

Acute Gastroenteritis

M Rawashdeh, MD, MSc, MRCP, FRCPCH

Professor of

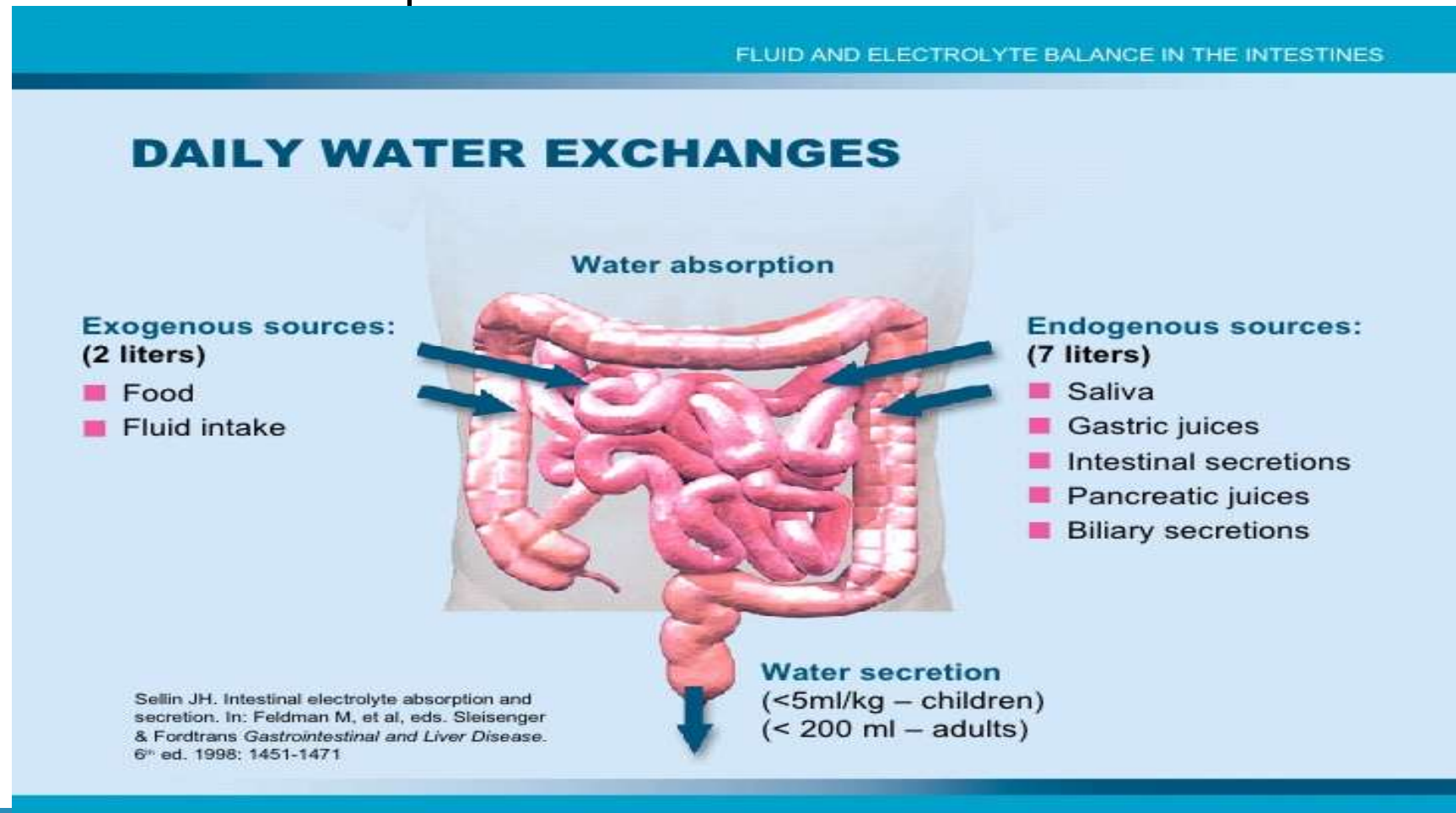
Pediatrics & Gastroenterology

Outline

- Basic physiology
 - Definition and classification
 - Epidemiology
 - Etiology
 - Complications
 - Management
 - Prevention
-

GI tract job description?

- To perform the mechanical and chemical processes of
 - Digestion of food
 - Absorption of nutrients
 - Elimination of waste



NORMAL STATE

Villus Tip: Absorption



Crypt: Secretion

Mechanism of Diarrhea

- Change in:
 - Absorption
 - Secretion
 - Gut motility
- In response to various etiologies

pathogenesis

- Bacteria → reaches to small intestine → multiplying in intestinal epithelium → produces enterotoxin (CT) → attached to GM1 (ganglioside receptor) → ↑cAMP → ↑fluid secretion (rich in k⁺ & bicarbonates)
- CT also inhibit absorption of sodium and chloride
- Cause massive water and electrolyte loss.

GE Definition

Acute gastroenteritis is generally defined as a decrease in the consistency of stools and/or an increase in the frequency of evacuations (typically ≥ 3 in 24 hours), with or without fever or vomiting.

However, a change in stool consistency versus previous stool consistency is more indicative of diarrhea than stool number, particularly in the first months of life.

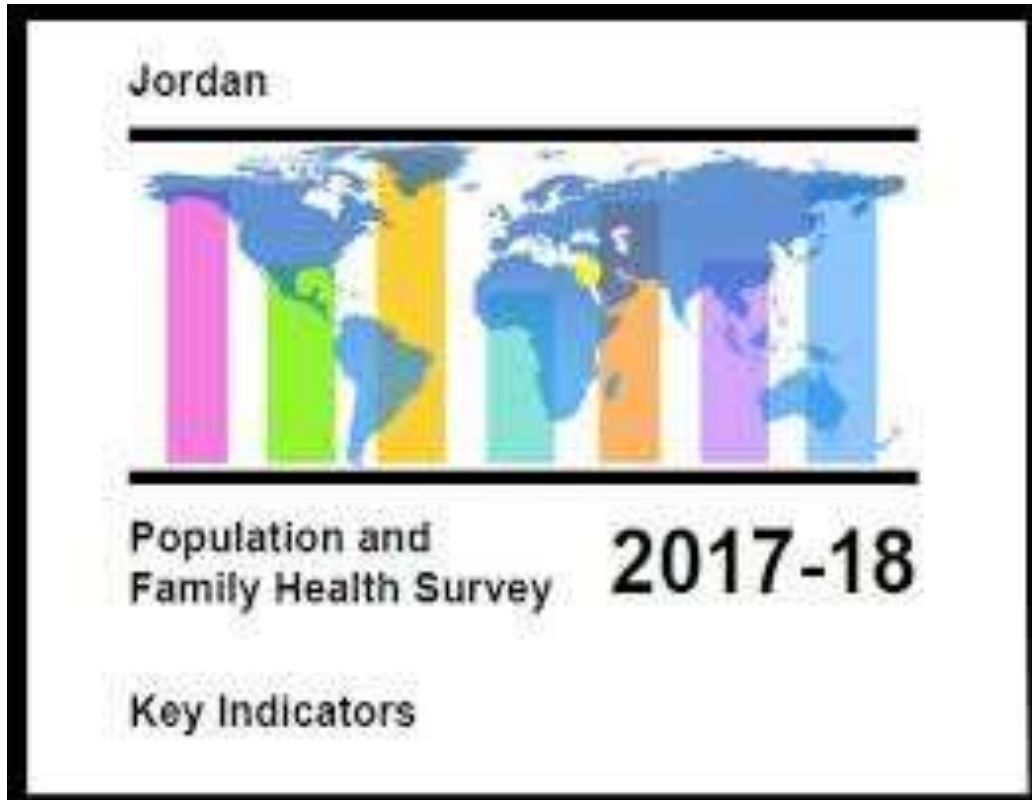
Acute diarrhea typically lasts less than 7 days and not longer than 14 days when it becomes chronic diarrhea.

Burden of Diarrhea

Diarrhea: Key facts

- Is the second leading cause of death in children under five (525,000) each year.
 - Globally, there are nearly 1.7 billion episodes diarrheal every year.
 - Is a leading cause of malnutrition in children under five years old.
 - It is both preventable and treatable.
 - Peak incidence is between 6-11 months
 - Age of complementary feeding
 - Related to developmental age (mouthing)
 - Declining maternal antibodies
-

Department of Statistics and diarrhea



10% of children under age 5 had diarrhea in the 2 weeks preceding the survey



Only 31% were given more fluids than usual (recommended).



45% were fed the same or more food



Thirty-six percent were given less food.



2% received no food during diarrhea

39.6% had Rotavirus by ELIZA

Viral Gastroenteritis Among Young Children in Northern Jordan

by Mamdoh M. M. Meqdam,* Mohammed T. Youssef,** Laila F. Nimri,* Abdullah A. Shurman,***
Mohammed O. Rawashdeh,*** and Munier S. Al-Khdour**

**Department of Applied Biology, Jordan University of Science and Technology,*

***Department of Biology, Yarmouk University, and*

****Princess Basma Teaching Hospital, Irbid, Jordan*

Summary

During the summer months of 1992 and 1993, a total of 439 diarrhoeatic fecal specimens from infants and young children less than 3 years of age admitted to the pediatric ward of Princess Basma Teaching Hospital, northern Jordan were tested for the presence of viruses using direct electron microscopy (EM) and enzyme-linked immunosorbent assay (ELISA) for rotavirus. EM revealed rotaviruses in 83 (18.9 per cent) of cases, adenoviruses in five (1.1 per cent) cases, and small round viruses in three (0.68 per cent) cases. In contrast, the ELISA method detected rotavirus in 154 (39.6

Diarrhea: Complications

- Dehydration leading to shock
 - Electrolytes imbalance
 - Metabolic acidosis
 - Convulsions (brain edema)
 - Malnutrition if chronic or recurrent
 - Sepsis and DIC
 - Disturbing with high frequency, urgency and abdominal cramps
-

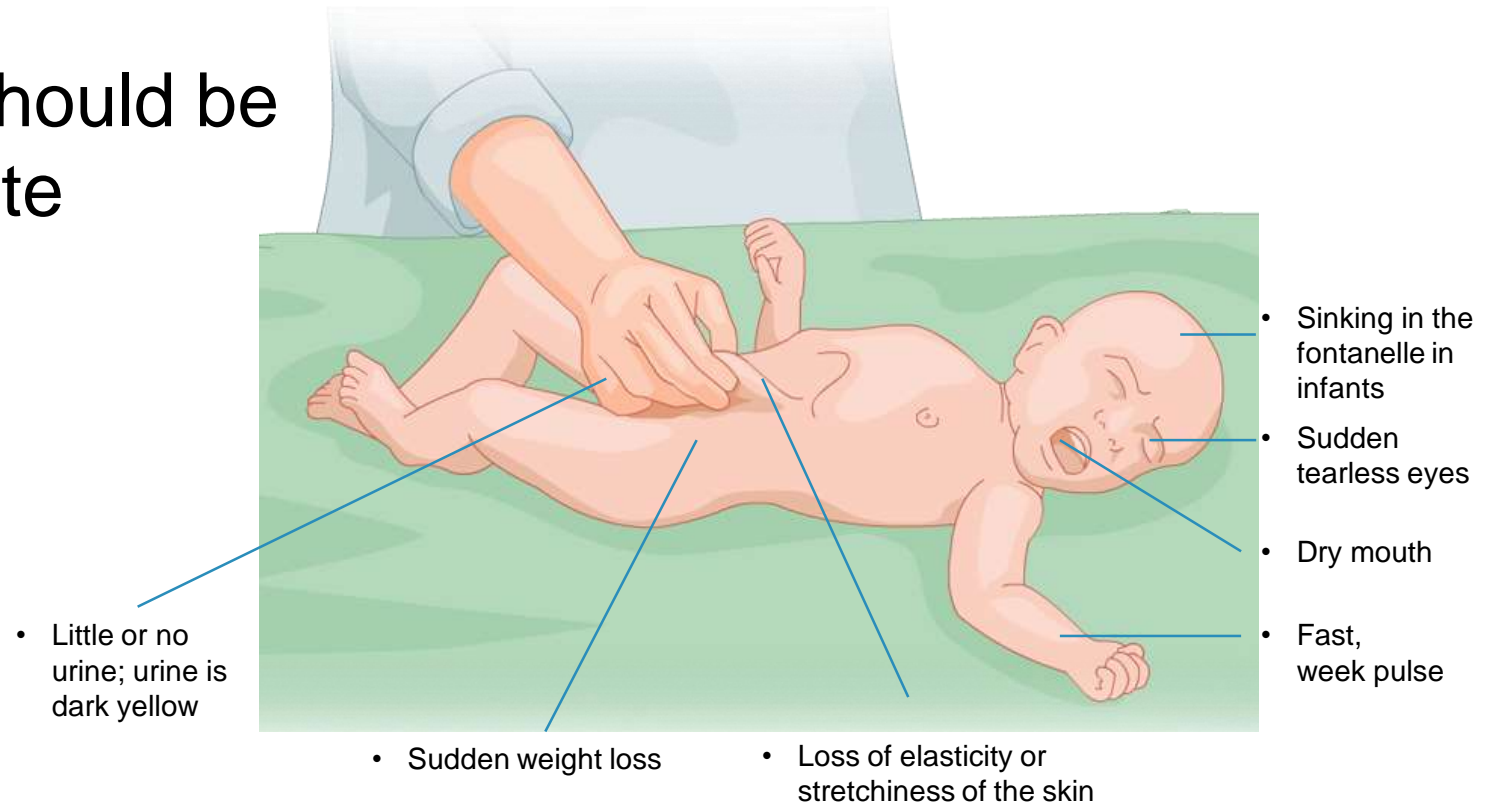
Assessment of dehydration

Assessment of Dehydration

- Studies that have evaluated the correlation of clinical signs of dehydration with post-treatment weight gain indicate that
 - the first signs of dehydration might not be evident until 5%,
 - with more numerous clinical signs evident at 5 -9%
 - and signs indicating severe dehydration not evident until fluid loss reaches 10%.
 - Duggan C, Refat M, Hashem M, Wolff M, Fayad I, Santosham M. How valid are clinical signs of dehydration in infants? *J Pediatr Gastroenterol Nutr* 1996;22:56--61.
-

Diarrhea: Signs of Dehydration

Dehydration assessment should be carried out through complete physical evaluation.



TABLE

Clinical Dehydration Scale

Characteristic	Score: 0	Score: 1	Score: 2
General appearance	Normal	Thirsty, restless, lethargic, but irritable when touched	Drowsy, limp, cold, or sweaty; may or may not be comatose
Eyes	Normal	Slightly sunken	Very sunken
Mucous membranes (tongue)	Moist	Sticky	Dry
Tears	Present	Decreased	Absent

Total CDS score: 0 = no dehydration; 1-4 = some dehydration; ≥ 5 = moderate/severe dehydration.

Source: Goldman et al. *Pediatrics*. 2008.⁹

Degree of Dehydration

- No clinical signs = Mild dehydration
- 2 signs with stable circulation = Moderate
- 2 signs and signs of shock = Severe

Diagnostic workup

Diarrhea: Who needs work up?

- Most children with acute gastroenteritis does not require diagnostic workup except:
- In very young children.
- In patients with underlying chronic conditions (e.g. cancer, inflammatory bowel diseases, immune deficiency disorders, diabetes mellitus).
- In very sick patients.
- In patients with febrile invasive diarrhea or bloody diarrhea with or without fever.
- In patients with known travel to high-risk areas or during disease outbreak.

Hospital admission

Indications for hospital admission

- Shock
 - Moderate-to-severe dehydration.
 - Neurological abnormalities (lethargy, seizures, etc.).
 - Intractable vomiting.
 - Failure of oral rehydration.
 - Suspected surgical conditions.
 - Electrolyte and/or acid/base imbalance.
 - Unmet conditions for safe follow-up and home management.
-

Treatment

Rehydration

Diarrhea: Management

- Oral rehydration solution (ORS)
- Enteral feeding
- Additional therapies
 - Probiotics
 - Antibiotics
 - Anti-diarrheal drugs
 - Antispasmodics

FLUID MANAGEMENT OF ACUTE GASTROENTERITIS

- ORS should be used as first-line therapy for the management of children with acute gastroenteritis with mild or moderate dehydration.
- All other therapies should be administered as add-on to ORS if needed.

WHO ORS Osmolarity

<i>Na⁺</i>		<i>90mM</i>	
<i>Cl⁺</i>		<i>80mM</i>	
<i>Glucose</i>		<i>110mM</i>	
<i>K⁺</i>		<i>20mM</i>	
<i>Citrate</i>	Bicarbonate	<i>10mM</i>	30 M
<i>TOTAL</i>		<i>310mM</i>	

How Much ORS?

- 75ml/kg in 3-4 hours
- Regular food
- 100 ml after each loose stool

Treatment

Nutritional management

AGE: Nutritional Management

- Breastfeeding should continue all through
- Early resumption of feeding after rehydration therapy is recommended
- Extra food and extra drink
- The use of lactose-free feeds is not
- The use of diluted milk is not recommended

What about Zinc?

- Oral zinc supplementation helps reducing the duration of symptoms, thereby preventing persistent diarrhea in this age group
 - The addition of zinc to ORS or concomitantly with probiotics (*Saccharomyces boulardii*) seems to be one of the most effective strategies for the reduction of diarrhea duration in children
 - Zinc is recommended along with ORS in children older than 6 months.
 - Zinc is usually given as zinc sulphate, zinc acetate, or zinc gluconate, which are all water-soluble
 - (WHO) and (UNICEF) recommend 10 mg to 20 mg of zinc per day for children with acute gastroenteritis.
-

Therapy of AGE



BOX 2. Seven principles of appropriate treatment for children with diarrhea and dehydration

1. Oral rehydration solutions (ORS) should be used for rehydration.
2. Oral rehydration should be performed rapidly (i.e., within 3–4 hours).
3. For rapid realimentation, an age-appropriate, unrestricted diet is recommended as soon as dehydration is corrected.
4. For breastfed infants, nursing should be continued.
5. If formula-fed, diluted formula is not recommended, and special formula usually is not necessary.
6. Additional ORS should be administered for ongoing losses through diarrhea.
7. No unnecessary laboratory tests or medications should be administered.

Source: Adapted from Sandhu BK. Practical guidelines for the management of gastroenteritis in children. *J Pediatr Gastroenterol Nutr* 2001;33(Suppl 2):S36–9.

Treatment

Pharmacological management



Adsorbents
Antimotility
Antisecretory

CURRENT THERAPEUTIC OPTIONS FOR DIARRHEA

Diarrhea Therapy Options

```
graph TD; A[Diarrhea Therapy Options] --> B[Motility inhibitors]; A --> C[Adsorbents]; A --> D[Probiotics]; A --> E[Anti-infectives]; A --> F[Antisecretory]; A --> G[Vaccines]; B --- B1[Loperamide]; C --- C1[Diosmectite]; C --- C2[Kaolin pectin]; D --- D1[ ]; E --- E1[ ]; F --- F1[Racecadotril]; G --- G1[Rotarix®]; G --- G2[RotaTeq®];
```

Motility inhibitors

Loperamide

Adsorbents

Diosmectite

Kaolin pectin,

Probiotics

Anti-infectives

Antisecretory

Racecadotril


Vaccines

Rotarix®

RotaTeq®

Prevention

- Wash hands thoroughly before and after eating or when preparing the meals.
- Make sure that the tools used for eating and preparing the meals are clean.
- Cover our food or put them in the fridge to prevent any contamination.
- Rotavirus vaccines



Thank You