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# Cholera epidemic control

Some practical steps in a district level approach.

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## INTRODUCTION

**Cholera is characterised by a profuse watery and painless diarrhoea (rice water stools) often associated with vomiting. In the absence of early treatment, cholera may lead to severe dehydration, rapid cardio-vascular collapse and death. In Malawi cholera epidemics have been occurring every year in several districts and cholera control poses an important public health challenge at the district health level. The main objectives of a response to a cholera epidemic are:**

*To reduce cholera related mortality by appropriate and accessible rehydration treatment, and to limit the total number of cholera cases by implementing effective preventive measures.*

In this article I outline some practical steps and approaches towards achieving these main objectives. The paper is targeted at district health officers and health personnel suddenly faced with a cholera epidemic.

## Practical steps in response to a cholera epidemic:

### 1) *Is this a cholera epidemic?*

An outbreak of cholera should be suspected when

- \* There is a sudden increase in the daily number of patients with acute watery diarrhoea especially those who pass the typical rice water stools or
- \* A patient aged 5 years or more develops severe dehydration or dies from acute watery diarrhoea.

### 2) *Confirmation of an epidemic*

A case of cholera is confirmed when *Vibrio cholerae* O1 is isolated from the stool of a patient with diarrhoea. Specimens can be collected and stored for laboratory confirmation at the beginning of a possible outbreak by immersing a cotton-tipped swab or a piece of filter paper in liquid stool, and then inserting it into a plastic bag containing 3-4 drops of normal saline (NaCl, 0.9%) and sealing hermetically. Specimens should be collected before any antibiotics are given to the patient. Laboratory confirmation is essential at the beginning of an epidemic, to confirm the biotype, serotype and if possible antibiotic sensitivity patterns. Transport medium (Cary-Blair) is often available later for specimen collection and transport.

### 3) *Cholera co-ordination committee (Task force) at the district level.*

Establish a **district cholera co-ordinating committee (task**

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force) that will be responsible for mobilising financial and material resources and for overall co-ordination and rapid implementation of all cholera control activities at the district level. The members will include health and administrative authorities of the district, representatives of agencies, and community leaders where relevant.

## 4) Cholera case definition

Inform all surveillance and treatment units to respect and adhere to the established **cholera case definition** in reporting of cases in order to avoid over-reporting. The following is an internationally acceptable case definition for cholera for district reporting purposes:

*in an area where there is a cholera epidemic, a patient aged 5 years or more who develops acute watery diarrhoea, with or without vomiting.*

## 5) Estimation of needs and supplies

Assume there will be an **attack rate of 0.2 %** (ie about 0.2% of the population will develop cholera illness) to estimate needs and supplies during the first week(s) of the epidemic, during which time the requirements should be reassessed. (The attack

rate in a severe epidemic may turn out to be 1% or even higher). *Example: In a district of 400,000 inhabitants, the estimated number of cholera cases during an epidemic (attack rate of 0.2%) will be:  $0.2/100 \times 400,000 = 800$  cases*

## 6) Estimated minimum supplies needed to treat 50 patients during a cholera outbreak (Table 1)

The estimated needs for 50 cholera cases are given in Table 1. (See end of article) These amounts can be extrapolated to calculate the needs for different numbers of expected cholera cases in a given population.

## 7) Reporting and surveillance

Collect surveillance data on a weekly basis (or, when the epidemic is severe, on a daily basis) for transmission to the district co-ordinating committee. Minimum information must include the details of all recorded cases and deaths by age and sex within an epidemiological week (*Monday to Sunday*) by geographic area. It is useful to make a standard reporting form for all health units.

## 8) Organisation of a cholera isolation units/treatment centre (Figure 1)

Treatment centres or isolation units should be operational as soon as there is a suspected cholera case and are essential to facilitate isolation, treatment and hygiene measures in hospitals and large treatment centres. They could be built from locally available material such as bamboo poles and grass sheets and covered in plastic sheeting. A big tent, or a vacant building or shed can also be adapted for use as a cholera camp. Figure 1 shows a general layout for a cholera camp that takes into

consideration some of the basic principles of isolation and hygiene.

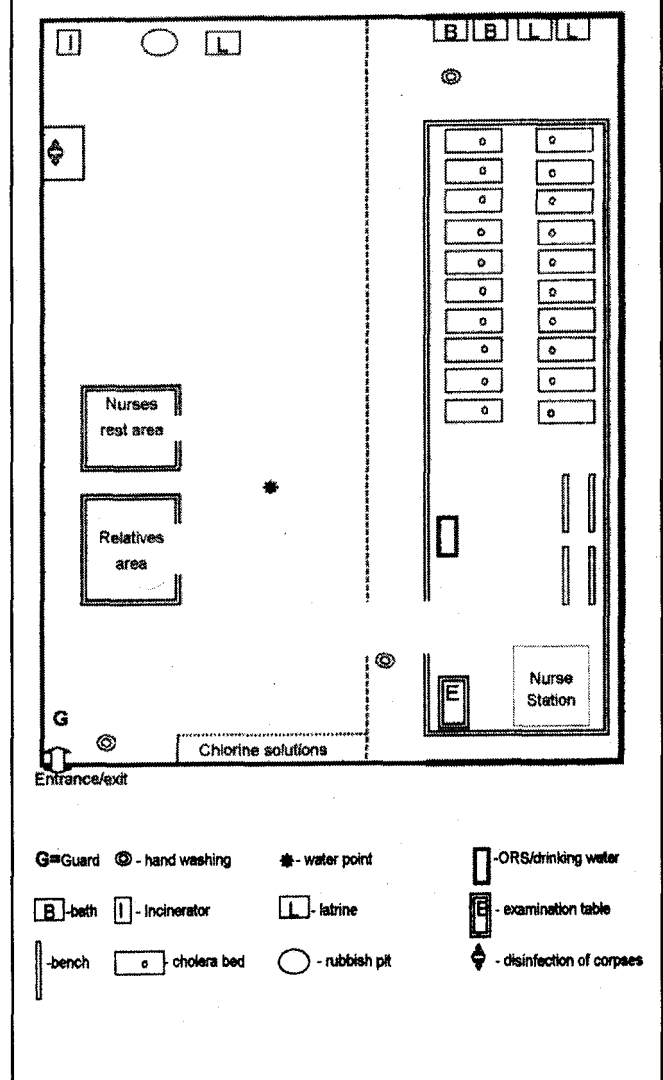
## Some of the basic logistic items that should be foreseen for a 20 bed cholera unit include:

- \* 20 cholera beds made of plywood sheets and bricks to support them basic furniture for nursing and patient examination
- \* 3 benches for patients in convalescence buckets and basins for stools and vomit (20 of each)
- \* 20-litre containers for chlorine solutions one sprayer a supply of 70% calcium hypochlorite (0.25kg/patient admitted)

## 9) Special precautions concerning chlorine solutions (HTH) for disinfection and hygiene

- \* Different concentrations of chlorine solutions made from 70% calcium hypochlorite (HTH) are essential for disinfection and hygiene in treatment units.
- \* Chlorine solutions must be stored in a well ventilated area.
- \* Chlorine solutions should never be prepared nor stored in

**Figure 1 : Basic layout of a cholera camp / treatment unit of 20 beds**



metal containers, as they will react with the metal and are inactivated.

- \* solutions containing 0.05% chlorine solutions have to be changed daily
- \* solutions of 2% and 0.2 % chlorine can be changed every 2 days.

#### 10) *Specific precautions for the cholera patient.*

- \* Disinfect the skin of patients when they arrive with 0.05% chlorine solution using a sponge or sprayer.
- \* Immerse clothes in 0.05% chlorine and rinse with normal water.
- \* Stools and vomit should be collected and disinfected in recipients article containing about 150ml (about one tea cup) of 2% chlorine. They should remain at least 10 minutes in contact with the chlorine, before being disposed of in a pit latrine.
- \* In case of death of a cholera patient wash the corpse with 2% chlorine and close all orifices with cotton soaked with the same solution. Funeral ceremonies are strictly discouraged.

#### 11) *Specific precautions for the accompanying relative.*

- \* If the clothes of the accompanying relative are soiled, they must also be rinsed in 0.05% chlorine. Make sure also that the relative washes hands with 0.05% chlorine.
- \* Dispose remaining food that is brought in by family members for patients into a pit dug for this purpose and rinse all vessels with 0.2% chlorine before returning them to the owners.
- \* In case of death of a cholera patient, inform the relative that the corpse is highly contagious and handling or touching the body by different individuals is strictly discouraged.

#### 12) *Specific precautions in the cholera treatment unit.*

- \* Hand washing: Place containers with chlorinated water (0.05%) and soap for hand washing at the toilets and at the exit of each unit for use by patients, accompanying members and staff.
- \* Cleaning: The cholera unit is to be cleaned with 0.2% chlorine 1 or 2 times daily. The walls, the bathrooms and toilets should be sprayed with 0.2% chlorine twice daily.
- \* Footbaths: should be placed at the main entry and exit of the camp. A sponge measuring 25cm x 25cm can be immersed in 2% chlorine or cresol solution and all individuals going out of the camp must step on the sponge in order to disinfect the feet or shoes.

#### 13) *Essential components of a treatment unit/cholera camp (see also figure 1)*

- \* Cholera beds: A hole of 10cm diameter can be cut in a piece 190 x 90 x 1.2cm plywood sheet which serves as a bed once it is placed on clay bricks which are often locally available. A small plastic bucket containing 2% chlorine solution (a

cupful) must be placed under the hole to collect stools and a basin with the same chlorine solution is also provided for vomiting. If cholera beds can not be provided due to limited resources then grass sheets can be placed on the floor and used as beds. A hole measuring 20 x 30 cm depth can be cut through the mats and dug into the mud floor for stools and another hole should be made beside the patient's head serving for vomitus. Pour 2% chlorine into both holes. 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, and have a depth of 0.5 m. The pit should have a wooden or concrete slab and be at least 30 metres from a well or other source of drinking-water and be at least 6 metres from the nearest house. The slab and floor should be washed and disinfected with 0.2% chlorine solution daily. There must be at least 2 pit latrines for 20 beds.

- \* Water: A water source must be available within the camp. Otherwise reservoirs with adequate capacity will have to be made available. Water reservoirs used for drinking water must be chlorinated. Chloramine tablets are best for this purpose (500mg or 1 tablet/25litres).
- \* Rubbish pit: This is necessary to get rid of non-combustible waste e.g. food ruminants. It can be dug to measure 1 x 1 m, by 1.5 metres in depth.
- \* Incinerator: Medical waste (infusion bags, syringes etc) should be incinerated. Kerosene helps to start the flame and should be available.
- \* Drainage: Ensure that there is adequate drainage around the camp site. This can be achieved by digging a small ditch around the site with a water exit at one end.
- \* Personnel: A cholera epidemic could result in a rapid influx of cases and personnel could get overloaded with work as a 24 hour service has to be ensured. Depending on the number of cases, full time nursing cover in shifts, health surveillance assistants to ensure precautionary measures and a guard(s) for ensuring limited entry into the unit are necessary.

**Training** of personnel, exact **job descriptions** for each person, frequent **supervision** and **incentives** are essential.

#### 14) *Treatment of cases*

For details regarding assessment of dehydration and rehydration techniques please refer to standard textbooks or WHO guidelines.

#### 15) *Emergency preparedness*

Pre-stock health centres with medical items adequate for at least 5-10 cases which will permit enough stocks to start an intervention. Train the personnel and ensure that the surveillance and reporting system is functional.

#### 16) *Mass awareness campaigns / Health education:*

The key public education messages are:

- boil water before drinking
- cook food or reheat it thoroughly and eat it while it is still hot
- avoid uncooked food unless it has been peeled or shelled
- wash your hands after any contact with excreta and before preparing or eating food
- always dispose off human excreta in a latrine.

These messages can often be diffused by groups such as religious leaders during church

gatherings, school teachers to pupils in schools, and mobile health education teams using loud-speakers in market places and villages.

#### 17) Evaluation of the epidemic trend and impact of control activities

Attack rates and case fatality rates (expressed in %) are appropriate indicators for this purpose and can be derived from weekly surveillance data. They can be plotted on a simple graph sheet to show trends over time. These main indicators can be calculated as follows:

**Attack rate = [Number of new cases during a period in a specified area x 100\*] divided by [Total population during the same period]**

(\*Attack rates can be standardised using 10,000 or 100,000 population)

**Case fatality rate = [Number of deaths from cholera during a period x 100] -- divided by [the number of cholera cases during the same period]**

**Table 1: Estimated minimum supplies needed to treat 50 patients during an outbreak\***

ITEM	QUANTITY
<b>Rehydration supplies</b>	
- Oral rehydration salts (1litre)	325 packets
- Ringers lactate solution, 1litre with giving sets	60
- 18 G Scalp-vein sets (butterfly needles)	5
- IV catheters (18-21G)	5
- Nasogastric tubes 5.3mm OD, 3.5mm ID, 50cm long (adults)	2
- Nasogastric tubes 2.7mm OD, 1.5mm ID, 38cm long (children)	2
<b>Antibiotics</b>	
- Doxycycline (100mg) capsules (for adults)	30 (3 capsules severely dehydrated)
- Erythromicin 250mg (for pregnant mothers)	30
- Co-trimoxazole 480 mg or syrups if available (for children)	20 (use pediatric dosage)
<b>Other supplies</b>	
- Chloraminetables (500mg)	1000
- Gloves	200
- Cotton (500gm)	2
- Adhesive tape	2
- Sphygmomanometer	1
- Stethoscope	1
- Tray	1
- Large buckets with cover for ORS and drinking water (20lt)	2
- Drinking cups (0.5liter)	20

The calculation are based on IV therapy using ringers lactate followed by oral rehydration alone for 80% of patients ( in practice this is an acceptable and safe proportion for estimating needs). Calculate an average of 6 litres ( average 6-8 litres) of Ringers lactate per severecase os cholera and ORS at 6.5 satchets per cholera cxase.If Ringers lactate is not available normal saline may be substituted. Plain glucose solutions are ineffective and should not be used. The preferred antibiotics include Doxycycline for adults, cotrimoxazole for children ( twice daily for 3-5 days ), and erythromycin (three times daily for 5 days ) for pregnant mothers.

**Table 2 Chlorine solutions for disinfection using 70 % calcium hypochlorite (HTH)**

	2% solution	0.2 %	0.05%
Calcium Hypochlorite 70% powder (HTH)	30g/litre (2 soup spoons / litre)	30g/10 litre (2 soup spoons /10litres)	7g/10 litre (1/2 soup spoon /10litres)
To be used for	Stools / Vomit Dead bodies	Floor / Objects / vessels Cholera beds	Hand-washing / Skin Clothes

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