0021-7557/11/87-02/175
Jornal de Pediatria

Oral rehydration therapy in emergency departments

Auxiliadora Damianne P. Vieira da Costa,[1] Gisélia Alves Pontes da Silva[2]

Abstract

Objective: To describe the management of acute diarrhea in emergency departments with emphasis on the type of hydration and exploring factors associated with prescription of oral rehydration therapy vs. intravenous rehydration therapy for children with dehydration that is not severe.

Methods: This was a descriptive study conducted from January to May of 2008 observing case management of children with non-severe dehydration due to acute diarrhea at two emergency units (A and B) in Recife, Brazil. Emergency unit B is affiliated to a teaching hospital. The primary variables were: 1) type of hydration prescribed, 2) associations with the characteristics of the children and emergency department (A or B).

Results: A total of 166 children took part in the study. The rates of prescription of oral rehydration therapy were similar at both services (32.2 vs. 31.6% for A and B, respectively, p = 0.93) and were lower for cases with moderate dehydration (17.6%) compared with mild dehydration (35.6%) (p = 0.07). Neither service had a dedicated oral rehydration room.

Conclusions: Most children were given intravenous rehydration therapy, especially those with moderate dehydration, without differences according type of service: whether a teaching institution or healthcare provider only.

J Pediatr (Rio J). 2011;87(2):175-179: Emergency medical services, fluid therapy, gastroenteritis, child.

Introduction

Acute diarrhea is an important cause of demand for care at emergency departments.[1] The principal complication of diarrhea is dehydration and, in 90% of cases, this can be managed by administration of oral rehydration therapy (ORT), which offers the same efficacy, is less invasive and involves less cost than intravenous rehydration therapy (IRT) for replacing hydroelectrolytic deficits.[2-6]

However, among physicians working in emergency departments there is a preference for intravenous treatment, particularly in the presence of vomiting and moderate dehydration, whereas indications may be present in only 10 to 33% of cases[7-9] These data are from questionnaires administered to physicians and as such are dependent on professionals' self-reporting. Practical observation provides a more contextualized and reliable overview of the true situation in these healthcare departments that are so tumultuous. The objective of this study was therefore to describe the management of acute diarrhea

1. Mestre, Saúde da Criança e do Adolescente, Universidade Federal de Pernambuco (UFPE), Recife, PE, Brazil. Médica, Emergência Pediátrica, Instituto de Medicina Integral Professor Fernando Figueira (IMIP), Recife, PE, Brazil.
2. Doutora, Pediatria, Escola Paulista de Medicina (EPM), São Paulo, SP, Brazil. Professora, Departamento Materno-infantil, UFPE, Recife, PE, Brazil.

No conflicts of interest declared concerning the publication of this article.

Suggested citation: Costa AD, Silva GAP. Oral rehydration therapy in emergency departments. J Pediatr (Rio J). 2011;87(2):175-179.

Manuscript submitted Sep 13 2010, accepted for publication Oct 25 2010.

doi:10.2223/JPED.2066

in emergency departments with emphasis on the type of hydration prescribed and to investigate factors associated with use of ORT vs. IRT in this sector.

Methods

This study, which was descriptive with an analytical component, was conducted from January to May of 2008 at two pediatric emergency departments in the city of Recife, Brazil. Emergency department A is a municipal secondary level service providing care, but not teaching, and emergency department B is part of a tertiary level teaching hospital.

Data collection was conducted in two phases. First, the management of children with acute diarrhea and non-severe dehydration was observed at the emergency departments. The second phase (conducted after conclusion of the case-management observation phase) involved collecting data on the profiles of the physicians at each department (age and time since graduation).

The cases selected for observation were children and adolescents with aged up to 14 years, presenting with acute diarrhea and non-severe dehydration (mild and moderate) and exclusion criteria were problems precluding use of oral route (altered level of consciousness or oral and maxillofacial deformities, for example), severe systemic diseases associated with diarrhea episodes and paralytic ileus. The sample was consecutive and of convenience, enroling children seen during the day shift at the emergency department, between 7 a.m. and 7 p.m.

Two features of case management were investigated: 1) type of hydration initially prescribed in the emergency department (ORT or IRT, according to the prescription noted on the treatment record) and 2) advice and instructions given to those responsible for the children (those interviewed at discharge) on home management on diarrheal disease (oral rehydration salts, other liquids, symptoms of poor progress and of dehydration).

The total frequency of each type of hydration (ORT or IRT) was recorded and analyzed with relation to age, sex, intensity of vomiting and diarrhea (median of number of evacuations during the 12 hours prior to consultation), hydration status and treating service (emergency department A or B).

The hydration status described on the treatment record was used for the purposes of classifying each child (treating physician's assessment). When this information was not available, the percentage weight gain after hydration was used, calculated as the difference between final weight (after hydration) and weight at admission, divided by final weight. In order to minimize the chances of measurement bias in these cases, the same balance was used at each service and children were weighed twice by two trained technicians. Children were classified as having mild dehydration if they had weight gain of up to 5%, and moderate dehydration if weight gain was 6-9%.[2,10]

Data were double input and processed using the statistical package Epi-Info 6.04. Differences between proportions were compared using the chi-square test with Yates' correction or Fisher's exact test when appropriate. Continuous variables were compared with the Kruskal-Wallis test and presented as medians and interquartile ranges (IQR). The significance level was set at $p < 0.05$.

This study was approved by the Research Ethics Committee at the Instituto de Medicina Integral Professor Fernando Figueira (protocol number 0193.0.099.172-07). Physicians and the parents or guardians of the children enrolled agreed to take part in the study and signed free and informed consent forms.

Results

One hundred and sixty-six of the 171 children selected took part in the phase of direct observation of case management in emergency departments, with 87 (52.4%) seen at emergency department A and 79 (47.6%) at service B, with a short duration of disease before seeking care (median = 2 days and IQR = 1-3 days). The guardians of five children (one at service A and four at service B) refused consent.

The factors associated with the type of hydration initially prescribed at the emergency departments are listed in Table 1. Length of stay in the emergency department was shorter for children given ORT (median of 180 minutes and IQR = 120-300 minutes) than for those on IRT (median = 310 minutes and IQR = 223-414 minutes), with $p < 0.001$. In 22.3% (37/166) of children, degree of dehydration was calculated as percentage weight gain after hydration. Neither service had a dedicated hydration room, whether for oral or intravenous hydration.

Table 2 shows the frequency with which advice and guidance was given to children's guardians at discharge.

Questionnaires were distributed to 69 physicians and 62.3% responded (n = 43); 64.3% (n = 18/28) at service A and 61% (n = 25/41) at B. The physicians at emergency department B were younger (median = 33 years; IQR = 27.5-44 years) than at service A (median = 47 years; IQR = 39-53.5 years), $p < 0.01$. The time since qualifying was also shorter at B (median = 6 years; IQR = 2-17), when compared with emergency department A (median = 25 years; IQR = 15-30), $p < 0.001$. All of the physicians interviewed were qualified in pediatrics.

Discussion

Campaigns to promote ORT in health services were one of the most important determinants of the reduction of

morbidity and mortality from acute diarrhea that began in the 1980s.[11,12] However, there is a tendency for emergency departments to underutilize this technique,[7,8,13] evidence of which was recorded in this study. In other words, even though ORT is strongly recommended for home management of diarrheal disease (which was detected in almost 80% of cases), there is apparently reluctance to employ it for correction of non-severe dehydration in emergency departments, particularly when vomiting (which was not observed in this study) and moderate dehydration are present,[7,8,13] even though ORT is appropriate for both these clinical conditions. The association with age is an interesting feature, which has not been observed in previous studies and may be related to the difficulties involved in venipuncture of small children, the avoidance of which is another advantage of ORT.

Table 1 - Type of hydration prescribed for children in emergency departments, by age, sex, hospital, hydration status and intensity of vomiting and diarrhea

Characteristics	Total (n = 166)		p
	ORT	IRT	
Age (months)			
Median (IQR)	22 (12-45)	36 (16-72)	0.04†
Sex			
Male (%)	35 (37.2)	59 (62.8)	0.13‡
Female (%)	18(25)	54 (75)	
Hospital			
Emergency department A (%)	28 (32.2)	59 (67.8)	0.93‡
Emergency department B (%)	25(31.6)	54 (68.4)	
Degree of dehydration			
Mild (%)	47 (35.6)	85 (64.4)	0.07‡
Moderate (%)	6 (17.6)	28 (82.4)	
Intensity of vomiting (n = 129)*			
Median (IQR)	3 (2-4)	3 (2-5)	0.11†
Intensity of diarrhea (n = 144)*			
Median (IQR)	4 (2-6)	4 (3-7)	0.23†

IQR = interquartile range; IRT = intravenous rehydration therapy; ORT = oral rehydration therapy.
* Median number of evacuations during the 12 hours prior to presenting at the emergency department.
† p value according to Kruskal-Wallis test for association with type of hydration.
‡ p value according to chi-square test with Yates' correction for association with type of hydration.

Table 2 - Instructions on home management of diarrhea given when child discharged

Instructions	Total (n = 166)	Service A (n = 87)	Service B (n = 79)	p*
Increase liquids	136 (81.9%)	71 (81.6%)	65(82.3%)	0.08
Symptoms of deterioration or dehydration	60 (36.1%)	27 (31.0%)	33 (41.8%)	0.07
Use ORS	129 (77.7%)	79 (79.3%)	60 (75.9%)	0.16

ORS = oral rehydration salts.
* Chi-square test for comparison between the two services.

Recently-graduated physicians reported using ORT with greater frequency for children with non-severe dehydration.[9] This was the professional profile observed at emergency department B, which is affiliated to a teaching hospital. Comparison between the two services did not, however, reveal any difference in management of the disease, either in relation to prescribing ORT to correct dehydration or in providing families with instructions. It is of note that less than half of the children's guardians were warned of the signs of deterioration and dehydration. It is possible that other determinants that are unrelated to medical training and are common to both services are interfering with medical practice.

Obstacles to using ORT in emergency departments are listed by physicians when interviewed; these include the pressures involved in providing care and structural factors, such as the lack of a dedicated space and qualified human resources.[7,8,13,14] The emergency department is a very tumultuous environment that is not well-suited to the practice. Furthermore, neither service had a dedicated oral rehydration room. In studies that have demonstrated the efficacy of ORT for management of moderate dehydration, ORT was administered in an area separated from the emergency department and under continuous supervision.[4,5] Uncertainty about the efficacy of the treatment when given in the real-life conditions of an emergency department, without being able to adhere to the basic principles, may contribute to its underutilization. The pressures of demand should not, however, be an obstacle to using ORT, since length of stay was shorter for children given oral treatment. Although the time taken for rehydration is longer with ORT, treatment is started earlier and patients are able to eat sooner.[5,6]

Finally, in the context of a vertical system, ORT only functions when healthcare support is also provided. The emergency departments proved to be structurally inadequate for this treatment. Furthermore, questions can also be raised about the role of these services within a hierarchical healthcare system. From a wider perspective, the ideal solution would be to redirect acute diarrhea cases that require oral treatment to basic healthcare services, leaving the emergency departments, particularly at tertiary hospitals, free to deal with more serious situations.

This study suffers from certain limitations. It was restricted to two emergency departments in Recife, which limits its appropriateness for generalization to other locations and developing countries. Furthermore, since the analyses are based on a descriptive study, the associations identified between type of hydration and its possible determinants are a little speculative. Since the decision on which type of hydration to prescribe involves multiple factors, other variables, relating to socioeconomic data, family educational level and home attempts to use oral rehydration salts, for example, may impact on the treatment chosen. Finally, using the hydration status defined by the treating physician could be subjective. Notwithstanding, it was not the objective of this study to investigate medical knowledge on diagnosis of hydration status. The aim was to observe whether children defined as having non-severe dehydration were given ORT or IRT. For the children whose percentage weight gain was used to gauge hydration status (22.3%), it must be accepted that there is a possibility of measurement variation caused by a full intestine or bladder, both of which reduce the weight deficit, thereby leading to errors.

Conclusions

Observation of the management of acute diarrhea in emergency departments revealed significant underutilization of ORT for children with non-severe dehydration (particularly those with moderate dehydration) and there was no difference between an emergency department in a teaching hospital and another that only provides care. Factors such as a lack of infrastructure (such as the lack of a dedicated oral rehydration room) and issues related to the role of these services in managing such cases may be involved.

References

1. Armon K, Stephenson T, MacFaul R, Eccleston P, Werneke U. An evidence and consensus based guideline for acute diarrhoea management. Arch Dis Child. 2001;85:132-42.
2. World Health Organization. The treatment of diarrhea: a manual for physicians and other senior health workers. Geneva: WHO; 2005. http://whqlibdoc.who.int/publications/2005/9241593180.pdf.
3. 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;3:CD004390.
4. Atherly-Jonh YC, Cunningham SJ, Crain EF. A randomized trial of oral vs intravenous rehydration in a pediatric emergency department. Arch Pediatr Adolesc Med. 2002;156:1240-3.
5. Spandorfer PR, Alessandrini EA, Joffe MD, Localio R, Shaw KN. Oral versus intravenous rehydration of moderately dehydrated children: a randomized, controlled trial. Pediatrics. 2005;115:295-301.
6. Boyd R, Busuttil M, Stuart P. Pilot study of a paediatric emergency department oral rehydration protocol. Emerg Med J. 2005;22:116-7.
7. Ozuah PO, Avner JR, Stein RE. Oral rehydration, emergency physicians, and practice parameters: a national survey. Pediatrics. 2002;109:259-61.
8. Sociedad Españhola de Urgencias de Pediatria. Utilización de la rehidratación oral en urgências: encuesta nacional. An Pediatr (Barc). 2004;60:243-8.
9. Bender BJ, Ozuah PO, Crain EF. Oral rehydration therapy: is anyone drinking? Pediatr Emerg Care. 2007;23:624-6.
10. Guarino A, Albano F, Ashkenazi S, Gendrel D Hoekstra JH, Shamir R, et al. European Society for Paediatric Gastroenterology, Hepatology, and Nutritional/European Society for Paediatric Infectious Diseases evidence-based guidelines for the management of acute gastroenteritis in children in Europe: executive summary. J Pediatr Gastroenterol Nutr. 2008;46:619-21.
11. Melli LC, Waldman EA. Temporal trends and inequality in under-5 mortality from diarrhea. J Pediatr (Rio J). 2009;85:21-7.

12. Victora CG. Diarrhea mortality: what can the world learn from Brazil? J Pediatr (Rio J). 2009;85:3-5.
13. Conners GP, Barker WH, Mushlin AI, Goepp JG. Oral versus intravenous: rehydration preferences of pediatric emergency medicine fellowship directors. Pediatr Emerg Care. 2000;16:335-8.
14. Reis EC, Goepp JG, Katz S, Santosham M. Barriers to use of oral rehydration therapy. Pediatrics. 1994;93:708-11.

Correspondence:
Auxiliadora Damianne P. Vieira da Costa
Rua Antônio Valdevino Costa, 280, Bloco 4, ap. 501 – Cordeiro
CEP 50640-040 – Recife, PE – Brazil
E-mail: doradami@gmail.com