

# Management of Acute Infectious Gastroenteritis in Children

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Acute gastroenteritis in children remains an important and costly clinical problem, commonly encountered by pediatricians. Diarrhea, vomiting and dehydration continue to present significant risks to children and spend considerable health system budgets. It has been estimated that the mean of acute gastroenteritis episodes is 3.2 per year in children under 5 years in resource-limited countries (1). Most episodes with various etiologies are self-limited, but the child should be carefully evaluated, which need precise history and a complete physical examination to assess the severity of the disease and uncover other illnesses with similar presentations. Minimal laboratory tests are usually required. The treatment is generally supportive, aimed at preventing or treating the dehydration. Common management errors include using antibiotic inappropriately, administering intravenous rehydration therapy, hospital admission with only mild dehydration and withholding oral rehydration solutions, and breastfeeding or other feedings in children with vomiting or dehydration.

Globally, infectious agents (viruses, bacteria and parasites) are by far the most common causes of acute gastroenteritis. Viruses, especially rotavirus, are responsible for 70% to 80% of infectious diarrhea cases in resource-limited countries and require no antibiotics. Bacterial pathogens account for another 10% to 20% of cases and parasites such as *Giardia* and *Entamoeba*, causes of fewer than 10% of cases (2), although this distribution is affected by climate and season. The principles for judicious antibiotic prescription focus on applying strict diagnostic criteria (clinical signs and symptoms, severity and paraclinical data), weighing the benefits and harms of antibiotic therapy, and understanding the conditions in which antibiotics may not be indicated.

Recent evidences show that broad-spectrum antibiotics are prescribed in occasions where either therapy is

not necessary or narrower-spectrum alternatives are appropriate (3). These occasions may cause avoidable drug-related adverse events (4-6), contribute to antibiotic resistance (7), and increase unnecessary medical costs. Judicious antibiotic prescribing that reduces the overuse and ensures that appropriate agents are prescribed, is an urgent public health and patient safety priority (8).

In an attempt to improve the physicians' knowledge of acute gastroenteritis management in children and bring more evenness to the assessment, treatment approaches and costs in Iran, we abbreviated the points that should be noticed with the word "Diarrhea" as follows (although their considerations in an episode of gastroenteritis are not as this order):

## 1. Data Gathering

It means getting the history of food consumption, recent travel, presence of fever, tenesmus, bloody diarrhea, frequency of diarrhea and different aspects of epidemiology.

## 2. Duration

It means onset less than two weeks before the visit.

## 3. Date (Time of Consumed Food)

Less than six hours: consider toxin of *Staphylococcus aureus* and *Bacillus cereus*; onset between 8 - 14 hours: enterotoxin of *Clostridium perfringens* and *B. cereus*; onset between 16 - 48 hours: norovirus, *Campylobacter*, *Escherichia coli*, *Salmonella*, *Shigella*, and *Vibrio parahaemolyticus*.

## 4. Intravenous Hydration

IV therapy is indicated in unstable patients, presence of protracted vomiting, ileus, patients with obtunded

### Implication for health policy/practice/research/medical education:

This study indicates that breastfeeding, continuous and proper nutrition, and age-appropriate calorie-protein intake during the gastroenteritis episode, will reduce further severe episodes.

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mental status, signs and symptoms of shock or intussusception, or stool output of more than 10 cc/kg/h, and carbohydrate intolerance.

## 5. Associated Signs and Symptoms

Signs and symptoms such as fever, anemia and hemolysis (*Yersinia*, *Campylobacter*), hemolytic uremic syndromes (HUS: Enterohemorrhagic *E. coli*, EHEC O159-H7 & O104-H4, *S. dysentery*), erythema nodosum (*Salmonella*, *Campylobacter*, *Yersinia*) (9, 10), IgA nephropathy (*Campylobacter*), glomerulonephritis (*Yersinia*, *Campylobacter*, *Shigella*, *Salmonella*), reactive arthritis (*Salmonella*, *Shigella*, *Campylobacter*, *Yersinia*, *C. difficile*, *Cryptosporidium*) (11), rashes (enteroviruses, adenovirus, *Yersinia*, *Salmonella*, *Listeria*), loss of consciousness (Ekiri syndrome, *Salmonella*, Encephalopathy, shock) seizures (*Salmonella*, *Shigella*, *Campylobacter*, rotavirus (12), Rhinovirus (13), *Listeria*), Guillan-Barre syndrome (*Campylobacter*) could be associated with the disease.

## 6. Red Flags

Red flags are signs and symptoms of severe dehydration, shock, loss of consciousness, acute abdomen, toxic megacolon, presence of protracted vomiting, and oliguria.

## 7. Repeated Re-Evaluation

Repeated re-evaluation is very important. These points should be considered: 1) Probable complications and/or differential diagnoses such as: toxic megacolon, hemolytic uremic syndrome (HUS), appendicitis, gastrointestinal obstruction, and intussusceptions. 2) Re-evaluation of the hydration level and electrolyte imbalance (monitoring the mental status, quality of pulse, heart rate, mucosa and skin dryness, breathing, capillary filling, thirsty, skin fold, and urine output).

## 8. Host Factors

Previous history or signs and symptoms of prematurity, failure to thrive, immune deficiency, and underlying diseases should be gained.

## 9. Exudative or Nonexudative Diarrhea and Electrolyte Correction

### 9.1. Probable Causes of Exudative Diarrhea

-Infectious: *Shigella* spp., *Salmonella* spp., *Campylobacter* spp., *Bacillus anthracis*, EHEC, *C. difficile*, *Entamoeba histolytica*, urosepsis (especially in infants), typhlitis.

-Noninfectious: intussusception, appendicitis, HUS, Kawasaki disease, milk allergy, Hirschsprung, bowel ischemia (9, 14).

### 9.2. Probable Causes of NonExudative Diarrhea

-Secretory; bacterial: *V. cholera*, *Salmonella* spp., *Enterotoxigenic* (ETEC), *Shigella* spp.; viral: rotavirus, enterovirus, adenovirus, astrovirus, calicivirus, avian flu.

-Toxin; Food poisoning: *S. aureus*, *C. perfringens*, *E. coli*, *V. cholera*, *V. parahaemolyticus*, Chinese restaurant food.

-Heavy metal poisoning: arsenic, lead, iron.

-Others: conium (9, 14).

### 9.3. Electrolyte Correction

The electrolyte imbalance should be corrected properly.

## 10. Antibiotic-Associated Diarrhea, Treatment and Other Therapies

### 10.1. Antibiotic-Associated Diarrhea

It can occur with *C. difficile* or Non-*C. difficile* (*klebsiella oxytoca*: cytotoxic hemolytic colitis) (9).

### 10.2. Antibiotic Therapy and Other Supplements

In a few cases of bacterial or protozoan gastroenteritis, antibiotics are needed. These included *Shigella* spp., *S. typhi*, *V. cholera*, some ETEC and Shiga toxin-producing *E. coli* and selected cases of non-typhi *Salmonella*, *E. histolytica*, *Giardia* and *Cryptosporidium*. Zinc sulfate, vitamin A and probiotics can be beneficial especially in resource-limited countries. Breastfeeding, continuous and proper nutrition, and age-appropriate calorie-protein intake during the episode will reduce further severe episodes.

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## Authors' Contribution

All authors contributed equally.

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