Cholera case management in Harare City, 2018: are we doing the right things right?

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ABSTRACT

Introduction: On September 6, 2018, a cholera outbreak was declared in Harare City. By September 17,31 deaths out of 3564 cases had occurred with a case fatality rate of 0.9%. Despite having sensitised staff on cholera case management, resources and a rapid response team being in place, 20 of 31 deaths (65%) occurred within cholera treatment centers. A September 12 situation report revealed that the cholera strain was resistant to ceftriaxone and ciprofloxacin and sensitive to azithromycin and imipinem. We assessed the quality of cholera case management. **Methods:** We carried out a descriptive cross-sectional study of records and observations for case management. Using a data extraction form, we extracted and reviewed 264 records of clients who were treated at major health facility in Harare City. Observations of patient triaging and treatment were done and case management was compared to Zimbabwe Cholera Control Guidelines standards. Data were entered into Epi info 7TM to calculate frequencies, means and proportions. **Results:** Antibiotic prescribing, fluid management and laboratory investigations were the quality indicators assessed. Intravenous (IV) fluids and oral rehydration solution (ORS) were documented for 73/264 (28%) and 78/264 (29%) of cases respectively. Out of 252 who had prescribed fluids, only 17/252 (7%) of the cases received adequate amount of fluids as prescribed. Ciprofloxacin was prescribed for 166/264 (63%) of cases with only 9/264 (3%) receiving azithromycin. The majority 93/95 (98%) and 69/95 (64%) of cholera case strains were resistant to ceftrioxone and ciprofloxacin respectively. **Conclusion:** There was over prescription of antibiotics. Fluid management was not according to hydration status and weight as stipulated in the cholera treatment guidelines. The results were shared with Harare City Health department. We recommended strengthening of record documentation, continuous mentorship on case management and use of guidelines to ensure rational drug use.

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Introduction

The World Health Organization (WHO) estimates that annually, about 3 to 5 million people are affected worldwide by cholera and over 100,000 cases result in death [**1**]. It is estimated that approximately 1.4 billion people are at risk in endemic countries, with disease incidence greatest in children aged below five years [**2**]. Africa accounted for 46% of all cases reported between 1970 and 2011 and has recorded high case fatality rates in the past [**3**]. Case fatality rates were reported to be less than 1% in Asia [**4**]. Cholera has caused large epidemics in many countries worldwide and its impact can be even more dramatic in areas where basic environmental infrastructure is disrupted or has been destroyed [**5**].

Zimbabwe has experienced sporadic outbreaks of cholera since the introduction of seventh pandemic El Tor strains in the 1970s. These have become difficult to control with the deterioration of the health system and its associated infrastructure, related to the national economic crisis [**6**]. The 2008–2009 cholera outbreak in Zimbabwe was the worst in Africa and was characterised by large number of cases, high case fatality ratio (CFR) and extensive spread [**6**].

The presence of V. *Cholerae* in stools is confirmed through laboratory procedures. A rapid diagnostic test (RDT), is available which allows quick testing at the patient´s bedside [**5**]. A case of cholera is confirmed when V. *cholerae* O1 or O139 is isolated from any patient with diarrhoea [**5**]. Zimbabwe Technical IDSR Guidelines state that the alert threshold for cholera is one suspected case and action threshold is when a suspected case is confirmed [**7**]. Once an outbreak is confirmed, a clinical diagnosis using WHO standard case definition is sufficient accompanied by sporadic laboratory testing at regular intervals [**5**]. Unlike other diarrhoeal diseases, cholera can kill healthy adults within hours due to dehydration [**8**]. Individuals with lower immunity, such as malnourished children or people living with HIV, are at greater risk of death if infected by cholera [**5**].

In an outbreak the usual intervention strategy aims to reduce mortality, ideally below 1%, by ensuring access to treatment and controlling the spread of disease [**5**]. This is achieved through properly coordinated collaborative efforts of different partners. Recommended control methods including standardised case management, have proven effective in reducing the case-fatality rate [**5**]. Timely case management in cholera treatment centres; specific training for proper case management; improved access to water, effective sanitation and vector control are the main areas of focus during cholera control [**5**].

On September 6, 2018, a cholera outbreak was declared in Harare City and by September 17, 31 deaths out of 3564 cases were reported with a case fatality rate (CFR) of 0.9%. Despite use of a loose case definition which included all age groups, having sensitised staff on cholera case management, rapid response team in place, and availability of resources, 20 of 31 (65%) deaths occurred within cholera treatment centers. A situation report released on September 12 revealed that the cholera strain was resistant to first-line antibiotic drugs ceftriaxone and ciprofloxacin. Given that the suspected cases were alarmingly rising, there was a possibility of the case fatality rate exceeding the 1% WHO threshold limit. Appropriate case management is one of the three key interventions in reducing CFR. We assessed the quality of cholera case management and adherence to the Zimbabwe cholera treatment guidelines (ZCTG) at Beatrice Road Infectious Diseases Hospital (BRIDH) in Harare City, 2018.

Methods

We conducted a descriptive cross sectional study of records for cholera cases at BRIDH in Harare City. Cholera Treatment Centres (CTCs) were set up in Harare, one at Glen View Polyclinic, one at Budiriro Polyclinic and one at Beatrice Road Infectious Diseases Hospital (BRIDH). Out of the three CTCs, BRIDH was made the referral unit for all complicated cases and severely dehydrated patients, as it was a fully functional infectious diseases hospital whereas, the other two units were community polyclinics, hence it had the capacity to carry more patients and had a laboratory within the hospital premises. We calculated a minimum sample size of 254 records using assumptions from a study by Blacklock et al (2015), where proportion of clients who were given oral rehydration sachets was 78.8%.

All case records of cholera cases who were admitted at BRIDH from 5 - 25 September 2018 were

considered for review. At the time of review, 363 records were available, we excluded 52 records because they had other diagnosis other than cholera and 47 had no recorded information on management, so we finally reviewed 264 records (**Figure 1**). Data were collected using a data extraction tool designed from the Zimbabwe Cholera Control Guidelines. Data which were abstracted included patient demographics, observations done (weight, blood pressure, hydration status, and temperature), signs and symptoms, fluid and antibiotic management. All data were entered into Epi info 7TM to calculate frequencies, means and proportions. All necessary permission to conduct the study was obtained from the Director Harare City health, Ministry of health and child care (MOHCC), and Health Studies office (HSO).

Strict confidentiality was ensured at all times when handling data during all processes of data capturing and analysis. Patient names or identifying information were not recorded on checklists.

Results

Demographic and clinical characteristics of cholera cases

Of the 264 records of cholera cases we reviewed, the majority 160/264 (61%) of cases were males. Among the cases, 51/264(19%) were children under 5 years of age. The median age of the cases was 28 years. Almost half of the cases 131/264 (49%) were from Glenview, 52/264 (20%) from Budiriro and 21/264 (8%) from Mbare residential areas. 227/264 (86%) cases had no documented chronic illnesses with only 10/264 (4%) documented as having HIV, hypertension or diabetes mellitus. The median number of days of illness before reporting to BRIDH was one day. (**Table 1**).

Initial observations for cholera cases at presentation to health facility

The majority of cases 155/264 (59%) had no single observation documented on arrival to the camp with only 13/264 (5%) having more than a single observation documented. None of the cases had their weight documented. Only 27/264 (10%) had their blood pressure documented and temperature was documented for only 54/264 (20%). A third 87/264 (33%) of the cases had no documentation on hydration status. Among those documented, 52/177 (30%) had severe dehydration, and 56/177 (32%) had no dehydration (**Table 2**).

Fluid management for cholera cases at health facility

A total of 252 cases (95%) had fluids prescribed. More than a third 101/252 (40%) of cases had both IV fluids and ORS documented in their records. 73/252 (29%) and 78/252 (31%) had IV fluids and ORS documented respectively. Only 12/264 (5%) had no fluid management prescribed. Seven percent of cases received adequate amount of fluids as per prescription and it was documented. Out of the 252 cases who had fluids prescribed for them, there was no documentation of them receiving the fluids in 234 (93%) of the cases (**Table 3**). While 121 of 264 cases (46%) were classified as having dehydration, 174 of 264 cases (66%) had IV fluids prescribed for them. Calculation of amount of required fluids depends on the weight of the patient but in our study, none of the patients had their weight taken. Although some fluids were readily available, paediatric solutions were either prepared on site or delivered prepared by pharmacy personnel. Buretrols for issuing the paediatric fluids were not available.

Sample specimen collection

Guidance on laboratory investigations were clearly laid out and stuck on the wall in all units within the CTC. Only 83/264 (31%) of the reviewed records had samples collected for laboratory investigations. More than two-thirds 181/264 (69%) of cases had no specimen collection done. For those who had samples collected, 27/83 (32%) were rectal swab specimens, 25/83 (30%) were stool samples and 31/83 (38%) were blood samples (**Table 4**).

Antibiotic management for cholera cases

Ciprofloxacin was the most commonly prescribed antibiotic 167/264 (63 %) followed by ceftriaxone 35/264 (13%). Only nine (3%) cases had azithromycin prescribed for them and 12/264 (5%) had more than one antibiotic. The minority 41/264

(16%) had no antibiotic prescribed for them (**Table 5**).

Antibiotic sensitivity testing for cholera cases

Ninety-eight percent (93/95) and 61/95 (64%) of cholera case strains were resistant to ceftriaxone and ciprofloxacin respectively, with only 1/95 (1%) being sensitive to ciprofloxacin. Close to half of the strains 47/95 (49%) had intermediate resistance to imipenem. More than half 57/95 (60%) of cholera strains were sensitive to azithromycin with only 32/95 (34%) being sensitive to imipenem. Only 3/264 (4%) were sensitive to chloramphenicol (**Table 6**).

Discussion

In our study, there was partial adherence to the Zimbabwe Cholera Control Guidelines in case management as was observed within the cholera treatment centre, and documented in patient records. We also found out that there was poor documentation. This was attributed to inadequate human resources and poor sensitisation on case management in the early days of the outbreak. Poor documentation has medico legal implications, which can result in litigation of either the institution or an individual.

Rehydration is the recommended mainstay of therapy and some intravenous fluids such as lactated ringer's solution and normal saline were readily available in the treatment centres, as well as WHO recommended oral rehydration salts at the time of the study, although the amount of fluids received was not documented in 93% of cases reviewed. Fluid management was not being done as per guidelines where hydration status and weight are important in calculating, and deciding on the right amount and type of fluid to be given as recommended by the WHO Global Task Force, following a cholera outbreak in Lake Chilwa, Malawi [**9**]. Not knowing the weight of a client can lead to fluid overdose or under dose hence increasing the case fatality rate. This is consistent with a study by Sirajuddin A et al in the 2008 Cholera Outbreak in Zimbabwe where there was overuse of intravenous fluids and inadequate patient monitoring [**10**].

Although some fluids were readily available, paediatric solutions were either prepared on site or delivered prepared by pharmacy personnel. Buretrols for issuing the paediatric fluids were not available and nurses were using their discretion to assess hydration status which could either underestimate or overstate requirements. This could have impacted paediatric treatment outcomes as it could have unnecessarily lengthened treatment time and patient stay in the CTC. Improper tools were used for documenting fluid intake instead of the recommended annexure 22 CTC/CTU Patient admission and follow up form. This could have resulted in some patients who were hydrated getting unnecessary fluids thereby wasting resources and prolonging patient admission time.

Many inconsistencies were realised in the use of antibiotics. The treatment guidelines reserve antibiotics for the severely ill cholera cases [**11**]. Nineteen percent of reviewed cases were classified as having severe dehydration but more than 85% of cases received antibiotic therapy. Ciprofloxacin was widely prescribed at 63% and in some instances was administered as a one-gram immediate dose not the standard five-day course. Ciprofloxacin continued to be prescribed besides laboratory sensitivity tests confirming that about **9**8% of specimens were resistant to ciprofloxacin and this information were even being conveyed in the public media. This is contrary to findings by Khonje A et al in an outbreak in Malawi where antibiotics were generally not used to treat cholera cases [**9**]. The displayed work instructions on antibiotic usage were quite amusing as they did acknowledge extensive antibiotic resistance but went ahead to recommend ciprofloxacin as an immediate dose of 15mg per kilogram of body weight.

Findings from this study should be interpreted in light of its limitations in generalisability to management of cholera cases at other cholera treatment units as records reviewed were only from Beatrice Road Infectious Diseases Hospital.

Conclusion

We conclude that there was poor adherence to Zimbabwe cholera treatment guidelines due to inadequate patient monitoring, no fluid monitoring documentation and over prescription of antibiotics.

Public Health Actions

As part of public health actions, the medical officers who were part of the investigators assisted in medical rounds, and the pharmacist and nutritionist assisted in issuing out rehydration sachets and providing counselling on proper and adequate hygiene to the discharged patients. The results were shared with the BRIDH case management team and this led to the rational use of antibiotics thereafter.

Recommendations

Following findings from this study, we recommend that the Harare City Health Department strengthens documentation of records in all facilities for traceability of transactions and elimination of medico legal hazards. The management should offer continuous training and mentorship to all clinical staff on epidemic case management. The Pharmacy department should purchase and avail buretrols for paediatric fluid administration, as well as ensure adherence to treatment guidelines to promote the rational use of drugs.

Competing interests

The authors declare no competing interest.

Authors´ contributions

EG, PM, TM, CG: conception, design, acquisition, analysis and interpretation of data and drafting the manuscript. TJ, GS, NGT: conception, design, acquisition, and interpretation of data, reviewing of manuscript draft for important intellectual content. MT: conception, design, data collection, analysis, interpretation and reviewing of manuscript draft for important intellectual content, oversight of the project

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Ethics approval and consent to participate

Permission to proceed with the study was obtained from Harare City Health services department and the University of Zimbabwe, Department of Community Medicine.

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Table 1: Demographic and clinical characteristics of cholera cases BRIDH 2018			
Characteristic	**Category**	Frequency n= 264	Frequency (%)
Sex	Male	160	61
	Female	104	39
Marital status	Married	138	52
	Divorced	7	3
	Widowed	19	7
	Never married	100	38
Place of residence	Budiriro	52	20
	Glenview	131	49
	Mbare	21	8
	Other	60	23
Chronic illnesses	Yes	10	4
	No	27	10
	Not documented	227	86
Median age (years)		28(Q1=15, Q3=37)	
Median time of illness before presentation(days)		1 (Q1 = 1 , Q3 = 2)	
Median time of staying in hospital (days)		2 (Q1 =2 , Q3 =3)	

Table 2: Initial observations for cholera cases at presentation to BRIDH, 2018			
Observations		Frequencies n= 264	Frequency (%)
Weight		0	0
Temperature		53	20
Blood pressure		27	10
Pulse		16	6
>1 observation		13	5
None		155	59
Hydration status	**Severe dehydration**	52	30
	Some dehydration	69	39
	No dehydration	56	32
	Not documented	87	33

Table 3: Fluid management for cholera cases at BRIDH, 2018		
Fluid Type prescribed	Frequency n=252	Frequency (%)
Both IV fluids +ORS	101	40
IV fluids	73	29
ORS	78	31
Not documented	12	5
Fluid received	Frequency n=252	Frequency (%)
Appropriate amount as prescribed	18	7
Not documented	234	93

Table 4: Sample specimens collected from cholera cases at BRIDH, 2018		
Specimen	Frequency n=264	Frequency (%)
Rectal swabs	27	10
Stool M/C/S	25	9
Blood (urea and electrolyte, full blood count)	31	12
No specimen collected	181	69

Table 5: Antibiotic management for cholera cases at BRIDH, 2018		
Antibiotic	Frequency n=264	Frequency (%)
Ciprofloxacin	167	63
Rocephine	35	13
Azithromycin	9	3
>1 antibiotic	12	5
None	41	16

Table 6: Antibiotic sensitivity testing for cholera cases at BRIDH, 2018						
Antibiotic	Sensitive n=95	%	Intermediate n=95	%	Resistant n=95	%
Ciprofloxacin	1	1	33	35	61	64
Ceftriaxone	2	2	0	0	93	98
Azithromycin	57	60	0	0	38	40
Imipenem	32	34	47	49	16	17
Chloramphenicol	3	4	26	27	66	69

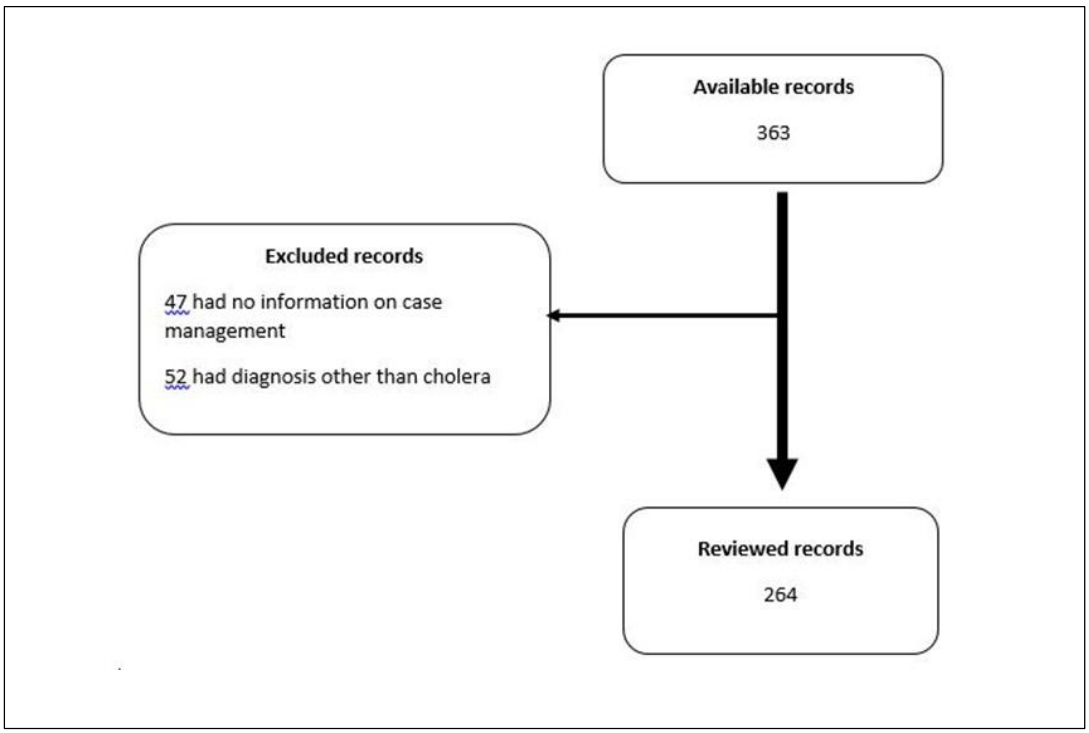

Figure 1: Sampling of records