

Diarrhoea Dialogue



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Reducing the risks

The main article in this issue by Professor G.C. Cook on the causes and control of chronic diarrhoea could arouse dismay among readers working in isolated places where drug supplies are scarce and referral possibilities very limited. Nevertheless they should not lose heart, for there is still a great deal that they can do to break the vicious cycle of chronic diarrhoea.

Simple preventive measures

It may be true that drugs are essential to cure established parasitic infections. However, improved environmental and personal hygiene together with more health education and advice about good nutrition can all combine to considerably reduce the risks which lead to the need for drugs and expert treatment.



WHO photo by J. Marshall

Preventive measures — better child hygiene.

Helping people to help themselves

Diarrhoea Dialogue's main purpose has always been to show how people can protect themselves against diarrhoeal disease. Early oral rehydration ought to be the immediate family reaction when acute diarrhoea occurs. This not only stops unnecessary deaths from dehydration but reduces the chances of malnutrition becoming associated with the infection. Several items in this issue stress the importance of early and proper feeding in diarrhoea and the value of breastfeeding young children. Similar nutritional principles



Photograph by Stanley Barnes

Could he eat better for the same money? See page three.

apply to adults as well as children, especially where the nutritional status of the whole population is marginal.

Value of an early warning

Earlier issues of *Diarrhoea Dialogue* have also stressed the importance of recognizing the cause as well as the effect. Wherever environmental health is poor, simple epidemiological techniques and the kind of diagnostic tests that can be carried out in the laboratory of a small hospital or large health centre will warn about the presence of organisms such as *Entamoeba histolytica* and *Giardia lamblia*. The new diagnostic wall charts from the Ross Institute (see page two) will be useful aids in this detective work. Outbreaks of these infections can then be quickly controlled or, better still, prevented.

To extend this possibility, the next issue of *Diarrhoea Dialogue* will take laboratory techniques at all levels of health care as its main theme.

W.A.M.C. and K.M.E.

In this issue...

- Causes and control of chronic diarrhoea
- Fighting malnutrition in Dacca
- Questions and answers

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ORT in high fashion

The July issue of VOGUE magazine contains an excellent description of the universal value of oral rehydration therapy in treating diarrhoea. The article was written by Dr Michael O'Donnell after a visit to Thailand. Breastfeeding is now the fashionable thing to do; we hope that oral rehydration will become equally acceptable everywhere.

Reviews

Oral rehydration therapy: an issue of growing controversy
Booth I W and Harries J T 1982
Journal of Tropical Paediatrics, 28: 116-123

Knowledge about the causes and management of acute diarrhoea has greatly increased over the last 15 years leading to better understanding rather than controversy about the main issues. Since the above article was published, an important paper (reviewed below) has shown that, even in well-nourished children in the United States, the WHO/UNICEF formula is safe and effective when used correctly. This is not to say that it is necessarily the only effective oral rehydration solution (see page seven).

The growing acceptance of oral rehydration therapy worldwide was also reflected in the findings of a meeting held in Baltimore, USA earlier this year (see below).

Obviously, several points need further study; for example, which is the most suitable carbohydrate for an oral rehydration fluid in a particular area and what is the role of food in the treatment of diarrhoea?

Oral rehydration therapy of infantile diarrhoea.

A controlled study of well-nourished children hospitalized in the United States and Panama.

Santosham M et al 1982

New England Journal of Medicine, 306: 1070-1076

This significant study among 146 well-nourished children admitted to hospital

with acute diarrhoea in the United States and Panama supports the efficacy of oral rehydration therapy and the WHO concept of a single formula as being universally applicable.

Additional water was given on demand after the first 24 hours or earlier if the diarrhoea ceased. Vomiting or hypernatraemia did not cause problems and the results show that the expense and discomfort of intravenous therapy is difficult to justify.

US paediatricians recommend ORT

Paediatricians, epidemiologists and public health workers, all with extensive worldwide experience, who met at Johns Hopkins University in March 1982 recommended oral rehydration therapy as a safe, effective and inexpensive method of treating acute diarrhoea in both developed and developing countries.

Agreement was reached on the controversial issues of:

— appropriate composition and methods of use of oral electrolyte glucose solution for rehydration; maintenance of hydration during diarrhoea; and prevention of dehydration.

— feeding advice during acute and subacute enteritis.

The following guidelines were issued for both developing countries and the United States:

1. The WHO formula (ORS) is a suitable oral rehydrating solution regardless of the aetiology or severity of the diarrhoea. The volume to be given should be assessed clinically to replace the estimated deficit.

2. Dehydration can be prevented by using ORS together with additional fluids for infants, such as breast milk on demand, or one part plain water to two parts ORS, or juices containing potassium, such as orange juice.

3. Where economically and practically feasible, a separate solution may be used preventively or to maintain hydration. Containing less glucose, more sodium, potassium, and bicarbonate or citrate than many commercial oral electrolyte solutions, its intake should be limited to avoid an excess of electrolytes and additional fluids such as plain water and breast milk must be freely given.

Feeding advice

The need to promote optimal nutritional intake during and immediately after episodes of diarrhoea was stressed. The use of ORS promotes appetite and continuation of breastfeeding should be encouraged. Milk formulas containing lactose should be avoided for one or two days and only resumed cautiously. The same applies to cow's milk. Cereals, bananas, potatoes and other carbohydrate-rich foods should be given as soon as possible, especially to children with borderline nutritional status.

The group agreed that more knowledge is needed about optimal feeding practices in diarrhoeal disease and recommended the use of locally available foods for this purpose. The recommendations of the meeting were signed on behalf of the group by Dr L. Finberg, Dr P. Harper, Dr H. E. Harrison and Dr R. B. Sack.

Wall charts published

In issue nine of *Diarrhoea Dialogue* we mentioned two wall charts, aimed at senior and middle level health workers, being produced at the Ross Institute of Tropical Hygiene in London. The charts have now been published and give 'at a glance' information about the causes of diarrhoea, therapy, transmission routes, epidemiology and control measures.

For further details please write to Dr Isabelle de Zoysa, Ross Institute of Tropical Hygiene, London School of Hygiene and Tropical Medicine, Keppel Street, London WC1E 7HT, U.K.

In the next issue . . .



We look at different levels of laboratory techniques in diarrhoeal disease control. *Diarrhoea Dialogue 11* will be published in November 1982.

Please write and let us know if there are any subjects that you would like us to include in the 1983 issues of *Diarrhoea Dialogue*. We are already planning features but do need to have suggestions from you.

Better food for the same money

Katherine Elliott reports on a project in Dacca where nutritional self-reliance is encouraged to combat malnutrition.

In Bangladesh, malnutrition kills many small children, almost always in combination with diarrhoeal disease and respiratory and other infections. Xerophthalmia (blinding malnutrition) is common and thousands become blind unnecessarily each year. In 1975, the Save the Children Fund (UK) set up the Children's Nutrition Unit (CNU) in Dacca where Dr Sultana Khanam is now Medical Director.

Assessing the child

On arrival, the child is weighed, measured and examined to assess the degree of malnutrition and to establish the presence of any complicating factors needing special treatment other than adequate feeding. Children who are 60 per cent and below their correct weight-for-age, 70 per cent and below their correct weight-for-height, and all cases with nutritional oedema fall within the third degree of severe under-nutrition. These, and others with second degree malnutrition and additional complications, are admitted to the 60 bedded Unit, which runs a twenty four hour service.

Early rehydration

In the Unit, dehydration is corrected and infections diagnosed and treated accordingly. Feeding begins at once and is carefully planned for maximum catch-up growth. The amount recommended is 150–200 calories per kg of body weight in each 24 hours, including 3gm per kg of high quality protein. In the most severe cases, a nasogastric tube may have to be used but most children, with persuasion, will drink from a cup or can be fed with a spoon. Milk feeds, made from dried skimmed milk reconstituted with additional glucose and oil, are given two-hourly throughout the twenty four hours. This frequency of feeding is essential to avoid hypoglycaemia (low blood sugar).

Solid and milk feeds

Cooked solid meals are also offered

four times a day from the beginning. Locally available foods are prepared appropriately but with salt omitted for those with kwashiorkor oedema. Every plate of food is weighed before and after feeding to calculate the daily calorie intake. A percentage refuse solid food initially but appetite usually quickly returns and all children receive as much as they can eat. The recommended full diet on recovery consists of three cooked meals — breakfast, lunch and supper — together with four milk feeds of 180 ml (six ounces) to be given between meals.

Vitamin and mineral supplements are also given. Gross vitamin A deficiency (keratomalacia and xerophthalmia) is treated with intramuscular injections of 100,000 i.u. a day for three days and all receive vitamin A by mouth prophylactically. Anaemia is invariably associated with malnutrition and iron is given by mouth as ferrous sulphate (4–6 mg/kg of body weight per day). In very severe cases, intramuscular iron therapy and blood transfusion may be required. Multi-vitamin preparations and folic acid are given routinely — also 5–6 mg/kg of potassium and 1 mg/kg of magnesium for the first 10 days. Lugol's iodine helps to correct any iodine deficiency.

Involvement of mothers

The signs of cure are based on a steady weight gain up to within 75–80 per cent of normal, together with a renewal of activity and interest in the surroundings. Most children are ready for discharge within three to four weeks. They are given BCG vaccine where indicated, and other immunizations are started before they leave and completed in the follow-up clinic.

It is very rare indeed for a child to be re-admitted for malnutrition although the family will often return for emergency advice if any illness occurs. The success lies in the close involvement of the mothers who are admitted with their children to the Unit, help

with their care and feeding and learn how to continue an adequate diet, using foods which are readily available locally. Breastfeeding mothers are encouraged to continue and it is worth re-emphasizing that all the feeding in the Unit takes place using a cup, plate and spoon. No feeding bottles are ever used.

Practical teaching

Children with milder degrees of malnutrition and without complications are seen as out-patients. They and their families are asked to attend each day so that the child's progress can be monitored and the older members can learn about the best kinds of food to buy with the limited money they have available. They are shown how the rice, legumes, vegetables and oil can all be cooked together in the same pot, adding the customary hot spices only after the baby's portion has been taken out.

They also learn how much food a small child needs to keep healthy and grow normally, and to make sure the child not only receives but actually eats its fair share. The Unit has an outdoor kitchen where this teaching takes place in a practical but informal fashion. Dr Sultana reckons most mothers learn all they need to know in two or three weeks. Later children in the same family seldom suffer from malnutrition.

Patience and enthusiasm

The enthusiasm and dedication of all the staff at the CNU inevitably rubs off on the families who attend. Persuading apathetic children to eat demands patience and, for the severely ill, recovery is very much dependent on persevering with the two-hourly milk feeds throughout both the day and night. Such gross malnutrition could be daunting but only about seven per cent of the worst cases die and this is usually within the first 48 hours.

Widespread influence

The Unit, although crowded and short of resources, is spotlessly clean and well kept, the surroundings are colourful to stimulate the children's interest — and even the weakest child has a toy close by. It is not surprising that the influence of the CNU is widespread within the surrounding community and is an example for other deprived areas.

Causes and control of chronic diarrhoea

A vicious cycle

Professor G. C. Cook considers the range of factors that can produce chronic diarrhoea.

How do we differentiate between acute and chronic diarrhoea? The division is not precise but, for this article, chronic diarrhoea lasts for at least one month. Acute diarrhoeas always get better more rapidly and their causes and treatments have been reviewed in earlier issues of *Diarrhoea Dialogue*^(1, 2).

Major causes of chronic diarrhoea

The vicious cycle associated with chronic diarrhoea shown in the diagram applies in all countries. There is always a need to check that too many purgatives, or antibiotics, have not been given over a long period. Surgical causes are rare in developing countries but general illnesses such as thyrotoxicosis and anxiety neuroses should be considered. The age of a child can be a factor in diagnosing the cause of chronic diarrhoea (for example cows milk protein sensitivity in very small infants; post-weaning malabsorption following repeated infections).

A future issue of *Diarrhoea Dialogue* will deal with parasite-related diarrhoea in more detail. The signs and symptoms vary with the cause but simple observation can give some clues. Diseases of the small intestine, liver and pancreas usually produce continuously large, very soft and sometimes watery stools. With diseases of the large intestine, the stools are usually small and contain blood, mucus and pus — and the diarrhoea may alternate with periods of normal bowel function.

Causes associated with the small intestine

Tropical malabsorption In tropical countries, mostly in Asia and Central America and very occasionally in Africa, chronic diarrhoea, associated with malabsorption, occurs in a condition that used to be called 'tropical sprue' but is now referred to as post-infective tropical malabsorption (TM). The problem usually follows acute diarrhoea, and bacteria such as *E. coli*,

Enterobacter cloacae or *Klebsiella pneumoniae* remain in excessive numbers in the small bowel, probably due to adverse changes in its structure and movements.

Large, bulky, fatty, foul smelling stools, which sometimes float in water due to excessive gas bubbles, may occur. If the condition is not treated, there may be severe weight loss and eventually death. All the absorptive functions of the small intestine may be found to be abnormal, if these can be investigated. Where the diet contains a significant amount of fat, examination of the stool will show fat droplets which stain with Sudan III. This is evidence of fat malabsorption or steatorrhoea. Tetracycline (250 mgs three times a day for 14 days) and folic acid (5 mgs three times a day for 28 days) is the appropriate treatment.

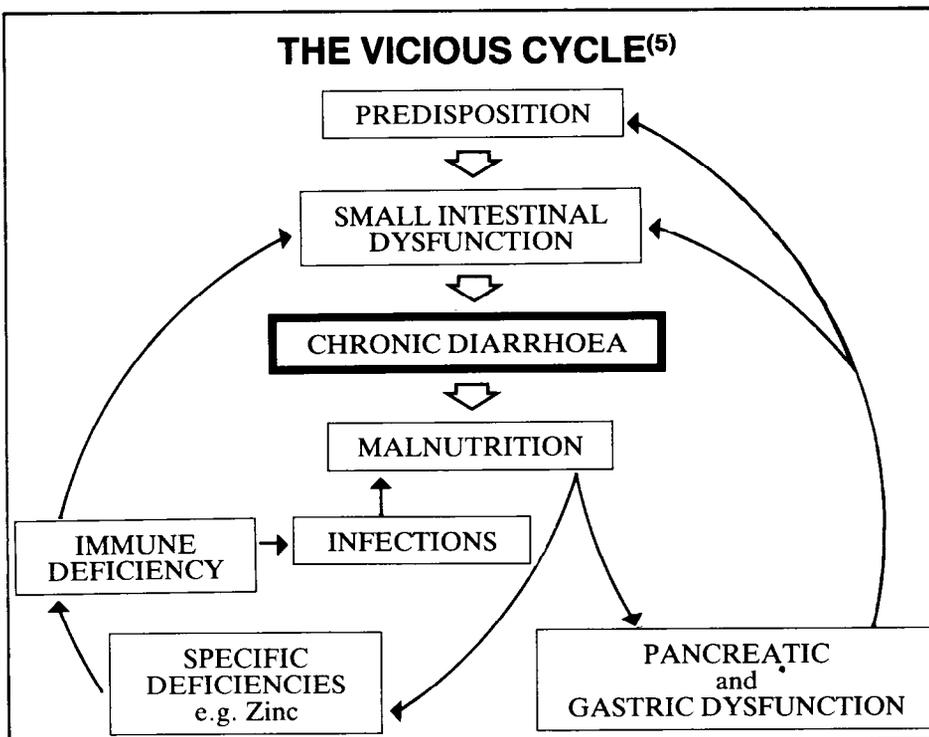
Dietary causes A component of food grains (particularly wheat) known as gluten can cause small bowel disease (gluten enteropathy or coeliac disease). The mucosal lining of the gut is more severely affected than in tropical malabsorption and the condition can, on rare occasions, be provoked by tropical exposure. The only effective treatment is to completely remove gluten from the diet; there is no response to antibiotics and folic acid.

Hypolactasia is a deficiency of the digestive enzyme which splits lactose, the sugar found in milk. Any condition which damages the mucosal lining of the small intestine can produce hypolactasia. It also occurs any time after three or four years of age as an inherited characteristic among a significant range of populations. Chronic diarrhoea results if large amounts of milk are consumed but the absorption of other foods is not affected.

Severe malnutrition^(3, 4) can also cause chronic small intestinal diarrhoea.

Surgical causes Removal of a length of the small intestine for a variety of reasons, such as injury, can produce chronic diarrhoea and there may be severe vitamin B₁₂ malabsorption and anaemia.

Parasitic causes The most important parasites affecting the small intestine are *Giardia lamblia* and *Strongyloides stercoralis* — also Kala-azar in some regions. All can lead to chronic



J. T. Harries

diarrhoea with malabsorption. These will be described in detail in a future issue of *Diarrhoea Dialogue*.

Photographs by Professor G. C. Cook.



Larval stage of *strongyloides stercoralis*.

Tumours and tuberculosis

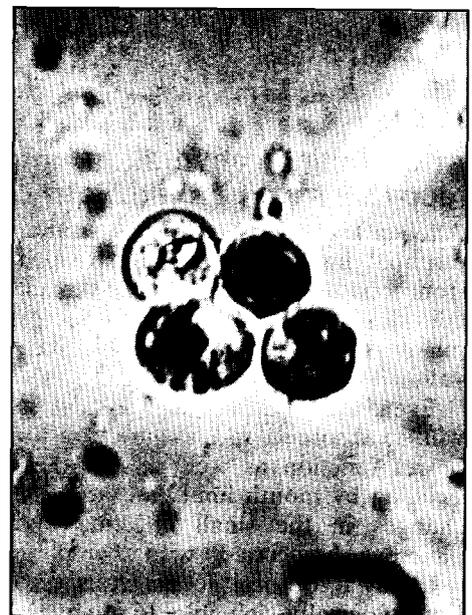
Certain tumours of the small bowel, e.g. lymphomas, may produce chronic diarrhoea.

Tuberculosis of the lower part of the small intestine (ileum) and caecum is an under-diagnosed cause of chronic diarrhoea and malabsorption. It starts with weight loss and low grade fever. Drug treatment for tuberculosis is essential and blockage of the bowel may require surgical intervention. The possibility of T.B. infection must always be kept in mind or the disease may be missed.

Causes outside the small intestine

Liver disease, either acute or chronic, can also produce diarrhoea and malabsorption. Hepatitis and cirrhosis are both common in developing countries due to viral infection and to alcohol and other toxic agents.

Chronic inflammation of the pancreas with calcification, possibly caused by childhood malnutrition, is not an uncommon cause of chronic diarrhoea and malabsorption in some parts of the developing world — e.g. tropical Africa, southern India and Indonesia. It may be associated with diabetes mellitus, which requires careful treatment with a low carbohydrate diet and special drugs. Any deficiency of pancreatic digestive enzymes can be partly replaced by giving pancreatic extracts by mouth.



Trophozoites of *Entamoeba histolytica* in a fresh stool specimen (left) and the cystic form (right).

Causes associated with the large intestine

As described at the beginning, chronic diarrhoea due to factors affecting the large bowel has different characteristics. Using a microscope, pus cells are usually visible in large numbers and are best seen if methylene blue or other stains are used.

Parasitic causes *Entamoeba histolytica* and, more rarely, *Balantidium coli* infections of the large bowel produce chronic, usually intermittent, diarrhoea with blood and mucus in the stools. Using a microscope, trophozoites and cysts can be readily identified in fresh stool specimens. Treatment is with metronidazole (800 mgs three times a day for five days), and diloxanide furoate (500 mgs three times a day for ten days) for those who continue to have cysts in their stools.

Particularly in Egypt and the Sudan, intermittent large-intestinal diarrhoea can result from *Schistosoma mansoni* and *S. japonicum* infections. Praziquantel or oxfamiquine are now the treatments of choice; older drugs are less effective and also more toxic.

In children, heavy infections with *Trichuris trichiura* may very occasionally produce chronic, bloody diarrhoea and mebendazole (100 mgs three times a day for three days) is the treatment of choice.

Infections associated with antibiotics Antibiotics are widely used in developing countries and antibiotic-associated,

pseudo-membranous colitis is an occasional sequel, especially with clindamycin, and lincomycin, but most antibiotics have been incriminated in this condition. Bowel damage is probably caused by the toxin from growth of a bacterium, *Clostridium difficile*, in the gut. Treatment with other antimicrobials, vancomycin and metronidazole is usually effective.

Inflammatory bowel diseases (ulcerative colitis and Crohn's disease) and diverticulitis are unusual in most developing country populations. They may be started or exacerbated when visitors move from temperate climates to the tropics. Colonic carcinoma is also unusual in tropical populations but should not be forgotten as a treatable cause of chronic bloody diarrhoea.

Professor G. C. Cook, Hospital for Tropical Diseases London, UK.

(1) Candy D 1981 Finding the guilty organisms. *Diarrhoea Dialogue* 7: 4-5

(2) Lambert H P 1982 Cautious prescription. *Diarrhoea Dialogue* 8: 4-5

(3) Cook G C 1980 Tropical gastroenterology. Oxford University Press, Oxford, New York, Delhi.

(4) Rowland M G M 1981 The diarrhoea-malnutrition complex. *Diarrhoea Dialogue* 6: 4-5

(5) Harries J T 1982 In The Leonard Parsons Symposium on Chronic Diarrhoea. Ed. McNeish A S University of Birmingham (in press).

Feeding and chronic diarrhoea

After initial rehydration, proper feeding is essential for recovery from chronic diarrhoea.

Adequate protein, energy and other essential nutrients must be provided from food to reduce the risk of further episodes of diarrhoea, protein energy malnutrition (PEM) and death. **Starvation is never appropriate.**

Even in chronic diarrhoea some food will be absorbed and is important for bowel function as well as nutrition. Feeding by mouth limits the atrophic changes in the small intestine and pancreas associated with complete withdrawal of oral feeds. It is also psychologically valuable to maintain eating habits.

Importance of breast milk

Breast feeding should be continued wherever possible, even during initial rehydration, because breast milk provides important immunological protection against infection as well as being the safest, cheapest and most nutritious food for young children with chronic diarrhoea. Where socially acceptable, freshly expressed, donated breast milk or 'wet nursing' can help out if the mother's own supply is insufficient or has been discontinued and cannot be re-established. Cow's milk may damage the intestinal lining causing subsequent intolerance. It should

therefore be avoided where alternatives are available but soya-based formulae (e.g. Formula S by Cow and Gate and Proso-bee by Mead Johnson), although nutritionally adequate, are expensive. Home made versions, like ground nut milk, and some commercial preparations are not sufficient as the only food source⁽¹⁾.

Sucrose (cane and beet sugar) intolerance is thought to be uncommon. Starches, such as rice powder or arrowroot, are well tolerated but again, in chronic diarrhoea, their low protein, mineral and energy content demands very careful supplementation.

Supplementary foods

Supplementary solids should be given as milk free multi-mixes made from locally available foods selected for high energy and nutrient content. Small portions should be offered five to eight times a day and the child coaxed to eat. Oral fluids to maintain hydration must be continued for as long as diarrhoea persists. Body stores of potassium are depleted in chronic diarrhoea so foods high in potassium are important, for example, bananas, orange and pineapple. Highly spiced foods, e.g. chillies, and large quantities

of legumes (peas, beans and dhal) may cause increased stool output. Food should be freshly prepared, ideally for each meal, to reduce the risk of microbial infection. Take great care to protect and preserve food which will be fed later.

TABLE B Modification of goat's milk for infant feeding

	Protein (g/100ml)	Carbohydrate (g/100ml)	Fat (g/100ml)	Energy Calories
75 ml boiled milk	2.5	3.5	3.4	53
25 ml boiled water				
5 g sugar or glucose or 7 g honey		5.0		20
100 ml total=	2.5	8.5	3.4	73
Vitamins A, D, C, B ₁₂ , folic acid and iron should be supplied from other sources.				

At the Hospital for Sick Children, London, I frequently use a diet made from commercially prepared comminuted (very finely ground) chicken⁽²⁾. This can be adapted for developing countries (see Table A). Other mammalian milks are sometimes tolerated by children sensitized to cow's milk protein, but these need modification for infants along the lines given for goat's milk in Table B.

If possible, mothers and other relatives should help, not only with the actual feeding, but also with the preparation of any special diet. This will encourage them to continue to provide suitable food after the child returns home. It is important to follow up undernourished children, especially those with chronic diarrhoea. Long-term malnutrition predisposes to further infections creating the vicious cycle of more malnutrition leading to death.

Dorothy Francis, SRD, Group Chief Dietician, The Hospital for Sick Children, Great Ormond Street, London, UK.

TABLE A Alternative ingredients for the chicken mixture

Protein	30 g comminuted chicken* can be replaced with: 10 g cooked weight lean minced or pounded chicken* or rabbit meat. or 10 g cooked weight lean minced or pounded beef or lamb†.
Protein and fat	30 g comminuted chicken plus 2 ml oil emulsion (50%) can be replaced with: 20 g cooked egg (yolk and white)
Carbohydrate	10 g sugar or glucose can be replaced with: 14 g honey or 12 g starch e.g. arrowroot or rice powder (must be cooked).
Fat	8 ml vegetable oil (50%) emulsion can be replaced with: 4 ml vegetable oil the 50% emulsion of oil and water can also be made with an edible gum e.g. gum acacia.

* Chicken fat is higher in essential fatty acids than other meats.

† Beef and lamb are higher in fat and energy than chicken but have a coarser muscle fibre.

If fed as the sole source of nutrition, offer 150 to 200 ml/kg actual weight/day. In a very sick infant the diet can be started at half strength, the sugar introduced to the full dose over three to four days and the oil emulsion added on the fifth to seventh day.

A complete mineral supplement including macro (calcium, phosphorous, magnesium, sodium, potassium) and trace minerals (zinc, copper, iron, etc.) together with the full range of all vitamins are necessary if this diet is used for more than one to two weeks.

⁽¹⁾ Tripp J H, et al 1979 *Infant Feeding Practices: a cause for concern. British Medical Journal* 2: 707-709.

⁽²⁾ Francis D E M 1978 *Treatment of Multiple-Malabsorption Syndrome of Infancy. Journal of Human Nutrition* 32: 270-278.

Questions and answers

From: André Briend, Dakar, Senegal

In my clinic every morning I give children a bowl of soured milk (200 ml) plus three spoons of cooking oil (30 ml) and three pieces of sugar (15 g), and I advise the mother to give more of the mixture in the afternoon. This seems to be well tolerated and also very much appreciated by children which is very important.

*I used this mixture after several empirical attempts to find something cheap, palatable and nutritious, but I must admit I have never tested its value by a rigid scientific protocol. I would appreciate the opinion of *Diarrhoea Dialogue*.*

In this issue of *Diarrhoea Dialogue* we are concerned about nourishment for children with diarrhoea, particularly those with chronic diarrhoea who often have protein-energy malnutrition (PEM). There is still much uncertainty about what food is best and this will certainly vary in different parts of the world. The principles and the ingredients you use are sound. Food should be nutritious, readily available, acceptable and effective. The mixture you are offering contains protein, is energy dense and rather similar to the milk feeds being given very successfully in Dr Sultana Khanam's nutrition centre in Dacca (see page three and photograph on this page).

From: Ian Cross, Save the Children Fund, Thailand

I would like some advice on oral rehydration. I realize that there is quite a wide variation among "experts" as to the sodium concentration of the rehydration fluid. What is considered the optimum range and the limits of safety? One tends to ask, "does it really matter, as long as the child drinks something... be it tea, coca cola or fruit juice".

The purpose of oral rehydration in diarrhoea is to replace the water and electrolytes (salts) that have been lost in stools, and also to correct other metabolic imbalances. For example, many children with severe diarrhoea have become acidotic and have deep rapid respiration. The "ideal" replacement fluid for a particular case depends on the cause of diarrhoea and the severity of the losses when the child is seen by the health worker.

It also depends on a special mechanism of the bowel that enables it



Photograph by Katherine Elliott

Children at Dr Sultana Khanam's nutrition centre in Dacca.

to absorb more fluid if water and electrolytes are mixed with carbohydrate, usually sugar or glucose in a particular proportion. Theoretically it should be possible to prepare a precise solution for an individual case. In practice the procedure is simplified and there are three sorts of fluid which are recommended.

In mild cases where diarrhoea has just started and the losses from the body are slight, extra fluids of almost any sort are valuable and the body can make its own corrections. Offer water, tea, fruit juice or whatever the child is used to drinking, and any fluid that is accepted by the local people as being suitable in diarrhoea.

In severe cases the body needs a fluid which will correct the deficiencies more precisely. The WHO/UNICEF packets of Oral Rehydration Salts (ORS) have been widely tested and found effective for such cases. The mixture contains bicarbonate to correct acidosis, and quite a lot of sodium because a significant number of children with severe diarrhoea in some countries have cholera and they need extra salt. This mixture is safe for other sorts of diarrhoea too, so long as ORS solution is given only to replace stool losses, and extra simple fluid, like water and fruit juice, is given to provide for the

ordinary daily intake and metabolic needs.

Sugar-salt fluid

There are intermediate cases which do not need precise replacements, but will benefit from the greater uptake due to the "linked-absorption mechanism" when a sugar-salt fluid is given. Such a mixture is not dependent on the availability of special packets, can be made up in most kitchens and is known to be very effective.

What is the best proportion of sugar and salt? It is not necessary to be absolutely accurate, but too much sugar and salt, especially salt, can be harmful. Different ways of measuring sugar and salt have been recommended (see *Diarrhoea Dialogue* 6, page seven). If 5 ml teaspoons are available, one level teaspoonful of salt and eight level teaspoonfuls of sugar in one litre of clean water is good. Remember the correct amount of water is as important as the correct amount of sugar and salt! About a cupful (200 ml) of this mixture ought to be given for each stool passed. Where there is vomiting as well as diarrhoea, the fluid should be given in small, frequent sips. Some of the basic issues have been discussed in the article by Booth and Harries reviewed on page two of this issue of *Diarrhoea Dialogue*.

letters... letters... letters... letters...

ORT and infants

We have been using ORT both in our hospital paediatric wards and in the community quite successfully for the last few years. However, with few studies on the use and safety of ORS for newborns and infants we have been hesitant in using it for this age group.⁽¹⁾ We recently carried out a study at our hospital with a small group of 50 newborns and infants under three months with acute gastroenteritis. The standard WHO formula for ORS was given orally, without any modification, alternating with breastfeeds/glucose or sterile water irrespective of the acuteness of diarrhoea or the severity of dehydration. Normal feeds, whether breast milk or other were continued in all patients. Fortunately we have not come across any case with hypernatraemia or any untoward complications. Though this is a preliminary study it has wider application especially in the community.

I would much appreciate the experience of other workers in the use of ORT in newborns and small infants.

Meenakshi N. Mehta, Professor of Paediatrics, L.T.M.G. Hospital, Sion, Bombay-400 022, India.

⁽¹⁾Pizarro D 1981 *Oral therapy for neonates with dehydrating diarrhoeas. In Acute Enteric Infections in Children: New Prospects for Treatment and Prevention 1981. Eds. Holme T et al. Proceedings of the Third Nobel Conference. Published by Elvira/Bio Medical Press, Holland.*

Demystifying ORT

While wholeheartedly supporting the theory of oral rehydration therapy (ORT), I find the promotion of oral rehydration salts (ORS) as a means of achieving this a disturbing phenomenon. As I see it, the essence of ORT is that it should be carried out by mothers and the key to its success lies in its early implementation — with or without packets.



WHO/UN photo

The importance of continuing breastfeeding during diarrhoea.

There are possibilities of error however oral rehydration solutions are made up. This brings us back to the vital importance of education and understanding in oral rehydration therapy. Don't let us make yet another simple life-saving remedy the prerogative of the professionals.

P. R. Rees, P.O. Box 8, Port Loko, Sierra Leone, West Africa.

Diarrhoea: a problem everywhere

We have three community health workers working with non-English speaking women. Some of the information in *Diarrhoea Dialogue* would be very useful to them. The most frequent reason for admission of children to hospital locally is gastroenteritis. Almost all the children admitted with diarrhoea have been bottle-fed.

Sad to say, most health workers in the community do not seem to be familiar with simple oral rehydration therapy.

Fedelma Winkler, City and Hackney Community Health Council, 210 Kingsland Road, London E2, UK

Kwashiorkor and potassium

On page three of *Diarrhoea Dialogue* 9 you featured an article on oral rehydration therapy in Uganda. There is an implicit connection between the picture of the child with kwashiorkor and the picture showing local ingredients for oral rehydration fluid i.e. salt and sugar, but no potassium. It should be stressed that children with kwashiorkor are particularly susceptible to oedema and congestive failure when given a salt load unaccompanied by potassium.

Norbert Hirschorn, John Snow Public Health Group, Inc., 210 Lincoln Street, Boston, Massachusetts 02111, USA

Editors' note:

For further information on potassium deficiency and kwashiorkor the following references are useful:

⁽¹⁾Potassium losses and replacement in diarrhoea 1980 *Diarrhoea Dialogue* 3: 7.

⁽²⁾Golden M H N 1982 Protein deficiency, energy deficiency and the oedema of malnutrition. *The Lancet* vol. 2: 1261-1265.

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