported (include health facilities that reported no cases)
- total number of health facilities in the district
- total number of suspected cholera cases and deaths during the reporting period.

During epidemics, health facilities must send a report, even if there were no cases or deaths during

the reporting period. This “zero reporting” lets the district tell the difference between an area which actually had no cases, an area which did not send a report, an area from which communication failed. In addition, it helps the crisis committee measure the effectiveness of the vaccination campaign.

4.4 Inform the Public and Neighboring Areas

When a cholera epidemic occurs, there is likely to be widespread public concern and media attention. Therefore, efforts to inform the community about the outbreak must begin as early as possible and continue throughout the epidemic. The public should be told when and where to seek medical attention and how to prevent the spread of the disease (see Section 4.6.1, and Annex 2, page 47). This information should be combined with health education messages whenever possible.

Health authorities in neighboring provinces, districts, and cities should be informed about epidemic activity so that health education efforts and heightened surveillance can begin. Health care personnel within the area should be kept informed of the extent of the epidemic, changes in reporting procedures, appropriate patient management and outbreak control.

4.5 Clinical Management of Patients

Principles of Clinical Management

- 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 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.

There are detailed guidelines on case management in Annex 1, beginning on page 41. These case management guidelines should be provided to health workers who treat cholera patients.

Assessment of Dehydration

When suspected cholera patients first appear at a health facility, assess the level of dehydration immediately. Severely dehydrated patients may die within hours of illness onset, if not promptly rehydrated. Monitor the patient's hydration status frequently until their diarrhea has ended as sudden, large fluid losses can occur.

Rehydration Therapy

Most cholera patients can be treated using oral rehydration therapy alone. Oral rehydration salt (ORS) can often rehydrate patients adequately even when they vomit, because most patients absorb enough ORS solution, despite vomiting, to achieve rehydration. The ORS packets produced for WHO contain the correct balance of electrolytes needed to replace those lost in the cholera patient's stool.

Patients with signs of severe dehydration require rapid fluid replacement with intravenous fluids initially to prevent shock, kidney failure, or death. Even these patients, however, should start oral therapy as soon as they are able to drink.

Ringer's Lactate is the preferred intravenous fluid. Normal saline or half normal saline with 5% glucose can also be used when Ringer's is not available. These solutions are less effective than Ringer's as they do not correct electrolyte imbalances. When these solutions are used, give ORS solution at the same time to help replace missing electrolytes. Plain glucose solutions are not effective in rehydrating cholera patients and should not be used.

When IV fluids are not available and the patient is too weak to drink effectively, ORS solution can be given by nasogastric tube.

Complications

Two complications can occur in the severely dehydrated patient. First, pulmonary edema (indicated by cough and difficulty breathing) can occur when too much intravenous fluid is given. This complication is most likely to occur when normal saline or half normal saline with 5% glucose is used and ORS solution is not given simultaneously. Second, kidney failure can occur if too little intravenous fluid is given, if it is given too slowly, or if the patient becomes severely dehydrated a second time.

Suspected cholera patients should remain at the health facility until their diarrhea and vomiting have ended. Even after dehydration has been corrected, these patients should be observed to assure that ongoing fluid losses are adequately replaced.

Antibiotic Recommendations

Antibiotics can reduce the volume and duration of diarrhea as well as shorten the period of infectivity. Only severely dehydrated patients should be given antibiotics because widespread antibiotic use may lead to *Vibrio cholerae* strains resistant to these drugs and may consume limited medical supplies. Suspect antibiotic resistance if diarrhea continues in a patient despite 48 hours of antibiotic treatment. The dosages of antibiotics used to treat cholera are given on page

45. Chemoprophylaxis of close patient contacts is discussed on page 27.

Estimating treatment supply needs

Having enough supplies to treat patients will save lives, and is especially important at the beginning of an epidemic. However, predicting the size of a cholera outbreak can be difficult because a number of factors influence the spread of *Vibrio cholerae* (such as the percentage of the population with access to safe water, the percentage with access to latrines, food preparation and hygiene habits, etc.) This makes it difficult to predict supply needs and underscores the importance of frequent, accurate surveillance reports from outbreak sites.

Health facilities must have rapid access to rehydration materials as outbreaks can quickly exhaust their supplies. A local emergency reserve would allow supplies to be rapidly mobilized. Rehydration materials and antibiotics used by the routine health care system should be rotated through these emergency buffer stocks so that supplies do not become outdated. A system to monitor use of the reserve should be established so that supplies can be replenished promptly and unused materials sought and returned after an outbreak.

The types and amounts of supplies needed to treat 100 patients with cholera are listed in Annex 5 on page 53.

A district which has experienced cholera epidemics in the past may maintain a reserve containing a one-month stock of emergency supplies (estimated from past epidemics). This should meet initial treatment needs and allow sufficient time to mobilize additional resources, if needed.

Another method for estimating the amount of supplies needed is to predict how many people might become ill, based on possible attack rates. When estimating initial supply needs for large populations, the attack rate of 0.2% recommended by WHO might be used. For rural populations of 5,000 or less, a higher attack rate of 2% might be considered. During a prolonged epidemic, estimates of attack rates from the outbreak sites can be used. These estimates should provide enough supplies to meet initial treatment needs and allow time for additional supplies to be requested and delivered, if needed.

How to Estimate the Amount of Supplies Needed for a Cholera Outbreak

Using the Attack Rate

Step 1) Multiply the population of catchment area by 0.002. The result is the number of people who might become ill with cholera.

- *Multiply by 0.002 if you are using the attack rate of 0.2%.*

- *Multiply by 0.02 if you are using the attack rate of 2%.*

- *Use the attack rate from the outbreak site, if you know it*

Step 2) Divide the result of Step 1 (the number of people who might become ill) by 100.

Step 3) Multiply each item on the supply list by the result of Step 2. This give the amount of each

item needed.

Example 1

In a district of 75,000 population, the Cholera Committee decided to use the attack rate of 0.2% to calculate the amount of supplies needed:

Step 1) They multiplied the population of catchment area by 0.002.
 $75,000 \times 0.002 = 150$

Step 2) Next, they divided the result of Step 1 (the number of people who might become ill) by 100.
 $150 / 100 = 1.5$

Step 3) Then, they multiplied each item on the supply list by the result of Step 2. The list gives 650 packets of ORS .
 $1.5 \times 650 = 975$. They ordered 975 packets of ORS.

Example 2

A remote health clinic, with a catchment population of 4,000 persons, has decided to maintain a reserve stock of cholera treatment materials. They use 2% as the attack rate.

Step 1) They multiplied the population of catchment area by 0.02.
 $4,000 \times 0.02 = 80$

Step 2) Then, they divided the result of Step 1 by 100.
 $80 / 100 = 0.8$

Step 3) Finally, they multiplied each item on the supply list by the result of Step 2. The list gives 650 packets of ORS .
 $0.8 \times 650 = 520$. They ordered 520 packets of ORS.

When an outbreak is first suspected, health facilities in the area should do an inventory of the cholera treatment and control supplies on hand, and submit it to the district level. The district should summarize the inventories, calculate the amount of supplies that might be needed, and send a report or request to the provincial or designated level.

Organizing treatment services

Most treatment services during cholera epidemics can be supplied through the usual health care

system. It may be necessary, however, to create temporary emergency treatment centers to provide medical care in remote areas or to handle patient overflow from existing health facilities. These emergency treatment centers must be appropriately staffed, supplied, and incorporated into the reporting system. The temporary centers must also contain handwashing facilities and be able to safely dispose of waste and contaminated materials.

Expert teams composed of clinicians, sanitarians, and health educators, who have previous experience with cholera epidemics, should be mobilized to provide on-site training and supervision to less experienced personnel and provide additional support at temporary emergency treatment centers and understaffed health facilities.

4.6 Community Outbreak Control Activities

Health education

Health education is the foundation of outbreak control, and an intensive cholera education campaign should be initiated as rapidly as possible during an outbreak. The media, community and service organizations, political and religious leaders, and schools should also be enlisted.

Initial health education should concentrate on informing people to seek medical care immediately when symptoms develop. People should be educated concerning the basics of ORS use so that they can hydrate themselves in transit to health facilities.

Studies of cholera in rural Africa and Latin America indicate that the majority of cases and deaths in small villages occur in the first few days of an outbreak. In these studies, people who died were less likely to have sought medical care and less likely to have taken adequate amounts of ORS than those who lived. In order to decrease the case fatality rate, it is important to begin health education immediately when a cholera outbreak occurs and to educate neighboring and other high risk areas before they are affected by the epidemic.

In order to prevent new cases, a cholera education program should inform people how to avoid sources of infection by instructing them on:

- water safety precautions,
- the importance of handwashing,
- proper food preparation and storage practices,
- and the need to use a latrine or toilet

A central focus for every cholera health education program should be instructing people how to make home water safe through chlorination.

Explore local beliefs about disease transmission or treatment and correct any misconceptions. Reach the public through radio, town criers, meetings with community, religious and political leaders, presentations at markets, health centers, schools, religious centers and house-to-house visits. Posters and fliers, newspapers and television may be used. There are sample Health Education Messages in Annex 2, beginning on page 47.

Water safety

Water sources, identified by sanitarians or implicated in the community investigation as potential sources of infection, should be treated or closed, and the public informed. The community should also be warned of the high risk of fecal contamination of surface waters and shallow wells. People should be directed to safe water sources, if available, such as tube wells.

A major component of a water safety program is promotion of home water chlorination (see Annex 4, page 52) for instructions on home water chlorination).

Sanitation and disinfection

Efforts to encourage building and use of latrines should be intensified during an epidemic.

Health facilities should practice careful disinfection procedures when disposing of human waste or contaminated materials. Waste from cholera patients should be separated from other kinds of waste. Safe disposal of cholera waste can be accomplished by incineration or burial. Before burying the waste, it should be mixed with a disinfectant, such as cresol, or mixed with acid to lower the pH of the waste to 4.5 or lower. Clothing, bedding, and mattresses can be disinfected by drying them thoroughly in the sun. Clothing can also be disinfected by stirring them in boiling water for 5 minutes.

Chemoprophylaxis - Only in Certain Circumstances

Mass chemoprophylaxis of communities has failed to limit cholera epidemics in the past and may have led to the emergence of antibiotic resistant strains.

The risk of cholera transmission from a patient to family members varies by locale. Selective chemoprophylaxis of family members may be considered if epidemiologic investigations indicate that family member attack rates are high (> 20%). Frequent use of antibiotics in a population will increase the risk of antibiotic-resistant organisms. However, chemoprophylaxis may be useful when a cholera outbreak occurs in a closed population, such as a prison.

Vaccination and Cordon Sanitaire - Not Recommended

Use of vaccines to control cholera epidemics is ineffective and not recommended. Currently available vaccines protect only about 50% of recipients for 3 - 6 months. They do not prevent asymptomatic infections so vaccination of travelers will not protect against importation of cholera. Vaccinating family members of cholera patients does not prevent illness.

Because most cholera infections are mild or asymptomatic, travel restrictions (cordon sanitaire) can not detect most cholera-infected travelers and do not prevent the exportation of cholera to new areas. These measures are ineffective and not recommended.

4.7 Case Reporting and Analysis of Surveillance Data

During an epidemic, it may be useful for health facilities to report cases daily so that current information is available to make decisions concerning control strategies or to estimate supply and personnel needs. If daily reporting is instituted, data should also be analyzed on a daily basis.

During an epidemic, the district level should perform the following:

- Monitor the number of cases, deaths, and outbreak sites;
- Monitor the attack rate and case fatality rate at each outbreak site;
- Map the location of outbreaks;
- Graph the number of cases by week of onset;
- Graph the number of outbreak sites by week of onset (based on onset date of the first case; and
- Review patient characteristics for high risk groups and potential sources of infection.

The district level should make weekly visits to outbreak sites to verify the accuracy of reports. If neighboring health facilities are not submitting reports, visits to these sites to determine if cases are occurring should be considered.

4.8 Requesting Additional Assistance

During an outbreak, assistance from more central Ministry levels or donor agencies may be needed to provide technical support in outbreak containment. This may include on-site training and supervision by clinicians and epidemiologists experienced in cholera epidemics. It may include support for more advanced epidemiologic studies to identify cholera transmission routes so that control efforts can be better targeted. Or assistance may be needed to provide additional emergency treatment supplies, medical personnel, sanitarians, and health educators.

Factors which suggest the need for additional support:

If any one of these factors is present In your area or in an area that you supervise), considering asking for additional support.

- staff that are inexperienced or untrained in epidemic cholera control;
- local resources that are inadequate to meet projected needs;
- a case fatality rate of 10% or more;
- the geographic extent (number and location of sites (focal versus diffuse))

- the severity (the case fatality rate)
- the tempo (graph of cases and outbreak sites by week of onset -- is the situation worsening or improving?)
- site-specific data - include information about problematic outbreak sites, such as:
 - unusually high attack rates
 - unusually high case fatality rates
 - difficulty with access
- the projected needed for personnel and supplies
- control activities undertaken and planned
- an inventory of materials and staff currently available

4.9 Document the Epidemic and Evaluate the Response

The Cholera Committee should prepare a summary report which documents the course of the epidemic and the emergency response. They should distribute this report to local personnel, the laboratory and to international organizations and donor agencies.

A thorough evaluation of the detection, confirmation, and control activities is important for training purposes and for planning future outbreak activities.

5.0 HOW TO PREPARE FOR AN EPIDEMIC OF CHOLERA

Being well prepared is the best way to guarantee a rapid and effective response to an epidemic of cholera. This chapter lists the components of preparedness. It also provides a way for you to judge whether your own district or area is prepared for an epidemic of cholera.

PREPAREDNESS COMPONENTS

- 1) ensure that the surveillance system can detect epidemic cholera
- 2) ensure the capability to get laboratory confirmation
- 3) identify and address training needs
- 4) maintain a reserve stock of essential equipment and supplies
- 5) organize an epidemic committee
- 6) plan logistics and staff responsibilities
- 7) ensure that financial support is available for preparation and response
- 8) plan for implementation of control measures
- 9) make an emergency response plan
- 10) evaluate epidemic preparedness
- 11) plan for prevention

Many of these components include activities that must be done *during* an outbreak, as well as activities that must be done to *become prepared* for an outbreak. The activities needed for the detection of an epidemic were covered in Chapter Three, and how to respond was covered in Chapter Four.

This chapter focuses on how to *prepare* a possible cholera epidemic. For each component, there is a box which asks questions about the state of readiness of your district. Answer each of these questions.⁴ Your district will be well prepared when you can answer “yes” to all the questions (there is some purposeful duplication in the questions). Although the components are numbered, there is not an exact order in which they should be considered - the order will depend on the situation in each district. Each district may be at a different state of readiness with respect to any given component.

⁴There is a table on which you can record your answers to most of these questions in the Exercise Book.

The preparedness components should be reviewed and acted upon

- *before* an epidemic, so that the district will be ready to respond,
 - *during* an epidemic, so that the response will be effective, and
 - *after* an epidemic, so that the district will be better prepared in the future.
-

5.1 Ensure That the Surveillance System Can Detect Cholera

Surveillance for cholera is discussed in Chapter 3 (Sections 3.1 through 3.5 and in Section 3.6).

Ensure That the Surveillance System Can Detect Cholera

Routine Reporting and Emergency Notification

- Can health workers recognize cases of cholera?
- Do health workers know the surveillance case-definitions for cholera?
- Do they know *how* to report suspected cases by the most rapid and reliable means?
- Do they know *what* to report?

In areas where cholera is endemic:

- Are routine reports complete, sent regularly, and on time?
- Are reports regularly analyzed for increases in cases that met the case-definition?

Investigation Team

- Have possible members of an Investigation Team been identified?
- Have they been trained or briefed on their duties?
- Has funding for an investigation been provided for?
- Have the necessary supplies and resources been provided for?

5.2 Ensure the Capability to Get Laboratory Confirmation

Laboratory confirmation of cholera is discussed in Section 3.5 of these Guidelines. Cary-Blair specimen collection kits should be readily available to local personnel so that specimens can be collected from the initial cases and before antibiotics are given. This facilitates the rapid confirmation of *Vibrio cholerae*.

Ensure the Capability to Collect and Transport Specimens to a Laboratory

- Are personnel trained in collection of specimens from cholera patients?
- Are the supplies needed for collection and transport of specimens available?
- Have Cary Blair kits been distributed to health facilities?
- Have any funds needed for laboratory costs been allocated?

5.3 Identify and Address Training Needs

One of the responsibilities of a district health officer is to make sure that district health personnel have the knowledge and skills to detect, and to respond to epidemics of cholera.

In order to *detect* an epidemic, clinical staff should know how to recognize and report possible cases of cholera. If they cannot, they should be trained as soon as possible. However, the district health team may decide to delay training on certain response activities until an epidemic threatens. In that case, district health officers should make a detailed training plan in advance, and plan to use the plan when an epidemic is suspected.

Decide who needs to be trained, what they need to learn and when to conduct training

The responsibilities of personnel involved in the detection, confirmation, and control of epidemic cholera should be determined prior to an epidemic (see Annex 6, page ?). Assess the training needs of the district's personnel, based on those responsibilities.

The table below lists suggested topics - if needed, modify it according to the responsibilities assigned in your own district. Staff should receive initial training and periodic refresher courses during non-epidemic periods and should be trained in the starred (*) topics *before* an epidemic. Decide whether you will train them in the other topics before an epidemic, or will conduct rapid training when an epidemic occurs.

Topics for Training District and Health Facility Staff	
Target Group	Topics
Health Facility Personnel	<ul style="list-style-type: none"> * basic epidemiology of cholera * how to recognise cholera * cholera case definitions * how to report suspected cholera * case management * collection of specimens - collection of data on patients and record keeping - reporting during epidemics - taking inventory of treatment and control supplies - community control measures - health education of patients and public
District-level Personnel	<ul style="list-style-type: none"> * epidemiology of cholera * surveillance for cholera * how to report suspected cholera * - field investigation, including data collection and analysis *- specimen collection and laboratory confirmation * case management - reporting and analysis of data during an epidemic - taking inventory, estimating and ordering supplies - implementing control measures - health education of the public

When making the training plan, consider the educational level of personnel, the resources available and the amount of time and travel involved. If possible, adapt standard curricula to the needs of the district. Consult the CDD Programme to coordinate training and for training materials.

Training should include plenty of practice of the skills that health workers would be expected to do. Plan for regular supervisory and follow-up activities to ensure that trainees are practising what they learned, to correct mistakes, and to get feedback from trainees. In addition to formal courses and workshops, supervisors may teach health workers during regular supervisory visits.

During an outbreak, simplified on-the-job training may be needed to rapidly bring health workers up-to-date.

Identify and Address Training Needs

- What % of district's health workers are up-to-date on case management of diarrhea?
- What % of district's health workers are up-to-date on items starred in the table above?
- Is there plan to train health workers *in advance* of an epidemic?
- Is there a plan to quickly train health workers at the time of an epidemic?
- Are health workers being trained according to the plan(s)?
- Is funding available (or planned) for training activities?

5.4 Maintain a reserve stock of essential equipment and supplies

See section "Estimating treatment supply needs", page 23.

Maintain a reserve stock of essential equipment and supplies

- Is there a reserve stock of the treatment supplies needed for cholera?
- If so, are the supplies being rotated with usual supplies?
- Is there a stock of specimen collection kits?
- Has funding been found for the reserve stock?

5.5 Organize an Epidemic Committee

The membership and responsibilities of Epidemic Committees are discussed in Section 4.1. Although an epidemic committee may not focus on cholera until there an epidemic has begun, a district that is working to become prepared should consider forming a committee (or sub-committee) well before an outbreak. Ideally, committee members should work as a group on the preparedness components. An Action Plan made by the group that would eventually implement it may be more realistic than one made by a few individuals, and the committee may function more smoothly during an epidemic if members have worked together before.

Organize an Epidemic Committee

- Is there a cholera epidemic committee or subcommittee?
- If so, do the members meet regularly?
- If so, are the members working to prepare the district for a possible epidemic?
- Are members agreed on an Emergency Response Plan?

5.6 Plan logistics and staff responsibilities

The major responses to an epidemic of cholera - patient care, public education and implementation of control measures - require extraordinary efforts by health personnel. The number of very sick patients may overwhelm health services, if there is not a plan or if resources are not available. To avoid confusion and panic, district health officials should plan how to make the best use of staff and of available resources *before* an epidemic occurs.

Annex 6 lists suggested responsibilities of health facility and district level staff. Review them before an epidemic and consider who among your staff would be responsible for each task. Notify those people and arrange for any necessary training or briefing.

Plan logistics and staff responsibilities

- Have the responsibilities for district personnel been decided?
- Is there a plan for re-assigning staff during an epidemic?
- Has funding been identified for extra staff costs during an epidemic?
- Is there a plan for setting up Temporary Treatment Centers?
- Have logistics needs during an epidemic been identified?
- Has funding for extra costs related to logistics been identified?

5.7 Ensure that financial support is available for preparation and response

Ensure that financial support is available for preparation and response

- Have the costs related to *preparation* for an epidemic been identified?
- Have the costs for investigation of suspected epidemics been identified?
- Have the costs related to the *response* to an epidemic been identified?
- Has a source of funding or support been found for each expense?

5.8 Plan for Implementation of Control Measures

The control measures needed to respond to an outbreak of cholera are covered in Chapter 4.

Control Measures

- Have potential members of Mobile Control Team been identified?
- If so, have they been trained?
- Has a source of supplies for the team(s) been identified?
- Has transport for the team(s) been identified?
- Have possible Temporary Treatment Center sites been identified?
- Are there plans for providing safe water in affected areas?
- Are there plans for ensuring safe disposal of excreta?
- Are health education materials ready?
- Has funding for control measures been identified?

5.9 Make an Emergency Response Plan for Responding to an Epidemic of Cholera

A district with a Cholera Emergency Response Plan can respond quickly and effectively to a suspected or confirmed epidemic. Planning an emergency response means that you have a procedure guide or “road map” to follow during an epidemic. It also means you have adequate resources and have identified sources of support. The CDD committee should be involved in making the plan, and if a crisis committee exists, it should be involved.

The Emergency Response Plan should specify:

- *what* should be done,
- *when* it should be done,
- *who* should do it, and
- what *resources* are needed.

The Action Plan Matrix in Self-Study Exercise Number 9 includes the activities listed below - you may add others.

Activities to be done when the first report of suspected cholera is received (the order in which each activity is done may vary and will depend on how well prepared the district is).

- 1) report the suspected cases to the designated authorities
- 2) convene the epidemic committee
- 3) identify (or review) responsibilities of staff
- 4) send investigation team to the field
- 5) inventory essential supplies
- 6) inform health facilities to be alert for cases (inform the public when you are more certain it is cholera, usually after the investigation)

Activities to be done when a cholera epidemic is confirmed, or strongly suspected

- 7) inform neighboring districts
- 8) regularly obtain health facility reports, summarise them, and forward them to the designated level
- 9) conduct training, if needed
- 10) obtain supplies
- 11) set up Temporary Treatment Centers, if needed
- 12) implement other control measures
- 13) monitor and evaluate control measures, and
- 14) inform and educate the public.

Assign a person to monitor and document control activities, costs and results throughout the epidemic. This will be useful if the strategy needs to be changed during the epidemic and will help you improve your district's epidemic preparedness in the future.

Make an Emergency Response Plan for an Epidemic of Cholera

- Is there an Emergency Response Plan for responding to cholera?
- Are members of a cholera (epidemic) committee, and other involved personnel, aware of the plan?

5.10 Evaluate epidemic preparedness

You should regularly assess your district's epidemic preparedness:

- *before* an epidemic (to be sure the district will be ready),
- periodically *during* an epidemic (to be sure that the response is effective), and
- *after* an epidemic (to be sure the district will be better prepared in the future).



Systematically review the questions in the boxes in this chapter. Decide whether there are other indicators of preparedness that you want to add. When you can answer “yes” to all the questions, your district will be ready to respond to an epidemic of cholera.

Evaluate Epidemic Preparedness

- Has the preparedness of the district been evaluated?
- If so, were the results of the evaluation acted on?
- Are regular, periodic evaluations scheduled?

5.11 Plan for Prevention

Improvements in the water supply and sanitation are the most effective means of preventing cholera. Water provided through piped municipal systems should be monitored regularly in different sites to assure adequate chlorine levels from reservoir to tap. In areas without piped systems, water safety programs should concentrate on increasing the number of deep covered wells and tube wells, which provide water safe from surface contamination. Programs should also emphasize the importance of home water chlorination during non-epidemic periods in order to prevent diarrhea due to many pathogens. Sanitation programs should encourage people to build and use latrines, and to practice good handwashing habits. Educate the public on safe food preparation and storage practices.

Plan for Prevention

- Has the district situation with regards to safe water and sanitation and domestic food safety been determined?
- Is there a plan to make any improvements needed?

ANNEXES

Annex 1- Clinical Management of Cholera Patients

Table A: Steps in the Management of Suspected Cholera Patients

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

STATUS:	PLAN A: NO DEHYDRATION	PLAN B: SOME DEHYDRATION	PLAN C: SEVERE DEHYDRATION
LOOK AT: 1. CONDITION 2. EYES (Tears) 3. MOUTH & TONGUE 4. THIRST	Well, alert Normal Present Moist Drinks normally, not thirsty	*Restless, irritable* Sunken Absent Dry *Thirsty, drinks eagerly*	*Lethargic or unconscious; floppy* Very sunken and dry Absent Very dry *Drinks poorly or not able to drink*
FEEL: 1. SKIN PINCH	Goes back quickly	*Goes back slowly*	*Goes back very slowly*
DECIDE:	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.

* = a major sign

In adults and children older than 5 years, other ***signs*** for severe dehydration are ***absent radial pulse*** and ***low blood pressure***. The skin pinch may be less useful in patients with marasmus (severe wasting) or kwashiorkor (severe malnutrition with edema), or obese patients. Tears are a relevant sign only for infants and young children.

Guidelines For Patients With No Dehydration

Patients who showed no signs of dehydration when they were first assessed at the health facility may be treated at home. They should be given a 2-day supply of ORS packets and instructed to take ORS solution according to the following schedule:

ORS Recommendations for Patients With No Dehydration

Age	Amount of solution after each loose stool	ORS packets needed
Less than 24 months	50-100 ml	Enough for 500 ml/day
2-9 years	100-200 ml	Enough for 1000 ml/day
10 years or more	As much as wanted	Enough for 2000 ml/day

Patients who showed signs of severe or some dehydration when first assessed but who show no signs of dehydration after receiving IVF or ORS solution should be kept under observation until their diarrhea stops. These patients should receive the maximum amount of ORS recommended for the patient's age in the table above after each loose stool. If the patient requests more ORS, he should be given as much as he requests. 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 4 hours.

Guidelines For Rehydrating Patients With Some Dehydration

ORS solution should be given according to the following schedule:

ORS Solution Guidelines for Patients With Some Dehydration

Approximate amount of ORS solution to give in the first 4 hours to patients with some dehydration						
Age*	<4 mo.	4-11 mo.	12-23 mo.	2-4 year.	5-14 year.	15+ year.
Weight (kg)	<5	5-7.9	8-10.9	11-15.9	16-29.9	30+
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.

Patients should be assessed every 1-2 hours to assure that they are taking ORS adequately and to monitor fluid losses. If a patient requests more ORS than is recommended in the table, they should be given as much as they can drink. If the patient is vomiting, give ORS in small, frequent sips or give the ORS more slowly. Patients who vomit can be given ORS by nasogastric tube, but this is usually not necessary. Vomiting should subside within 2-3 hours as the patient becomes rehydrated.

The patient should be completely reassessed after 4 hours, and guidelines for no, some, or severe dehydration should be followed, as appropriate.

Guidelines For Rehydrating Patients With Severe Dehydration

Intravenous fluids should be started immediately; 100 ml/kg of Ringer's Lactate Solution should be given as follows:

Guidelines for Intravenous Fluid Replacement

Age	First give 30 ml/kg IV in:	Then give 70 ml/kg IV in:
Infants (<12 mos.)	1 hour*	5 hours
One year or older	30 minutes*	2.5 hours

*Repeat once if wrist pulse is weak or not detectable after first 30 ml/kg IV.

The patient should be assessed after the first 30 ml/kg IVF is given, and then every 1-2 hours. If hydration is not improving, IVF should be given more rapidly.

ORS solution should be given as soon as the patient can drink in addition to IVF.

After 6 hours (for infants) or 3 hours (one year or older), the patient should be completely reassessed. The treatment guidelines for patients with no, some, or severe dehydration should be followed, as appropriate.

Antibiotics Recommended in the Treatment of Severely Dehydrated Cholera Patients		
Antibiotic	Children	Adults
Doxycycline <i>one single dose</i>	---	300 mg ^a
Tetracycline <i>4 times per day for 3 days</i>	12.5 mg/kg	500 mg
Trimethoprim-sulfamethoxazole (TMP-SMX) <i>twice a day for 3 days</i>	TMP 5 mg/kg and SMX 25 mg/kg ^b	TMP 160 mg and SMX 800 mg
Furazolidone <i>4 times per day for 3 days</i>	1.25 mg/kg	100 mg ^c
Erythromycin ^d <i>adults: 4 times per day for 3 days</i> <i>children: 3 times per day for 3 days</i>	10 mg/kg	250 mg

^a Doxycycline is WHO's antibiotic of choice for adults (except pregnant women) because only one dose is required.

^b TMP-SMX is WHO's antibiotic of choice for children. Tetracycline is equally effective; however, in some countries it is not available for pediatric use.

^c Furazolidone is WHO's antibiotic of choice for pregnant women.

^d Erythromycin or chloramphenicol may be used when the other recommended antibiotics are not available, or where *V. cholerae* is resistant to them.

General Instructions For Patients and Their Families

Patients and their families should be provided some basic information about home care before leaving the health facility, such as:

- (1) A normal diet should be resumed as soon as vomiting stops.
- (2) Breast-feeding of infants and young children should be continued.
- (3) If the patient develops any of the following, he should return for treatment:
 - increased number of watery stools
 - eating or drinking poorly
 - marked thirst
 - repeated vomiting
 - fever
 - blood in the stool.

The health care worker should use this opportunity to give a the patient and family a few simple health education messages regarding personal hygiene, food and water safety, and sanitation (see Annex 2).

Annex 2 - Sample Health Education Messages

Three Simple Rules for Preventing Cholera

1. Cook your food
2. Boil or chlorinate your drinking-water
3. Wash your hands

Are You Protected From Cholera? Do you prepare food safely?

Cooking kills cholera germs

- Thoroughly cook all meats, fish and vegetables
- Eat them while they are hot

Washing protects from cholera

- Wash your *hands* before preparing or serving food.
- Wash your *dishes and utensils* with soap and water
- Wash your *cutting board* especially well with soap and water.

Peeling protects from cholera

- Eat only fruits that have been freshly peeled, such as oranges and bananas

KEEP IT CLEAN: COOK IT, PEEL IT OR LEAVE IT!

**Are You Protected From Cholera?
Is Your Drinking-Water Boiled or Treated?**

Even if it looks clean, water can contain cholera germs.

Water for drinking can be made safe in two ways:

- *Boil* it to kill cholera germs; bring water to a rolling boil, and keep it boiling for one minute
- *Chlorine* kills cholera germs; use three drops of *chlorine solution* for each litre of water, mix well, and leave it for half an hour before drinking

To make the chlorine solution: mix 3 level tablespoons (33 grams) of bleaching powder in one litre of water. *

DRINK ONLY SAFE WATER

* This amount is for a bleaching powder that contains 30% concentration by weight of available chlorine. If the bleaching powder available in the market is different, adapt the amount needed to prepare the chlorine solution.

**Are You Protected From Cholera?
Is Your Drinking-Water Stored Safely?**

Clean water can become contaminated again if it is not stored safely.

Store drinking-water in a clean container with a small opening or a cover. Use it within 24 hours.

Keep the water out of the reach of children and animals.

Pour water from the container - do not dip a cup into the container.

KEEP IT CLEAN: STORE DRINKING-WATER SAFELY

**Are You Protected From Cholera?
Do you wash your hands?**

The germs that cause cholera are invisible. They can be carried on your hands without you knowing it.

Always wash your hands:

- after you use the toilet or latrine, or clean up your children
- before you prepare or serve food
- before you eat and before you feed your children

This is the best way to wash your hands:

- Always use soap or ash
- Use plenty of clean water
- Wash all parts of your hands - front, back, between the fingers, under the nails.

KEEP IT CLEAN: WASH YOUR HANDS

**Are You Protected From Cholera?
Do you use a toilet or latrine?**

Cholera germs live in faeces. Even a person who is healthy might have the germs in the faeces.

- *Always* use a toilet or latrine. If you don't have one, build one.
- Keep the toilet or latrine clean.
- Dispose of *babies' faeces* in the toilet or latrine (or bury them).
- *Wash your hands* with soap (or ash) and clean water after using the toilet or latrine.

KEEP IT CLEAN: USE A TOILET OR LATRINE

Are You Prepared for Cholera?
What should you do if you get cholera?

Cholera can be treated. The biggest danger of cholera is the loss of water from the body.

Don't panic, but act *quickly*.

- Drink ORS mixed with safe water (boiled or treated)
- Go immediately to the health center. Continue drinking as you go.

Now, before you or your family get cholera - find out where you can get ORS, and how to mix it.

Annex 3 - Rules for Safe Food Preparation to Prevent Cholera

- 1. Cook foods thoroughly** - *all parts of the food* must be heated to at least 70 °C. Do not eat uncooked foods, unless they can be peeled or shelled.
- 2. Eat cooked foods immediately.** When cooked foods cool to room temperature, bacteria begin to grow. The longer the wait, the greater the risk. When there is delay between cooking and eating food (as with restaurants or food vendors), the food should be kept at 60° C or more, over heat, until served.
- 3. Store cooked foods carefully** - in an refrigerator or ice box below 10 °C, or kept hot at 60° C. or higher. Cooked foods that have been stored must be thoroughly reheated before eating. *Food for infants should be eaten immediately after being prepared, and not stored at all.*
- 4. Reheat cooked foods thoroughly.** Reheating foods thoroughly is the best protection against bacteria that may have grown during storage (low temperatures slow the growth of bacteria, but do not kill them). Reheating means that *all parts of the food* reach at least 70 °C. Eat food while it is still hot.
- 5. Avoid contact between raw and cooked foods.** Safely cooked food can become contaminated though even the slightest contact with raw food. This cross-contamination can be direct (raw fish touches cooked food), or indirect (cooked food is put on a cutting board where raw fish was cut, or cut with the same knife).
- 6. Wash hands repeatedly.** Wash your hands thoroughly before you start to prepare food and after every interruption (especially if you use the toilet, or clean up a baby). Wash your hands after preparing raw foods, such as fish or shellfish.
- 7. Keep all kitchen surfaces clean.** Since foods are so easily contaminated, every surface used for food preparation must be kept absolutely clean. Every food scrap, crumb or spot can be a potential source of bacteria. Cloths used for washing or drying food preparation surfaces should be changed every day and boiled. Floor cleaning clothes should be washed every day.
- 8. Use safe water.** Safe water is just as important for preparing food as for drinking. If there is any doubt, bring water to a rolling boil before adding it to food that will not be cooked further, or for making ice. Be especially careful with water used to prepare meals for infants.
- 9. Canned, dried and acidic foods should be safe.**

Annex 4 - Making Water Safe by Chlorination

Make a stock solution of chlorine (1% concentration by weight). Add to 1 liter of water:

15 g of calcium hypochlorite (70%)
or
33 g of bleaching powder or chlorinated lime (30%)
or
250 ml of sodium hypochlorite (5%)
or
110 ml of sodium hypochlorite (10%)

Store the stock solution in a cool place in a closed container that does not admit light. To be effective, new stock solutions must be made monthly.

Combine the stock solution with household water. Add water to the stock solution to assure proper mixing.

Add 1 liter of water to 3 drops of stock solution, or
Add 10 liters of water to 6 ml of stock.

Let the chlorinated water stand for 30 minutes before using.

Water that is cloudy should be filtered before chlorinating.

Annex 5 - Supplies Needed to Treat 100 Cholera Patients

Rehydration supplies¹

- 650 packets oral rehydration salts (1 liter each)
- 120 bags Ringer's lactate solution,² 1 liter, with giving sets-
- 10 scalp-vein sets
- 3 nasogastric tubes (adult)
- 3 nasogastric tubes (child)

Antibiotics

For adults:

- 60 capsules doxycycline, 100 mg (3 capsules per severely dehydrated patient)
- or
- 480 capsules tetracycline, 250 mg (24 capsules per severely dehydrated patient)

For children:

- 300 tablets trimethoprim-sulfamethoxazole, TMP 20 mg + SMX 100 mg (15 tablets per severely dehydrated patient)

Other treatment supplies

- 2 large water dispensers with tap (marked at 5- and 10-liter levels) for making ORS solution in bulk
- 20 bottles (1 liter) for ORS (e.g. empty IV bottles)
- 20 bottles (0.5 liter) for ORS
- 40 tumblers, 200 ml
- 20 teaspoons
- 5 kg cotton wool
- 3 reels adhesive tape

¹ The supplies listed above are sufficient for intravenous fluid followed by ORS for 20 severely dehydrated patients, and for ORS alone for 80 patients.

²If Ringer's lactate is unavailable, normal saline can be substituted.

Annex 6 - Responsibilities in Detection and Control of Epidemic Cholera

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

- the "health facility" level is responsible for recognition of patients with cholera, for reporting cases, for treatment of cases and for educating the public
- the "district" level is responsible for surveillance for epidemics, investigation of epidemics, and for coordinating and implementing control measures
- the "national" level is responsible for establishing policy, for obtaining and stockpiling supplies and for providing assistance and advice to lower levels.

There is more detail for the provincial and national level, so that the district level will know what to expect from those levels.

The activities listed for each level are suggestions. Individual countries may decide to assign certain activities to other levels, depending on the size of the country, the degree of decentralization of the health system and the degree of experience with cholera epidemics.

For example, large countries may choose to assign some of the "national" activities to a provincial or regional level. Or, a large health facility, such as a hospital, may undertake some "district" responsibilities, such as laboratory confirmation.

Responsibilities of Health Facilities in the Detection and Control of Epidemic Cholera

1. Identify suspected cases
2. Treat patients
3. Collect and transport specimens
4. Collect and report data
5. Maintain an inventory of supplies needed to treat cholera patients and to collect specimens.
6. Educate the public

Responsibilities of the District Level in the Detection and Control of Cholera

1. Maintain surveillance for cholera epidemics
2. Investigate suspected epidemics
3. Report cases and inform authorities
4. Coordinate treatment and control
5. Organize mobile teams and Temporary Treatment Centers
6. Plan and assess resources
7. Evaluate district preparedness and make needed improvements

Responsibilities of the Province in the Detection and Control of Epidemic Cholera

1. Convene Provincial Cholera 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 district requests assistance, if there are multiple confirmed outbreaks, or if there is one severe outbreak.

2. Organize Mobile Expert Teams

Maintain a list of experts (clinicians and sanitarians with experience from previous cholera outbreaks) who could be sent as a mobile 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 province should receive emergency reports of cholera outbreaks from affected districts. Contact the District Chief of Health 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 district and provincial 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 districts

4. Investigate Suspected Epidemics

Consult with districts regarding community investigations via telephone and on-site visits. Review investigations with the districts 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 consultations if:

- requested by a district
- there are confirmed outbreaks in multiple communities; and
- there is a particularly severe outbreak (attack rate $> 0.2\%$ of village population or case fatality rate $> 20\%$).

The Provincial level should have a low threshold for involvement initially, using this as an opportunity to train and consult with district 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 national 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 district and national levels whether *V. cholerae* 01 or 0139 was confirmed in stool specimens.

5. Report

Epidemic Reporting

Report weekly to the national level while there are ongoing cholera outbreaks. Report the results of on-site investigations, district and provincial attack rates, case fatality rates, locations of new outbreaks, the number of new cases and new outbreaks over time, and the level of inventory of cholera treatment supplies

6. Resource Assessment

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

Consult with the national level regarding the need for additional technical, resource, or personnel support from the national level. Request additional emergency supplies when provincial reserves can not supply districts for more than one month during an outbreak.

Responsibilities of the National Level in the Detection and Control of Epidemic Cholera

1. Notify

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

2. Convene National Epidemic Coordinating Committee

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

3. Analyze Data

The national level should receive weekly collated reports from the provinces of suspected cholera cases, deaths, and their locations.

Analyze the data and results of provincial investigations to:

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

4. Assist in Field Investigations

Consult with provinces regarding provincial on-site investigations via telephone or on-site visits. Review outbreak investigations with Provinces and advise them regarding data collection methodology, analysis, and actions to take.

5. Provide Assistance

Review provincial 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 national support include:

- requests from provinces for assistance;
- attack rates > 0.05 in a district
- case fatality rates $> 15\%$; and
- confirmed cholera outbreaks in multiple locations.

The national level should have a low threshold for involvement initially, using this as an opportunity to train and consult with Provincial staff in case management, epidemiologic

studies, and community education.

6. Mobilize Additional Emergency Supplies

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

7. Monitor Antibiotic Resistance

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

8. Conduct Epidemiologic Studies

Discuss with provinces the need for additional analytic epidemiologic studies, such as case control studies to identify risk factors for cholera and to guide control efforts. If needed, provide technical training in case control methods.

Annex 7 - Indicators for Evaluating Epidemic Preparedness

Cholera epidemic preparedness should be assessed periodically so that program activities can be modified, and the level of preparation optimized prior to an outbreak. Some indicators which may assist in evaluating preparedness during non-epidemic periods include:

- proportion of medical personnel trained in surveillance case definitions, sample collection, and patient management;
- proportion of public health personnel trained in cholera detection, confirmation, and control activities;
- proportion of health facilities which have been given a supply of Cary-Blair specimen collection kits;
- proportion of emergency supply reserve available at the local level;
- proportion of reported cases which resulted in a community investigation (in non-endemic areas);
- proportion of health facilities maintaining patient register appropriately (requires on-site review);
- proportion of health facilities that reported suspect cases (requires on-site review).