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COMMUNITY-OPERATED TREATMENT CENTRES PREVENTED MANY CHOLERA DEATHS

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Abstract

In December 1979, a community-operated Diarrhoea Treatment Centre was set up at Shataki, Matlab Thana, a rural area of Bangladesh. Over time, the Centre demonstrated that a community-operated centre could effectively handle the endemic patient load. Following the Shataki model, another community-operated centre was opened at Kalirbazar, Matlab Thana, in June 1982. In October 1982, a cholera outbreak was identified in Matlab and neighboring thanas (districts.) With the onset of the epidemic, the catchment areas of the centres expanded, and between October and December about 2,000 patients were treated by these two centres Despite increased severity and case loads, case fatality rates during the pre-epidemic and epidemic periods were almost equal. It was estimated that during the 1982 cholera epidemic, the two community-operated centres averted approximately 820-1,000 deaths.

With the current state of knowledge, in the absence of primary prevention, establishment of community-operated treatment centres with provisions for intravenous fluids is highly effective in reducing mortality from cholera and other acute diarrhoeal diseases.

Key words: Diarrhoea; Cholera; Epidemic; Deaths Averted; Community-Operated Centre.

Introduction

Diarrhoeal diseases long have been recognized as a leading cause of morbidity and mortality, especially in developing countries (1). Acute diarrhoea annually affecting 500 million children worldwide (2) is the most important cause of death in the under-five age group (3-5). Furthermore, these highly prevalent illnesses contribute to a significant degree of malnutrition (6,7). Until 25 years ago, dogmatic approaches to the treatment of diarrhoea delayed the process by which knowledge gained from scientific research led to a falling mortality rate (8,9.). Thus, it was only in 1958 that a correct effective intravenous replacement solution for cholera was formulated and widely used (10,11). Then, in 1968, came another critical research advance, one that greatly simplified treatment of severe diarrhoea patients. This was the discovery that acute diarrhoea, regardless of etiology or patient age, can be safely and effectively treated with a simple oral rehydration solution (12-16).

Thanks to these advances, simple methods now are available for the treatment of acute diarrhoeal diseases. Early use of these methods can prevent diarrhoeal complications and deaths Community health workers can learn to administer these techniques, after a brief training period. Realizing the potential benefits of placing diarrhoea care in communities, the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) worked with a rural community remote from the ICDDR,B's major facility, to establish a diarrhoea treatment centre. This centre now operates at Shataki, Matlab Thana,* Bangladesh.

During the first two years (Dec. 1979–Nov. 1981) of its operation, this Centre treated about 900 patients per year, with results comparable to those of the ICDDR,B's central facility. Following the Shataki model, a second community-operated treatment centre was opened at Kalirbazar, Matlab Thana, on June 22, 1982. In September 1982, epidemic cholera broke out in many areas of Bangladesh. The outbreak was identified in Matlab and neighboring thanas in early October, and rose to a peak in mid-November. The two community-operated treatment centres (COTC) at Shataki and Kalirbazar effectively participated in managing the epidemic. Between

* Thana (average pop. 200,000 — 400,000) is the lowest administrative unit in the Bangladesh Government structure.

October and December, these two centres treated approximately 2,000 diarrhoea patients. The Shataki Centre already had demonstrated that a community-operated facility could effectively treat diarrhoeal diseases at an endemic level. However, the 1982 cholera outbreak was the first epidemic to be handled by such centres. To assess the role and importance of a COTC during an epidemic, we have reviewed the results achieved by the Shataki and Kalirbazar Centres.

Materials and methods

Description of the area

Since 1963, the ICDDR,B's Matlab Field Project has conducted health research and provided health services in a rural diarrhoea endemic area (Fig. 1), situated 45 km southeast of Dhaka, Bangladesh's capital. The area is a low-lying deltaic plain laced with tidal rivers and numerous canals, and fed primarily by the river Meghna. A central hospital, staffed by physicians and para-professionals, located at Matlab Bazar provides free treatment to all diarrhoea patients. To rapidly bring patients to the Matlab Hospital, the ICDDR,B maintains several speedboats and one car-ambulance, stationed at dispersed locations.

Shataki Community-Operated Diarrhoea Treatment Centre

Until 1979, one speedboat ambulance was stationed at Shataki, about 25 km northwest of Matlab Bazar, on the eastern bank of the main river Meghna (Fig. 1). Patients from surrounding areas had to reach Shataki to use the ambulance that would take them to the Matlab Hospital. Since Shataki is located far from Matlab, patients often faced serious delays in reaching the hospital, especially if the ambulance boat was out with a patient. Such delays frequently led to patients' conditions deteriorating significantly; and, occasionally, severely dehydrated patients died between Shataki and Matlab. Moreover, patients also found it difficult to return home from the hospital. These realities led us to suggest the establishment of a simplified community-operated treatment centre at Shataki.

Shataki area residents arranged a meeting of all interested persons on November 10, 1979, and formed a management committee. The committee recruited four local volunteers. The ICDDR,B trained the volunteers over a two-week period to diagnose dehydration, to administer oral and intravenous fluids, and to use a limited number of essential drugs. Training was done at the ICDDR,B's Matlab Hospital, where the volunteers, carefully supervised and supported by physicians, helped treat diarrhoea patients. Some theoretical classes also were held. Refresher courses were provided later.

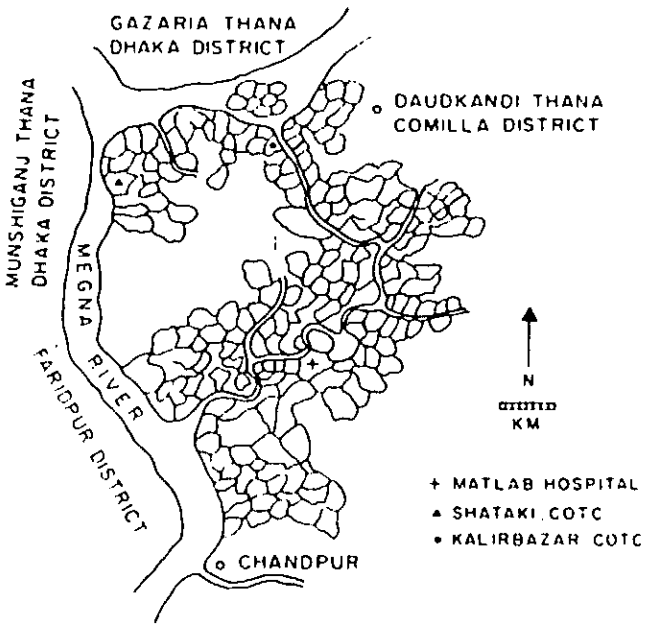

Fig. 1 – Matlab Field Project area of ICDDR,B; Catchment areas of Matlab Hospital, Shataki and Kalirbazar Community-Operated Treatment Centres.

A treatment centre was opened at Shataki on December 1, 1979, in a building that had been constructed by the Cholera Research Laboratory (ICDDR,B's predecessor), on community donated land. Originally, the building had been used by two anthropologists observing health behavior. The ICDDR,B supplied hospital and office supplies, while the local management committee administered the Centre. Initially, a fee of Tk. 15 was charged per patient to meet local expenses; this later was raised to Tk. 20† The committee took charge of financial matters, and reported monthly to the Matlab Centre, giving information on number of patients treated, drugs consumed, and supplies required. The volunteers manned

† In 1983, approximately 25 taka equaled $ 1 US

the Centre 24 hours a day in shifts. Each volunteer received an honorarium of Tk. 200 per-month. At the Shataki Centre, an admissions register and treatment records were maintained.

Kalirbazar Community-Operated Treatment Centre

Following the Shataki model, the second community-operated Centre was opened at Kalirbazar, 20 km north of Matlab Bazar (Fig. 1), on June 22, 1982. In January, 1982, Kalirbazar area residents formed a management committee, and a community member donated land. The ICDDR,B constructed a building, financed by the Australian Government. The committee recruited six local volunteers, who were trained for two weeks at the ICDDR,B's Matlab Hospital. As at the Shataki Centre, the local management committee administered the Kalirbazar Centre with assistance from the ICDDR,B. A Tk. 20 fee was collected from each patient to cover local expenses. Volunteers worked on shifts covering 24 hours-a-day, and received a Tk. 200 per-month honorarium. An admissions register and patient records were maintained.

At the COTCs, volunteers received patients, recorded their histories and physical examination results on a standard form, and administered appropriate therapy based on clinical impressions. Dehydration was graded as: none, mild (<5%), moderate (5-10%), and severe (>10%), according to clinical signs (17). Patients were monitored by intermittent observations of hydration status. An eight hourly intake-output chart was maintained.

To characterize the epidemic, we calculated the weekly number of patients treated at the Shataki and Kalirbazar COTCs between July 1 and December 31, 1982. The epidemic started in early October and continued until the end of December. We chose the period July 1 to December 31 for analysis, to have comparable periods for the pre-epidemic and epidemic situations. Clinical records of a 25% systematic sample of all patients treated during the same period were reviewed. The differences between patients in pre-epidemic and epidemic periods were analyzed, using X^2 statistics.

To identify the epidemic's causative agent at its peak in November, rectal swabs were collected from 28 patients, placed in Cary-Blair media, and transported to the ICDDR,B Matlab Hospital laboratory for culture. The specimens were processed for vibrios, *Shigella* and *Salmonella*, using standard techniques (18).

Results

Between July 1 and December 31, 1982, the Shataki Centre treated 1,076 diarrhoea patients. Until the 2nd week of October, from 7 to 19 patients per week attended the Centre. From the 3rd week of October, the number of patients increased sharply (Fig. 2). The epidemic peaked in the 3rd week of November. During this week alone, 237 patients were treated. Thereafter, weekly patient attendance gradually dropped to the pre-epidemic level.

During the same six-month period, the Kalirbazar Centre treated 1,246 diarrhoea patients. Until September, 8 to 22 patients per-week visited the centre. From early October, the patient load increased sharply (Fig. 2). The epidemic continued throughout November and December, and thereafter weekly attendance gradually declined.

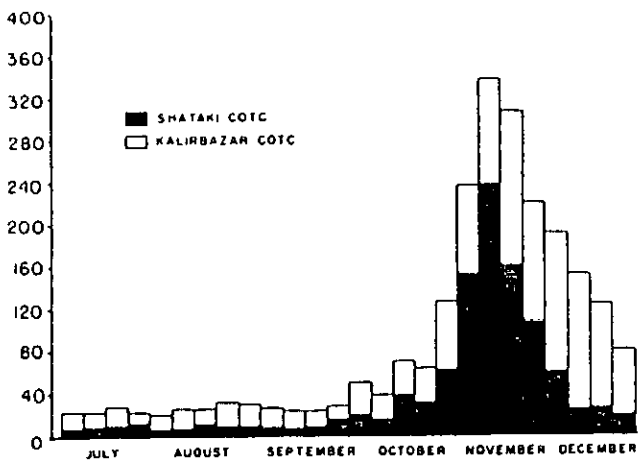

Fig. 2 – Number of patients treated by week, at the Shataki and Kalirbazar Community-Operated Treatment Centres, between July 1 and December 31, 1982.

While 51% of patients visiting the Shataki Centre during the pre-epidemic period were children under age 5, during the epidemic only 31% ($p<0.05$) of patients belonged to this age group (Table I). Patients aged 5-14 years accounted for 12% of the total before the onset of the epidemic, but 29% ($p<0.05$) during the epidemic.

In both centres, the percentage of patients presenting with watery diarrhoea was higher during the epidemic (Shataki COTC, 83% vs 63%, $p<0.01$; Kalirbazar COTC, 94% vs 54%, $p<0.001$). In contrast to the pre-epidemic period, more patients tended to present with severe dehydration (Shataki COTC, 39% vs 9%, $p<0.001$; Kalirbazar COTC;

42% vs 2%, p<0.001) during the epidemic (Table II)

Before the onset of the epidemic, 74% of Shataki patients and 60% of Kalirbazar patients were residents of Matlab Thana. However, during the epidemic, a majority of patients at both centres (Shataki 68% and Kalirbazar 80%) came from the neighboring Munshiganj, Daudkandi and Gazaria Thanas (Table III).

During the epidemic, 96% of patients received oral rehydration therapy (Table IV). Intravenous rehydration was required more frequently in patients over age 5, and antibiotic use was proportionately higher in adults.

At the Shataki Centre, the case fatality rates during pre-epidemic and epidemic periods were: 12/1,000 (2/170) and 10/1,000 (9/906) — (Table II). Both the patients who died during the pre-epidemic were under-five children from Matlab Thana. One had bloody mucoid diarrhoea, fever and convulsions; the other had watery diarrhoea and severe dehydration. Of the 9 patients who died during the epidemic, six were under age five. One was a girl aged six, and

TABLE I — PERCENTAGE DISTRIBUTION OF PATIENTS BY AGE AND SEX, TREATED AT SHATAKI COMMUNITY-OPERATED CENTRE DURING PRE-EPIDEMIC AND EPIDEMIC PERIODS (JULY – DECEMBER, 1982)

	Pre-epidemic n=43			Epidemic n=209		
Age	Male	Female	Total	Male	Female	Total
<1	12	5	16	3	2	6
1– 4	30	5	35	15	11	26
5–14	7	5	12	12	17	29
15–44	5	28	33	11	20	30
45+	5	—	5	6	4	10

Comparisons of age-specific admissions between pre-epidemic and epidemic periods were significant at the p<0.05 level by X^2 test.

TABLE II — CLINICAL PRESENTATION, DEHYDRATION STATUS AND CASE FATALITY RATES OF PATIENTS TREATED AT SHATAKI AND KALIRBAZAR COMMUNITY-OPERATED CENTRES (JULY—DECEMBER, 1982)

	SHATAKI		KALIRBAZAR	
	Pre-epidemic	Epidemic	Pre-epidemic	Epidemic
	n=43	n=209	n=48	n=265
Presentation				
Watery	63	83	54	94
Bloody and or mucoid	37	17	46	6
Dehydration				
None-Mild	58	28	63	23
Moderate	33	33	35	35
Severe	9	39	2	42
Case Fatality Rates*	12/1000	10/1000	—	3/100

Data are percentages of patients.

Comparison between patients during pre-epidemic and epidemic periods were significant at the p < 0.01 level by X^2 test.

*Derived from all admissions and all deaths during the period. The differences were not significant.

TABLE III – CATCHMENT AREAS OF PATIENTS TREATED AT SHATAKI AND KALIRBAZAR COMMUNITY-OPERATED CENTRES DURING EPIDEMIC AND PRE-EPIDEMIC PERIODS BY DEHYDRATION STATUS (JULY – DECEMBER, 1982)

	SHATAKI CENTRE				KALIRBAZAR CENTRE			
	Pre-epidemic		Epidemic		Pre-epidemic		Epidemic	
	Matlab n=32	Others* n=11	Matlab n=67	Others* n=142	Matlab n=29	Others† n=19	Matlab n=52	Others† n=213
Dehydration								
None-Mild	53	73	25	29	69	53	40	19
Moderate	34	27	42	30	28	47	29	36
Severe	13	—	33	42	3	—	31	47

Data are percentages of patients.
* Includes Munshiganj and Gazaria Thanas under Dhaka district, and Daudkandi Thana under Comilla district.
† Includes Daudkandi and Gazaria Thanas.

TABLE IV – REHYDRATION SOLUTIONS AND ANTIBIOTICS USED AT SHATAKI CENTRE IN DIFFERENT AGE GROUPS DURING EPIDEMIC PERIOD (OCTOBER 14 – DECEMBER 8, 1982)

	ORS SOLUTION		I.V FLUID		ANTIBIOTICS
Age of patients	% received	Liters per patient	% received	Liters per patient	% received
<5	97	2.1	42	0.8	69
5–14	95	3.9	74	1.6	77
15+	96	5.3	75	2.1	92

another two were adult females (aged 22 and 70). Eight of them were residents of Munshiganj Thana (Dhaka district) and one was from Matlab Thana. Eight patients had watery diarrhoea, while only one had bloody mucoid diarrhoea. Six of the nine fatalities arrived with severe dehydration, while 3 had moderate dehydration. Three patients had convulsions on admission and 2 had pneumonia. At Kalirbazar, there was no death before the epidemic's onset, and the case fatality rate during the epidemic was 3/1,000 (3/1,060). Of them, two were under five children and one was a female aged 35. All were from the neighboring Daudkandi Thana, had watery diarrhoea and severe dehydration. Despite an increased severity and case load during the epidemic, case fatality rates were not significantly different.

Bacteriology report

During the 3rd week of November 1982, rectal swabs were collected from 20 patients treated at the Shataki Centre; 17 cases were vibrio-positive, 9 of which were *Vibrio cholerae* 01 and 8 were NAG. During the same period, rectal swabs were collected from only 8 patients treated at the Kalirbazar Centre. All the specimens yielded vibrios: 5 *Vibrio cholerae* 01 and 3 NAG.

Discussion

Our experience during the first two years of operation of the Shataki Centre indicated that a community-operated diarrhoea treatment centre can effectively handle the endemic patient load. The 1982 cholera outbreak provided a unique opportunity to demonstrate the importance of treating people closer to their homes.

The centres were run by trained volunteers under the supervision of local management committees. The ICDDR,B contributed ORS packets, intravenous fluids, medicines and essential hospital supplies, and monitored technical aspects of

the centres' operations. With the onset of the epidemic, the existing facility could not fully cope with the heavy patient load, with many of the patients coming from outside the community. At that time, we had to reinforce the centres, initially with full-time physicians, and later with frequent supervision to retrain the volunteers on the spot. We also increased supplies proportionate to the increased patient loads. The local government thana health authorities deputed two medical assistants to the Shataki Centre. With this support, supplies and supervision the centres successfully managed the epidemic. Since the centres already had been in operation, information was rapidly available and prompt reinforcement was possible. Without the centres, patients would have had to travel to the Matlab Hospital or to some other facility, with increased loss of life. Most patients would have been unable to afford the cost and time, where the only transport was a country boat. It takes about eight hours by country boat to travel to Matlab from Shataki, and about six hours from Kalirbazar.

In comparison to a large central hospital, simplified community-operated local treatment centres are much more easily accessible. We believe from these observations that such centres can reduce diarrhoeal mortality in situations where travel and communication are difficult. Moreover, a local treatment centre staffed by community volunteers is more cost-effective than is a larger centre. Comparing long-run average costs, it takes $3.36 to treat a patient at the Shataki Centre, against $15.65 (minimum estimate) at the Matlab Hospital, with an additional $12.85 per patient who comes by ambulance (19). Thus, a series of community-operated centres would seem preferable.

During the epidemic, the two COTCs treated about 2,000 patients. We could not collect rectal swabs for culture from all patients, nor even from any systematic sample of patients, due to logistic reasons. However, during the epidemic patients were more likely to present with watery diarrhoea and moderate-to-severe dehydration. Moreover, we collected rectal swabs from all patients who attended the Matlab Hospital during the same period, and 70% yielded *Vibrio cholerae* 01. All these were highly suggestive of a cholera epidemic. Assuming that 50% of these patients would have died if treatment were not provided (20), the two COTCs averted approximately 1,000 deaths during the 1982 cholera epidemic. The above estimate should be treated with caution and deserves comments. Alternately, one can estimate crudely the number of deaths averted by assuming that patients with salt and water depletion of 10% or more of their normal body weight would have died in the absence of medical intervention (21,22). Of the 2,000 patients treated during the epidemic, 41% arrived with severe dehydration.* Thus, conservatively, at least 820 deaths were averted by these two centres.

The most significant aspect of the COTCs is the voluntary participation of a community to organize and operate its own treatment centre. During the 1982 cholera epidemic the majority of patients at both centres came from outside the communities. The self-help attitude of the Shataki and Kalirbazar area residents benefitted not only them but also their neighbors.

We may conclude that community-operated treatment centres are a rational approach, which is simple, cheap and applicable under the adverse conditions and shortages of the developing world. In a country such as ours, replication of the Shataki model can help avert thousands of diarrhoeal deaths by preventing dehydration and malnutrition. However, in emergency situations, such as epidemics, the support of central health facilities is very important, and must be a part of the planning leading to such community initiatives.

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* Severe dehydration was graded in a patient who had the signs of established dehydration with, in addition, pale or mottled cold extremities and impalpable peripheral pulses.

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