

Our Successes and Failures in the Implementation of Acute Gastroenteritis Guidelines In Clinical Practice

Dr. Anwar T. Elgasseir

Faculty of Medicine, University of Misurata – Libya

Abstract:

Objectives: This study intended to determine the difference between recommendations to manage dehydration in Acute Gastroenteritis (AGE), compared to practical clinical judgment in using these recommendation, concerning oral rehydration solution (ORS) use, pharmacotherapy, and nutritional management. **Patients and Methods:** Descriptive study (Longitudinal hospital based study) during the period of one year in Paediatric Department, Misurata teaching hospital. All hospital admissions, of children under the age of five and older than two month, with clinical symptoms of acute gastroenteritis are included in the study. Dehydration severity was categorized and treated according to the level of dehydration. **Results:** The percentage of AGE estimated in children below 5 years is 12% from the total hospital admission (1182). 90% of patients were diagnosed clinically as mild and moderate dehydration. In our unit 124 patients (88%) were managed by intravenous fluid initially. 15 patient (10.6% from total AGE cases) were initially treated with ORS. 12% of patient used soft drinks and/or fruits drinks at home, as replacement therapy. Antibiotic and antiemetic were used at home in 16% of AGE admitted patients. Antidiarrheal treatment was received before admission just in 3 patients (2%). **Conclusion:** There is clear gap between recommendation and practice, and the need to disseminate recommended guidelines to different health care level about ORS use, ideal feeding practice and the role of pharmacotherapy, is very essential.

Key Words: Acute gastroenteritis; pharmacotherapy; ORS; Recommendation; Practice.

Introduction:

Acute Gastroenteritis (AGE) is a common condition in children under 5 years of age, comprising up to 16% of presentations to emergency departments⁽¹⁾. Enteral rehydration for managing dehydration is preferable to intravenous rehydration⁽²⁾. Oral rehydration has been shown to have fewer major adverse effects and a shorter hospital stay, and fails in only approximately 4% of children less than 5 years of age^(3,4). Failure to use oral rehydration solution (ORS) and discontinuation of breastfeeding during the illness puts children at increased risk of dehydration⁽⁵⁾.

AGE remains the second leading cause of death due to infection globally for children aged under 5 years⁽⁶⁾, with an estimated 700 000 children younger than five dying of diarrhea annually⁽⁷⁾. ORS has been regarded as the most important medical advance of the 20th Century⁽⁸⁻¹⁰⁾ and is estimated to have prevented some 40 million child deaths since its invention⁽¹¹⁾. WHO and Unicef issued a joint statement with the latest diarrhoea treatment recommendations for low-income countries, promoting use of ORS. The joint statement further recommends, alongside the administration of ORS, an increase of fluids in general, continued food intake and breastfeeding to help maintain nutritional status and fight infection⁽¹²⁾. No role of antibiotics in

treatment of AGE and the use of antibiotics is recommended by WHO and Unicef only for selective cases of bacterial diarrhoea, especially dysentery or severe shigellosis⁽¹²⁾.

Severe dehydration is the principle cause of death from acute diarrhoea due to the large loss of water and salt through excretion⁽⁸⁾. As such, death is almost entirely preventable if dehydration is appropriately treated with ORS⁽¹³⁾. Over the past 2 decades, worldwide mortality from viral AGE has fallen, mostly as a consequence of widespread use of ORS⁽¹⁴⁾. Now, ORS is accepted as the standard care for the clinically efficacious and cost-effective management of AGE⁽¹⁵⁾.

In our hospital we observed that pre-hospital and hospital management of acute gastroenteritis was suboptimal compared to the guidelines.

This research addressed how frequently the clinicians apply the general medical knowledge and the recommendation that advised in the management of AGE in clinical practice.

Objectives:

This study intended to determine the difference between recommendations to manage AGE compared to clinical practice, concerning ORS use, pharmacotherapy, and nutritional management.

Patients and Methods:

Design: Descriptive study (Longitudinal hospital based study) in Paediatric Department, Misurata teaching hospital, from January 2012-December 2012.

Study Sample: All hospital admissions, of children between two month and five year who presented to paediatric department with clinical symptoms of acute gastroenteritis are included in the study.

Prospectively collected data on AGE admitted cases include; history, clinical examination (with degree of dehydration), investigation and treatment.

Participants - inclusion criteria:

Eligible children are presented with history of acute diarrhea (≥ 3 watery stools per day for no more than seven days)⁽¹⁶⁾.

Participants - exclusion criteria:

- Children with frank protein-energy malnutrition.
- Clinical signs of a coexisting acute systemic illness (e.g. meningitis, sepsis).
- Immunodeficiency.
- Underlying severe chronic diseases.
- Food allergy or other chronic gastrointestinal diseases
- Poor compliance

In our study the following **definitions were adapted:**

Before entry into study, clinical assessment of degree of dehydration was performed. Dehydration severity was categorized and dehydrated patients divided to mild, moderate, and severe dehydration according to Centre Disease Control recommendation⁽¹⁵⁾

Interventions:

Children aged 2 to 60 months, who presented with signs and symptoms of, acute dehydration caused by diarrhea with or without vomiting, presumed to be caused by gastroenteritis, are enrolled and rehydrated and treated according to the level of dehydration either orally with ORS or with intravenous (IV) fluid or with both. Maintenance therapy was given according to the severity of dehydration, and age of the child. All participants were weighed pretreatment and post-treatment and underwent initial and final measurements (if relevant) of their serum electrolytes, blood urea, CBC, and glucose levels, along with urine analysis. Other investigations are requested according to patient condition.

Outcome measure(s): Diarrhoea duration defined as the time in hours from the first to the last abnormal (loose or liquid) stools.

The main outcome measure are percent body weight gain at rehydration and at resolution of illness (**weight at resolution of diarrhea –admission weight÷ weight at resolution of diarrhea**)⁽¹⁷⁾.

It is recommended that for children receiving care in a hospital setting, prompt discharge be considered when the following levels of recovery are reached:

- Sufficient rehydration achieved as indicated by weight gain and/or clinical status.
- IV fluids not required.
- Adequate family teaching has occurred.
- Medical follow up is available via clinic visit.

Results

In our study, the percentage of AGE estimated in children below 5 years is 12% from the total hospital admission (1182). The majority of

children of AGE admitted are younger than 2 year (81.5%). Based on clinical examination; 52 patients (37%), 75 patient (53%), and 14 patient (10%) were diagnosed clinically as mild, moderate, and severe dehydration respectively.

Concerning type of dehydration, 119 patients out of 141 (84%) of cases of AGE was Isonatremic dehydration, where 11% is hypernatremic dehydration. In isonatremic dehydration 95 patients (80%) were less than 1 year and just 25% of them used ORS at home prior to admission. In

hypernatremic patient, 87% were less than 1 year and 56% of them used ORS at home prior to admission. Total patient used ORS at home (prior to admission) were 40 patients (28% from the total cases of AGE) 68% used WHO (standard) ORS and 32% used WHO (new) and other types of ORS.

In our unit 124 patients (88%) were managed initially by IV fluid (Figure1). ORS used as the initial treatment (as deficit and ongoing loss) in 15 patient (10.6%). 14 patient (82% from ORS treatment group) respond to ORS treatment and discharged without IV fluid (Figure2).

Soft drinks and/or fruits drinks at home we're use by 12% of patient, as replacement therapy. Antibiotic and antiemetic were used at home in 23 patient (16% of AGE admitted patients) with 6 patient (4% of AGE admitted patients) presented with complication secondary to antiemetic drugs. Antidiarrheal treatment was received before admission just in 3 patients (2%) (Table1).

Discussion:

In our hospital, AGE admitted cases in children below five year is about 12% from the total hospital admission and majority of cases of AGE among children below two years.

Based on our study, IV fluid are often used unnecessarily in our department (88%), if we compare it to the use of ORS as initial treatment (10.6%), taking in consideration, the majority of admitted cases are mild and moderate dehydration (90%) where ORS is recommended to treat these cases⁽¹⁸⁾.

Results of studies that evaluate the hospital management to admitted cases of AGE, confirm the effectiveness of ORS. In a study of 42 patients with estimated mild to moderate dehydration, ORS and IV rehydration were equally effective (successful rehydration 82% vs 78%)⁽¹⁹⁾.

Treatment of diarrhea usually begins at home⁽²⁰⁾. In our study total patient used ORS at home (prior to admission) were 40 patient (28% from the total cases of AGE). If we look to other Libyan studies, ORS were used at home in less than 9%⁽²¹⁾. All families should be encouraged to have a supply of ORS at home and to start therapy with a commercially available ORS product as soon as diarrhea begins. Although producing a homemade solution, which seen in certain communities, with appropriate concentrations of glucose and sodium, is possible serious errors can occur⁽²²⁾.

In literature, ORS can be administered in hypernatremic dehydration to replace the calculated deficit and ongoing losses after stabilization of patient. ORS might be safer than IV therapy because it is less likely to lead to a precipitous increase in intracellular water associated with seizures and elevated intracranial pressure⁽²³⁾.

Our results showed that hypernatremic dehydration attribute to about 11% of admitted AGE cases. In children younger than one year, with hypernatremic dehydration, 56% started ORS at home compared to isonatremic dehydration where 25% of children younger than one year, used ORS at home prior to admission. It is not clear from our study that hypernatremia is associated with use of ORS or due to improper preparation, type, or amount of ORS, given to dehydrated children before admission. Children enrolled to our study received different commercial types of ORS before admission (68% used WHO (standard) ORS and 32% used WHO (new) and other types of ORS).

Low-osmolality ORS is preferred for children with acute diarrhoea and dehydration in developed communities⁽²⁴⁾. A systematic review by Hahn S et al. where reduced osmolality oral rehydration solution were used for treating dehydration caused by acute diarrhoea in children, with ORS formulations with osmolality 200–250 mOsm/L versus higher-osmolality solutions (WHO standard ORS) found that, low-osmolality

ORS decrease stool output, vomiting and the need for unscheduled IV fluids⁽²⁵⁾.

Clinical research, documented in multiple controlled trials and summarized in a meta-analysis⁽²⁵⁾, has supported adoption of a lower osmolarity ORS (i.e., proportionally reduced concentrations of sodium and glucose).

Soft drinks and/or fruits drinks were used at home, in 12% of patients admitted to our unit. Physiological studies have shown that clear fluids (water, carbonated drinks, fruit drinks), which are low in sodium and potassium and have a high sugar content and high osmolarity, may exacerbate diarrhoea and dehydration and cause electrolyte disturbance. Thus, their use is not recommended in children with significant dehydration⁽²⁶⁾. Among patients, barriers to using ORS and continued nutrition during diarrheal disease probably include; cultural practices, lack of parental knowledge, and lack of training of medical professionals.

Concerning our physicians practice, IV fluid given to 88% of patient admitted to hospital, preference for IV hydration, even where evidence indicates improved results from oral rehydration, remains a major barrier seen in our hospital practice.

In outpatients clinic, patients, even at times under physician supervision, frequently attempt rehydration with solutions bearing no resemblance to physiologically based ORS (e.g. soft and fruits drinks).

Antibiotics and antiemetics were used in 16% of admitted AGE. These medications are given either by parents themselves or after they consult a General Practitioners or pharmacists. Other Libyan study had different results where, Libyan parents use antibiotic in treatment of their children, with AGE, in more than 30%⁽²¹⁾.

Different studies show antibiotic and antiemetic agents are frequently prescribed for acute diarrhoea, but there is little evidence of their effectiveness and they may have adverse effects^(27,28). Our clinical experience with antiemetic drugs, and based on the results of our study, has revealed an adverse effects, especially extrapyramidal reactions (6% from the total patient presented with history of antiemetic treatment).

Reflecting this unfavorable clinical experience, we could find no recent review articles or guidelines in which the use of antiemetic agents for the treatment of childhood gastroenteritis was encouraged.

Antidiarrheal treatment was received before admission just in 3 patients (2%). Side effects of antidiarrheal drugs are well-known, in particular among the antimotility agents, including opiate-induced ileus, drowsiness, and nausea caused by the atropine effects and binding of nutrients and other drugs. In Pakistan, 18 cases of severe abdominal distention associated with using loperamide included 6 deaths⁽²⁹⁾.

Antidiarrheal Racecadotril, (an enkephalinase inhibitor) and Antiemetics Ondansetron, (a serotonin antagonist) are new drugs used in treatment of AGE. Several studies have shown reduce the diarrhea and vomiting with the use of these new antidiarrheal and antiemetic medications.

Racecadotril used in one study to assess efficacy and tolerability of racecadotril in acute diarrhea in children, and A randomized clinical trial comparing oral ondansetron with placebo in children with vomiting from AGE, these studies have shown significantly reduction to stool output and decrease vomiting with limiting the duration of diarrhea^(30,31), but in our sitting reliance on pharmacologic agents shifts the therapeutic focus away from appropriate fluid, electrolyte, and nutritional therapy, and can add unnecessarily to the economic cost of illness, because acute diarrhea is a self-limiting disease, cost-effective analyses should be undertaken before routine pharmacologic therapy is recommended.

Conclusion and Recommendation:

Consensus exists regarding the benefits of use of ORS which used not uncommon as outpatient and inpatient management. The impact of this approach, particularly when carried out, on an outpatient basis, will benefits the patients with AGE.

Continuing to feed the child age-appropriate diet is recommended in AGE, but soft and fruit drinks, have been used inappropriately in our community. In children with diarrhea, these beverages have dangerously low electrolyte concentration and high carbohydrate content compared to

ORS. Furthermore, pharmacotherapy is used frequently in outpatient, but with little evidence of benefit.

Nowadays none of these drugs is considered to have a role in the treatment of AGE in children, and it is possible that, their use may have adverse consequences.

In our study the number of children receiving intravenous rehydration is high. It concluded that education and training were needed to improve the enteral rehydration rate. No implementation program was delivered at this stage.

In my opinion, there is clear gap between recommendation and practice, and the ongoing need to disseminate accurate recommended guidelines to different health care level regarding ORS use, ideal feeding practice and the role of pharmacotherapy, is very essential for proper management of

AGE in children in our community.

Thus, an implementation programme was important to put in place and highlight the need to change practice with emphasis on enteral rehydration. We recommend program including teaching sessions for medical staff discussing the evidence for enteral rehydration. The program should take

enough time with sessions delivered for all staff. A guideline was written for all nursing and medical staff to use for the management of gastroenteritis and this was core to the teaching material for the sessions. The guidelines should be promoted during every handover where a patient with gastroenteritis had been admitted by senior doctor.

Repeated the research alone will not change practice. Implementation programs need to be put in place alongside studies if change is to be delivered. A clear planned implementation program is necessary to successfully change practice. Once the cultural change in practice has occurred, it can be maintained without further targeted training.

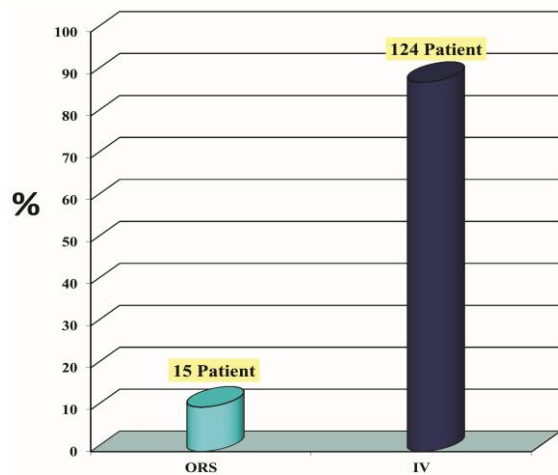


Figure (1): Types of initial fluid used in admitted cases
ORS, Oral Rehydration Solution (as deficit and ongoing loss)
IV, Intravenous fluid.

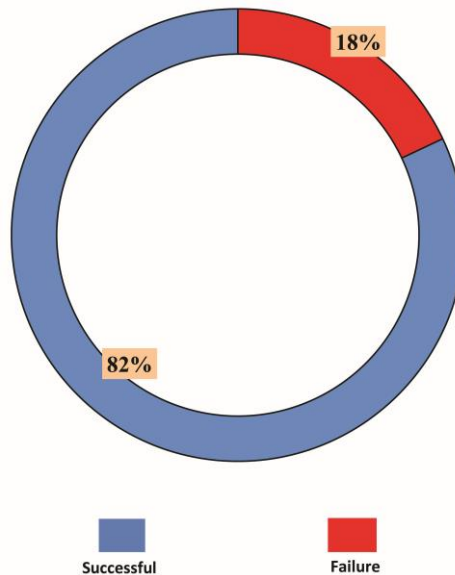


Figure (2): Use of ORS in dehydrated children
ORS, Oral rehydration solution.

Table (1): Oral fluid and Medication used At home

Total hospital admission 141		
Antibiotic & Antiemetic drugs	Antidiarrhea drugs	Soft & Fruit drinks
16%	2%	12%

References

- 1- Diarrhoea and vomiting in children caused by gastroenteritis: diagnosis, assessment and management in children younger than 5 years. NICE Clinical Guideline 84, 2009.
- 2- Murphy MS. Guidelines for managing acute gastroenteritis based on a systematic review of published research. *Arch Dis Child* 1998;79:279–84.
- 3- 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;158:483–90.
- 4- Mackenzie A, Barnes G. Randomised controlled trial comparing oral and intravenous rehydration therapy in children with diarrhoea. *BMJ* 1991;303:393–6.
- 5- Bhattacharya SK, Bhattacharya MK, Manna B, et al. Risk factors for development of dehydration in young children with acute watery diarrhoea: a case-control study. *Acta Paediatr* 1995;84:160–4.
- 6- Liu L, Johnson HL, Cousens S, et al. Global, regional, and national causes of child mortality: an updated systematic analysis for 2010 with time trends since 2000. *Lancet* 2012;379:2151–61.
- 7- Bhutta ZA, Das JK, Walker N, et al. Interventions to address deaths from childhood pneumonia and diarrhoea equitably: what works and at what cost? *Lancet* 2013;381:1414–29. 2
- 8- Santosham M, Chandran A, Fitzwater S, et al. Progress and barriers for the control of diarrhoeal disease. *Lancet* 2010;376:63–7.
- 9- Taylor CE, Greenough WB III. Control of diarrhoeal diseases. *Annu Rev Public Health* 1989;10:221–44.
- 10- Water with sugar and salt. *Lancet* 1978;2:300–01.
- 11- United Nations Children’s Fund (UNICEF). Pneumonia and diarrhoea: tackling the deadliest diseases for the world’s poorest children. New York: UNICEF, 2012.
- 12- World Health Organisation/United Nations Children’s Fund. WHO/UNICEF joint statement on the clinical management of acute diarrhoea. Geneva: WHO/UNICEF, 2004.

- 13- Munos MK, Walker CL, Black RE. The effect of oral rehydration solution and recommended home fluids on diarrhoea mortality. *Int J Epidemiol* 2010;39:75–87.
- 14- Kosek, M., Bern, C., and Guerrant, R.L. (2003). The global burden of diarrhoeal disease, as estimated from studies published between 1992 and 2000. *Bull World Health Organ* 81,197- 204.
- 15- Duggan, C., Santosham, M., and Glass, R.I. (1992). The management of acute diarrhea in children: oral rehydration, maintenance, and nutritional therapy. *MMWR* 41, 1-20.
- 16- Guandalini, S (2005). Acute diarrhea. *Essential Pediatric Gastroenterology, Hepatology, & Nutrition* 1st edition, pp. 15-23. The McGraw-Hill companies.
- 17- Duggan, C., Refat, M., and Hashem, M. (1996). How valid are clinical signs of dehydration in infants? *J Pediatr Gastroenterol Nutr* 22,56-61.
- 18- Kosek, M., Bern, C., and Guerrant, R.L. (2003). The global burden of diarrhoeal disease, as estimated from studies published between 1992 and 2000. *Bull World Health Organ* 81,197- 204.
- 19- Issenman, R.M., and Leung, A.K. (1993). Oral and intravenous rehydration of children. *Can Fam Physician*.39, 2129 –2136.
- 20- Mull, J.D., and Mull, D.S. (1988). Mothers' concepts of childhood diarrhea in rural Pakistan: what ORT program planners should know. *Soc Sci Med* 27, 53-67.
- 21- Sifaw, k., Abaeid, S., Bara, F. (2001). Etiology of childhood diarrhea in Tripoli-Libya. *JMJ* 2, 43-45.
- 22- Meyers, A., Sampson, A., and Saladino, R. (1997). Safety and effectiveness of homemade and reconstituted packet cereal-based oral rehydration solutions: a randomized clinical trial. *Pediatrics* 100, E3.
- 23- Sandhu, B.K. (2001). European Society of Paediatric Gastroenterology, Hepatology, and Nutrition Working Group on Acute Diarrhoea. Rationale for early feeding in childhood gastroenteritis. *J Pediatr Gastroenterol Nutr* 33, S13-6.

- 24- Erica, L. L.(1998). Clinical and laboratory evaluation and management of children with vomiting, diarrhea, and dehydration. *Current opinion in pediatric* 10, 461-469.
- 25- Hahn, S., Kim, Y., and Garner, P.(2001). Reduced osmolarity oral rehydration solution for treating dehydration due to diarrhoea in children: systematic review. *BMJ* 323, 81-5.
- 26- Armon, K., Stephenson, T., and MacFaul, R. (2001). An evidence and consensus based guideline for acute diarrhoea management. *Arch Dis Child* 85, 132-142.
- 27- Elliott, E.J., Backhouse, J.A., and Leach, J.W.(1996). Pre-admission management of acute gastroenteritis. *J Paediatr Child Health* 32, 18-21.
- 28- O'Loughlin, E.V., Notaras, E., and McCullough, C. (1995). Home-based management of children hospitalized with acute gastroenteritis. *J Paediatr Child Health* 31, 189-191.
- 29- Bhutta, T.I., and Tahir, K.I. (1990). Loperamide poisoning in children. *Lancet* 335, 363.
- 30- Cezard, J.P., Duhamel, J.F., and Meyer, M (2001). Efficacy and tolerability of racecadotril in acute diarrhea in children. *J Gastroenterology* 120, 799-805.
- 31- Ramsook, C., Sahagun-Carreon, I., and Kozinetz, C.A. (2002). A randomized clinical trial comparing oral ondansetron with placebo in children with vomiting from acute gastroenteritis. *Ann Emerg Med* 39, 397-403.