

## Miracle cure for an old scourge

Millions of lives are saved every year thanks to the development of a simple treatment called oral rehydration salts (ORS) solution, once dubbed “potentially the most important medical advance” of the 20th century by the *Lancet*. Yet for years Dr Dhiman Barua, at the World Health Organization (WHO), and Dr Dilip Mahalanabis, at the Johns Hopkins International Center for Medical Research and Training in the Indian city of Kolkata, struggled to convince a sceptical medical fraternity that it could be administered by people with little or no training.



WHO/Fiona Fleck

Dr Dhiman Barua

Dr Dhiman Barua started working for WHO in 1965 with the Cholera Control Team based in Manila in the Philippines. In 1966, he moved to WHO head office Geneva as a medical officer working on cholera and other diarrhoeal diseases. In 1978, he established the Diarrhoeal Diseases Control Programme. Throughout his career at WHO, he trained health workers in many countries in oral rehydration therapy and other aspects of diarrhoeal diseases, using facilities, notably the International Centre for Diarrhoeal Disease Research in Dhaka, Bangladesh.

*Q: Can you describe your first experience of cholera?*

A: My first memory of cholera was when I was eleven. The village in what is today Bangladesh was dying of cholera. I asked the doctor why and he told me that the only treatment was intravenous saline (IV) and that, without it, people die. And before my eyes, the doctor, his wife – who was related to me – and their two daughters died. Our household was not affected, but most households in the village were affected. People died like flies. That was really shocking.

*Q: How did your early experiences of cholera influence your work later on?*

A: As a professor at the Kolkata School of Tropical Medicine, I investigated cholera epidemics in the field. I saw people dying and, again, it reminded me of what I had seen when I was eleven. IV saline was not available, so the health workers collected water from dirty ponds to boil and to add salt to make IV saline! You cannot imagine a more primitive way of making something to be injected into the veins.

*Q: How did the cholera situation in Africa change your thinking in WHO?*

A: In those days IV saline was made in glass bottles, as there were no plastic

bottles, and a one-litre bottle was so heavy that to transport it by air was many times more expensive than the fluid itself. This made it impossible to provide, for example, tonnes of IV saline that were needed to meet demand in Africa, where 40 countries were affected by cholera in 1970. WHO was inundated with requests for IV fluid from African countries. One WHO consultant sent us a telegram from Guinea saying that he saw “children swimming in the cholera stools of their parents”. Such horrific conditions I could not have imagined. These circumstances obliged us to think about alternatives to IV fluid in oral rehydration. But hospital-based clinicians were against allowing untrained people to use oral rehydration. (Former Director-General) Dr [Halfdan] Mahler was very supportive; we had long discussions about the use of oral rehydration in place of intravenous fluid. And ultimately he agreed with my proposal. He arranged for me to go to Africa to run five training courses in different countries. We were able to provide ORS packets that were much cheaper than IV fluid.

*Q: What did you gain by visiting Mahalanabis who was working with refugees in Bongaon, India, in 1971 during the cholera outbreak?*

A: I saw an incredible number of sick and dehydrated people lying on the floor there. Mahalanabis kept drums of oral rehydration fluid each with a nozzle on the side and told relatives to fetch the solution in cups and mugs to feed the patients. When the patient is thirsty, he drinks. When he's no longer thirsty, he's no longer seriously dehydrated. When the patient is healthy again, the solution tastes bad. When you are very dehydrated, the taste of ORS is wonderful. What I saw in Bongaon convinced me that our decision, to use ORS solution in Africa and allow minimally trained people to administer it, had been right.

*Q: So how did WHO get ORS produced in the large quantities that were needed?*

A: At the end of 1970, a Swiss company succeeded in packaging the ingredients in aluminium foil bags to prevent absorption of moisture and caking of the powder. The shelf-life was long and transportation was easy. This was a great discovery. We would never have succeeded without this development. The new packet became a symbol of the success of oral rehydration therapy. Many training activities ensured proper utilization of this therapy. Paediatricians attending a WHO seminar agreed on a single formula for all types of acute diarrhoeas in all ages; this formula was the result of years of studies in Kolkata and Dhaka.

*Q: Why were physicians reluctant to put ORS in the hands of people with no medical training?*

A: Hospital doctors regarded oral rehydration therapy as a second-class treatment. A single death under their watch is always a shock. They tend to consider the number of deaths, not how many lives are saved. Paediatricians in developed countries feared that sodium concentration in the formula was too high for children, who would die of hypernatraemia. It took a long time to convince the critics that experience in practice showed no ill effects. We had to invite them to try it for themselves. I remember seeing one Pakistani doctor, who was amazed to see the miraculous effect of ORS

on one patient he was treating, kneel down by the patient's bedside, which was very dirty, and say: "Allah what have I seen?"

*Q: How has the programme performed since you left it?*

A: I am very glad that there are no longer panicky reactions, leading to crippling restrictions on travel and trade on countries affected by cholera by their neighbours that we fought in the 1960s and 1970s. This is thanks to the availability of oral rehydration

therapy that prevents death and, consequently, fear. Annual global mortality due to diarrhoea in children aged under five years was about five million in the 1950s and 1960s, while in the mid-1980s and 1990s it was around two million. Oral rehydration therapy may not be solely responsible for this improvement, but it certainly played a significant role in it. I left the programme in the very capable hands of Dr Michael Merson who did extremely well in promoting and implementing the activities for proper use of

oral rehydration therapy. He deserves much of the credit for converting the "most important medical advance" of the 20th century into a household medicine worldwide. His premature departure from the programme and some other changes at WHO affected the continuation of support that was still needed. I hope recent efforts by WHO Director-General Dr Margaret Chan to revitalize primary health care will bear fruit and provide the essential support needed to ensure proper use of ORS. ■



Courtesy of D Mahalanabis

Dr Dilip Mahalanabis

Dr Dilip Mahalanabis studied cholera and other diarrhoeal diseases at the Johns Hopkins International Center for Medical Research and Training in the Indian city of Kolkata. His work at a refugee camp in Bangaon, in India near the border with Bangladesh, during a cholera epidemic in 1971 was instrumental in proving that untrained people could successfully administer ORS solution. From 1975 to 1979, he worked in cholera control for WHO in Afghanistan, Egypt and Yemen. During the 1980s, he worked as a WHO consultant on research on the management of bacterial diseases.

*Q: The Bangladesh war of independence sparked an influx of refugees into Bangaon, why did you go there and what did you see?*

A: In 1969 and 1970, I was working on research on diarrhoeal diseases in children at the infectious diseases hospital in Kolkata. When the cholera epidemic began in 1971, we had to leave our research and go out into the field to work with the refugees. The government was unprepared for the large numbers. There were many deaths from cholera, many horror stories. When I arrived, I was really taken aback. There were two rooms in the hospital in Bangaon that were filled with severely ill cholera patients lying on the floor. In order to treat these people with IV saline, you literally had to kneel down in their faeces and their vomit. Within 48 hours of arriving there, I realized we were losing the battle because there was not enough IV and only two members of my team were trained to give IV fluids.

*Q: That was when you decided to allow non-specialists to administer ORS – a decision that went against the prevailing*

*wisdom of the time. Did you realize the risk you were taking?*

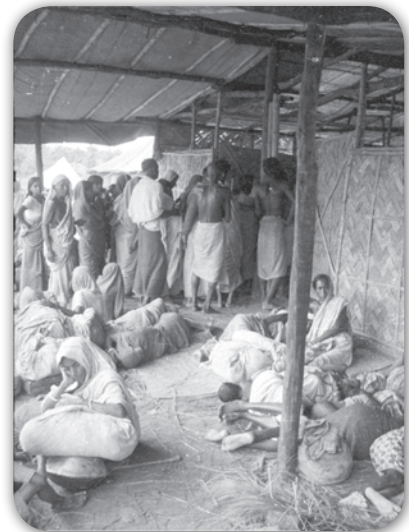
A: I didn't have the privilege of consulting knowledgeable people at that time. I had to decide on my own what to do. I had no choice but to go ahead and use ORS to the maximum, hoping for the best. I was confident that it could work, but not necessarily in these circumstances. I also feared that if it didn't work, we would have no more options. It was a huge relief when we saw that it really did work.

“We were just happy that it worked there and that we could help these people.”

Dr Dilip Mahalanabis

*Q: Bangaon was a stunning victory for ORS. At what stage did you know that it was working?*

A: Within two or three weeks, we realized that it was working and that it seemed to be all right in the hands of



D Mahalanabis

India, 1971. Refugees from former East Pakistan, now Bangladesh, seeking shelter, food and medical attention at the Bangaon refugee camp.

untrained people. However, people did need some supervision and persuasion that it really would work. People knew that IV saline was the treatment for cholera because cholera is endemic in the region. At that time we coined the term 'oral saline'. We told them that this was also saline, but that it was given by the mouth. At the time, we didn't know that it would become so well known and that people would take it up everywhere. We were just happy that it worked there and that we could help these people. We prepared pamphlets describing how to mix salt and glucose and distributed them along the border. The information was also broadcast on a clandestine Bangladeshi radio station. The cholera outbreak was not just among refugees, but also in Bangladesh itself. ■