

Management of Acute Gastroenteritis in Children below Five Years by General Practitioners: An Egyptian Consensus

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Abstract

Objective: Acute Gastroenteritis (AGE) is a major public health problem, especially in developing countries. Therefore, we aim to update the Egyptian clinical practice by providing consensus statements regarding the diagnosis and management of AGE.

Methods: The present consensus was developed to address the current practice regarding the management of AGE among the pediatric population in Egypt. In order to address the current challenges and to reach a national consensus in the management of AGE in children below 5 years old The "Egyptian Consensus Guideline for Management of Pediatric AGE" was formulated based on the panel recommendations from two meetings held in Cairo in July and December 2018.

Results: Laboratory investigations have no role in the diagnosis of AGE. However, Lab investigations are highly indicated in the presence of red flags and should be individualized according to the case. Primary care physicians should evaluate the hydration status of patients and identify patients at risk of developing severe dehydration. The physician should search for signs of hypovolemic shock in children with severe dehydration. In addition, it is important to recognize early signs of hypernatremia. Cases with no or minimal dehydration can be managed at home with fluid therapy and a regular diet. The fluid administration is indicated for patients with severe dehydration or non-response to rehydration therapy, shock, impaired consciousness, severe metabolic abnormalities, persistent vomiting despite appropriate fluid administration, and/or severe abdominal distension and ileus.

Conclusion: AGE is a major health problem in developing countries. The management lines for AGE include assessment of hydration status, treatment or prevention of dehydration, and reducing the severity and duration of symptoms. Children with no dehydration can be managed safely at home. However, children with a high risk of developing dehydration or other complications should be hospitalized for the proper care.

Keywords

Acute gastroenteritis; Egypt; Consensus; Primary care management; Pediatrics; dehydration; Racecadotril

Abbreviations AGE: Acute Gastroenteritis; CRP: C-reactive protein; ESPGHAN: European Society for Pediatric Gastroenterology, Hepatology, and Nutrition; IV: Intravenous; NICE: National Institute for Health and Care Excellence; ORS: Oral rehydration solution; UNICEF: United Nations Children's Fund; WHO: World Health Organization

Introduction

Acute gastroenteritis (AGE) is a major public health problem, especially in developing countries, and the most common infectious disease in many countries [1]. According to recent epidemiological

studies from the Middle East, one in every 50 newborns is hospitalized for AGE during childhood, with a peak incidence between 3 and 24 months of age [2]. Previous reports showed that AGE accounts for more than 2 million deaths annually in developing countries as well [3]. In Egypt, AGE is a public health concern; previous epidemiological studies from Egypt demonstrated that the incidence of rotavirus diarrhea was 0.13 for infants aged 6 months, 0.61 for those aged 6-11 months, 0.17 for those aged 12-23 months, and 0.15 for those aged 24-35 months. Fifty six percent of children with rotavirus diarrhea had clinical dehydration [4]. AGE represents an economic burden as well with a reported direct cost of \$ 250 million each year in the United States alone [5].

AGE is an infectious disorder that is presented with an acute attack of diarrhea, which may be associated with other symptoms such as vomiting and abdominal pain [6]. It can be complicated, if untreated properly, by severe dehydration, metabolic acidosis, electrolyte disturbance, hemolytic uraemic syndrome, and eventually death [3]. The viral infection is the commonest etiology of AGE and it is responsible for up to 70% of AGE episodes, though different types of viruses have been recognized as etiological causes of AGE, rotavirus still represents the most common viral cause of AGE and accounts for up to 72% of all AGE-related hospitalizations [7,8]. On the other hand, bacterial infection represents 10%-20% of the AGE causes, mainly *Salmonella* species and *Campylobacter* species [5].

The management lines for AGE include assessment of hydration status, treatment or prevention of dehydration, and reducing the severity and duration of symptoms [9]. Although all existing international guidelines are in agreement with these management lines, many clinicians are outdated about the management of AGE [10]. For example, current evidence supports the usage of oral rehydration with numerous published guidelines and many professional organizations recommending its use; nonetheless, oral rehydration solution (ORS) is still described as an underused simple therapy [11]. Moreover, various agents are commonly prescribed by clinicians for the management of AGE, though they are not recommended by international guidelines [5]. The landscape for the management of AGE has changed over the past few decades as well with the introduction of new promising therapies such as ondansetron [12].

Therefore, the present consensus was developed by a panel of Egyptian experts in order to reach a statement about recent updates in the diagnosis and management of AGE; and how to implement these updates in the current practice in Egypt.

Consensus Development

Target users and population

This consensus is directed towards general practitioners, pediatricians, gastroenterologists, emergency department physicians, nurses and, any healthcare professional involved in the care or management of children younger than 5 years presented with diarrhea and vomiting. In the present consensus, we did not address the following types of patients:

1. Neonates and young infants below 3 months of age.
2. Infants and young children with chronic diarrhea and vomiting (lasting more than 14 days).
3. Infants and young children with disorders other than gastroenteritis that cause diarrhea or vomiting (for example, specific food intolerances/allergies or inflammatory bowel disease).
4. Children with medical disorders that significantly alter the approach to their fluid management, such as those with cardiac or renal failure.

Outcomes and adaptation

A comprehensive update of international guidelines, new indications, as well as clinical applications, were discussed during these scientific roundtable meetings by experts in the field, and the outcomes of these discussions are presented in the form of statements.

These statements were adopted from National Institute for Health and Clinical Excellence (NICE) and European Society for Pediatric Gastroenterology, Hepatology, and Nutrition (ESPGHAN) guidelines and were endorsed by the Egyptian Pediatric Association and will be disseminated among general practitioners, pediatricians, gastroenterologists, emergency department physicians, nurses and, any healthcare professional involved in the care or management of children with AGE.

Health Questions

What are the most common organisms?

The viral infection is the commonest etiology of AGE and it is responsible for up to 70% of AGE episodes, though different types of viruses have been recognized as etiological causes of AGE, rotavirus still represents the most common viral cause of AGE and accounts for up to 72% of all AGE-related hospitalizations [7,8]. On the other hand, bacterial infection represents 10%-20% of the AGE causes, mainly *Salmonella* species and *Campylobacter* species [5].

What are the risk factors that can affect the outcome of AGE?

The cumulative body of evidence indicates that older age, elevated CRP level, presence of fecal leukocytes, and presence of fecal occult blood are significantly associated with hospital admission in cases with AGE. In addition, the presence of fecal leukocytes, winter, frequency of vomiting, and abdominal pain are significantly associated with the duration of illness. The presence of fecal leukocytes, winter, frequency of diarrhea >10 times/day, and eating shrimp or crab is highly associated with bacterial gastroenteritis [16].

How to diagnose AGE?

The diagnosis of AGE is based mainly on clinical evaluation. Primary care physicians should perform a history and physical examination to confirm the diagnosis of AGE and rule out any symptoms or signs that may indicate a more severe underlying illness. History taking should be comprehensive and includes any recent contact with other patients with diarrhea, the frequency and consistency of the stool, the onset and duration of diarrhea and/or vomiting, the presence of blood in stool or green vomitus (bile in vomitus), the presence of fever, history of ORS intake and response to it, and the child's mental status. The presence of any of the red flags should be considered as possible indicators of severe and/or complicated GE [17].

In uncomplicated cases, history evaluation is usually enough to start appropriate management; on the contrary, the presence of red flags mandates comprehensive physical examination. The physical examination usually aims to assess the child's weight and the degree of dehydration (see next section) [18]. History taking may help in differentiating between viral and bacterial causes of AGE. A viral infection is usually associated with prominent vomiting (long lasting and frequent), watery diarrhea, low grade fever, and the manifestation of upper respiratory tract infection. On the contrary, the bacterial infection is usually associated with offensive stool with overt blood, high grade fever, and abdominal pain [15]. In addition, inflammatory markers, such as C-reactive protein (CRP), can help in differentiating between viral and bacterial etiologies. It should be noted that the ESPGHAN guideline does not recommend the routine use of fecal

markers (as fecal calprotectin) to distinguish between viral and bacterial AGE (Table 1) [19].

The caregiver report of decreased tearing, sunken eyes, decreased urine output, or dry mucous membranes	
Fever	≥ (38°C) in infants younger than 3 months. ≥ (39°C) in children three months to 5 years of age.
Frequent and substantial episodes of diarrhea	
History of premature birth, chronic medical conditions, or an accompanying illness	
Mental status changes (e.g., apathy, lethargy, irritability)	
Greenish (bilious) vomitus	
Poor response to oral rehydration therapy or the inability of the caregiver to give adequate therapy	
Visible blood in the stool	
Young age (younger than six months) or low body weight (less than 8 kg)	

Table 1: Red Flags “Serious Clinical Findings”: Ask For Help. Adapted from NICE guidelines [17].

Laboratory investigations largely have no role in the diagnosis of AGE. The NICE guideline recommends serum electrolyte measurements in cases with suspected hyponatremia, suspected shock, or for the cases need intravenous (IV) fluid therapy [15]. Thus, laboratory investigations are highly indicated in the presence of red flags and should be individualized according to the case.

According to the NICE guideline, stool analysis is recommended in cases with diarrhea that does not improve by day 7 or the presence of blood and/or mucus in the stool [15]. The ESPGHAN guideline added that stool microbiology is recommended in cases with underlying chronic conditions (e.g., oncologic diseases, immune compromised children, ileocecal valve abnormalities, etc.), extremely severe conditions, or suspected septicemia [13]. In addition to stool culture, stool microbiology tests should include specific viral tests and specific parasitological investigations.

Dehydration is a major concern in children with AGE. The severe form of dehydration may lead to metabolic acidosis, electrolyte disturbance, hemolytic uraemic syndrome, hypovolemic shock, and eventually death [3]. Thus, primary care physicians should evaluate the hydration status in patients with AGE and they should be able to identify patients at risk of developing severe dehydration. The NICE guidelines identified risk factors for developing dehydration which include [15]:

1. Infants less 1 year old, particularly those younger than 6 months
2. Low birth weight
3. More than five episodes of diarrhea per day
4. More than two episodes of vomiting per day
5. Intolerance to supplementary fluids before the presentation
6. Infants who have stopped breastfeeding during the illness
7. Signs of malnutrition.

Patients presenting with any of the above risk factors should be monitored closely for the development of dehydration. It is critical to identify the degree of dehydration as well, as the management plan differs according to the hydration status. According to the World Health Organization (WHO) and The United Nations Children's Fund (UNICEF) joint statement regarding clinical management of AGE, dehydration can be classified into three categories according to clinical signs (Table 2) [9].

Signs	Classification of dehydration
At least two of the following signs: lethargy/unconsciousness Sunken eyes Unable to drink or drink poorly Skin pinch goes back very slowly (≥ 2 seconds)	Severe dehydration
At least two of the following signs: Restless or irritable Sunken eyes Drinking eagerly and thirsty Skin pinch goes back slowly (<2 seconds)	Some dehydration
Not enough signs to classify as some or severe dehydration.	No dehydration

Table 2: IMCI Classification of Dehydration Degree. Adopted from WHO [20].

Children with severe dehydration, who presented with deteriorated mental status, tachycardia, and/or tachypnea, should be suspected to have hypovolemic shock [21]. The physician should search for signs of hypovolemic shock in children with severe dehydration, which include decreased level of consciousness, pale or mottled skin, cold extremities, tachycardia, tachypnea, weak peripheral pulses, prolonged capillary refilling time, and/or hypotension (Decompensated shock) [22].

In severe dehydration, the deficit in total body water may lead to a relevant increase in serum sodium concentration, which is known as hypernatremic dehydration. Hypernatremic dehydration can lead to marked shrinkage of cerebral blood vessels with subsequent cerebral hemorrhage, seizure, paralysis, and/or encephalopathy [23]. Thus, it is important to recognize early signs of hypernatremia. The NICE guideline recommended that the physicians should suspect hypernatremia in children present with any of the following [15]:

- Very dry parched tongue
- Jittery movements
- Increased muscle tone
- Hyperreflexia
- Convulsions
- Drowsiness or coma.

Consensus statement

AGE is defined as frequent, watery, diarrhea with or without vomiting that lasts typically between 7-14 days. Diarrhea usually

resolves within 5-7 days, while vomiting usually disappears within two days. The diagnosis of AGE can be made clinically, in the absence of any red flags. The presence of red flags calls for prompt physical evaluation and management. Laboratory investigations largely have no role in the diagnosis of AGE. However, laboratory investigations are highly indicated in the presence of red flags and should be individualized according to the case.

Primary care physicians should evaluate the hydration status in patients with AGE and they should be able to identify patients at risk of developing severe dehydration. The physician should search for signs of hypovolemic shock in children with severe dehydration. In addition, it is important to recognize early signs of hypernatremia.

Management of AGE

Primary care physicians should evaluate the hydration status in patients with AGE and they should be able to identify patients at risk of developing severe dehydration. The physician should search for signs of hypovolemic shock in children with severe dehydration. In addition, it is important to recognize early signs of hypernatremia.

Fluid therapy

The amount and route of administration of fluid therapy depend on the severity of dehydration. Children with no dehydration can be managed safely at home. However, children with a high risk of developing dehydration or other complications should be managed remotely under the observation of primary care physicians [14].

Plan A fluid therapy

In a child with no or minimal dehydration, fluid therapy is initiated at home. Many fluids can be given to a child with diarrhea such as oral rehydration therapy (ORS), salted or unsalted soup, yogurt based drinks, breast milk, cereal water, plain clean water, fresh fruit juice, and weak herbal tea. In order to reduce the risk of dehydration in patients with no dehydration, the following recommendations were recently released by the NICE guideline [15]:

- The children should still receive breastfeeding or other forms of milky fluids
- The physician should encourage the mother to maintain a suitable level of fluid intake
- Fruit juices and carbonated drinks should be avoided, especially in risky population
- Cases with a high risk of dehydration can be offered ORS solution as supplemental fluid.

Generally, the following types of fluid should be avoided: drinks sweetened with sugar, commercial carbonated beverages, commercial fruit juices, sweetened tea, coffee, and some medicinal teas [3].

Oral rehydration therapy (ORS) is the main step in the management of patients with AGE and the recommended modality in many guidelines. The solution is characterized by low osmolality (200-250 mOsm/l) and sodium (60-70 mmol/l); in addition, ORS contains glucose, potassium, and a base (such as citrate) [24]. The solution has the advantage of being cheap, easily administered, widely available, safe, and can be administered to any age group orally.

Although cereal based ORS is beneficial in cholera like diarrhea, evidence of benefit in non-cholera diarrhea is scant and further trials are needed to evaluate efficacy and cost effectiveness [25]. As

conventional ORS has a bad taste which may lead to its refusal by the child, some researchers advocated that the frozen fruit flavored ORS has better tolerance and outcomes. Nevertheless, the current data are limited to support higher efficacy with flavored ORS than conventional ORS [19].

In children with their body weight <10 kg, ORS should be given in a dose of 60 ml-120 mL for each diarrheal stool or vomiting episode. This amount is doubled in children with their body weight >10 kg [26].

Plan B fluid therapy

In a child with some degree of dehydration, the initial fluid therapy should be administered slowly (one spoon every 1-2 minutes) in a dose of 75 mL per each Kg of body weight over a period of 4-6 hours. The fluid can be administered by a teaspoon, syringe, or dropper. After four hours, the primary care physicians should assess the degree of dehydration. If the signs of dehydration disappear, the child should be shifted to plan A fluid therapy. In case of persistent dehydration, plan B can be continued. On the other hand, if the dehydration status deteriorates, the child should be hospitalized and managed by plan C (see the next section) [15].

The subsequent fluid therapy should be started after the initial therapy in order to maintain the proper hydration status. This therapy is composed of maintaining fluid requirements by normal foods/drinks and replacement of any on-going losses. In children with their body weight less than 10 kg, ORS should be given in a dose of 60-120 mL/for each diarrheal stool or vomiting episode. This amount is doubled in children with their body weight more than 10 kg [26].

Plan C fluid therapy

Hospital admission is indicated in case of severe dehydration, shock, failure ORS, severe vomiting, neurological symptoms, the inability of caregivers to manage the problem, and in case of surgical condition is considered. Generally, these conditions do not allow ORS and require IV rehydration [27].

In such cases, the treatment should include two phases of therapy: shock therapy and maintenance phase. In the shock phase, the fluid should be replaced rapidly in a 3-4 hour period. If signs of shock are present, an amount of 20 ml/kg of saline or ringer lactate over one hour should be administered. If no improvement occurs, the same dose should be repeated over two hours. If the child starts to urinate, a dose of 20 mmol/L of K⁺ chloride should be administered [28].

In the maintenance phase, calories, in addition to fluids, are administered. The amount of ORS during the rehydration phases depends on the child's weight (Table 3) [21]. The type of fluid depends on the child's status. Pansol, polyelectrolyte, or Ringer's lactate can be used in isotonic or asymptomatic hypotonic cases; while hypertonic (Serum Na⁺ >150 mEq/L) can receive the same fluids plus 5% Dextrose in a ratio of 2:1 or hypoosmolar ORS. On the other hand, symptomatic hypotonic (Na⁺ <120 mEq/L) can receive the same fluids plus 3% NaCl in a ratio of 2:1 or regular ORS. During the rehydration phase, the fluid can be administered by a teaspoon, syringe, or dropper. In case of intolerance to these tools, persistent vomiting, or the need for more fluid, the nasogastric tube can be used which exhibited similar efficacy to IV hydration with a well tolerable safety profile [29]. In case of on-going losses, ORS should be given in a dose of 60-120 mL/for each diarrheal stool or vomiting episode. This

amount is doubled in children with their body weight more than 10 kg [26].

Weight	<6 kg	6-<10 kg	10-<12 kg	12 kg-19 kg
Age*	Up to 4 months	4 months up to 12 months	12 months up to 2 years	2 years up to 5 years
In ml	200-450	450-800	800-960	960-1600

Note: *Use the child's age only when you do not know the weight. The approximate amount of ORS required (in ml) can also be calculated by multiplying the child's weight (in Kg) times 75.

If the child wants more ORS than shown, give more

For infants under 6 months who are not breastfed, also give 100-200 ml clean water during this period if you use standard ORS. This is not needed if you use new low osmolarity ORS.

Table 3: The amount of recommended ORS over 4 hour period in some dehydration.

If the signs of dehydration disappear, the child should be shifted to plan a fluid therapy. In case of persistent severe dehydration, plan C can be continued. On the other hand, if the child had some dehydration, plan B should be started [15].

The normal diet is resumed once the patient restores the normal appetite; while breastfed infants should continue breast feeding on demand even during oral rehydration [1]. The criteria for hospital discharge include sufficient rehydration as indicated by weight gain or normal respiratory rate, IV fluid is no longer required, tolerance of ORS or normal diet, and adequate family teaching [21].

Nutritional management

Once the patient restores the normal appetite, a normal diet should be resumed. According to many international guidelines, Breastfed infants should continue breast feeding on demand even during oral rehydration [1]. In the case of artificially fed infants, routine dilution of milk and routine use of lactose free milk formula are not usually necessary. The lactose free formula is generally not necessary in AGE episodes. However, lactose restricted diets may be considered in hospitalized children and children with prolonged diarrhea (>7 days). The lactose free formula should be recommended in children with persistent diarrhea (>14 days) [28].

On the other hand, weaned infants should not be offered solid food during initial rehydration. Regular oral feeding should be reintroduced no later than 4-6 hours after the onset of rehydration. The elimination diet is usually not indicated for children with AGE and it may further impair the child's nutritional status. After rehydration, offer the child food every three or four hours (six times a day). The recommended foods should be culturally acceptable, readily available, have a high content of energy, and provide adequate amounts of essential micronutrients. Food should be well cooked, and mashed or ground to make it easy to digest [9].

Pharmacological therapies

Pharmacological therapies are rarely needed during the management of AGE; however, they can be used for specific indications in some cases. They can be categorized under groups of antipyretics, antispasmodic, antiemetics, antispasmodics, modifiers of stool consistency, antimotility, antisecretory, and probiotics.

Antipyretics

Fever is not uncommon; acetaminophen is the safe remedy in this regard [30].

Antispasmodics

They should be avoided in patients with AGE. If pain is severe, rule out the possibility of intussusception first and then you can the analgesic effect of acetaminophen [30].

Antiemetics

Vomiting of mild severity will respond to rehydration therapy. The only medicine with sound evidence is ondansetron. Previous trials showed that ondansetron significantly reduced the severity and duration of vomiting, hence, they can be administered, orally or IV, to children who cannot tolerate ORS because of severe vomiting [19]. Only a single dose of ondansetron should be administered; the physician should ensure that there are no electrolyte disturbances before administration of ondansetron as they can increase the risk of adverse events, especially cardiac arrhythmias [31].

Stool forming remedies

Adsorbents, like kaolin and pectin, are no more indicated in AGE as they are not having any sound evidence. Their use was associated with the false impression of improvement with decreasing or stopping the rehydration therapy. Another adsorbent drug is diosmectite, a natural product based on aluminum silicate and magnesium is in use but its effectiveness has not been demonstrated [32].

Zinc

Zinc supplementation (20 mg per day for children and 10 mg for infants below 6 months for 10-14 days) can effectively reduce the duration and intensity of symptoms of gastroenteritis [19]. It was found very helpful in children from developing countries with recurrent AGE or persistent diarrhea. Evidence in developed countries, with a low risk of diarrheal persistence, is not clear [33].

Probiotics

Recent studies showed the effectiveness of some strains (Lactobacillus GG and *Saccharomyces boulardii*) in decreasing the duration of illness. However, the results of studied strains cannot be generalized for others [34]. *L. reuteri* use was also associated with a reduced duration of hospitalization [35].

Anti-motility drugs

Although antidiarrheal drugs can reduce the duration and frequency of diarrhea during AGE, many of these drugs (such as loperamide) are associated with a high risk of adverse events and they are not recommended during AGE [36].

Antisecretory drugs

In the modern industrialized life, with working mothers, it is essential to shorten the duration of acute diarrhea of AGE. It is no more sufficient to look after mortality only. Racecadotril is an antisecretory drug that inhibits intestinal enkephalinase without slowing intestinal transit or promoting the overgrowth of bacteria. The

drug reduces stool output and duration of diarrhea in AGE, including that caused by rotavirus. It can be used to treat children with severe watery diarrhea as an adjunct to ORS [37]. In a recent systematic review and network meta-analysis, racecadotril was found to be superior to other drugs, except loperamide, in terms of reducing the duration and frequency of diarrhea during AGE. The racecadotril was well tolerable as well [38]. Based on these results, racecadotril can be recommended in children with acute diarrhea.

Consensus statement

The panel members recommend decreasing simple sugars, excess fat, and high fiber containing foods and to increase intake of complex carbohydrates, pure white meat, and vegetable oil.

Anti-diarrheal drugs are not recommended during the management of AGE. However, Racecadotril is a guideline recommended option for the treatment of acute diarrhea in children. Zinc supplementation and probiotics can reduce the intensity and duration of symptoms. Antibiotics are not routinely recommended for children with gastroenteritis unless bacterial GE is evidenced. Racecadotril can be considered in the management of AGE. Ondansetron can be used in young children with AGE related vomiting.

Fluids that do not contain salt are recommended for rehydration, while sweetened fluid should be avoided. Solutions with low osmolality (200-250 mOsm/l) and sodium (60-70 mmol/l) that contain glucose, potassium, and a base (such as citrate) are recommended for developed and developing communities. Cases with no or minimal dehydration can be managed at home with fluid therapy and a regular diet. In the case of mild to moderate dehydration, the fluid can be administered by a teaspoon, syringe, or dropper. In case of intolerance to these tools, persistent vomiting, or the need for more fluid, the nasogastric tube can be used which exhibited similar efficacy to IV hydration with a well tolerable safety profile. IV fluid administration is indicated for patients with severe dehydration or non-response to rehydration therapy, shock, impaired consciousness, and severe metabolic abnormalities, signs of hypernatremia, persistent vomiting despite appropriate fluid administration, and/or severe abdominal distension and ileus.

Hygienic Measures and Vaccine

The NICE guideline recommends the following in order to reduce the incidence of AGE:

- Frequent and appropriate hand wash by soaps (preferably liquid soap) and warm water
- The hand wash should be maintained after going to the toilet or changing nappies. In addition, the hand should be washed before and after eating food.
- During the attack, children should stay at home and do not go to school. After 48 hours from the last episode, children can resume their daily activities including school attendance.
- Children should not swim in swimming pools for 2 weeks after the last episode of diarrhea [12].

In addition, both NICE and ESPGHAN recommend a medical visit when the following findings are observed [15,19]:

1. Symptoms may indicate dehydration: appearing to get more unwell
2. Persistent vomiting

3. High output diarrhea with elevated stool volumes (>8 episodes/day)
4. Changing responsiveness (for example, irritability, lethargy)
5. Decreased urine output
6. Pale or mottled skin
7. Cold extremities
8. The child's symptoms do not resolve within the expected timeframes.

Conclusion

AGE is a major public health problem, especially in developing countries, and the most common infectious disease in many countries. AGE is generally defined as “a decrease in the consistency of stools (loose or liquid) and/or an increase in the frequency of evacuations (typically ≥ 3 in 24 hours), with or without fever or vomiting”. The management lines for AGE include assessment of hydration status, treatment or prevention of dehydration, and reducing the severity and duration of symptoms. The amount and route of administration of fluid therapy depend on the severity of dehydration. Children with no dehydration can be managed safely at home. However, children with a high risk of developing dehydration or other complications should be managed remotely under the observation of primary care physicians. Thus, primary care physicians should evaluate the hydration status in patients with AGE and they should be able to identify patients at risk of developing severe dehydration. Laboratory investigations largely have no role in the diagnosis of AGE. However, laboratory investigations are highly indicated in the presence of red flags and should be individualized according to the case.IV

Recommendation

I. Primary care physicians should evaluate the hydration status in patients with AGE and they should be able to identify patients at risk of developing severe dehydration.

II. The physician should search for signs of hypovolemic shock in children with severe dehydration. In addition, it is important to recognize early signs of hypernatremia.

III. Fluids that do not contain salt are recommended for rehydration, while sweetened fluid should be avoided.

IV. Cases with no or minimal dehydration can be managed at home with fluid therapy and a regular diet.

V. Fluid administration is indicated for patients with shock, altered level of consciousness or severe acidosis, worsening of dehydration or lack of improvement despite oral or enteral rehydration therapy, persistent vomiting despite appropriate fluid administration orally or via an NG tube, and/or severe abdominal distension and ileus.

VI. The panel members recommend decreasing simple sugars, excess fat, and high fiber-containing foods and to increase the intake of complex carbohydrates, pure meat, and vegetable oil.

VII. Ondansetron can be used in young children with AGE-related vomiting.

VIII. Anti-diarrheal drugs are not recommended during the management of AGE. However, Racecadotril is a guideline recommended option for the treatment of acute diarrhea in children.

Ethics Approval and Consent to Participate

Not applicable

Consent for Publication

Not applicable

Availability of Data and Materials

The datasets supporting the conclusion and our recommendation are included within the manuscript.

Competing Interests

All authors confirm no financial or personal relationship with a third party whose interests could be positively or negatively influenced by the article's content. This is a working paper, and hence it represents the opinions of the authors and is the product of professional research. It is not meant to represent the position or opinions of the official position of any staff members. This work was supported by Abbot Egypt

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Authors' Contributions

All authors contributed equally in all steps of the manuscript development including idea generation, tabulation, data revision, manuscript writing, and final review of the manuscript.

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