Characteristics of a cholera outbreak, patterns of *Vibrio cholerae* and antibiotic susceptibility testing in rural Malawi

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Abstract

The cumulative cholera attack rate in an epidemic in Malawi in 1999/2000 was 59/100 000 population, case-fatality rate 4%, and 98% of all cases presenting to health facilities required intravenous therapy. Microbiological studies showed high resistance of *Vibrio cholerae* to commonly recommended antibiotics, predominant Ogawa serotypes and no O139 isolates.

Keywords: cholera, epidemics, *Vibrio cholerae*, case-fatality rate, drug sensitivity, serotypes, Malawi

Introduction

Cholera outbreaks linked to *Vibrio cholerae* O1 have been occurring on a yearly basis in different parts of Malawi since 1997 (ANONYMOUS, 1999). A non-O1 *Vibrio*, O139 (synonym ‘Bengal’), produces clinical manifestations that are indistinguishable from O1 cholera, has epidemic potential, and is now known to exist in different parts of the world (RAMAMURTHY et al, 1993). Laboratory surveillance for this serotype is, however, non-existent in Malawi, and its epidemiological significance is therefore not known.

Baseline information on cholera outbreaks such as attack rates, average hospitalization time and quantity of infusions (Ringer’s lactate) used per cholera case, although currently unavailable, would be useful in estimating medical and logistic needs and for planning control strategies. Although not necessary for a cure, the use of an antibiotic to which *V. cholerae* is susceptible will diminish the duration and volume of fluid loss and is known to hasten clearance of the organisms from the stool. From an operational and economic point of view, this would reduce the average hospitalization time and the amount of required infusions and would be an advantage. In Malawi, antibiotic susceptibility surveillance, although important, has been limited or non-existent.

The objective of this study was to determine the characteristics of a cholera outbreak, the pattern of *Vibrio cholerae* O1 (Ogawa/Inaba) and non-O1 (O139) as well as antibiotic susceptibility during a cholera epidemic in a rural region of southern Malawi.

Material and Methods

All patients conforming to a cholera case definition and presenting to public health facilities in 3 neighbouring districts of southern Malawi from November 1999 to May 2000 were involved in the study. A standard data collection form was used for collecting baseline information and a cholera case was defined as ‘in an area where an epidemic is confirmed, any patient aged ≥5 years who develops acute watery diarrhoea, with or without vomiting’.

Stool specimens were collected randomly from cases presenting to health facilities, and WHO guidelines (WHO, 1987, 1993) were used for transport, culture and identification of *V. cholerae*. Antimicrobial-susceptibility testing was done using the disk-diffusion technique and quality control was ensured. Inhibition zone sizes (IZS, nearest whole mm) for *V. cholerae* were read according to NCCLS standards (NCCLS, 1998).

Results

A total of 661 cholera cases were registered during the epidemic period including 398 females (mean age, 33 years). The cumulative attack rate for the epidemic period was 59/100 000 population while the case-fatality rate was 4%.

Of all cases presenting to health facilities, 98% required intravenous rehydration as well as oral rehydration salts (ORS) while 2% were managed with ORS alone. Among those requiring intravenous therapy, an average of 5-9 litres of Ringer’s (range 1-20) was used per patient and the mean hospitalization period was 1.7 days (range 1–6 days).

The Figure shows the epidemic curve by epiweek for the period of the epidemic. A total of 32 of 53 random stool specimens that were collected grew *V. cholerae* on culture. All the isolates were found to be *V. cholerae* O1 and there were no non-O1, O139 (Bengal), strains. Of the 32 O1 strains isolated, 28 were Ogawa while 4 (13%) were Inaba serotypes.

The antibiotic-susceptibility patterns to different antibiotics are shown in the Table.

Discussion

Cholera epidemics in the southern region of Malawi have occurred on yearly basis since 1997. The ‘trigger point’ for initiating investigations in this particular epidemic was an unusual increase in the incidence of acute watery diarrhoea associated with severe dehydration, reported from health facilities. The large majority of the population in the area of study cannot afford to pay for existing public transport and walk long distances through mountainous terrain to health facilities for treatment.

There is no active case finding, and registration of deaths is not compulsory in Malawi. The cholera cases and deaths that are reported by the current surveillance system will therefore include only those cases that present at health facilities for treatment and are likely to be underestimations.

Although the case-fatality rate (CFR) of 4% is similar to that in previous epidemics reported in Africa and in rural Kenya (ANONYMOUS, 1998; SHAPIRO et al., 1999), we consider that this level can be reduced further, with early access to effective rehydration. The fact that 98% of cases presenting at health facilities required intravenous infusions and were hospitalized implies that these patients arrived very late.

Possible measures to reduce the proportion of hospitalized cases, and the CFR, for future epidemics in the area could include health education, increased emphasis at the community level on the early use and availability of ORS, as well as training and continuing supervision of health personnel on cholera management.

The most commonly recommended antibiotics for
presumed cholera in Malawi (MOHP, 1999) include doxycycline (adults), co-trimoxazole (children) and amoxicillin or furazolidone (pregnant women). Doxycycline use could continue as 72% of isolates are susceptible whereas current resistance to co-trimoxazole, amoxicillin and furazolidone is high and limits their usefulness in the area. Although ciprofloxacin and nalidixic acid are most likely to be effective, ciprofloxacin is expensive and along with nalidixic acid is contra-indicated in children. Multidrug resistance in V. cholerae is common and resistance profiles change with time, making continuing susceptibility surveillance imperative to determine effective therapy (RAMAMURTHY ET AL., 2000).

Although the number of isolates tested for antibiotic susceptibility is limited, this study shows relatively high resistance to commonly used antibiotics in Malawi and reiterates the importance of ensuring prudent and restricted use of antibiotics to severe cholera cases.

Acknowledgements
Médecins sans Frontières—Luxembourg financed the laboratory material and reagents required for this study and continues to support cholera control in the area of study. The National Reference Laboratory of the Ministry of Health, Malawi, and the National Reference Laboratory, Luxembourg, supported quality control. We also thank the district health management teams for the excellent collaboration and support.

References

Received 19 March 2001; revised 21 June 2001; accepted for publication 29 June 2001