

Department of Pediatrics, Mama Yemo Hospital  
(Chairman: Prof. F. Davachi, M.D., F.A.A.P., F.A.C.C., F.A.C.A.) (1)  
Expanded Program on Immunizations/CCCD Project Kinshasa, Zaire (2)  
University of Kinshasa, School of Public Health, Kinshasa, Zaire (3)

# The Impact of Oral Rehydration Therapy on the Treatment of Diarrheal Diseases in Kinshasa, Zaire

F. Davachi<sup>1</sup>, L. Bongo<sup>1</sup>, M. Mutombo<sup>2</sup>, M. Moore<sup>3</sup>

## Introduction

Diarrheal diseases are the major cause of morbidity and mortality in children under five in the world, the predominant cause of death being dehydration (1). Recognizing that Oral Rehydration Therapy (ORT) is the most effective measure against dehydration and the primary treatment for diarrheal diseases, an ORT program was officially established in August 1984 in the Emergency Room of the Department of Pediatrics at Mama Yemo Hospital, Zaire. Subsequently, a 30 bed ORT center was constructed and became operational in 1986. Mama Yemo Hospital is a 2000 bed teaching hospital with the Department of Pediatrics comprising 560 beds, two emergency rooms and a ORT center which operates 24 hours a day.

The goal of the ORT center is to treat diarrheal diseases, to provide training in ORT to Zairian and other french-speaking African health professionals and to provide data for research on the evaluation and treatment of diarrheal diseases. We report the clinical outcome of the first three years (August 1984 - July 1987) of the center and compare these results with those of 1982 before the introduction of ORT.

## Method

In order to objectively evaluate the results of the program, a prospective study was designed using a computerized form to record information on each patient. This paper reviews the information on age, sex, quantity of oral rehydration solution (ORS) administered at the center, number of hours spent for rehydration, weight gained and clinical outcome.

Upon physical examination, patients were placed in one of three categories; Plan A (no apparent dehydration), Plan B (5 - 9% dehydration) and Plan C (10% dehydration or more). Standard World Health Organization ORS (2), or the same formula locally commercialized, was administered and recorded. All children received ORS by mouth, except those with more than four episodes of vomiting per hour, those in Plan C unable to drink or those in coma, in which cases intravenous fluid was given. However, ORS was administered per os as soon as clinical conditions permitted. No antiemetic or anti-diarrheic medications were prescribed. Antibiotics were used only as recommended by WHO (3) and in cases of associated infections. All infants received their mother's milk during treatment while older children received bananas, cereals or other traditional food.

Regular nutritional and sanitary education was given to mothers at the center. Particular emphasis was placed on the continuation of breast feeding during diarrhea, the recognition of the signs of dehydration and the need for early treatment.

Upon satisfactory rehydration, patients were discharged with additional packages of Oral Rehydration Salts to be given, as instructed, at home. Those requiring hospitalization for associated illnesses, after rehydration, were admitted to the pediatric wards. In recent months, all children older than nine months who were not previously immunized, were given measles vaccine.

In order to compare the effectiveness of ORT with intravenous therapy, charts of all children in 1982 and all hospitalized children and those treated in the ORT center in 1986 were reviewed.

## Results

In the first three years of ORT operation (August 1984 - July, 1987) 7729 completed forms were reviewed. There were 3478 (45%) girls and 4251 (55%) boys. Ninety percent of the patients were under 2 years of age. Thirty-five percent of the patients were classified as having no apparent dehydration (Plan A), 52% had moderate dehydration (Plan B) and 13% had severe dehydration (Plan C). Fifty-eight percent were febrile on admission.

Table 1 shows the average quantities of ORS administered in each Plan, the average periods of time in which these solutions were administered and the average percentage of weight gained. Children in Plan A gained an average of 4.4% of their body weight in 7.4 hours, Plan B gained 5.5% in 9 hours, and Plan C gained 6.2% in 11.7 hours.

At discharge 67.4% of the patients were rehydrated and sent home with further treatment whereas 26.4% were hospitalized for investigation and treatment of associated diseases. The overall mortality for the three year period was 2%.

## Discussion

During the first three years of Oral Rehydration Therapy there was a steady increase in ambulatory treatment of diarrheal diseases (66% the first year, 81% the second and 90% the third year) and a decrease in hospitalization (30% the first year, 16% the second year and 9.4% the third year). Mortality also correspondingly decreased from 4% in the first year to 3% in second year and to 0.6% in the third year.

It is of particular interest to note a steady decline in severely dehydrated patients (Plan C) over the three year period (24% the first year, 9% the second year and 3% the third year). This remarkable decrease in Plan C is attributed to improved diagnostic skills and to public education in several areas. First, there was a positive response to the education given to mothers at the center. This education put particular emphasis on the continuation of breast feeding during diarrheal episodes, thus combatting the local belief that mother's milk may cause diarrhea. Mothers were also given sanitary education and taught personal hygiene for prevention of diarrhea. They were taught how to identify signs of dehydration for early treatment. Secondly, an ORT campaign by poster, radio and television by the National Diarrheal Disease Control Program has also been a significant educative factor.

A comparison of patient charts from January to December, 1982 (Table 2), when all patients were being treated with i. v. fluid, with those treated at the ORT center from January to December 1986 revealed that there was no significant change in age, sex or pathology. Hospital admission for diarrheal diseases decreased from 44% in 1982 to 15% in 1986 whereas ambulatory treatment rose from 56% in 1982 to 85% in 1986.

TABLE 1  
Average quantity of ORS administered, average percentage of weight gained in average number of hours

Plan	ORS ml/kg	Avg. Hours	Avg. % wt. gain
Plan A	100	7.4	4.4
Plan B	140	9.0	5.6
Plan C	200	11.7	6.5

TABLE 2  
Comparison of diarrheal cases in 1982 and 1986

Description	1982	%	1986	%
Total number of diarrheal cases	4365		2248	
Average age	10.4 mo.		10.7 mo.	
Number of boys	2691	62	1286	57
Number of girls	1674	38	962	43
Ambulatory treatment	2452	56	1918	85
Hospitalization	2913	44	330	15
Total mortality	686	16	67	2.9

TABLE 3  
Comparison of mortality of diarrheal cases to all pediatrics admissions

Description	1982	%	1986	%
Tot. numb. of children admitted to Pediatrics	13725		10552	
Tot. numb. of pediatrics deaths	1372		1116	
Tot. numb. of deaths from diarrhea	686	50	67	6

In 1982, there were 13,725 pediatric admissions with 1372 deaths from all causes (Table 3). Six hundred and eighty-six (686) of these deaths were due to diarrhea thus accounting for 50% of all pediatric deaths. In 1986, there were 10,552 pediatric admissions with 1116 deaths from all causes, including 67 from diarrheal diseases. This represents 6% of all deaths. The deaths from diarrheal diseases, therefore decreased from 50% to 6% of all pediatric deaths.

In 1982, drug therapy was widely used; 3764 children received antidiarrheal and 213 received antiemetic medications. In 1986 none of these drugs were given. Antibiotics were administered to 3565 patients in 1982 and 123 in 1986. These dramatic changes are clear evidence that there is little need, if any, for antidiarrheal and antiemetic agents in the routine treatment of acute diarrhea in children. It also indicates that the use of antibiotics is limited to specific conditions such as amebiasis, shigellosis, giardiasis and cholera.

There was also a significant decrease in the cost of treatment for diarrheal diseases. In 1982 the average cost was \$ 27 per patient whereas in 1986, the average cost was \$.90 per patient. This represents about 3% of the previous cost.

## Conclusion

The use of ORT has markedly decreased the hospitalization rate, the mortality rate and the medical care cost of diarrheal diseases. The education of mothers in the areas of personal hygiene, recognition of the signs of dehydration and administration of ORS has resulted in fewer severely dehydrated children presenting at the center. Our comparative study demonstrates, with dramatic results, the superior effectiveness of ORT over intravenous therapy in combating dehydration.

We find ORT to be highly successful, easy to administer, practical, safe and inexpensive. Supported by our data and experience, we strongly recommend this mode of treatment for diarrheal diseases.

## Summary

The World Health Organization has estimated in 1980 that of 5 million deaths worldwide attributed to children under 5 years of age, 70% were due to dehydration. In 1984 an Oral Rehydration Therapy Unit was established in the Pediatric Emergency Room of Mama Yemo Hospital in Kinshasa, Zaire. The review of 7729 cases treated with Oral Rehydration Solution (ORS) reveals a remarkable decrease in the number of hospitalizations and an increase in ambulatory treatment. A comparative study of children treated with intravenous fluid therapy in 1982 with those treated by ORS in 1986 shows a dramatic reduction in mortality and medical care costs.

## Key words

Diarrhea, Oral Rehydration Therapy, mortality, children, Africa.

## Zusammenfassung

Die Bedeutung der oralen Rehydratationstherapie bei der Behandlung von Durchfallerkrankungen in Kinshasa, Zaire

Nach einer Schätzung der Weltgesundheitsorganisation sind von den insgesamt 5 Millionen Todesfällen, die 1980 bei Kindern unter 5 Jahren auftraten, 70% auf eine Dehydratation zurückzuführen. Im Jahre 1984 wurde eine Einheit für die Durchführung der oralen Rehydratationstherapie in der pädiatrischen Intensivstation des Mama Yemo Hospitals in Kinshasa, Zaire, eröffnet. Ein Überblick über 7729 Fälle, die mit oralen Rehydratationslösungen (ORS) behandelt worden waren, zeigte eine bemerkenswerte Senkung der Hospitalisationen und einen Anstieg der ambulanten Behandlungen. Ein Vergleich von Kindern, die 1982 eine intravenöse Flüssigkeitstherapie erhalten hatten, mit jenen, die 1986 mit oralen Rehydratationslösungen behandelt worden waren, zeigte eine dramatische Reduktion sowohl bei der Letalität als auch bei den Behandlungskosten.

## Schlüsselwörter

Diarrhoe, Rehydratationstherapie, Sterblichkeitsrate, Kinder, Afrika.

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ADDRESS FOR CORRESPONDENCE

Professor F. Davachi, M.D.  
Professor and Chairman, Department of Pediatrics  
Mama Yemo Hospital, Kinshasa, Zaire

B. P. 4697  
Kinshasa 2 · Republic of Zaire

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Autor(en)/Author(s): Davachi F., Bongo L., Mutombo M., Moore M.

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