

ACUTE GASTROENTERITIS

Introduction

This guideline is based on the WHO guideline on *The Treatment of Diarrhoea in Children and the Integrated Management of Childhood Illness (IMCI) guidelines*. However modifications have been made to Treatment Plan C in keeping with the guideline on fluid resuscitation in the *Paediatric Advanced Life Support Programme*.

Acute gastroenteritis is a leading cause of childhood morbidity and mortality and is also an important cause of malnutrition. Many diarrhoeal deaths are caused by dehydration from fluid and electrolytes loss. Mild and moderate dehydration can be safely and effectively treated with ORS solution but severe dehydration needs intravenous fluid therapy.

If you have gone through the PALS course, first assess the state of perfusion of the child: Is the child in shock? If so go straight to treatment Plan C.

OR you can also use the WHO chart below to assess the degree of dehydration and then choose the treatment plan A, B or C, as needed.

<i>Assess</i>			
Look at child's general condition	well, alert	restless or irritable	lethargic or unconscious
Look for sunken eyes	no sunken eyes	sunken eyes	sunken eyes
Offer the child fluid	drinks normally	drinks eagerly, thirsty	not able to drink or drinks poorly
Pinch skin of abdomen	skin goes back immediately	skin goes back slowly	skin goes back very slowly (> 2 seconds)
<i>Classify</i>	no dehydration (< 5%)	≥ 2 above signs present: some dehydration (5-10%)	≥ 2 above signs present: severe dehydration (> 10%)
<i>Treat</i>	Give fluid and food to treat diarrhoea at home, Treatment Plan A	Give fluid and food for some dehydration, Treatment Plan B	Give fluid for severe dehydration, Treatment Plan C

Note: Children on treatment Plan C may show signs of shock such as tachycardia, weak peripheral pulses, delayed capillary refill time > 2 seconds, cold peripheries, depressed mental state with or without hypotension.

PLAN A: TREAT DIARRHOEA AT HOME

Counsel the mother on the 3 rules of home treatment:

Give Extra Fluid, Continue Feeding, When to return

1. Give Extra Fluids (as much as the child will take)

- tell the mother:

- breastfeed frequently and for longer at each feed
- if the child is exclusively breastfed, give ORS or cooled boiled water in addition to breastmilk
- if the child is not exclusively breastfed, give one or more of the following: ORS, food-based fluids (soup and rice water) or cooled boiled water

It is especially important to give ORS at home when:

- the child has been treated with Plan B or Plan C during this visit
- the child cannot return to a clinic if the diarrhoea gets worse

- teach the mother how to mix and give ORS. Give the mother 8 packets of ORS to use at home.

- show mother how much ORS to give in addition to the usual fluid intake:
 - Up to 2 years : 50 to 100ml after each loose stool
 - 2 years or more : 100 to 200ml after each loose stool
 - (If weight is available, give 10ml/kg of ORS after each loose stool)
- tell mother to
 - give frequent small sips from a cup or spoon
 - if child vomits, wait 10 minutes, then continue but more slowly
 - continue giving extra fluid until diarrhoea stops

2. Continue Feeding

- breastfed infants should continue nursing on demand
- formula fed infants should continue their usual formula immediately on rehydration
- lactose-free or lactose-reduced formula usually are unnecessary
- children receiving semi-solid or solid foods should continue to receive their usual food during the illness
- foods high in simple sugar should be avoided as osmotic load may worsen the diarrhoea

3. When to Return (to clinic/hospital)

When child is

- not able to drink or breastfeed or drinking poorly
- becomes sicker
- develops a fever
- has blood in stool

PLAN B: TREAT SOME DEHYDRATION WITH ORS

Give recommended amount of ORS over 4-hour period:

Table 2. Determining the amount of ORS to give in the first 4 hours

Age ¹	Up to 4 months	4 - 12months	12 months -2 years	2 - 5 years
Weight	<6kg	6- <10kg	10- <12kg	12- 19kg
In ml	200-400	400-700	700-900	900-1400

footnote: 1. Use the child's age only when you do not know the weight. The approximate amount of ORS required (in ml) can be calculated by multiplying the child's weight (in kg) x 75

2. If the patient wants more ORS than shown, give more

Show the mother how to give ORS solution

- give frequent small sips from cup or spoon
- if the child vomits, wait 10 minutes, then continue but more slowly (i.e. 1 spoonful every 2 - 3 minutes).
- continue breastfeeding whenever the child wants

After 4 hours

- reassess the child and classify the child for dehydration
- select the appropriate plan to continue treatment (Plan A, B or C)
- begin feeding the child

If the mother must leave before completing treatment

- show her how to prepare ORS solution at home.
- show her how much ORS to give to finish the 4-hour treatment at home.
- give her enough ORS packets to complete rehydration. Also give her 8 packets as recommended in Plan A.
- explain the 3 Rules of Home Treatment (Plan A):
 1. GIVE EXTRA FLUID
 2. CONTINUE FEEDING
 3. WHEN TO RETURN

Important

- If possible, observe the child at least 6 hours after re-hydration to be sure the mother can maintain hydration giving the child ORS solution by mouth
- If there is an outbreak of cholera in your area, give an appropriate oral antibiotic after the patient is alert.

PLAN C: TREAT SEVERE DEHYDRATION QUICKLY

1. *Start intravenous (IV) or intraosseous (IO) fluid immediately.* If patient can drink, give ORS by mouth while the drip is being set up. Give 100 ml/kg Ringers lactate or normal saline divided as follows:-
 - i) first give 20 ml/kg as fast as possible. Repeat fluid boluses as necessary until perfusion has improved.
 - ii) then give the remaining fluid over 5 hours (age \leq 12 months) or 2 1/2 hours (age $>$ 12 months)
 - reassess the patient after every bolus and stop the boluses once perfusion improves or when fluid overload is suspected. If the patient does not respond to rapid bolus rehydration, consider the possibility of an underlying disorder e.g. septic shock, toxic shock syndrome, myocarditis, cardiomyopathy or pericarditis. Inotropic agents may then be necessary to maintain perfusion
 - reassess the child every 1-2 hours during rehydration.
 - also give ORS (about 5 ml/kg/hour) as soon as the child can drink, usually after 3 to 4 hours for infants, and 1 to 2 hours for older children.
 - reassess an infant after 6 hours and a child after 3 hours. Classify dehydration
 - then choose the appropriate plan (A, B, or C) to continue treatment.
2. *If you cannot or fail to set up IV or IO line, arrange for the child to be sent to the nearest centre that can do so immediately.* Meanwhile as arrangements are made to send the child (or as you make further attempts to establish IV or IO access):
 - try to rehydrate the child with ORS orally (if the child can drink) or by orogastric tube. Give ORS 20 ml/kg/hour over 6 hours. Continue to give the ORS along the journey.
 - reassess the child every 1-2 hours
 - if there is repeated vomiting or increasing abdominal distension, give the fluid more slowly.
 - reassess the child after six hours, classify dehydration
 - then choose the most appropriate plan (A, B or C) to continue treatment.

Indications for intravenous therapy

- severe dehydration
- unconscious child
- continuing rapid stool loss ($> 15\text{-}20\text{ml/kg/hour}$)
- frequent, severe vomiting, drinking poorly
- abdominal distension with paralytic ileus, usually caused by some anti-diarrhoeal drugs (e.g. codeine, loperamide) and hypokalaemia
- glucose malabsorption, indicated by marked increase in stool output and large amount of glucose in the stool when ORS solution is given (uncommon)

Intravenous therapy

Calculation of required therapy is as follows:

1. Fluid deficit

- fluid deficit (mls) = percentage dehydration X body weight in grams

2. Maintenance fluid therapy

- type of fluid solution:
 $\frac{1}{5}$ normal saline 5% dextrose solution *or* $\frac{1}{2}$ normal saline 5% dextrose with or without added KCl in the drip.
- volume of fluid required:
 - less than 6 months age: 150 ml/kg/day
 - 6 months to 1 year age: 120 ml/kg/day
 - more than 1 year age: 1st 10 kg = 100 ml/kg
 $10\text{-}20\text{ kg} = 1000\text{ ml}$ for first 10 kg
 $+ 50\text{ ml/kg}$ for next 10 subsequent kg
 $>20\text{ kg} = 1500\text{ ml}$ for first 20kg
 $+ 20\text{ ml/kg}$ for any subsequent kg

3. Treating metabolic acidosis

- metabolic acidosis usually self corrects with rehydration
- correction only required if $\text{pH} < 7.1$
- formula for calculation of sodium bicarbonate correction:
 $\text{IV } 8.4\% \text{ NaHCO}_3 \text{ (mEq or ml)} = \frac{1}{3} \times \text{base deficit} \times \text{weight};$
usually only *half* this volume ($\frac{1}{2}$ correction) is given
- review with a repeat blood gas

4. Electrolyte requirement and replacement formulae

- normal daily requirement of K^+ (potassium) = $2\text{-}3\text{ mmol/kg/day} \times \text{body weight (kg)}$
- normal daily requirement of Na^+ (sodium) = $2\text{-}3\text{ mmol/kg/day} \times \text{body weight (kg)}$
- sodium deficit (mmol) = $(140 - \text{patient's serum Na level} \times 0.6 \times \text{wt (kg)})$

Indications for admission to Hospital

- need for intravenous therapy (as above)
- concern for other possible illness or uncertainty of diagnosis
- patient factors, e.g. young age, unusual irritability/drowsiness, worsening symptoms
- caregivers not able to provide adequate care at home
- social or logistical concerns that may prevent return evaluation if necessary

Electrolyte disorders

Knowing the levels of serum electrolytes often does not change the management of children with diarrhoea. The disorders described below can often be adequately treated by using ORS solution.

1. *Hypernatraemia (serum sodium > 150 mmol/l)*

- clinical presentation is notoriously deceptive
 - shock is late and ominous sign
 - skin has a characteristic doughy feel
 - anterior fontanelle may not be sunken
- Treatment :
 - a. Resuscitation
 - if in shock, give normal saline/Ringer's lactate 20ml/kg intravenously over ½ to 1 hour and repeat as necessary till perfusion improves
 - b. Rehydration
 - reduce serum sodium slowly - dramatic fall results in cerebral oedema, seizures.
 - calculate the fluid deficit and give together with maintenance fluid over at least 48 to 72 hours. If fluid has been given to resuscitate, the amount given should be subtracted from the fluid deficit. This is particularly important in hypernatraemic dehydration to avoid giving too much fluid.
 - reduction in serum sodium should not exceed 10 mmol/L per 24 hours
 - oral rehydration is the method of choice and the safest. Only if this fails is slow IV rehydration necessary.
 - use normal saline 5% dextrose for the duration of the fluid replacement, continue using this fluid until serum sodium is <145mmol/l. Then use 1/2 normal saline 5% dextrose or 1/5 normal saline 5% dextrose solution.
 - add KCL when child passes urine and review blood urea and serum electrolytes
 - monitor blood urea serum electrolytes 6 hourly

2. *Hyponatraemia (serum sodium <130 mmol/l)*

- ORS solution is safe and effective therapy for nearly all children with hyponatraemia.

3. *Hypokalaemia (serum potassium <3 mmol/l)*

- hypokalaemia can be prevented, and the potassium deficit corrected, by using ORS solution for rehydration therapy and by giving food rich in potassium during diarrhoea and after it has stopped.

Acute bloody diarrhoea (Dysentery)

- assess for dehydration and treat accordingly
- consider antimicrobial* treatment:
Trimethoprim (TMP) 5 mg/kg /sulfamethoxazole(SMX) 25 mg/kg BD for 5 days
or
Ampicillin 25 mg/kg 4 QID for 5 days

*check for sensitivities of local strains

Other problems associated with diarrhoea

1. Fever

- may be due to *another infection or dehydration*
- always search for the source of infection if there is fever, especially if it persists after the child is rehydrated

2. Convulsions

- consider:
 - febrile convulsion (assess for possible meningitis)
 - hypoglycaemia
 - hyper – or hyponatraemia

3. Lactose intolerance

- usually in formula-fed babies less than 6 months old with infectious diarrhoea
- clinical features:
 - persistent loose/watery stool
 - abdominal distension
 - increased flatus
 - perianal excoriation
- making the diagnosis: compatible history; check stool for reducing sugar
- treatment: If diarrhoea is persistent and watery (over 7-10 days) and there is evidence of lactose intolerance, a lactose free formula may be given. Normal formula can usually be reintroduced after 2–3 weeks

Pharmacological Agents

• antimicrobials

Antibiotics should not be used routinely. They are reliably helpful only in children with bloody diarrhoea, probable shigellosis, and suspected cholera with severe dehydration.

• antidiarrhoeal and anti emetic drugs

Antidiarrhoeal drugs and anti emetics should not be given to young children with diarrhoea or dysentery. They do not prevent dehydration and some have dangerous, sometimes fatal side effects.

• probiotics

Lactobacillus containing compounds are not recommended in the treatment of acute diarrhoea in children. Based on limited scientific evidence, efficacy has not been shown, although toxic effects are not a concern.

• zinc supplements

It has been shown that zinc supplements during an episode of diarrhoea reduce the duration and severity of the episode and lower the incidence of diarrhoea in the following 2-3 months. WHO recommends zinc supplements as soon as possible after diarrhoea has started. Dose up to 6 months of age is 10 mg/day, and age 6 months and above 20mg/day, for 10-14 days.