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Overview of Optimal Management for Pediatric Acute Gastroenteritis

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Abstract: **Acute gastroenteritis (AGE), defined as the inflammation of the mucus membranes of the gastrointestinal tract and is characterized by diarrhea or vomiting. It is a common childhood disease. The purpose of this review is to discuss the management options for those children with acute gastroenteritis. We search major databases; PubMed (MIDLINE) and Embase for the identification most important and recent reviews and clinical trials on the following treatments of AGE in children were potentially eligible for inclusion. We excluded reviews of other topics including the prevention of gastroenteritis. Thus, we searched the mentioned databases through December 2016.Rehydrate children with AGE are required, the rapid rehydration plans might be filled with electrolyte imbalances and have no clear advantages compared to standard rehydration. Probiotics have actually been shown to reduce hospitalization duration by over 24 hours. The financial and scientific implications that this benefit incurs could be substantial at both a patient- and hospital-level. Although the existing proof for probiotics utilize in AGE appears to favor its usage, the size of the effect differs throughout research studies.**

Keywords: **Acute gastroenteritis (AGE), PubMed (MIDLINE) and Embase.**

1. INTRODUCTION

Acute gastroenteritis (AGE), defined as the inflammation of the mucus membranes of the gastrointestinal tract and is characterized by diarrhea or vomiting. It is a common childhood disease [(1)]. Kids in developing countries are specific at risk of both morbidity and mortality. Worldwide, gastroenteritis affects 3 to 5 billion children each year, and accounts for 1.5 to 2.5 million deaths per year or 12% of all deaths amongst children less than 5 years of age [(1,2,3)]. In industrialized countries, such as the United States, intense gastroenteritis hardly ever causes deaths, nevertheless, it still accounts for 300 deaths per year [(2)]. AGE is characterized by the start of diarrhea with or without throwing up, continues to be a significant cause of morbidity and mortality in kids mainly in resource-constrained nations. Although usually it is a self-limiting and mild disease, gastroenteritis is one of the most common causes of hospitalization and is related to a significant disease problem [(4,5)]. According to the World Health Organization (WHO), diarrhea is defined as the passage of 3 or more loose or liquid stools per day, or more frequently than is normal for the person [(6)]. When young kids suddenly experience an episode of intense diarrhea, with or without vomiting, contagious gastroenteritis is without a doubt the most typical description [(7)].

Infections are the most crucial etiology and are responsible for around 70% of the episodes of intense gastroenteritis in children (8). There are over 20 various kinds of viruses that have actually been recognized as etiological representatives [(9)]. Worldwide, rotavirus is still the most typical virus causing this disease and represent some 30% to 72% of all the hospitalizations and 4% to 24% of acute gastroenteritis at the neighborhood level [(10,11)]. Virtually all children have been infected with rotavirus by the age of 3 years [(11)]. Rotavirus infection is seasonal in temperate climates, peaking in late winter season, although it happens throughout the year in the tropics. The peak age for infection ranges from 6 months to 2 years. Other common viruses triggering gastroenteritis consist of calicivirus, adenovirus and astrovirus [(12,13)]. Bacterial infection accounts for 10% to 20% of all the intense gastroenteritis [(14,15)]. (**TABLE. 1**) [(16)] lists some causes of severe gastroenteritis in kids. Worldwide, the majority of cases are due to viral infection, Rotavirus pressures differ by season and geographically within countries [(16)].

TABLE. 1: Causes of acute gastroenteritis in children [16]
Viruses (~70%)
• Rotaviruses
• Noroviruses (Norwalk-like viruses)
• Enteric adenoviruses
• Caliciviruses
• Astroviruses
• Enteroviruses
Protozoa (<10%)
• Cryptosporidium
• *Giardia lamblia*
• *Entamoeba histolytica*
Bacteria (10-20%)
• *Campylobacter jejuni*
• Non-typhoid *Salmonella* spp
• Enteropathogenic *Escherichia coli*
• *Shigella* spp
• *Yersinia enterocolitica*
• Shiga toxin producing *E coli*
• *Salmonella typhi* and *S paratyphi*
• *Vibrio cholerae*
Helminths
• Strongyloides stercoralis

The purpose of this review is to discuss the management options for those children with acute gastroenteritis, which as in TABLE.1 caused by many microbial agents, therefore we aimed to summarize recent evidence for active treatment of AGE.

2. METHODOLOGY

Search methods:

We search major databases; PubMed (MIDLINE) and Embase for the identification most important and recent reviews and clinical trials on the following treatments of AGE in children were potentially eligible for inclusion. We excluded reviews of other topics including the prevention of gastroenteritis. Thus, we searched the mentioned databases through December 2016. Authors reviewers independently screened the results of the literature search. The full texts of potentially relevant articles were retrieved, independently screened and assessed for inclusion. we restricted our search for only English language and human trials.

3. RESULTS & DISCUSSION

The diagnosis of AGE is a clinical one based on a child's clinical presentation. The occurrence of at least three loose or watery stools (taking the shape of the container) in a 24-hour period is generally required to confirm the presence of diarrhoea. Since the aetiologic agents in developed countries are most commonly viruses (17), treatment remains primarily supportive.

Rehydration treatment (Intravenous rehydration IVT, and Rehydration through nasogastric tube NGT or Oral rehydration ORT):

The indications to intravenous rehydration therapy (IV) normally overlap the indicators to health center admission. Standards suggest I.V. rehydration in case of serious dehydration and/or in case of oral rehydration failure. The recent evidence-based standards from Cincinnati Children's Hospital [18] advise I.V. therapy, if there is a severe dehydration or if it is impossible to replace the estimated deficit fluids using oral solution alone. Intravenous rehydration consists in the administration of an isotonic crystalloid service without dextrose as an I.V. bolus of 20 ml/kg followed by a constant

infusion of dextrose-- consisting of crystalloid solution if extended hydration is required. Intravenous rehydration needs to be started with isotonic fluid (normal saline) because this is more effective in decreasing the risk of hyponatremia than hypotonic fluids (half regular saline with 5% dextrose) [19]. Isotonic Ringer lactate is connected with a much better outcome from shock compared to hypotonic fluids in kids with serious malnutrition and hypovolemia [20]. The Cincinnati Children's Hospital guidelines [18] suggest to start IVT with a bolus of 20 ml/kg of normal saline over 30-60 minutes followed by an upkeep volume of half regular saline with 5% dextrose to replace losses and preserve hydration. Despite the lack of evidence of efficacy, in the last years a fast rehydration scheme (40-60 ml/kg typical saline bolus over 60 minutes) has actually been slowly integrated into clinical practice with the goal to get a decrease of symptoms, an improvement of hunger, and a decrease of healthcare facility stay and of international costs of AGE. A survey of North American physicians, specialized in pediatric emergency situation, found that numerous programs are utilized [21]. In a current scientific trial comparing 2 different I.V. plans, the tolerance to the administration of 50 ml/kg in 1 h was similar to that of 50 ml/kg in 3 h, however it was associated to earlier discharge from emergency department (ED) [22].

Hartling et al. [23] included 17 randomized controlled trials in their evaluation comparing ORT versus IV rehydration for treating dehydration due to AGE. The evaluation authors concluded that kids should be provided ORT at first as there are no essential scientific differences between the two therapies. The review demonstrated much shorter medical facility stays with ORT; however, this finding was sensitive to an outlying research study including neonates and the outcome was no longer considerable when this trial was removed from the analysis. The review authors kept in mind a variety of distinctions throughout the included research studies. For instance, although all trials reported on the review authors' main result of interest the failure to rehydrate using ORT the definition of treatment failure differed substantially between research studies. A meta-analysis [24] revealed that NGT rehydration is connected with minimized risk of electrolyte imbalances, cerebral edema, phlebitis compared with i.v. rehydration. Rehydration through NGT is a legitimate alternative to IVT with equivalent efficacy, less negative occasions and decreases the length of medical facility stay [24]. Existing guidelines concluded that rehydration should be offered through NGT if children are not able to drink it or if they have persistent vomit. The American Academy of Pediatrics advises fast (over 4 h) NGT rehydration for treatment of kids with moderate dehydration. This routine offers several benefits consisting of a much shorter remain in the hospital and less disruption of the family routine compared to the standard routine. A potential, randomized, scientific trial compared two various regimens of nasogastric rehydration: the basic nasogastric regimen (SNR) (replace fluids over 24 h) and the fast nasogastric program (RNR) (100 ml/kg of rehydration service administered over 4 h) [25].

Other proof state that the oral rehydration solution is considered as one of the most crucial medical advances of the 20th century. Although there is much proof to support the use of oral rehydration with many released guidelines and many expert companies advising its usage, oral rehydration solution is still described as an underused easy therapy [26]. Intravenous therapy is still typically picked rather than oral rehydration treatment. Information from Europe, Australia and Canada show that 80% to 94% of hospitalized kids do not have any signs of dehydration and yet they still get intravenous treatment [27,28,29]. Data from Hong Kong, that examined more than 7000 episodes of admission due to gastroenteritis in children under 5 years of age, likewise revealed that just 1.3% to 8.4% had signs of dehydration but approximately 48% of the patients got intravenous therapy [30]. The rate of intravenous therapy was even higher in the rotavirus group. According to a current study, 45% of physicians still chosen intravenous fluid therapy rather than oral rehydration therapy in dealing with moderate dehydration in intense gastroenteritis [31].

Management of symptoms:

The Cochrane review of anti-emetics for minimizing vomiting related to AGE [32] evaluated time taken from the very first administration of the treatment up until cessation of vomiting as a main outcome. Secondary outcomes included parental satisfaction (survey or interview), variety of individuals who required hospitalization, variety of participants who required IV rehydration, mean variety of episodes of throwing up, proportion of participants with cessation of vomiting, variety of participants who reviewed an ED, and number of participants who resumed oral rehydration (i.e. patients who were able to endure oral hydration). Adverse events were documented. In the Cochrane evaluation comparing probiotics with placebo or no probiotics (i.e. oral rehydration fluid, non-fermented lactogen-2, inulin, standard treatment, trimethoprim - sulfamethoxazole) [33], the main results were duration of diarrhoea, diarrhoea lasting ≥ 4 days and stool frequency on day 2 after intervention. Secondary outcomes were diarrhoea enduring ≥ 3 days and stool frequency on day 3 after the intervention [34].

Probiotics for the treatment of AGE:

These are acknowledged as first-line treatment for AGE in accessory to rehydration [35], based upon a shown impact in reducing the duration of diarrhea by about 24 h, the risk of diarrhea lasting a minimum of 4 days and the stool frequency on day 2 [36]. An analysis on hospitalized kids also revealed a significant effect of probiotics on duration of diarrhea [36]. As the helpful impacts of probiotics are stress related, pooling information on various pressures is unsuitable. Lactobacillus rhamnosus GG [LGG] and Saccharomyces boulardii are the two strains, with consistent evidence of effectiveness. LGG is the suggested treatment in evidence-based standards [5,7]. It also lowered the period of hospitalization in previous meta-analysis [37]. 2 current double-blind RCTs, were conducted on S. boulardii in children hospitalized in lowincome areas. The first was performed in two Brazilian health centers and showed a decrease of diarrhea period within 72 h from its onset. This reduction was substantial in kids with rotavirus infection (RR 0.45, 95% CI 0.28- 0.74), however not in nonrotaviral diarrheal episodes [38]. The 2nd study, carried out on a little Bolivian population with rotaviral infection, compared the result of S. boulardii and a mix of probiotics consisting of lactobacilli, bifidobacteria and S. boulardii with placebo. The authors reported a modest but significant result of S. boulardii on the period of diarrhea that was not observed with the combined probiotic item [39].

4. CONCLUSION

A number of standards on the management of AGE in kids are available, of good quality and similar in their indicators. Their application ought to limit the high variety of unsuitable interventions that are common in healthcare facility settings and could significantly minimize health center costs. Kids admitted to ED with mild-to-moderate dehydration frequently get i.v. fluids and unneeded lab tests. Procedures to rehydrate children with AGE are required, the rapid/ultrarapid rehydration plans might be filled with electrolyte imbalances and have no clear advantages compared to standard rehydration. Probiotics have actually been shown to reduce hospitalization duration by over 24 hours. The financial and scientific implications that this benefit incurs could be substantial at both a patient- and hospital-level. Although the existing proof for probiotics utilize in AGE appears to favor its usage, the size of the effect differs throughout research studies.

REFERENCES

[1] Payne J, Elliott E. Gastroenteritis in children. Clin Evid. 2004;12:443–454.

[2] King CK, Glass R, Bresee JS, Duggan C. Managing acute gastroenteritis among children: oral rehydration, maintenance, and nutritional therapy. MMWR Recomm Rep. 2003;52(RR-16):1–16.

[3] Santosham M. Oral rehydration therapy: reverse transfer of technology. Arch Pediatr Adolesc Med. 2002;156 (12):1177–1179.

[4] Pieścik-Lech M, Shamir R, Guarino A, Szajewska H. Review article: the management of acute gastroenteritis in children. Aliment Pharmacol Ther. 2013;37:289–303.

[5] Guarino A, Dupont C, Gorelov AV, et al. The management of acute diarrhea in children in developed and developing areas: from evidence base to clinical practice. Expert Opin Pharmacother. 2012;13:17–26.

[6] World Health Organization Diarrhoea Available from: http://www.who.int/topics/diarrhoea/enAccessed April 7, 2013

[7] National Collaborating Centre for Women's and Children's Health Diarrhea and Vomiting Caused by Gastroenteritis: Diagnosis, Assessment and Management in Children Younger Than 5 Years London: RCOG Press; 2009Available from: http://www.nice.org.uk/nicemedia/pdf/CG84FullGuideline.pdf

[8] Webb A, Starr M. Acute gastroenteritis in children. Aust Fam Physician. 2005;34(4):227–231.

[9] Wilhelmi I, Roman E, Sanchez-Fauquier A. Viruses causing gastroenteritis. Clin Microbiol Infect. 2003;9(4):247–262.

[10] Rivest P, Proulx M, Lonergan G, Lebel MH, Bedard L. Hospitalisations for gastroenteritis: the role of rotavirus. Vaccine. 2004;22(15–16):2013–2017.

[11] Ehlken B, Laubereau B, Karmaus W, Petersen G, Rohwedder A, Forster J. Prospective population-based study on rotavirus disease in Germany. Acta Paediatr. 2002;91(7):769–775.

[12] Andreasi MS, Cardoso DD, Fernandes SM, et al. Adenovirus, calicivirus and astrovirus detection in fecal samples of hospitalized children with acute gastroenteritis from Campo Grande, MS, Brazil. Mem Inst Oswaldo Cruz. 2008;103(7):741–744.

[13] Caracciolo S, Minini C, Colombrita D, Foresti I, Avolio M, Tosti G, et al. Detection of sporadic cases of Norovirus infection in hospitalized children in Italy. New Microbiol. 2007;30(1):49–52.

[14] Fodha I, Chouikha A, Dewar J, Trabelsi A, Boujaafar N, Steele AD. Prevalence of adenovirus antigens in children presenting with acute diarrhoea. Med Trop (Mars) 2007;67(3):256–258.

[15] Jakab F, Peterfai J, Meleg E, Banyai K, Mitchell DK, Szucs G. Comparison of clinical characteristics between astrovirus and rotavirus infections diagnosed in 1997 to 2002 in Hungary. Acta Paediatr. 2005;94(6):667–671.

[16] Elliott EJ. Acute gastroenteritis in children. *BMJ : British Medical Journal*. 2007;334(7583):35-40. doi:10.1136/bmj.39036.406169.80.

[17] Payne DC, Vinje J, Szilagyi PG, Edwards KM, Staat MA, Weinberg GA, et al. Norovirus and medically attended gastroenteritis in U.S. children. N Engl J Med 2013; 368: 1121–1130

[18] Acute gastroenteritis guidelines Team, Cincinnati Children's Hospital Medical Center: evidence –based care guidelines for prevention and management of acute gastroenteritis in children aged 2 months to 18 years, http//www.cincinnatichildrens.org/service/j/Anderson-center/evidence–based-care/ gastroenteritis/Guideline 5, pages I-20

[19] Hanna M, Saberi MS. Incidence of hyponatremia in children with gastroenteritis treated with hypotonic intravenous fluids. Pediatr Nephrol 2010; 25:1471–1475.

[20] Akech SO, Karisa J, Nakamya P, et al. Phase II trial of isotonic fluid resuscitation in Kenyan children with severe malnutrition and hypovolaemia. BBMC Pediatr 2010; 10:71–80.

[21] Freedman SB, Sivabalsundaram V, Bohn V, et al. The treatment of pediatric gastroenteritis: a comparative analysis of pediatric emergency physicians' practice patterns. Acad Emerg Med 2011; 18:38–45.

[22] Nager AL, Wang VJ. Comparison of ultrarapid intravenous rehydration in pediatric patients with dehydration. Am J Emerg Med 2010; 28:123– 129.

[23] Hartling L, Bellemare S, Wiebe N, Russell K, Klassen TP, Craig W. Oral versus intravenous rehydration for treating dehydration due to gastroenteritis in children. Cochrane Database Syst Rev 2006; CD004390. Epub July 21, 2006.

[24] Fonseca BK, Holdgate A, Craig JC. Enteral vs intravenous rehydration therapy for children with gastroenteritis: a meta-analysis of randomized controlled trials. Arch Pediatr Adolesc Med 2004; 158:483–490.

[25] Powell CVE, Priestley SJ, Young S, Heine RG. Randomized clinical trial of rapid versus 24-h rehydration for children with acute gastroenteritis. Pediatrics 2011; 218:e771.

[26] Avery ME, Snyder JD. Oral therapy for acute diarrhea. The underused simple solution. N Engl J Med. 1990;323(13):891–894.

[27] Sandhu BK, Isolauri E, Walker-Smith JA, et al. A multicenter study on behalf of the European Society of Paediatric Gastroenterology and Nutrition Working Group on Acute Diarrhoea. Early feeding in childhood gastroenteritis. J Pediatr Gastroenterol Nutr. 1997;24(5):522–527.

[28] Elliott EJ, Backhouse JA, Leach JW. Pre-admission management of acute gastroenteritis. J Paediatr Child Health. 1996;32(1):18–21.

[29] Ford-Jones EL, Wang E, Petric M, Corey P, Moineddin R, Fearon M. Hospitalization for community-acquired, rotavirus-associated diarrhea: a prospective, longitudinal, population-based study during the seasonal outbreak. The Greater Toronto Area/Peel Region PRESI Study Group. Pediatric Rotavirus Epidemiology Study for Immunization. Arch Pediatr Adolesc Med. 2000;154(6):578–585.

[30] Chow CM, Choi K, Nelson EA, et al. Use of intravenous fluids in Hong Kong children hospitalised for diarrhoea and relationship to severity and aetiology. Vaccine. 2009;27(Suppl 5):F55–F60.

[31] Bender BJ, Ozuah PO, Crain EF. Oral rehydration therapy: is anyone drinking? Pediatr Emerg Care. 2007;23(9):624–626.

[32] Fedorowicz Z, Jagannath VA, Carter B. Antiemetics for reducing vomiting related to acute gastroenteritis in children and adolescents. Cochrane Database Syst Rev 2011; Issue 9. Art. No.: CD005506. DOI: 10.1002/14651858. CD 005506.pub5.

[33] Allen SJ, Martinez EG, Gregorio GV, Dans LF. Probiotics for treating acute infectious diarrhoea. Cochrane Database Syst Rev 2010; Issue 11. Art. No.: CD003048. DOI: 10.1002/14651858.CD003048.pub3.

[34] Salari P, Nikfar S, Abdollahi M. A meta-analysis and systematic review on the effect of probiotics in acute diarrhea. Inflamm Allergy Drug Targets 2012; 11: 3–14. Epub Februrary 9, 2012

[35] Guarino A, Lo Vecchio A, Canani RB. Probiotics as prevention and treatment for diarrhea. Curr Opin Gastroenterol 2009; 25:18–23.

[36] Allen SJ, Martinez EG, Gregorio GV, Dans LF. Probiotics for treating acute infectious diarrhoea. Cochrane Database of Systematic Reviews 2010: CD003048.

[37] Szajewska H, Skorka A, Ruszczynski M, et al. Meta-analysis: Lactobacillus GG for treating acute diarrhoea in children. Aliment Pharmacol Ther 2007; 25:871–881.

[38] Correa N, Penna FJ, Lime FMLS, et al. Treatment of acute diarrhea with Saccharomyces boulardii in infants. J Pediatr Gastroenterol Nutr 2011; 53:497–501.

[39] Grandy G, Medina M, Soria R, et al. Probiotics in the treatment of acute rotavirus diarrhea. A randomized, double-blind, controlled trial using two different probiotic preparation in Bolivian children. BMC Infect Dis 2010; 10:253–259.