New formulation of Oral Rehydration Salts (ORS) with reduced osmolarity- February 2004

Frequently Asked Technical Questions

1. What should we advise mothers to give at home to a child with diarrhoea, but who has no signs of dehydration?

Give the child more fluids, or increased frequency of breastfeeding, than usual, to prevent dehydration

What fluids to give
Many countries have designated recommended home fluids. *Wherever possible, these should include at least one fluid that normally contains salt* (see below). Plain clean water should also be given. Other fluids should be recommended that are frequently given to children in the area, that mothers consider acceptable for children with diarrhoea, and that mothers would be likely to give in increased amounts when advised to do so.

Suitable fluids
Most fluids that a child normally takes can be used. It is helpful to divide suitable fluids into two groups:
Fluids that normally contain salt, such as:

- ORS solution
- Salted drinks (e.g. salted rice water or a salted yoghurt drink)
- Vegetable or chicken soup with salt
- Breastmilk

Teaching mothers to add salt (about 3g/l) to an unsalted drink or soup during diarrhoea is also possible, but requires a sustained educational effort.
Fluids that do not contain salt, such as:

- plain water
- water in which a cereal has been cooked (e.g. unsalted rice water)
- unsalted soup
- yoghurt drinks without salt
- green coconut water
- weak tea (unsweetened)
- unsweetened fresh fruit juice.

Unsuitable fluids
A few fluids are potentially dangerous and should be avoided during diarrhoea. Especially risky are those drinks sweetened with sugar, which can cause osmotic diarrhoea and hypernatraemia. Some examples are:

- soft drinks
- sweetened fruit drinks
- sweetened tea.

Other fluids to avoid are those with stimulant, diuretic or purgative effects, for example:

- coffee
- some medicinal teas or infusions.

How much fluid to give
The general rule is: give as much fluid as the child wants until diarrhoea stops. As a guide, after each loose stool, give:

- children under 2 years of age: 50-100 ml (a quarter to half a large cup) of fluid; or one to two extra breastfeedings
- children aged 2 up to 10 years: 100-200 ml (a half to one large cup);
- older children and adults: as much fluid as they want.

2. Should I continue to breastfeed my child with diarrhoea?

During the first 6 months of life, your infant should be *exclusively* breastfed. This means that the healthy baby should receive breastmilk, preferably directly from the breast, and *no other fluids*, such as water, teas, juice, cereal drinks, animal milk or formula. Exclusively breastfed babies are much less likely to get diarrhoea or to die from it than are babies who are not breastfed or are partially breastfed. Breastfeeding also protects against the risk of allergy early in life, aids in child spacing and provides protection against infections other than diarrhoea (e.g. pneumonia). It is also related to increased intelligence, decrease in chronic disease, and it supports good growth. Breastfeeding should be continued until at least 2 years of age. The best way to initiate breastfeeding is to put the baby to the breast immediately after birth, to remain with the mother, to increase frequency up to 8 to 20 times per 24 hours, and to be responsive to the child's searching for the breast. There is no need to give any other fluids even in hot weather; breastmilk is mostly water.

If breastfeeding is not possible, specially diluted and treated cow's milk or formula should be given from a cup. This is possible even with very young infants. Feeding bottles and teats should *never* be used because they are very difficult to clean and easily carry the organisms that cause diarrhoea. Careful instructions should be given on the correct preparation of milk formula using water that has been boiled briefly before use, and on how to feed from a cup.

Complementary foods should normally be started when a child is 6 months old, while continuing the same frequency of breastfeeds. Good feeding practices involve selecting nutrient rich foods and using hygienic practices when preparing them. The choice of complementary foods will depend on local patterns of diet and agriculture, as well as on existing beliefs and practices, but should never include thin gruels or non-milk liquids. In addition to breastmilk (or animal milk), aminal products, fruits and vegetables should be given after they are cooked, mashed ,or treated with enzymes or fermented. Soft mashed foods (e.g. cereals) can be given, to which some vegetable oil (5-10 ml/serving) has been added, however, other foods should be added weekly.. (see section 4.2). Whenever possible, eggs, meat, fish and fruit should be given.

Good feeding practices also involve adopting behaviours that will help to prevent the contamination of food:

- Wash hands before preparing the complementary foods and before feeding them to the child.
- Prepare food in a clean place.
- After one year, if you begin to give uncooked food, wash it in clean water before feeding it to the child.
- Cook or boil food well when preparing it.

Mash or grind all foods, and add breastmilk if fluid is needed.

- If possible, cook foods immediately before they will be eaten.
- Cover foods that are being kept. Keep foods in a cool place (refrigerate, if possible).
- If cooked food is prepared more than two hours in advance of feeding, and is not refrigerated, reheat it until it is thoroughly hot before giving it to the child.
- Feed the child with a clean spoon.

To encourage exclusive breastfeeding and proper complementary feeding practices, health workers should be instructed in the regular use of growth charts to monitor the height and weight of children. Before a child with diarrhoea leaves a health facility, his or her weight should be taken and recorded on the child's growth chart, and the mother should be counselled on how feed to ensure that any weight lost is regained..

3. Should we advise mothers to continue to feed a child who has diarrhoea?

Continue to feed the child, to prevent malnutrition
Feeding should be continued during diarrhoea and increased afterwards. Food should *never* be withheld and the child's usual foods should *not* be diluted. Breastfeeding should *always* be continued. The aim is to give as much nutrient-rich food as the child will accept. Most children with watery diarrhoea regain their appetite after dehydration is corrected, whereas those with bloody diarrhoea often eat poorly until the illness resolves.

When food is given, sufficient nutrients are usually absorbed to support continued growth and weight gain. Continued feeding also speeds the recovery of normal intestinal function, including the ability to digest and absorb various nutrients. In contrast, children whose food is restricted or diluted lose weight, have diarrhoea of longer duration, and recover intestinal function more slowly.

What foods to give
This depends on the child's age, food preferences and pre-illness feeding pattern; cultural practices are also important. *In general, foods suitable for a child with diarrhoea are the same as those required by healthy children*. Specific recommendations are given below.

Milk
· *Infants of any age who are breastfed* should be allowed to breastfeed as often and as long as they want. Infants will often breastfeed more than usual; this should be encouraged.
· *Infants who are not breastfed* should be given their usual milk feed (or formula) at least every three hours by cup, depending on age. Special commercial formulas advertised for use in diarrhoea are expensive and unnecessary; they should *not* be given routinely. Clinically significant milk intolerance is rarely a problem.
· *Infants less than 6 months of age who take breastmilk and other foods* should receive increased breastfeeding. As the child recovers and the supply of breastmilk increases, other foods should be decreased (and fluids should be given by cup, not bottle). This usually takes about one week. If possible, the infant should become exclusively breastfed.

There is no value in routinely testing the stools of infants for pH or reducing substances. Such tests are oversensitive, often indicating impaired absorption of lactose when it is not clinically important. It is more important to monitor the child's clinical response (e.g. level of dehydration, weight gain, general improvement). Milk intolerance is only clinically important when feeding of formula or animal milk causes a prompt increase in stool volume and a return or worsening of the signs of dehydration, often with loss of weight.

Other foods
If the child is at least 6 months old or is already taking soft foods, he or she should be given thick cereals, vegetables and other foods, in addition to milk. If the child is over 6 months and such foods are not yet being given, they should be started during the diarrhoea episode or soon after it stops.

Recommended foods should be culturally acceptable, readily available, have a high content of energy and provide adequate amounts of essential micronutrients. They should be well cooked, and mashed or ground to make them easy to digest. Fermented foods are easy to digest. Milk, preferably breastmilk, should be mixed with a cereal, never excess water.. If possible, 5-10 ml of vegetable oil should be added to each serving of cereal. Meat, fish or egg should be given, if available. Foods rich in potassium and vitamins, such as bananas, green coconut water and fresh fruit juice are beneficial. Colorful vegetables and fruits will be important as the child returns to health.

How much food and how often

Offer the child food every three or four hours (six times a day), in addition to breastfeeds. Frequent, small feedings are tolerated better than less frequent, large ones, however, breastmilk should be provided as much as the child will tolerate.

After the diarrhoea stops, continue giving the same energy rich foods and provide one more meal than usual each day for at least two weeks. If the child is malnourished, extra meals should be given until the child has regained normal weight-for-height.

4. When should I take my child with diarrhoea to a health centre?

Take the child to a health worker if there are signs of dehydration or other problems

The signs of dehydration are due to lack of water in the body:

- sunken eyes;
- absence of tears;
- dry mouth and tongue;
- the patient is thirsty and drinks eagerly
- the skin pinch goes back slowly

Other problems which require taking the child to a health worker include:

- starting to pass many watery stools;
- repeated vomiting;
- becoming very thirsty;
- stops breastfeeding
- eating or drinking poorly;
- develops a fever;
- develops convulsions
- has blood in the stool; or
- the child does not get better in three days.

5. What should I do in case of vomiting?

Vomiting often occurs during the first hour or two of treatment, especially when a child drinks the solution too quickly. However, this rarely prevents successful oral rehydration since most of the fluid is absorbed. After this time vomiting usually stops. If the child vomits, wait 5-10 minutes and then start giving ORS solution again, but more slowly (e.g. a spoonful every 2-3 minutes).

6. What should I do in case of electrolyte disturbances in a child with diarrhoea?

Knowing the levels of serum electrolytes rarely changes the management of children with diarrhoea. Indeed, these values are often misinterpreted, leading to inappropriate treatment. It is usually *not helpful* to measure serum electrolytes. The disorders described below are *all* adequately treated by ORT with ORS solution.

Hypernatraemia

Some children with diarrhoea develop *hypernatraemic dehydration*, especially when given drinks that are hypertonic owing to their content of sugar (e.g. soft drinks, commercial fruit drinks), some animal milks, or salt. These draw water from the child's tissues and blood into the bowel, causing the concentration of sodium in extra-cellular fluid to rise. If the solute in the drink is not fully absorbed, the water remains in the bowel, causing osmotic diarrhoea.

Children with hypernatraemic dehydration (serum Na+ >150 mmol/l) have thirst that is out of proportion to other signs of dehydration. Their most serious problem is convulsions, which usually occur when the serum sodium concentration exceeds 165 mmol/l, and especially when IV therapy is given. Seizures are much less likely when hypernatraemia is treated with ORS solution, which usually causes the serum sodium concentration to become normal within 24 hours.

Hyponatraemia

Children with diarrhoea who drink mostly water, or watery drinks that contain little salt, may develop hyponatraemia (serum Na+ <130 mmol/l). Hyponatraemia is especially common in children with shigellosis and in severely malnourished children with oedema. Hyponatraemia is occasionally associated with lethargy and, less often, seizures. ORS solution is safe and effective therapy for nearly all children with hyponatraemia. An exception is children with oedema, for whom ORS solution provides too much sodium.

Hypokalaemia

Diarrhoea stool contains large amounts of potassium. Inadequate replacement of potassium losses during diarrhoea can lead to potassium depletion and hypokalaemia (serum K+ <3 mmol/l), especially in children with malnutrition. Hypokalaemia is worsened when base (bicarbonate or lactate) is given to treat acidosis without simultaneously providing potassium. Hypokalaemia can be prevented, and the potassium deficit corrected, by using ORS solution for rehydration therapy and by giving foods rich in potassium during diarrhoea and after it has stopped.

7. What should I do if intravenous therapy is not available for a severely dehydrated child?

Dehydration is very severe when, in addition to the signs of dehydration noted in #4. above:

- The child is lethargic, unconscious or floppy
- The child is unable to drink
- The child's radial pulse is weak
- The skin pinch goes back very slowly

If IV therapy is not available at the facility, but can be given nearby (i.e. within 30 minutes), send the child *immediately* for IV treatment. If the child can drink, give the mother some ORS solution and show her how to give it to her child during the journey.

If IV therapy is not available nearby, health workers who have been trained can give ORS solution by NG tube. Give it at a rate of 20 ml/kg body weight per hour for six hours (total of 120 ml/kg body weight). If the abdomen becomes swollen, give the ORS solution more slowly until it becomes less distended.

If NG treatment is not possible but the child can drink, ORS solution should be given by mouth at a rate of 20 ml/kg body weight per hour for six hours (total of 120 ml/kg body weight). If this rate is too fast, the child may vomit repeatedly. In that case, give ORS solution more slowly until vomiting subsides.

Children receiving NG or oral therapy should be reassessed at least every hour. If the signs of dehydration do not improve after three hours, the child must be taken immediately to the nearest facility where IV therapy is available. Otherwise, if rehydration is progressing satisfactorily, the child should be reassessed after six hours and a decision on further treatment made. If neither NG nor oral therapy is possible, the child should be taken *immediately* to the nearest facility where IV or NG therapy is available.

8. When should I suspect cholera in a child with diarrhoea?

Cholera should be suspected when a child older than 5 years or an adult develops severe dehydration from acute watery diarrhoea (usually with vomiting), or any patient older than 2 years has acute watery diarrhoea when cholera is known to be occurring in the area. Younger children also develop cholera, but the illness may be difficult to distinguish from other causes of acute watery diarrhoea, especially rotavirus.

9. How can I assess for dehydration in a severely malnourished child?

Assessment of hydration status is difficult because many of the normally-used signs are unreliable. Skin turgor appears poor in children with marasmus owing to the absence of subcutaneous fat; their eyes may also appear sunken. Diminished skin turgor may be masked by oedema in children with kwashiorkor. In both types of malnutrition the child's irritability or apathy make assessment of the mental state difficult. Signs that remain useful for assessing hydration status include: eagerness to drink (a sign of some dehydration), and lethargy, cool and moist extremities, weak or absent radial pulse, and reduced or absent urine flow (signs of severe dehydration). In children with severe malnutrition it is often impossible to distinguish reliably between some dehydration and severe dehydration.

Of equal importance, it is also difficult to distinguish severe dehydration from septic shock, as both conditions reflect hypovolaemia and reduced blood flow to vital organs. An important distinguishing feature is that severe dehydration requires a history of watery diarrhoea. *A severely malnourished child with signs suggesting severe dehydration but without a history of watery diarrhoea should be treated for septic shock*.

10. What should I do in case of fever in a child with diarrhoea?

Fever in a child with diarrhoea may be caused by another infection (e.g. pneumonia or otitis media). Young children may also have fever on the basis of dehydration. The presence of fever should prompt a search for other infections. This is especially important when fever persists after a child is fully rehydrated.

Children with fever (38°C or above) or a history of fever in the past five days, and who live in a *Plasmodium falciparum* malarious area, should also be given an anti-malarial or treated according to the policy of the national malaria programme.

Children with high fever (39°C or greater) should be treated promptly to bring the temperature down. This is best done with an antipyretic (e.g. paracetamol). Reducing fever also improves appetite and diminishes irritability.

11. What should I do in case of convulsions in a child with diarrhoea?

In a child with diarrhoea and a history of convulsions during the illness, the following diagnoses and treatments should be considered:

· *Febrile convulsion*: This usually occurs in infants, especially when their temperature exceeds 40°C or rises very rapidly. Treat fever with paracetamol. Sponging with tepid water and fanning may also be used if the temperature exceeds 41°C. Evaluate for possible meningitis.

· *Hypoglycaemia*: This occasionally occurs in children with diarrhoea, owing to inadequate gluconeogenesis. Any child with diarrhoea and seizures or coma should be treated as though the child is hypoglycaemic, with 1.0 ml/kg of 50% glucose solution or 2.5 ml/kg of a 20% glucose solution intravenously over five minutes.

If hypoglycaemia is the cause, recovery of consciousness is usually rapid. In such cases ORS solution should be given (or 5% glucose should be added to the IV solution) until feeding starts, to avoid recurrence of symptomatic hypoglycaemia.

12. Should we give vitamin A to a child with diarrhoea?

Diarrhoea reduces the absorption of, and increases the need for, vitamin A. In areas where bodily stores of vitamin A are often low, young children with acute or persistent diarrhoea can rapidly develop eye lesions of vitamin A deficiency (xerophthalmia) and even become blind. This is especially a problem when diarrhoea occurs during or shortly after measles, or in children who are already malnourished.

In such areas, children with diarrhoea should be examined routinely for corneal clouding and conjunctival lesions (Bitot's spots). If either is present, oral vitamin A should be given at once and again the next day: 200 000 units/dose for age 12 months to 5 years, 100 000 units for age 6 months to 12 months, and 50 000 units for age less than 6 months. Children without eye signs who have severe malnutrition or have had measles within the past month should receive the same treatment. Mothers should also be taught routinely to give their children foods rich in carotene; these include yellow or orange fruits or vegetables, and dark green leafy vegetables. If possible, eggs, liver, or full fat milk should also be given.

13. Should we give zinc supplementation to a child with diarrhoea?

Recent research studies have shown that zinc supplementation has a significant beneficial impact on the clinical course of acute diarrhoea. Zinc supplementation, at a dose of 10-20 mg day (1 to 2 RDAs per day) for 14 days is associated with:

- a reduction in the duration of acute diarrhoeal episodes
- reduction in stool output
- reduction in stool frequency
- reduction in incidence of diarrhoea in the 2 to 6 months following the end of the short course of supplementation

Zinc supplementation with 1 to 2 RDAs of zinc per day for 14 days is now included as an integral part of the case management for acute diarrhoea (see WHO-UNICEF Joint Statement on the Management of Acute Diarrhoea)

14. Can I give anti-diarrhoeal drugs to a child with diarrhoea?

These agents, though commonly used, have no practical benefit and are never indicated for the treatment of acute diarrhoea in children. Some of them are dangerous. Products in this category include:

Adsorbents (e.g. kaolin, attapulgite, smectite, activated charcoal, cholestyramine). These drugs are promoted for the treatment of diarrhoea on the basis of their claimed ability to bind and inactivate bacterial toxins or other substances that cause diarrhoea, and their claim to "protect" the intestinal mucosa. None, however, has proven effective or practical in the routine treatment of acute diarrhoea in children.

Antimotility drugs (e.g. loperamide hydrochloride, diphenoxylate with atropine, tincture of opium, camphorated tincture of opium, paregoric, codeine). These opiate or opiate-like drugs inhibit intestinal motility and may reduce the frequency of stool passage in adults. However, they do not appreciably decrease the volume of stool in young children. Moreover, they can cause severe paralytic ileus, which can be fatal, and they may prolong infection by delaying elimination of the causative organisms. Sedation may occur at usual therapeutic doses and fatal central nervous system toxicity has been reported for some agents. None of these agents should be given to infants or children with diarrhoea.

Bismuth subsalicylate. Bismuth subsalicylate decreases the number of diarrhoea stools and subjective complaints in adults with travellers' diarrhoea. When given every four hours, it is reported to decrease stool output in children with acute diarrhoea by about 30%. This treatment schedule is, however, rarely practical.

Combinations of drugs. Many products combine adsorbents, antimicrobials, antimotility drugs or other agents. Manufacturers may claim that these formulations are appropriate for various diarrhoeal diseases; however, such combinations are irrational and their cost and side effects are substantially higher than for individual drugs. They have *no place* in the treatment of diarrhoea in children.

Antiemetics. These include drugs such as prochlorperazine and chlorpromazine, which cause sedation that can interfere with ORT. For this reason antiemetics should *never* be given to children with diarrhoea. Moreover, vomiting stops when a child is rehydrated.

Cardiac stimulants. Shock in acute diarrhoeal disease is caused by dehydration and hypovolaemia. Correct treatment is rapid IV infusion of a balanced electrolyte solution. The use of cardiac stimulants and vasoactive drugs (e.g. adrenaline, nicotinamide) is *never* indicated.

Blood or plasma. Blood, plasma or synthetic plasma expanders are *never* indicated for children with dehydration due to diarrhoea. These children require the replacement of lost water and electrolytes. These treatments are used, however, for patients with hypovolaemia due to septic shock.

Steroids. Steroids have no benefit and are *never* indicated.
Purgatives. These can make diarrhoea and dehydration worse; they should *never* be used.

15. What antimicrobials can be used with ORS in the clinical management of diarrhoea ?

Antimicrobials should not be used routinely. This is because it is not possible to distinguish clinically episodes that *might* respond, such as diarrhoea caused by enterotoxigenic *E. coli*, from those caused by agents unresponsive to antimicrobials, such as rotavirus or cryptosporidium. Moreover, even for potentially responsive infections, selecting an effective antimicrobial requires knowledge of the likely sensitivity of the causative agent, information that is usually unavailable. In addition, use of antimicrobials adds to the cost of treatment, risks adverse reactions and enhances the development of resistant bacteria.

Antimicrobials are reliably helpful *only* for children with bloody diarrhoea (probable shigellosis), suspected cholera, and serious non-intestinal infections such as pneumonia. Anti-protozoal drugs are *rarely* indicated.

If the child has signs of shigellosis (acute, bloody diarrhoea usually accompanied by fever and abdominal cramps), the child should be treated for dehydration as above, plus provided with one of the following antibiotics:

- Nalidixic acid 1g, 4 times a day for 5 days
- Ciprofloxacine 500 mg, twice a day for 3 days

For cholera cases with severe dehydration, one of the following antibiotics can be used:

- Doxycycline single dose 300mg
- Tetracycline 12.5 mg/kg, every 6 hours for 3 days
- For young children: Erythromycin liquid 30mg/kg, 4 times a day for 3 days
- For pregnant women: Furazolidone 1.25mg/kg, 4 times a day for 3 days

16. How can we protect our water?

The risk of diarrhoea can be reduced by using the cleanest available water and protecting it from contamination. Families should:

· Collect water from the cleanest available source.

· Not allow bathing, washing, or defecation near the source. Latrines should be located more than 10 metres away from the water source and downhill.

· Keep animals away from protected water sources.

· Collect and store water in clean containers; empty and rinse out the containers every day; keep the storage container covered and do not allow children or animals to drink from it; remove water with a long handled dipper that is kept especially for the purpose so that hands do not touch the water.

· If fuel is available, boil water used for making food or drinks for young children. Water needs only to be brought to the boil (vigorous or prolonged boiling is unnecessary and wastes fuel).

The *amount* of water available to families has as much impact on the incidence of diarrhoeal diseases as the *quality* of water. This is because larger amounts of water facilitate improved hygiene. If two water sources are available, the highest quality water should be stored separately and used for drinking and preparing food.

17. How important is handwashing?

Nearly all diarrhoeal disease agents can be spread by hands that have been contaminated by faecal material. The risk of diarrhoea is substantially reduced when family members practice regular handwashing. All family members should wash their hands thoroughly after defecation, after cleaning a child who has defecated, after disposing of a child's stool, before preparing food, and before eating. Good handwashing requires the use of soap or a local substitute, such as ashes or soil, and enough water to rinse the hands thoroughly.