The McMaster at night Pediatric Curriculum

Objectives

• Understand important aspects of the history and physical exam in a patient with acute gastroenteritis

• Effectively manage isotonic dehydration

• Understand use of oral rehydration therapy and early re-feeding

• Use of medications in acute gastroenteritis
Background – Acute Gastroenteritis

• The most common cause of physician visits and hospitalizations in infants and young children

• Children < 5 years experience 1–2 episodes annually
Background – Acute Gastroenteritis

• Definitions:
  • **Diarrhea** – passage of ≥ 3 loose or watery stools per day

• Diarrhea Classifications
  • **Acute Diarrhea**
    • Lasting several hours to days
  • **Acute bloody diarrhea or dysentery**
  • **Persistent Diarrhea**
    • Lasting 14 days or longer
The Case

- 14 months Female
- Presents with 2 days of intermittent fever with profuse watery diarrhea and vomiting
- Unable to tolerate oral intake
- Previously healthy, term baby with no previous illnesses or admissions to hospital
History

What would you ask?
History

- **Onset of diarrhea and vomiting**
  - Number of episodes of diarrhea and vomiting
  - Bloody diarrhea / emesis
  - Bilious emesis

- **Oral intake**
  - How much and what fluids are they taking orally
  - Number of wet diapers and last void
History

- **ROS:** fever, rash, abdominal pain, URTI symptoms, urinary symptoms, joint swelling
- Sick contacts
- Daycare attendance
- Travel history
- Water source
- Pets
- Medications used
- Immunizations
Test Your Knowledge

• If vomiting is the only presenting sign, what other diagnostic possibilities must one consider?

A. UTI
B. Meningitis
C. Gastrointestinal obstruction
D. All of the above
The Answer

• All of the above!

• If vomiting alone without diarrhea – MUST consider other diagnoses!
  • Meningitis / Increased ICP
  • Diabetes
  • Metabolic disorders
  • UTI
  • Gastrointestinal obstruction
  • Toxic Ingestion
Physical Exam

What would you look for?
Physical Exam

• Vitals
  • Fever
  • Tachycardia
  • Hypotension

• Level of Consciousness
  • Alertness
  • Lethargy

• Signs of dehydration
  • Sunken eyes
  • Dry mucous membranes
  • Tears
  • Sunken anterior fontanelle
  • Capillary refill time

• Rash
# Assessment of Dehydration

<table>
<thead>
<tr>
<th>Mild Dehydration (&lt; 5%)</th>
<th>Moderate Dehydration (5-10%)</th>
<th>Severe Dehydration (&gt;10%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slightly ↓ urine output</td>
<td>↓ Urine output</td>
<td>Markedly ↓ or absent urine output</td>
</tr>
<tr>
<td>Slightly ↑ thirst</td>
<td>Moderately ↑ thirst</td>
<td>Greatly ↑ thirst</td>
</tr>
<tr>
<td>Slightly dry mucous membranes</td>
<td>Dry mucous membranes</td>
<td>Very dry mucous membranes</td>
</tr>
<tr>
<td>Slightly elevated HR</td>
<td>Elevated HR</td>
<td>Greatly elevated HR</td>
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<tr>
<td>↓ Skin Turgor</td>
<td>↓ Skin Turgor</td>
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</tr>
<tr>
<td>Sunken eyes</td>
<td>Very sunken eyes</td>
<td></td>
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<tr>
<td>Sunken Anterior Fontanelle</td>
<td>Very sunken anterior fontanelle</td>
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<td></td>
<td>Lethargy</td>
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<td>Cold extremities</td>
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<td>Hypotension</td>
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Workup

What would you order?
Workup

- Usually no investigations needed

- May consider the following if severe dehydration:
  - Electrolytes
  - Blood glucose
  - BUN, Cr
  - Venous blood gas

- Stool studies
  - school/child care or hospital outbreak
  - dysentery, recent travel, and immunocompromised patient
Etiologies of Acute Gastroenteritis

• Viruses
  • Rotaviruses
  • Noroviruses (Norwalk – like viruses)
  • Enteric adenoviruses
  • Caliciviruses
  • Astroviruses
  • Enteroviruses

• Bacteria
  • Campylobacter jejuni
  • Nontyphoid Salmonella
  • Enteropathogenic Escherichia coli
  • Shigella
  • Yersinia enterocolitica
  • Shiga toxin producing E. coli
  • Salmonella typhi and S paratyphi
  • Vibrio cholerae
Etiologies of Acute Gastroenteritis

• Protozoa
  • Cryptosporidium
  • Giardia lamblia
  • Entamoeba histolytica

• Helminths
  • Strongyloides stercoralis
Test Your Knowledge

All of the following can be used in the management of acute gastroenteritis except?

A. IV fluids
B. Oral rehydration therapy (ORT)
C. Water
D. Early re-feeding
The Answer

• WATER!

• Parents should be specifically instructed NOT to offer plain water to children with acute gastroenteritis to avoid hyponatremia and hypoglycemia.

Also should avoid fluids with non-physiological concentrations of glucose and electrolytes:
  • carbonated drinks
  • sweetened fruit juices
Oral Rehydration Therapy (ORT)

- Uses a simple, inexpensive glucose and electrolyte solution promoted by the WHO

- Oral rehydration solution (ORS)
  - Scientific basis for use = co-transport of glucose and sodium across the intestinal membrane
  - Glucose enhances sodium, and secondarily, water absorption
  - Solution needs to have an optimal glucose : sodium ratio to ensure maximal sodium absorption
    - Ex. Pedialyte, Gastrolyte etc
  - Should be given in small amounts, in frequent intervals
**Implementation of ORT**

**Figure 1** Algorithm for managing acute gastroenteritis in children. ORS Oral rehydration solution; ORT Oral rehydration therapy

- Small amounts of ORS in frequent intervals
- Increase volume until child can drink as desired
- Use spoon or dropper for very small infants
- Squirt ORS into mouth with a syringe for children who refuse to drink
- Should consider NG tube for ORS prior to IVF

Test Your Knowledge

- What are contraindications to the use of ORT?
The Answer

- Protracted vomiting despite small, frequent feeding
- Severe dehydration with shock-like state
- Impaired consciousness
- Paralytic ileus
- Monosaccharide malabsorption
Early Refeeding

- Induces digestive enzymes
- Improves absorption of nutrients
- Enhances enterocyte regeneration
- Promotes recovery of disaccharidases
- Reduces the duration of diarrhea
Early Refeeding

• Breastfeeding should continue throughout acute gastroenteritis

• Do not dilute formula or use lactose-free formula in refeeding non-breastfed infants

• Children WITHOUT dehydration should continue to be fed age-appropriate diet

• Children WITH dehydration should be fed age-appropriate diet as soon as re-hydrated

• No benefit to “bowel rest”
Test Your Knowledge

• Which of the following medications can be safely used in a patient with acute gastroenteritis?

A. Dimenhydrinate (Gravol)
B. Metoclopramide
C. Ondansetron (Zofran)
D. Domperidone
The Answer

- **ONDANSETRON**
  - Highly potent and selective serotonin 5-HT3 receptor blocker
  - Rapidly absorbed from the GI tract when given orally
  - For use in children > 6 months of age
  - Effective in:
    - Reducing frequency of vomiting
    - Reducing IVF administration
    - Reducing hospital admissions
  - Common side effect:
    - Diarrhea
Summary

• Acute gastroenteritis is a very common illness in pediatrics
  • Caution in diagnosing acute gastro in patients with vomiting only!

• Rehydration and maintenance of adequate fluid and electrolyte balance is key in management

• Evaluation of degree of dehydration informs treatment options

• ORS is a useful and an evidence-based treatment
  • Use in frequent intervals and gradually increase volume
  • Use a WHO approved, premixed ORS

• Avoid plain water, carbonated drinks and sweetened fruit juices

• Ondansetron is a safe and effective medication to use in acute gastroenteritis
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