

Coping with cholera: the importance of coordinated planning

Ever been faced with a cholera epidemic in your neighbourhood? Done a risk assessment? Bryan Pearson has been looking at some of the guidelines on the subject

Cholera epidemics in Zimbabwe, Haiti, and Nigeria have grabbed worldwide headlines in the last couple of years as beleaguered health agencies battled to contain a rising tide of patients. Is this resurgence a pathological issue, or simply the consequence of poor public health provision? Superficially there should be little excuse for the epidemics of the size we have witnessed recently (more than 1500 died in the outbreak in Nigeria in 2010), cholera is not a mystery illness, and measures to contain an outbreak are known. But the logistics can be daunting and if health systems are weak, they can quickly become overwhelmed.

Can one prepare? Of course... and in fact it is a must. As with all infectious diseases, lessons from one campaign will educate and illuminate actions for another. Hospitals and communities should be undertaking regular risk assessments, and providing quality training and resources to enable swift and decisive action the moment a problem is identified.

Until the 1980s most outbreaks were managed at the local level using the best available common sense. Apart from in the most densely populated areas, this was largely successful. Slowly, public health experts started comparing notes and the compilation of guidelines for the control of cholera outbreaks started to emerge with epidemiologists from WHO helping to 'join up the dots' between experiences in different continents and countries.

Introduction

Cholera has been prevalent worldwide since the early 19th century and has been endemic in most of Africa since that time. Research has contributed a great deal in providing health practitioners with knowledge on the aetiology and epidemiology of the disease, including the clinical management of patients. Both public and clinical research contributed the following data to help understand cholera:

- In approximately 90% of cholera cases, the disease is mild; and it is difficult to differentiate it from other diarrhoeal diseases.
- Oral rehydration therapy is important in case management and can reduce the case fatality.
- Vaccination and other chemoprophylaxis are ineffective in preventing and controlling cholera; personal hygiene in drinking and eating habits, and safe disposal of human waste have proven to be effective in controlling the disease.

Cholera epidemics are public health problems and could claim up to 50% of its victims. It is therefore important for all the stakeholders in cholera prevention and control to use correct intervention strategies useful in curbing the epidemic.

Aetiology

Cholera is caused by a bacterium called *Vibrio cholerae*. There are more than 60 cholera bacteria; however, current

outbreaks in Africa are generally caused by El Tor biotype of *Vibrio cholerae* serogroup O1. The serotype of El Tor biotype prevalent in Africa is Inaba. *Vibrio cholerae* O139 serovar is the major causative agent of epidemics in Asia.

Presentation

Most cholera infections are asymptomatic or mild, and indistinguishable from other mild diarrhoea. In its severe form the following signs and symptoms characterise cholera:

- Onset is typically sudden.
- Diarrhoea is profuse, painless and watery, with flecks of mucus in the stool ('rice water' stools). The presence of blood in stools is not a characteristic of cholera.
- Vomiting may occur, usually early in the illness.
- The majority of patients are afebrile, children are more often febrile than adults.
- Dehydration occurs rapidly (up to 1000ml/hour of diarrhoea may be produced).
- All complications result from effects of loss of fluids and electrolytes in stools.
- Vomiting; muscle cramps, acidosis, peripheral vasoconstriction, and ultimately renal and circulatory failure, arrhythmias and death may occur if treatment is not given in good time.

Transmission

Cholera is restricted to humans and faecally contaminated

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water is the most important reservoir of infection and vehicle of transmission, either directly or indirectly through contaminated food. *Vibrio cholerae* is spread mainly via the faecal–oral route. Some of the best-known sources of infection are as follows:

- drinking water that has been contaminated at its source, during storage or usage;
- contaminated foods, vegetables that have been fertilised with human excreta (nightsoil) or ‘freshened’ with contaminated water;
- soiled hands can also contaminate clean drinking water and food;
- fish, particularly shellfish taken from contaminated water and eaten raw or insufficiently cooked.

The incubation period ranges from a few hours to 5 days (usually 2–3 days). It is communicable for the duration of stool-positive stage, and asymptomatic carrier status may persist for several months.

The people most at risk of contracting cholera are those who do not have access to piped, safe water and adequate and proper sanitation.

Epidemic preparedness

A strong programme for the control of diarrhoeal diseases is the best preparation for a cholera epidemic. In the long term, improvements of safe water supply and adequate sanitation are the best means of preventing cholera. In an outbreak, the best control measures are the early detection of cases and treatment of patients; coupled with health education. In order to respond quickly to the cholera epidemic and to prevent deaths, health facilities must have access to adequate quantities of essential supplies, particularly oral rehydration solution and intravenous fluids.

During an outbreak of cholera, these supplies are needed in greater quantities than normal. To prepare for an outbreak, it is essential to maintain additional stocks at appropriate points in the drug delivery system. Small ‘buffer stocks’ should be placed at local health facilities, larger buffer stocks at district or provincial levels, and an adequate emergency stock at a central distribution point.

Refer to Appendix C for supplies and equipment needed for epidemic preparedness. Medical and paramedical personnel involved in the treatment of cholera should receive intensive and continuing training to ensure that they are familiar with the most effective techniques for the management of patients with cholera.

Prevention and control

The community should be informed about sources of contamination and ways to avoid infection. Attention to sanitation can markedly reduce the risk of transmission of cholera including other intestinal pathogens. This is especially true where lack of good sanitation may lead to contamination of water sources. High priority should be given to observing the basic principles of sanitary human waste disposal and particularly the protection of water sources from faecal contamination.

The development of sanitary systems appropriate to local conditions should be facilitated and their siting in relation to water sources emphasised. Basic hygiene



This water may look clean but there is still a risk of contamination

involving thorough hand washing following contact with excreta should be encouraged for adults, children and infants.

Where water supplies are at risk of contamination, households should be taught the necessity and the techniques of sanitising water in the home. The simplest and most cost effective method is chlorination of water in the storage container using household bleach. Boiling is also effective. Filtration may be necessary in addition to boiling if the only water available contains much particulate matter. Chlorination alone is not sufficient in such circumstances. Even when drinking water is rendered safe, infection may still be transmitted by contaminated surface water used for bathing and for washing clothing, food, or cooking utensils. In an outbreak, all water sources with the potential for contamination must be

Preparing an emergency pit latrine

In an emergency, while a more permanent latrine is being built, a simple pit can be dug as a temporary solution for the disposal of human excreta. It should measure 0.3 x 0.3 metres, have a depth of 0.5 metres, and be at least 30 metres from a well or other source of drinking water. Where possible, the pit should be at least 6 metres from the nearest house. It should not be located uphill from the water source or dug in marshy soil. The bottom of the pit should never penetrate the groundwater table. After each use, a layer of soil should be laid down in the pit. In an area affected by cholera, the pit should also be coated each day with a layer of unslaked lime.



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Street food-vendor: a possible contributor to the spread of cholera?

tested, rendered safe if contaminated, or otherwise closed to usage and alternative sources provided.

Since food is an important vehicle for the transmission of enteric pathogens, attention to food safety is an essential preventive measure, which should be intensified when there is a threat of cholera. Street vendors and communal food sources will require particular attention, since they pose a special risk. Flies play a relatively small role in spreading cholera but their presence in large numbers indicates poor sanitary conditions, which favour transmission of the disease.

Public awareness

In the case of an outbreak, communities at risk should be sensitised through intensive health education; and encouraged to participate in the following activities:

- i. Water purification or ensuring a safe water supply by boiling or chlorination of domestic water using household bleach: add 1 teaspoonful (5 ml, or one capful if bottle has a screw cap) of household bleach to 20–25 litres of water. Thoroughly mix solution with the water and allow to stand for at least 2 hours (preferably overnight) before use.
- ii. Sanitary disposal of human waste without contaminating water sources, and control of flies.
- iii. Food hygiene – avoid any potentially contaminated food, especially raw or partially cooked fish and shellfish. Food of vegetable origin should be peeled or shelled. Boil or pasteurise all milk.

It is important to actively inform and educate healthcare workers and the community about the extent and severity of the outbreak and the effectiveness and simplicity of current treatment methods, and benefits of reporting cholera cases promptly. The free

flow of information would prevent panic spreading through the community. Communities should also be involved in educating themselves through the use of various communication strategies. Street food-vendors and restaurants may contribute in the spread of the disease. Therefore, Environmental Health Officers need to be vigilant in inspecting food-handling practices, and should be authorised to stop street sales or close restaurants if insanitary practices are revealed. Health education activities for food handlers in areas under the threat of cholera should stress the following:

- Exclude infected persons from handling food.
- Wash vegetables and fruit in treated water before use.
- Prepare and store food under proper hygienic conditions.
- Cook food thoroughly in treated water and eat it while still hot, or reheat it thoroughly before eating.
- Prevent contamination of food by contact with other contaminated raw food, contaminated surfaces, or flies.
- Wash hands thoroughly with soap after defaecation and before preparing or eating food.
- Encourage individuals to use clean cutlery when eating.
- Discourage the habit of several people eating simultaneously from a communal food container.
- Left over food should be reheated before eating.
- Encourage breast-feeding of infants.

It is very important to liaise with local media such as press, radio, and television to ensure that correct health education messages are passed on to the general public.

An organised programme for the control of diarrhoeal diseases is the best preparation for a cholera outbreak. The best control measures are the early detection and effective treatment of infected persons allied to health education. The mortality is likely to be high among severe cases (up to 50%) in an unprepared community.

The basic requirements for preparedness include the establishment of a reliable surveillance and reporting system, ensuring the availability of essential supplies, and the training of workers in the clinical management of acute diarrhoea.

Surveillance

Every ministry of health should have an effective public health epidemiological reporting system and all proven cases must be reported immediately through this process. Does such a system exist where you are? It would be well worth asking questions if you are unaware of the structure. An attempt must be made to establish a bacteriological diagnosis from rectal swabs or stool specimens (see Appendix A) in cases of gastro-enteritis suspected of being due to or possibly due to cholera, presenting at hospitals/peripheral clinics or observed by mobile health teams and field workers in cholera-designated areas.

Environmental surveillance forms one of the most important parts in the control of and preparedness for the cholera epidemic. The following are to be taken into consideration when conducting environmental surveillance:

- Identify communities at risk (unsafe water supplies or inadequate sanitation) and ensure that they are informed about sources of contamination and ways to avoid infection.
- Investigate all bacteriologically proven cases to identify the sources of infection.
- Monitor the spread of cholera in risk areas by periodically sampling strategic sewage effluent (hospitals, prisons, hostels, sewage purification works) as an early warning system (see Appendix B).
- Surveillance using Moore pads should only be done in high-risk areas where there is a definite chance of cholera being identified. Selected sentinel sites should be monitored in large cities. Moore pads should be used to monitor the end of an epidemic. *Vibrio cholerae* isolated from Moore pads should be tested to determine whether they are indeed *Vibrio cholerae* 01 or not, since *Vibrio cholerae* 01 results in diarrhoea. When such changes in the pattern of diarrhoeal illness occur the notification process should be activated immediately. When this information comes from an area where cholera has not previously been confirmed, bacteriological and epidemiological investigations should be arranged promptly to establish the cause of the outbreak and epidemic control measures instituted, if indicated.

Reporting

When suspected cases of cholera are detected at a health facility, the nearest referral facility or designated local health officer should be notified immediately. The Provincial Department of Health (or whatever the next layer of authority is called) should then be notified to investigate and confirm the diagnosis. Upon confirmation, the National Department or Ministry of Health should be notified since cholera is a notifiable disease.

It should then be decided who should inform the community, via the media, of the cholera threat and measures to be taken to prevent the outbreak from spreading.

The National Communicable Disease Officer should then inform the Senior Management of the outbreak of the disease and the steps being taken to contain and control the outbreak. The opportunity should be used to motivate improved water quality and sanitation through provision of safe water supplies and the building of toilets or latrines.

International notification

According to regulations National Health Authorities should report the first suspected cases of cholera to the World Health Organization as rapidly as possible. Laboratory confirmation should be obtained at the earliest opportunity and also reported to WHO. Weekly reporting is required where cholera is confirmed.

Reports should include the number of new cases and deaths since the previous report, plus the cumulative totals for the current year by province or other applicable geographic division.

Additional demographic information should be provided, if available. Once the presence of cholera in an area has been confirmed it is not a requirement to

confirm all subsequent cases.

Neither the treatment of individual cases nor the notification of suspected cases needs laboratory confirmation of the presence of *Vibrio cholerae* 01. Monitoring of an epidemic should include laboratory confirmation of a small proportion of cases on a continuing basis.

Treatment

Hospitalisation with enteric precautions is desirable for severely ill patients but strict isolation is not necessary. Less severe cases can be managed on an outpatient basis with oral rehydration. Crowded cholera wards can be operated without hazard to staff and visitors when effective hand washing and basic procedures of cleanliness are practised. The only treatment needed is rehydration as soon as possible. It is essential that all cases presenting clinically as cholera cases, must be treated as such immediately.

Recognition of cholera case 'rice water stools' is very important, and health workers need to start treatment as early as possible to reduce potential contamination of the environment and death. Cholera should be suspected when:

- a patient older than 5 years develops severe dehydration from acute watery diarrhoea (usually with vomiting); or
- any patient above the age of 2 years has acute watery diarrhoea in an area where there is an outbreak of cholera.

Dehydration, acidosis, and potassium depletion typical of cholera are due to loss of water and salts through diarrhoea and vomiting. Therefore rehydration, which consists of replacing water and salts, is necessary. Patients should be encouraged to seek medical attention from trained health workers as rapidly as possible to reduce the risk of shock. The following are useful steps that can assist in the management of cholera patients.

Step 1: assess the patients for dehydration

Use Table 1 to determine whether the patient has severe, some, or no signs of dehydration.

Step 2: rehydrate the patient and monitor frequently, reassess hydration status

For severe dehydration:

- Give intravenous (IV) fluid immediately to replace fluid deficit. Use Ringer's lactate solution or, if not available, normal saline.
- If the patient can drink give oral hydration salts (ORS) by mouth simultaneously while the drip is being set up.
- For patients aged 1 year and older, give 100 ml/kg IV in 3 hours, as follows:
 - 30 ml/kg as rapidly as possible (within 30 minutes); then 70 ml/kg in the next 2.5 hours.
 - For patients aged less than 1 year, give 100 ml/kg IV in 6 hours, as follows:
 - 30 ml/kg in the first hour; then
 - 70 ml/kg in the next 5 hours.
- Monitor the patient very frequently. After the initial 30 ml/kg have been given, the radial pulse should be strong and blood pressure should be normal. If the

Table 1 Assessment of the diarrhoea patient for dehydration

Look	Condition Eyes Tears Mouth/tongue Stool	Well, alert Normal Present Moist Loose	Restless*, irritable* Sunken Absent Dry Rice watery	Lethargic*, unconscious*, floppy* Very sunken and dry Absent Very dry Rice watery
Feel	Skin pinch	Goes back quickly	Goes back slowly*	Goes back very slowly*
Decide		The patient has no sign of dehydration	If the patient has two or more signs, including at least one * sign there is moderate dehydration	If the patient has two or more signs, including at least one * sign there is severe dehydration

NB. 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 oedema), or obese patients. Tears are a relevant sign only for infants and young children.

Table 2 Approximate amount of ORS solution to give in the first 4 hours

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

Use the patient's age only when you do not know the weight. The approximate amount of ORS required (in ml) can also be calculated by multiplying the patient's weight (in kg) by 75.

NB. Use nasogastric tube if the patient cannot drink and IV therapy is not possible at the facility. Regular urinary output (every 3–4 hrs) is a good sign that enough fluid is being given.

- pulse is not yet strong, continue to give IV fluid rapidly.
- Give ORS solution (about 5 ml/kg per hour) as soon as the patient can drink in addition to IV fluid.
- Reassess the patient after 3 hours (infants after 6 hours), using Table 1.
- If there are still signs of severe dehydration (this is rare), repeat the IV therapy.
- If there are signs of some dehydration, continue as indicated below for moderate dehydration.
- If there are no signs of dehydration, go on to step 3 to maintain hydration by replacing continuing fluid losses.

For moderate dehydration

- Give ORS solution in the amount recommended in Table 2. If the patient passes watery stools or wants more ORS solution than shown, give more.
- Monitor the patient frequently to ensure that ORS solution is taken satisfactorily and to detect patients with profuse and continuing diarrhoea who will require closer monitoring.
- Reassess the patient after 4 hours, using Table 1.
- If signs of severe dehydration have appeared (this is rare), treat as in step 1, above.
- If there is still moderate dehydration, repeat the procedures for some dehydration, and start to offer food

and other fluids.

- If there are no signs of dehydration, go on to step 3 to maintain hydration by replacing continuing fluid losses.

For no sign of dehydration

Patients observed to be without signs of dehydration could be treated at home (see Table 3).

- Give ORS packets to take home. Give enough ORS for 2 days.
- Instruct the patients or the care-giver to return if the patient develops watery stool, marked thirst, repeated vomiting, fever and bloody stool.

Step 3: maintain hydration, replace continuing fluid losses until diarrhoea stops

The amount of ORS solution required varies from one patient to another. The greatest amount of ORS solution is required within the first 24 hours, especially in patients with severe dehydration. In the first 24 hours, such patients require an average of 200 ml of ORS solution per kg of body weight.

Prompt fluid therapy with volumes of electrolyte solution, enough to correct dehydration, acidosis, and hypokalaemia is the cornerstone to cholera therapy.

Oral administration of glucose–electrolyte solution (8 teaspoons sugar, half teaspoon salt, mixed with 1 litre safe water) to patients with diarrhoea, including patients with cholera, will save many lives. Approximately 80–90% of patients can

Table 3 Approximate amount of ORS solution for home treatment

Age	Amount of solution after each loose stool	ORS packets needed
< 24 months	50–100 ml	Enough for 500 ml/day
2–9 yrs	100–200 ml	Enough for 1000 ml/day
≥10yrs	As much as wanted	Enough for 2000 ml/day

be successfully treated by oral rehydration. It should be emphasised that all cases of diarrhoea showing signs of dehydration must receive adequate oral rehydration immediately, before transportation to hospital.

NB: patients should be properly fed after vomiting has stopped.

Antibiotics

Antibiotic management is not recommended for cholera patients, including severe cases. With good clinical care, the patient will respond to rehydration therapy.

There is no evidence to support the suggestion that the use of antibiotics increase the chances of survival of cholera patients. Although its use has previously been shown to shorten the duration of the diarrhoea, current strains tend to be resistant. The use of antibiotics in mild cases can quickly use up supplies and hasten the development of antibiotic resistance among *Vibrio cholerae* and, STDs, *Haemophilus* and *Pneumococci*, not only to tetracycline but also to other antibiotics.

In very severe dehydration and under supervision of a medical doctor, antibiotics may be given in a hospital setting. The choice of antibiotics should take into account local patterns of resistance. Knowledge of antibiotic sensitivity patterns of recent isolates in the immediate area or in adjacent areas is therefore important. Antibiotic-resistant *Vibrio cholerae* O1 should be suspected if diarrhoea continues after 48 hours of antibiotic treatment.

Vaccines

Cholera vaccination is **NOT** recommended, and vaccines currently available **DO NOT** help in controlling cholera because they lack the required potency and have low rates of protective efficacy; they provide immunity of limited duration only; they do not reduce the rate of asymptomatic infections, and prompt a false sense of security.

No anti-diarrhoeal, antiemetic, antispasmodic, cardiotoxic, or corticosteroid drugs should be used to treat cholera. Blood transfusion and plasma volume expanders are not necessary.

Prophylaxis

Prophylaxis with antibiotics such as tetracycline is not recommended because of the high incidence of resistance. The best prophylaxis is clean water and toilets, together with hand washing before food handling. During a local cholera epidemic:

- discourage community members from attending large communal gatherings, e.g. beer drinking;
- furthermore attempting to limit travel across borders etc. (e.g. 'cordon sanitaire') diverts manpower and resources from more effective control activities and hampers collaboration between agencies and countries in joint efforts to control cholera outbreaks.

Note: travel and trade restrictions between countries or different areas of one country, cannot prevent the spread of cholera.

General measures

- Start rehydration immediately and remove patient to a treatment centre if diarrhoea and/or dehydration persists.
- The patients' soiled clothes and linen should be thoroughly washed in hot strong soapy solution and hung out to dry in the sun.
- Do not wash soiled clothes or allow people to play or swim in communal drinking water sources, rivers, etc.
- Corpses should be transported in sealed, fluid-tight containers where possible.
- Strict hand washing must be practised after using the toilet and before handling food.
- Promote the construction and use of clean toilets – there must be no faecal contamination of the environment (water and food sources).
- Promote the use of safe sources of water, and identify and eliminate breeding places of flies.

Training

Since case fatality is largely determined by the urgency and adequacy of diarrhoeal management practices, prior training and continual supervision of health workers in the assessment of diarrhoea cases and the promotion and use of ORT and continued feeding during diarrhoeal illness are essential.

Effective rehydration practices cannot be assumed during an outbreak if they are not part of established daily routine practice. Such practice is the cornerstone of diarrhoeal disease control in the conditions that prevail throughout much of South Africa and each province should pay due attention to training in, and supervision of, the practice of ORT at primary care level.

It is therefore essential to educate all health workers regarding cholera and to create an awareness of possible cholera cases. All hospitals, clinics, mobile health teams, and other field workers such as Health Inspectors and Health Assistants must be equipped with, or have ready access to, a 'cholera pack' containing the following items:

- Screw top specimen bottles containing 'single strength' alkaline peptone water.
- Sterile rectal swabs and disposable gloves.
- Laboratory request forms.
- Instructions for collection and dispatch of specimens.

Note. If delay in transport to laboratory is anticipated to be >24 hours, use Cary–Blair transport medium instead. Instructions for the collection of stool specimens for cholera investigation are contained in Appendix A. It is suggested that individual hospitals, clinics, and other health authorities consult with their respective laboratories in this regard.

Intersectoral mobilisation

If there is a chance of a cholera outbreak occurring in an area where the peripheral health services are inadequate or have no experience in controlling the disease, mobile teams need to be available from national or provincial level, to be called upon for assistance. These outbreak response teams should have intersectoral representation including representation from those responsible for areas such as water, forestry, defence,

local government, and national communicable disease officers, environmental health officers, and communications and laboratory services. The members of each team should be brought together for briefing on emergency activities and their individual responsibilities.

Appendix A

Instructions for collection of stool specimens for cholera investigations

General information

1. Specimen labels must be properly filled in.
2. Specimens should be collected before antibiotic treatment.
3. Delays between collection of specimens and dispatch to the laboratory should be minimised.
4. Stools may be sent:
 - a. in normal specimen containers for isolation of all pathogens including *Vibrio cholerae*, or
 - b. in single strengths alkaline peptone water, specifically for accelerated *Vibrio cholerae* isolation. Dip a swab into the stool and express fluid against the inside of the bottle; repeat. Discard swab into disinfectant, or
 - c. If a delay of more than 24 hours is anticipated, the specimen should be submitted in Cary–Blair transport medium. Swabs should be plunged deeply into the medium, left in position for at least 30 seconds, then twisted gently and removed.
Note. This applies to plastic-stemmed swabs, if wooden-stemmed swabs are used, these can be broken off at the lip of the specimen container after plunging into the transport medium.
5. Specimen containers with alkaline peptone water and Cary–Blair transport medium need to be available quickly either through local laboratory services or from a designated central store. It is worth checking what the arrangements are in your area. What local labs are capable of testing the samples?

Appendix B

Instructions for collection and sending of sewer pads for cholera determination

1. Special wide-necked bottles containing (double strength) alkaline peptone water need to be obtainable from the Ministry.
2. Commercially available plain sterile surgical gauze swabs measuring approximately 10 cm square should be used. Tie one corner with a length of wire (or string if no rats present) and immerse the pad to hang below the surface of the effluent. The swab should remain in place for 24–72 hours, after which it should be pulled out.
3. Hold a 2–3 cm long piece of the swab with sterile forceps, cut it off with sterile scissors and place the piece in the peptone water bottle. Close the lid tightly.
4. Place the used instruments in a jar or flat container with methylated spirits. The instruments must be completely immersed. On arrival at the next sewer pad site, remove the instruments from the jar, close the jar and then hold a lighted match to the instru-

ments to remove all traces of alcohol.

5. Complete the attached label and send the specimen to the laboratory serving the specific hospital, clinic, etc. Specimens should arrive at the laboratory within 6–12 hours of collection.

Appendix C

Supplies and equipment estimate: for the first week of the cholera epidemic

Buffer and emergency stocks of essential supplies should already be in place before an epidemic starts. It is essential to establish a system to monitor their use and ensure their prompt replacement. Emergency supply requirements should be determined and individuals assigned to coordinate their procurement and distribution. The supplies and equipment needed have been calculated on an attack rate of 0.2, that is 200 cases may be expected to occur in a population of 100 000. This is only for calculating initial stocks to cope with the beginning of an epidemic of cholera.

Using the estimates in the panel below for 100 patients and current population in an area and an attack rate of 0.02, the needs may be calculated for stocking of supplies in preparing for an epidemic for the first week. Reassessment on a weekly basis for actual attack rate must be done. It is essential to establish a system to monitor use of supplies and ensure their prompt replacement.

Emergency supply requirements should be determined and individuals assigned to coordinate their procurement and distribution. A review based on weekly actual figures will help to reassess actual needs and prompt replacements.

Estimated minimum supplies needed to treat 100 patients during a cholera epidemic

Rehydration supplies

- 650 packets oral rehydration salt [for 1 litre each]
- 120 bags Ringer's lactate solution
- 10 scalp vein set
- 3 nasogastric tubes (paediatric)
- 3 nasogastric tubes (adult)

Other treatment supplies

- 2 large water containers with tap (marked at 5–10 litre levels) for making oral rehydration solution in bulk
- 20 bottles (1 litre) for ORS, e.g. empty i.v. bottles
- 40 tumblers, 200 ml
- 20 teaspoons
- 5 kg cotton wool
- 3 reels of adhesive tape

The supplies are sufficient for i.v. fluids followed by oral rehydration salts for 20 patients, and for ORS alone for the other 80 patients.