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**ORAL REHYDRATION THERAPY IN CHILDHOOD  
DIARRHOEA: HOW EDUCATED ARE CAREGIVERS?**

by

**DR LIZANNE KONING**

**KNNLIZ001**

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**Supervisor: Dr A Morison**

**Dept of Paediatrics**

**Victoria Hospital**

**UNIVERSITY OF CAPE TOWN**

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## **Oral rehydration therapy in childhood diarrhoea:**

**How educated are caregivers?**



**by**

**Dr Lizanne Koning**

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Thank you to the following persons:

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This dissertation is dedicated to all the mothers of our beloved country who suffered the unbearable loss of a child due to dehydration. May your suffering not be in vain.

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## **GLOSSARY**

Oral rehydration therapy: The method by which a patient is rehydrated using the oral route, i.e. with a sugar salt solution, or with a pre-packaged oral rehydration solution.

Sugar Salt Solution: Home-made solution consisting of 1 litre of cooled down boiled water, 8 teaspoons of sugar, and half a teaspoon of salt.

Oral rehydration solution: A pre-packaged powder to which cooled down boiled water is added, according to the manufacturer's instructions. Several products are available on the market.

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## CHAPTER 1: INTRODUCTION

Thirty years ago, oral rehydration therapy (ORT) was hailed as potentially the most significant medical advance of the century. Dehydration from diarrhoea killed approximately 5 million children per year in the late 1970's. ORT is a simple and inexpensive means of treating diarrhoeal dehydration. Today 25% of the world's children have access to ORT, and it is estimated that every year it saves 500,000 lives (Drucker 1988).

Prior to the development of oral rehydration solution (ORS), intravenous rehydration was the mainstay of treatment of dehydration due to acute gastro-enteritis. This required hospital admission, increased the workload of healthcare practitioners, and led to escalating cost of healthcare.

During the 1940s, paediatricians started to use oral electrolyte solutions as maintenance therapy for mildly dehydrated children (da Cunha Ferreira *et al* 1990). In the 1950s, research of basic physiology showed that, in the small intestine, transport of sodium and glucose are coupled, and that the presence of glucose in an electrolyte solution will promote the absorption of both water and sodium (Farthing 1988).

However, it wasn't until 1964 that oral glucose and saline was successfully used on two cholera patients in the Philippines by Captain Phillips of the US Army. After that, scientists working at the Cholera Research Laboratory, Dhaka, and the Infectious Diseases Hospital, Calcutta, contributed to the development of modern ORS (Bhattacharya 1994). Pierce *et al* first demonstrated the efficacy of standard ORS during 1965-69, and the results was repeated by Dr. Dilip Mahalanabis during the Bangladesh liberation war when he treated cholera cases among Bangladeshi refugees with ORS (1971-72). Sircar *et al* in 1978 demonstrated the efficacy of ORS in a cholera epidemic in Manipur. De *et al* in 1974 and Chatterjee *et al* in 1978 convincingly demonstrated the efficacy of ORS in children with diarrhoea including cholera (Bhattacharya 1994).

According to da Cunha Ferreira *et al.* clinical studies carried out in Dhaka and Calcutta confirmed the efficacy of ORS, and showed that nearly 80%



of IV fluid could be saved if patients were hydrated by the oral route. The safety and efficacy of ORT in patients of all ages suffering from acute diarrhoea of any cause was demonstrated in further studies.

Bellemare *et al.* also proved in a study that there were no clinically important differences between IV rehydration and ORT in terms of efficacy and safety. The author stated that for every 25 children treated with ORT in his study, only one would fail and require IV therapy. The author concluded that his study results supported the existing practice of recommending ORT as the first course of treatment in appropriate children with dehydration secondary to gastroenteritis.

Based upon these successes, the World Health Organization launched the global Diarrhoeal Diseases Control (DDC) programme in 1978. The mainstay of this program was ORT as treatment of dehydration due to diarrhoea, with the objective to reduce worldwide mortality associated with diarrhoeal disease.

The SSS was modified by reducing the amount of salt in the solution from 1 teaspoon to half a teaspoon. This was done to make the SSS appropriate for both cholera- and non-cholera diarrhoea.

The DDC advocated a 4-part strategy for diarrhoea control. It consisted of:

1. Improved case management,
2. Improved maternal and child health care,
3. Improved use and maintenance of drinking water and sanitation facilities and improved food hygiene,
4. Detection and control of epidemics.

It also undertook a systematic review of the feasibility, effectiveness, and cost of available antidiarrhoeal interventions. A classification of interventions was developed to guide the review process.

It was decided that each intervention will be reviewed using a standard format. The intervention will then be assigned to 1 of 3 categories:

1. Feasible, effective, and affordable interventions. For this category the DDC programme developed guidelines for implementation within primary health care programmes;

2. Interventions that is believed to be effective on theoretical grounds only. These interventions received further field testing by the DDC programme; and
3. Interventions that have proven to be too costly, ineffective, or unfeasible. These interventions were not recommended by the DDC.

The interventions were also divided into categories:

1. Case management, including oral rehydration therapy at home or at a medical facility, promoting appropriate feeding during diarrhoeal episodes, and chemotherapy at home or in a medical facility;
2. Increasing host resistance to infection through various programmes of maternal nutrition, child nutrition, immunization, or chemoprophylaxis;
3. Reducing transmission of the pathogenic agents through control of water supply and excreta disposal, personal and domestic hygiene, food hygiene, control of zoonotic reservoirs, or fly control; and
4. Controlling or preventing diarrhoea epidemics (Feachem *et al.* 1983).

International efforts proved to be very successful, and by 1994 dehydration-induced child deaths were reduced by one million deaths per year. ORT now encompassed 99% of the developing world, although it was still implemented unevenly, being as low as 12% in Africa (Banwell 1990).

ORT proved to have the potential to allow substantial reductions in the morbidity and mortality of acute diarrhoea in children living in less developed countries, because it was cheap, easy to administer and easy to obtain. According to Gold (1988), the major obstacles to achieving its potential were social issues such as production and distribution of ORS sachets, and of educating parents in how to use ORT with confidence at home.

Since 1981, the global ORS supply has increased eleven fold. The ORS access rate has also increased from 46% to 68% (Sengupta *et al.*). In

spite of this, however, the global ORS use rate was low (21%). The reason for this occurrence was investigated by Sengupta *et al.* in India during 1994. They found that the *implementation* of ORT was the key element of the WHO DDC Programme. ORT implementation included production and distribution of packets of ORS, training of medical and paramedical personnel and education of mothers, and operational/health services research for identification of suitable strategies for implementation. The authors found that, in India, the ORS and ORT use rates were only 7% and 14% respectively. They showed that the major barriers to ORT implementation were scarcity of resources, lack of political commitment, managerial and organizational problems, and problems related to community participation, education, health personnel, and dissemination of information.

Some countries tried to combat above issues by setting up Diarrhoea Training Units (DTU) and ORT facilities in the rural areas. This was done to improve access to and education about the importance of ORT.

The efficacy of such DTU was assessed in multiple studies, one of which was done by Baig in 1997. The author assessed the role of supervisors in diarrhoea case management at the ORT corners of Sindh. A random sample of 62 ORT corners was assessed in both rural and urban areas. At each facility, the supervisors as well as the medical superintendents, district health officers, senior medical officers, civil surgeons and medical officers were included. His study showed dismal results. The author found that, in majority of cases, the supervisors did not do anything related to improvement of diarrhoea case management. The study showed that supervision at ORT facilities were at a rudimentary level and that it was adversely affecting the quality of diarrhoea case management.

The same tendencies were noticed in the South African context. During 1995, Huskisson *et al.* investigated the demographic and health profile of 106 young children that were hospitalised with acute diarrhoea at the Red Cross War Memorial Children's Hospital, Cape Town. Information regarding socio-economic status, feeding practices and mothers' knowledge/perceptions about the aetiology of diarrhoea and the use of ORT was collected on a predetermined questionnaire. The findings of the

study underlined the need for an aggressive, well-targeted education programme to reduce the morbidity and mortality of vulnerable children as well as the financial drain on the hospital budget.

Mawela *et al.* from MEDUNSA conducted a study in Gauteng during 1999 to assess whether a period of contact with health workers (doctors, nurses and medical students) had an effect on the carers' knowledge of gastro-enteritis. Fifty carers of children aged 2 years and less with gastro-enteritis were interviewed on admission and on discharge from the paediatric short-stay facility. On discharge, 50% of carers did not know any of the signs and symptoms of dehydration. Sixty-seven per cent of carers had first tried ORS at home, but of these only 49% could prepare an acceptable solution. The study concluded that contact with health workers during a period of admission to hospital had no impact on caregivers' knowledge of gastro-enteritis and its management. Primary Health Care Clinics, and not hospitals, were still the major source of information about ORT according to the majority of caregivers. This study confirmed that caregivers are not adequately educated about the role of ORT in diarrhoeal disease.

This was not the exception to the rule. Doctors working in emergency centres all over South Africa often see the lack of knowledge and administration of ORT among local mothers and caregivers. They also note the lack of insight into the need of adequate fluid replacement during gastroenteritis. Numerous strategies have been implemented to improve the knowledge of mothers and caregivers on the usefulness of ORT during an episode of diarrhoea, for instance printing the recipe of the sugar salt solution (SSS) on the back of the Road to Health card, or providing ORS sachets, but still the incidence of maladministration and lack of knowledge seem high.

Another obstacle in the way of successfully implementing the WHO DDC Programme is inadequate administration of ORT by caregivers, even in the presence of sufficient knowledge in preparing ORS.

The recommended volume of ORT to be administered after each loose stool is 20ml per kilogram body weight. Although there is limited data available about the administration practices of mothers and caregivers in

South-Africa, Wagstaff *et al.* showed in a study done in Soweto that only 29% of caregivers knew that one should increase the fluid intake of a child with diarrhoea.

The study concluded that there was a need to improve caregivers' understanding of adequate fluid replacement during gastroenteritis. Even though the majority of mothers knew about ORT, and could correctly state the recipe of SSS, they did not increase the fluid intake during the diarrhoeal episode. In most cases, the total daily fluid intake during diarrhoea was less than the normal fluid intake of the particular child during a healthy period.

Taking the above studies and evidence in account, it is clear that many misconceptions exist amongst mothers and caregivers regarding ORT. These misconceptions adversely influence the use rate of ORT, and thus the effectiveness of the WHO DDC program.

One of these misconceptions often seen by doctors working in emergency centres in India is that mothers don't administer ORS and / or SSS, because the ORT "does not stop the diarrhoea" (Bentley 1988).

Although there are no recent studies in South Africa that has assessed the local situation, there is anecdotal evidence that the above situation is present here as well. It is a fact that, if treatment (in this case ORT), does not satisfy the caregivers expectations (stopping the diarrhoea), it won't be used again in a similar situation. It is therefore of the utmost importance that the South African caregivers' perception should be investigated, and if needed, be rectified by education.

Lastly, recent studies have shown the beneficial effects of breast-feeding in preventing morbidity and mortality from diarrhoea in infants. A case-control study in Brazil has shown that young infants who are not breast-fed had a 25-time greater risk of dying of diarrhoea than those who were exclusively breast-fed. It is a well known fact that the body can't absorb nutrients during a diarrhoeal episode as effectively as it does when it is healthy (Africa Women and Health, 1993). During the first days of a diarrhoeal episode, the nutrient intake may fall by as much as 33%. The child usually feeds less, because of vomiting, loss of appetite, or the

incorrect practices of mothers following traditional beliefs to stop oral intake during diarrhoeal disease.

All of the above contribute to malnutrition, and in the end, a decrease in the immunity of the child, leading to longer and more severe episodes of acute diarrhoea. The current consensus is that, if a child develops dehydration because of diarrhoea, ORT should be administered, and feeding (other than breastfeeding) should only be interrupted for a few hours. Feeding should be resumed within 4 – 6 hours from the start of ORT. Breastfeeding should be continued at at least the same level as before during the diarrhoeal episode (Africa Women and Health 1993).

Although there is a worldwide call for a combination of ORT with early feeding 4-6 hours after completion of rehydration, and in the face of growing evidence of the benefits of early feeding, the practice of withholding food from children with diarrhoea still persists (Drucker 1988).

Following the above evidence, it is clear that diarrhoeal disease control programmes need to modify service delivery to ensure that breast-feeding mothers are not separated from their infants while being treated with ORT as inpatients or outpatients (Huffman *et al.*). No relevant studies could be found that described the feeding practices of caregivers during diarrhoea in the South African context, or whether South African health care providers do advise caregivers to continue breastfeeding during diarrhoea.

## CHAPTER 2: AIM

The **aim** of the study is to determine caregivers' knowledge, preparation and administration practices of ORT during childhood diarrhoea as well as the degree of continuation of feeds, within a secondary healthcare facility in the Western Cape, as well as at a referral hospital in the Northern Cape.

The **objectives** are:

- Determine the caregivers' level of education
- Determine whether the correct formula is used to prepare SSS and ORS
- Describe the administration practices of SSS and ORS
- Describe the reasons of using / not using ORT during diarrhoea
- Determine whether breast- / formula feeds are continued during diarrhoea
- Determine whether any of the above is a predictor of hospital admission

## CHAPTER 3: LITERATURE REVIEW

The literature review for this study took the form of a search of the following databases:

- **Pubmed 1966 - present**
- **OVID**
- **Google scholar**

The followings search terms were used:

- For review of the history of oral rehydration therapy:  
History + ORT + Diarrhoea
- To determine the caregivers' knowledge about ORT:  
Knowledge + caregiver + diarrhoea
- To determine administration practices:  
Diarrhoea + ORT + administration
- To evaluate feeding practices of mothers with symptomatic children:  
Breastfeeding + diarrhoea

All retrieved articles were assessed for suitability, by a review of the abstract. All articles that were included had their reference lists checked for more articles of interest.

An attempt was made to obtain previously unpublished materials including dissertations and clinical trials via internet registries.

A total of **194** relevant articles were retrieved, of which **122** were useful.



## CHAPTER 4: METHODOLOGY

In order to achieve the aim of the study, interviews were conducted in a questionnaire format with all mothers and caregivers that presented their symptomatic children younger than 5 years to the emergency centres of Victoria and Kimberley Hospitals with diarrhoea as the main complaint.

Consent was obtained from both the CEO's of Victoria Hospital Wynberg and Kimberley Hospital Complex to conduct a study in their facilities.

A questionnaire was presented to every mother and caregiver who brought their children to the Emergency Centres of Victoria Hospital (May 2008) and Kimberley Hospital (February 2009), with diarrhoea as the main complaint.

Medical officers working in the Emergency Centres were educated in how to conduct the questionnaire and a weekly progress report and update meeting were held.

Prior to filling the questionnaire, informed consent was obtained from the respondents. The consent form was written in three languages, namely English, Afrikaans and Xhosa.

The questionnaire was in the form of a tick sheet with 10 variables.

1. Age of patient in months
2. Caregivers level of education
3. Clinical severity of dehydration
4. Use of SSS, and formula used to make it
5. Use of ORS sachets, and formula used to reconstitute it
6. Volume given (in millilitre) per dose of ORT
7. Frequency of administration
8. Reason for giving ORT
9. Continuation of breast- or formula feeds
10. Whether patient was admitted or discharged

Patients with the following criteria were excluded from the study:

1. Caregiver not giving consent
2. Patient older than 5 years
3. Chronic diarrhoea (more than 2 weeks)
4. Patient not accompanied by primary caregiver

The medical officer attending to the patient in the Emergency Centre filled the questionnaire while obtaining the history of the main complaint from the caregiver.

All completed questionnaires were collected by the doctorate author on a biweekly basis. All data were transferred to a Microsoft Excel® spreadsheet on a password protected personal computer.

All data obtained from the questionnaires was analysed by the department of Biostatistics of the University of the Free State, by using simple descriptive statistics.

A comparison was done to see whether any of the variables were linked to the probability of hospital admission. A p value of  $< 0.05$  was considered as significant.

Ethical approval for this study was obtained from UCT Ethics Committee.

**REC REF: 264/2008.**

## CHAPTER 5: RESULTS

The study population consisted of questionnaires presented to the caregivers of children younger than 5 years with acute diarrhoea, seen over a one month period in the Emergency Centres of Victoria Hospital Wynberg in 2008, and Kimberley Hospital Complex in 2009.

A total of 205 questionnaires were filled, 58 from Victoria Hospital, and 147 from Kimberley Hospital.

No caregiver refused permission for inclusion into the study.

### 5.1 Age

The median age of the children seen during the one month period was 12 months. The youngest patient was one month old, and the oldest patient was 60 months old. Twenty five percent of patients seen were younger than seven months, and 75% of patients were younger than 18 months.

Above mentioned results are shown in the following table:

<b>N</b>	<b>25<sup>th</sup> percentile</b>	<b>Median</b>	<b>75<sup>th</sup> percentile</b>	<b>Minimum</b>	<b>Maximum</b>
205	7	12	18	1	60

**Table 1** Population age in months

### 5.2 Caregiver level of education

The caregivers' level of education was assessed as being one of the following:

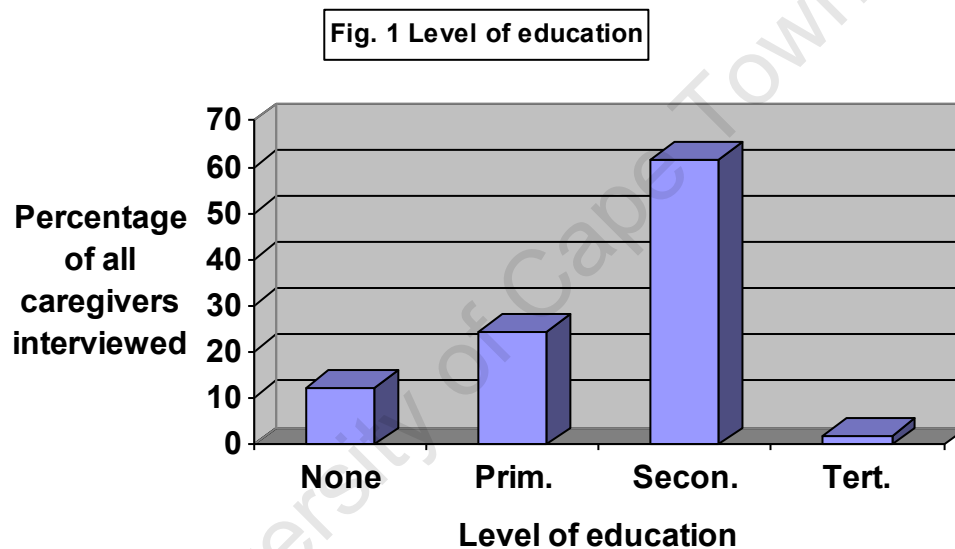
- Unschooler
- Primary education
- Secondary education
- Tertiary education

The majority of caregivers (61.5%) had secondary education. Twenty five caregivers (12.2%) were unschooled, 50 completed primary education

(24.4%), and only four caregivers had tertiary education (2%). The above is illustrated in Table 2 and Figure 1.

Education level	n	Percent
Unschooling	25	12.2
Primary	50	24.4
Secondary	126	61.5
Tertiary	4	2

**Table 2** Caregiver education



### 5.3 Severity of dehydration

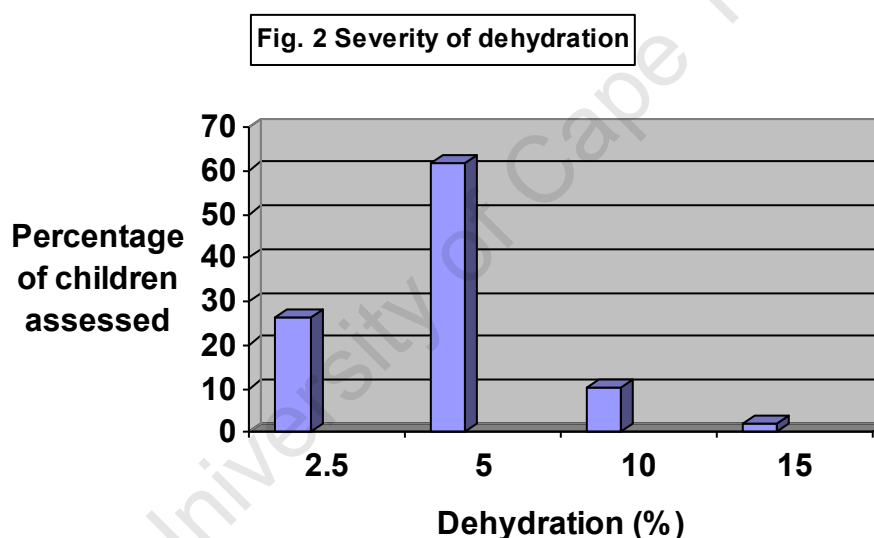
All the children included in the study were assessed regarding their hydration status. They were classified as either being <5%, 5%, 10%, or more than 10% dehydrated. The classification was done on the basis of clinical findings and vital signs:

- <5%: Not unwell, thirsty child with dry mucous membranes
- 5%: Sunken eyes or fontanel, reduced skin turgor
- 10%: Apathetic, tachypnoea, oliguria
- >10%: Shocked, small pulse volume, tachycardia, depressed level of consciousness, hypotension

Of the 205 patients, the majority (61.5%) were assessed as being 5% dehydrated. Only four patients were >10% dehydrated. Fifty four (26.3%) of the patients were less than 5% dehydrated, and the rest (10.2%) were assessed as being 10% dehydrated. The results are illustrated in Table 3 and Figure 2

Dehydration	n	Percent
<5%	54	26.3
5%	126	61.5
10%	21	10.2
>10%	4	2

**Table 3** Severity of dehydration



#### **5.4 Administration and preparation of home-made SSS**

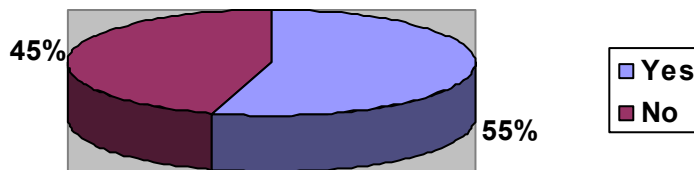
The caregivers of the children that were enrolled in the study were asked if they used home-made SSS during the diarrhoeal episode. If they did use it, they were asked on how they prepared it. The amount of sugar, salt and water used to prepare the SSS were recorded.

Of the 205 caregivers, 112 (54.6%) did use SSS during the diarrhoeal episode, prior to presenting to hospital (Table 4 and Figure 3).

SSS used?	Yes	No
Percent	54.6	45.4
Frequency	112	93

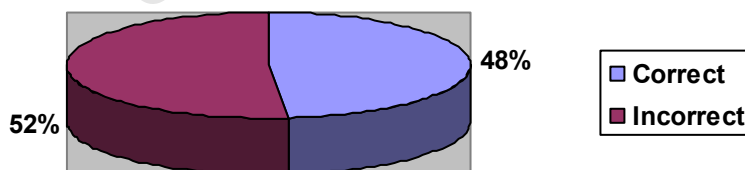
**Table 4** Administration of SSS

**Fig.3 Administration of SSS**



Of the 112 caregivers who did administer SSS at home, 80.7% used 8 teaspoons of sugar, 71% used a half teaspoon of salt, and 83.9% used 1000ml of water. Despite of this, only 48.4% of caregivers used all three ingredients (sugar, salt and water) in the correct amounts (8 teaspoons, half a teaspoon and 1000ml respectively). This is illustrated in Figure 4.

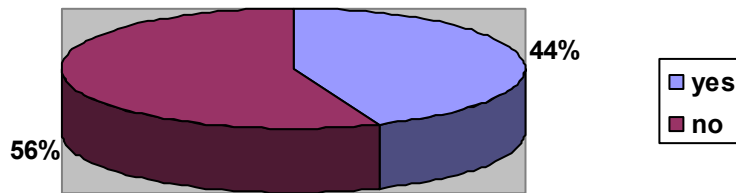
**Fig. 4 Preparation of SSS**



### 5.5 Administration and reconstitution of ORS sachets

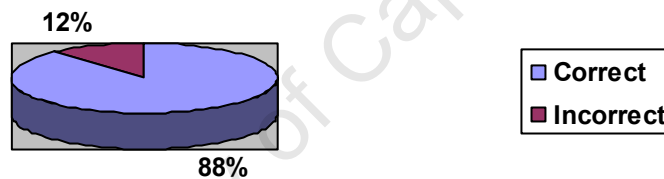
Ninety (44%) of the caregivers did use commercially available ORS sachets alone, or in conjunct with SSS as oral rehydration therapy during the diarrhoeal episode (figure 5).

**Fig. 5 Administration of ORS sachets**



Of the 90 caregivers who did use ORS sachets, 79 (88%) reconstituted it correctly, by adding 1000ml of cooled down boiled water to 1 sachet powder as per manufacturer’s instructions (figure 6).

**Fig. 6 Reconstitution of ORS sachets**



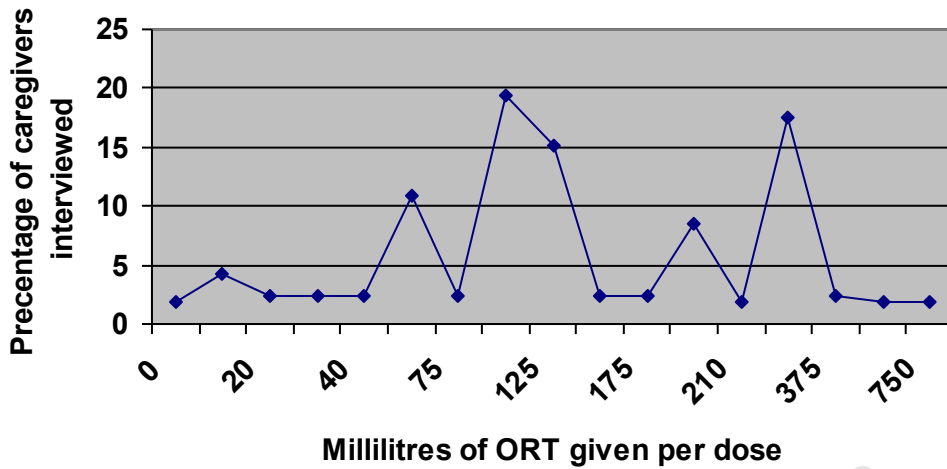
### 5.6 Volume of ORT administration

The caregivers, who had indicated that they did use SSS and / or ORS sachets, were asked about the volume per dose that they administered. The results are summarised in table 5 and table 6, as well as figure 7.

Millilitre per dose	Number (n)	Percent
0 - 100	76	45.9
101 - 200	47	28.5
201 - 300	32	19.4
301 - 750	10	6

**Table 5** Volume of ORT administered per dose

Fig. 7 Dose per administration



The median volume of SSS and ORS that was given per dose was 125ml. The minimum was 0ml, and the maximum was 750ml. Twenty five percent of caregivers gave less than 75ml per dose, and 75% of caregivers gave less than 210ml per administration.

Above mentioned results are shown in the following table:

N	25 <sup>th</sup> percentile	Median	75 <sup>th</sup> percentile	Minimum	Maximum
165	75	125	210	0	750

Table 6 Volume administered per dose in millilitre

### 5.7 Frequency of ORT administration

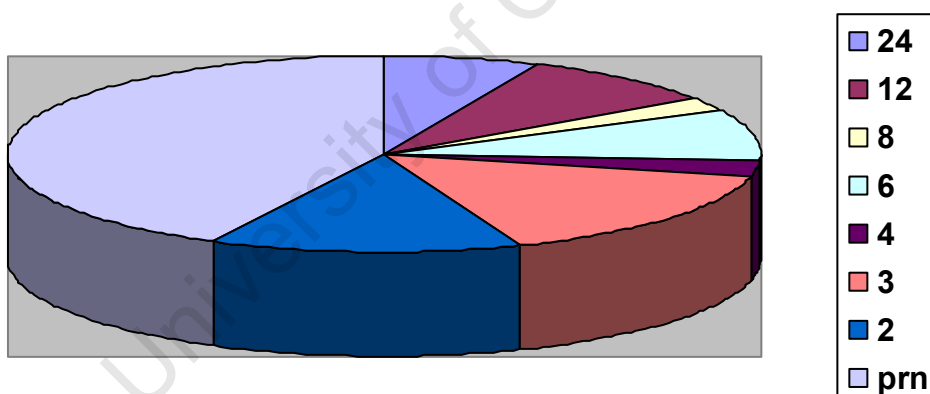
The caregivers were also questioned on how often they administered SSS and / or ORS during a 24h period. The majority of caregivers (42.4 %) administered the SSS and ORS on a “as needed” (prn) basis. The results are summarised in Table 7 and Figure 8



Times given in 24h	Number of participants	Percent
24	11	6.7
12	14	8.5
8	4	2.4
6	14	8.5
4	4	2.4
3	26	15.8
2	22	13.3
prn (as Needed)	70	42.4

**Table 7** Frequency of ORT administration

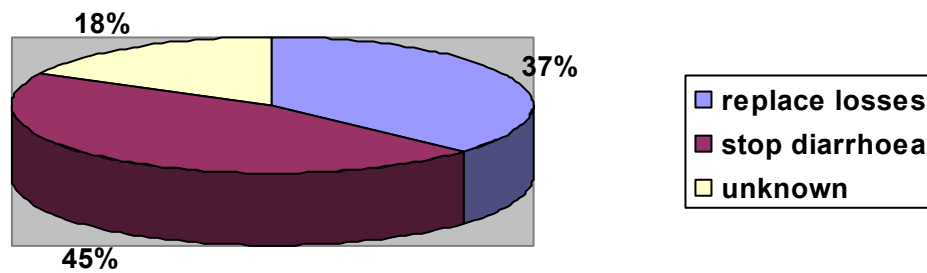
**Fig.8** Frequency of administration per 24h



### 5.8 Reason for giving ORT

The caregivers were asked about their motivation for giving ORT to their children during the diarrhoeal episode. Sixty one (37%) said they gave ORT to replace fluid and electrolyte losses, 75 (45.5 %) said that they believe that ORT will stop the diarrhoea, and 29 (17.5 %) did not know why they were giving it (Figure 9).

Fig. 9 Reasons for giving ORT



### 5.9 Continuation of feeds during diarrhoea

All of the participating caregivers were asked whether or not they continued breast- and / or formula feeds and solids during the diarrhoeal episode. A hundred and four caregivers (50.9%) said that they had continued, and 101 (49.1%) said that they had stopped feeds.

### 5.10 Disposal of patients

Of the 205 children enrolled in the study, 155 (75.6 %) were admitted to the paediatric ward for rehydration, and 50 (24.4 %) were discharged on ORT.

### 5.11 Comparison of variables

A comparison was made between all the variables to determine if any were significantly linked to a higher probability of hospital admission. Two factors were found to be linked with a higher hospital admission rate.

- The severity of dehydration on presentation was positively linked to hospital admission (p-value = 0.0021). Sixty percent of children who were <5% dehydrated, were discharged, compared to only 11.9% of children who were 5 or more percent dehydrated.
- The discontinuation of feeds was linked to a higher probability of hospital admission (p-value = 0.0170). Of the 101 patients whose feeds were stopped, only 11 (10.9 %) were discharged, as opposed to 38% of those children who continued breast- or formula feeds.

## CHAPTER 6: DISCUSSION

### 6.1 Previous studies

#### **a) Caregivers' knowledge regarding preparation of ORS and SSS**

Multiple studies were conducted worldwide to assess the knowledge of mothers and caregivers regarding the preparation of ORS and SSS. Most of them shared the same outcomes.

The awareness and knowledge of ORT and preparation abilities of SSS were investigated between March 1993 and April 1994 through focus group discussions and surveys of mothers in rural and urban areas of north-eastern Nigeria by Akpede *et al.*

Two hundred and sixty respondents from the Kanuri and Bura ethnic groups were interviewed in Bama, Hawul and Maiduguri. In the survey, 77% of the Kanuri mothers and 84% of the Bura mothers were aware of ORT/SSS. At least 25% of mothers were unable to properly prepare SSS and the materials and ingredients required for its preparation.

The authors stated that these results pointed to the need to re-consider the content and method of disseminating health education messages in ORT promotion. They also recommended that standardized cups for water, salt, and sugar measurements should be provided to households to ensure the correct preparation of SSS in the home-based management of diarrhoea.

In July 1990 a health survey was administered in 155 randomly selected homes in Matiguas, Nicaragua, after it was noted that the expected decline in mortality rate amongst children with diarrhoeal disease was not reached.

Gibbons *et al.* asked caretakers of children about their knowledge, attitudes, and practices in treating diarrhoea in children younger than age 5. They were also asked to demonstrate their knowledge of mixing World Health Organization oral rehydration salts packets. Ninety percent of the respondents said they used oral rehydration therapy. The major reason quoted for not using it was dislike of the taste. Of the three-quarters willing

to mix the oral rehydration salts, 62 percent prepared the solution correctly and 38 percent incorrectly.

Gibbons found that knowledge about diarrhoea and the role of oral rehydration therapy was high in this population, and those with this knowledge were more likely to use it. Respondents who learned to mix the oral rehydration salts at the health centre, had more years of education and were more likely to mix the salts correctly. In that study, there was a positive association between contact with the health centre and the correct use of the rehydration salts, proving the importance of educating caregivers to successfully implement the WHO DDC.

Ahmed *et al.* also investigated the preparation practices of SSS by mothers and caregivers in 2000.

The authors found that the incorrect preparation of SSS was significantly linked with the refusal of SSS by the children ( $p$  value  $< 0.01$ ). They also showed that the only maternal factor that was associated with the correctness of the preparation of SSS was if there had been previous exposure to the demonstration of SSS preparation ( $p$  value  $< 0.000$ ). They concluded that the demonstration of the preparation of SSS to mothers and caregivers should be an integral point in the healthcare education package of ORT for diarrhoeal disease.

Ketsela *et al.* conducted a study in the rural North, South, East and West Shewa Administrative Regions in April, 1990. The objectives of the study was to assess the knowledge and practice of mothers and other caretakers of children towards diarrhoeal diseases and the sociodemographic correlates of adequate knowledge and practice.

Of the total of 750 respondents, 79.3% were illiterate, 78.5% got their water from unprotected sources, 88.9% had no latrines, 80.4% had no access to mass media and 7.1% spent more than 2 hours to reach to the nearest health facilities.

Only 2.6% and 5.7% of mothers had adequate knowledge and practice on diarrhoea or its treatment, respectively. Age and educational level of mothers or other caretakers were found to be positively associated with adequate knowledge and practice towards diarrhoea and its treatment.

The study clearly indicated that health education messages have not been

effectively disseminated to the rural population. The authors strongly recommended that the WHO DDC Programme should strengthen its communication activities to improve the mothers and caregivers' understanding and knowledge of ORT.

Shaw *et al.* conducted a community based study on the understanding and knowledge of childhood diarrhoea and use of ORT in four selected villages in Tumpat District, Kelantan. The main caregivers of children aged 0 to four years were interviewed and asked to demonstrate how to mix a standard ORS sachet. Forty percent of care-givers had heard of the locally available ORT and 30% had actually used ORT. Of those who had heard of or used ORT, 10% had good knowledge of what it was and what it was used for, 51% had some knowledge and 39% had either no knowledge or inaccurate knowledge. Of caregivers who had previously used ORS only 20.5% demonstrated the correct volume of water to add to one sachet of ORS. The study showed that significantly more literate women had used ORT than those not literate ( $p = 0.002$ ). Shaw recommended that components of health education should include advice on what ORS is, what it is used for, and how to correctly mix a standard sachet.

De Zoysa *et al.* conducted a study in the rural areas of Zimbabwe. Only 12% of the respondents gave the correct recipe for SSS, and of these 12%, only 26% could prepare SSS with sodium and sucrose concentrations within the safe and effective ranges. In a subsequent review, the same author showed that 73% of caregivers in Zimbabwe could correctly prepare ORS, versus 33% for SSS.

Most of the studies discussed above reached the same conclusion, and that is that the mothers and caregivers of children worldwide are inadequately educated about the use of ORT during childhood diarrhoea. No recent studies could be found that has evaluated the education of their South African counterparts.

#### **b) Administration practices of ORS and SSS**

The aforementioned study that De Zoysa *et al.* conducted in Zimbabwe showed that, although 52% of caregivers claimed knowledge of SSS, only 5% administered it at home. In the subsequent review, the knowledge of

the caregivers regarding ORT had improved, but the amount of ORS administered was still inadequate, while SSS was consumed in larger amounts. Eighty six percent of children accepted SSS compared to 65% who accepted ORS.

During 1995, Bhandari *et al.* conducted a study in India to determine the patterns of use of ORT in an urban community. It was reported that home available fluids were given in more than the usual amounts in only 8.2% of cases. ORS was only given for one day in the majority of episodes, with only 2 children out of more than 200 consuming it daily throughout the diarrhoeal episode. The amount of ORS administered to children was inadequate at all ages, with the majority consuming only spoonfuls or a few sips. Very rarely was a glass per day consumed. SSS was consumed in larger, but still inadequate, amounts, with older children consuming 1-2 glasses per day. 86% of children accepted SSS compared to 65% who accepted ORS.

The above results were repeated in a study done by Centuori *et al.* at the Department of Paediatrics, Tirana, Albania. They found that the failure of the WHO DDC Programme at their institution was always due to the insufficient intake of fluids. The reason for inadequate fluid intake in the majority of cases was because caregivers were not administering it properly.

During 1996, fluid intake during diarrhoea was investigated by Edet in Odukpani, Nigeria. The author showed that only 6% of 5 296 children investigated were given an increased amount of fluid during the diarrhoea episode. A staggering 48.2% were given even less fluid than before the onset of illness. This emphasizes the importance of educating the caregivers in the importance of continuous liberal fluid intake during diarrhoea.

Jousilahti *et al.* investigate the diarrhoeal disease morbidity and home treatment practices in Egypt. It was found that although the majority of the caretakers knew about ORS and 77.1% could prepare it correctly, only 22% of cases with diarrhoea in the last 24 h received ORS. The mean quantity of ORS was 351 ml/child, probably too little for effective

rehydration. Only 24.4% of cases who received fluids other than breast milk before diarrhoea received more fluids during diarrhoea.

The same tendency was illustrated in 2005 by MacDonald *et al.* during a survey done in Indonesia. The study concluded that, although caretakers have knowledge about ORT, only 23.7% of mothers could correctly prepare ORS, and none exhibited fully correct administration practices. All of the above studies show that there is a world wide tendency of inadequate ORT administration by caregivers during diarrhoea, even in the presence of being educated about ORT. No recent studies could be found that addressed this issue in the South African context.

### **c) Caregivers' reasons for administering ORT**

As stated previously, there are many misconceptions amongst mothers and caregivers regarding the role of ORT during childhood diarrhoea. The above statement is illustrated in a study done by Bentley in rural northern India. The author found that acceptance and sustained use of ORT was inversely related to an understanding of the function of ORT. Eighty-one percent of mothers who had previously used ORT but who do not plan to use it again were dissatisfied because it 'did not stop the diarrhoea'. These mothers thought that ORT was a medicine that would cure the diarrhoea. Therefore, in ORT interventions there is a need to explain that the function of ORT is to replace lost fluids, and not to stop the diarrhoea (Bentley1988).

Akpede *et al.* (1997) showed the same results when the awareness and knowledge of ORT and the preparation abilities of SSS were investigated in Nigeria. A structured questionnaire survey of mothers in the urban areas of north-eastern Nigeria was conducted by the authors. It was found that, although the ORT awareness was high, the perception of ORT function was grossly unrealistic, with a third to four-fifth of mothers expecting the ORT to stop the diarrhoea (Akpede *et al.*).

The same results were obtained in a different study conducted at a well-baby clinic in Johannesburg. In 1989 Ross *et al.* gave questionnaires to 1087 caretakers to assess their knowledge about ORT. The study showed that although 54% of caregivers had heard about ORT,

misconceptions existed in this group and half of the caregivers thought that ORT stops diarrhoea.

It seems that the misconception that ORT stops diarrhoea is a universal and global phenomenon. It is of the utmost importance that this should be rectified if the WHO DDC Programme is to succeed.

#### **d) Continuation of breast- or formula feeds during diarrhoea**

The interactions between diarrhoeal disease and nutritional status are complex and synergistic. These are serious issues globally because they affect hundreds of millions of young children and annually cause > 3 million deaths in children younger than 5 years of age. Despite intensive field-based and laboratory studies over three decades, many questions remain unanswered about the causes, pathophysiology and best approaches to the management and prevention of this "diarrhoea-malnutrition" syndrome. Continuation and encouragement of breastfeeding is an important strategy to prevent and control diarrhoea, as is early re-feeding to reduce the duration, severity and nutritional impacts of diarrhoeal disease (Gracey 1999).

According to Almroth *et al.*, the international health community initially ignored the potential usefulness of food, especially carbohydrates and proteins, in preventing and treating dehydration. The leading obstacle to acceptance of allowing food intake during diarrhoea was variations in composition of local food staples. Food was almost always excluded during conventional clinical management of diarrhoea. The authors claimed that health workers were advised to withhold food, including breast milk, during the first rehydration phase (first 24 hours).

Despite the advice to withhold feeding, mothers in many developing countries continued to feed and breast feed their children during diarrhoea with no ill effects. The mothers tended to use cereal-based solutions or breast milk during diarrhoeal episodes (Almroth *et al.* 1995).

This anecdotal evidence led to the investigation of the role of continuous breastfeeding and early reintroduction of normal diet during a diarrhoeal episode. It was subsequently found that breastfeeding in combination of



ORT could play a positive role in reducing anorexia and promoting food intake by restoring appetite. (Hirschhorn 1982).

A longitudinal study done in the urban slums of Lima, Peru, found that exclusively breast-fed infants had a reduced risk of diarrhoeal morbidity when compared with infants receiving only water in addition to breast-milk. The study showed that breast-feeding helped to maintain hydration status during diarrhoeal episodes.

Further studies in Peru, India, and Nigeria have shown that breast-feeding can be continued during diarrhoea when the infants often refuse other foods, especially non-human milk. Thus, breast-feeding is important in providing necessary calories and protein during a time when a loss of appetite for other foods is common (Huffman *et al.* 1990).

According to Arato *et al.* (2001) it is important to rapidly rehydrate with ORS over 3-4 hours, after which normal diet should rapidly be reintroduced. If possible, breastfeeding should not be interrupted at all. In this study, the authors analysed how the recommendation of European Society of Paediatric Gastroenterology, Hepatology and Nutrition were followed in Hungary. The study formed part of a European multi-centre survey using questionnaires to 80 primary care and 51 hospital-based paediatricians.

It was found that only 10% of paediatricians suggested the early reintroduction of normal feeding after giving the oral rehydration, while more than half of the respondents (52%) thought that the temporarily use of lactose free formula is justified. However, it was a very favourable fact that 84% of doctors recommended the continuation of breast feeding. The authors came to the conclusion that, in this particular study, healthcare providers were delaying the reintroduction of normal feeding during diarrhoea, which is linked with an increase of morbidity and mortality during childhood diarrhoea.

Rahman *et al.* further investigated the practices of healthcare providers in 2001. An anonymous questionnaire was sent to general practitioners and primary healthcare workers in the Tees Health region. Three case scenarios were presented in the questionnaire, involving a breast-fed infant, a formula-fed infant and a four-year-old child, all with diarrhoea and

vomiting, but able to tolerate oral fluids and not ill enough to need hospital admission.

The authors found that most GPs (78.6%) and primary healthcare workers (80.5%) advised continuation of breast-feeding, though the practice of giving advice to stop breast-feeding, starve the child and substitute with inappropriate fluids such as flat coke, was still common. For infants who were bottle-fed, this inappropriate advice was given much more commonly (only 25.6% and 52.8% of GPs and primary healthcare workers respectively gave advice to continue bottle-feeding). This was even more true for the four-year-old, for whom advice to continue with a normal diet was very much the exception (7.7% of GPs and 19.5% of primary healthcare givers).

The authors found that advice given to parents of children with gastroenteritis regarding feeding, was inconsistent and, in many cases, inappropriate. The authors concluded that there was an urgent need for the development and implementation of local guidelines in this region. The above statement was proven by Faruque *et al.* in 1992, when they performed a case-control study to evaluate the role of maternal behaviour, as reflected in maintenance of breast feeding and the use of ORT at home during acute diarrhoea, in preventing dehydration in infants and young children.

A systematic 5% sample was taken of all children aged 1-35 months attending the treatment centre of the International Centre for Diarrhoeal Disease Research, Bangladesh, with acute watery diarrhoea of six days or less between August 1988 and September 1989. There were 285 children with moderate or severe dehydration as cases and 728 with no dehydration as controls in the study. In a multivariate analysis using a logistic regression model the authors showed that withdrawal of breast feeding during diarrhoea was associated with a five times higher risk of dehydration compared with continuation of breast feeding during diarrhoea at home.

The authors recommended that health education programmes should promote continued breast feeding and adequate ORT for infants with acute diarrhoea at home.

Ahmed *et al.* found that 45% of illiterate mothers and 30% of literate stopped breast feeding and food during diarrhoea. This study was conducted in two rural villages in Sudan during 1994.

A study done by Edet in Nigeria not only showed that ORS was administered in inadequate amounts (as discussed in previous sections) but also found that only 5.0% of children received more food during diarrhoea than before becoming ill. Forty nine percent received the same amount, and 32.2% received less food during their illness. Thirteen percent of children stopped feeding at all. The author also showed that only 40.1% of children who were still breast feeding were nursed during the episode. The author stated that education of care givers should emphasize the importance of continuous liberal dietary intake, including breast feeding, during and after diarrhoea.

Once again, no recently published studies were found that had addresses the feeding practices of mothers and caregivers of children with diarrhoea in South Africa.

#### **e) Strategies to improve implementation of ORT**

In many countries, the establishment of diarrhoea treatment and training units (DTTUs) in all major health facilities for promotion of appropriate ORT is an important strategy for control of diarrhoeal diseases in children. Ali *et al.* investigated such a unit in the department of Paediatric Medicine, RG Kar Medical College in Kulkata during 2003. The author did a univariate analysis of the mortality rate on a random sample of 225 children treated at the DTTU. The analysis revealed that the case fatality ratio (CFR) of diarrhoea was much higher among children treated with intra venous fluid therapy (20.6%), compared to those treated with ORT only (0.75%). The authors also showed that other healthcare practices, such as immunisation, breastfeeding and use of ORS and / or SSS at home also favourably influenced the survival of children suffering from diarrhoea. Interestingly, the analysis also showed that the CFR was not influenced by the type of diarrhoea, or the nutritional status of the child. The study concluded that the presence of a DTTU improved the use rate of ORT, and thus strengthened the WHO DDC programme in their region.

Similar results were obtained in a study done closer to home. Prior to 1986, diarrhoea was the leading cause of hospital mortality in children younger than 5 years of age in Lesotho. Because of this, an Oral Rehydration Therapy Unit (ORTU) was opened at the Queen Elizabeth II Hospital. Hatch *et al.* investigated the impact that the opening of this ORTU made on diarrhoeal disease morbidity and mortality. The authors found that diarrhoea-related admissions as a proportion of all admissions in children less than 5 years of age declined from 23% in the year prior to the opening of the ORTU to 13% in the first nine months of 1987 ( $p < 0.05$ ). In addition, the study showed a dramatic drop in the CFR of children treated in the ORTU from 1.4% in the first quarter of 1986 to zero in the second and third quarters of 1987 ( $p < 0.05$ ). The authors concluded that the standardization of outpatient treatment for diarrhoea ORS in the context of an ORTU resulted in a marked decrease in diarrhoea-associated hospitalization and deaths in children less than 5 years of age.

After studies done in Bangladesh had showed that the WHO DDC Programme was failing miserably, the government of the country, along with foreign aid, invested large amounts of money in the education of the community regarding the principles of ORT during childhood diarrhoea. The results of this mass campaign were evaluated by Chowdhury *et al.* in 1997. It was a massive study, with over 9000 households in 90 villages revisited. Interviews were conducted with 306 government outreach health workers, 296 pharmacists, and 237 village doctors. One hundred and fifty two government facilities and 495 pharmacies were visited. Mothers were asked to prepare SSS, and interviewers collected information on use of ORT for diarrhoeal episodes occurring in the preceding two weeks.

The data quality was assessed through a resurvey of sample respondents within two weeks of the first interview. The study showed that more than 70% of the mothers could correctly prepare SSS. Interestingly enough, a significant proportion of these mothers were very young at the time of the original mass campaigns, thus implying that there was an

intergenerational transfer of the knowledge on how to prepare SSS. The study showed that:

1. ORT was used in 60% of all diarrhoeal episodes,
2. ORT was recommended more frequently by village doctors and pharmacists, and
3. The availability of ORS sachets in rural pharmacies had improved substantially.

The authors concluded that there was convincing evidence that the wide scale promotion in the past of ORT as treatment for dehydration in diarrhoea has led to this marked improvement.

In another study done by Heymann *et al.* (1990), it was shown that there was:

1. A 50% decrease in the number of children admitted to the paediatric ward with the diagnosis of diarrhoeal diseases,
2. A 56% decrease in the use of intravenous fluid to rehydrate such children,
3. A threefold increase in the exclusive use of ORS to rehydrate children with mild or moderate dehydration, and
4. A 39% decrease in the number of paediatric deaths associated with diarrhoeal diseases, in the first 2 years following refresher training of paediatric staff in ORT and the establishment of an ORTU at the Kamuzu Central Hospital, Lilongwe, Malawi.

As an added bonus, the study showed a 32% decrease in healthcare cost associated with paediatric diarrhoeal disease.

ORT was introduced to Southern Sudan in 1980 in the form of ORS sachets, after it was struck by a severe cholera epidemic. After the epidemic was controlled, the importance of ORT was realised. A training programme was launched, consisting of workshops for healthcare workers on the treatment and prevention of diarrhoea; and outreach by trained medical staff for individual in-service training and supervision. ORT was introduced as being a new and more effective way to treat dehydration secondary to diarrhoea. Following the training programme an audit was done to evaluate its impact. It was found that the use of sulphonamides decreased considerably from 76% in 1980 (pre ORT) to 22% in 1982

(after training), and the exclusive use of ORS rose from 8% in 1980 to 72% by 1982(Hetta *et al.* 1984).

The studies described above collectively showed that the implementation of the WHO DDC Programme was greatly enhanced by introducing simple measures like DTTUs and ORTUs at healthcare facilities.

## **6.2 Study outcomes**

### **a) Caregivers' knowledge regarding preparation of ORS and SSS**

The international tendencies above were confirmed in this study. It showed that although 54.6% of caregivers did use SSS, only 48.4% of them could prepare it correctly. In comparison, 88% of caregivers who used ORS sachets, reconstituted it correctly, although the use rate was lower (44%). This points to the fact that we should consider supplying all mothers and caregivers with WHO standardised ORS sachets, rather than teaching them how to mix and use home made SSS. However, this will have serious cost implications, and it will mean that there will be a risk that there won't be ORS sachets available in the household when a child develops diarrhoea. It is clear that the understanding of the caregivers in this study is much better regarding the use of ORS sachets compared to home made SSS, pointing to the fact that SSS mixing should be taught better if it is still to be used as the first-line treatment of ORT.

### **b) Administration practices of ORS and SSS**

The present study shows that the median volume of ORT given per dose was 125ml, and that 75% of mothers and caregivers gave less than 210ml per dose. If one takes into account that the median age of the children in the study was 12 months, it is clear that the median dose of ORT is not sufficient. The recommended volume of ORT to be administered after each loose stool is 20ml per kilogram, and with the average weight of a 12 month old child being 10kg, it is clear that the median dose should have been at least 200ml. The frequency of administration of ORT in this study was also not adequate. Only 42.4% of mothers and caregivers gave the ORT after each loose stool. Fifteen point eight percent of carers only gave it three times per day. It is clear from the results of this study that mothers and caregivers do not administer ORT optimally at home. An

improvement in this regard may lead to a decrease in morbidity and mortality, may decrease hospital admission and length of stay, and may reduce the cost of healthcare.

### **c) Caregivers' reasons for administering ORT**

The present study confirmed that the misconceptions discussed in section 6.1c) still exist in the South African community, and that little has changed in the past twenty years. A staggering 45.5% of mothers and caregivers still thought that ORT will stop the diarrhoea. Only 37% knew that one should administer ORT to replace fluid and electrolyte loss. As many as 17.5% of mothers did not know the reason for giving ORT during diarrhoeal disease. These results are ominous if one takes into account that 61.5% of these mothers and caregivers did complete some form of secondary level education. It is clear from these results that South African Mothers and caregivers are in serious need of adequate education surrounding diarrhoea and the role of ORT if we want the WHO DDC programme to succeed in our country. It is important that messages that are meant to change behaviour must be based upon the target group's perception, which in this case is that ORT is supposed to stop diarrhoea.

### **d) Continuation of breast- or formula feeds during diarrhoea**

Despite of all the evidence and studies advocating the continuation of breastfeeding during a diarrhoeal episode, it doesn't seem as if the message of the importance of continuation of breastfeeding has reached the mothers and caretakers of South Africa. In this study 49.1% of mothers and caregivers stopped breast- and formula feeds during the diarrhoeal episode. The discontinuation of feeds was a statistically significant contributor to hospital admission, along with severity of dehydration on presentation.

## **6.3 Study limitations**

The study population is a convenience sample of patients who presented to the emergency centres of Victoria Hospital Wynberg and the Kimberley Hospital Complex. The population in this study was skewed towards the younger age group, and not evenly spread between 0 – 5 years. However

this will fit with the normal incidence of diarrhoeal disease in children, which is higher in the younger child than in the older child.

The study looked at only two of the many secondary level hospitals in the Western Cape Peninsula and Northern Cape Province, and the patient profile might not be similar in other areas. However, Victoria Hospital's drainage area does include the more affluent community of Hout Bay, the middle class residential area of Wynberg, as well as the poorer informal settlement of the Nelson Mandela squatter camp. Similarly, Kimberley Hospital receives patients from all over the Northern Cape Province, including the most rural of places like Platfontein. All of these communities were included in this study, which will take away some of the bias of only looking at the data from two hospitals.

This study was conducted in a Secondary Hospital setting as opposed to a Primary Health Clinic. This means that the children with caregivers who have given and mixed ORT correctly may have been selected out as they were successfully managed at home or the Primary health Clinic, and did not require referral.

The effect of ethnic race was not considered in this study. African and Coloured children form the majority of the patient population, but subgroup analysis by race has not been possible. The effect of ethnicity on education of mothers and caregivers may be less than the effect of socioeconomic status in urbanised populations. The ethnic spread of the population of this study is representative of that seen in many provincial hospitals, but further work is needed on other population groups with different ethnic mix.

#### **6.4 Study strengths**

In terms of standardisation this study succeeds because it has one set of trained interviewees with a formal prescribed technique of conducting the questionnaires.

Questionnaires were filled in reproducible fashion allowing for comparison of results, and weekly updates were held to ensure accuracy.



By interviewing mothers and caregivers from two different hospitals and two different provinces, the results are not only applicable to one specific area, but may be applied to a wider population. Further studies need to be done to confirm that these study results are a nationwide tendency.

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## CHAPTER 7: CONCLUSION

This study has shown that the mothers and caregivers of children presenting to secondary hospitals in the specific areas of the Western Cape Peninsula, and Northern Cape Province are not educated about the value of ORT during childhood diarrhoea.

It has shown that they do not prepare or mix it correctly, nor do they give ORS and / or SSS in adequate volumes and frequency.

The study has also highlighted the fact that mothers and caregivers are more likely to correctly reconstitute ORS sachets than correctly prepare home made SSS.

Certain misconceptions regarding ORT still exist in these communities; with the major one being that mothers and caregivers are wrongfully under the impression that ORT will stop diarrhoea.

It has confirmed the practise of mothers and caregivers to stop breast- and formula feeds during a diarrhoeal episode, which is against the principles of the WHO DDC programme.

All of the above are attributing to the failure of the WHO DDC programme in these particular communities in the Western Cape Peninsula, and Northern Cape Province. This may lead to higher rates of hospital admissions, and it may increase hospital length of stay, morbidity and healthcare costs.

Despite of the major medical breakthrough that was made in the 1970's by successfully implementing ORT as treatment for childhood diarrhoea, the implementation of this cost effective drug is still regrettably inadequate in these studied communities. Children are still dying unnecessary deaths as result of dehydration. We as emergency physicians have an important role to play in the education of mothers and caregivers regarding all the aspects of ORT. More often than not, the mothers and caregivers don't go further than the emergency centre of a hospital, and thus we are the only contact that they may have with a medical doctor. If every emergency physician and EC doctor adequately educates the mothers and caregivers on ORT when they

are discharged from the EC, the vicious cycle of dehydration and malnutrition can and will be broken.

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## CHAPTER 8: RECOMMENDATIONS

This study has shown that the mothers and caregivers interviewed during this study are not educated about the value of ORT in childhood diarrhoea. Therefore the following recommendations are made:

- Further, bigger studies should be done to assess whether these study results can be applied to the national community.
- Further studies need to be done to evaluate the primary healthcare practitioner's knowledge of ORT, and if the correct information is given to the mothers and caregivers at primary healthcare level
- Emergency centres should have dedicated protocols dealing with the preparation and administration of ORT, as well as education of mothers and caregivers on discharge
- WHO ORS sachets may be used in place of homemade SSS to rehydrate children more successfully at home
- Breastfeeding should not be discontinued during diarrhoea
- ORTUs and DTTUs should be opened at all healthcare facilities to improve the out patient treatment of diarrhoeal disease
- After the implementation of above recommendations, follow-up studies should be done to evaluate whether the goals of the WHO DDC programme have been reached.

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## APPENDIX

1. Data sheet of ORT study
2. Consent form

University of Cape Town

## Data sheet of ORT Study

1. Age of patient

2. Caregiver- level of education

Unschool	Primary	Secondary	Tertiary
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3. Dehydration (%)

< 5%	5%	10%	>10%
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4. Was home-made ORT used?

Yes	No
-----	----

if Yes, state recipe:

a) Sugar (teaspoons)

b) Salt (teaspoons)

c) Water (ml)

5. Was ORS (sachets) used?

Yes	No
-----	----

if Yes, how was it reconstituted?

6. Volume given (ml) per dose  
(ORS/SSS )

7. Frequency of administration

8. Reason for giving ORT

Replace losses	Stop diarrhoea	Unknown
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9. Breast/Formula continued?

Yes	No
-----	----

10. Disposal

Ward	Home
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## Consent form of ORT study

Hiermee verklaar ek \_\_\_\_\_ dat ek die vraelys oor orale rehidrasie vrywilliglik voltooi. Hierdie inligting mag gebruik word vir navorsing, en mag gepubliseer word. Ek begryp dat alle informasie as vertroulik beskou word, en dat dit my geensins sal benadeel nie.

GETEKEN: \_\_\_\_\_

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I hereby declare that I, \_\_\_\_\_, have no objections against filling this questionnaire about oral rehydration. I consent to the use of this information in research, and have no objection to it being published. I understand that this information will be confidential, and that it will in no way be used to my detriment.

SIGNED: \_\_\_\_\_

---

Mna \_\_\_\_\_, ndiyavuma yaye ndingaphikisani nokugcwalisa lemibuzwana ndinika imvume yokusetyenziswa kwempendulo zam kuphando, yaye andiphikisani nokuba ipapashwe. Ndiyaqonda ukuba yonke inkcukacha iyakuba yeyakulikhusela igama lam yaye ayisokuze isetyenziswe ekuhliseni isidima sam.

IGAMA: \_\_\_\_\_

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