OUTBREAK REPORT

Occurrence of cholera in Lukanga fishing camp, Kapiri-mposhi district, Zambia

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Most of the cholera outbreaks in Zambia have been recorded from fishing camps and peri-urban areas of the Copperbelt, Luapula and Lusaka provinces. Cholera cases have been recorded every year in the Lukanga fishing camps in the last five years. This article documents a cholera outbreak reported at the Lukanga fishing camp in Kapiri Mposhi district in September, 2016. All cases that met the cholera case definition as prescribed in the Integrated Diseases Surveillance and Response guidelines were admitted and treated using WHO standard protocols. A total of 27 patients all adult except 1, 26 of whom were male were seen at the cholera treatment center. Two facility deaths were recorded during the outbreak. All cases were linked to the fishing camps, lack of clean drinking water and poor sanitary conditions among other factors. The incubation period was about 4 days. All patients responded well to treatment with doxycycline and intravenous fluids. There were 2 facility deaths recorded; Case Fatality Rate (CFR): 7.4%. All cases tested on RDT and the water samples were positive for cholera. The outbreak on the Lukanga swamps is associated with *choleravibrio*.

There is need to employ interventions in the area of water and sanitation on the Lukanga swamps in order to address the annual cholera outbreaks.

Introduction

The first outbreak of cholera in Zambia was reported in 1977/1978, then cases appeared again in 1982/1983. The first major outbreak occurred in 1990 and lasted until 1993. Since then, cholera cases were registered every year except in 1994 and 1995[1]. A suspected cholera outbreak was reported at the Lukanga swamps / fishing camp in Kapiri Mposhi district in September, 2016.

Kapiri Mposhi district is situated about 180 km from Lusaka and 50km from Kabwe towns and lies along the Great-North road. It has 30 health facilities, managing a total

population of 282,308. The Lukanga swamps are located 70km North West of Kabwe and 130km from Kapiri Mposhi District. The Lukanga swamps are shared among the four districts of Central Province namely, Kabwe, Mumbwa, Ngabwe, Chisamba and KapiriMposhi. The swamps are easily accessible through Kabwe and fall within the Waya health centre catchment area of Kapiri Mposhi district. Waya health centre has a catchment population of 16,000 and 5000 living on the upper land and the Lukanga swamps respectively (CSO, 2010).

Cholera is an acute secretory watery diarrhoea caused by the Gram-negative bacterium *Vibrio cholerae*, with 01 and 0139 types being the principal ones associated with epidemics and they thrive wherever crowded housing conditions exist and water and sanitary conditions are suboptimal [2,3,4,5]. It's transmitted by the fecal oral route. The organism produces an enterotoxin, promoting secretion of fluids and electrolytes into the lumen of the small intestine. Cholera epidemics have been increasing in intensity, duration, and frequency, showing the need for more effective approaches to prevention and control [6, 7].

Although most cholera infections are not detected, large cholera outbreaks, such as those seen in Haiti [6] Viet Nam [7] and Zimbabwe [8] in recent years, can occur. Industrialized countries have seen practically no cholera cases for over a century because of their good water and sewage treatment infrastructure, though it remains the significant cause of illness and death in many

African countries. The priority in management of any watery diarrhoea is replacing the lost fluid and electrolytes and providing an antimicrobial agent when indicated. Although the disease may be asymptomatic or mild, severe cholera can cause dehydration and death within hours of onset. Mortality is higher in pregnant women and children [7].

Mortality rates are lowest where intravenous therapy is available [9]. In the twenty-first century, sub-Saharan Africa bears the brunt of global cholera, with a high mortality rate [10]. Improving global access to Water, Sanitation and Hygiene (WASH), as well as cholera treatment is a critical step to reducing Africa's cholera burden [11]. The disease burden in most outbreaks is underreported. Fear of travel-related and trade-related sanctions may contribute to underreporting

and may jeopardize efficiency of control measures [12]. Limitations in surveillance systems, inconsistencies in case definitions, variation in modalities, lack of standard terminology, completeness and lack of laboratory diagnostic capacities may also contribute to under- as well as overreporting[13, 14]. Most of the cholera outbreaks in Zambia in the past have been recorded from fishing camps and peri-urban areas of the Copperbelt, Luapula and Lusaka provinces. The article documents the epidemiological findings of the 2016 cholera epidemic within the Lukanga swamps in Kapiri-Mposhi district.

Methods

After having recorded several cases with diarrhoea and vomiting from the fishing camp, a suspicion of cholera was raised, followed by establishment of a Cholera Treatment Centre (CTC), 100 meters away, from Waya health centre.

Case investigation: All suspected cases were admitted and managed and the Cholera Treatment Centre. A suspected case of cholera was defined as any person admitted to the cholera treatment centre with acute watery diarrhoea, with or without vomiting. The demographics and clinical history on every suspected case were documented including age, sex, residency and symptoms.

Laboratory investigation: On admission, Rapid Diagnostic Tests (RDT) using SD Bioline-Cholera Ag 01/01/39 for cholera were conducted for all suspected cases.

Water sampling was also performed.

Case management: WHO cholera treatment protocols were implemented on all patients. Infection control was a top priority using disinfectants chlorine. All patients were treated with doxycycline, metronidazole and intravenous fluids.

Data analysis: Data on the progress of in patients and new admissions were sent 2 to 3 times daily to the Ministry of Health, WHO and other partners. A line list was compiled daily to keep track of new admissions. A descriptive analysis of the outbreak and review of literature was used to determine the extent and factors contributing to the epidemic.

Results

A total of 27 cases were seen at the cholera treatment centre from 13 different lagoons, with majority coming from Namabala lagoon 5/27. There were two facility deaths recorded; case ratality rate (CFR): 7.4%. All

patients except one were male. Except for one 15 year old male, the rest were adults. The incubation period was about 4 days. There were 5 additional cases reported from Kapiri Mposhi urban, 3 from Kabwe and 1 from Chibombo districts, all linked to have had visited the Lukanga swamps or received visitors from there. The index case was reported on 11th September, 2016 and the last case on the 21st October, 2016, as shown in figure 1.

Laboratory results

Laboratory investigations for stool culture with TCB media revealed growth of *Vibrio Cholerae* on all the 10 samples tested confirming cholera. The sensitivity test results also revealed that the species organism was sensitive to doxycycline. The 22 samples tested using RDT were also positive. All water samples collected were positive for the cholera vibrio.

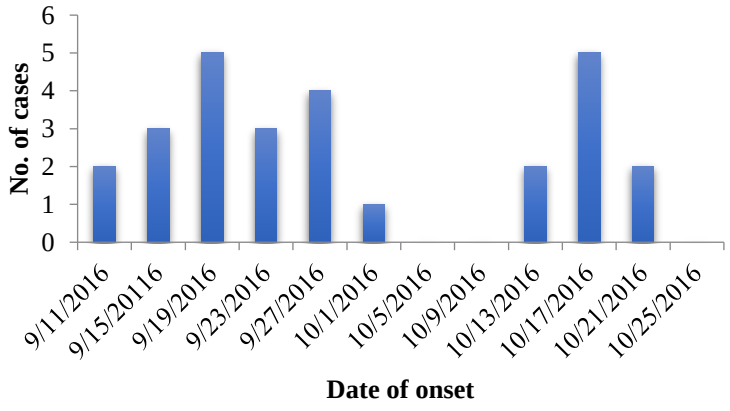

Figure 1 Cholera incidence in Lukanga swamps, September, 2016

Three water samples from selected lagoons were tested and were all positive for *Vibrio cholerae*. In addition, 14 RDTs were done on the water samples using Hydrogen Sulphide tests and they all showed heavy coliform contamination demonstrating the poor sanitary conditions.

Environmental findings

Environmental surveillance revealed non-availability of sanitation and clean drinking water infrastructure on the swamps being factors that precipitated the outbreak. The persons affected, most of whom are fishermen have no access to sanitary facilities and safe drinking water. They use the swamp waters for all need including drinking and sanitation.

Discussion

The outbreak that occurred in Kapiri Mposhi, in particular on the Lukanga swamps is linked to infection with *Vibrio Cholerae* as per laboratory confirmation. Close to 30 persons on the swamps were affected. Considering all those affected lived on the swamps which have no prescribed sanitation or clean water source, it can be assumed that the source of infection was the contaminated water from

the swamps. There was evidence of water contamination with *Vibrio cholerae*. Other persons outside the swamps from Kapiri-Mposhi urban, Kabwe and Chibmbo districts which are in close proximity to the swamps who were exposed on visiting the swamp or in contact with persons from the swamps were affected.

There were two facility deaths recorded (CFR = 7.7%). WHO indicates CFRs up to 20% in rural areas. It is also possible that the denominator (cases investigated) is lower than the actual number of cases and so increasing the CFR. The actual number of deaths is smaller than in previous outbreaks and this could be attributed to high community sensitization, which prompted patients to seek treatment at the cholera center timely. The 2015 outbreak recorded 5 deaths [15]. Good case management of cases could have also led to adequately managing the cases. However, many deaths due to cholera have been reported from other places, including the same Lukanga swamps More than 40 years after its resurgence in Africa in 1970, cholera remains a grave public health problem, characterized by large disease burden, frequent outbreaks, persistent endemicity, and high Case Fatality Rates (CFR) [16]. Population density, poor sanitation and health infrastructure, and logistical obstacles to appropriate case management also contribute to a high case-fatality rate in epidemic settings [17]. Of the estimated 3 to 5 million cases that occur globally every year, about 100 000 to 120 000 die [18].

Analysis of reports from previous outbreaks indicate that cholera epidemics in Lukanga swamps occur in the dry season, just before the onset of the rains. The waters in the swamps are low and so the flow of water is poor. The cholera outbreak showed two peaks, with an initial sharp rise at the beginning of September, and the second peak occurred around mid-October within the hot dry season in Zambia which spans from September to November. Fishermen and their families usually spend several weeks every year in fishing camps, in which the swamps is the only source of water. Interventions prescribed such as boiling water are not adhered to due to lack of resources such as firewood, charcoal let alone electricity. Chlorinating water is also prescribed but most persons do not have resources to purchase it. Although chlorine was distributed within the population, it appears there was a shift of source of infection each time the people were provided with clean drinking water (through distribution of liquid

chlorine), with people in other lagoons that did not have access to chlorinated water being exposed. It may have been more effective if distribution was done in all lagoons within the same period of time. This way, re-emergence of cholera cases from other sources would be reduced.

There is poor sanitation and clean drinking water infrastructures are likely the contributing factor to the continued outbreaks on the Lukanga swamps. The findings of this study show that there were poor sanitary conditions in the fishing camps, where the same water is used for drinking and all sanitary purposes. There is need to come up with ways of improving the sanitary conditions in the swamps or consider closing all fishing activities until a solution is sanitary conditions improve. Many countries are making important efforts to contain the spread of cholera, but concerns have been raised about the growing number of people living in unsanitary conditions who are at risk for outbreaks of cholera and other epidemic-prone diarrheal diseases [18].

The Lukanga swamps is one of the areas that was considered for cholera vaccination due to cholera endemicity. The first round of Oral Cholera Vaccine (OCV) was conducted from 28th October to 5th November 2016, while the second round was conducted from 26th to 30th November 2016. The target population was from 1year of age upwards, targeting 5,000 people living in Waya catchment area. WHO recommends instituting cholera immunization, in conjunction with other prevention and control strategies, in endemic areas, and perhaps in areas at risk for cholera outbreaks [5, 6]. In 2011, the 64th World Health Assembly adopted resolution WHA 64.15 recognizing the re-emergence of cholera as a significant public health burden and calling for the implementation of an integrated and comprehensive approach to cholera control [4, 7]. Local capacities for improving diagnosis, and for collecting, compiling and analysing data, need to be strengthened so that vulnerable populations living in high-risk areas may be identified and benefit from comprehensive control activities. This includes provision of safe water to all African populations. This requires considerable human and financial resources and time [4]. Prevention, preparedness and response all depend upon effective surveillance system and are linked and interdependent. There is a need to shift the emphasis from response to prevention in order to avert outbreaks in the fishing camps by providing safe water and means for disposal of human excreta and by working

with communities to encourage behavioral change to diminish the risks of infection [19].

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