

Gastroenteritis – Dr. Bakr

Gastroenteritis is infection of the GI tract.

Causes

- Viral (Rota, Norwalk, Calici, Adeno)
- Bacterial (Cholera, Yersinia, Campylobacter, E. coli)
- Protozoa (Entamoeba, Giardia)
- Fungal

Route of Transmission: feco-oral; contaminated water & food

Pathologic Changes

- *Inflammatory*
- *Non-inflammatory:* by enterotoxin (e.g. Rota & Cholera), cytotoxin & cellular invasion (e.g. Shigella)

Clinical features

- Mainly diarrhea ± Vomiting
- Systemic: fever, lethargy
- Remain for 1 week & then subside

Diagnosis

Usually knowing the specific causative organism is not necessary because the main point is to prevent and treat dehydration.

Investigations

Blood: electrolytes

Stool:

- Cyst, trophozoite (for protozoa)
- Blood (invasion)
- Pus
- Nothing (viral, toxin-mediated)
- pH (acidic 2° to lactate deficiency)
- Culture

Complications

- *Main:* dehydration
- Extra-intestinal
 - Glomerulonephritis
 - RA (Salmonella, Yersinia)
 - GBS (Campylobacter)
 - HUS (E coli)
 - Autoimmune hemolysis (Campylobacter)
 - IgA nephropathy (Yersinia)

Risk factors

- Immune-compromised
- Male
- Young age
- Lack of breast feeding
- Malnutrition
- Bad hygiene

Management

- A. Assessment of degree of dehydration
- B. Antibiotics
- C. Others: Zinc, Vitamin A, Pre- & Probiotics

A) Assessment of degree of dehydration (mild, moderate, severe)

Parameter	Mild	Moderate	Severe
Change in weight	< 3%	3-6%	6-9%
Mental change	Conscious, awake	Irritable	Confused, comatose
Pattern of drinking	Normal drinking	Eagerness to drink	Unable to drink
Fontanel	Normal	Moderate depression	Severe depression
Eye	Normal tear	↓ tears	Absent tears
Oral cavity	Moist	Dry	Wood-like
Capillary refill	Normal (< 2s)	Some delay	Too much delay
Skin turgor	Normal	Within 2 s	> 2 s
Pulse rate	Normal	Tachycardia	Severe tachycardia, bradycardia in shock
Sinking of the eyes	None	Moderate	Severe
Breath	Normal	Tachypnea	Deep (acidotic)
Pulse volume	Normal	↓ volume	Thread, weak, undetectable
Peripheries	Normal	Cold	Severe cold, cyanotic
Urine output	Normal	Decreased	Minimum, absent

Management depends on degree of dehydration

a) Only diarrhea, no dehydration

- Continue breastfeeding, make it more
- Give more liquids (*avoid*: cola & juice, *good*: yoghurt, buttermilk), more soup
- If no improvement within 2 days then re-evaluate
- Give ORS:
 - Every time the pt has diarrhea give 60-120 cc (one tea cup) if < 10kg, 120-240 cc (one glass) if > 10kg till the diarrhea disappears.

b) Mild dehydration

- 50 cc/kg in 4 hr
- Reassess, if same repeat, if better treat like step 1

c) Moderate

- 100 cc/kg in 4 hr
- Reassess, if same repeat, if becomes mild treat like step 2

d) Severe

- Hospital admission & IV fluids

How ORS is given?

- By spoon or dropper not by bottle

ORS Types (WHO standard)

1) Oldest	2) Hypo-osmolar *	3) Most recent
Glucose: 20 g/L Na: 90 mEq/L Cl: 80 mEq/L K: 20 mEq/L HCO₃⁻: 30 mEq/L Osm: 311 mOsm (hyper)	Glucose: 13.5 g/L Na: 75 mEq/L Cl: 65 mEq/L K: 20 mEq/L HCO₃⁻: 30 mEq/L Osm: 245 mOsm (hypo)	Glucose: 13.5 g/L Na: 75 mEq/L Cl: 65 mEq/L K: 20 mEq/L HCO₃⁻: 10 mEq/L Osm: 245 mOsm (hypo)
* better tolerated & ↓ diarrhea, stool volume NB: <ul style="list-style-type: none"> • ORS contains glucose because it enhances absorption of other electrolytes especially Na, Cl • ORS is never given IV → it will kill the pt instantly • If the pt can't take ORS orally → put NG tube 		

Contraindications of ORS

- Severe vomiting
- Severe dehydration, coma
- Paralytic ileus
- Intussusception
- Intestinal obstruction

IV fluid calculation (classical method, WHO method)

WHO method (easy, best, only in severe cases)

- Age < 1 yr → 30 cc/kg Ringer lactate within 1 hr, 70 cc/kg within 5 hr
- Age > 1 yr → 30 cc/kg Ringer lactate within 30 min, 70 cc/kg within 2.5 hr
- Reassess: if same repeat, if becomes moderate change to ORS, if moderate but can't take orally give: ½ glucose saline + K + half maintenance

Classical method (for mild/mod/severe, 3 volumes: deficit, maintenance, ongoing loss)

- Deficit (depends on degree of dehydration)
 - Severe (150 cc/kg)
 - Moderate (100 cc/kg)
 - Mild (50 cc/kg)
- Maintenance (rule of 10)
 - 1st 10 kg → 100 cc/kg
 - 2nd 10 kg → 50 cc/kg
 - 3rd 10 kg → 20 cc/kg
- Ongoing loss
 - Roughly based on amount of vomiting & diarrhea
- How the fluid is given? (E.g. a 10 kg child with severe dehydration)
 - 3000 cc/kg (1500 deficit, 1000 maintenance, 500 ongoing loss). Half within 8 hrs, other half divided into 2 equal amounts each given within 8 hrs

Exceptions

- *Shock volume:* normal saline 20 cc/kg within 30 min – 1 hr, repeat up to 3 times till no shock (till there is urine output). If no urine even with diuretics → renal failure (treat as RF). Later when we calculate fluid volume we should subtract the shock volume from it.
- *Hypernatremic (Na > 153):* rehydrate slowly, fluid that is normally given for 24 hr should be given within 48 hrs. If fast rehydration → cerebral edema

Complications of dehydration

- Renal failure
- Metabolic acidosis (*cause*: loss of HCO_3 , poor renal perf (loss of H ion), poor tissue perf (\uparrow anaerobic metabolism, lactate accumulation)
- Electrolyte disturbance
- Convulsion (*cause*: fever, elec imbalance, spread of infec, intracranial hemorrhage, TE, cerebral edema)
- CNS: thromboembolism (due to hemoconc,), cerebral edema, hemorrhage
- Death

B) Antibiotics

- Indications:
 - Shigellosis
 - Campylobacter
 - Giardia, Amoeba (antiprotozoal)
 - Immunodeficiency
 - Spread of infection
 - < 3 months of age
- Otherwise Ab is avoided because it leads to prolongation of diarrhea & antimicrobial resistance
- Ab:
 - *Oral*: ampicillin, amoxicillin, TMP/SMX (Bactrim)
 - *IV*: 3rd generation cephalosporins

C) Others

- **Zinc**: \downarrow frequency of diarrhea, \uparrow immunity, improve mucosal healing. A single daily dose (10 mg below 6 months, 20 mg above 6 months)
- **Vitamin A**: \downarrow morbidity & mortality
- **Probiotics**: beneficial bacteria (e.g. bifidobacteria, lactobacilli)
- **Prebiotics**: substances that enhance grow of probiotics (e.g. fucto-oligo-saccharide, inulin)
 - Pre & Pro usually given in combination
- **Stool thickeners** (pecto kaolin), **antidiarrheal** (loperamide, lomotil) and **antiemetics** *should be avoided*