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Coverage and acceptability of cholera vaccine among high-risk population of urban Dhaka, Bangladesh

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ABSTRACT

The oral cholera vaccine (Shanchol), along with other interventions, is a potential new measure to prevent or control cholera. A mass cholera-vaccination programme was launched in urban Dhaka, Bangladesh, during February–April 2011 targeting about 173,041 people who are at high risk of cholera. This cross-sectional, descriptive study assessed the coverage and acceptability of the vaccine. The study used a quantitative household survey and qualitative data-collection techniques comprising focus-group discussions, in-depth interviews, and observations for assessment. The findings revealed that 88% of the target population received the first dose of the vaccine, and 79% received the second dose. Absence of persons at home was a prominent cause of not administering the first (71%) and the second dose (67%). Thirty-three percent of the respondents ($n = 9308$) did not like the taste of the vaccine. Only 1.3% and 3% recipients of the first dose and the second dose of the vaccine respectively reported adverse effects within 28 days of vaccination, and the adverse effects included vomiting or vomiting tendency and diarrhoea. To improve the coverage of the cholera vaccine, exploration of effective solutions to reach the unvaccinated population is required. The vaccine may be more acceptable to the community through changing its taste.

1. Introduction

Cholera, caused by *Vibrio cholerae*, is a life-threatening watery diarrhoeal disease which may cause death if not immediately treated with oral rehydration solutions or intravenous fluids. It is mainly a disease of the poor who live in the unhealthy environment, with overcrowding, insufficient supply of safe water, and lack of a proper disposal system for human excreta. The disease occurs both endemically and epidemically in the greater part of 14 Asian countries [1]. This disease is a real challenge for people of urban slums in Bangladesh where access to safe water, sanitation, and overcrowding are common problems [2]. Controlling cholera by improving the supply of safe water and by ensuring improved sanitation requires a large investment, which is a major burden for poor countries, like Bangladesh. Thus, alternative options should be considered or tested to overcome the problem.

The World Health Organization has recently started to consider orally-administered cholera vaccines as a potential new measure to prevent or control cholera for population at risk [3]. Oral cholera vaccine has already been successfully introduced in countries, such as Viet Nam and India; it was found to be effective and safe [4–6]. The project "Introduction of Cholera Vaccine in Bangladesh (ICVB)" has been evaluating a two-dose regimen of an oral killed whole-cell vaccine (Shanchol), along with a behaviour-change communication intervention in reducing dehydrating diarrhoea in a low-income area (Mirpur) of Dhaka, Bangladesh [7]. Shanchol™ (Shantha Biotechnics Limited, Hyderabad, India) [8] has been chosen because it requires a small amount of liquid vaccine directly from the vial and cost is affordable (US$ 4).

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To start with, the ICVB Project conducted a population-based census in Mirpur area of Dhaka, with high cholera incidence. The census team enumerated 316,766 residents with high risk of cholera, based on the set criteria "Overcrowded households, poor living conditions, use of unsafe water, poor sanitation and hygiene practices, and shared water sources, toilet facility, and kitchen" [9]. The study area was then divided into 90 geographical clusters, each having around 2749 targeted high-risk populations. The 90 clusters were randomly distributed equally into three arms: 30 clusters (with approximately 89,567 people) for receiving the cholera vaccine alone, 30 clusters for both cholera vaccine and behaviour-change interventions (approximately 87,467 people), and 30 clusters with no interventions (approximately 72,900 people). Just before vaccination, the targeted high-risk individuals within the clusters were given an ICVB card at household level with unique identification numbers. Vaccination programme was conducted during February–April 2011, targeting 172,754 high-risk people in 60 intervention clusters (30 for vaccine recipients only and another 30 for receiving vaccine with behaviour change components) where 141,839 (82%) received the first dose, and 123,666 (72%) received the second dose of the vaccine. The adopted strategy was designed to vaccinate through fixed outreach sites with the provision for additional sites, through mobile camps and house-to-house visits from 7:00 am to 5:00 pm. After completion of the vaccination, the behaviour change interventions were planned to be implemented in 30 of those 60 clusters. Accordingly, education, along with logistics for hand washing practice, was gradually imparted to all 30 clusters in two months from June 2011 and, after that, point-of-use water treatment with sodium hypochlorite was implemented in those clusters [10].

Normally, data on administrative coverage are used for assessing a campaign or the performance of mass vaccination. Results of a Zimbabwean study showed that 1–29% of routine data on administrative coverage were less recorded compared to the overall vaccine coverage survey [11]. In Cameroon, data from routine immunisation programme tended to be over-estimated [12]. Evidence shows that a survey for assessing the vaccine coverage is a better option than review of the vaccination records [13] as it helps to ignore over-reporting and/or under-reporting [14]. Conducting a coverage survey with a subsample of population is useful to determine the consistency or accuracy of an administrative report [15].

On the other hand, vaccine campaigns may succeed or fail depending on the various behavioural and cultural issues, such as perceptions about disease, vaccines, local systems, acceptable practices, incentives, and considerations in vaccine delivery [16]. The influences of social and cultural matters on the acceptability of a vaccine were also found to be significant [17]. Results of a study by Kaljee et al. [18] showed that urban male people and higher-income groups were less likely to accept a new vaccine as they perceived low vulnerability to diseases. Researchers also suggest that individual's knowledge on, attitude towards, and experience with vaccination, stability and political-economic support for the existing infrastructure of the health system, and effective interactions between healthcare providers and clients should be studied to understand the acceptability of a vaccine [19]. A study in six Asian countries has shown that vaccine is desirable and demanding throughout the area, although they do not consider themselves at risk of disease [20]. Thus, the present study assessed the coverage and acceptability of a potential cholera vaccine among high-risk population of urban Dhaka, Bangladesh. Findings on the coverage and acceptability of the vaccine will be useful to evaluate mass vaccination and to identify the issues behind success or failure, which will help formulate policy recommendations for future mass vaccination campaigns.

2. Materials and methods

2.1. Study design and sites

This cross-sectional, descriptive study was conducted in the ICVB project areas after the mass vaccination campaign on Shanchol cholera vaccine during May 2011–June 2012. Both quantitative and qualitative methods were employed to collect data. This study covered two arms (or 60 clusters, with 30 in each) of the ICVB Project where vaccination was administered.

2.2. Study population

The study included different groups of adult men and women as study population to achieve objective of the study. The study population of the survey included all adult men and women who were targeted for cholera vaccination, excluding pregnant women as they did not receive the vaccine. The study population for qualitative component included recipients of the vaccine, the staff members involved with vaccination, and their supervisors.

2.3. Sampling

A household survey was conducted to assess the coverage immediately after the completion of vaccination. A cluster-sampling methodology was used for collecting data. Clusters were chosen from the 60 clusters of two arms where the programme was implemented. Twenty clusters – 10 each from two arms – were randomly selected for the survey. The survey was carried out in all the households of the 20 clusters. The study sample included 12,000 households, which was determined by estimating that each cluster has about 600 households (600×20). To collect information on cholera vaccination, one adult person (who was available and responsive to providing information) from each household was invited to take part in the interview.

2.4. Data collection

Details of the data-collection process are described in the following:

2.4.1. Household survey

The list of households in each selected cluster was collected from the ongoing demographic surveillance system of the ICVB Project. All the interviewers had experience on quantitative data-collection procedure for a couple of years. However, they were trained before data collection for the study. The training included both classroom lectures and field practice. A structured questionnaire was used for collecting data relating to vaccination status, drop-outs, and taste of vaccine and its side-effects. The cholera vaccination status was validated by checking the cards distributed from the ICVB Project and from history. In addition, the questionnaire captured information on adverse events if any vaccinee suffered from a health problem with an onset up to 28 days after receipt of a vaccine dose.

2.4.2. Observations of vaccination sessions

For the mass vaccination, 180 regular sites were organised with a few need-based additional sites within the intervention clusters for delivering two doses of oral cholera vaccine (OCV) at a minimum interval of 14 days between the doses. Eighteen purposively-selected sessions were observed during vaccination. The observers used an open-ended guideline to record the observations relating to conduction of the vaccination sessions and information on the acceptability of the vaccine, such as perceptions and likings.