

This section looks back to some ground-breaking contributions to public health, reproducing them in their original form and adding a commentary on their significance from a modern-day perspective. Olivier Fontaine and Charlotte Newton review the 1973 paper by D. Mahalanabis et al. on the use of oral fluid therapy in the treatment of cholera. The original paper is reproduced by permission of The Johns Hopkins University Press.

A revolution in the management of diarrhoea

Olivier Fontaine¹ & Charlotte Newton²

The Lancet has called it the most important medical discovery of the 20th century (1). It did not come about from a randomized double blind clinical trial or a sophisticated molecular biology experiment, but from the urgent need to manage severe cholera spreading among innocent victims of war. This month's classic paper will remind us all of the magic of medicine — how something as simple as a solution of sugar and salts administered orally by health workers in the field can save millions of lives (2).

Oral rehydration therapy for the management of severe cholera, researched as far back as the 1940s, was developed simultaneously in the last half of the 1960s in Dhaka, Bangladesh (then the Eastern Province of Pakistan) and Calcutta, India (3, 4). Although this new treatment was as effective as intravenous fluid therapy, experts were advising extreme caution and warning that its administration should not be left in the hands of inexperienced health workers. The widespread professional opinion was that the new therapy should replace intravenous fluids in the hospital management of cholera, and should be supervised by doctors and trained health workers only (5). Consequently, in 1970, WHO responded to health authorities seeking to control the seventh cholera pandemic by distributing large amounts of intravenous fluids (entailing high transportation costs), whose use was limited by a scarcity of experienced health workers.

Shortly afterwards, in 1971, the Bangladesh war of independence resulted in a massive exodus into West Bengal, India, with an estimated 10 million refugees flowing into camps along the border. Not surprisingly, a severe cholera epidemic broke out. In one of the camps the health centre was headed by Dr Dilip Mahalanabis, who was familiar with the new oral rehydration therapy through his participation in

its development as a staff member of the Johns Hopkins Centre for Medical Research and Training, Calcutta. With intravenous fluids in short supply, he began giving oral rehydration fluids to all patients deemed not to be in urgent need of intravenous therapy. Contrary to the experts' advice, well-trained, experienced health workers did not administer the oral rehydration solution to patients: instead, mothers, sisters, spouses, grandmothers and friends collected the solution in small cups from central drums and dosed their suffering family members. The overwhelmed health workers concentrated on replenishing the supplies in the drums and making quick visits to check on patients. Remarkably, the case-fatality rate in Mahalanabis's camp was about 3% compared with 20–30% rates in the camps that used only intravenous fluids. This was the first, most brilliant demonstration that oral rehydration therapy was more than simply a treatment to replace intravenous fluid treatment in hospitals.

The same year Dr Dhiman Barua, head of the Bacterial Diseases Unit of WHO, visited the camp health centre managed by Mahalanabis. From his own account, Barua realized the vast potential of this new tool and began boldly promoting it for treating childhood diarrhoea as well as cholera (5). However, at that time, few doctors or paediatricians were convinced of the efficacy of the new therapy. Many thought it an inferior alternative, to be used only when intravenous fluids were unavailable. In fact, scepticism was so high that a number of medical journals rejected Mahalanabis's paper describing his refugee camp experience, believing that his results were not credible. Yet researchers persisted and launched projects in communities to demonstrate the feasibility, acceptability and efficacy of oral rehydration therapy for the treatment of childhood diarrhoea (6). The success of these projects — combined with Barua's unyielding pressure — led to the creation in 1978 of WHO's Diarrhoeal Diseases Control Programme to reduce childhood mortality due to diarrhoea.

At the time of the Programme's creation, almost five million children under five years of age

¹ Medical Officer, Child and Adolescent Health and Development, World Health Organization, 1211 Geneva 27, Switzerland. Correspondence should be addressed to this author.

² Communications Consultant, 8 chemin Rieu, 1208 Geneva, Switzerland.

were dying annually from diarrhoea, and most paediatric departments were fully occupied with rehydrating young patients with intravenous fluids (7). Today, more than 20 years later, oral rehydration solution is an accepted therapy, valued by health workers in developing and developed countries alike. In fact, oral rehydration therapy may be one of the best examples of a reverse technology transfer as its use spreads throughout the industrialized world (8).

With referral hospitals no longer required to maintain large wards for intravenous treatment, space, time and money are now becoming available to treat more efficiently an increasing number of severely ill patients. More importantly, the diarrhoea mortality rate for children under five years of age has decreased from almost five million to 1.8 million a year (9). This is the true “miracle” of the simple therapy tested in refugee camps and now used worldwide. ■

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4. **Pierce NF et al.** Oral replacement of water and electrolyte losses in cholera. *Indian Journal of Medical Research*, 1968, **57**: 848–855.
5. **Barua D.** Application of science in practice by the World Health Organization in diarrhoeal diseases control. *Journal of Diarrhoeal Diseases Research*, 1993, **11**: 193–196.
6. Report of a field trial by an international working group. A positive effect on the nutrition of Philippine children of an oral glucose-electrolyte solution given at home for the treatment of diarrhoea. *Bulletin of the World Health Organization*, 1977, **55**: 87–94.
7. **Samadi AR, Islam R, Huq MI.** Replacement of intravenous therapy by oral rehydration solution in a large treatment centre for diarrhoea with dehydration. *Bulletin of the World Health Organization*, 1983, **61**: 471–476.
8. **Santosham M et al.** Oral rehydration therapy for diarrhea: an example of reverse transfer of technology. *Pediatrics*, 1997, **100** (5), available at: <http://www.pediatrics.org/cgi/content/full/100/5/e10>
9. *The world health report 1999 — Making a difference*. Geneva, World Health Organization, 1999.