Lecture 4 Fluid therapy in acute diarrhea

2023-2024 Dr. Hanan R. Abood

Learning Objectives: Learn The Following:

- **What is IMNCI: Integrated Management of Childhood Illnesses.?**
- **How to assess child presented with acute diarrhea.**
- **Choosing of appropriate management plan**
- **What is ORS? Low osmolarity ORS?**
- **Zinc supplement in acute diarrhea, role, dose, and duration.**

What is IMNCI?

What is IMNCI? The Integrated Management of Newborn and Childhood Illnesses (IMNCI) case management approach offers simple and effective methods to comprehensively prevent and manage the leading causes of serious illnesses and mortality in children below five years.

- **IMNCI** is an integrated approach that focuses on the well-being of the whole child.
- IMNCI aims to reduce death, illness and disability, and to promote improved growth and development among children under five years of age.
- IMNCI includes both preventive and curative elements that are implemented by families and communities as well as by health facilities

CHECK FOR GENERAL DANGER SIGNS:

All sick children aged up to 5 years are examined for **general danger signs**. These signs indicate the need for immediate referral or admission to hospital.

Assess For 5 General Danger Signs:

Ask:

1.the child is not able to drink or breastfeed.
2.the child vomits everything
3.the child has had convulsions

Look:

4.the child is lethargic or unconscious.
5.the child is convulsing now.

Any General Danger Sign ⇒ Very sever disease

- ✓ Treat the convulsion
- ✓ Complete assessment immediately.
- ✓ Give first dose of appropriate antibiotics.
- ✓ Prevent low blood sugar.
- ✓ Refer ***Urgently*** to hospital.

- **Then you need to Assess hydration state:**
  - **Conscious level**: well-alert, Restless-irritable, or lethargic.
    **AVPU - Alert, Voice, Pain and Unresponsive.
  - **Pulse normal, weak , or absent pulse**.

- **Capillary refill>3 sec.** indicate the pt in shock
- **Eyes**: Normal, Sunken eyes, or very sunken eyes.
- **Skin pinch** goes back normally, slowly, or v. slowly.
- **Drinks water**: offer the pt sips of water and see if he drinks water Normally, eagerly-thirsty, or unable to drink

Classify Dehydration

- IF the patient has **all 4 of**
  1. **Weak/absent pulse .**
  2. **AVPU* < A :**

  ***AVPU** - *Alert, response to Voice, to Pain and Unresponsive. This is a basic assessment of conciousness.Anything less than A is considered a sign of severely impaired circulation - likely, hypovolaemic shock*
  3. **Cold hands + Temp gradient**
  4. **Capillary refill > 3 sec**

PLUS • sunken eyes and very slow/slow skin pinch.

Consider as Hypovolemic Shock From Dehydration:

Give ringer`s lactate 20ml/kg/15 min , repeat if the signs persist. then reassess

- **If the patient get 2 or more of severe signs ➡ the pt have Severe Dehydration (should be treated at hospital) plan c**
- **If the patient get 2 or more of less- severe signs ➡ the pt have SOME Dehydration (should receive ORS at PHC) plan B**
- **If no signs of dehydration are present then the pt have No Dehydration (can be treated** at **Home. Plan A**

Give Extra Fluid For Diarrhoea And Continue Feeding .

Management plans:

Patient with no dehydration should treat with plan Plan A: Treat Diarrhoea At Home : Not enough signs to classify as some or severe dehydration.

The 3 Rules of Home Treatment are:

1. Give extra fluid (as much as the child will take)
2. Continue feeding
3. Advice when to return immediately

Teach The Mother How To Mix And Give ORS.

Up to 2 years 50 to 100 ml after each loose stool

2 years or more 100 to 200 ml after each loose stool

Tell the mother to:

- Give frequent small sips
- from a cup or spoon.

- Use a spoon to give fluid to a young child.
- If the child vomits, wait 10 minutes before giving more fluid. Then resume giving the fluid, but more slowly.

When to return: Tell the mother of any sick child to return if he:

- Not able to drink or breastfed.
- Become sicker.
- Develop a fever.
- Drinking poorly.
- Blood in stool.

Plan B: Some dehydration: When the pt have Two or more of the following signs:

- Restless irritable
- Sunken eyes
- Drinks eagerly, thirsty
- Skin pinch goes back slowly

Plan B: Treat Some Dehydration with ORS

- Give in clinic recommended amount of ORS over 4-hour period
- Determine amount of ORS to give (50-100 mL/kg) over 3-4 hours
- Show the mother how to give ORS solution.
- Reassess after 4 hours.

PLAN C: Treat Severe Dehydration Quickly

- IV fluids are usually used, either Ringer's Lactate solution or Normal Saline) .
- Give 100ml/ kg:
- As 30ml/kg/ 30 min, then70 ml/kg over the next 2 and half hrs in children more than 12 months age .
- And 30 ml/ kg over 1 hour, then70 ml/kg over the next 5 hours in infants less than 12 months age

Reassess the patients every 1-2 hours .If hydration status not improving ,give the IV drip more rapidly

- Also give ORS (about 5ml/kg/hour) as soon as the child can drink: usually after 3-4 hours (infants) or 1-2 hours (children).
- Reassess an infant after 6 hours and a child after 3 hrs.

- IF the patient has **all 4 of**

1.Weak/absent pulse .

2.AVPU* < A :

***AVPU** - *Alert, response to Voice, to Pain and Unresponsive. This is a basic assessment of conciousness.Anything less than A is considered a sign of severely impaired circulation - likely, hypovolaemic shock*

3.Cold hands + Temp gradient

4.Capillary refill > 3 sec

PLUS • sunken eyes and very slow/slow skin pinch.
Consider as hypovolemic shock from dehydration:
Give ringer`s lactate 20ml/kg/15 min , repeat if the signs persist.
Then re-assess

- ***All three plans provide fluid to replace water and salts lost in diarrhoea.***
- ***An excellent way to both rehydrate and prevent dehydration in a child is to give him a solution made from oral rehydration salts (ORS).***
- IV fluid should be used only in cases of SEVERE DEHYDRATION.

ORS: oral rehydration solution:

- Oral rehydration therapy is a type of fluid replacement used to prevent and treat dehydration, especially due to diarrhea. It involves drinking water with modest amounts of sugar and salts , WHO and UNICEF have recommended a single formulation of glucose based ORS to prevent or treat diarrheal dehydration .
- An improved ORS formulation was introduced and found to be safe & effective as the original in preventing &treating diarrheal dehydration but also reduced stool output or offered additional clinical benefits, or both.

ORS-bicarbonate	grams/litre	ORS-citrate	grams/litre
Sodium chloride	3.5	Sodium chloride	3.5
Sodium bicarbonate (sodium hydrogen carbonate)	2.5	Trisodium citrate dihydrate	2.9
Potassium chloride	1.5	Potassium chloride	1.5
Glucose anhydrous	20.0	Glucose anhydrous	20.0

LOW OSMOLARITY ORS

Researchers has been developed an improved ORS formulation that was safe & effective as the original in preventing &treating diarrheal dehydration but also reduced stool output or offered additional clinical benefits, or both.

		Reduced-osmolarity ORS		
	Standard WHO ORS[2]	ReSoMal[2]	New WHO reduced osmolarity ORS[25,26]	Diorolyte
Glucose	111	105	75	90
Na	90	45	75	60
Chloride	80	40	65	60
K	20	40	20	20
Citate	10	10	10	10
Osmolarity	311	240	245	240

ReSoMal, rehydration solution for malnutrition.

Composition of reduced osmolarity ORS

Sodium chloride= 2.6 g/l
Glucose anhydrous =13.5 g/l
Potassium chloride = 1.5 g/l
Trisodium citrate dihydrate = 2.9 g/l
Total weight = 20.5

Benefits of Reduced(low) osmolarity ORS

- Reduced(low)osmolarity ORS solution reduces by 33%the need for supplemental IV fluid therapy after initial rehydration when compared to the standard ORS solution.
- The new ORS solution also reduces the incidence of vomiting by 30%and stool volume by 20%.

Zinc supplements

- Zinc is an essential trace element for all forms of life. Zinc plays important roles in growth and development, the immune response, neurological function, and reproduction.
- More recently, it has become apparent that zinc deficiency contributes to a number of health problems, especially common to children who live in developing countries, Infants and children are at risk of zinc deficiency.
- The adverse effects of zinc deficiency on immune system function are likely to increase the susceptibility of children to infectious diarrhea, while persistent diarrhea contributes to zinc deficiency and malnutrition.
- WHO recommend oral zinc in some form for 10–14 days during and after diarrhea, it can be given as a syrup or as dispersible tablets, whichever formulation is available and affordable.
- **When giving zinc as soon as diarrhea starts, and once vomiting stops.** the duration and severity of the episode as well as the risk of dehydration will be reduced. By continuing zinc supplementation for 10 to 14 days, the zinc lost during diarrhea is fully replaced and the risk of the child having new episodes of diarrhea in the following 2 to 3 months is reduced.
- WHO recommend oral zinc in some form for 10–14 days during and after diarrhea (10 mg/day for infants <6 m of age and 20 mg/day for those >6 m

References:

- Nelson Textbook of Pediatrics , 21 edition .
- IMCI Integrated Management of Childhood Illnesses, Chart booklets, WHO, 2017

Appendix

TREAT THE CHILD

REHYDRATION THERAPY & FEEDING FOR DIARRHOEA

(See FOOD advise on COUNSEL THE MOTHER chart) PLAN A, B, C excludes children with acute malnutrition.

Plan A: Treat diarrhoea with no dehydration

Counsel the mother/caregiver on the 4 Rules of Home Treatment:
Give Extra Fluids, Give Zinc Sulphate, Continue Feeding.
Advise when to Return

1. GIVE EXTRA FLUID (Give ORS and other Fluids- as much as the child will take)

- **ADVISE THE MOTHER:**
  - Breastfeed frequently and for longer at each feed.
  - If the child is exclusively breast-fed, give ORS in addition to breast milk.
  - If the child is not exclusively breast-fed, give one or more of the following: ORS solution, food-based fluids (such as soup, enriched uji, and yoghurt drinks e.g. Mala), or safe water.
  - Give fresh fruit juice or mashed bananas to provide potassium.
  - Advise mothers/caregivers to continue giving ORS as instructed.

- **TEACH THE MOTHER/CAREGIVER HOW TO MIX AND GIVE ORS. GIVE THE MOTHER/CAREGIVER 4 PACKETS OF ORS TO USE AT HOME.**

- **SHOW THE MOTHER /CAREGIVER HOW MUCH FLUID TO GIVE IN ADDITION TO THE USUAL FLUID INTAKE:**
  Up to 2 years 50 to 100 ml after each loose stool
  2 years or more 100 to 200 ml after each loose stool

  Advise the mother/caregiver to:
  - Give frequent small sips from a cup.
  - If the child vomits, wait 10 minutes. Then continue, but more slowly.
  - Continue giving extra fluids until the diarrhoea stops.

2. GIVE ZINC SULPHATE & VITAMIN A

- **TELL THE MOTHER/CAREGIVER HOW MUCH ZINC SULPHATE TO GIVE:**
  - Up to 6 months 1/2 tablet per day for 10 days
  - 6 months or more, 1 tablet per day for 10 days

- **SHOW THE MOTHER HOW TO GIVE ZINC SULPHATE:**
  - Infants: dissolve the tablet in a small amount of expressed breast milk, ORS or safe water, in a small cup or spoon.
  - Older children: tablets can be chewed or dissolved in small amounts of ORS or safe water.

REMIND THE MOTHER/CAREGIVER TO GIVE THE ZINC SUPPLEMENTS FOR THE FULL 10 DAYS

3. CONTINUE FEEDING
4. WHEN TO RETURN } **See COUNSEL THE MOTHER Chart**

Plan B: Treat Diarrhoea at Facility with ORS (Some Dehydration)

Give in clinic recommended amount of ORS over 4-hour period

1. **DETERMINE AMOUNT OF ORS TO GIVE DURING FIRST 4 HOURS.**
   - The approximate amount of ORS required (in ml) should be calculated by multiplying the child's weight (in kg) with 75.
   - Use the child's age only when you do not know the weight.
   - If the child wants more ORS than shown, give more.
   - For infants under 6 months who are not breast-fed, also give 100-200 ml clean water during this period.

TABLE :25

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

2. **SHOW THE MOTHER/CAREGIVER HOW TO GIVE ORS SOLUTION.**
   - Give frequent small sips from a cup (or a spoon every 1-2 minutes for a child under 2 years).
   - Check from time to time to see if there are any problems. If the child vomits, wait 10 minutes then continue, but more slowly.
   - Continue breast feeding whenever the child wants.
   - If the child's eyelids become puffy, stop ORS and give plain water or breast milk.
   - Give ORS according to plan A when the puffiness is gone.

3. **AFTER 4 HOURS:**
   - Reassess the child and classify the child for dehydration.
   - Select the appropriate plan to continue treatment.
   - Begin feeding the child in the clinic.

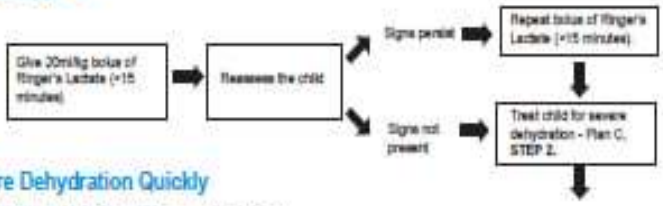
4. **IF THE MOTHER MUST LEAVE BEFORE COMPLETING TREATMENT:**
   - Show her how to prepare ORS solution at home.
   - Show her how much ORS to give to finish 4-hour treatment at home.
   - Give her enough ORS sachets to complete rehydration under this plan. Also give her 4 ORS sachets to
   - continue with Plan A. Explain the 4 Rules of Home Treatment:

1. GIVE EXTRA FLUID
2. GIVE ZINC SULPHATE & VITAMIN A
3. CONTINUE FEEDING
4. WHEN TO RETURN } See Plan A for recommended fluids and Zinc Sulphate and Vitamin A, and See COUNSEL THE MOTHER chart.

TREAT THE CHILD

REHYDRATION THERAPY

Treat Shock



Plan C: Treat Severe Dehydration Quickly

FOLLOW THE ARROWS. IF ANSWER IS "YES", GO ACROSS. IF "NO", GO DOWN.

START HERE

Can you give intravenous (IV) fluid immediately? — YES →

NO ↓

Is IV treatment available nearby (within 30 minutes)? — YES →

NO ↓

Are you trained to use a naso-gastric (NG) tube? — YES →

NO ↓

Can the child drink? — YES →

NO ↓

Refer URGENTLY to hospital for IV or NG treatment

Start IV fluid immediately. If the child can drink, give ORS by mouth while the drip is set up. Give 100 ml/kg Ringer's Lactate Solution or if not available use normal saline as follows:

AGE	STEP 1 First give 30 ml/kg in:	STEP 2 Then give 70 ml/kg in:
Infants (under 12 months)	1 hour*	5 hours
Children (12 months up to 5 years)	30 minutes*	2 1/2 hours

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

- Reassess the child every 1- 2 hours. If hydration status is not improving, give the IV drip more rapidly.
- Also give ORS (about 5 ml/kg/hour) as soon as the child can drink: usually after 3-4 hours (infants) or 1-2 hours (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.

- **Admit or Refer URGENTLY to hospital** for IV treatment. If the child can drink, provide the mother with ORS solution and show her how to give frequent sips during the trip.

- **Start rehydration by NG tube (or mouth) with ORS solution:** give 20 ml/kg/hour for 6 hours (total of 120 ml/kg). Reassess the child every 1-2 hours.
  - If there is repeated vomiting or increasing abdominal distension, give the fluid more slowly.
  - If hydration status is not improving after 3 hours, send the child for IV therapy.
- After 6 hours, reassess the child. Classify dehydration. Then choose the appropriate plan (A, B, or C) to continue treatment.

NOTE: If possible, observe the child at least 6 hours after rehydration to be sure the mother can maintain hydration giving the child ORS solution by mouth.

Rehydration therapy for diarrhoea in children with acute malnutrition

ONLY rehydrate until the weight deficit (measured or estimated) is corrected and then STOP. Do not give extra fluid to prevent recurrence.

Conscious –Not in shock	Unconscious /IN SHOCK
ReSoMal	
• 10ml/kg half hour for the first 2 hours • 5-10ml/kg hourly, for the next 10-12 hours as tolerated • If a child cannot take orally, use an NG tube.	• Don't give fluids unless the child is in SHOCK • Treat hypoglycaemia Keep warm • Refer URGENTLY

Note: Alternate feeding with fluids hourly

TABLE 2B

Give Multivitamin/Mineral supplement for persistent diarrhoea

Give daily for two weeks

Age/Weight	Multivitamin/Mineral Syrup
2 months-6 months (4 - 6 kg)	2.5 ml
6 months-2 years (6 - 12 kg)	5.0 ml
2 years-5 years (12 - 19 kg)	7.5 ml