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PRITECH

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ORAL REHYDRATION THERAPY

REPORT COMPILED FOR CDD/KENYA

THE FLUID/FOOD PANEL

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Preface

The fluid/food panel was appointed by The Director, Division of Family Health to assist The Control of Diarrhoeal Diseases Programme (CDD) in identifying areas of operational research and provide guidance in formulation of policy issues regarding home management of diarrhoea.

The specific terms of reference of the panel were :

1. To review research work done both locally and outside the country.
2. Identify research questions and give recommendations to the CDD programme.
3. To review the existing home based fluids which are applicable and how they could be operationalised

   .outline the merits and demerits of the home based fluid recipes.
   .suggest ways in which the home based fluids can be advised to mothers.

4. Suggest priority areas for applied research

The Panel Members Were:

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Dr. J. Alwar
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Dr. N. Mirza (Convener)

Acknowledgement

The food/fluid committee would like to acknowledge the following:

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Abbreviations

CEBORT	Cereal-based Oral Rehydration Therapy
CDD	Control of Diarrhoeal Disease programme
CHW	Community Health Worker
g/l	Gramms per litre
mEq/l	Milli-Equivalent per litre
mmol/l	Milli-mole per litre
Na+	Sodium
NB	Notta Benne
NGO	Non-governmental Organization
ORS	Oral Rehydration Salts (Refers only to the WHO formulation)
ORT	Oral Rehdration Therapy
PEM	Protein-Energy Malnutrition
SSS	Sugar Salt Solution
TBA	Traditonal Birth Attendents
WHO	World Health Organization

Executive Summary

Diarrhoea still contributes a significant morbidity and mortality in the underfives, particularly in the under two years.
In Kenya it is estimated that each underfive experiences on the average 4 episodes of diarrhoea per annum, giving an annual incidence of 16,000,000 episodes(1). Case fatality rate for diarrhoea ranges between 1 - 20%.

Reasons for high incidence and unfavourable outcome of diarrhoea in Kenya is similar to that in many developing countries. Important among these causes are; under nutrition, poor sanitation, inadequate supply of safe water, poor knowledge about acquisition and transmission of disease and low rate of immunization (2). It has been shown that diarrhoeal mortality rate increases about four fold in children who are less than the 65th percentile weight for age.
Other high risk groups for diarrhoeal morbidity and mortality are: non-breast fed babies, low birth weight babies, and post-measles children.

The immediate cause of death in the majority of cases of diarrhoea is dehydration and electrolyte imbalance. It has been estimated that only 5-10% of diarrhoeal episodes lead to dehydration, and that the majority of patients have mild self-limiting diarrhoea.

The few severe cases who account for high case fatalities usually have an underlying problem, most often malnutrition, with diarrhoea being more a symptom of the underlying problem.

Therefore the logical approach to effective diarrhoea management is fluid and electrolyte replacement at onset of diarrhoea and maintainance of adequate nutrition preceeding, during and after diarrhoea.

Oral administration of fluids has been found to be effective in preventing as well as treating dehydration. The crucial scientific basis for Oral Rehydration Therapy(ORT) was the discovery of glucose coupled sodium absorption and the demonstration of effective clinical application of this discovery in the mid and late 1960's (3-11). This mechanism was later shown to operate with other substrates (11-14).

The WHO glucose-electrolyte (ORS) has been proven as a physiologically appropriate formulation of oral rehydration therapy which can also be effectivly used for prevention of dehydration.

However, in many developing countries, cost and distribution of ORS sachets has hindered wide-scale implementation of ORS. In Kenya for example, surveys have shown that ORS usage during diarrhoea ranged from 14 to 29% with only 1.9 - 8.6% receiving correctly prepared ORS solution (1,15,16).

Several reasons can be advanced for this low usage of ORS, amongst them, the accessability and acceptability of ORS. In the diarrhoeal disease case management survey (16), 94% of ORS was obtained from some health facility, with the commonest source being government health facilities (88%).

If reliance for delivery of ORS is to be placed solely on the Ministry of health, this would prove a huge economic burden for the already strained National Treasury. Because, based on current population statistics of 4 milliion underfives and prevailing incidence of 4 diarrhoeal episodes per child per year, lasting on the average 3 days per episode, would require a supply of almost 8 million ORS sachets per month. This assumes a usage of 2 packets per day (500mls sachets). This is an enormous burden not-withstanding distribution and handling costs.

When considering diarrhoea management it is also important to bear in mind that majority of the diarrhoea episodes are initially managed at home and referral to a health facility is usually done after 3 - 4 days of diarrhoea or when diarrhoea is perceived to be getting worse(17,18).

The above reasons raise doubts about suitability of use of ORS sachets as home therapy for diarrhoea in this country.

Therefore, a more feasible approach would be the use of home-fluids that would be less costly, readily available, culturally acceptable and equally efficacious.

Investigations conducted in various parts of Kenya suggest that Kenyan child caretakers are aware that diarrhoea is a wide spread and serious health problem, especially among the under five population. Several surveys indicate that damages of diarrhoea are well recognized. However, communities perception regarding causation of diarrhoea will determine their health seeking behaviour.
Amongst factors believed to cause diarrhoea are:-

- infedility by any or both parents but especially the father of the child.
- false teeth in children.(17)

It is not-worthy to observe that in the focus group discussion, hygienic practices such as drinking safe water, use of latrine, keeping food safe and washing hands was little mentioned as preventative measures. There was inadequate understanding of rehydration/dehydration relationship (17).

The Kenya Diarrhoeal Diseases Household Case Management Survey(1990) found that use of oral fluids during diarrhoea was reasonably high ranging from 69.4 to 93%. The fluids frequently given are uji, (71.6%), water (45%), tea (30%), milk (18%). Feeding was continued in 46.2 - 80.6 % of the children with diarrhoea (16).

Though no concensus can be reached for a universal home based fluid due to the varying ethnographic and ecological differences several types of home fluids have beeen proposed. These inlcude gruels, soups and fruit juices. Commercial fruit juices and soft drinks are not recommended because of their high sugar contents. In addition, concentrated fruit juices may provide dangerously high levels of potassium which can result in hyperkalaemia and subsequent cardiac arrest. Mother should therefore be cautioned as they are likely to use the easily available and well liked sodas when the messaage is "give any fluid available in the home".

The sugar-salt-solution (SSS), though successfully used in other countries, does not appear to be a feasible approach in this country. The unfavourable experiences with SSS was due to problems related to the dangerously high osmolar solutions prepared and, the inappropriate use of these solutions such as in "preventing" diarrhoea.

<u>Issues and concerns</u> about home management of diarrhoea

1. What is the electrolyte balance of the fluids currently being given at home?

2. Is amount given adequate?

3. In the absence of standardized administration, how can the fluids be promoted effectivly?

4. Can the fluids (and foods) be reasonably standardized for effective diarrhoea managment and ease of promotion?

In Kenya, the fluid that stands out prominantly in the search for a future diarrhoea home management fluid is <u>Uji</u>. This is because uji is widely used throughout the country - both as a weaning food and a fluid given during diarrhoea.

Prospects of Promoting Uji

Advantages

-Widely consumed by all age groups in most Kenyan societies and is widely available. Surveys indicate that cereals for making uji are available in 68 to 90% of Kenyan households.

-It is consumed daily by the family and hence familiar.

-It's preparation utilizes existing processes within the household.

-a popular weaning food and widely regarded as a food that gives strength during sickness or when the body is tired.

-Uji is seen as a thirst quenching drink.

These attributes should enhance its food and rehydration qualities. More information however is needed on:-

1. Concentration of uji across the country and the amounts parents would be willing to give to children during diarrhoea.

2. How frequently parents would be willing to give uji.

3. Osmolality and sodium concentration of uji.

4. Acceptable additive to improve nutrient density.

5. Is uji currently perceived as food or a drink?

6. "Cost" of uji preparation in terms of time, fuel and ingredients.

7. Standardizing recommendations on preparation, feeding

8. Effective promotion strategy (perceptions about uji by the caretakers and the health workers both in the governmental and non-governmental institutions who are supposed to promote it).

Other home fluids that may be used in diarrhoea include: Plain water, soups, fresh fruit juices, fermented milk/porridge and coconut water (in regions where these fluids are currently used).

As a policy issue however, it is easier and more cost-effective to promote, evaluate and reinforce use of one hydration fluid rather than several treatments, but for practical purposes alternative fluids should be allowed.

While ORT centers should stock and provide ORS, feasibility and logistics of introducing uji at these centers should be looked into. The preparation and use of uji at oral rehydration centers will help in terms of practical demonstration and also to reinforce use of home fluids. It will also help erradicate any misconceptions that use of uji is "inferior" treatment.

A). Can uji meet the requirements of an effective ORT?

The requirements of an ORT can be considered under the following subheadings:

- .volume requirements
- .Osmolality and Electrolyte contents
- .Acceptability and accessability
- .Cost

i). Volume Requirement

In acute childhood diarrhoea, the fluid losses are estimated at 10-20mls per kg body weight per episode of opening bowel (2,19). Depending on the weight of the child, the volume loss due to diarrhoea could be between 25-180mls per episode of bowel opening. Additional losses may be incurred if the child has a fever or is hyperventilating from acidoses or lower respiratory infection.

This led to the WHO recommendatioin in 1984 of fluid replacement at 100mls per kg body weight per 24 hours.

It is felt that for efficient prevention of dehydration, a child should have fluid replacement with every episode of purging.

The inability to gauge how much fluid is required during diarrhoea is clearly demonstrated in some of the surveys done in Kenya, where obvious discrepancies between maternal knowledge and practice about volumes of ORT to be given is seen (1,15,16). These surveys show that about 30-75% of the mothers indicate that they would increase fluids to their children during diarrhoea, while semiquantitative analysis of actual fluid given during

diarrhoea revealed that only 317-708mls of ORT per 24 hours were given on average.

The aspect of increased volumes needs emphasis inorder to avoid misconception that fluids are "medicinal" during diarrhoea and usually "medicines" are taken in small quantities.

Guidelines of volumes of ORT required should be provided, instead of leaving the messages vague, such as "increase fluids during diarrhoea". Mothers should have an indication of how much fluid to give. The guidelines should be simple and easy to recall.

Proposed guidelines for fluid replacement for home therapy of diarrhoea are as follows:

- for children < 1 yr - half Tea cup of fluid for every loose stool.
- for children > 1 yr - 1-2 Tea cups for every loose stool

where a Tea cup is estimated to be 200 mls.

The preferred home fluid to be given in the above suggested volumes should be uji. The mothers may however alternate this with other home fluids suggested above.

It is anticipated that the recommendation of giving uji during diarrhoea will meet little resistance from mothers, since they already give uji during diarrhoea. But what will need promotion and evaluation for acceptability is the increased frequency and volumes required during diarrhoea.

Thinning of uji is not to be recommended, as uji also serves as a weaning food. This is to avoid the possible danger of continuing dilution well beyond the diarrhoeal episode resulting from misunderstood messages.

ii). Osmolality and Electrolyte Content

It is recommended that rehydrating fluids should have maximum osmolality lower than that of plasma. The fluid should have an osmolality less than 302 mos/kg water. Osmolality is a factor of water, electrolytes and the organic solutes that are contained in the solution of the rehydrating fluid.

Sodium

During diarrhoea, there is loss of electrolytes . It is estimated that in acute diarrhoea rate of sodium (Na+) loss is 50mmol/l.
Potassium (k+) loss is approximately 30mmOl/l with equivalent chloride and bicarbonate losses (19,20,21)

Absorption of Na+ in the gut occurs through:

- passive flow using the osmotic and electrochemical gradiant
- energy dependent Na+ pump
- substrate coupled Na+ absorption

The above mechanism is also responsible for chloride absorption.

Bicarbonate is absorbed through independent active mechanism which may also promote Na+ and water absorption (22).

ORS uses glucose facilitated Na+ transport. The limiting factor of ORS is osmolality.

Inorder to avoid the above mentioned effect of a hyperosmolar solution, an ORS solution should not exceed plasma osmolality of 300mOsm/l. To comply with this restriction, the ratio of Na+ to glucose in ORS should not exceed 1:1 or 1:1:4 , with the optimal Na+ and glucose concentration ranging between 30-80mml/l and 30-112mml/l respectively.

Cereal based ORT (CEBORT) do not incur such osmotic penalty. Starch, the major component in cereals is digested into smaller polymers by intestinal amylase. These polymers are further split by maltase into glucose at the intestinal brush border.

One molecule of glucose has the same osmotic equivalent as one molecule of starch containing hundreds of glucose molecules. Thus cereal based solutions provide many molecules of glucose to facilitate sodium transport without concomitant increase in osmolarity.

Cereal proteins also provide amino acids and small peptides which can facilitate Na+ transportation, independent of the glucose pathway.

As starch breakdown requires the presence of digestive enzymes, a limiting factor in case of cereals is absence or reduction of these enzymes as occurs in neonates, premature infants and those with pancreatic insufficiency(23). There is also concern about the ability to digest cereals by infants less than 6 months because of their relative defeciency of amylase.

Salt concentration though important is probably not as critical in CEBORT as in glucose based ORT(ORS/SSS).

The safe and recommended Na+ level for oral rehydration fluids ranges between 30-80 mEq/L (24). For a fluid to be considered safe, surveys should show that at least 90% of the fluid made by mothers do not exceed the recommended upper limit for Na+, and that no more than 2% of fluid have Na+ greater than 120 mEq/L (24).

The risk of developing hypernatraemia is less with food based ORT than with SSS. This is due to lower osmolarity in food based ORT. It is the combination of high osmolarity and high Na+ concentration that is particularly dangerous.

Kenya et al (25) found Na+ outside safe range of 50-120mEq/L to be 10 times greater in glucose based ORT than that of maize-based solution. Alwar (26) in laboratory prepared recipes of food based fluids found Na+ level ranging between 3-15 mmoles/L in cereal based fluids before addition of salt and on addition of salt, Na+ levels increased to 62-175 mmol/L

In the 2nd and the 3rd National Child Nutritional Surveys in Kenya (27,28,29) salt was rarely added to the porridge (the main additives being milk and sugar).

Concern has been raised about the probability of increasing hypernatraemia by the cereal based ORT because of enhancement of sodium reabsorption due to several Na+ co-transporting molecules present in CEBORT. However the concomitant improvement of water reabsorption makes hypernatraemia unlikely. This view is supported by failure to observe hypernatraemia in any of the reported cereal-based studies (30).

Some parts of this country have been shown to have high salinity of ground water and fear has been expressed about the possible interference this might have on ORT preparations that have additional salt (25,26). This fear however may be unjustified as only 18% of the rural population depends on wells while the rest depends on rivers and other sources for their water supplies (16), secondly, it is not clear if the communities use the obviously salty water for drinking purposes.

The two debatable issues about Na+ in ORT are:

(1) The necessity of addition of salt to uji communities that do not already do so, especially if these fluids are given in conjunction with food which will provide some of these electrolytes.

(2) Secondly, the amount of Na+ required to prevent dehydration is not known. This questions the need of adding salt to home based ORT, since the main objective of household management of diarrhoea is to prevent dehydration.

It is felt that until the osmolality and sodium content of home prepared uji is known, the addition of salt should not be currently recommended.

The withholding of salt is of course not without its risks as some children (albeit a few) who might end up with severe dehydration will not be given salt, and if they are not within access of ORS the resulting electrolyte imbalance may be associated with increased morbidity and mortality.

It is however hoped that referral system will be strengthened and most health facilities will be equipped with ORS for management of the referred cases. It is encouraging to note that 70% of the Kenyan mother do recognize the signs of dehydration and over 90% claim that they would seek medical help on recognizing these signs (15,17).

Potassium

Absorption of K+ is less well understood. Current view is that K+ is absorbed through 2 processes:

-passive ill-defined process
-electrochemical gradient and transmembranous electrochemical mechanism that are related to content of Na+ (31,32).

K+ is an important ion for transmembranous electrical stability, action potential and muscle contractility, especially heart muscle. Small shift in extracellular fluid k+ result in severe cardiovascular contractility disorder. Caution is therefore necessary where k+ solution are being administered until full understanding of the mechanism and rate of plasma influx after oral administration are understood.

Post diarrhoeal hypokalaemic states have been described. They occur with a greater frequency among malnourished children who are at a higher risk of developing symptomatic hypokalaemia (25,33,34).

To minimize the risk of developing hypokalaemia it is recommended that potassium supplements should be given during diarrhoea either in the ORT or by feeding K+ rich foods. The recommended range of K+ supplementation is 25-30mEq/L (35,36).
In his analysis of electrolyte content of commonly prepared home fluids, Alwar (26) found porridges to contain K+ levels ranging between 2-8 mmol/L and rather high K+ levels in some vegetable soups.

It therefore appears that encouraging intake of various home fluids and food in addition to uji will provide adequate K+ level - though this may require verification by further research on electrolyte contents prepared by mothers in the homes.

It is important that during promotion of uji as a hydration fluid, mothers and health workers are cautioned about mixing ORS with uji as this may result in a potentially hyperosmolar solution.

iii) Acceptability and Accessability

Acceptability has to be seen at various levels:-

.By the child - palatability and volumes to be consumed.

.By the mother in terms of palatabililty, ease of preparation and availability should be culturally acceptable.

.By health workers who are supposed to promote it.

As indicated earlier, uji is widely available, cheap, consumed daily by the family (hence familiar), and its preparation uses existing processes within the household.

Focus group discussion conducted by CDD programe in 1987 revealed that there is acceptance of administration of cereal based fluids during diarrhoea. It would therefore seem appropriate for the National CDD programme to promote use of use of cereal gruels and other staples in this country.

iv) Cost-Effectiveness

In terms of cost-effectiveness of the various forms of ORT, sustainability is more important than short-term cost-effectiveness when planning for hydration therapy. The use of home-fluids which are independent of outside sources would therefore appear as a more attractive and sustainable approach.

B). Feeding During Diarrhoea

Management of diarrhoea should involve feeding and fluid replacement as 2 distinct but interrelated goals. Feeding done without increasing the fluids given can be dangerous as unabsorbed water - soluble substances are likely to exert osmotic pressure that drains water and electrolytes into the intestinal lumen, leading to greater risk of dehydration and electrolyte imbalance (39).

Rationale of feeding during diarrhoea is to:

(1) Minimize effects of illness on nutritional status
(2) Promote normal intestinal mucosal renewal and absorptive and digestive functions.
(3) Provide electrolytes
(4) Supply small nutrient molecules (glucose, amino acids and di and tripeptides) which act as specific carriers of Na^+.
(5) Improve clinical course of disease by shortening its duration and the total stool output - particularly important for the mother who wants to see diarrhoea stopped immediately.
(6) Provide micronutrients. Recent evidence confirms the importance of micronutrients as growth determinants and their role in reducing severity of diarrhoea and acute respiratory infections (40,41).

i) Energy Requirement

Diarrhoea is associated with immediate decrease in weight gain and height increment. Considering that young infants under 2 years may spend about 16-17% of their time having diarrhoea, the effect that diarrhoea will have on their nutritional status is severe enough to warrant concern. The effect on nutrition takes an even heavier toll on malnourished children. Because of the longer duration of diarrhoea and the increased number of diarrhoeal episodes in these children, there is less time for recovery and "catch-up" growth between episodes.

Normal energy requirement in children is approximately 110 Kcal/Kg body weight. During diarrhoea one should aim at giving about 220 cal/Kg /day . An absorbtion of 50 - 60% of nutrients from such a high caloric diet made of 50 - 60% of calories derived from carbohydrates, 10-20% from protein and 20-30% from fat, will ensure protection of endogenous nutrient loss. These recommendations are slightly high, because based on local studies, over 60% of children presenting with diarrhoea have protein-energy malnutrition and the above recommendations will also serve for nutritional rehabilitation.

ORS has 80 kcal/L and CEBORT has an estimated 250-400 kcal/L depending on cereal used and method of preparation. Whatever the ORT used therefore, the calorific content is not adequate for maintaining a growing child. These calories have to come from another source - thus emphasising the role of early and adequate feeding during diarrhoea to meet calorie demand.

It has been shown that substantial nutrient absorption occurs during diarrhoea and that there is no physiological basis for "resting the gut". On average during diarrhoea there is 70-90% absorption compared to the pre-illness state, with absorption of

80-90% of ingested carbohydrate, 50-70% of fat and 50-75% of protein. Absorption depends on the food sources of nutrients, amounts ingested, and type and severity of diarrhoea. It has been shown that increasing dietary intakes is associated with increased absorption of ingested nutrients (38).

Young undernourished children fed protein and energy-rich foods might gain weight at up to 7 times the expected rate until they catch-up to their optimal nutritional status (37,38)

It is encouraging to note from the Kenyan surveys, that most mothers continue feeding during diarrhoea, though only a few would actually increase either the frequency or volume of feeds (15,16,17). Whether this decrease in feeding was due to the child's refusal to feed from anorexia or a deliberate action by the mother was not determined by these surveys.

It is also important to observe food taboos, as promotion of foods considered "harmful" during diarrhoea will meet with little success. Cultural practices that prescribe witholding of foods during diarrhoea should be identified and discouraged.

While awaiting identification of region specific nutrient dense weaning food recipes, the CDD message to caretakers about "increase feeding" during diarrhoea should be more specific. Suggested feeding frequency is "at least 5 times a day during and one week after diarrhoea".

Messages about continuing breastfeeding during diarrhoea should be promoted.

ii) Weaning Foods

The two important factors apart from hydration fluid which will determine outcome of diarrhoea are pre-illness nutritional status and maintainance of adequate nutrition during diarrhoea. Determination of quality and quantity of weaning foods is therefore an important component of diarrhoea management requiring joint efforts between the National CDD programme and the Nutrition Division of the Ministry of Health.

The calorific adequacy of most of the Kenyan weaning foods has not been studied, though cereals and milk are the most popular weaning foods in all ecological zones (29). Porridge made out of maize floor, millet flour or a combination of both were the most popular weaning foods found in the 2nd and 3rd National Child Nutritional Surveys. (28,29). 50% of respondents in rural and 75% in urban Kenya used porridge for weaning with 75% of the mothers adding something to the porridge. This "additive" was milk in 27%, milk and sugar in 26% and sugar only in 22%.

It is therefore apparent that in Kenya, uji is a popular weaning food in most of the ecological zones. What needs to be determined is the nutrient density and quantity required for the different age groups particularly the age groups 6 - 12 and 12 - 18 months. These age groups have a high incidence of diarhoea and are still on weaning food.

If the calorific value of uji is found to be unsuitable, the two possible ways of increasing calorific intake are either increasing frequency of feeding or increasing the nutrient density of the weaning food.
Enrichment of uji will vary between the ecological zones due to the different cultural practices and availability of raw material.

The role of fermented foods such as porridges and milk which where used traditionally by some cultures need to be identified and promoted. Fermented foods have the advantage in that they have less chance of contamination and are easily digestible.The possibility of using germinated grain flour in childrens food should also be looked into.

iii) Infants less than 4 months

For infants less than 4 months, exclusive breastfeeding should be promoted.

Incidence of diarrhoea in infants less than 4 months is low. However diarrhoea in this age group may be associated with a more severe illness and may be more of a symptom of an underlying problem.

Inorder to avoid conflicting messages, diarrhoea during this period should be managed by frequent breastfeeding and provision of liberal amounts of safe water. These children should also be seen and evaluated at a health facility.
Promoting use of home based fluids in this age group as a National policy might encourage early weaning as giving of food based fluids might be misinterpreted as "preventing diarrhoea", the same way that messages about SSS were misintepreted and a large proportion of infants in an urban slum in Nairobi were being given SSS (42). However at health facilities, the appropriate home-fluid for an individual infant may be recommended (this may apply for infants who are either being partially breast-fed or not breast-fed at all).

Breast milk provides 680 kcal/L and has a sodium content of 7 mEq/L, and protein of 9 g/L (43), providing adequate calories and nutrients for nutrient linked Na+ absorption.

It has been shown that exclusively breast fed children have a lower mortality from diarrhoeal illnesses and have signficantly less weight faltering than children who are not breastfed (40,44).

iv) Milk

Giving large volumes of cows milk during diarrhoea is still controversial. This is due to the fact that reduced lactose function during diarrhoea may exacerbate diarrhoea due to secondary lactose intolerance. This effect is much less felt with breast milk. Some of the reasons for better tolerance of breast milk include.

- lower osmolality of human milk
- continuous verses bolus feeding in the case of human milk
- immune factors in human milk that discourage further infection
- hormonal factors which tend to enhance mucosal renewal (45).

Upon digestion by the human gut, cows milk tends to leave considerable residue which has to be excreted.

Lactose intolerance is not complete and therefore breast feeding should be encouraged though giving of large bolus volumes of cows milk is still controversial.

C) Communication and Training

Communication support is an essential component of any health development programme as success of programmes depends on promotion. It should be in-built into the programme and should have a re-inforcing and an evaluatiion component.

Promotion required to motivate people to:-

..Appreciate the need to carry out certain actions.

.Carry out the actions accurately

.Carry out the actions on a sustained basis.

The policies regarding home-based fluids will need to be communicated to the health workers and community health workers(CHW) through training programmes, and to the communities using various communication strategies.
Curricula needs to be developed for health workers and CHW which is consistent with the new policies regarding use of home-fluids.

When considering communication strategies, it is important that consideration should not only be given to communicating new knowledge but, internalization of these messages to result in behaviour and attitude change. As has been shown in some of the Kenyan surveys, though knowledge about causation and treatment of diarrhoea may have been well received, this has not necessarily resulted in concommittant change in behaviour, thus indicating that there is inappropriatness of some of the communication strategies (1,15.17).

When planning communication strategies it is important to know and understand the behavioural and non-behavioural problems, predisposing factors, enabling and reinforcing factors. Reliance for communicating message in Kenya has been placed mainly on radio, posters, and health workers. This may have resulted in acquisition of knowledge without changing in behaviour. There is therefore need to look at alternative ways of presenting communication that will also result in behaviour change such as inco-oporating important allies and resources such as leadership, non-governmental organizations(NGO'S) and the community.

Communication needs to be " audience targetted " and for successful communication, programmes should aim at reaching above 70% of their target audience. This can be done through:

1. Individual level

To deal specifically with the caretaker in terms of acceptance and utilization of home based fluid for management of diarrhoea

2. Family level

Family level communication is addressed to mother's older siblings, grandparents, father and other household members. This can be done through home visits, individual groups, and community group meetings.
These individuals provide social support to the caretaker.

3. Community level

Communication to be addressed to community leaders, traditional birth attendents(TBA), community health workers, teachers, religious leaders, herbalists and extention agencies. These groups will help in trasmitting and reinforcing messages.

Message strategy

Messages should be specific, short, simple, clear and non-conflicting.

Messages need to address misconceptions, beliefs, values, attitudes, perception and strengthen positive attitudes, practices and expectation.

Research is needed to maximize appeal and attract attention to ORT using new and attractive terminolgy.and to explore the possibilities of commercial marketing of home-based oral hydration fluid

Media strategies

Appropriate media is needed to convey messages, though , multimedia approach ensures integrations and re-inforcement of messages and has a multiplier effect. The following media may be used:-

1. Folk Media

Use of traditional muscicians who entertain the public during ceremonies and rites/rituals.
Choirs - women groups, church choirs, school choirs or institutional choirs.

2. Electronic Media

Radio - presentation including interviews, discussions, drama
Radio messages for target groups :
- use of local opinion leaders. Interview using vernacular programmes.
- health groups.

Tape/Cassette - can be used during group discussions.

Slide Shows - on specific forms e.g ORS preparation and administration.

Phonograph

-films depicting local situation
-captions for cinema halls - useful for urban population.

3.Printed Materials

Develop training materials for CHW, TBA, adult literacy teachers, women group leaders, other extention agents. Develop materials for schools for ORT/food programmes eg jig-saw puzzles, booklets, board games, card games, cross-word etc.

Strategies for support and Sustainance

(1) Networking

- networking maximizes impact of communication because it ensures that :-
- Target groups hear messages from a variety of sources. Repeated hearing of messages enhances comprehension.
- Hearing the message from different sousrces gives the message a sense of importance because it is supported by more than once source.

(2) Developing re-inforcement and evaluation strategies

(3) Integrating the ORT programmes training and messsages into other child survival initiatives.

(4) Developing implementation capacity at the provincial and district level.

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RECOMMENDATIONS

AND

OPERATIONAL RESEARCH

Fluid - Foods Panel

Recommendations and Operational Research

The following recommendations and areas of research were identified.

A) Recommendations

1. Use of familiar home-prepared fluids for prevention of diarrhoeal dehydration in the home is preferred to the packet approach. Home-based fluids is a more sustainable approach as the raw materials are available in the home and hence independent of distribution problems.
   Home fluids are not intended for children with severe or persistent diarrhoea and infants less than 4 months of age.

2. Use of sugar salt solution (SSS) is to be discouraged as sustainability of this approach is unreliable due to its preparation techniques, which demands recall of recipes of three fairly precise measurements.

Choice of Fluid:

3. It was agreed that any foods and fluids available in the homes could be given during diarrhoea to prevent dehydration.

However for a programmatic point of view, it is easier and more cost-effective to promote a single fluid rather than several solutions, with an option for use of alternative fluids.

3.1 Uji stands out as the most commonly used weaning food and also the commonest home fluid used during diarrhoea though volumes used are far below the recommended fluid intake to prevent dehydration.

Though the composition of uji varies in different regions, the starches used are ideal in terms of providing sodium-co-transport.

- Several questions about uji were raised, which will be considered under operational research below.

While awaiting results of some of these queries and formulation of a physiological ideal fluid, it was felt that the programme should promote use of uji during diarrhoea with the following emphasis:-

3.1.1) No alteration in the way mothers presently prepare it.

3.1.2) Extra dilution of uji during diarrhoea is <u>not</u> to be recommended, as uji also serves as a weaning food in most communities.

3.1.3) Addition of salt to uji (though an uncommon practice) should not be promoted until further research on osmolality detects defeciency of sodium in the home prepared solutions.

3.1.4) As uji does not have adequate supply of calories and electrolytes, uji plus other foods should be given during diarrhoea.

3.1.5) Uji should not be mixed with ORS or with ORS salts.

3.1.6) CDD messages about giving "more fluid and continue feeding during diarrhoea" should be more specific.

Guidelines for volumes of home-fluids to be given during diarrhoea should be provided.

Volumes suggested (for ease of recall) are:-

- for children < 1 yr - half Tea cup of fluid for every loose stool.

- for children > 1 yr - 1-2 Tea cups for every loose stool

where a Tea cup is estimated to be 200 mls.

3.2 Other Fluids

Alternative fluids that may be given include:-

1) Liberal intake of plain water

2) Soups and fresh fruit juices to be promoted but commercial fruit juices and drinks to be discouraged in view of their relatively high osmolality and potassium content.

3) Fermented milk (in regions and communities where this is consumed).

4) Coconut water in regions where it is available.

3.3 Breastfeeding

Continued breastfeeding during diarrhoea should be encouraged.

Infants aged less than 4 months

The incidence of diarrhoea in this age group is low. Occurrance of diarrhoea in this age may be associated with severe symptoms and may be a manifestation of an underlying problem.

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Infants less than 4 months with diarrhoea should therefore be :

i) Exclusively breastfed and the frequency of breastfeeding increased. Use of home fluids such as uji in this age group is not to be encouraged, because of the potential conflict with messages to "exclusively breastfeed for at least 4months".

ii) Referred to a health facility for evaluation. Health workers will assess each case individually and recommend the appropriate ORT.

4. Foods

Energy requirements during diarrhoea cannot be adequately met by a rehydration fluid only, even if uji were not to be diluted.

The CDD policy encourages feeding during diarrhoea. This should be promoted. The message of "increase feeding during diarrhoea" should be more specific in order to provide guidelines to mothers/caretakers about the ideal requirements. The message suggested was "Feed at least 5 times or more a day during diarrhoea."

5. Communication

5.1 Though knowledge about diarrhoea and its treatment may have been well received by the communities, surveys indicate that this has not resulted in concommittent change in attitude and behaviour towards prevention and treatment of diarrhoea. This questions appropriatness of communications strategies used so far.

5.2 Communication has to be audience targeted with special emphasis on the caretakers of these "at risk" group. This includes:-

- malnourished children
- post measles
- low birth weight babies
- Non-breastfed babies
- First-born babies

5.3 CDD needs to address inappropriate use of ORS resulting from:-

i) incorrect preparation

ii) The possibility of addition of ORS to uji (this should be actively discouraged).

6. Training:

6.1 The committee endorsed an integrated approach to training i.e. CDD, KEPI and nutrition department in order to present a comphrensive child survival package training.

6.2 It was felt that to translate the CDD policies at the household level, curriculla for training trainers of trainers (TOTS) and trainers of community health workers needs to be developed.

B. Operational Research:

The following areas of research were identified in order to provide answers to some of the gaps that currently ninder formulation of definite policy statements.

1. Fluids:

Uji

Though uji stands out as the commonest used home fluid during diarhoea it is also the most popular weaning food.

There are several issues that need clarification about uji and the following priority OR were recommended:-

1.1 There is need to determine osmolality and sodium content of samples of uji prepared in the different regions.

1.2 Ethnographic studies are required to look into receptivity and acceptability of uji as a rehydration fluid by:-

- the communities
- health workers in both the government and non-governmental institutions.

1.3 Operational research to look into feasibility and logistics of introducing uji at ORT corners in health facility.

1.4 Studies are needed to look into the possibilities of increasing the nutrient density of uji.

2. Foods

2.1 Studies are needed to identify regional weaning foods, their nutrient density (using semi-quantitative assay), and preparation techniques (salt content, malting, fermentation). Surveys should focus on the age groups 6 to 12 and 12 to 18 months.

2.2 If weaning foods are found to be calorie deficient, then region specific ways of increasing calorie intake by either increasing frequency of feeding or identifying new calorie dense recipes should be explored.

2.3 Establish feeding practices during diarrhoea for the different region with special reference to foods prohibited and foods promoted during diarrhoea, frequency of feeding and use of salt.

2.4 Investigate the use of fermented milk and porridge during diarrhoea.

3. Communications

3.1 Comparative studies are required to determine the most effective communication strategies that would effect behaviour changes.

3.2 Studies are needed to determine frequency of re-inforcing communication messages with a plan to evaluate the reinforcment strategies.

3.3 Explore cost-effectiveness of commercial marketing of ORT. The possibility of using new and attractive terminology to promote uji as a rehydration fluid to be looked into.

3.4 Ethnographic studies to look into traditional beliefs about causation of diarrhoea that ultimately influence behaviour and practice.

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DRAFTS

PREPARED BY

PANEL MEMBERS

DIARRHOEA

Literature Review on Preparation and Acceptability of Management Mixtures

by

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for

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May, 1990

DIARRHOEA

Review of Literature on Preparation and Acceptability of Management Mixtures

Nutritional damage in diarrhoea

Diarrhoea, whatever the cause, is bad for children. Nearly all children in both the developed and the developing world suffer from it, although episodes per child are more common in the developing world. Many of the conditions that precipitate diarrhoea also cause vomiting and anorexia. Fever is also common in some conditions. Therefore some of the cases of the so called "with-holding of food", at least in Kenya, may well be cases where children are too ill to accept food.

Diarrhoeal diseases can produce nutritional damage because of decreased appetite leading to reduced food intake, large faecal losses of incompletely absorbed nutrients; and increased catabolism especially in cases of fever. It is therefore not surprising that repeated episodes of diarrhoea very quickly lead to malnutrition.

Advantage of feeding during diarrhoea

Chung, showed, more than 4 decades ago that continued feeding during diarrhoea improved its course, reducing its severity, than when food was witheld for a day of two.[1,2]

In the past decade, numerous studies have yielded positive results that indicate the advantages of continuing to feed during diarrhoea.[3]

Sound dietary practices during diarrhoea and after can achieve the following:

- reduce or prevent the damage of intestinal functions induced by witholding food;
- prevent or decrease the nutritional damage caused by the disease
- accelerate catch-up growth during convalescence
- improve the clinical course of the disease by shortening its duration and reducing total stool output.

This last point is particularly important for the mother who wants to see diarrhoea stopped immediately. For the food to have an effect then, it has to be eaten, by the child. But it is usually the mother who tastes the food for her child.

The losses are so great and fast that they can render a child vulnerable to mortality within a very short time. The immediate first-aid, therefore, to save life is to replace fluids and electolytes which are being lost. The problem has always been: What fluids are suitable both scientifically and from a palatability point of view?

Acceptability - considerations

Acceptability has to be seen at various levels:

1) By the child in terms of palatability and how much can be consumed.
2) By the mother in terms of palatability, easy of preparation and availability. It should also be cost-effective and culturally acceptable.
3) By health workers who are supposed to recommend it, in terms of efficiency and preparation instructions to the mother.

Appetite during diarrhoea

In most cases of acute diarrhoea, there is a reduction in appetite. Total food intake therefore goes down. However, in the absence of fever, anorexia or vomiting children are able to eat significant amounts of food. It is important for children to have an appetite so that they can take in the required amounts of fluids for rehydration, and enough food to maintain adequate nutrition to avoid trauma.

In this respect, it has been observed that children receiving ORS often want to eat within hours of correction of fluid and electolyte depletion.[4] And so children are bound to start eating faster when they are rehydrated and do therefore recover faster. It therefore appears that rehydration decreases the severity of anorexia.

Children with severe diarrhoea and anorexia must be in a hospital setting as they will need to be fed nasogastrically. Others are fed orally but very patiently. Feeding and rehydration are very crucial for recovery. It therefore becomes a matter of serious concern when cultural practices call for withholding of food during diarrhoea episodes. Efforts to break that practice must go hand in hand with diarrhoea control measures. Other practices should also be documented and understood. For example, do mothers understand the impact of diarrhoea on the child's health? Do they understand what dehydration means and that therapy must attempt to replace lost fluids and nutrients? There is also need to understand what types of food and fluids are withheld and what types are promoted.

Types of food and fluids

Management of diarrhoea should involve feeding and replacement of fluids as two distinct but interrelated goals. Food should be given which is soft, palatable and easily tolerated in order to maintain good nutrition and to replace some of the nutrients which are lost. Such food should not be seen as rehydration therapy. Feeding done without increasing the fluids given can be dangerous because unabsorbed water-soluble substances are likely to exert osmotic pressure that draws water and electrolytes into the intestinal lumen, leading to greater risk of dehydration and electrolyte imbalance.[4]

Fluids are usually dilute in both consistency and nutrients and should be used mainly for rehydration and not for nutritional purposes. Therefore when the child's appetite picks up during convalescence, nutritious easily digestible food should be given.

Because water and electrolytes are being lost through the intestinal mucasa, foods and fluids should be given which do not encourage osmotic diarrhoea. The concentrations of these mixtures are therefore very important. The ORS and SSS are based on the principal that the glucose they contain or generate will facilitate salt and water entry into the body through the intestinal mucosa. Too much glucose will lead to osmotic diarrhoea while too much salt will get into the body and lead to cardiac arrest. The "simple solutions" therefore are not as harmless as they appear to be. They can indeed be fatal if mixed or constituted wrongly.

Concentrated fruit and vegetable juices and soft drinks are not recommended because of their high sugar contents. In addition, concentrated fruit juices may provide dangerously high levels of potassium which can result in hyperkalemia and subsequent cardiac arrest. Mothers should be warned as they are likely to use the easily available and well liked sodas when the message is "give any fluid available in the home". Foods to be recommended should be easily available, easy to prepare and should exclude foods which mothers believe to be bad

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for diarrhoea or for their children.[5] Mothers should be willing and prepared to give these fluids to their children in amounts ranging from 500-1000cc in order to replace lost fluids. Some preparations could be seen as medicines in which case mothers would not be in a position to give the required amounts. Once a fluid is acceptable for administration in large amounts, then it is easy to convince a mother to try and give quantities that equal the output in volume.

Milk:

Should it or should it not be given during diarrhoea? This aspect is still controversial. It was observed a long time ago that feeding of cow's milk during diarrhoea tended to exercerbate the diarrhoea. This is possibly due to reduce lactose function during diarrhoea. But if that is the case, many researchers have argued, how about breast milk which is higher in lactose and appears to be tolerated better? Possible reasons for this phenomenon are:

* Lower osmolarity of human milk
* Continuous versus bolus feeding in the case of human milk
* immune factors in human milk which do not encourage further infections
* normonal factors which tend to enhance mucosal renewal.[6]

Further, upon digestion by the human gut, cow's milk tends to leave considerable residue which is excreted.

Other foods or mixtures

Whatever foods are promoted should have certain characteristics. They should be palatable so that they can be consumed without much force. In some cases, though, foods have been given by force in those communities where forced feeding is acceptable. Palatability will be judged by the mother, since it is she who will taste the mixture on behalf of her child. The mother has to have confidence in the mixture before she can give it to her child. Not only that, mothers will also accept those mixtures which shorten the course and severity of the diarrhoea; can such mixtures be identified?

Breastfeeding

This should be encouraged. Apart from the advantages mentioned earlier, shorter diarrhoea episodes have been observed in exclusively breastfed infants.[7]

Reported in the literature is Jellife's study which analysed information on traditional practices concerning feeding during and after diarrhoea.[7] The findings showed that in most cases children were fed dilute/soft preparations of local staples. But in these were also

contradictions in the types of foods with particular foods being avoided by some people and recommended by others.[7] It probably all depends on what is available and the cultural beliefs associated with what is available. Foods stand a better chance of being accepted if they are easy to prepare and fit in with normal household practices and technologies.

Cereal-based ORT

Certain problems with WHO/UNICEF ORS have let researchers to develop ORS based on substrates other than glucose. Several of these are cereal-based. WHO/UNICEF glucose based ORS on its own:

* does not reduce stool volume, frequency or duration of diarrhoea. This drawback might have affected its wider acceptability.

The ORS can however:

* rehydrate 90% of the patients with dehydration
* can reduce hospital admission rate of diarrhoea by at least 50%
* can reduce diarrhoeal morbidity
* can be used very inexpensively.[7]

The study by Kenya et al. used a maizemeal based ORT and this was associated with more rapid weight gain after episodes of diarrhoea and improved catch-up growth in severely affected children.[7,8] Other cereals tested

were sorghum, rice, and millet and all these compared well with regard to weight gain. There are a number of advantages to using local staples as a base:

- they are easily available
- they are cheap
- they are consumed daily by the family
- their taste is more acceptable
- their preparation utilizes existing processes within the household.

However, they will not keep as well as the glucose ORS. There might also be the danger of giving the local staple as is normally prepared, in a concentrated form, instead of making an appropriate preparation for diarrhoea, or without giving additional fluids.

Research in Kenya

Focus group research in Western Kenya revealed that when it comes to diarrhoea, mothers worry most about:

- speed at which diarrhoea can kill
- anorexia

One can capitalize on these two aspects for the promotion of various mixtures. Most mothers believed that:

- breastfeeding should be continued
- ORS gives strength to children
- traditional healers could treat diarrhoea.[9]

Amongst factors believed to cause diarrhoea were:

- infedility by any or both parents but especially the father of the child
- false teeth in children

It is interesting to note that failure to observe any of the hygienic practices such as: drinking safe water, use of latrines, keeping food safe, and washing hands was little mentioned as a preventive measure. There was also inadequate understanding of rehydration/dehydration relationship.[9] Foods withheld during diarrhoea included, sweet potatoes, milk, beans.

A study by Oniang'o and Alnwick[10] on traditional weaning practices in Kenya has shown that fermented milk was used as a first weaning food in very few communities, and that the red sorghum porridge was used in South Nyanza during diarrhoea because it was believed to cause "less stomach problems". Fermented porridge was consumed widely by adults and older children in most of the communities but feeding of it to very young children was mentioned in only one district. In most areas fermented porridge was believed to cause heartburn, indigestion, constipation, and diarrhoea in children.[10] The basis of these beliefs needs to be established.

Fermented porridge has the advantage of condensing more energy into a mixture of low viscosity, keeps well and is said to stimulate appetite in anorexic cases. The

possibility of using fermented porridge in diarrhoea management should be explored.

In the same study by Oniang'o and Alnwick[10], the use of germinated grain flour in children's food was said to be unheard of, although the technology was widely used in brewing. This is another area for research.

Electrolyte content of local foods:

Preliminary work by the CDC suggests that:

* Ujis can be used but sugar should not be added
* soups with very little salt can also be used

for rehydration and electrolyte balance. For the time being, fruit and vegetable juices have been discouraged until more work is done. Green leafy vegetables on the whole, onions and bananas are quite high in potassium.[11] It is better if they are fed in appropriately diluted form, especially in cases of vomiting, to replace pottassium losses.

All these foods can be used in normal feeding in their soft form, in addition to suitable rehydration fluids.[11] Flavour development of foods and fluids suitable during diarrhoea should take into account the fact that their sugar and salt contents must be controlled.

Instructions o: feeding during diarrhoea are contained in a handbook on diarrhoea.[12] Another booklet by the Ministry of Health, "Improving Young Child Growth" .. needs more detail on diarrhoea management.[13]

A 1988 Ministry of Health statement recommended the following home fluids:

- Uji
- Fresh juice
- Coconut water
- Soups and milk[14]

In view of what we have just discussed regarding the constitution of these mixtures, this statement should not be used as an operational statement. A more detailed statement, taking into consideration the dilution, electrolyte, and sugar content of these fluids would suffice.

Points to consider:[5]

1) Should home fluids always be compared to ORS?

2) Do communites increase amount of fluid during diarrhoea because the child demands it or because they feel it is needed?

3) What are the practices regarding foods, fluids or medicines during diarrhoea?

4) Where supplementary staples are normally salted, they can be prepared into thin gruels - in Tanzania, this was not the case in that rice and cassava are not salted. But will recommending the use of salt cause problems as in the case of SSS?

5) To date, no country has identified a home fluid that is ideal as traditionaly prepared - Even then, some mothers are unwilling to give those preparations in quantities that would be ideal.

6) It is clear that complicated home preparation procedures should be avoided.
Contradictions should be avoided i.e "give thin porridge during diarrhoea but not for normal feeding". how does one handle this?

7) Mothers might not be in a position to prepare something special for every episode of diarrhoea - they might be more prepared to give extra amounts of food and fluids usually prepared for and consumed by children in the home.

In any case, mixtures should be:

* nutritious as far as possible
* easily digestible
* able to provide relief and not make the condition worse
* Palatable to both mother and child
* culturally acceptable
* easily available, easy to prepare and cheap in terms of cost.

Gaps

1) As attempts are made to identify suitable home fluids to recommend, something should be done about the current messages.

2) There is need to document what foods are encouraged during diarrhoea and what foods are avoided - in other words, what are the cultural practices? Should our efforts be national or more community focussed?

3) What is the extent of acceptability of ORS? Does it need further promotion?

4) Awareness campaigns are required with regard to: what causes and prevents diarrhoea? Water and sanitation issues and simple hygienic practices which cost little money should be promoted.

5) Should we develop a mixture to meet both fluid and nutritional needs? Which is more critical to be tackled in the short term dehydration, nutrient loss, or both? Does an increase in energy density reduce amounts consumed? Studies have shown more severe diarrhoea and longer lasting episodes in undernourished individuals.

6) Is there a place for the use of fermented and germinated - flour products? Should these be included in our trials. Fermented products have been very well accepted in Nigeria and are successfully being used for diarrhoea management.[15]

7) How should we promote the use of maize based ORT described by Kenya et al.?[8,9] For commercial production or for home preparation right from the raw ingredients?

8) In Kenya, it was interesting to note that:

   1) Withholding of food is not commonly practised and there is forced feeding incase of anorexia.

   2) Breastfeeding during diarrhoea was widespread.

9) Studies are required on the longer-term use of locally used and acceptable mixtures - to assess their effect on the course of the diarrhoea.

10) There is little reported in many of the studies whether mixtures are voluntarily taken by children or they are forced?

11) What are the attitudes and practices of health workers? What are they willing to promote?

Which Direction for Kenya

1. Increased promotion of ORS.
2. Improve messages on home fluid use - be more specific.
3. Embark on personal hygiene and environmental sanitation messages as measures to curb the spread of diarrhoea.
4. Field and clinical trials of various mixtures locally used and with therapeutic potential.
5. Work on electrolyte content of local foods should be continued.
6. Work on fermented and germinated-flour products should be started.
7. There is need to discuss how to use the cereal-based ORS.

8. We must continue to stress adequate feeding during health. Healthy children are less prone to infections and even when they do catch the infections, the course of the disease is not very severe.

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Oral Rehydration Therapy

Electrolyte, Energy and Volume Requirements

Draft Prepared For The Fluids/Foods Panel

By

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Oral Rehydration Therapy

Electrolyte, Energy and Volume Requirements

INTRODUCTON

Diarrhoea is a common cause of childhood morbidity and mortality. Annualy 770 episodes of diarrhoea occur resulting in approximately five million deaths in children world-wide (1). In Kenya it is estimated that each underfive experiences on the average 4 episodes of diarrhoea per annum (2), giving an annual incidence of 16,000,000 episodes. Case fatality rate for diarrhoea ranges between 1 - 20%.

Reasons for high incidence and unfavourable outcome of diarrhoea in Kenya is similar to that in many developing countries. Important among these causes are under nutrition, poor sanitation, inadequate supply of safe water, poor knowledge about acquisition and transmission of disease and low rate of immunization (3,). It has been shown that diarrhoea mortality rate increases about four fold in children who are less than the 65th percentile weight for age.

The immediate cause of death in the majority of cases of diarrhoea is dehydration and electrolyte imbalance. It has been estimated that only 5-10% of diarrhoeal episodes lead to dehydration, and that the majority of patients have mild self-limiting diarrhoea. Therefore the logical approach to effective diarrhoea management is fluid and electrolyte replacement at onset of diarrhoea.

The WHO glucose-electrolyte (ORS) has been proven as a physiologically appropriate formulation of oral rehydration which can also be effectivly used for prevention of dehydration. However, in many developing countries, cost and distribution of ORS has hindered wide-scale implementatiion of ORS. For example, in Kenya, surveys have shown that ORS usage during diarrhoea ranged from 14 to 29% with only 1.9-8.6% receiving correctly prepared ORS solution (2,4,5).

Proper home management of diarrhoea is important, as majority of diarrhoeal episodes are managed at home and referral to a health facility is usually done after 3 - 4 days of diarrhoea (6,7). The fact that only about a fifth of the diarrhoeal episodes are given ORS raises doubts about suitability of this form of ORT as a home therapy for diarrhoea in this country. Several reasons can be advanced for this low usage of ORS, amongst them, the accessability and acceptability of ORS. In the diarrhoeal disease case management survey (5), 94% of ORS was obtained from some health facility, with the commonest being government health facilities (88%).

If reliance for delivery of ORS is to be placed solely on the Ministry of health, this would prove a huge economic burden for the already strained National Treasury. Because, based on current population statistics of 4 milliion underfives and prevailing incidence of 4 diarrhoeal episodes per child per year, lasting on the average 3 days per episode, would require a supply of almost 8 million ORS sachets per month. This assumes a usage of 2 packets per day (500mls sachets). This is an enormous burden not-withstanding distribution and handling costs.

Therefore, a more feasible approach would be the use of home-fluids that would be less costly, readily available, culturally acceptable and equally efficacious. Though no concensus can be reached for a universal home based fluid due to the varying ethnographic and ecological difference, several types of home fluids have beeen proposed. These include gruels, soups and fruit juices.

Before reaching any conclusions and making recomendations for home fluids, it is important to understand the underlying pathophysiological mechanisms of diarrhoea and rationale for ORT in its management.

Pathophysiology of Diarrhoea

Normal physiological process of the gastrointestinal tract consist of carefully balanced processes of secretion and absorption, maintaining adequate hydration status. Diarrhoea occurs as a consequence of imbalance of these processes resulting from direct invasion or inflammation of the mucosa, or production of toxins which interfere with the normal metabolic processes(8,9). Under normal physiological status sodium plays an important role, as absorption of sodium is accompanied by absorption of water along an osmotic gradient. There are 3 recognized mechanisms of sodium absorption.

1. Passive diffusion
2. ATP dependent active absorption.
3. Nutrient linked sodium absorption. This mechanism is preserved in most cases of diarrhoea. It is minimally affected by cyclic AMP levels, which are increased in certain forms of diarrhoea. Small nutrient molecules such as glucose, amino acids and di and tripeptides act as specific carriers of sodium ions.

When in the intestinal cell, sodium (Na+) is extruded by the sodium pump into the intercellular space. The osmotic and electrical gradients created, result in entry of water and small solutes into this space from the intestinal lunen. Any increase in the intraluminal osmotic pressure for eg. from administration of hyper osmolar fluids would result in water being drawn out from the intestinal cells (hence from intravasular volume)into the lumen.

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Rationale of ORT

Preservation of the coupled nutrient - Na+ absorption led to discovery of use of ORT during diarrhoea. ORS uses glucose facilitated Na+ transport. The limiting factor of ORS is osmolarity.

Inorder to avoid the above mentioned effect of a hyperosmolar solution, an ORS solution should not exceed plasma osmolarity of 300mOsm/l. To comply with this restriction, the ratio of Na+ to glucose in ORS should not exceed 1:1 or 1:1:4 , with the optimal Na+ and glucose concentration ranging between 30-80mml/l and 30-112mml/l respectively.

Cereal based ORT (CEBORT) do not incur such osmotic penalty. Starch, the major component in cereals is digested into smaller polymers by intestinal amylase. These polymers are further split by maltase into glucose at the intestinal brush border.

One molecule of glucose has the same osmotic equivalent as one molecule of of starch containing hundreds of glucose molecules. Thus cereal based solutions provides many molecules of glucose to facilitate sodium transport without concomitant increase osmolarity.

Cereal proteins also provide amino acids and small peptides which can facilitate Na+ transportation, independent of the glucose pathway.

As starch breakdown requires the presence of digestive enzymes, a limiting factor in case of cereal-based ORT is absence or reduction of these enzymes as occurs in neonates, premature infants and those with pancreatic insufficiency(9).

There is also concern about the ability to digest cereals by infants less than 6 months because of their relative defeciency of amylase. Salt concentration though important is probably not as critical in CEBORT as in glucose based ORT. (ORS/SSS).

Requirements of an ideal Oral Rehydration fluid

Important consideration as regards the ideal rehydration fluid are:

- Electrolyte content
- Osmolarity
- Energy content
- Volume

This is because when considering effective management of diarrhoea, there are 3 important areas that need to be addressed:-

(1) Prevention of dehydration and electrolyte abnormalities
(2) Treatment of dehydration and electrolyte abnormalities
(3) Maintainance of nutrition during and after the diarrhoeal episode.

Fulfilling these requirements does not necessarily guarantee usage, as acceptability, availability and affordability play an equally important role.

Electrolyte

The two important electrolytes whose physiological balance is adversely affected during diarrhoea are sodium and potassium.

Sodium

Interference with sodium reabsorption during diarrhoea results in a net sodium loss in the stool estimated at a level of 50mmol/L.

Serum sodium level during diarrhoea is determined by:-

(1) Na+ concentration of diarrhoeal stool
(2) Urine concentration and volume
(3) Concentration and volume of insensible fluid loss
(4) Composition of ingested food
(5) Pre-illness sodium level

Malnourished children with diarrhoea tend to have significantly lower serum sodium than their well-nourished counterparts (7,12,13). Infact one of the reasons advanced for increased mortality in malnourished children with diarrhoea is electrolyte imbalance (7). A study in Bangladesh (12) showed a higher mortality risk in malnourished children with hyponatraemia. Hypernatraemia on the other hand is also associated with increased morbidity and mortality. This may result from administration of a hyperosmolar solution and is more frequently associated with sugar salt solutions (SSS) or ORS that is not appropriately prepared.

The safe and recommended Na+ level for oral rehydration fluids ranges between 30-80 mEq/L (10). For a fluid to be considered safe, surveys should show that at least 90% of the fluid made by mothers do not exceed the recommended upper limit for Na+, and that no more than 2% of fluid have Na+ > 120 mEq/L (10).

The risk of developing hypernatraemia is less with food based ORT than with SSS. This is due to lower osmolarity in food based ORT. It is the combination of high osmolarity and high Na+ concentration that is particularly dangerous.

Kenya et al (18) found Na+ outside safe range of 50-120mEq/L to be 10 times greater in glucose based ORT than that of maize-based solution. Alwar (15) in laboratory prepared recipes of food based fluids found Na+ level ranging between 3-15 mmoles/L in cereal based fluids before addition of salt and on addition of salt, Na+ levels increased to 62-175 mmol/L

In the 2nd and the 3rd National Child Nutritional Surveys in Kenya (35,36,37) salt was rarely added to the porridge (the main additives being milk and sugar).

Concern has been raised about the probability of increasing hypernatraemia by the cereal based ORT because of enhancement of sodium reabsorption due to the presence of the various Na+ co-transporting molecules. However the concomitant improvement of water reabsorption makes hypernatraemia unlikely. This view is supported by failure to observe hypernatraemia in any of the reported cereal - based studies (17).
Some parts of this country have been shown to have high salinity of ground water and fear has been expressed about the possible interference this might have on ORT preparations that have additional salt (15,18). This fear however may be unjustified as only 18% of the rural population depends on wells while the rest depends on rivers and other sources for their water supplies (5).

The 2 unresolved issues about Na+ in home-based ORT are:

(1) The necessity of addition of salt to cereal based fluids in communities that dont already do so, especially if these fluids are given in conjunction with food which will provide some of these electrolytes.

(2) Secondly, the amount of Na+ required to <u>prevent</u> dehydration is not known. This questions the need of adding salt to home based ORT, since the main objective of household management of diarrhoea is to prevent dehydration. The withholding of salt is of course not without its risks as some children (albeit a few) who might end up with severe dehydration will not be given salt and if they are not within access of ORS the resulting electrolyte imbalance may be associated with increased morbidity and mortality.

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It is however hoped that referral system will be strengthened and most health facilities will be equipped with ORS for management of the referred cases. It is encouraging to note that 70% of the Kenyan mother do recognize the signs of dehydration and over 90% claim that they would seek medical help on recognizing these signs (4,6).

Potassium (K+)

There is net loss of K+ during acute diarrhoea. This is mainly through:

- fecal loss
- aldosterone mediated K+ loss.
  With dehydration resulting in hypovalaemia, the aldosteron-mediated excretion of K+ in exchange for Na+ comes into play

Post diarrhoeal hypokalaemic states have been described. They occur with a greater frequency among malnourished children who are at a higher risk of developing symptomative hypokalaemia (13,18,19).

To minimize the risk of developing hypokalaemia it is recommended that potassium supplements should be given during diarrhoea either in the ORT or by feeding K+ rich foods. The recommended range of K+ supplementation is 25-30mEq/L (20,21).
From anecdoctal observations, symptomatic hypokalaemia is an infrequent occurence.

In his analysis of electrolyte content of commonly prepared home fluids, Alwar (15) found porridges to contain K+ levels ranging between 2-8 mmole/L and rather high K+ levels in some vegetable soups.

It therefore appears that encouraging the intake of various home fluids and food may provide adequate K+ level - though this may require verification by further research on electrolyte contents prepared by mothers in the homes.

Volume of fluids

The normal fluid requirements is about 100mls per 100 kcal/day (22) which estimates to about 100mls/kg/day.

With diarrhoea, there is increased fluid requirements, proportional to the amount being lost. The principal objective of home based fluids is prevention of dehydration by replacement of ongoing losses.

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Guidelines of volumes of ORT required should be provided, instead of leaving the messages vague, such as "increase fluids during diarrhoea". Mothers should have an indication of how much fluid to give.

The inability to gauge how much fluid is required during diarrhoea is clearly demonstrated in some of the surveys done in Kenya, where obvious discrepancies between maternal knowledge and practice about volumes of ORT to be given is seen (2,4,5). These surveys show that about 30-75% of the mothers indicate that they would increase fluids to their children during diarrhoea, while semiquantitative analysis of actual fluid given during diarrhoea revealed that only 317-708mls of ORT per 24 hours were given on average.

Proposed guidelines for fluid replacement for home therapy of diarrhoea are as follows (these volumes have been calculated by estimating: fluid loss per stool at 10mls per kg: average weight for those 6/12 at 5kg and 10kg at 1 year).

(1) For children < 6/12:- 50mls or 1/4 cup after each loose stool. Breastfeeding frequency to be increased

(2) 6 month - 1 year :- 100mls or 1/2 cup after each loose stool

(3) 1-2 years :- 200mls or 1 cup after each loose stool

(4) Over 2 year : 200-250mls after each loose stool (as much as can be tolerated).

The aspect of increased volumes needs emphasis inorder to avoid misconception that fluids are "medicinal" during diarrhoea and usually "Medicines" are taken in small quantities.

Acidity (pH)

Severe diarrhoea leads to dehydration and metabolic acidosis. To correct acidosis, WHO/ ORS preparation incooperates bicarbonate/citrate. It has been shown that cereal based ORS or SSS alone used as rehydration fluid can maintain normal serum bicarbonate levels in children (14,13), thus indicating that Na+ and water alone can re-expand the vascular volume and restore renal perfusion. This suggests that with only a few exceptions, metabolic acidosis can be reversed even in moderate dehydration.

(4) Energy Requirement

Diarrhoea is associated with immediate decrease in weight gain and height increment. Considering that young infants under 2 years may spend about 16-17% of their time having diarrhoea, the effect that diarrhoea will have on their nutritional status is severe enough to warrant concern.

Nutritional defect during diarrhoea arises due to:

- nutrient loss from vomiting and malabsorption.
- reduced food intake which may be due to anorexia or deliberate with-holding of food.
- increased catabolic losses.

Studies from Bangladesh noted a 30-50% decrease in caloric intake during the early days of illness (24,25). The effect on nutrition takes an even heavier toll on malnourished children. Because of the longer duration of diarrhoea and the increased number of diarrhoeal episodes in these children, there is less time for recovery and "catch-up" growth between episodes.

It has been shown that substantial nutrient absorption occurs during diarrhoea and that there is no physiological basis for "resting the gut". On average during diarrhoea there is 70-90% absorption compared to the preillness state, with absorption of 80-90% of ingested carbohydrate, 50-70% of fat and 50-75% of protein. Absorption depends on the food sources of nutrients, amounts ingested, and type and severity of diarrhoea. It has been shown that increasing dietary intakes is associated with increased absorption of ingested nutrients (26).

Young undernourished children fed protein and energy-rich foods might gain weight at up to 7 times the expected rate until they catch up to their optimal nutritional status (26,27)

Nutritional needs for a child with diarrhoea should take into consideration.

(1) Nutrition losses imposed by illness
(2) Catch-up growth

Rationale of feeding during diarrhoea is to:

(1) Minimize effects of illness on nutritional status
(2) Promote normal intestinal mucosal renewal and absorptive and digestive functions.
(3) Provide electrolytes
(4) Provide food containing small nutrient molecules (glucose, amino acids and di and tripeptides act as specific carrier of sodium).

It has been suggested that to provide optimum catch-up growth, allowing for factors that would interefere with food utilization, an increment of 30% energy and 100% of protein is required (27).

The FAO/WHO recommendations for energy requirements in children (for no weightloss and at 95% of expected weight for length) are 110,105 and 100 kcal/kg/day for ages 6, 12 and 24 months respectively (28)

Working on the assumption that a large number of the underfives in this country will be 90% of expected weight for length and will have lost a minimum of 250g during illness, then the energy requirement to replace illness induced loss in 5 days will be 166, 146 and 134 kcal/kg/day, for ages 6, 12 and 24 months.

Protein

Protein requirement is estimated at 6% of energy intake if protein is from animal sources and 10-15% if from vegetable sources. In general, a protein intake of twice the recommended allowance would be adequately sufficient to cover losses and for catch-up growth (about 4g/kg/day).
Dietary intake exceeding absorptive capacity may result in increased intralumal osmotic pressure due to unabsorbed water soluble particles.

Fat

Fat should supply 40-50% of dietary energy during the first 6/12 of life and then 35-40% for the remainder of early childhood. Unsaturated fats (such as vegetable fats) or medium chain triglycerides are recommended for the first 6 months of life and are preferred during the early phases of treatment of diarrhoea as they are easily digestable and absorbable (29)

Fats can be used to decrease bulk of food by increasing nutritional density of foods. They also improve appetite and delay gastric emptying time, thus resulting in slow release of nutrients to the gut.

Fats being water insoluble do not contribute significantly to osmolarity. The practical implication of hydroxylation of unabsorbed fatty acids by colonic bacteria resulting in stimulation of colonic secretions remains unknown (10).

Carbohydrates (CHO)

Accounts for 35-55% of dietary energy during early infancy (29). CHO include starches, sucrose and lactose.

Nutrient Density

When energy density is increased above 80 kcal/100g children are able to meet their energy needs, irrespective of severity of diarrhoea. However diets of this energy density cannot be prepared in a liquid form unless substantial amounts of oil or sugar are added or amylase to decrease viscosity of starch (17).
It is recommended that in children, nutrient density should not exceed 100 kcal/100mls.

Digestability of food can be improved by certain food preparation practices such as germination and fermentation processes. Some of these techniques have been used traditionally but fell out of use with "modernization". They may be a need to revive some of these techniques. It has to be borne in mind that ultimately food choice and preparation will be dictated by the age of the child, socioeconomic and socio-cultural factors.

When prescribing volumes of feeds to be given, it is important to take into consideration the gastric capacity of a child: This varies with age and is estimated at:- 200, 250,290, 340 and 410 at 3-5 months, 6-8 months, 9-11 months, 12-23 months and 24-36 months (26). Therefore inorder to increase the total energy intake per 24 hours, frequent feeds (6-8)feeds per days) should be given.

Role of Micronutrients

- Recent evidence confirms the importance of micronutrients as growth determinants and their role in reducing severity of diarrhoea and acute respiratory infections (30, 31).
  Feeding during diarrhoea will provide some of these micronutrients.

Calorific Value of ORT

ORS has 80kcal/L and CEBORT has an estimated 250-400 kcal/L depending on cereal used and method of preparation.

Whatever the ORT used the calorific content is not adequate for maintaining a growing child who is expected to gain weight at rate of about 20-30g/day (for eg. a 10kg 2 year old child requires 1000 kcal/day and if he is 90% for weight and height and has diarrhoea and has weight loss of 250g then he needs about 1300 kcal. If this child has mild-moderate dehydration with 6 stool per day then amount of ORT required is 1200mls, providing about 400

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kcals of CEBORT used or about 95 kcals of ORS used).
It is therefore important that these calories have to come from another source - thus emphasising the role of early and adequate feeding to meet calorie demand. The advantages of early feeding have already been enumerated.

It is encouraging to note that from the Kenyan surveys, most mothers continue feeding during diarrhoea, though only a few would actually increase either the frequency or volume of feeds (4,5,6). Whether this decrease in feeding was due to the childs refusal to feed from anorexia or a deliberate action by the mother was not determined by these surveys.

The calorific adequacy of most of the Kenyan weaning foods has not been studied.
For effective treatment and control of diarrhoea, pre-illness nutritional status is an important factor. It has been shown that exclusively breast fed children have a lower mortality from diarrhoeal illnesses and have signficantly less weight faltering than children who are not breastfed (32,33).
It has also been suggested that children who receive an adequate dietary intake may be resistant to diarrhoea related growth failure.

Greater weight gain has been documented in infants given a liberal dietary intake during diarrhoea when compared to others on more restricted diet (11,34).

Determination of quality and quantity of weaning foods is therefore an important component of diarrhoea management requiring joint efforts between the National CDD programme and the Nutrition Division of the Ministry of Health.

Weaning Foods and Diarrhoea

In Kenya exclusive breastfeeding in the first 4 - 6 months has been shown to range between 22-45%, while average duration of breastfeeding is 14months with over 20% of children breastfed for 18 months.

Weaning in Kenya is initiated too early (2-4 weeks) by some mothers. This trend tends to be more frequent in urban areas where upto 82% of mothers introduce cows milk as early as 2-8 weeks (16).

The important issues to be considered under weaning foods is:

- quantity
- quality, in terms of nutrient density, availability of foods and contamination rates (which will be determined by socio-cultural factors that govern preparation, and storage).

Methods of improving quality of foods include pH changes, temperature and moisture regulation and addition of preservatives or the presence of natural inhibitiors.

In Kenya, cereals and milk are the most popular weaning foods in all ecological zones (37). Porridge made out of maize floor, millet flour or a combination of both were the most popular weaning foods found in the 2nd and 3rd National Child Nutritional Surveys. (36,37). 50% of respondents in rural and 75% in urban Kenya used porridge for weaning with 75% of the mothers adding something to the porridge. This "additive" was milk in 27%, milk and sugar in 26% and sugar only in 22%.

Alwar (5) in his household survey in Western and Central Kenya found that maize flour was available in 68-90% of the homes. The other popular weaning foods in Kenya are mashed fruits and vegetables (bananas, potatoes, beans and peas).

Van Steenberger (38) in Machakos found that in the 0-6 months age group, cows milk and porridge was the most popular weaning food. This porridge was prepared by boiling 60-150g of flour in 1 litre of water for 15-30 minutes. 200 mls of milk and 20g of sugar were then added to this mixture. At 7 months other semisolids were introduced while porridge was continued for 36 months.

It is therefore apparent that in Kenya, porridge or uji is a common weaning food in most of the ecological zones. What needs to be known now is the nutrient density, electrolyte content and quantity required for the different age groups so that appropriate recommendations can be made.

For infants less than 4 months, exclusive breastfeeding should be promoted. Breast milk provides 680 kcal/L and has a sodium content of 7mEq/L, and protein of 9g/L (22), providing adequate calories and nutrients for nutrient linked Na+ absorption.

Inorder to avoid conflicting messages, diarrhoea during this period (occuring at a much smaller frequency than in the older child) should be managed by frequent breastfeeding and provision of liberal amounts of safe water. Promoting use of home based fluids in this age group might encourage early weaning as giving of food based fluids might be misunderstood as "preventing diarrhoea", the same way that the messages of SSS was misintepreted and a large proportion of infants in an urban slum in Nairobi were being given SSS (16).

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Conclusions and Recommendations

1. Most cases of diarrhoea can effectively be managed at home. In Kenya, majority of the cases of diarrhoea are initially managed at home. What is questionable however is the effectiveness and appropriatiness of this home mangement. The most commonly used fluid is uji - a cereal gruel. Though cereal based ORT has been shown to be as effective as ORS in prevention of dehydration, more information is required before specific messages can be formulated by CDD in terms of policy statements. Operational research is required in the following areas :

   i. Region specific home fluid availability

   ii. Consistency of uji and other home fluids. How much does it need to be diluted (from the usual preparation as a weaning food)

   iii. Electrolyte content - is it necessary to add salt? Though addition of salt in cereal based ORT does not carry as high a risk of hypernatraemia as SSS, in communities that do not add salt to uji, how acceptable and practical is this recommendation?.

   iv. Volume requirement for different age groups should be determined and specified - to avoid vagueness in health education messages.

   v. "Shelf life" of prepared uji - how long can it be kept after cooking before the risks of contamination outweighs its advantage as a rehydration fluid. Reheating may not be practical due to high fuel costs.

   vi. Is it practically feasible to concurrently adminster high volumes of uji and other weaning foods? Considering the limited gastric capacity of infants, does the uji bulk satisfy satiety and therefore compromise intake of other foods which are important sources of nutrients and electrolytes?

   vii. Will home based fluids be acceptable to all cultures as "treament" for diarrhoea?

   viii. How effective (and practical) is the combined use of home fluids and ORS at ORT centres? Would this help in promotion of appropriate home fluids?

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2. For infants less than 6 months, exclusive breastfeeding is to be promoted. During diarrhoea, breast feeding frequency to be increased and plain boiled cooled water may be the only advisable home fluid at the moment.

3. ORT centers, and all health facilities to be well stocked with ORS. ORS sachets to be standardized inorder to avoid confusion about diluting volumes.

4. Feeding frequency to be increased during and one to two weeks after diarrhoea. In this context CDD should work together with the nutrition department of Family Health division in strengthening the growth monitoring programme.

5. Evaluate weaning patterns in the different regions. Nutrient density of weaning foods to be determined. Those found adequate should be promoted. Ways of enriching other foods should be sought - without compromising acceptability. Some useful traditional food preparation techniques need to be evaluated as they may be more culturally acceptable.

6. Identify cost-effective methods of conveying and re-inforcing health education messages.

7. Surveillance studies of home management of diarrhoea inorder to evaluate effectiveness of the CDD programme (currently evaluation is based on hospital returns only)

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RECOMMENDATION FOR APPROPRIATE HOME FLUIDS AVAILABLE FOR USE IN THE TREATMENT OF CHILDHOOD - DIARRHOEA IN KENYA

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LIST OF ABBREVIATIONS

NB	Notta Benne
ORS	Oral Rehydration Salts (reffers only to the Standard WHO formulation)
ORT	Oral Rehydration Therapy
PEM	Protein Energy Malnutrition
SSS	Salt Sugar Solution (Reffers to any recipe)
WHO	World Health Organization

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Physiological Basis of Oral Rehydration Therapy and Its Scientific Superiority to Conventional Rehydration:

The crucial scientific basis for oral rehydration therapy (ORT) was the discovery of glucose coupled sodium, water absorption and the subsequent demonstration of effective clinical application of this discovery in the mid and late 1960s (1-9). This mechanisms was later shown to operate with other substrates (9-12) Since then ORT has been used extensively and other scientific evidence for the rationale of its being used as the first treatment of choice demonstrated (13-21)

In summary the advantage of ORT as compared to other methods of treatment of diarrhoea can be summarized as follows:

- It is the most physiological and scientifically correct treatment that deals directly with the untoward effects of diarrhoea which can be instituted early enough from the onset of the illness

- It is medically safe and has few complications in the hands of professional health personnel.

- It is very simple to administer and can be practiced safely in the homes by immediate attendants of patients suffering from diarrhoea.

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- It conserves and promotes feeding during diarrhoea. This is especially useful as a method of encouraging continued feeding during diarrhoea. It promotes faster healing of intestinal mucosa as well as enhancing rapid weight gain thus preventing diarrhoea associated protein energy malnutrition.

On this basis this paper seeks to review some aspects of appropriate practice to be recommended in the home treatment of diarrhoea. These are:

- Fluid requirements
- osmolality.
- electrolyte content.
- Energy requirement

Fluid Requirements

The important issues to be addressed in this section are

- What is the net volume loss due to diarrhoea in acute childhood diarrhoea?
- What are other associated losses?
- What are the rates of volume replacements that can be tolerated orally?

- What is the current practice of mothers in terms of volume replacement?

- What are the current known obstacles to volume replacements?

- How can current volume replacement be assured?

Fluids Losses

The normal fluid excreted stool is 5.5mls·kg/day/(21) i.e. 5gm·kg. In acute childhood diarrhoea the losses may reach 10mls/kg or above resulting in passage of stool of 30g/kg or above (22). Thus for acute childhood diarrhoea fluid losses are estimated to be between 10 mls to 20 mls per kilogramme body weight per episode of opening bowel (23) Depending on the weight of the child the volume loss due to diarrhoea could be between 25 - 180 mls per episode of bowel opening Depending on the cause of diarrhoea or other complicating condition the volume loss may be compounded by increased insensible water loss such as may occur with fever in rota virus diarrhoea, or in children with associated lower respiratory infection in whom hyperventilation may compound the fluid loss

Based on these information the World Health Organization (WHO) in 1984 recommended replacement of 100ml fluid per kilogram

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body within 24hrs (23). In the experience of the author, for efficient prevention of dehydration a child should have fluid replacement with every episode of opening of bowel. However, note has to be taken that the maximum amount that can be given orally is 5ml/kg body weight every 5 minutes

The Current Observed Practice In-terms of Fluid Replacement

One of the greatest concern for ORT programmes the world over is the issue of replacement of adequate amount of fluid In Nairobi at Kenyatta National hospital in a study of 184 randomly selected cases Migiro, Alwar and Orinda found treatment of diarrhoea prior to attending the hospital to be 65 7%. Among these cases 24% did not develop dehydration at all 48% had mild dehydration inspite of home fluid therapy using oral rehydration (predominantly SSS) or oral rehydration salt (ORS) solution (24) In the household treatment practice survey carried out in February, 1990 in Kenya the CDD programme found that most mothers gave lower than recommended quantity of fluids These two reports indicate similarity with the global situation Mothers have a tendency to give insufficient quantity of fluids Whether this is due to discrepancy between volume of purge and administered volume or the administration was only remotely addressed to the extent that from the household survey, caretakers used less water than recommended amount for mixing of ORS.

Recommendations for Fluid Replacement

In view of this it is appropriate to recommend volume replacement according to the age and per episode of purge in the child

The following may be an appropriate guidelines for volume replacement per episode of purge:

- Children 0-6 months minimum of 1/4 tea cup full (50 mls)
- Children 7-12 months minimum of 1/2 tea cup full (100 mls)
- Children 13-36 months minimum of 1 tea cup full (200 mls)
- Children 37-6 months minimum of 1 1/2 tea cup full (300 mls)

(Note: Important consideration has been given here to transpalatability of the volumes to common domestic measure)

These recommendations may sound higher than the WHO one of 100ml/kg/24hrs This is because here the author has considered the above observed behaviour and the extra deficit from insensible water loss, vomiting and the fact that the home fluid electrolyte content may be lower than that of standard ORT Therefore more volume replacement and sustenance of normal kidney function would result is better replacement of on-going losses.

Osmolality

This term refers to the osmotic pressure exerted by a solute which dissociates when dissolved in a solvent (for our interest the solvent is water).

It is a function of molality (or number of molecules per unit mass), the degree of dissociation or molecular fragments and the osmatic coefficient of the substance. Real osmolality + m^2Vg (where m = molality, V = Molecule fragments, g = osmotic coefficient) (27)

The important issues to be considered in discussion of osmolality are as follows:

- What is the limit of osmolality for oral fluids used in treatment of diarrhoea?

- What factors will contribute to the overall intestinal osmolality during episodes of diarrhoea?

- What ingredients in oral fluids contribute to osmolality?
- How can the composition of the ingredients be altered

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so as to ensure efficient water and salt absorption during diarrhoea?

In addressing this issue it becomes clear that factors related to rehydrating fluids as well as factors related to foods to be fed will need consideration. It would be futile to give a fluid that will be optimally absorbed only to follow with a food that will completely reverse the action of the former

The Limit of Osmolality for Rehydrating Fluids

It is recommended that rehydrating fluids should have maximum osmolality lower than that of plasma. Ideally at a time of diarrhoea, the osmolality of the intestinal luminal fluid should usually be equal to or lower than that of plasma in order to avoid anosmotic loss of fluid into the gut lumen Thus the fluid should have an osmolality less than 302 mos/kg water

As indicated osmolality is a factor of the water itself, the electrolytes and the organic solutes that are contained in the solution of the rehydrating fluid As far as the home fluids are concerned the organic solutes are the organic substrates contained in the food based fluids such as simple or complex carbohydrates, amino acid, polypeptides and proteins as already stated above.

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It must be emphasized that individual solutes have characteristics that may not solely depend on their contribution to total osmolality of the luminal fluid This will be referred to later

Having considered these facts, suffice it to say that with respect to home available fluids the major contributors to osmolality are sodium chloride and simple sugars.

Sodium chloride (the common salt) has a molecule weight of 58 443 and dissociates into two ions - it has an osmotic coefficient of 0.9778 Hence 1gm of sodium chloride gives an ideal osmolality of 34 22 mml Glucose on the other hand has a molecule weight of 180.16 and weakly dissociates into two ions 1gm of glucose gives an ideal osmolality of 5 55mmol The common table sugar - sucrose contains both glucose and fructose Fructose has the same elementary composition as glucose and osmotically behaves the same Thus a solution of sucrose essentially behaves the same as that of glucose

The complex sugars and polypeptides and proteins found in cereal flours on the other hand are osmotically very weak because of their very low degree of dissociation When administered orally they will be broken at the mucosal level to simple sugars and amino acids which are osmotically active. However, these

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normally get absorbed as rapidly as they are produced Their contribution to luminal osmolality are therefore negligible. However their availability at the mucosal level provide even larger numbers (but not higher concentration) of the glucose or amino acid substrates necessary for absorption of sodium and water

In real life a solution of simple sugar (glucose or sucrose) and salt when given to an individual although it aids absorption of salt and water, it also has an osmatic penalty A solution of complex sugar (carbohydrate) on the other hand has no osmotic penalty (12) This is the likely scientific basis of why cereal based fluids have higher water absorption capacities than salt sugar solution (SSS) or even the WHO Standard ORS

As had been indicated above glucose has individual characteristics that makes it important to have just the right concentration. Maximal absorption of salt and water will only occur for glucose concentrations between 50 - 140 mmol below this range there is no net water absorption and beyond this range especially from 160mmol and above there is net water loss, an effect which is independent of osmolality ([illegible]

In addition, when salt sugar solution are used, the sodium concentration must be equal or slightly above that of the normal jejunal content. Below this the net absorptive effects does not

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occur (28). Ideally a salt to sugar rates of i:1 or 1 1.4 is essential for optimal absorption.

The use of complex substrates avoids these intricate difficulties. While the recommended maximum concentration of glucose or sucrose is 20 gm per litre That of complex carbohydrates can be upto 50 gm/litre even in the presence of low sodium concentration and still adequate absorption will occur (12,29,30).

Research done locally has shown cereal based oral rehydration fluid use to be efficient both in health facilities (29) as well as homes (30). Moreover households surveys of current weaning practices reveal wide use of cereal gruels for weaning (31) Other reports also confirm the superiority of cereal based oral rehydration solutions in the reduction of stool output (32,33).

The focus group discussions conducted by the CDD programme in 1987 revealed that there is still heavy acceptance of cereal gruel as a traditional method of treatment of diarrhoea (34)

Because of their marked physiological and phormocological advantages the conclusion that one draws is that it is most logical for the Kenya National CDD Programme to encourage use of

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cereal gruels and other staple carbohydrate gruels eg from plantain and potatoes as the home fluids. There is need to improve the technology at the household level to make the treatment more efficient.

Electrolytes

Just like fluid loss there is concomitant loss of important electrolytes during acute diarrhoea. The most important of these are sodium, potassium, chloride, and bicarbonate It is estimated that in acute diarrhoea rate of sodium loss is approximately 50mmol/L, potassium loss is approximately 30 mmol/L, with equivalent chloride and bi-carbonate losses (23,35,36).

In dealing with electrolytes therefore the factors to be considered are:

- the losses encountered during diarrhoea

- the amount of electrolytes requirement for replacement of deficit caused by the losses and the amount required to give the daily maintenance
- the electrochemical gradient likely to be produced by rapid influx of a given electrolyte between the

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intracellular and extracellular fluid - space and its consequences.

- absorption and electrochemical behaviour of individual electrolytes.

Currently our knowledge regarding these issues are limited So far we know that sodium is absorbed in the gut through various active transport mechanism:

- by the normal energy dependent sodium pump.
- by the alternative substrate coupled sodium absorption
- by passive flow along the osmotic and electrochemical gradient.

These mechanisms are also responsible for absorption of chloride Bi-carbonate is absorbed through independent active mechanisms which may also promote sodium and water absorption (37).

The absorption of potassium is unfortunately less well understood The current view is that potassium is absorbed through two processes. One is a passive ill defined process The other is through electrochemical gradient and transmembranous electrochemical mechanisms that are related to the movement of sodium. (38,39)

Thus recommendation for oral potassium concentration can be made only in relation to sodium concentration. The intracellular fluid and extracellular fluid ration of potassium ion is 10:1. Being and important ion for trans membranous electrical stability, action potention and muscle contractility especially heart muscle, small shift in extracellular fluid potassium resolt in severe cardiovascular contractility disorder.

Caution is therefore necessary where potassium solutions are being administered until full understanding of the mechanisms and rate of plasma influx after oral administration are understood

The ranges of electrolyte concentration have been well summarized by WHO (40) with respect to sodium. Looking at the Kenya situation investigations have shown use of the following fluids during diarrhoea: continued breast feeding, cereal gruel, salt sugar solution (SSS), cows milk (fermented or unfermented), fruit juices (41).

In addition these fluids have been shown to be the most common weaning diets in Kenya and thus readily available (42).

Investigation of the common readily available fluid ingredients and those that can be prepared in the home revealed that the ingredients were widely available in most households in

Kenya (43). Further analysis of fluids prepared in hospital set up using different recipes revealed that the sodium content of the fluids was low for cereal gruels while their potassium content was just under 1/3 of the standard ORS contents. For the fresh juices the sodium content was low while potassium content was also low in the juices diluted to taste, however, the undiluted fresh juice contained considerable quality of potassium. In the case of meats, all meat soups were found to have lower contents of potassium than in ORS, they also had very low sodium contents Green vegetables soups however contained larger quantities of potassium reaching concentrations of upto 112mmols/L

Fluids from coconut had little sodium but large quantities of potassium only when the flesh of coconut was added Fluids from ripe paw paw had adequate amount of sodium and large amount of potassium. Tuber soups had adequate potassium but little sodium (45) All the carbonated beverages (sodas) have very low sodium and potassium and very high sugar contents (45) However, work on preparation of cereal based rehydration solution by addition of salt has shown encouraging result (48)

These results had several major limitations, the most important of which are summarized below:

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- The use of urban tap water may make a difference since most rural water are ground water with varying concentrations of salt. In some areas such as Eastern and Coast Provinces the concentration is high enough to give salty taste to the water.

- The recipe used were highly standardized and likely to be impractical for use in the homes during an urgent situation such as an episode of diarrhoea.

- Some of the foods used may not be fed to children at certain ages

- Availability as shown by Theuri, Kinoti and Katsiro (43) and by Alwar (44) may limit the use of some of the fluids

In view of the preceeding facts the following recommendations can be made:

1 Breast milk should be encouraged for all children who are still breast feeding at time of attack with diarrhoea.

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2. Cereals gruels and soups from tubers and plantain should be the fluids of choice for all children from the age of 4 months.

3. Addition of sugar and salt to the cereal gruels during episodes of diarrhoea should be avoided currently.

4 Green vegetable soups should not be used as rehydration fluid but should be used only as feeding soups to avoid giving too large quantities of potassium

5 Soups from meats (fish, chicken and livestock) can be used as rehydrating fluid provided extra salt has not been added for the time being

6 Soups from plantains should be used but no salt should be added

7 When available undiluted fresh fruit juices and coconut water should only be used as potassium supplements to the cereal gruels

- where available fermented milk/yoghurt should be encouraged

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- Several of the above fluids should be recommended and local messages be based on the most readily available fluids in individual districts or divisions in the country.

NB: In the use of gruels from cereals tubers and plantain, it is best that the current normal composition of the child feeding gruel be maintained, except for addition of extra sugar or salt which should be avoided during episodes of diarrhoea

In the event of diarrhoea, the appropriate volume for giving after a bout of loose or water stool should be composed of equal mixture of the gruel and the cleanest drinking water available or fresh citrus fruit juices. Alternatively the child can be given 1/2 of the fluid as gruel and the other 1/2 as clean drinking water or frech citrus fruit juices

These recommendations are made to form a basis for a starting policy for management of diarrhoea and for further research Such factors as substrate interference etc can be investigated by further research and clinical experience.

Energy Requirements

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The energy requirements for child with diarrhoea should currently not be addressed from the point of view of a home available fluid for treatment of diarrhoea, but from the nutritional point of view of recommendation for feeding.

The issues to be addressed here include:

- What is the state of absorptions during attacks of diarrhoea?

- What current feeding practices are useful and should be encouraged?

- What current feeding practices are dangerous and should be discouraged.?

- What special alteration should be made of the child daily foods during episodes of diarrhoea?

- How can it be ensured that reasonable amount of nutrients are given and retained by the child Without exhausting the child.

- What special foods can be recommended and what ages of children can be given the food?

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The current knowledge that will be useful to recommendations are:

- Transient malabsorption of CHO, and lipids is known to occur during diarrhoea - the reduction in absorption may be upto 50% (47, 48, 49).

- Loss of both exogenous and endogenous proteins occurs during diarrhoea especially in dysentery.

However, inspite of these in vitro observations, in vivo observation indicate that an average of 80-90% of ingest CHO, 50-70% of fat and 50-75% of nitrogen are absorbed depending on the food source by nutrients and amounts ingested. Moreover increasing high dietary intake are associated with absorption of increasingly high amounts of ingested nutrients. In addition there is added advantage of hastened intestinal cell regeneration as pointed out earlier (1-21, 47-49) What recommendations can be made?

1. During diarrhoea, the home fluid used for rehydration be regarded merely as treatment for the diarrhoea and the normal feeding be maintained or even increased to as much as the child can take.

2. The above recommendation assume that mothers currently give their children adequate nutrients in their diets. This may not be the case. Most children who suffer from diarrhoea also come from poor families It is important that an appropriate and acceptable local fortified food gruel be developed by the nutrition technicians This gruel should be used to teach women both for nutritional management of normal children and children with diarrhoea.

3 Since the normal daily requirement of energy is approximately 110Kcal/Kg body weight Feeding during diarrhoea should aim at giving 220 Kcal/Kg/day An absorption of 50-70% of nutrients from such a high caloric diet made of 50-60% of calories being derived from carbohydrates, 10-20% from protein and 20-30% from fat will ensure protection of endogenous nutrient loss.

4. Note should be taken that the above recommendations exceed those that have been suggested in the NCP paper This recommendation takes into consideration that over 60% of children presenting with diarrhoea have protein energy malnutrition (PEM) It also considers that the dose suggested approximates those that have been used for nutritional rehabilitation and therefore easy to adopt without introducing confusion.

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TOWARDS EFFECTIVE DIARRRHOEA MANAGEMENT IN KENYA

PROPOSALS FOR HOME MANAGEMENT OF DIARRHOEA AND EFFECTIVE PROMOTION

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1. INTRODUCTION

These notes have been prepared as part of the ongoing efforts of the Kenya CDD Research Committee to review existing literature, recommend a suitable diarrhoea management strategy for the country and advise on its implementation. The purpose of the notes is to present ideas which can facilitate evolvement of the necessary strategy.

2. DIARRHOEA IN KENYA

2.1 INCIDENCE AND SEVERITY

The importance of diarrhoea as a health problem in Kenya is amply documented. Many authorities list it as the number two or three health problem among children below five years. The diarrhoeal diseases household case management survey of 1990 conducted in six Kenyan Districts (Nakuru, Kisumu, Kwale, Kilifi, Kisii and Kakamega) found an annual diarrhoea incidence rate of between 3.3 and 5.8 episode per child per year. The point prevalence rate for the preceeding 24 hour period varied from 4.0 to 7.7.

The adverse effects of diarrhoea on the health status of children is well documented. The effects include the following:

- Diarrhoea leads to loss of body nutrients through vomiting and frequent loose stools;

- It leads to loss of large amounts of water;

- By triggering loss of appetite, diarrhoea reduces food intake;

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- It leads to intestinal malabsorption.

These effects precipitate conditions of dehydration and malnutritic among children. In turn, malnutrition:

- Lowers body resistance to infections;
- Creates conditions favourable to frequent attack of diarrhoea and other diseases;
- Increases the severity of diarrhoea when it attacks;
- Prolongs the period of each diarrhoea incidence;
- Denies the body the water necessary for body processes;
- Worsens malnutrition;
- Causes increased damage to health of the patient and can lead to death;

It is estimated that 9% of the deaths among children below five years of age is associated with diarrhoea.

2.2 KNOWLEDGE, ATTITUDE AND PRACTICE

Investigations conducted in various parts of Kenya suggest that Kenyan child caretakers are aware that diarrhoea is a wide-spread and serious health problem, especially among the under-five population. It has been identified as a problem of concern in virtually all the groups asked to name health problems in any given locality. And virtually all groups interviewe recognise the seriousness of diarrhoea and identify some correct signs which allude to the dangers of diarrhoea. Asked to state what was worrying about diarrhoea, for example, participants in focus groups conducted among the Luo, Luhya, Kuria and Kisii

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of Western Kenya (1987/88), listed the following: weakness, sunken eyes, loss of appetite, the short time diarrhoea takes to make a child very ill and the fact that diarrhoea kills. It is also clear that in their own ways, communities have been "studying" diarrhoea and coming up with information which now guides the way they respond to the diarrhoea menace. Investigations conducted in Western Kenya, for example, provide evidence of three different classifications of diarrhoea according to the colour of the faecal matter, the texture of the faecal matter and by cause. Focus group discussions conducted by the Kenya CDD programme (1987/88) give the following classifications.

Classification of diarrhoea by colour of stool

Greenish diarrhoea, bloody diarrhoea, bulky diarrhoea, yellow diarrhoea.

Classification of diarrhoea by texture

Watery diarrhoea, milky diarrhoea frothy/bubbling diarrhoea, mucoid diarrhoea.

Classification of diarrhoea by cause

Diarrhoea is said to be caused by one of the following: measles, infidelity, teething, false teeth, breast feeding while pregnant, dirty feeds, eating soil, close spacing of children, malaria, old milk from the breast (i.e. when a mother breast feeds without first expressing milk), mother going to the river too early in the morning and meeting with bad spirits, a breast feeding mother greeting a mother who after the death of her child, has not gone through cleansing rites, child looking at the moon (some say new moon), when a man's family and the family he has inherited after the death of a male relative eat together before cleansing rites are performed, etc.

Different faecal colours and textures are linked to different causes, and the people's perception is that the different diarrhoeas should receive different forms of treatment. Traditional treatment cited during focus groups include cleansing rites, herbs, removal of false teeth or removal of milk teeth (Kuria and Kisii).

2.3 MODERN TREATMENT PRACTICES

The 1990 diarrhoeal diseases household case management survey (DDHMS) provides the most recent data in regard to modern diarrhoea treatment practices in Kakamega, Kisumu, Kisii, Kwale, Kilifi and Nakuru Districts. These data read together with data generated in other studies gives some insight into the pattern of modern diarrhoea treatment in Kenya.

- During focus groups in Western Kenya, the most frequently mentioned modern forms of treatment included sugar-salt solution, capsules bought from drug peddlers and ORS. In addition, most mothers said that they gave children breast milk, porridge, cow's milk (whole or diluted) and fruit juice during diarrhoea.

- The DDHMS found that use of oral fluids during diarrhoea was reasonably high from 69.4% in Kwale District to 93.0% in Kisumu, most of the fluids used being the recommended home fluids (65.6% to 90.7%).

- As many as 96.2% to 100% of the women continue to breast feed their children during diarrhoea. The average breast feeding duration was reported to be 19 months.

- The frequently given fluids are as follows:

Uji (gruel)	71.6%
Water	45.0%
Tea	30.1%

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Milk	18.0%
Fresh fruit juice	3.8%
Sugar salt solution	3.5%
Soup	0.9%
Coconut water	0.4%
Other	4.9%

- ORS is used in 10.1% to 29% of the cases of diarrhoea. Only 10.3% to 41.7% prepare ORS properly. The common fault in ORS preparation was mixing it in too little water. Only between 1.9% (Kwale) and 8.6% (Nakuru) children received correctly mixed ORS.

- 80.6% to 46.2% child caretakers reported continuing to feed during diarrhoea.

- The proportion of respondents (child caretakers) who knew when to take children to health facilities for further help ranged from 6.8% in Kwale to 50.5% in Kisii. Reasons prompting them to seek help from medical facilities included the following:

Many stools	62.4%
Very weak	42.8%
Not getting better	31.7%
Not drinking/eating	28.0%
Sunken eyes	17.6%
Do not know	5.2%
Skin pinch	3.1%
Other	22.8%

- Data to indicate whether ORT is given in adequate quantities is scant. The water content, elctrolyte balance, energy content and acceptability of additives which can make commonly used fluids, such as uji more suitable, needs further investigation Oniang'o and Alnwick found that although fermented uji was commonly used in some communites in Kenya, in most

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of them it was considered unsuitable for children below one year. Some Central Kenya tribes are however, known to add salt and margarine to their uji.

3. HOME TREATEMENT STRATEGY

3.1 CURRENT POLICY RECOMMENDATIONS

The current CDD policy recommendations for home management of diarrhoea are:

- Increase fluid intake during diarrhoea;
- Continued feeding during diarrhoea;
- Referral to a health facility when symptoms and signs of dehydrations are recognised;
- Extra feeding for a week after diarrhoea steps to promote catch-up growth.

Home fluids

Recommended home fluids include ceral gruels (uji), fresh fruit juice, coconut water, soups, breast milk and ORS.

Feeding during diarrhoea

The policy recommends exclusive breast-feeding during the first four months followed by a gradual introduction of semi-solid weaning foods rich in protein, calories and potassium. "These include mixtures of cereals and beans or cereals and meat or fish, fresh fruit and eggs. Foods should be well cooked and mashed to ensure that they are easily digestible. The policy encourages giving children small feeds at frequent intervals (five to seven times a day).

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Referral signs

A child should be referred to a health facility for further assistance when he has one or more of the following signs:

- Bloody or excessively watery stool;
- Very thirsty;
- Sunken eyes;
- Loose skin;
- Fever;
- Weakness;
- No improvement after two days.

3.2 ISSUES AND CONCERNS

The current diarrhoea home management recommendations raise a number of issues.

- What is the electrolyte balance of the fluids currently being given at home?
- Does the composition promote maximum fluid absorption in the gut?
- How much is given in any given period of diarrhoea?
- Are these fluids given in any standardised way?
- In the absense of standardised administration, how can the fluids be promoted effectively?

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- Can the fluids (and foods) be reasonably standardised for effective diarrhoea management and ease of promotion?

Two factors stand out prominently in the search for a future diarrhoea home management policy: the widespread use of uji throughout the country and the fact that of the children receiving ORS only between 1.9% and 8.6% received the right concentrations of the fluid. Nothing is known about the proportion who receive the fluid in adequate amounts. Even less is known of the electroly balance of the other fluids given (see 2.3), their ability to improve absorption in the gut or the amounts in which they are given during diarrhoea. This situation begs a more definitive diarrhoea home management strategy:

- Acceptable to the people;

- Within the ability of the people to implement with convinience and confidence;

- Which can be defined and communicated in precise terms;

- And whose performance can be effectively evaluated.

3.3 FOOD-BASED REHYDRANTS

Numerous studies in developing countries have shown that cereal-based oral rehydration solutions are as good rehydrants, in some cases better rehydrants than the standard ORS. In addition, they have nutritional value. Some studies found these solutions to reduce the stool volume, this meeting the desire of many parents. Maize and millet-based trials in Africa have produced results comparable to rice trials in Asia.

3.3.1 EXPERIENCE WITH PROMOTING STANDARDISED HOME-MADE REHYDRANTS

Attempts to promote am, a standardised of rice water drink as a home fluid in the Phillipines met with little success.

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Difficulties included:

- The vagueness of that country's CDD policy which only talked about "home available" fluids without naming them. This confused health workers. The policy was also unclear about the distinction between "home available" and "home made" fluids. Also the policy did not distinguish between fluid, food and medicine adequately. This was corrected later (Elizabeth Herman, 1989);

- Competition between the standardised rice water fluid with other drinks traditionally perceived to be superior and with more medicinal properties (eg herbal tea);

- Am was not a traditional drink; it was developed specifically for use during diarrhoea;

- Unclear distinction between the role of the new drink against the known drinks such as porridge, milk (especially powdered milk);

- Inconsistency in the preparation and administration of the new drink from one household to the next.

Nigeria considered the possibility of promoting a standardised, indigenous home-made drink for use during diarrhoea, but rejected the idea because of the difficulty of identifying a widely acceptable drink that would be acceptable the many ethnic groups in the country. Instead they settled for SSS.

Possibilities of promoting uji, perhaps in a modified form, have been identified in Tanzania although no other details are available on this possibility.

3.3.2 PROSPECTS FOR PROMOTING UJI

Uji is widely consumed by all age groups in most Kenyan societies.

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It is a popular weaning food and widely regarded as a food that gives strength during sickness or when the body is tired. Uji is also seen as a thirst quenching drink. These attributes should enhance its food, rehydration and medicinal qualities.

Advantages

Specific benefits in promoting uji as the principal home drink in Kenya include the following:

- it is widely available;
- it is a popular drink during sickness and weakness;
- some communities in Kenya already have a tradition of adding salt, margarine and/or fruit juice to uji;
- fermentation of uji is already a widespread practice.

More information is needed on:

- The concentrations of uji across the country and the amounts parents would be willing to give to children during diarrhoea;
- How frequently parents would be willing to give uji;
- Current water/cereal ratio and electrolyte balance of uji;
- Acceptable additives to improve electrolyte balance and improve absorption;
- Is uji currently perceived as food or as a drink?

Issues to be addressed

- Positioning of uji: food, drink or medicine?
- Putting "costs" such as efforts required to make uji, time, fuel, etc into a context.

- Standardising recommendations on preparation, feeding.

- Role of uji in weaning vs its role in preventing rehydration.

3.4 STRATEGY RECOMMENDATIONS

In view of the discussion above, it is our opinion that standardis uji can be promoted in Kenya to great advantage in:

- Saved costs;

- Improved levels of acceptability and compliance;

- Reduced dehydration among children with diarrhoea;

- Reduced mortality from diarrhoea.

Below we propose steps by which uji can be promoted effectively:

Step One: Continue implementing and promoting the CDD policy as currently set out.

Step Two: Carry out studies in preparation for promoting uji as the principal home treatment fluid. Studies should look into:

- Possibilities for standardised recommendations about the texture of uji;

- Acceptable additives;

- Quantities to administer;

- Availability of ingredients;

- Acceptability of the recommended uji;

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- Data on which to base an effective promotion strategy (perceptions about uji, vocabulary, communication channels, etc).

Step three: Strategy development.

Step Four: Strategy implementation in a limited area.

Step Five: Monitoring, evaluation and strategy modification.

Step Six: Wider strategy implementation; revision of CDD policy.

4. PROMOTION OF DIARRHOEA HOME MANAGEMENT STRATEGY

One of the least appreciated truths in programme implementation is that to a large extent, the success of programmes depend on promotion. Promotion becomes even more important when the programme requires that people are motivated enough:

- To appreciate the need to carry out certain actions;
- To carry out the actions accurately;
- And to carry out the actions on a sustained basis.

As a result of the inadequate recognition of communication as important process in project implementation, health communicatio has largely remained under-developed (Kenya National AIDS control programme review, 1989). As a result, many communication efforts "continue to shoot in the dark, without a solid scientific information base to guide the process" (Draft National IEC strategy in support of population and development programmes, 1990). Where communication has been its rightful role, it has shown a great potential for:

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- Creating awareness;

- Increasing knowledge;

- Changing attitudes and behaviour;

- Improving skills;

- Sustaining desired behaviour.

The quatifiable results achieved in promotion of ORT in Egypt, the Gambia, Swaziland, honduras and Bangladesh serve as an example of what adequately supported communication can do. At the minimum communication for promotion of ORT in Kenya should:

- Identify clear, specific, actionable messages;

- Include health worker education;

- Create demand for ORT;

- Provide for sustenance of deman and practice.

Below we offer suggests which could facilitate ORT promotion in Kenya.

4.1 SHORT AND LONG TERM COMMITMENT

Important factors which have influenced the success of communicatic activities have been funding and personnel. A shortage of either or both has resulted in low implementation and low achieveme levels. The Kenya CDD programme is very thin both on funding and personnel, especially at the headquarter level. These issues ought to be addressed to facilitate adequate planning and implementation of the envisaged communication campaign.

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In addition, an adequate ORT promotion plan will need to recognise that it takes time and effort to achieve behaviour change. The plan will need to provide for both short and long term activities and funding.

4.2 REACHING OUT AT THREE CRITICAL LEVELS

To enhance success, communication programmes should aim at reaching a critical mass of awareness (above 70% of their target audience) in the early stages of programme implementation. This can be achieved through use of mass, group and individual level media. Communication planning should also consider and, if necessary, plan for message phasing to achieve

- awareness, through;
- attitude and behaviour and
- sustenance of the new behaviour.

4.3 DEVELOPING EFFECTIVE AND CREATIVE STRATEGIES THROUGH RESEARCH

As in other fields, research can make communication more focused, relevant and effective. We recommend a research-based communicati process as follows:

4.3.1 Conducting of formative research to establish the main current knowledge, attitudes, practices, concepts, vocabulary, likes and dislikes, communication channels, etc.

4.3.2 Developing of a strategy based on research findings above. Among other things, the strategy should include:

- How to position ORT to maximise appeal and attract attention.
- Define the items of behaviour which require changing;

- Detail the process of changing them;

- Determine media and channels of communication on the basis of research;

- Define messages on the basis of research material and the desired change and identify few messages to communicate at a time;

- Specify a cost-effective material distribution and monitoring strategy which will also incorporate important allies and resources such as the leadership, NGOs, the community and resources.

4.3.3 Develop materials by the pre-test method.

4.3.4 Distribute materials and implement the strategy, including monitoring of the performance of educational material, and making the necessary adjustments.

4.3.5 Carry evaluations every two to three years and re-plan.

4.4 DEVELOPING STRATEGIES FOR SUPPORT AND SUSTENANCE

4.1 BUILDING NETWORKINGS

Networking maximise the impact of communication because it ensures that:

- Target groups hear the message from a variety of sources. This has several advantages:

  - the target can hear the message repeatedly. This may enhance comprehension;

  - hearing the message from different sources may give

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the message a sense of importance because it is supported by more than one source;

- some of the allies disseminating the message may be trusted more by the target and may be more effective in communicating with them.

- More resources are available for promotion of project activities;

- The message is disseminated beyond the reach of the health workers alone;

- Allies are available in the community to provide support to targets who are evaluating the message and those who are already acting on it.

Networking and participation in ORT promotion should be prompted with institutions and individuals in the community.

4.4.2 Developing reinforcement strategies such as:

- Effective health provide training programmes in key areas of content, communication processes and programme management.

- Strengthening planning, supervision and the management information system.

- Running periodic media campaigns to reinforce practice.

4.4.3 Matching demand and supply

4.4.4 Mobilising new resources such as:

- Increasing staff strength or upgrading capacity of existing staff;

- Negotiating long term funding commitments;

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- Enlisting the expertise and support of the private sector and other professionals.

4.4.5 **Integrating the ORT programme and messages into other child survival initiatives**

4.4.6 **Developing implementation capacity at the provincial and district level.**

This strategy was adopted by the CDD programme from its inception. District teams will need to be updated on new ORT strategies and given other forms of support to improve their skills for managing and implementing major a communication effort such as that required to promote ORT.

4.4.7 **Strengthening communication management,** especially strengthening the ability of the national and the district teams to manage a research-based communication process. Key skills that would need developing through training and on the job would include:

- Planning;
- Implementation;
- Supervision;
- Monitoring;
- Record keeping and utilisation;
- Review and adjustment.

4.4.5 **Maintaining a high technical standards** in all the above.

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COMMUNICATION SUPPORT STRATEGIES

FOR

PROMOTION OF USE OF ORAL REHYDRATION FLUIDS/FOODS BY MOTHERS AND OTHER RELATED TARGET AUDIENCES

A SYNOPSIS FOR CDD

RESEARCH REVIEW PANEL

ELLY ODUOL M.P.H.
Health Behaviour and Education Department
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15TH MAY 1990

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BEST AVAILABLE

COMMUNICATION SUPPORT STRATEGIES FOR PROMOTION OF USE OF ORAL REHYDRATION FLUIDS/FOODS BY MOTHERS ETC

INTRODUCTION

To strengthen any health development programme adequate consideration should be given to communication support component of the programme. Reason for this consideration is that many programmes fail to achieve their objectives because they lack the communication support component. When these programmes fail a call has often been made on communication experts to give such a programme motivation and education [illegible]. [illegible] as causes of failure are inadequately trained change agents, unmotivated community and a multitude of other causes. While the causes may be complex it seems clear that that the common thread which runs through many of these programmes is lack of or inadequately planned communication support component of the programme. This is because the [illegible] [illegible]

[illegible] problems, Non-behavioural problems, Predipoaing factors, Enabling factors, and Reinforcing factors, with regard to the promotion of use of oral rehydration fluids/food by mothers. Some of these issues may not be Kenya specific but have a bearing on planning communication strategies for promotion of oral rehydration foods/fluids use by mothers and other relevant target audiences.

THE PROBLEM

Behavioural Factors

- o Inability to make correct measurement of water, salt and sugar leading to wrongly mixed solutions
- o Poor distribution of ORS in the country
- o Use of contaminated water
- o Long instructions for users a disincentive for use
- o Choice of allopathic anti-diarrhoea mixtures
- o Delayed action to seek medical attention as diarrhoea continues
- o Prohibiting use of certain foods during episodes of diarrhoea

Best Available Document

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- Use of herbal remedies in the home
- Withholding food, milk and other fluids during diarrhoea
- Cleansing gastrointestinal tract with purgatives during diarrhoea
- Ritual and devotional practices to promote spiritual healing
- Different health seeking preferences e.g rituals, herbal remedies etc.
- Cutting of gums for teething diarrhoea or (Removal of plastic teeth to control/prevent diarrhoea)
- Health workers lamenting the unwillingness of target populations to change their ways and doing nothing about it.
- Unwillingness of health workers to incorporate ethnomedical research findings to promote ORT
- Men determining the health seeking options of treatment despite the fact that women are directly involved in the care of children
- Child care taker readiness/willingness to prepare and administer home made fluid
- Too many family chores to allow adequate time for mothers to look after young children
- Use of sidedishes with unknown sodium consent
- The child's willingness to eat
- Health workers reluctance to consider mother's per-ception of the cause, course and desired treatment for diarrhoea
- Different treatments for perceived different causes of diarrhoea illness as distinguished by the various cultures
- Frequent pregnancies resulting to neglect of other young children and discontinuation of breastfeeding

Non-Behavioural

- Mixture of too high/low concentrations of salt
- Lack of utensils for standardization of measurements
- Difference in grain (crystal) sizes and moisture contents of sugar and salt available in the homes
- Difference in salinity of ground water

- Scarcity of fuel energy inhibiting the Teaching of boiled water which is cooled for mixing ORS
- Lack of conceptual framework that incorporates ethnographic data in programmes
- Lack of established policy on home theraphy for diarrhoea treatment
- A wide range of compositions of home fluids made by mothers from ethnic group to ethnic group (different food-based solution which are peculiar to certain part of the country) hence difficulty in promotion of one specific solution
- Taste of the fluid (lack of appeal as a therapy)
- Lack of intensified communication activities to promote self and prevention of diarrhoea incidence
- Different teaching methods on how to measure the required amount of ingredients hence improper instruction to mothers by health workers and others
- Relying on radio and health workers for dissemination of information and neglecting traditional forms of communication (inadequate use of folk media)
- Poor pre-illness nutritional status of children

Predisposing Factors

<u>Knowledge</u>

- Inability to remember instructions correctly
- Unawareness on the part of mothers on the common dangers of diarrhoea
- Lack of understanding of the association between diarrhoea, water and sanitation: use of latrine, washing hands, keeping food safely
- Confusing and/or diverse away of treatment recommendations from relatives and others in the social network
- Lack of understanding of the factors which affect food choices in respective target populations
- Inadequate knowledge on cultural determinants of feeding practices during and after diarrhoea
- Mothers inability to assess acuteness of the diarrhoea and progress

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- Primary health care workers (CHWs, TBAs, including dispensary workers) inability to identify infants who require individualized attention.

- Blurred distinction between foods, weaning foods and food based fluids.

- Death of dehydrated children without access to ORS incase mothers are only taught to give extra water and food during diarrhoea.

- Many pathogemic causes responsible for diarrhoea affecting mothers capability to asses the magnitude of diarrhoea

Values

- High Value placed on industrially prepared ORS

- Culturally sanctioned responses to illness e.g rituals

- Possibility of recommended fluid being in consistent with cultural norms about the treatment of diarrhoea

- Selective elimination of certain foods based on cultural [illegible] taboos.

Attitudes and Perception

- Assumption that availability and affordability of home fluids will make mothers find it convenient and desirable for management of diarrhoea.

- Familiarity with the recommended home made fluid

- Teething believed to be cause of diarrhoea

- Diarrhoea associated with measles perceived as a favourable sign to the resolution of measles

- Continuing to eat and drink perceived as likely to fuel the symptoms

- Diarrhoea perceived as a process of stomach cleansing

- Diarrhoea inflicted on the victim by others through the evil eye

- Commoness of diarrhoea perceived as a normal process of life in childhood

- Diarrhoea a normal phenominon during harvest period

- Unpalatability of porridge after the additional ingredients

- Extra fluids and food not perceived by mothers as something special.

- Some home fluids perceived as "food" while others as "medicines" which also determine quantities administered

- Lose of confidence in the health worker if child on extra water and food during diarrhoea dies

BEST AVAILABLE

JUSTIFICATION

Enabling Factors

- Less costly than the conventional intravenous therapy

- Can be made accessible cheaply to most diarrhoea victims or widely available.

- Safe method for the treatment of watery diarrhoea

- Easily affordable

- Use of food the child is familiar with

- Availability of basic ingredients in most households for preparation of ZSS or cereal based oral rehydration solution

- Availability of containers for preparation of oral rehydration fluids

- Not dependent on a delivery system

- Availability of trained personnel in some regions to enhance further training of extension agents

- Involvement of the mother, whenever a child is admitted with diarrhoea, in treatment and management of diarrhoea to facilitate her recognition of importance of feeding during diarrhoea which influence practice during future episodes.

Reinforcing Factors

- Food based home fluid eliminates use of contaminated water for mixing of ORS

- Use of food the child is familiar with

- Food based home fluid reduce time spent on separate home fluid

- Food based home fluid may eliminate giving wrongly mixed solution

- Food based home fluid may increase popularity of ORT

- ORT trials carried out have shown great improvement in reduction of case fatality rates

- ORT has shown reduction of cost of treatment of diarrhoea
- Cereal gruels are in safe range of fluids to be advised as a home fluid with or without addition of salt
- Continuing breastfeeding throughout the course of diarrhoeal illness
- Porridge seemingly universal food for weaning in the country.

THE OBJECTIVES

- To help develop guidelines for families to manage and treat diarrhoea
- To enlist the support of older siblings, grandparents, fathers and child care takers in management of diarrhoea at home
- To employ appropriate communication strategies which would influence behaviour of mothers in the management and treatment of diarrhoea
- To strengthen use of indigenous systems and resources in diarrhoea management and treatment
- To develop messages tailored to address knowledge, attitudes, perceptions, values and behaviours to effect desirable behaviour change.

THE COMMUNICATION STRATEGIES

Introduction

The implementation of health promotion and disease prevention projects relies upon both mass media: radio, television, print and indigenous media and face to face communication. Each plays a complementary role in providing different audience segments with information, skills and action reminders as required to stimulate, transfer and maintain a set of critical behaviours being promoted. The face to face component facilitates intensive training for mothers older siblings, fathers, grandparents, child care takers, community leaders and community health workers and provides continued peer support to mothers. Even though our main target audience is the mother as an individual, we cannot lose sight of other levels like the family and the community because these levels of intervention also dictate our message strategies for the varying audiences on whom the program activities depend for diffusion and eventual innovation. However, use of mass media and interpersonal channels to achieve specific communication objecting are dependent of the broader policy. It is at the policy level where sequence of events begins that leads to an effective communication programme.

Audience Strategy

For a programme like promotion of use of home based fluids for management and treatment of diarrhoea a number of potential audiences need to be identified to strengthen existing social network of interpersonal communication to influence adoptive behaviour. The audience appropriateness depends on what needs to be done and by whom. There are those who influence the actors and then the actors themselves and of course the service providers. The determination of target audience helps in developing appropriate messages for specific audiences. There are those audiences with the knowledge and resources, those with knowledge and lack resources, those without knowledge but have resources and those lacking both knowledge and resources or have a minimum of these two.

Individual Level Intervention: This level of intervention deal specifically with the target population of mothers of children under five years of age, fathers and child care takers. These have specific roles in acceptance and utilization of home based-fluids for management and treatment diarrhoea.

Family Level Intervention: The intervention at this level mainly address mothers of children under five years of age, older sibling, grandmothers, co-wives and fathers who will be reached by change agents through home visits, women group and community group meetings. The family level operates on a social support system on which each and every member of the family depends.

Community level Intervention: At this level, the intervention involve training of informal community leaders; TBAs, CHWs, Teachers, religious leaders, adult literacy teachers, traditional herbalists (change agents) who, in turn, are to disseminate the ideas through home visits, peoples assembly meetings (baraza), and use mass media -- traditional, print and electronic media to reach the target audience.

MESSAGE STRATEGY

The Principal content for a communication programme must be identified. It is necessary to identify major themes that will be used keeping in mind that it is important to distinguish between messages designed to inform or reinforce (cognitive) and those intended to move a person to action (motivational) and those essential for carrying out action (behavioural). In otherwords messages and themes need to address misconceptions, beliefs/values/attitudes/perceptions and strengthen positive attitudes/practices and expectations. In the problem synthesis in this paper I have addressed issues on behavioural problems and predisposing factors which need to be addressed. These messages and themes need to be scheduled logically so that particular themes are for particular phases of the programme.

MEDIA STRATEGY

The selection of media for a specific programme must take into account the programme goals and the audience to be reached. What available appropriate media can we use to transmit the message to the audience? The variety of media available for communication programme may vary from place to place. The choice may range from inter-personal communication during a home visit or using indeginous media systems to mass communication via the radio, television and print materials. Multi-media approach will ensure integration and reinforcement of messages and will have a multiplier effect in the community. The following media could be used in varying situations:

Folk Media

Folk media can be developed into an effective tool for no-formal education for promotion of use of oral rehydration fluids/foods. It can there be used to calculate concerns, needs, demands and clarify the nature and magnitude of the diarrhoea problem lighten peoples understanding of factors responsible for diarrhoea and how to manage and treat it.

Among the Kenya tribes there are traditional musicians who entertain the public during ceremonies and rites/rituals. Most of these have not been exploited adequately to help in disseminating health information to the rural population. In Nyanza, I know they are a powerful force in influencing political status of individuals.

Choirs (Songs)

These could be drawn from women's groups church, school and other institutional choirs. Their entertainment influence has the attention catcher capability for disseminating health information.

Electronic Media

Radio

The use of radio for disseminating health messages cannot be over-emphasized. Radio messages generate discussion among the public. It is both useful for creating awareness and providing the necessary knowledge. It is quite effective when different formats are used e.g. interview, discussion and drama. When addressing specific audiences it would be advisable to record 'satisfied consumers' and local opinion leaders during discussions and interviews in VOK vernacular programme. Recording of health songs should also be encouraged.

Tape/cassette Recorders

Audio cassette players provide greater flexibility than radio. The messages can easily be repeated without the sender getting bored or fatigued. Designing content for the cassettes is important. You can record discussions, interviews, songs and drama on health. Messages can be those recorded from

authoritative sources, local health workers, opinion leaders to 'satisfied consumers'. They can easily be used during group discussions at various settings.

Slide Shows

Slides should be developed on specific topics of concerned e.g. ORS preparation and administration. Slides developed with synchronized messages in kiswahili and possibly local languages can be very useful teaching tools in groups. To develop a good sequence for slides, it is advisable to write story-boards. This will also help in building the appropriate messages.

Phonograph records

Currently some of the available health films are not suitable to the rural audience. The development of films depicting local situations and relevant to the health needs should be explored. Otherwise films are a necessary tool for mass education. A mobile cinema van would be useful for mass film shows. This could further be used during epidemics and at emergency relief service areas.

Captions for cinema halls

This is one way of reaching the urban population with health messages. Captions can be useful aids for creating awareness.

PRINTED MATERIALS

Learning about better health goes beyond gaining new knowledge to actually acquiring and adopting improved health practices. Health learning materials or teaching aids should help promote effective teaching-learning for better health development. Learner levels, education and cultural environments differ from area to area. The health learning materials should be a mixture or combination of adaptable educational materials with specific audiences in mind. These materials should stimulate learners to actively explore and act on those health problems and issues that will promote use of oral rehydration fluid/food for management and treatment of diarrhoea. This of course means that the health learning materials must transcend the "information" role. They must now sensitize, explore problems, create learning activities/exercises, the learners must be urged to find solutions for themselves. This strategy deals with basic changes in values and practices so that mothers, families etc. can act as implementers and adopt specific innovations and behaviour which is conducive to child survival.

Develop training materials for:-

- Community Health Workers (CHWs)
- Traditional Birth Attendants (TBAs)

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- Family Planning Motivators
- Adult Literacy teachers
- Women group leaders
- School teachers/leaders
- Other Extension agents

Develop materials for schools for oral rehydration fluis/food programme. for example:

- jig-saw puzzles
- booklets - (comic or photoevella booklets)
- board games
- card games
- word scrabble exercises
- crossword puzzle leaflets. etc.

For listener groups in project areas for radio programmes with support materials:

- instructional flyers
- flip charts
- leaflets
- booklets
- recorded cassette songs.
- charts
- calendars
- gameboards
- boardgames

COMMUNICATION SUPPORT MATERIALS CHART

PRINTED MEDIA	TRADITIONAL	ELECTRONIC	AUDIENCE/ACTIVITY
1. Calypso booklet	Formation Folk-songs for drama/ dance	Taped song broadcast over radio	a) Child-child in schools b) Listening groups - adult literacy - women groups, etc
2. Instruction flyers' folder hand-out/leaf-lets	-	Supported/ reinforced radio	a) Women groups b) CHW c) TBA
3. Card games Crossword puzzle leaflets Word scrabble leaflets Word description Drama illustra-tions. Jig-saw puzzles	-	-	a) Child-Child in schools b) Teachers-child in schools c) Adult literacy groups d) Women groups
4.		Slide shows films	a) TBA b) CHWs c) Adult teachers d) Listening groups e) Health workers/ patients
5. Charts Flip charts Posters flash cards			All audiences depending on the learning needs and activity/top of concern
6. Training modules and booklets			Extension agents
7. Transparencies		Transparent	Health workers
8. Carbon booklet			Health workers
9.		Cassette recorder	Village health workers
10. Photographs			
11.		Slides with synchronized messages	Facilitators Health workers

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CONCLUSION

In this paper, I have given a general outline of communication strategy and stressed the complementary role of mass media and inter-personal channel to achieve specific communication objectives. This paper, however, is not a comprehensive strategy that may involve other sectors. It is after a programme policy has been formulated that a comprehensive communication strategic plan can be developed to provide a systematic intervention which indicates the role the various audiences and sectors will play in achieving the policy goal. Inevitably, communication must be seen as the spinal cord that keeps the programme running just as evaluation and monitoring remains the backbone with other technical components of a programme being the flesh that gives the programme its beautiful shape.

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