Management of Gastroenteritis in Primary Care – A Review

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This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT
Gastroenteritis is one the most common diseases worldwide, and it’s more dangerous in children, although in most time it’s self-limited, it can be fatal in case of children, the most dangerous side of GE is diarrhea and the dehydration that follows it. Since dehydration is the most dangerous...
symptom of the Gastroenteritis Oral rehydration solutions and even intravenous solution intake (in case of severe dehydration) is the main treatment, followed by symptomatic treatment such antiemetics or antidiarrheal drugs, although caution should be considered for drugs used in children. The need to make cost-effective diagnostic and treatment decisions, avoid unnecessary investigation and referral, provide long-term effective control of symptoms, and minimize the risk of complications constitute the main challenges that PCPs face. During the last few years, the role of primary care physicians in the diagnosis and management of gastroenteritis has been recognized as very important, and it has been suggested that they have all the available resources in order to ensure high standard of care for their patients. In particular, clearly articulated clinical practice guidelines, effective medications, accurate noninvasive investigations, and evidence-based primary care management plans are available to support PCPs who want to raise their threshold for referring patients with GI symptoms.

Keywords: Gastroenteritis; chronic gastrointestinal disorders; gastrointestinal problems.

1. INTRODUCTION

Chronic gastrointestinal disorders are a source of substantial morbidity, mortality, and cost. They are common in general practice. Gastrointestinal problems account for a significant proportion of the workload of general practitioners (GPs) [1].

In the United States, there are more than 350 million instances of acute gastroenteritis each year, with 48 million of these cases being caused by foodborne germs. Acute gastroenteritis (AG) has a significant illness burden, health-care costs, and socioeconomic impact around the world. Nausea, vomiting, diarrhea, and stomach discomfort are all symptoms of acute gastroenteritis [2].

A recent history of fluid intake and output should be included in the evaluation of a kid with acute gastroenteritis. The best technique to determine hydration status is through a physical examination. [3].

Because GE is predominantly of viral etiology and usually self-limiting, routine prescription of antibiotics is not recommended in clinical practice guidelines (CPGs) for primary care, so antibiotic treatment of GE in primary care is relatively infrequent. Empirical treatment is more frequent compared with targeted treatment and was mostly with non-CPG-recommended antibiotics.

In this narrative review, we discuss the published literature on the potential roles of the primary care physician in the diagnosis and management of gastroenteritis.

2. EPIDEMIOLOGY

GI disorders are common in general practice, accounting for about 10% of the work of general practitioners. More than half of those going from industrialized to developing nations have traveler’s diarrhoea. Clostridium difficile is becoming more common in both adult and paediatric patients [1].

Acute gastroenteritis is often regarded as a nuisance in the United States rather than the life-threatening sickness it can be in developing countries. According to statistics, the United States has more than 350 million instances of acute diarrheal diseases each year. As the most frequent infectious disease syndrome, acute gastroenteritis is second only to upper respiratory infections [1,4,5]. In the United States, 48 million episodes of foodborne bacterial gastroenteritis occur each year, resulting in 125,000 hospitalizations, 3000 deaths, and expenses of more than $150 billion [1]. Diarrhoea affects 68 percent of children under the age of five worldwide. Diarrhoea is the sixth largest cause of death in children worldwide, with 2.5 million deaths each year [3].

Gastroenteritis affects 3 to 5 billion children worldwide each year, resulting in 1.5 to 2.5 million deaths, or 12 percent of all deaths among children under the age of five. Acute gastroenteritis seldom kills people in wealthy countries like the United States. Acute gastroenteritis results in 1.5 million visits to primary care providers and 220,000 hospital hospitalizations for children under the age of five years per year, accounting for 10% of all paediatric hospital admissions [6-9].

Norovirus causes 20 million illnesses in the United States each year, including around 2 million outpatient visits, and is the main cause of acute gastroenteritis (AGE) in people of all ages. The disease has a significant impact; children
under the age of five have the highest prevalence of norovirus-related medical visits, while older persons are at the highest risk of norovirus-related mortality. However, Intramuscular vaccination candidate with a consensus sequence virus-like particle that has completed phase II studies in children, adults, and the elderly [10-17].

In the United States, children under the age of five are admitted at a rate of 9 per 1000 every year. Admission rates are roughly 12 to 15 per 1000 each year, which is comparable to the United Kingdom and Australia. In China, however, the rate rises rapidly to 26 per 1000 every year. The disparity can also be explained by the fact that the incidence of acute gastroenteritis in developing countries is substantially higher than in developed countries. Interestingly, despite being a wealthy city, Hong Kong has a higher admission rate than many undeveloped countries. This could indicate that admission decisions are not solely based on clinical circumstances [6,18-23].

Acute gastroenteritis in young children is reduced by handwashing, nursing, and rotavirus immunisation [6].

3. CAUSES

Infectious agents (viruses, bacteria, and parasites) are the most common causes of acute gastroenteritis in the world. In the developed world, viruses, especially rotavirus species, account for 70 to 80 percent of infectious diarrhoea cases, bacterial pathogens account for 10 to 20% of cases, and parasitic organisms such as Giardia species account for less than 10% of cases [24].

Norovirus is a leading cause of acute gastroenteritis (AGE) in people of all ages, and candidate vaccines are now being tested. While norovirus diagnostic testing is becoming more widely available, stool testing may not be done on a regular basis, which can obstruct surveillance and estimates of illness burden. Furthermore, a lack of understanding of the disease burden may prevent providers from recommending vaccines, lowering coverage rates and, ultimately, the vaccine’s effectiveness [10].

The majority of instances of acute viral gastroenteritis are caused by a variety of viruses, including rotavirus, norovirus, adenovirus, and astroviruses. The majority of infections are spread through the feces-oral route, which includes contaminated food and water. Fomites, vomitus, and perhaps airborne mechanisms of transmission have also been discovered. Norovirus is more resistant to inactivation by chlorine and ethanol than other viruses [25]. Bacteria cause gastroenteritis in various ways. Some species, such as Vibrio cholerae, enterotoxigenic strains of Escherichia coli (E. coli), and Clostridium difficile, bind to the intestinal lining without invading the intestinal lining without invading it [1]. Some intestinal parasites, particularly Giardia intestinalis, attach to or invade the lining of the intestine, causing nausea, vomiting, diarrhea, and general malaise. Another type of intestinal parasite, Cryptosporidium parvum, causes watery diarrhea [2].

4. TYPES OF ACUTE GASTROENTERITIS

Bacteria are responsible for about 20% of cases. Parasitic infections, which account for less than 5% of acute gastroenteritis cases, are more likely to induce diarrhoea that lasts at least 14 days. The causative bacteria change according to the season and climate, here are the three main types of GE.

Traveler’s Diarrhea: Travelers to underdeveloped nations frequently consult their primary care professionals about traveler’s diarrhoea and how to prevent or manage it if it occurs. This problem affects 40 percent to 60 percent of travellers to underdeveloped countries [1].

Foodborne Acute Gastroenteritis: Pathogens that produce a toxin in the food before it is consumed are one of three pathways that cause foodborne gastroenteritis (preformed toxin). or pathogens that produce a poison after food has been consumed. or pathogens that penetrate the gut wall and break down the epithelial lining directly, releasing substances that induce inflammatory diarrhoea [1].

Antibiotic-Associated Diarrhea: C difficile colitis is another name for antibiotic-associated diarrhoea. This infection is common in hospitalised patients, with the risk increasing with the length of stay. The use of multiple antibiotics and duration of antibiotic are associated with an increased risk of C difficile infection [1].

The impacts of the viruses, together with particular cytotoxins, on the enterocytes of the
intestine cause the clinical signs of viral gastroenteritis. The virus replicates in the enterocyte, interfering with the generation of brush border enzymes, resulting in malabsorption and osmotic diarrhoea. Furthermore, viral toxins cause direct injury to enterocytes and intestinal villi cells, resulting in a transudative leak of fluid into the intestine [25].

5. SYMPTOMS

Identifying a specific pathogen is rarely necessary in acute bacterial gastroenteritis, except in situations of fever, bloody diarrhoea, immunocompromised patients, or patients with major comorbidities, because sickness is usually self-limited [1].

These are the red-flag symptoms which indicate severe case of acute gastroenteritis in the children:

- Sensorium that has changed
- Vomiting that is bilious or bloody
- Cyanosis
- Excessive irritation or inconsolable crying
- Petechial rash is a type of rash that appears on the skin
- Perfusion of the peripheral vessels is poor.
- Breathing quickly
- A temperature of 104°F (40°C) or higher is required.
- Having a toxic appearance
- Young age (less than six months) or a small body mass index [3]

6. DIAGNOSIS

Based on physical examination results, the four-item Clinical Dehydration Scale can be used to estimate the degree of dehydration. When viral gastroenteritis is the most likely diagnosis, stool microbiological testing are not required in children with moderate illness. Children with mild gastroenteritis can be treated at home [6]. Dehydration in a patient can also be classified as mild, moderate, or severe based on clinical indications. Traditional clinical symptoms, on the other hand, have been shown to be unreliable in identifying the degree of dehydration [24].

Laboratory Testing: Dehydration can be indicated by a serum bicarbonate content of higher than 15 mEq per L (15 mmol per L). If intravenous rehydration is likely, electrolytes, creatinine, and glucose levels should be ordered as well. If the patient is restless or has hyperreflexia, seizures, sleepiness, or coma, serum sodium levels can indicate the presence of hypernatremic dehydration [3].

When accompanied with a history of decreased urine flow, a high urinary specific gravity can suggest serious dehydration. Most patients' first management approaches are unaffected by serum chemistry tests such as electrolyte, blood urea nitrogen, and creatinine levels. Oral rehydration therapy can be used safely in children who are hemodynamically stable, with only a small risk of serious electrolyte abnormalities [24].

In the case of severe disease (e.g., signs of dehydration/hypovolemia, severe stomach pain, or the requirement for hospitalisation), high-risk host traits, and other signs and symptoms of inflammatory diarrhoea, stool testing for bacterial pathogens is recommended. Salmonella, Campylobacter, and Shigella are three common bacteria that can be identified through a normal stool culture. Other bacterial pathogens (such as Vibrio, Yersinia, Aeromonas, and Listeria) should be investigated using specific microbiology and culture techniques. Additional tests for Shiga toxin and leukocytes in stool for EHEC should be conducted in addition to stool culture in the case of bloody diarrhoea [26].

6.1 Hypernatremia

- Cutaneous manifestations
- Texture is warm and "doughy."
- In extreme dehydration, skinfold tenting may be reduced, providing the appearance of a lesser level of dehydration.
- Signs of the nervous system
- Hypertonia
- Hyperreflexia
- When touched, there is a lot of lethargy, but there is also a lot of agitation [24].

6.2 Hypokalemia

- Weakness
- Ileus accompanied by abdominal distention
- Arrhythmias of the heart [24]

7. TREATMENT

The primary supportive treatment for acute gastroenteritis is to avoid dehydration or to provide adequate fluids [1].

In a study that looked onto the antibiotic usage in GE cases it found that Antibiotics were provided
in 8.8 percent of incidents, with metronidazole (4.9 percent), azithromycin (1.9 percent), and ciprofloxacin (1.9 percent) being the most common (1.4 percent). For 641 (5%) GE occurrences, empirical treatment was used, with 30% of those choosing the antibiotics indicated by the CPG [27].

Oral rehydration therapy, such as giving half-strength apple juice followed by the child's favourite liquids, is the basis of treatment for moderate dehydration and is just as successful as intravenous rehydration in avoiding hospitalisation and ER visits. For moderate dehydration, oral rehydration solutions are suggested. To avoid vomiting and enhance tolerance of oral rehydration solutions, ondansetron may be administered [3]. There are no general nutritional guidelines for patients with viral gastroenteritis. Although a diet of bananas, rice, apples, tea, and toast is frequently recommended, multiple studies have found no meaningful difference in outcomes when compared to typical diets [25].

**No Dehydration:** Children who have diarrhoea but not vomiting and who are not dehydrated based on a physical examination can continue to eat an age-appropriate diet safely. It is not required to withhold specific foods, such as full-strength milk and other dairy products, as long as no indications or symptoms of malabsorption appear throughout the therapy period [24].

**Dehydration Severe:** Intravenous treatment is often reserved for children who have severe dehydration that is accompanied by shock or near-shock. Hemodynamic instability manifests as profound lethargy, severely delayed capillary refill, and tachycardia with severe orthostatic blood pressure variations, and necessitates rapid and intensive intravenous therapy to restore intravascular volume. Patients with severe dehydration or intractable vomiting may need to be admitted to the hospital for intravenous fluids and careful electrolyte monitoring. Electrolyte abnormalities can be treated on an individual basis, although they're usually the result of a fluid volume deficit, which can be repaired and cause electrolytes to return to normal. For the treatment of dehydration caused by viral gastroenteritis, both saline and lactated Ringer's solutions appear to be useful [25].

**Antibiotic Treatment:** The most common antibiotics prescribed are metronidazole, azithromycin, and ciprofloxacin. Approximately half of antibiotic treatment for GE is given on an individual basis, without the benefit of microbiological test results [28]. Antibiotics should not be administered to every patient, even if they have a confirmed bacterial aetiology, especially if they have Shiga toxin-producing E. coli. In cases of severe disease, empiric antibiotic therapy with azithromycin or fluoroquinolones may be indicated [26]. Tetracyclines are the most effective antibiotics against Vibrio. Ampicillin is the treatment of choice for pregnant women who have a Listeria infection. In the case of C. difficile infection (CDI), the causative drug should be stopped and antibiotic therapy started [26]. For fulminant CDI, a combination of oral vancomycin and IV metronidazole should be administered.

**Symptomatic Treatment:** In patients 65 and older, medications like diphenoxylate/atropine or loperamide are not advised. Antimotility drugs may be beneficial to younger people. However, other experts believe that if a patient can stay hydrated, antidiarrheal medication should not be used [25].

### 8. ANTIEMETIC MEDICATIONS

- **Serotonin 5HT3 Receptor Antagonists (Ondansetron):** It's one of the most well-known serotonin 5-HT3 receptor antagonists, and it works by blocking receptors in the vagus and sympathetic nerves, as well as the chemoreceptor trigger zones. It doesn't have any antidopaminergic effects. Ondansetron's effectiveness in treating chemotherapy-induced or postoperative vomiting in children has been thoroughly demonstrated. It also has promising results in patients with migraine vomiting, ketamine procedural sedation, and acetalaminophen toxicity [6,29-34].
- **Dimenhydrinate** is an H1 receptor antagonist of the first generation. It inhibits H1 receptors in the nucleus tractus solitarius as well as muscarinic-cholinergic receptors in the vestibular apparatus and vomiting centre. Because dimenhydrinate can be administered orally, rectally, intramuscularly, or intravenously, it is particularly convenient to use. A dose of 1.25 mg per kilogramme of body weight is advised, with a maximum of 50 mg. It's also used to treat and prevent motion sickness, radiation sickness, labyrinthine
function problems, and post-operative nausea and vomiting [18,35-39].
- **Antagonists of dopamine receptors:**
  - **Metoclopramide** It reduces nausea and vomiting by decreasing afferent impulses to the chemoreceptor trigger zone, lowering gastric sphincter tone, promoting gastric motility, and speeding up gastric emptying and small intestine transit time [18]. At a dose of 0.1 mg/kg (up to a maximum of 10 mg), it can be given intravenously, intramuscularly, or orally, with onset times of 1 to 3 minutes, 10 to 15 minutes, and 30 to 60 minutes, respectively [18].
  - **Domperidone** works by blocking the D2 receptor. It affects the chemoreceptor trigger zone and has the potential to speed up stomach emptying. Domperidone has been used to prevent and treat nausea and vomiting after surgery. Oral doses of 0.3 to 0.6 mg/kg bodyweight are advised, with a maximum of 25 mg three times each day.
  - **Trimethobenzamide** is an antiemetic that has yet to be categorized. It’s thought to work on the chemoreceptor trigger zone [18].

**9. CONCLUSION**

Primary care physicians and GPs have important roles in early diagnostic decision making, separating the minority of patients with potential alarm symptoms, suggestive of serious disease and mandating early investigation, from the majority whose symptoms are less significant and whose conditions may well resolve spontaneously or with minimal intervention.

Antibiotic treatment should be indicated only in case of bacterial infection is suspected and in case of severe or immunocompromised patients, caution also should be taken when selecting antibiotic treatment in order not to develop C. Difficile or antibiotic caused diarrhea. It’s also recommended to do stool testing before giving any antibiotic treatment just to confirm the type of the pathogen, moreover we hoping in the future for more standardized treatment for gastroenteritis.

**CONSENT**

It is not applicable.

**ETHICAL APPROVAL**

It is not applicable.

**COMPETING INTERESTS**

Authors have declared that no competing interests exist.

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