

Guideline for the Management of Diarrhoea in Children

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Ministry of Health
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Table of Contents

| | |
|--|----|
| 1. Overview | 3 |
| <i>Clinical types:</i> | 3 |
| 2. Assessment of the child with diarrhoea | 3 |
| Clinical diagnosis | 3 |
| Rule out other potential causes of diarrhoea | 4 |
| History:..... | 4 |
| Physical examination:..... | 5 |
| 1.look for these signs:..... | 5 |
| 2.feel the child to assess:..... | 5 |
| 3.take the child's vitals and weight | 5 |
| 3. Assessment of degree of dehydration and plan of management | 6 |
| Table 1. WHO classification of dehydration | 6 |
| 4. Laboratory investigation..... | 7 |
| laboratory investigations for assessing dehydration | 7 |
| 5. Management of acute watery diarrhoea..... | 7 |
| 5.1 Plan A <i>management of diarrhea without clinical dehydration:</i> | 7 |
| How to make ORS?..... | 8 |
| Zinc supplement:..... | 8 |
| 5.2 Plan B <i>management of diarrhea with some dehydration</i> | 9 |
| 5.3 Plan C <i>management of severe dehydration</i> | 10 |
| 6. Management of hypernatremia dehydration..... | 12 |
| 7. Management of hyponatraemic dehydration | 13 |
| 8. Use of probiotics and antiemetics | 13 |
| 9. Use of antibiotics | 14 |
| 10. Dysentery..... | 14 |
| 11. Persistent diarrhea | 15 |
| 12. Prevention of diarrhea..... | 16 |
| <i>Flowchart for management of acute watery diarrhea</i> | 17 |
| References | 18 |

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1. OVERVIEW

Diarrhoea is the second leading cause of death in children under five years old. It is both preventable and treatable. Diarrhoea is also a leading cause of malnutrition in children under five years old.

Diarrhoea is defined as the passage of three or more loose or liquid stools per day or more frequent passage than is normal for the individual. Frequent passing of formed stools is not diarrhoea, nor is the passing of loose, "pasty" stools by breastfed babies. However, a change in stool consistency is more indicative of diarrhea rather than stool number, particularly in the first months of life.

Diarrhoea is usually a symptom of an infection in the intestinal tract, which can be caused by a variety of bacterial, viral and parasitic organisms. Infection is spread through contaminated food or drinking-water, or from person-to-person as a result of poor hygiene.

Clinical types:

- *Acute watery diarrhoea*
- *Acute bloody diarrhoea*, which is also called dysentery
- *Persistent diarrhoea*, which lasts 14 days or longer

2. ASSESSMENT OF THE CHILD WITH DIARRHOEA

Clinical diagnosis

Acute watery diarrhea usually lasts for 5–7 days, and stops within 2 weeks whereas vomiting usually lasts for 1–2 days, and stops within 3 days. No clinical feature can differentiate a bacterial from a viral etiology. Children with viral intestinal infection had significantly more respiratory symptoms and presented with more frequent and longer-lasting vomiting than children with bacterial intestinal infection. High fever (>40 C), overt fecal blood, abdominal pain, and central nervous system involvement each suggests a bacterial pathogen, but viral etiology can't be excluded. Vomiting and respiratory symptoms are associated with a viral etiology. Fever usually subsides early after the onset of viral illness. Common viruses are Rotavirus, Norovirus, Enteric Adenovirus, etc.

Diarrhea can be a common presentation in non-intestinal diseases like pneumonia, acute otitis media, dengue, urinary tract infection, sepsis.

Rule out other potential causes of diarrhoea if the following clinical features are present

- shortness of breath or tachypnoea
- altered conscious state
- neck stiffness
- bulging fontanelle in infants
- non-blanching rash
- blood and/or mucus in stool
- bilious (green) vomit
- severe or localized abdominal pain
- abdominal distension or tenderness

History:

Ask the mother or other caretaker about:

- presence of blood in the stool;
- duration of diarrhoea;
- number of watery stools per day;
- number of episodes of vomiting;
- presence of fever, cough, or other important problems (e.g., convulsions, recent measles);
- pre-illness feeding practices (Exclusive breastfeeding below six months)
- type and amount of fluids, and food taken during the illness;
- drugs or other remedies taken;
- immunization history, recent contact with someone with acute diarrhoea and/or vomiting and exposure to a known source of enteric infection (possibly contaminated water or food)
- urine output – wet diapers

Physical examination:

1. Look for these signs:

- General condition: is the child alert; restless or irritable; lethargic or unconscious?
- Are the eyes normal or sunken? Specifically ask the mother as she will know the recent changes
- When fluids or ORS solution is offered to drink, is it taken normally or refused, taken eagerly, or is the child unable to drink owing to lethargy or coma?
- Mouth and tongue: moist or dry

2. Feel the child to assess:

- Skin turgor. When the skin over the abdomen is pinched and released, does it flatten immediately, slowly, or very slowly (more than 2 seconds)?
- Capillary refill time CRT (press over nail bed/ trunk)
- Pulse volume: weak / feeble or absent
- Feel for the extremities: warm, cool

3. Take the child's vitals and weight.

- Fever may be caused by severe dehydration or hypernatremic dehydration in infants, and it can be caused by non-intestinal infection such as dengue or pneumonia.

Recognize that the following are at increased risk of dehydration:

- children younger than 1 year, particularly those younger than 6 months or those born with low birthweight
- children who have passed more than five or more diarrheal stools in the previous 24 hours
- children who have vomited more than twice in the previous 24 hours

3. ASSESSMENT OF DEGREE OF DEHYDRATION AND PLAN OF MANAGEMENT

Table 1. WHO classification of dehydration

| No dehydration | Some dehydration | Severe dehydration |
|--|--|--|
| Not enough signs to classify as some or severe dehydration | Two or more of the following signs <ul style="list-style-type: none"> • Restlessness or irritability • Sunken eyes • Drinks eagerly, thirsty • Skin pinch goes back slowly | Two or more of the following signs <ul style="list-style-type: none"> • Lethargic or unconsciousness • Sunken eyes • Unable to drink or drinks poorly • Skin pinch goes back very slowly |
| PLAN A | PLAN B | PLAN C |
| Treatment at home: <ol style="list-style-type: none"> 1. Give extra fluids ORS 2. Continue feeding 3. Give zinc 4. Counsel mother when to return immediately | Treatment in observation ward 50-75ml/kg of ORS over 4hrs to correct deficit orally or by tube feeding. Continue extra fluids, feeding and give zinc | IV therapy with RL or DNS over 3 to 6hrs depending on age. |

The most severe threat posed by diarrhoea is dehydration. During a diarrhoeal episode, water and electrolytes (sodium, chloride, potassium and bicarbonate) are lost through liquid stools, vomit, sweat, urine and breathing. Dehydration occurs when these losses are not replaced. In the early stages of dehydration, there are no signs or symptoms. As dehydration increases, signs and symptoms develop. Initially these include: thirst, restless or irritable behavior, decreased skin turgor, sunken eyes, and sunken fontanelle (in infants).

In severe dehydration, these effects become more pronounced and the patient may develop evidence of hypovolemic shock, including: diminished consciousness, cold extremities, pale or mottled skin, a rapid and feeble pulse (the radial pulse may be undetectable), low or undetectable blood pressure, prolonged capillary refill time and peripheral cyanosis. Death follows soon if rehydration is not started quickly.

5. LABORATORY INVESTIGATION

Perform stool microbiological investigations if:

- Septicemia is suspected or there is blood and/or mucus in the stool or the child is immunocompromised.
- The diarrhea has not improved by day 7 or there is uncertainty about the diagnosis of gastroenteritis.

Laboratory investigations for assessing dehydration

- Do not routinely perform blood biochemical testing for acute uncomplicated watery diarrhoea.
- Send serum sodium, potassium, urea, creatinine and glucose concentrations if intravenous fluid therapy is required or there are symptoms and/or signs that suggest hyponatremia.
- Send venous blood gas analysis to look for metabolic acidosis if signs of severe dehydration or shock.

6. MANAGEMENT OF ACUTE WATERY DIARRHOEA

Oral rehydration is the first-line treatment for all of the children with acute diarrhea. Since oral rehydration is more effective and less invasive than IV rehydration, administration of ORS should be attempted and promoted. In the case of children on IV therapy, attempts should be made to switch to oral rehydration as soon as indications for parenteral rehydration are no longer observed.

5.1 PLAN A *Management of diarrhea without clinical dehydration:*

- Treat the child as an outpatient. Counsel the mother on the four rules of home treatment:
 1. Give extra fluid.
 2. Give zinc supplements.
 3. Continue feeding.
 4. Teach when to return to the clinic.
- Give extra fluid, as follows: –
 - If the child is being breastfed, advise the mother to breastfeed frequently and for longer at each feed.

- In non-breastfed children, give one or more of the following: ORS solution, food-based fluids (such as soup, rice water “bai-pen”), clean water/coconut water.
- To prevent dehydration, advise the mother to give as much extra fluids as the child will take:
 - for children < 2 years, about 50–100 ml after each loose stool
 - for children ≥ 2 years, about 100–200 ml after each loose stool.

Teach the mother to give small sips from a clean cup (for older children) or spoon. For babies a dropper or syringe (without a needle) can be used to put small amounts of ORS into mouth. If the child vomits, wait 10 min, and then give more slowly. Mother should continue giving extra fluid until the diarrhoea stops. Teach the mother how to mix and give ORS solution, and give her two packets of ORS to take home.

How to make ORS?

Different sachets need to be diluted in different amount of water. Read the label to see how much water is needed for dilution. Use the whole packet to mix to the required amount of water. Do not mix ORS with other fluids (coconut water) or glucose. ORS can be stored for 24 hours in room temperature.

Zinc supplement:

It reduces the duration of a diarrhoea episode by 25% and are associated with a 30% reduction in stool volume.

Give zinc sulphate

- Age 2-6 months: (10mg) OD;
- Age >6 months : (20mg) OD for 10 -14 days.

Zinc supplements reduces duration of diarrhoea and stool volume as well as reduces the risk of new episodes of diarrhea for following 2-3 months. Use plain zinc sulphate solution.

- Not to use zinc containing multivitamins.

Continue feeding with the usual feed. Food should never be withheld and the child’s usual food shouldn’t be diluted. Continued feeding also speeds the recovery of normal intestinal function. Frequent and small

feedings are well tolerated. Foods rich in potassium such as banana, coconut water and fresh fruit juice are beneficial. Don't give carbonated commercial drinks or sugar containing commercial juices.

Advise the mother to return immediately to the health facility

- if the child becomes sicker, is unable to drink or breastfeed, drinks poorly, develops a fever or has blood in the stool.
- If the child shows none of these signs but is still not improving, advise the mother to return for follow-up after 2-3 days

5.2 PLAN B *Management of diarrhea with some dehydration*

- Use ORS solution for oral rehydration therapy. Give 50 -75 ml/kg ORS for over 4 hours in health facility under supervision and needs frequent re-assessment.
 - ✓ For example, an infant weighting 10 kg having some dehydration, needs 500-750 ml of ORS over 4 hrs.
- Check regularly to see whether there are problems.
 - If the child vomits, wait 10 min; then, resume ORS solution more slowly (e.g. a spoonful every 2–3 min)
 - If the child's eyelids become puffy, stop ORS solution, reduce the fluid intake and continue with breast milk.
- Check blood glucose or electrolytes, if possible, in a child who is restless or irritable and convulsing, in case hypoglycemia or hypernatremia is present. Manage the child accordingly.
- If the mother cannot stay for 4 h, show her how to prepare ORS solution and give her enough ORS packets to complete rehydration at home plus enough for 2 more days.
- Reassess the child after 4 hours, checking for signs of dehydration listed earlier. Reassess the child before 4 h if he or she is not taking the ORS solution or seems to be getting worse.
 - If there is no dehydration, teach the mother the four rules of home treatment like in Plan A.
 - If the child still has some dehydration, repeat treatment with ORS solution for another 4 h, as above, and start to offer food and milk and breastfeed frequently.
 - If the child's condition has deteriorated and there are signs of severe dehydration management as PLAN C.

Use of IV fluids in moderate dehydration:

When the child has continuous rapid stool loss, insufficient intake of ORS owing to fatigue or lethargy and frequent severe vomiting oral rehydration therapy fails, such children should be given ORS by Nasogastric feed if feasible or 50 ml/kg of Ringers lactate solution or DNS IV over 4 hours and reassess hourly to look for fluid overload. Fluid should be readjusted during these 4 hours according to clinical status.

5.3 PLAN C Management of severe dehydration

- Treatment of Children with severe dehydration should be given rapid IV rehydration followed by oral rehydration therapy which needs hospital admission. Many experts now support rapid intravenous rehydration, suggesting that it allows oral fluids to be started earlier and can shorten the duration of hospital treatment. Rehydration with intravenous fluid therapy has traditionally been undertaken slowly – typically over 24 hours.
- Start IV fluids immediately. While the drip is being set up, give ORS solution if the child can drink.
Note: The best IV fluid solutions for rehydration are isotonic solutions: Ringer’s lactate solution (called Hartmann’s solution for Injection) and normal saline solution (0.9% NaCl). Do not use 5% glucose (dextrose) solution or 0.18% saline with 5% dextrose solution (ISOLYTE-P), as they increase the risk for hyponatremia, which can cause cerebral oedema.

Give 100 ml/kg of the Ringer’s Lactate or Normal Saline as described below according to age.

IV therapy in severe dehydration.

| Age | First give 30 ml/kg over | Then, give 70ml/kg over |
|----------|--------------------------|-------------------------|
| < 1 year | 1 hour* | 5 hours |
| > 1 year | 30 mins* | 2.5 hours |

*Repeat once if radial pulse is still very weak or not detectable.

- Reassess the child every 15–30 min until a strong radial pulse is present. Thereafter, reassess the child by checking skin pinch, CRT, level of consciousness and ability to drink at least every hour, in

order to confirm that hydration is improving. *Sunken eyes recover more slowly than other signs and are less useful for monitoring.*

- When the full amount of IV fluid has been given, reassess the child's hydration status fully.
 - ✓ If signs of severe dehydration are still present, repeat the IV fluid infusion outlined earlier. Persistent severe dehydration after IV rehydration is unusual; it usually occurs only in children who pass large watery stools frequently during the rehydration period.
 - ✓ If the child is improving but still shows signs of some dehydration, discontinue IV treatment and give ORS solution for 4 hours as PLAN B.
 - ✓ If there are no signs of dehydration, follow the guidelines in treatment plan A. When appropriate, encourage the mother to continue breastfeeding frequently. Observe the child for at least 24- 48 h before discharge, to confirm that the mother is able to maintain the child's hydration by giving ORS solution.

Give zinc and resume oral feed as the dehydration gets corrected. All children should start to receive some ORS solution (about 5 ml/kg per h) by cup or spoon when they can drink without difficulty (usually within 3–4 h for infants and 1–2 h for older children). ORS provides additional base and potassium, which may not be adequately supplied by IV fluid.

- ***If iv access isn't possible*** in severe dehydration, arrange for referral to nearby hospital where IV access is possible and simultaneously start rehydration by nasogastric tube (or mouth) with ORS solution:
 - ✓ Give 20 ml/kg per hour of ORS for 6 h (total 120 ml/kg).
 - ✓ Reassess the child every 1–2 h:
 - If there is repeated vomiting or increasing abdominal distension, give the fluid more slowly.
 - If hydration status is not improving after 3 h, send the child for IV therapy.
 - ✓ After 6 h, reassess the child and classify dehydration. Then, choose the appropriate plan (A, B or C) to continue treatment.

Signs of rehydration includes:

skin pinch becomes normal; - thirst subsides-, urine is passed adequately; - the child becomes quiet, no longer irritable and often falls asleep.

6. MANAGEMENT OF HYPERNATREMIA DEHYDRATION

Serum Na > 145 meq/mL. Signs of dehydration may be masked in hypernatremic dehydration. It can cause severe neurological damage such as hemorrhage and thrombosis. Cause includes excessive loss of water via loose stools; excessive intake of sodium (improperly prepared ORS) or combination of both.

Suspect hypernatremia dehydration if there are any of the following:

- jittery movements,
- increased muscle tone,
- hyperreflexia
- convulsions
- drowsiness or coma.
- Infants <6 months doughy skin.

Oral or NG rehydration with ORS is an effective and safe treatment and has fewer adverse effects than IV rehydration. If the child is hypernatremic and needs IV rehydration:

- Use an isotonic solution (0.9% saline) or 5% DNS or ½ NS 5% DW for fluid deficit replacement and maintenance. Monitoring sodium frequently is more important than choice of fluids. Don't use RL/ isolyte-P as it is hypotonic.
- Replace the fluid deficit slowly, typically for 48 hours, with the aim of reducing it to <0.5 mmol/L/hr
- More slow replacement in severe hypernatremia (Na>170) needs correction over 72-96 hrs. Rapid correction causes cerebral edema, which can manifest as seizure. Sodium should not decrease more than 12 meq/L every 24 hr.

Worked example for hypernatremia dehydration to correct the deficit fluid:

A 30 kg child, moderate dehydration (5% dehydration) with diarrhea, initial Na 160 meq/L

Fluid Deficit for replacement = (weight)30* (%dehydration) 5*(constant) 10=1500ml **over 48 hrs**
= 31.25ml/hr

Maintenance fluids for 24 hr using Holiday Segar formula = 1700 ml = 70.83 ml/hr

So, IV fluids 5%DNS (31.25+ 70.83) @ 102 ml/hr. Replace ongoing losses as they occur.

Determine time for correction for deficit fluid on the basis of initial sodium concentration:

| | |
|----------------------------------|----------------------------------|
| Na 145 – 157 meq/L : over 24 hrs | Na 171 – 183 meq/L : over 72 hrs |
| Na 158 – 170 meq/L: over 48 hrs | Na 184 – 196 meq/L: over 84 hrs |

7. MANAGEMENT OF HYPONATRAEMIC DEHYDRATION

Serum Na < 135 meq/mL

Cause: excessive water intake or retention, excessive sodium loss or combination of both

Treatment:

ORS will correct most of the mild and asymptomatic hyponatremia dehydration.

If the child is having seizure due to low sodium or Na < 120 meq/L

- 3-4ml per kg of 3% NaCl over 15 mins. It will raise 3 mmol/L and will usually stop seizure.

If hyponatremia is due to water retention or excessive water intake and the patient is asymptomatic, restriction of fluid intake to half or normal daily requirement is adequate.

Monitor weight, hydration and Na level frequently. Aim to raise the Na at the rate of no more than >0.5mmol/hr. Overly rapid correction or overcorrection of hyponatremia causes central pontine myelinosis.

8. USE OF PROBIOTICS AND ANTIEMETICS

- Probiotics are not routinely advised.
- Use of the following probiotics should be considered: *L rhamnosus GG and S boulardii*.
P.S. Neutrolin B has lactobacillus sporogens.
- Avoid probiotics in immunocompromised patients presenting with diarrhoea.
- Ondansetron (Emeset): usually preferred at dosages 0.15 mg /kg/dose used orally or iv.

9. USE OF ANTIBIOTICS

Do not use antibiotics for acute watery diarrhea routinely.

Give antibiotic treatment for following circumstances

- Suspected cases of septicemia
- Cases of bloody diarrhoea (dysentery)
- Suspected cases of cholera
- When diarrhoea is associated with another acute infection (e.g., pneumonia, urinary tract infection), that infection also requires specific antimicrobial therapy.

Use of loperamide / antidiarrheals: do not use in children as it usually resolves in a few days and use of these medications leads to complications such as paralytic ileus.

10. DYSENTERY

- Dysentery is diarrhoea presenting with frequent loose stools mixed with blood not just a few smears on the surface. Most episodes are due to Shigella, which can lead to life-threatening complications, including intestinal perforation, toxic megacolon and haemolytic uraemic syndrome. Other causes of dysentery are salmonella, E. coli, Entamoeba histolytica, etc.
- Diagnosis
 - ✓ The diagnostic signs of dysentery are frequent loose stools mixed with visible red blood.
 - ✓ Other findings on examination may include:
 - abdominal pain ■ fever ■ convulsions ■ lethargy ■ dehydration ■ rectal prolapse
- Consider intussusception in infants and young children if attacks of crying with pallor and blood/mucus in stool with abdominal mass for which needs surgical intervention.
- Dysentery is unusual in infants, consider life threatening bacterial sepsis.
- Stool microscopy reveals mucus, pus cells more than 5>hpf. Stool culture may isolate the organisms.

Most children usually do not need admission in hospital so can be treated at home for uncomplicated dysentery. Refer to table 2 for treatment of dysentery.

Table 2. Drugs for dysentery

| Bacillary dysentery | Amoebic dysentery |
|---|--|
| <ul style="list-style-type: none"> • Oral ciprofloxacin 15mg/kg/dose BD for 5 to 7days. (Preferred drug of choice but unavailable in syrup) or • Oral cefixime at 10 mg/kg/day BD for 5 to 7days or • Oral azithromycin 10mg/kg/day OD for 5 days. | <ul style="list-style-type: none"> • IV or oral metronidazole at 10 mg/kg TDS for 5 to 7 days |

Admit to hospital especially for:

infants and young children and severely ill children, who look lethargic, have abdominal distension and tenderness or convulsions – children with any another condition requiring hospital treatment.

- ✓ Injection ceftriaxone IV or IM at 80 mg/kg per day for 5-7 days to severely ill children.

Give extra fluids, ORS, continue feeding, zinc supplements as for children with acute watery diarrhea. Management of dehydration follows similar to PLAN B and C as per the clinical condition and dehydration.

11. PERSISTENT DIARRHEA

- Persistent diarrhoea is diarrhoea, with or without blood, that begins acutely and lasts for ≥ 14 days.
- Examine every child with persistent diarrhoea for non-intestinal infections such as pneumonia, sepsis, urinary tract infection, oral thrush and otitis media, and treat appropriately.

MANAGEMENT

- Fluid management is similar to PLAN B or C. ORS solution is effective for most children with persistent diarrhoea.
- A few children, however, may have impaired glucose absorption, and ORS solution may not be as effective. When these children are given ORS, their stool volume increases markedly, thirst increases,

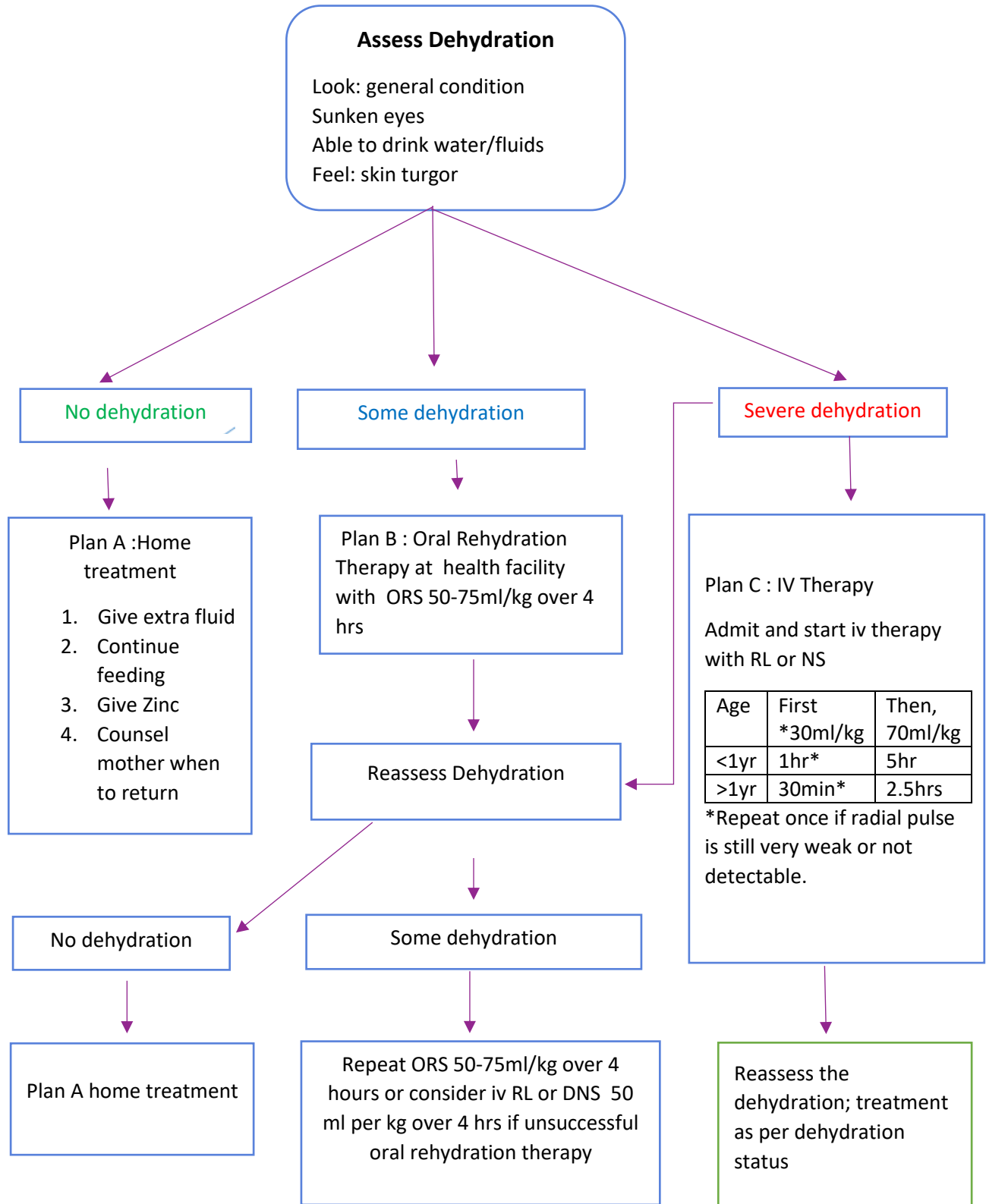
signs of dehydration develop or worsen, and the stools contain a large amount of unabsorbed glucose. These children require IV rehydration until ORS solution can be taken without causing the diarrhoea to worsen.

- Secondary lactose intolerance occurs after acute watery diarrhoea commonly caused by Rota virus which is transient but can present as persistent diarrhoea. This is characterized by loose explosive stools. Treatment includes lactose free formula for infants and reduced lactose intake in older children.
- Routine treatment of persistent diarrhoea with antibiotics is not effective and should not be done. Some children, however, have non-intestinal or intestinal infections that require specific antibiotic therapy.
- Treat persistent diarrhoea with blood in the stools with an oral antibiotic effective for *Shigella* as in Table 2.
- Give oral metronidazole at 10 mg/kg three times a day for 5 days only if:
 - ✓ microscopic examination of fresh faeces reveals trophozoites of *Entamoeba histolytica* within red blood cells; or
 - ✓ trophozoites or cysts of *Giardia* are seen in the faeces
- Give multivitamins containing essential micronutrients. Supplement with zinc for 2 weeks.

12. PREVENTION OF DIARRHEA

- Promotion of exclusive Breast feeding
- Improved complementary feeding practices
- Promotion of personal and domestic hygiene
- Improved water and sanitary facilities
- Improved case management of diarrhoea
- Immunization- measles and rotavirus vaccine

Flowchart for management of acute watery diarrhea



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