Acute Gastroenteritis

This protocol is based on the WHO protocol for Management of Acute Gastroenteritis in Children. However modifications were made to the treatment plan C in keeping with the fluid resuscitation methods recommended in the Paediatric Advanced Life support course.

AGE is a leading cause of childhood morbidity and mortality and important cause of malnutrition. Many diarrhoeal deaths are cause by dehydration , which can be safely and effectively treated (except when severe) by using ORS solution.

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 as needed.

1. Look At general condition of the child	Well. Alert	* Restless, irritable	*Lethargic or unconscious or floppy
Eyes	Normal	*Sunken	*Sunken
Tears	Present	Absent	Absent
Mouth and Tongue	Moist	Dry	Very Dry
Thirst	Drinks normally or not thirsty	* Thirsty, drinks eagerly	*Drinks poorly or unable to drink
2. Feel Skin Pinch	Goes back quickly	* Goes back slowly	*Goes back very slowly
3. Decide	The patient has **no signs of dehydration (< 5 %)**	If the patient has 2 or more *signs , there is **some** dehydration (5-10%)	If the patient has 2 or more *signs there is **severe dehydration (> 10%)**
4. Treat	Use treatment **Plan A**	Weigh the patient if possible, and use treatment **Plan B**	Weigh the patient, and use treatment **Plan C**

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

A. TREATMENT PLAN "A" TO TREAT DIARRHOEA

EXPLAIN THE THREE RULES FOR TREATING DIARRHOEA AT HOME:

1. GIVE EXTRA FLUIDS (as much as the child will take)
   - Breastfeed frequently and for longer at each feed
   - If child exclusively breastfed, give ORS in addition to breast milk
   - If child not exclusively breastfed, give one or more of the following: ORS, food-based fluids (soup and rice water)

It is especially important to give ORS at home when:
- The child has been treated with Plan B or Plan C during visit
- The child cannot return to a clinic if the diarrhoea gets worse

Teach mother how to use ORS and how much ORS to give in addition to 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 available, replace 10ml/kg of ORS after each loose stool)
Give mother 8 packets of ORS to use at home

Tell mother to give frequent small sips from cup/spoon. If child vomits, wait 10 mins then continue but more slowly. Continue to give extra fluid until diarrhoea stops.

2. CONTINUE FEEDING
   - Breast fed 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 diet during episodes of diarrhoea
   - Foods high in simple sugar should be avoided as osmotic load might worsen diarrhoea

3. WHEN TO RETURN
   - Not able to drink or breastfeed or drinking poorly
   - Becomes sicker
   - Develops a fever
   - Blood in stool

B. TREATMENT PLAN "B" TO TREAT DEHYDRATION WITH ORS

1. AMOUNT OF ORS SOLUTION TO GIVE OVER 4-HOUR PERIOD

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

* Use the patient's age only when you do not know the weight. The approximate amount of ORS required (in ml) can also be calculated by multiplying the child's weight (in kg) times 75

NOTE: ENCOURAGE THE MOTHER TO CONTINUE BREAST-FEEDING.

- If the patient wants more ORS, give more,
- If the eyelids become puffy, stop ORS and give other fluids. If diarrhoea continues, use ORS again when the puffiness is gone
- If the child vomits, wait 10 minutes and then continue giving ORS, but more slowly (i.e. 1 spoonful every 2 - 3 minutes). Some children may want to drink too quickly. This may make them vomit.

2. AFTER 4 HOURS, REASSESS THE CHILD

- Reassess the child and classify the child for dehydration
- Select the appropriate plan to continue treatment
- Begin feeding the child in clinic

3. IF THE MOTHER MUST LEAVE ANY TIME 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:
  1. GIVE EXTRA FLUID
  2. CONTINUE FEEDING
  3. WHEN TO RETURN – see Plan A

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C. TREATMENT PLAN "C" - TO TREAT SEVERE DEHYDRATION QUICKLY

Follow the arrows, if answer is "YES" , go across. If "NO" go down

Can you give intravenous or intraosseous fluids immediately?

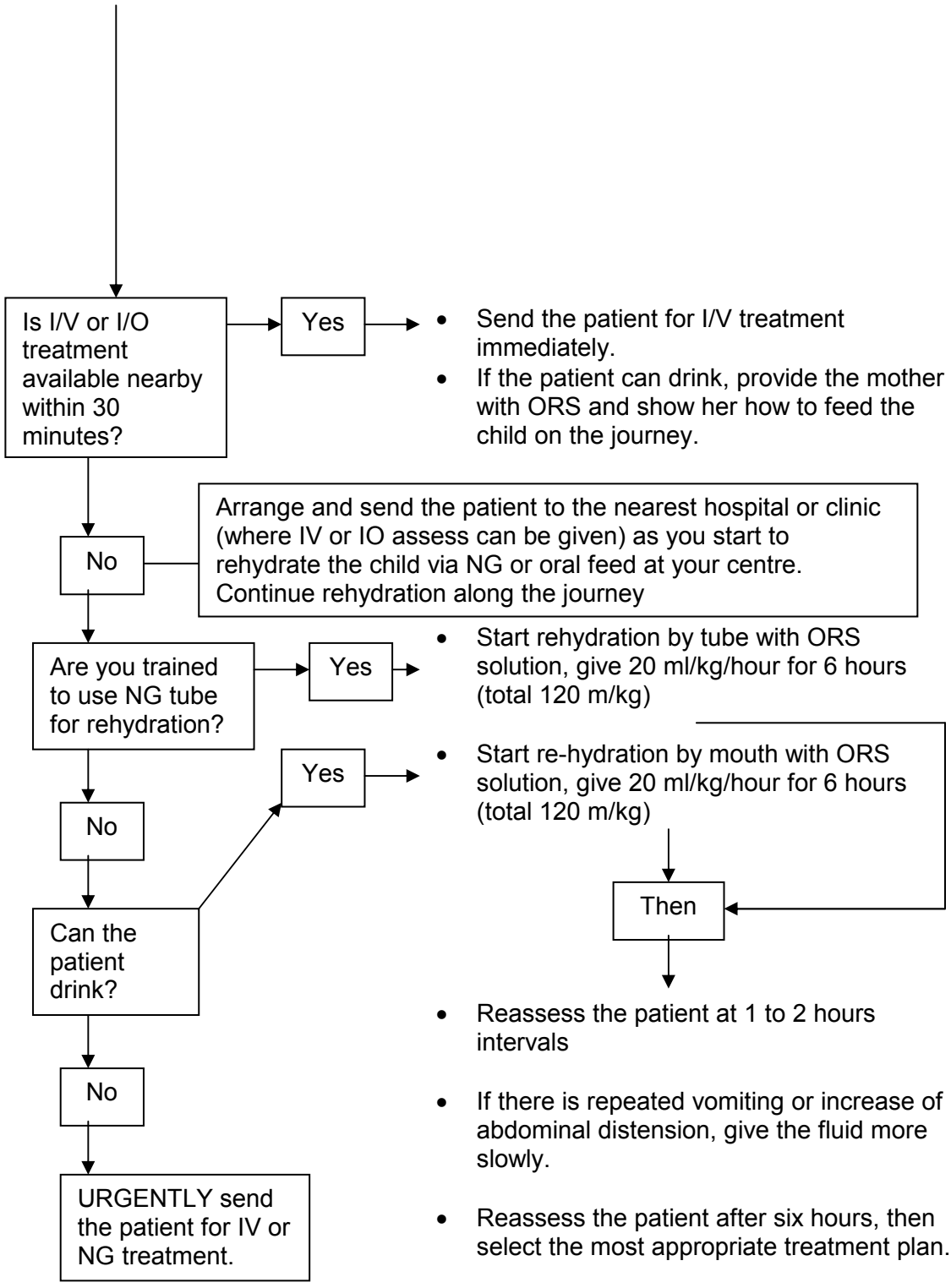
→ Yes →

Start IV or IO fluids 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:-

Age	First give 20 ml/kg as fast as possible. Repeat fluid boluses as necessary until perfusion has improved.	Then give the remaining fluid over
< 12 months old		5 hours
> 12 months old		2 1/2 hours

↓ No

- reassess the patient after every bolus and stop the boluses once perfusion improves or when fluid overload is suspected. Inotropic agents may then be necessary to maintain perfusion.
- If the patient does not respond to rapid bolus rehydration, should consider the possibility of an underlying disorder e.g. septic shock, toxic shock syndrome, myocarditis, myocardiopathy or pericarditis
- as soon as patient can drink, also give ORS (5 ml/kg/hour) . Usually after 3 to 4 hours for infants, and 1 to 2 hours for older child
- evaluate the patient using the assessment chart after 6 hours for infants, and 3 hours for older child Then choose the most appropriate Plan (A, B, or C) to continue treatment.



- If possible, observe the patient at least 6 hours after re-hydration making sure that the mother maintains hydration by feeding ORS fluid
- If there is an outbreak of cholera in your area, give an appropriate oral antibiotic after the patient is alert.

D. Criteria for admission to Hospital

Inpatient care is indicated for children if:

- Caregivers cannot provide adequate care at home
- Substantial difficulties exist in giving ORS including intractable vomiting, ORS refusal or inadequate ORS intake
- Concern exist for other possible illness complicating the clinical course
- ORS treatment fails including worsening diarrhoea or dehydration despite adequate volume
- Severe dehydration (> 9% of body weight)
- Social or logistical concerns that might prevent return evaluation if necessary
- Factors especially young age, unusual irritability/drowsiness, progressive course of symptoms, or uncertainty of diagnosis that might need closer observation

E. When oral rehydration fails

In about 5% of children the signs of dehydration do not improve during ORT, or they worsen after initial improvement. The usual causes are :

- Continuing rapid stool loss (> 15-20ml/kg/hour)
- Insufficient intake of ORS solution owing to fatigue or lethargy
- Frequent , severe vomiting

Treatment :
Give ORS solution by nasogastric tube
Or
IV Hartmann solution (amount to be given depend on the degree of dehydration)

F. When oral rehydration should not be given

- All children who are severely dehydrated and in state of shock or near shock require immediate iv therapy
- Unconscious child
- Abdominal distension with paralytic ileus , usually caused by opiate drugs (e.g. codeine, loperamide) and hypokalaemia
- Glucose malabsorption – indicated by marked increase in stool output, failure of the signs of dehydration to improve and a large amount of glucose in the stool when ORS solution is given.

Treatment :

- Rehydration should be given IV
- NG therapy should not be used

G. Electrolytes disturbances

Knowing the levels of serum electrolytes rarely changes the management of children with diarrhoea. **The disorders described below are all adequately treated by using ORS solution.**

1. Hypernatraemic dehydration

Def : serum Na > 145mmol/l

Clinical features :
Clinical presentation is notoriously deceptive
Shock is late and ominous sign
Skin having a characteristic doughy appearance
Anterior fontanelle is typically not 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

b. Rehydration

Aim : reduce sodium slowly , dramatic fall results in cerebral oedema and convulsions
Rehydrate over 48 to 72 hours
Reduction in plasma 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

Calculate the fluid deficit and give together with maintenance fluids over at least 48 hours.
If fluid was 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

* use ½ normal saline/5%dextrose for the duration of fluid replacement after this if the Na is still > 145mmol/l, continue using this fluid until the serum sodium is < 145mmol/l, after which 0.18%saline/5%dextrose may be used. Add KCL when child PU and review BUSE.

Monitor BUSE 6 HOURLY

2. Hyponatraemia

- ORS solution is safe and effective therapy for nearly all children with hyponatraemia **EXCEPT** those with oedema

3. 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.

If intravenous drip is required:-
Notes:
Fluid deficit (mls) = percentage dehydration X body weight in grams

- Correction of metabolic acidosis if pH < 7.1. Otherwise metabolic acidosis self corrects with rehydration
- Administration of IV 8.4% NaHCO3 (mEq or ml)= 1/3 x base deficit x weight * usually only ½ correction is given. Review with a repeat blood gas
- Maintenance fluid using 0.18% saline 5% dextrose solution (up to 2 years) , ½ normal saline 5% dextrose (children) +/- KCL in drip

  Less than 6 months = 150 ml/kg/day:
  6 months to 1 year = 120 ml/kg/day
  More than 1 year (according to weight):
  1st 10 kg = 100 ml/kg;
  10-20 kg = 1000 ml for first 10 kg + 50 ml/kg for any subsequent kg
  Over 20kg = 1500 ml for first 20kg and 20 ml/kg for any subsequent kg.

- Normal daily requirement of K+ = 3 mmol/kg/day x body weight (kg)
- Normal daily requirement of Na+ = 3 mmol/kg/day x body weight (kg)
- Sodium deficit (mmol) = (140 - patient's serum Na level x 0.6 x wt (kg)

H. Management of acute bloody diarrhoea (Dysentery)

1. Assessment for amount of dehydration and treat accordingly
2. Treat for 5 days with an antimicrobial.

   Trimethoprim (TMP) 5 mg/kg and sulfamethoxazole(SMX) 25 mg/kg twice a day for 5 days
   OR
   Ampicillin 25 mg/kg 4 times a day for 5 days

3. May consider discharging if
   - Disappearance of fever
   - Less blood in the stool
   - Passage of fewer stools
   - Improved appetite
   - Return to normal activity

*check for sensitivities of local strain *

I. Other problems associated with diarrhoea

1. **Fever**
   It may be due to
   - Another infection
   - Dehydration

   Always search for the source of infection if there is fever, especially if it persists after the child is fully rehydrated

2. **Convulsion**
   Consider : Febrile convulsion (evaluate for possible meningitis)
   Hypoglycaemia
   Hyper – or hyponatraemia

3. **Lactose intolerance**

Usually formula-fed babies less than 6 months old with infectious diarrhoea

Clinical features:

- Persistent loose stool
- Abdominal distension
- Increased flatus
- Perianal excoriation

Diagnosis

- History
- Clinitest
- Benedict's test

Collect stool fluid in diapers lined with plastic. Dilute 5 drops of stool fluid with 10 drops of water in a test tube

Clinitest – Add a Clinitest tablet into the resultant mixture. A colour reaction indicating over 0.5% reducing substances suggests the diagnosis

Benedict's test – 5 ml of Benedict solution is mixed with 0.5ml of liquid stool. The resultant solution is boiled for about 5 minutes. A colour reaction indicating over 0.5% reducing substances suggests the diagnosis

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
The usual formula can usually be reintroduced after 3 – 4 weeks

J. Pharmacological Agents

1. **Anti microbial medication**

Not indicated as majority of diarrhoea are caused by viruses. Even when bacterial cause is suspected, antimicrobial therapy is not indicated among children because in majority of cases diarrhoea are self limited. Exceptions involve special needs of individual children (e.g.. Immune compromised host, premature infants or children with underlying disorder)

2. **Antidiarrheal compound**

As a general rule, these pharmacologic agents should not be used to treat acute diarrhoea

3. **Supplemental zinc**

Number of trials have supported zinc supplementation as an effective agent in treating and preventing diarrhoea, Further research is needed to identify mechanism of action and to determine optimal delivery.

4. Probiotic - Lactobacillus containing compounds currently 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