ACUTE GASTROENTERITIS

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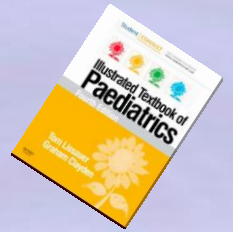
Objectives:

- Def. of diarrhea
  types of diarrhea
- Causative agents
- DDx of diarrhea
- Assessment of dehydration
- Types of dehydration
- Treatment
- Complication of diarrhea

- ***Reference :***
- WHO guidelines for management of acute gastroenteritis
- Nelson textbook of pediatrics
- Illutrated pediatrics



ACUTE GASTROENTERITIS

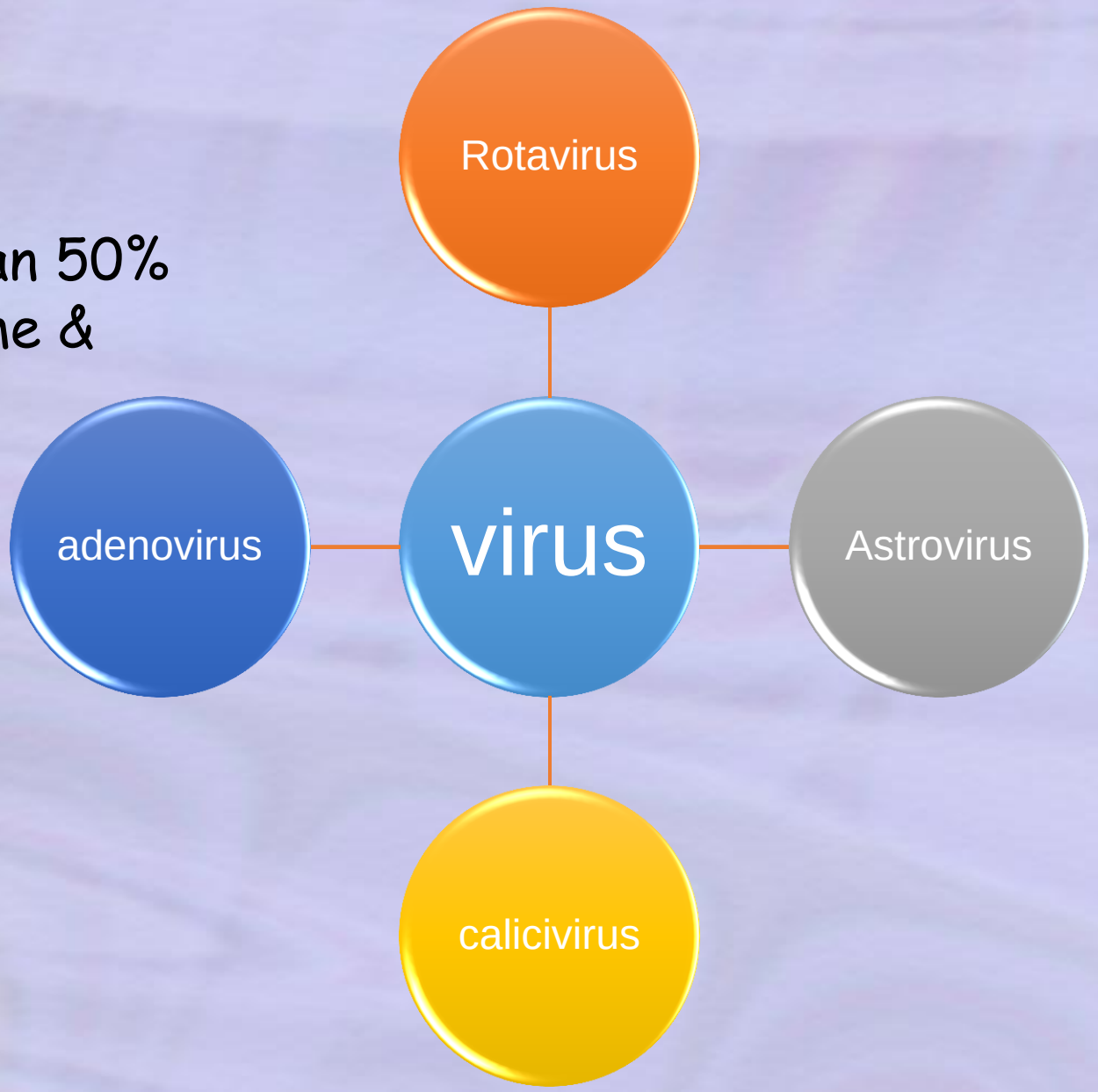
- **Definition;**
- It is the process of malabsorbtion or increase secretion of fluid & electrolyte that lead to increase frequency, volume & fluidity of the stool apart from normal.

EPIDEMIOLOGY

- Diarrhea is the leading cause of morbidity and the second most common disease in children in the developing world; it is a major cause of childhood mortality.

Causes

Viruses: Responsible For More Than 50% Of All Cases Of GE In Summer Time & 80% In Winter Time.



- Enteropathogenic (EPEC)
- Enterotoxigenic (ETEC) (Traveler's Diarrhea)
- Enteroinvasive (EIEC)
- Enterohemorrhagic (EHEC) (Includes O157:H7 ……. Causing HUS hemolytic uremic syndrome)

Campylobacter Jejuni

Escherichia Coli

Clostridium Difficile

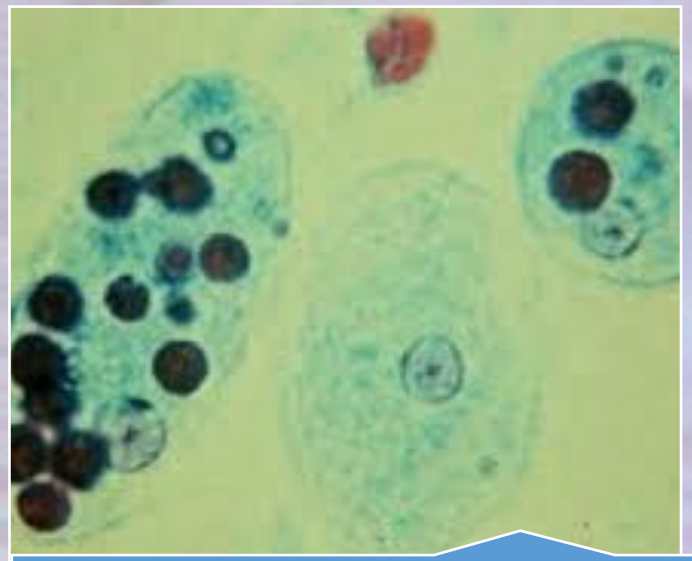
Bacteria

Shigella

Salmonella

Yersinia Enterocolitica

Vibrio Cholerae

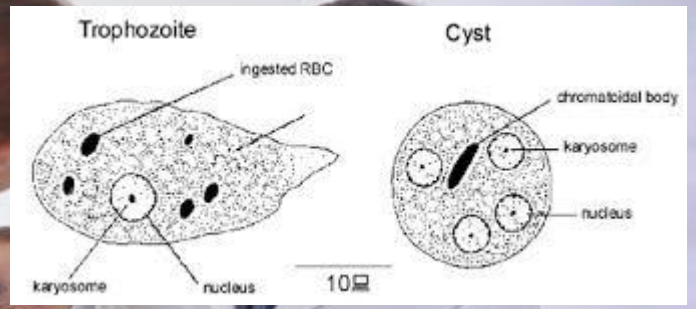


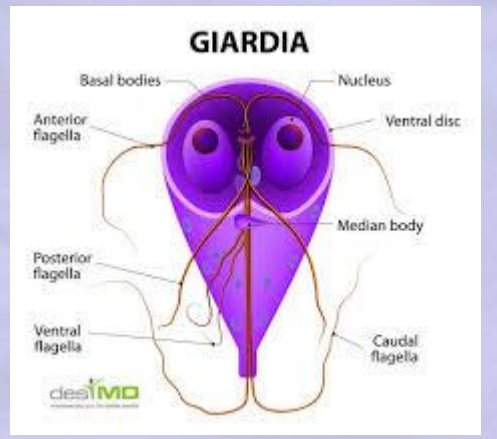
Entamoeba Histolytica

Giardia lamblia

Other Spore forming Intestinal Protozoa

Cryptosporidium Parvum, Isospora Belli





Parasite

MECHANISMS OF DIARRHEA;

Secretory diarrhea

- occurs when the intestinal mucosa directly secretes fluid and electrolytes into the stool.
- Cholera is a secretory diarrhea stimulated by the enterotoxin of vibrio cholerae. This toxin causes increased levels of CAMP within enterocytes, leading to secretion into the small bowel lumen.

Osmotic diarrhea

- occurs after malabsorption of ingested substances, which pull water into the bowel lumen.
- A classic example is lactose intolerance. Certain nonabsorbable laxatives, such as polyethylene glycol and magnesium hydroxide (milk of magnesia) also cause osmotic diarrhea.

Differential diagnosis of osmotic and secretory diarrhea

Stools	Osmotic diarrhea	Secretory diarrhea
Electrolytes	Na<70 mEq/l	Na>70 mEq/l
Osmolality	>(Na + K)×2	=(Na + K)×2
pH	<5	>6
Reducing substances	Positive	Negative
Volume	< 200 ml/day	> 200 ml/day

- Another way to differentiate between osmotic and secretory diarrhea is to stop all feedings and observe. This observation must be done only in a hospitalized patient receiving IV fluids to prevent dehydration.
- If the diarrhea stops completely while the patient is receiving nothing by mouth (NPO), the patient has osmotic diarrhea.
- Neither of these methods for classifying diarrhea works perfectly because most diarrheal illnesses are a mixture of secretory and osmotic components.

Clinical Manifestation;

- Gastroenteritis may be accompanied by **systemic findings**, such as fever, lethargy, and abdominal pain.

1. **VIRAL DIARRHEA**

Is characterized by watery stools, with no blood or mucus. Vomiting may be present, and dehydration may be prominent. Fever, when present, is low grade.

2. DYSENTERY

Is diarrhea involving the colon and rectum, with blood and mucus, possibly foul smelling, and fever.

- *Shigella* must be differentiated from infection with
- EIEC, EHEC,
- *E. Histolytica* (**amebic dysentery**),
- *C. Jejuni*,
- *Y. Enterocolitica*,
- and nontyphoidal *salmonella*.

Gastrointestinal bleeding and blood loss may be significant.

3. ENTEROTOXIGENIC DISEASE

- is caused by agents that produce enterotoxins, such as *v. Cholerae* and ETEC(this organism associated with 40% to 60% of cases of traveler's diarrhea).
- In this diarrhea fever is absent or only low grade.
- Diarrhea usually involves the ileum with watery stools without blood or mucus and usually lasts 3 to 4 days with four to five loose stools per day.
- Insidious onset of progressive anorexia, nausea, gaseousness, abdominal distention, watery diarrhea, secondary lactose intolerance, and weight loss is characteristic of **GIARDIASIS.**

DDx of acute gastroenteritis

Box 13.3 Conditions which can mimic gastroenteritis

Systemic infection	Septicaemia, meningitis
Local infections	Respiratory tract infection, otitis media, hepatitis A, urinary tract infection
Surgical disorders	Pyloric stenosis, intussusception, acute appendicitis, necrotising enterocolitis, Hirschsprung disease
Metabolic disorder	Diabetic ketoacidosis
Renal disorder	Haemolytic uraemic syndrome
Other	Coeliac disease, cow's milk protein intolerance, adrenal insufficiency

- A chief consideration in management of A child with diarrhea is to assess the degree of dehydration. The degree of dehydration dictates the urgency of the situation and the volume of fluid needed for rehydration.

FIRST, ASSESS YOUR PATIENT FOR DEHYDRATION

PEDIMEDICINE.COM

		A	B	C
1. LOOK AT:	CONDITION	Well, alert	★ **Restless, irritable** ★	★ **Lethargic or unconscious; floppy**★
	EYES	Normal	Sunken	Very sunken and dry
	TEARS	Present	Absent	Absent
	MOUTH and TONGUE	Moist	Dry	Very dry
	THIRST	Drinks normally, not thirsty	★ **Thirsty, drinks eagerly**★	* **Drinks poorly or not able 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	If the patient has two or more signs including at least one * **sign** *, there is SOME DEHYDRATION	If the patient has two or more signs, including at least one * **sign** *, there is SEVERE DEHYDRATION
4. TREAT		Use Treatment Plan A	Weigh the patient, if possible, and use Treatment Plan B	Weigh the patient and use Treatment Plan C URGENTLY

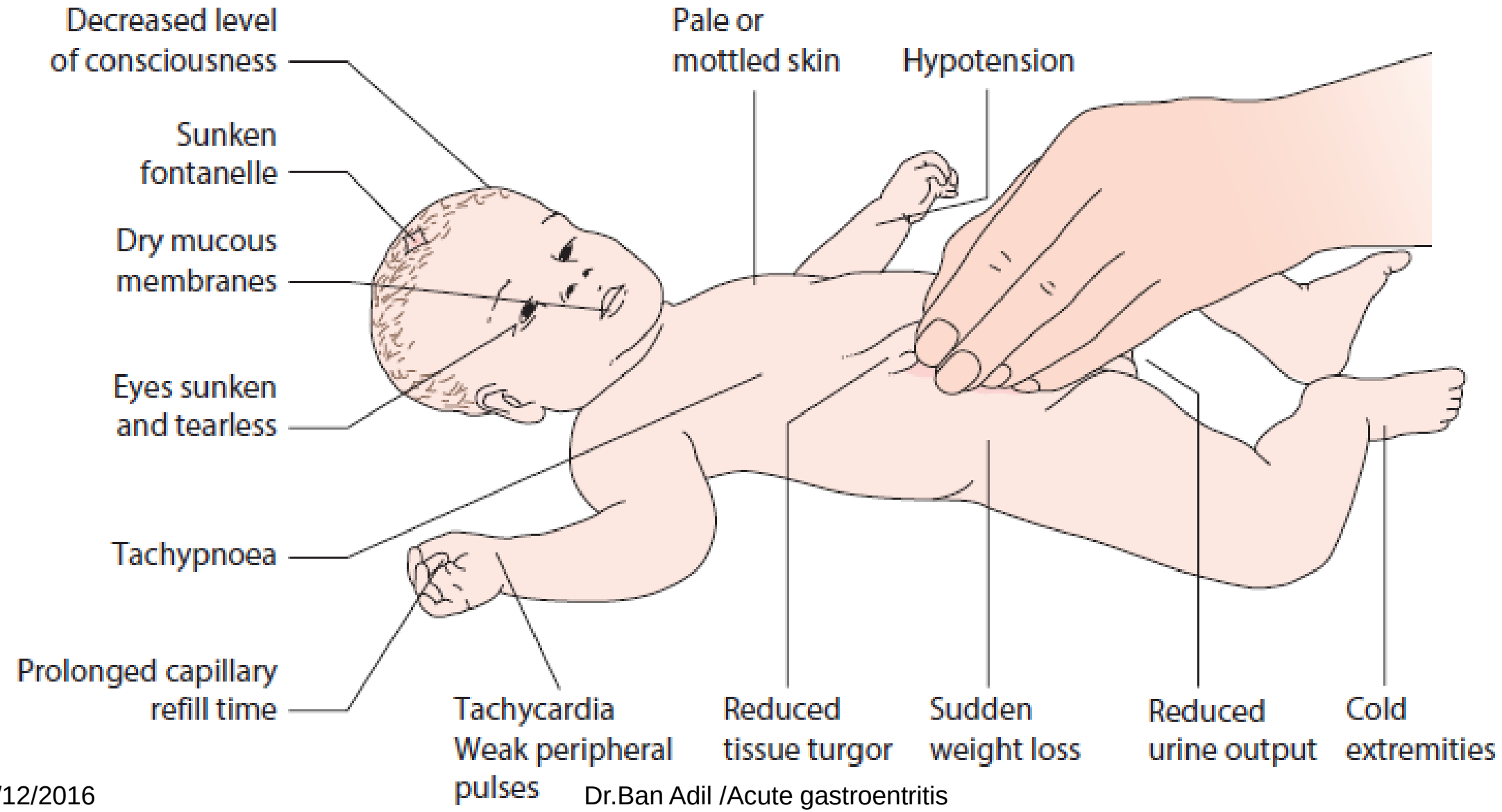


Figure 13.9 Clinical features of shock from dehydration in an infant.

NEW WAY FOR ASSESSMENT OF DEGREE OF DEHYDRATION:

	NO	SOME	SEVERE
Condition	Well,alert	Restless, irritable	Lethargic ,unconscious
Eyes	Normal	Sunken	Very sunken
Tears	present	Absent	Absent
Mouth&tongue	Moist	Dry	Very dry
Thirst	Drinks normally	Thirsty or drinks eagerly	Unable to drink
Skin turgor	Go back quickly	Goes back slowly	Goes back very slowly

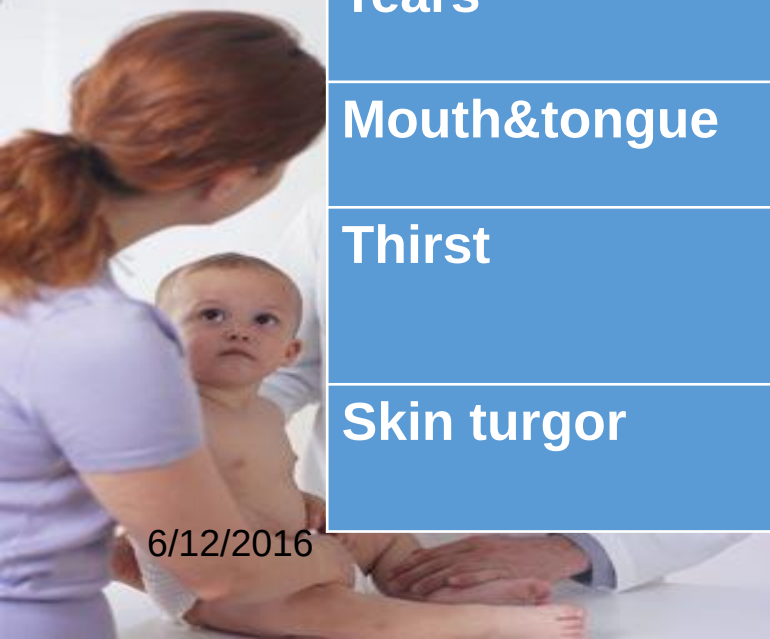
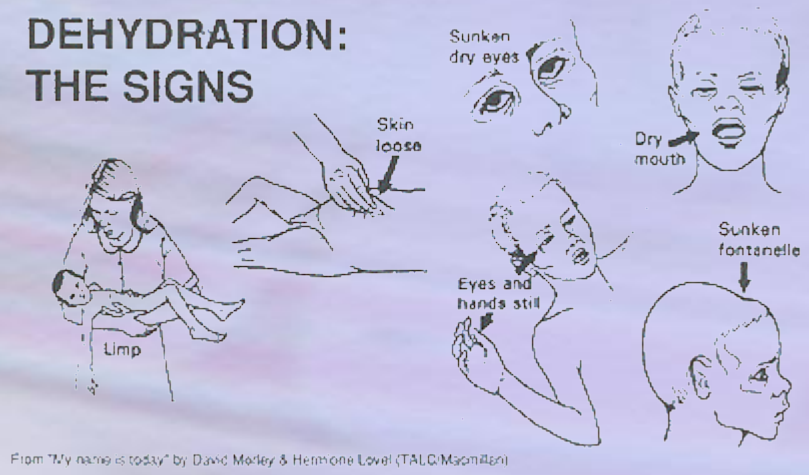
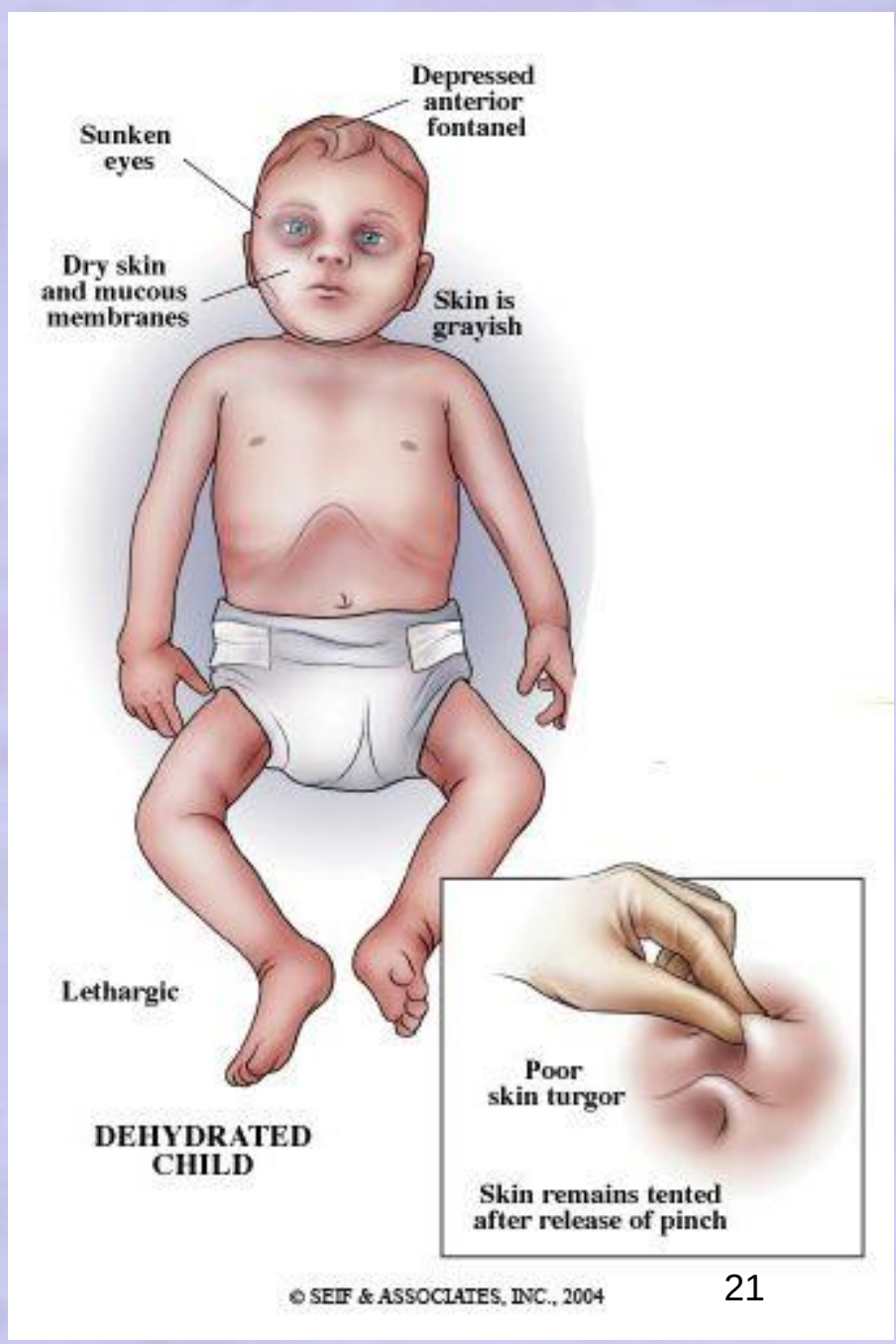


Table 33-5 .Assessment of Degree of Dehydration

	Mild	Moderate	Severe
Infant	5%	10%	15%
Adolescent	3%	6%	9%
Infants and young children	Thirsty; alert; restless	Thirsty; restless or lethargic but irritable or drowsy	Drowsy; limp, cold, sweaty, cyanotic extremities; may be comatose
Older children	Thirsty; alert; restless	Thirsty; alert(usually)	Usually conscious (but at reduced level) apprehensive; cold, sweaty, cyanotic extremities; wrinkled skin on fingers and toes; muscle cramps
Signs and Symptoms			
Tachycardia	Absent	Present	Present
Palpable pulses	Present	Present (weak)	Decreased
Blood pressure	Normal	Orthostatic hypotension	Hypotension
Cutaneous perfusion	Normal	Normal	Reduced and mottled
Skin turgor	Normal	Slight reduction	Reduced
Fontanel	Normal	Slightly depressed	Sunken
Mucous membrane	Moist	Dry	Very dry
Tears	Present	Present or absent	Absent
Respirations	Normal	Deep, may be rapid	Deep and rapid
Urine output	Normal	Oliguria	Anuria and severe oliguria


DEHYDRATION:
THE SIGNS
Sunken dry eyes
Skin loose
Dry mouth
Limp
Eyes and hands still
Sunken fontanelle


Depressed anterior fontanel
Sunken eyes
Dry skin and mucous membranes
Skin is grayish
Lethargic
Poor skin turgor
Skin remains tented after release of pinch
DEHYDRATED CHILD
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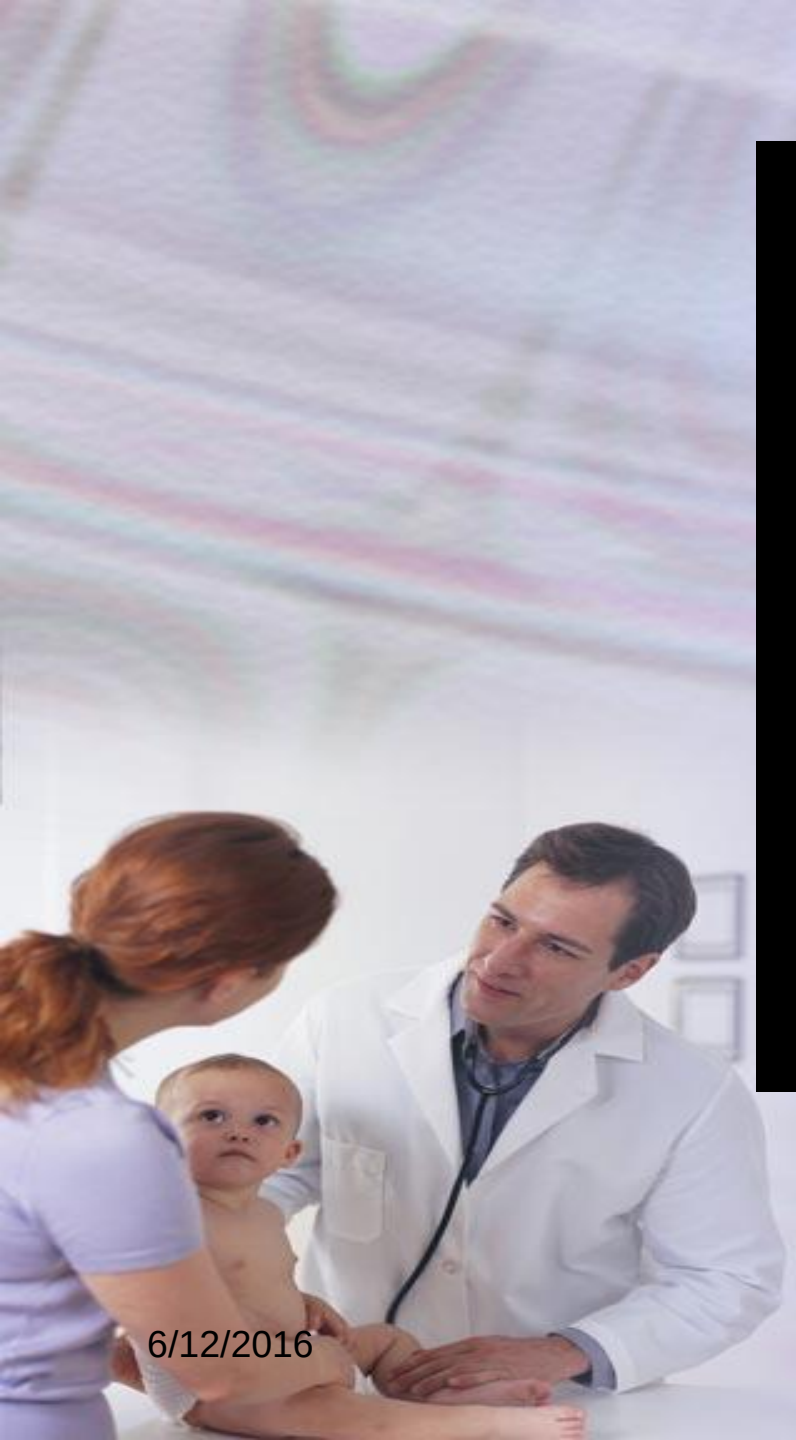


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Types of dehydration

1. Isotonic dehydration
2. Hyponatremic dehydration (hypotonic)
3. Hypernatremic dehydration (hypertonic)

Isotonic dehydration :

- It is the most common type 70%,
- it occur when the net loss of water &Na is the same proportion to that found in the normal ECF.

Hypernatemic (hypertonic)dehydration:

- It is less frequent15-%20,
- but the most dangerous type ,as it is associated with serious neurological damage (CNS hemorrhage or thrombosis)
- these complications occur secondary to movement of water from the brain cells into the hypertonic ECF, causing brain cell shrinkage & tearing of blood vess .within the brain.
- occur when Na loss >water loss)i.e .s.Na>150meq/L& s.osmol.>295 mosm ,

- it may occur during the course of diarrhea **when oral homemade electrolyte solutions with high concentrations of salt are administered .**
- when infants are **fed boiled skim milk**, which produces a high renal solute load and increased urinary water losses
- increases with increased evaporative water loss as a result of **fever**, high environmental temperatures, and hyperventilation, and with decreased availability of free water

- **Hyponatremic dehydration** is seen in approximately 10–15 %of all patients with diarrhea.
- It occurs when large amounts of electrolytes, especially sodium, are lost in the stool out of proportion to fluid losses.
- It occurs more frequently with bacillary dysentery or cholera.
- Hyponatremia may develop or worsen if there is a considerable oral intake of low-electrolyte or electrolyte-free fluids during diarrhea

	Isotonic dehydration	Hypertonic	Hypotonic
Water &Na loss	Balanced deficit of water &Na	Deficit of water >Na	Water loss>Na
S.Na)mmol/L(S.osmolarity)mOsmol/L(	Normal)130-150(Normal)275-295(	Elevated>150 Elevated >295	Decrease<130 Decrease<275
Clinical manifestation	The usual signs of dehydration as mentioned in table	Thirst is severe & out of proportion to the apparent degree of dehydration. Irritability, hypertonia ,hyperreflexia Convulsions esp>s.Na>165mmol/L Normal or full fontanel Normal eyes U.O.P preserved longer than other type Brought to medical attention with profound dehydration Doughy abd. Woody tongue	Lethargy Infreq.convulsion

- Clinical assessment of dehydration is only an estimate; the patient must be continually reevaluated during therapy.
- The degree of dehydration is underestimated in hypernatremic dehydration because the osmotically driven shift of water from the intracellular space to the extracellular space helps to preserve the intravascular volume. The opposite occurs with hyponatremic dehydration.

Question

- Ahmed is a 8m.old boy ,had D&V for the last 3days ,on examination you found him restless,was sucking from his bottle filled with water,
- What important signs you ‘ll look for in examining this child?
- What type of dehydration if you found his investigation :s.K 2.5,s.Na 165,Cl 100,.

Lecture 2

- Complications
- Invx
- Lines of rx

- **Complication;**

1. Dehydration, metabolic acidosis, shock and acute renal shutdown.

2. Electrolyte disturbance; hypokalemia (abdominal distention), hypernatremia & hyponatremia.

3. Convulsion; might be due to:

A. Hyper or hyponatremia.

B. Fever either because of the primary infection or dehydration fever.

C. Hypoglycemia (due to fasting & glycogen mass is small in children).

D. Hypocalcemia usually associated with hypernatremia.

E. Toxic convulsion (e.G. Toxin secreted by shigella).

F. GE may present as prodromal period of CNS infection like meningitis.

- **4.** EHEC, especially the *E. Coli* O157:H7 strain, produce a shiga-like toxin that is responsible for a hemorrhagic colitis and most cases of hemolytic uremic syndrome (HUS), which is a syndrome of microangiopathic hemolytic anemia, thrombocytopenia, and renal failure.
- **5. Post AGE syndrome** (persistent diarrhea):
- **a.** Secondary (transient) lactose deficiency.
- Can be diagnosed by finding of low ph & positive reducing substance in stool, hydrogen breath test or by measurement of mucosal lactase concentration with small bowel biopsy. Diagnostic testing is not mandatory & often simple dietary changes (reduce or eliminate lactose from the diet) result in symptom relief.
- **B.** Cow s milk/ soy protein intolerance.
- **C.** Persistent infection. E.G. Giardia.

LABORATORY EVALUATION;

1. **Stool** specimens should be examined

- macroscopically for mucus, blood, and
- microscopically for RBC & leukocytes, which indicate colitis.
  - Fecal leukocytes are present in response to bacteria that diffusely invade the colonic mucosa.
  - such as *shigella, salmonella, C. Jejuni,* and invasive *E. Coli.*
  - Also to look for trophozoites and/or cysts of E.*Histolytica* or giardia.

► If the stool test result is negative for blood and WBCs, and there is no history to suggest contaminated food ingestion, a viral etiology is most likely.

► A rapid diagnostic test for rotavirus in stool should be performed, especially during the winter.

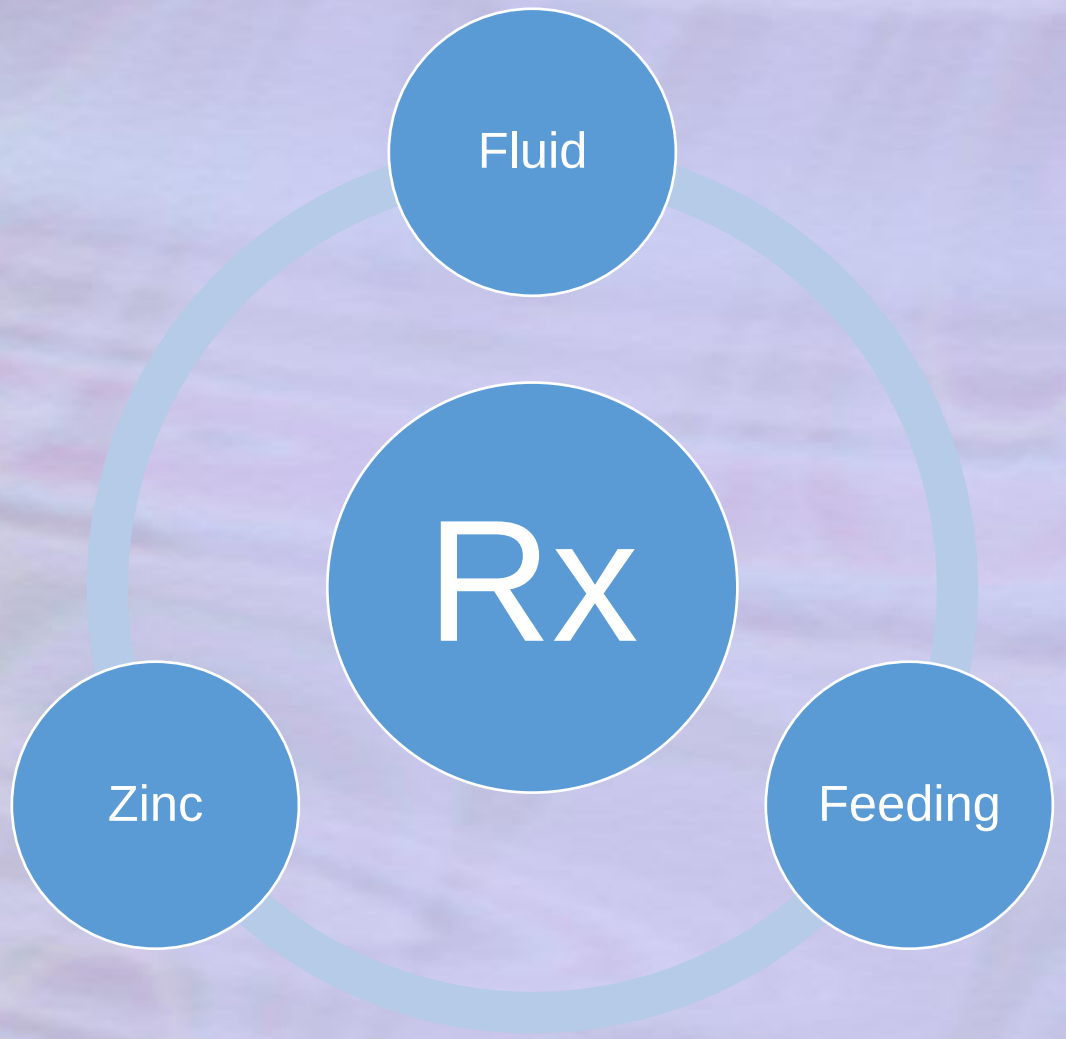
Enzyme-linked immunosorbent assays, which offer >90% specificity and sensitivity, are available for detection of group A rotavirus. Latex agglutination assays are also available for group A rotavirus and are less sensitive

- ►► **Stool cultures** are recommended for
  - patients with fever, profuse diarrhea, and dehydration , bloody diarrhea and
  - in cases when you suspect organisms that need antibiotic therapy or
  - if HUS is suspected.
- **2 Electrolytes, BUN, creatinine, a complete blood count,** Hemoconcentration from dehydration causes an increase in the hematocrit and hemoglobin.

- **3. Urinalysis** for specific gravity as an indicator of hydration. The urine specific gravity is usually elevated (≥1.025). Urinanalysis may show hyaline and granular casts, a few WBC and RBC, and 30 to 100 mg/dl of proteinuria.
- ►If UTI is suspected, **urine** should be send for **C&S test.**

- **4.** Positive **blood cultures** are uncommon with bacterial enteritis except for *S. typhi* (typhoid fever) and for nontyphoidal *Salmonella* and *E. coli* enteritis in very young infants.

- Treatment;
- Most infectious causes of diarrhea in children are self-limited.
- Management of viral and most bacterial causes of diarrhea is **primarily supportive** and consists of correcting dehydration and ongoing fluid and electrolyte deficits and managing secondary complications resulting from mucosal injury.
- Antibiotic is not indicated for routine use.


Fluid
Rx
Zinc
Feeding

Steps for treatment of AGE:

1. Correction of dehydration:

- The first step in caring for a child with dehydration is to assess the degree of dehydration.
- The degree of dehydration dictates the urgency of the situation and the volume of fluid needed for rehydration.

NEW WAY FOR ASSESSMENT OF DEGREE OF DEHYDRATION:

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Condition	Well,alert	Restless, irritable	Lethargic ,unconscious
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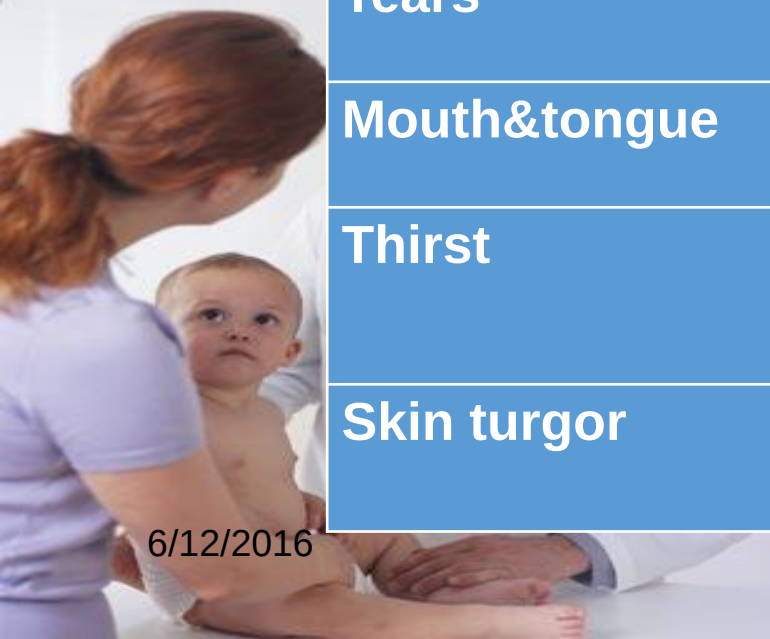

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2. FEEL:	SKIN PINCH	Goes back quickly	★ **Goes back slowly** ★	★ **Goes back very slowly** ★
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4. TREAT		Use Treatment Plan A	Weigh the patient, if possible, and use Treatment Plan B	Weigh the patient and use Treatment Plan C URGENTLY

PLAN -A-

Treatment here is directed towards preventing dehydration by **giving extra fluid & salt** to replace diarrheal loss.

The mother is instructed to give extra amount of suitable fluids

- Fluids should be given as much as the child wants till diarrhea stops.
- as a role the child should receive ORS at least AFTER EACH BOWEL MOTION:
- 1/4-1/2 large cup (50-100ml (fluids)for children <2y)
- 1/2-1large cup (100-200ml(fluids)for children 2-10y)

2.FEEDING

- Also part of the treatment is to **continue feeding** to prevent malnutrition.
  - Most children with watery diarrhea regain appetite when dehydration is corrected while those with dysentery remain anorexic till the disease resolves.
  - Continuing feeding during diarrhea also speeds the recovery of normal intestinal mucosa function.
- Breast feeding should be continued &artificial feeds if used should be giving with very careful attention to sterilization .DONOT DILUTE THE MILK

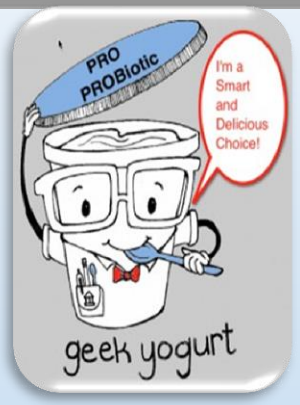
1.Suitable fluid

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

- **Home prepared ORS** composed of 1L of boiled water +3g of table salt (NaCl){amount held among thumb,index&middle fingers}+18g of sugar{1/4 teaspoon}

2.Fluids that do not contain salt

(don't give freely but with fluid in(1)



- plain water
- unsalted rice water
- unsalted soup
- yoghurt drinks without salt
- green coconut water
- weak tea (unsweetened)
- unsweetened fresh fruit juice.

Unsuitable fluids

- carbonated beverages
- commercial fruit juices
- sweetened tea.
- coffee
- some medicinal teas.

3.Zinc supplementation

- Zinc decreases the length and severity of the diarrhea.
- Zinc is important for the child's immune system and will help the child fight off new episodes of diarrhea in the 2-3 months following treatment.
- Zinc improves appetite and growth.
- Children less than 6 months of age should receive ½tablet (10mg)once a day for 10/14 days.
- Children 6 months and older receive 1 tablet per day (20mg)for 10/14 days.

- Lastly the mother should be **instructed to take the child to the hospital** if he starts to develop one or more of the following:

1. Passing many water stool;
2. Repeated vomiting.
3. Severe thirst.
4. Poor eating or drink.
5. Fever.
6. Blood in stool.
7. No improvement after 3 days.

- If there is some dehydration →**PLANE –B**-
- A child with some signs of dehydration needs **extra fluids and food .**
- Treat the child with ORS first in the **health facility** and then, when all signs of dehydration have disappeared, the child should be sent home for continued treatment.
- Give ORS in the clinic until the skin pinch is normal, the thirst is over, the child is calm .Four hours of rehydration are usually necessary for this.

How to use it ?

- As a guideline for ORS, it is advisable to give it in case of GE with ***no signs of dehydration*** to prevent dehydration. The ***deficit*** in case of ***mild dehydration*** gives 50 ml/kg and 100 ml/kg for ***moderate dehydration*** to be given within 4 hours.
- ■ Supplementary ORS is given to replace ongoing losses from diarrhea or emesis.
- ■ An additional 10 ml/kg of ORS is given for each stool.
- ■ Fluid intake should be decreased if the patient appears fully hydrated earlier than expected or develops periorbital edema.

How IRT

Rehydration	maintenance	losses
Plane A No dehydration → no need	The general rule is: give as much fluid as the child or adult wants until diarrhoea stops.	**10ml/kg/bowel motion**
Plane B Mild- Moderate dehydration →50ml-100ml/kg/4hrs	**500ml/day <2yrs.**	**2ml/kg for each vomitus**
Plane C sever dehydration →IRT	**1000ml/day 2-10yrs.**	❑ <2y → 50-100 ml/Bm 2 -10 years: 100-200 ml /BM ❑ >10ys → as much fluid as they want.
	2000ml/day for >10yrs.	

The American Academy of Pediatrics (AAP), the European Society of Pediatric Gastroenterology and Nutrition (ESPGAN), and the World Health Organization (WHO) all recommend oral rehydration solution (ORS) as the treatment of choice for children with mild-to-moderate gastroenteritis in both developed and developing countries, based on the results of dozens of randomized, controlled trials and several large meta-analyses

- In addition to fluid the child with SOME DEHYDRATION needs food .
- Breastfed children should continue breast feeding .Other children should receive their **usual milk or some nutritious food after 4 hours of treatment with ORS**.

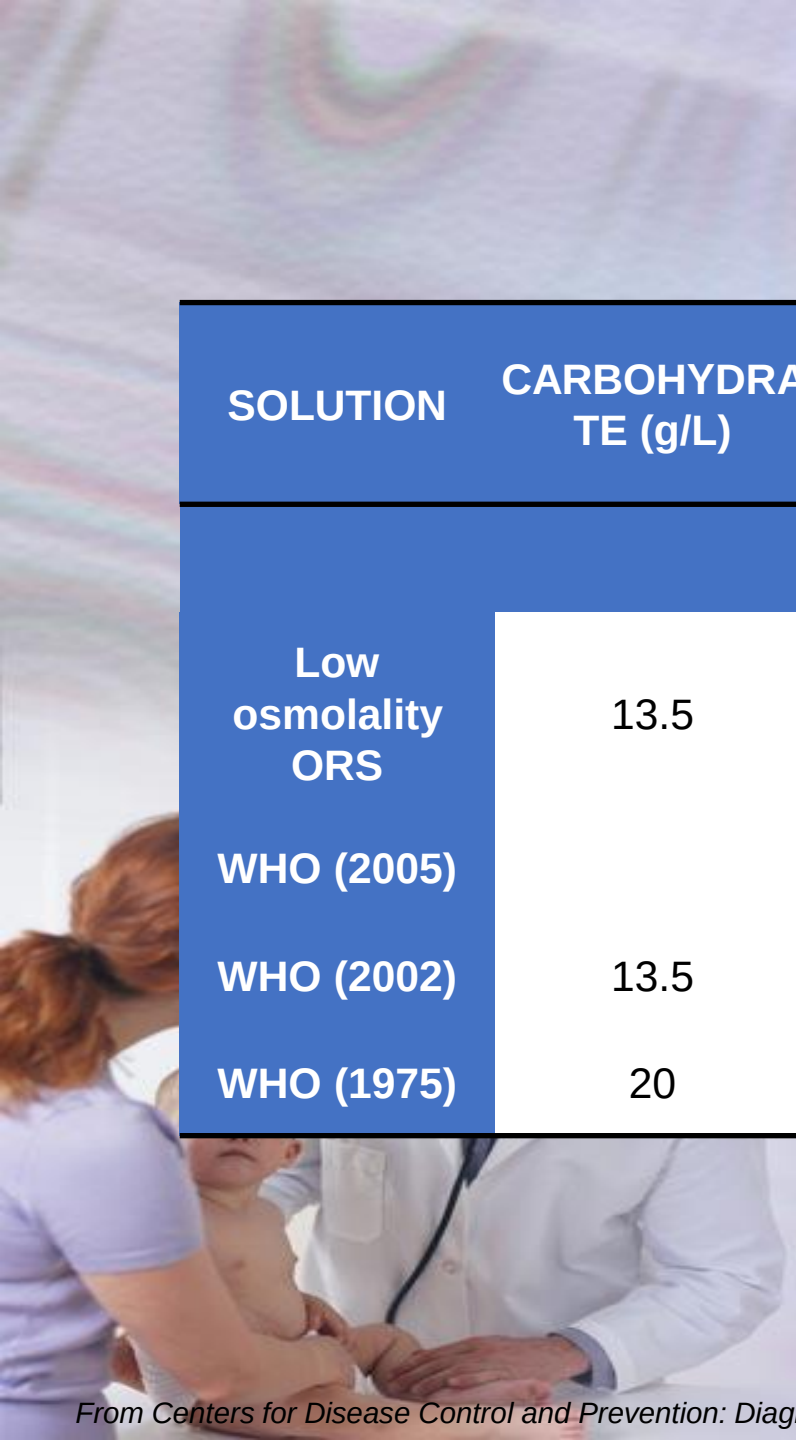
- Give the first zinc supplement in the clinic .Instruct the mother that zinc should be continued for 10/14 days with the recommended dose dependent on the child’s age.
- Zinc should be given as soon as the child can eat and has successfully completed 4 hours of rehydration.

- Here is the role of the **oral rehydration therapy ORT**
- Oral rehydration salt (ORS)solution is the fluid specifically developed for ORT

- .Oral rehydration therapy (ORT) is the administration of fluid by mouth to prevent or correct dehydration that is a consequence of diarrhea .

ORS

SOLUTION	CARBOHYDRATE (g/L)	SODIUM (mmol/L)	POTASSIUM (mmol/L)	CHLORIDE (mmol/L)	BASE* (mmol/L)	OSMOLARITY (mOsm/L)
ORAL REHYDRATION SOLUTION						
Low osmolality ORS	13.5	75	20	65	10	245
WHO (2005)						
WHO (2002)	13.5	75	20	65	30	245
WHO (1975)	20	90	20	80	10	311



From Centers for Disease Control and Prevention: Diagnosis and management of foodborne illnesses, MMWR 53:1–33, 2004.

The principle of the ORT

- is based on that intestinal absorption of Na,other electrolytes &water is enhanced by active absorption of certain food molecules such as glucose &L-aminoacids
- The process of active absoption continues to function normally during secretory diarrhea when other pathways are impaired .so if the patient with secretory diarrhea drinks an isotonic salt solution that does not contain a source of glucose or aminoacids .Na is not absorbed &the fluid remains in the gut which will be added to the volume of the stool.

- A more effective, lower-osmolarity ORS with reduced concentrations of sodium and glucose,
- associated with less vomiting,
- less stool output,
- and a reduced need for intravenous infusions in comparison with standard ORS has been developed for global use .

- **Composition of ORS,**
- Nacl…….. 2.6g/l.
- Kcl …… 1.5g/l.
- Na citrrate… 2.9g/l.
- Glucose…. 13.5g/l.
- **Concentration of ors,**
- Na→ 75 mmol/l.
- Cl → 65 mmol/l
- K → 20 mmol/l.
- Na citrate →10 mmol/l.
- Glucose → 75 mmol/l.
- Osmolality-----245

- **A. ORS;**
- ***Advantage of ORS over IV therapy,***
- **1.** Less expensive, available & easily prepared.
- **2.** Given by normal oral root.
- **3.** Shorter time for correction of dehydration (4hr) instead of (24hr) in IV therapy.
- **4.** No complication that occur with IV therapy like pain, phlebitis, thromboembolic phenomena, over hydration……
- **5.** Successful in more than 95% of all cases of AGE, and has lessened diarrhea-associated malnutrition.

- When rehydration is complete, **maintenance therapy** should be started, using 100 ml of ORS/kg/24 hr until the diarrhea stops.
- Breastfeeding or formula-feeding should be maintained and not delayed for more than 24 hours. Also to continue on soft easily digestible diet in small &frequent period.
- Patients with more severe diarrhea require continued supervision. The volume of ORS ingested should equal the volume of stool losses. If stool volume cannot be measured, an intake of 10 to 15 ml of ORS/kg/hr is appropriate.

How to prepare & to give ORS

- ORS should be dissolved with appropriate amount of sterile water according to the instruction in the container, and should be given by spoon or syringe (but not by feeding bottles), in sips every few minutes according to the severity of vomiting. ORS should not be used 24hr after preparation. Also should be kept in the fridge.

- **<u>Example;</u> a 9 mo old infant presented with history of acute gastroenteritis, mild dehydration & his body weight is 8 kg. Calculate the total amount of ORS for this infant & how are you going to give it in the next 24hr.**
-

1. Calculate the deficit: 50 ml / kg

   50ml × 8 = 400 ml

   to be given in 4 hr by spoon or syringe (but not by feeding bottles),

   in sips every few minutes.

3. Maintenance: 100 ml / kg /24 hr until the diarrhea will stop.
4. Supplementary ORS is given to replace ongoing losses from diarrhea or emesis.
5. An additional 10 ml/kg of ORS is given for each stool.

- **Example;**

A 5 mo old infant presented with history of acute gastroenteritis, moderate dehydration & his body weight is 6 kg. Calculate the total amount of ORS for this infant & how are you going to give it in the next 24hr.

1. Calculate the deficit: 100 ml / kg

100ml × 6 = 600 ml

to be given in 4 hr by spoon or syringe (but not by feeding bottles),

in sips every few minutes.

3. Maintenance: 100 ml / kg /kg/24 hr until the diarrhea will stop.
4. Supplementary ORS is given to replace ongoing losses from diarrhea or emesis.
5. An additional 10 ml/kg of ORS is given for each stool.

- **Contraindication for ORS,**
- **1.** Severe & persistent vomiting.
- **2.** Severe dehydration approaching to shock.
- **3.** Severe diarrhea (more than 10ml/kg/bowel motion.
- **4.** Inability to have oral fluid as in case of change in level of consciousness (stupor, coma…) because of risk of aspiration.
- **5.** If you need IV line for other purposes (sepsis, other medication….).

Plan C

- **IV fluid management of dehydration.**

- General fluid management (for hyponatremic & isonatremic dehydration).

- 1. Restore intravascular volume (***fluid bolus***). {NOTE; A child with mild dehydration does not usually require a fluid bolus. In contrast, a child with severe dehydration may require multiple fluid boluses and may need to receive fluid at a faster rate}.

Normal saline: 20 ml/kg over 20 min (repeat as needed).

- 2. Calculate 24-hr fluid needs:

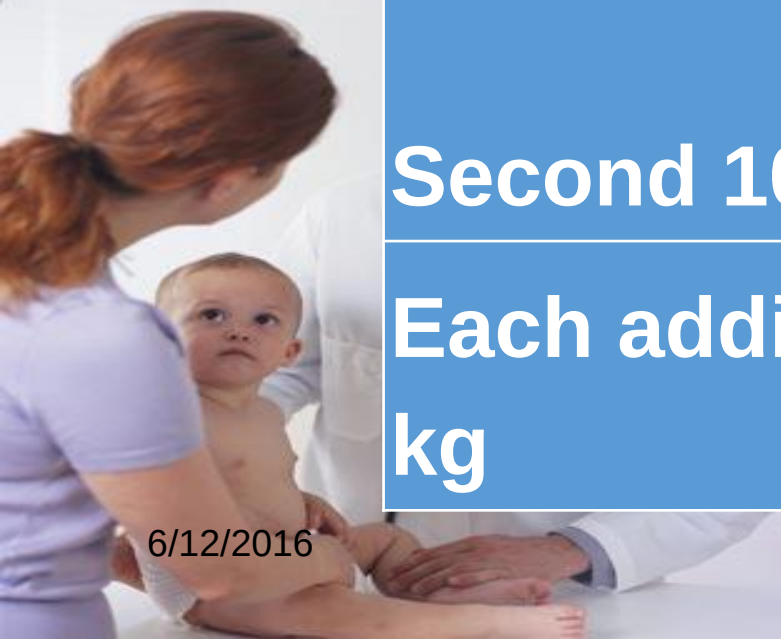
maintenence + deficit volume.

- (Subtract fluid administered from 24hr fluid needs.)
- (Select an appropriate fluid (based on total water and electrolyte needs), usually 1/4th to 1/3rd g.S.

- **<u>Calculate deficit water:</u>**
- **For** mild dehydration; 50ml/kg.
- Moderate dehydration; 100ml/kg.
- Severe dehydration; 150ml/kg.

MAINTENENCE

	Water	
Body Weight	mL/kg/day	
First 10 kg	100	
Second 10 kg	50	
Each additional kg	20	



- **3.** Administer half the calculated fluid during the first 8 hr, (first subtracting any boluses from this amount).
- **4.** Administer the remainder over the next 16 hr.
- **5.** Replace ongoing losses as they occur.

- **Example;**

  A 6mo old infant presented with history of acute gastroenteritis, mild dehydration & his body weight is 7kg. Calculate the total amount of fluid for this infant & how are you going to give it in the next 24hr.

1. Calculate 24-hr fluid needs (maintenance) + deficit volume.

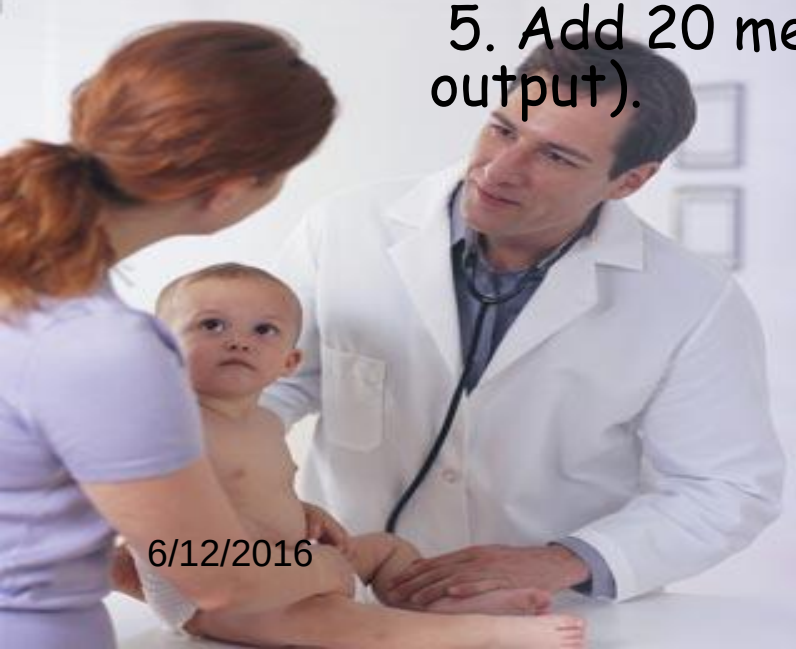
   Maintenance: 1st 10 kg = 100 ml × kg

   so: 100 ml × 7 = 700 ml

   deficit: mild 50 ml / kg

   50 ml × 7 kg = 350 ml

2. Total amount of fluid required in the next 24hr is 1050 ml.
3. Half to be given in the 1st 8hr = 525 ml.
4. Second half (525 ml) in the next 16hr.
5. Add 20 meq/L potassium chloride unless contraindicated (no urine output).



- **B. IV fluid management of dehydration.**
-
- **Hyponatremic dehydration; (serum Na < 130meq/l).**
- Occurs in children who have diarrhea & consume a hypotonic fluid (water or diluted formula).
- Overly rapid correction of hyponatremia (>12meq/l/24hr.) Should be avoided because of the risk of central pontine myelinolysis.

- **Example;**
  an 8mo old infant presented with history of acute gastroenteritis, severe dehydration & his body weight is 8 kg. Calculate the total amount of fluid for this infant & how are you going to give it in the next 24hr.
- 1. Calculate 24-hr fluid needs (maintenance) + deficit volume.
  Maintenance: 1st 10 kg = 100 ml × kg
  so: 100 ml × 8 = 800 ml
  deficit: sever 150 ml / kg
  150 ml × 8 kg = 1200 ml
  2. Total amount of fluid required in the next 24hr is 2000 ml.
  3. Give bolus shoot 20 ml / kg
  20 ml × 8 = 160 ml to be given in 20 min
  the remaining fluid is 1040 ml
  4. Half to be given in the 1st 7hr = 520 ml.
- 5. Second half (520 ml) in the next 16hr.
  6. Add 20 meq/L potassium chloride unless contraindicated (no urine output).

Indications of using Antibiotics in gastroenteritis

- <u>Antimicrobials are reliably helpful only for children with:</u>

1. bloody diarrhea)most likely shigellosis(,
2. suspected cholera with severe dehydration,
3. serious nonintestinal infections)e.g., pneumonia.(
4. Antiprotozoal drugs can be very effective for diarrhea in children, especially for Giardia, Entamoebahistolytica, and now Cryptosporidium, with nitazoxanide.
5. All severely malnourished children should receive broad spectrum antibiotics for infections.
6. Toxic febrile child ,age<3months.

- **Adsorbents**)such as kaolin, pectin, activated charcoal (arenot useful for treatment of acute diarrhoea .Adsorbents havebeen shown to induce only a slight change in stool consistency.However, they do not reduce fluid and salt losses.
- **Antimotility drugs**)such as tincture of opium or loperamide(may be harmful, especially in children less than 5 years of age.

- **<u>G. There are no indication for use of anti diarrheal drugs</u>** e.G. Pectin, kaolin, bismuth & antispasmodic because they interfere with normal peristaltic movement and absorption of fluid & electrolyte which lead to pooling of fluid in the small intestine.


QUESTIONS?
COMMENTS?
CONCERNS?


ANY QUESTIONS?