MODULE VI

Diarrhea

and

Dehydration
ACUTE DIARRHEA

• Increased number of bowel movements!
• Loose and watery stools
• ↑ Fluid and electrolyte loss
ACUTE DIARRHEA TYPES

- Watery
- Bloody diarrhea (dysentery)
**DIARRHEA ETIOLOGY**

- **Watery**
  Rotavirus, Norwalk like viruses, enterotoxigenic *E coli* (ETEC), *Vibrio cholerae*, *Staphylococcus aureus*, *Clostridium difficile*, *Giardia*, and cryptosporidia

- ** Bloody**
  *Shigella* and *Entamoeba histolytica*. *Campylobacter* organisms, invasive *E coli*, *Salmonella*, *Aeromonas* organisms, *C difficile*, and *Yersinia*
DIARRHEA MANAGEMENT

- Maintain appropriate hydration
- Continued feeding
- Drug therapy: limited cases (IMCI)
  - Dysentery / cholera
  - Antiparasitic (amebiasis/giardiasis)
BLOODY DIARRHEA
ANTIMICROBIAL THERAPY

• Bacterial dysentery.
  – Ceftriaxone
  – Azithromycin
  – Quinolones (older children)
  – Ampicillin, TMP-SMX (depending on local resistance pattern)

• Amebiasis /Giardiasis
  – Metronidazole

• Cholera
  – TMP/SMX
  – Doxicycline
  – Tetracycline
PERSISTENT DIARRHEA

- > 14 days (IMCI > 7 days)

- Causes
  - Inadequate diet
  - Malabsorption
  - Parasitosis

- Management
  - Adjust diet
  - Consider antiparasitic agents
DIARRHEA OUTBREAKS (e.g., cholera)

- Epidemiologic surveillance
- SUSPECT! (adults with dehydration)
- Early identification of suspected cases
- Culture confirmation
- Report
- Active investigation and treatment of secondary cases
- Strengthen preventive measures
Severe disease if:

- Newborn (distinguish from transition stools)
- Persistent (> 7 days)
- Bloody
  - Infection
  - Necrotizing enterocolitis
  - DIC (sepsis)
  - Hemorrhagic disease of the newborn
  - Cow’s milk allergy
DEHYDRATION

NEGATIVE WATER BALANCE
(WITH OR WITHOUT ELECTROLYTIC AND ACID-BASE DISTURBANCES)
DEHYDRATION EVALUATION

ASSESS DEGREE

IDENTIFY TYPE
DEGREE

WEIGHT LOSS (%)

<table>
<thead>
<tr>
<th>Degree</th>
<th>0-5 years</th>
<th>&gt; 5 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>MILD</td>
<td>Up to 5%</td>
<td>3%</td>
</tr>
<tr>
<td>MODERATE</td>
<td>&gt;5 - 10%</td>
<td>6%</td>
</tr>
<tr>
<td>SEVERE</td>
<td>&gt; 10%</td>
<td>9%</td>
</tr>
</tbody>
</table>
CLINICAL SIGNS
## CLINICAL SIGNS

<table>
<thead>
<tr>
<th>SIGN</th>
<th>MILD</th>
<th>MODERATE</th>
<th>SEVERE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enophthalmos</td>
<td>+/-</td>
<td>++/++++</td>
<td>++++</td>
</tr>
<tr>
<td>Mucose membranes</td>
<td>Part. moist</td>
<td>Dry</td>
<td>Very dry</td>
</tr>
<tr>
<td>Tears</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Fontanelle</td>
<td>Normal</td>
<td>Sunken</td>
<td>Sunken</td>
</tr>
<tr>
<td>Thirst</td>
<td>Increased</td>
<td>Intense</td>
<td>Very intense</td>
</tr>
<tr>
<td>Skin</td>
<td>Pink</td>
<td>Pale and cold</td>
<td>Mottled</td>
</tr>
<tr>
<td>Skin turgor (Skin pinch)</td>
<td>Slightly delayed</td>
<td>&gt; 2 sec.</td>
<td>&gt; 4 sec.</td>
</tr>
<tr>
<td>SIGN</td>
<td>MILD</td>
<td>MODERATE</td>
<td>SEVERE</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>------------</td>
<td>----------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Pulse</td>
<td>Normal</td>
<td>Increased/</td>
<td>Increased/</td>
</tr>
<tr>
<td></td>
<td></td>
<td>mildly weak</td>
<td>Thready</td>
</tr>
<tr>
<td>BP*</td>
<td>Normal</td>
<td>Mild hypotensivee</td>
<td>Shock</td>
</tr>
<tr>
<td>Level of conscious state</td>
<td>Normal</td>
<td>Drowsy</td>
<td>Lethargic/coma</td>
</tr>
<tr>
<td>Capillary refill</td>
<td>&lt; 2 sec.</td>
<td>3 to 5 sec.</td>
<td>&gt; 5 sec.</td>
</tr>
<tr>
<td>Urine output</td>
<td>Reduced</td>
<td>Oliguria</td>
<td>Oligoanuria</td>
</tr>
</tbody>
</table>
TYPE
ISOTONIC DEHYDRATION

Net isotonic loss
↓ ↓ ECF
OSM normal

Marked clinical signs

H₂O

ECF  ICF
HYPOTONIC DEHYDRATION

Net hypertonic loss
↓↓↓ ECF
OSM ↓

ECF \[\text{H}_2\text{O}\] ICF

More marked clinical signs
HYPERTONIC DEHYDRATION

Net hypotonic loss
↓↓ ECF
OSM ↑

ECF → H₂O → ICF

Intracellular dehydration
ECF relatively preserved
Less marked clinical signs
HYPERTONIC DEHYDRATION

- History
- Less marked physical signs
- Skinfold sign
- Fever
- Skin: pink and warm
- Late shock
- Very intense thirst
- Irritability
- Seizures
DEHYDRATION
LABORATORY TESTS

SERUM ELECTROLYTES
ACID-BASE STATUS
Blood urea nitrogen (BUN)
UREA IN URINE (U/P)
DEHYDRATION MANAGEMENT

- PLAN A - no dehydration - / B / C - severe dehydration -
- Oral rehydration therapy (ORT)
- Intravenous hydration
  - Expansion (fluid resuscitation)
  - IV hydration
ORAL REHYDRATION
ADVANTAGES

• Physiological
• Early refeeding
• Effective in 90-95% of cases; same for all DH types
• REDUCES MORBIDITY AND MORTALITY!
• Low cost, simple implementation
• Accessibility
• No infective, metabolic or electrolytic complications
ORT

RESOURCES

- Room
- Envelopes containing solutions
- Safe drinking water
- Refrigerator
- Clock / Watch
- Paper and pencil
- Scale
- Containers (jar, cups; metered containers); spoons
- NGT
- Trained staff
## ORS - COMPOSITION

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>g/L</th>
<th>mmol/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>NaCl</td>
<td>3.5</td>
<td>90</td>
</tr>
<tr>
<td>KCl</td>
<td>1.5</td>
<td>20</td>
</tr>
<tr>
<td>Na$_2$HCO$_3$</td>
<td>2.5*</td>
<td>30</td>
</tr>
<tr>
<td>Glucose</td>
<td>20</td>
<td>80</td>
</tr>
</tbody>
</table>

WFI 1 L

* tri-Na citrate, dihydrate 2.9 g/L 10 mmol/L

Total osm. 331 mOsm/L

* Total osm 311 mOsm/L
# LOW OSMOLALITY ORS

<table>
<thead>
<tr>
<th>Component</th>
<th>g/L</th>
<th>mmol/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>NaCl</td>
<td>2.6</td>
<td>75</td>
</tr>
<tr>
<td>Gluc. (anhidre)</td>
<td>13.5</td>
<td>65</td>
</tr>
<tr>
<td>KCl</td>
<td>1.5</td>
<td>20</td>
</tr>
<tr>
<td>tri-Na citrate, dihydrate</td>
<td>2.9</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total weight</strong></td>
<td><strong>20.5</strong></td>
<td></td>
</tr>
</tbody>
</table>

Total OSM 245 mOsm/L
NORMOHYDRATION
ORS ADMINISTRATION

PLAN A (AT HOME)

• Give more fluids than usual
• ORS with each diarrheal stool passed / vomit
  < 2 years:  50 – 100 mL
  > 2 years:  100 – 200 mL
• Continued feeding/ breast-feeding
• Follow-up / Alarm signs
ADEQUATE FEEDING/BREASTFEEDING!
ORS ADMINISTRATION
ORAL REHYDRATION CONTRAINDICATIONS

- Shock
- Age < 1 month
- Functional obstruction/ Ileum
- Bilious emesis
- Severely impaired consciousness
- Severe respiratory distress
- Tense and/or tender abdomen
ORS ADMINISTRATION

PLAN B

• According to weight:
  
  50 - 100 mL/kg in 4 hs

• According to age (in 4 hs):
  
  > 4 mos: 200-400 mL    4 - 12 mos: 400-700 mL
  
  1- 2 yr: 700-900 mL    2- 5 yr: 900-1400 mL

• Every 30 minutes (if well tolerated)

• Continued monitoring; re-assess at 4 h

• Switch to Plan A when patient has normal hydration
VOMITING DURING ORT
SMALLER SIPS
INCREASE INTERVAL BETWEEN THEM
NGT

Gavage (gravity): 20-25 mL/kg/h every 20 min
Drip: 5 macrodrops/kg/min, in 30 min
ORAL REHYDRATION FAILURE

- Worsening of clinical signs
- Loss of fluids greater than intake
- Persistent vomiting
- Significant abdominal distension
- Persistence of dehydration after 6 h
HYDRATION PLAN C

• Shock:

  Intravascular volume expansion

  Isotonic crystalloid solution: 20 mL/kg, as rapidly as possible*

  OR

  30 mL/kg

  < 12 mos.  1 h *

  1 - 5 years  30 min *

  70 mL/kg

  < 12 mos.  5 h

  1 - 5 years  2½ hs

  *Repeat if shock signs persist

  Alternative: ORS via NGT 20-25 mL/kg/h; in 6 h
ENHANCING ORT IN A HUMANITARIAN EMERGENCY SETTING

- Prepare a specific ORT area in each health facility
- Teach the population the adequate technique for ORT
- Consider cultural features and issues of the affected population
- Epidemiologic surveillance registry
DIARRHEA AND DEHYDRATION TREATMENT SUMMARY

- Anticipate needs in the rehydration posts according to the population affected by the disaster
- Determine degree of dehydration and proceed
- Initiate ORT, except in cases of severe dehydration
- Reinitiate feeding immediately after rehydration
- Antibiotic treatment only for dysentery or if cholera is suspected
- NO antiemetics/ antidiarrheics
THANK YOU!