

**ORAL REHYDRATION THERAPY IN THE TREATMENT
OF GASTROENTERITIS IN CHILDREN**

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Introduction

Loss of fluid and electrolytes has long been recognised as the immediate hazard of acute diarrhoea. A significant development in recent years has been the discovery that dehydration from acute diarrhoeas of all etiologies and in all age groups can be safely and effectively treated by the simple method of oral rehydration using a simply reconstituted fluid - **Oral Rehydration Solution**. Oral Rehydration Salt (ORS) solution is absorbed in the small intestine even during copious diarrhoea, thus replacing the water and electrolytes lost in the faeces. (WHO 1990).

Methodology

Study 1

The total quantities of various ORS brands including constituents and flavours imported to Malta in the year 1990 were determined from records kept at the Port Health Office, Valletta. The quantity of ORS sachets procured by the Government Pharmaceutical Services was obtained from the Government Medical Stores. Information also included the consumption of ORS within the Government hospital and by outpatients through the Government Pharmacies over the past 5 years. The use of ORS per capita was then calculated.

Study 2

Section A: This survey was conducted at the paediatric wards, Karin Grech Hospital, on 80 infants and children admitted during the Summer months in 1991, suffering from gastroenteritis. Information included the degree of dehydration and its cause, treatment with ORS and the recovery period. The management before admission as well as the duration of the illness were taken into account. Information was collected from patient medical records and during ward rounds.

Section B: This part of the survey was directed towards the mothers and carried out in the form of an interview. It was aimed at determining their knowledge about the condition including the need for replacement therapy and the preparation of the solutions. Questions also dealt with the medication and foods given to the child at home and the reasons for non-compliance were evaluated.

Study 3: A questionnaire was sent to all the 155 pharmacies over the Island to determine the consumption of ORS in the community; the pharmacists' knowledge about treatment and risks associated with diarrhoea as well as the advice they give regarding its prevention.

Study 4: Questionnaires were sent to 150 physicians, randomly selected from the Medical Register, as well as 13 child specialists at Karin Grech Hospital. This survey was aimed at assessing the incidence of childhood gastroenteritis and the physicians' views regarding causes of diarrhoea, reasons for dehydration and the management plan carried out in private practice.

Study 5: Following the second study it appeared that the major problem regarding ORS use is the unacceptable taste resulting in the children's refusal to drink the solution. The common practice is to reconstitute the ORS with soft drinks in order to mask the taste. Laboratory tests were carried out at the Biochemistry Laboratory, St. Luke's Hospital in order to analyse the sodium and glucose contents and the osmolality of various ORS solutions, when reconstituted with soft drinks rather than water. These tests were also carried out on a mixture of lemonade and water to assess their efficacy as replacements for ORS.

Results

Study 1:

The most common ORS used in Malta in 1990 was Dioralyte^R (Rorer). In fact all the pharmacies (100%) stocked this brand. This is presently the ORS brand used by the hospital sector. Figure 1 shows the distribution of ORS consumption. The number of ORS sachets consumed through the Government Pharmaceutical Services over the past 5 years, increased from 12,208 in 1987 to 93,740 in 1991. In 1990, 64% of the total quantity for that year (45,720), was consumed by St. Luke's Hospital, of which 80% was used by inpatients and 20% by the Outpatient's sector. The use per capita in Malta was compared with that of Northern Ireland (Figure 2).

Study 2

Section A: From the 80 children studied, 45 were male and 35 were female. Their ages ranged from 3 weeks to 12 years with the most common age group being 1 - 3 years (43.7%). 43.7% of children were kept at home for more than 2 days before being taken to hospital, and 65% were found

Figure 1: Distribution of ORS consumption from records of importation in 1990

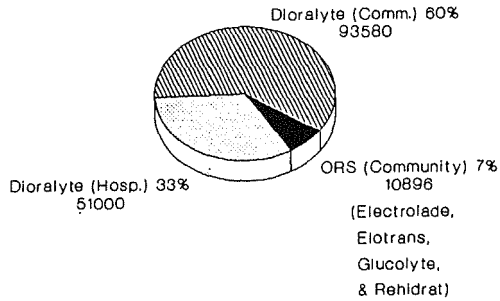
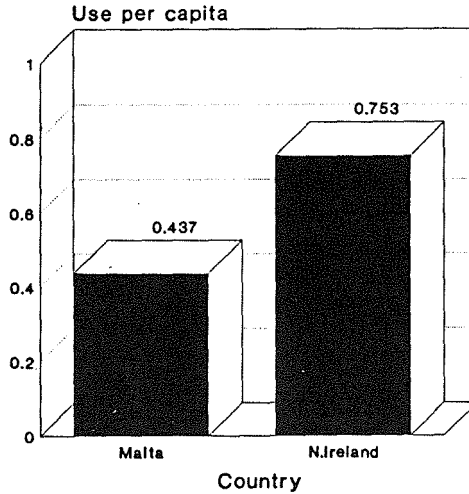


Figure 2: ORS use per capita: comparison between Malta and N.Ireland



to be mildly dehydrated while only 3.75% were moderately dehydrated. None were severely dehydrated. Children were commonly treated with ORS (53.7%) before admission to hospital with only 30% given antibiotics and 10% antidiarrhoeal agents. The length of hospitalisation of these patients is shown in Figure 3. It includes periods ranging from <1 day to >10 days, with the majority of children (62.5%), being kept in the wards for a period of 1 - 3 days. During this period, treatment was mainly based on rehydration therapy with 88.8% (n=71) given ORS. 67.5% (n=54) required more intensive measure, i.e. IVI rehydration. Other medication included antibiotics (18.8%) and antipyretics (66.8%). The results of laboratory tests carried out on stool specimens to identify the causative organisms most commonly implicated are shown in Figure 4.

Section B: On interviewing the mothers, common trends in the management of childhood gastroenteritis were revealed. Figures 5, 6 and 7 shows the results.

Assessing their knowledge about Oral Rehydration Therapy, it was observed that 53.8% had already used ORS before. Of these 71% reconstituted the powder correctly with 19% adding it to a soft drink or milk. 38.8% knew that ORS are used to correct fluid loss, while 42.5% were under the impression that they 'stop the diarrhoea and settle the intestine'. A significant amount of children (48%) refused to drink the ORS solution due to its bad taste.

Study 3: The response rate in this study was 45% (n=71). 35% of the pharmacists dispensed more than 50 ORS sachets weekly during Summer, whilst 47% dispensed 10 - 30 sachets weekly in Winter. Regarding knowledge of the condition, 84% of pharmacists said that dehydration is the most important complication of acute diarrhoea, and 88% of them stated it to be the most important symptom to be treated.

43% of pharmacists refer a child to the doctor if the frequency of diarrhoea increases, there is blood in the stools, or the diarrhoea lasts for longer than 24 hours. 29% think it is important to refer when the child is very young, or when there are signs of dehydration present.

95% of pharmacists would dispense an ORS for a child suffering from diarrhoea, 18% adding on an antidiarrhoeal agent. 73% of pharmacists advise the mothers on the importance to stop all milk formulae for the first 24 hours, while only 54% advise them to continue breast feeding.

Figure 3: Variation in length of hospitalization in children suffering from gastroenteritis

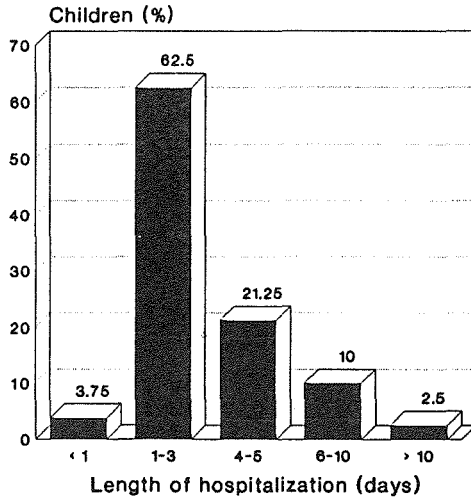
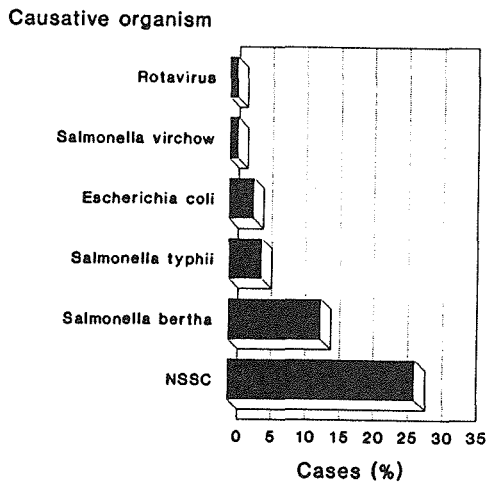


Figure 4: Organisms responsible for causing gastroenteritis in children at SLH



NSSC - No Salmonella, Shigella, Campylobacter or Enteropathogenic Escherichia coli isolated.

Figure 5: Medicines used by mothers to treat acute gastroenteritis in children

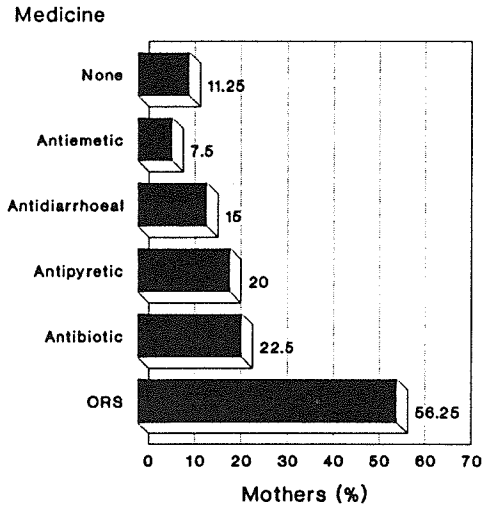
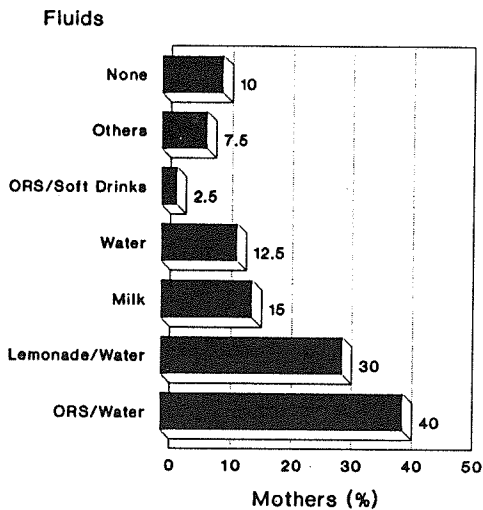


Figure 6: Fluids administered by mothers to children suffering from acute gastroenteritis



53% of pharmacists advise the mothers on the importance of hygiene and sterilisation for the prevention of diarrhoea, and 38% base their advice on dietary factors. With regards to a suitable substitute to ORS in case of refusal to drink, only 21% said they advise a change of flavour, while 45% would encourage the child to drink a mixture of lemonade and water or water alone. 8% would advise the mother to reconstitute the ORS with the child's favourite drink.

Study 4: Only 27% (n=41) of the 150 GP's responded, whereas all the 13 child specialists sent a reply. The seasonal variation in the number of children examined weekly by doctors is shown in Figure 8.

The commonest age range seen by both groups of physicians is the 1 - 5 years age group (GP's 85%, Child specialists 61%). 38% of child specialists also see many children below 1 year of age.

With regards to the causes of childhood diarrhoea, all the child specialists said that most cases are of viral origin and 92% of them also indicated bacteria as the causative organisms.

Only 15% thought it was due to food poisoning. 78% of the GP's indicated viruses as the major cause and 39% bacteria.

31% said that the common cause was food intolerance and 21% suggested food poisoning.

92% of the child specialists said most children were mildly dehydrated upon examination and this was supported by the GP's (90%).

When questioned about the reason for dehydration and the mother's common errors in management, the majority of physicians said that a common habit was continuing food administration and giving incorrect fluids.

With regards to management plan adopted, all the paediatricians treated with oral rehydration therapy (ORT) and 7% might add an antidiarrhoeal. None of them would prescribe an antibiotic or antiemetic. All the GP's would treat using ORS and 12% would add an antibiotic, 9% an antidiarrhoeal, and 7% an antiemetic. All the paediatricians advised the mothers to stop feeds for the first 24 hours and also to continue breast feeding; 97% of the GP's advised to stop feeds and only 73% thought it wise to continue breast feeding.

Figure 7: Food given by mothers to children suffering from acute gastroenteritis

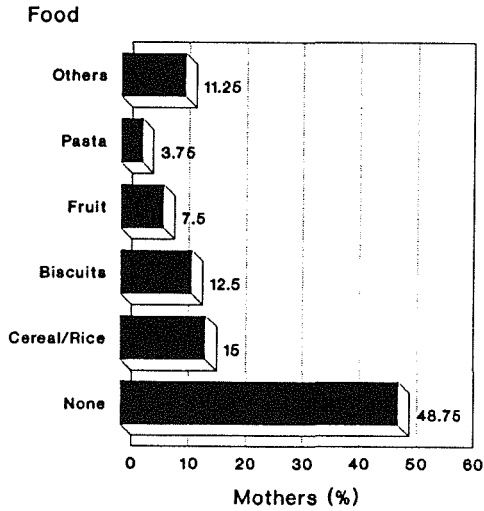
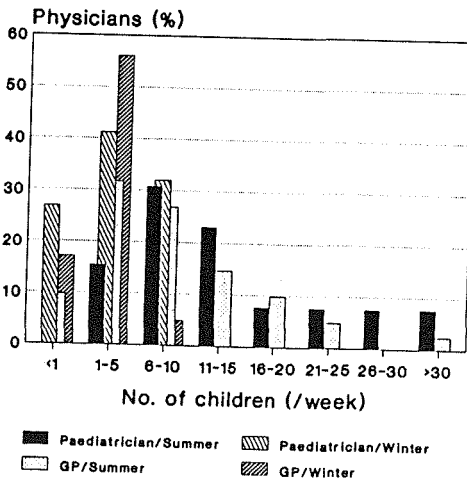


Figure 8: Seasonal variation in childhood gastroenteritis as seen by doctors



Study 5: The results obtained from the laboratory tests are summarised in Table 1.

Table 1: Composition of various fluids used to treat dehydration in acute diarrhoea

Fluid	Na+ *	Glucose **	Osmolality (mOsm/kg)
	(mmol/l)	(mmol/l)	
Tap water	-	0.08	-11
Mineral water	-	0.11	-18
Lemonade	-	33.6	392
Lemonade + Tap water	-	16.9	186
Lemonade + Mineral water	-	16.9	182
ORS + boiled Tap water	41	24.9	332
ORS + Mineral water	36	24.09	345
ORS + Lemonade	51	29.6	820

* These tests were carried out in the Biochemistry Laboratory, where the equipment is programmed to detect clinical values of Sodium which range from 136 - 142 mmol/L. This explains why results obtained for water and lemonade were negligible, the values being too low to be detected.

** In the case of glucose, the equipment is programmed to detect D-glucose only; this being the only isomer found in the human body. This explains the low glucose values obtained, since the L isomer present in the ORS solution was not detected.

Since optimal solutions for promoting water absorption should have a sodium concentration of 60 mmol/l (Hunt JB et al, 1988); a glucose concentration of 100 mmol/l (Sladen & Dawson, 1969) and an osmolality of 240 mOsm/kg (Hunt JH et al, 1988), it can be seen that:

- a) Soft drinks alone are too low in sodium and have an unacceptably high osmolality. When mixed with water, the sodium and glucose concentrations, and the osmolality are all too low to effect absorption.
- b) None of the 3 ORS solutions tested have the optimum concentrations for maximum absorption. However, it is evident that the mixture of ORS and lemonade has an osmolality far beyond acceptable limits, even though the sodium content is acceptable. Thus, the powder should NEVER be mixed with soft drinks even though this might improve palatability.
- c) Alternative solutions of lemonade and water are also not acceptable and although traditional ORS's do not have optimum concentrations of constituents, so far they have proved to be the best in effecting maximum absorption.

Conclusion

The sevenfold increase in consumption of ORS in the hospital sector over the past 5 years suggests that doctors and paramedics are becoming more aware of the benefits achieved from ORT in the primary treatment of acute diarrhoea. However, the low value of the use per capita for Malta, as compared to that for Northern Ireland, indicates a great need for educating the population. This point is clearly illustrated in the mothers' interview, where one can see that the primary needs are education regarding food and fluid intake, and awareness that dehydration is the greatest hazard of acute diarrhoea. This can be achieved through the professional advice of the community pharmacist who has been shown to have a good knowledge regarding the management of acute gastroenteritis, and who is in an ideal position to supply information. The pharmacist may be aided in this by means of an information leaflet for the patient.

References

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