Intravenous Dextrose during Outpatient Rehydration in Pediatric Gastroenteritis

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Abstract

Background: Rapid intravenous (IV) rehydration in the emergency department (ED) is required for certain children with acute gastroenteritis (AGE).

Objectives: To determine whether the amount of IV dextrose administered is related to a return visit with admission (RVA) in children with AGE and dehydration, and to determine which clinical, laboratory, and treatment parameters are associated with an RVA.

Methods: The investigators performed a case control study of children aged 6 months to 6 years who presented to an urban ED with AGE and dehydration and who received IV rehydration before discharge from the ED. Dehydration was defined a priori on the basis of parameters used in prior studies. Cases were defined as those patients who had an RVA within 72 hours of an original visit for ongoing symptoms. Controls were defined as those patients who met inclusion criteria who did not have an RVA. The authors studied whether the amount of IV dextrose administered at the initial visit was related to an RVA as well as which other clinical and treatment parameters were associated with an RVA.

Results: A total of 56 cases and 112 controls were studied. Patients who had an RVA received significantly less IV dextrose (mean: 399 mg/kg vs. 747 mg/kg, p < 0.001) than those who did not have an RVA. Patients who received no IV dextrose had 3.9 times greater odds of having a return visit with admission than those who received some dextrose. Controlling for fluid volume, the amount of dextrose administered remained statistically significant by logistic regression; for every 500 mg/kg of IV dextrose administered, the patient was 1.9 times less likely to have an RVA. Patients with length of symptoms less than or equal to one day were more likely to have an RVA than were those with symptom length of two or more days. No other historical or physical exam findings or laboratory parameters (including mean serum bicarbonate) were associated with a return visit requiring admission.

Conclusions: Administration of larger amounts of IV dextrose is associated with reduced return visits requiring admission in children with gastroenteritis and dehydration.

ACADEMIC EMERGENCY MEDICINE 2007; 14:324–331 © 2007 by the Society for Academic Emergency Medicine

Keywords: gastroenteritis, dehydration, intravenous fluids, dextrose, rehydration

Acute gastroenteritis (AGE) accounts for 2–3 million office visits and 10% of all pediatric hospital admissions, most often as a result of dehydration.[1–3] Currently, oral rehydration therapy (ORT) is the preferred method of rehydration in these children and has been proven to be efficacious.[1,4–6] In cases of severe dehydration or when ORT fails, however, intravenous (IV) fluid therapy may be warranted.

Although not standardized, children at our institution who warrant IV rehydration typically receive a 20 mL/kg bolus of normal saline, sometimes followed by a solution containing dextrose at one to two times maintenance for variable lengths of time. Likewise, although many pediatric emergency departments (EDs) use rapid IV rehydration, there is no standard regimen or published guideline for the amount or type of fluids administered. Thus, considerable variation exists in the literature and in clinical practice as to what constitutes rapid IV rehydration. Furthermore, a certain percentage of these children will return for ongoing symptoms and recurrence of dehydration. Published data to determine which features are associated with return visits requiring admission are lacking in this population.

In our experience, many children with AGE and dehydration have an anion gap acidosis from ketosis. Similar to patients with diabetes, this acidosis may perpetuate

poor oral intake secondary to nausea, and contribute to persistent vomiting. We hypothesized that a glucose load and subsequent increased endogenous insulin production may reduce free fatty acid breakdown and facilitate faster resolution of ketosis and thus, quicker return to baseline.

The primary objective of our study was to determine whether the amount of IV dextrose administered to children with gastroenteritis and dehydration influences return visits requiring admission. We also sought to determine which clinical, laboratory, and treatment variables are associated with return visits requiring admission in this population.

METHODS

Study Design
We performed a case control study in an urban, academic, tertiary care pediatric hospital. This study was approved by the institution's Committee on Clinical Investigation and deemed compliant with the Health Insurance Portability and Accountability Act.

Study Setting and Population
As a quality-improvement tool, automated electronic reports are generated for every patient with a second ED visit that requires hospital admission within 96 hours of the first visit. Cases were identified by reviewing these reports and including patients with AGE and dehydration that were intravenously rehydrated, discharged from the ED, and subsequently had a return visit requiring admission for ongoing symptoms of gastroenteritis and dehydration within 72 hours of the original ED visit. Records were reviewed from January 2001 to December 2003. Controls were patients with AGE and dehydration who received IV rehydration and were subsequently discharged, without return, from an ED visit. Controls were matched for day of visit and identified by using a text word-search tool to query an electronic medical record from the same calendar day as the case patient; if more than two controls existed on a single day, they were chosen as they appeared (chronologically) in the database query results; when a control was not identified on the same calendar day, subsequent days were investigated in order, and the first patient who was found by the search strategy that met inclusion criteria would be used. Search terms included "gastro," "gastroenteritis," and "dehydration." Two controls were identified for each case.

Patients were included in the study if they were 6–72 months of age and met the following criteria: 1) were given a discharge diagnosis of gastroenteritis, 2) had evidence of dehydration (defined a priori), and 3) received IV fluids and were subsequently discharged to home from the ED on the initial (cases) or only (controls) visit. Patient disposition was determined by the treating attending physician and no established criteria for admission or discharge were followed. Patients were excluded if they had any underlying chronic medical condition such as cardiac, gastrointestinal, renal, or metabolic disease, ventriculoperitoneal shunt, sickle cell disease, cerebral palsy, or any acute condition (e.g.,

pneumonia, appendicitis). Patients were also excluded if they had three or more ED visits within 96 hours or were known to have received IV fluids within the prior seven days.

Dehydration was defined a priori on the basis of prior studies[7–18] if patients were found to have at least two of the following features: history of decreased urine output, acute weight loss, decreased tears, noted to be "dry" or "dehydrated" on physician ED visit note, dry mucous membranes, sunken eyes, sunken fontanel, poor skin elasticity, poor perfusion, blood urea nitrogen (BUN) of >18 mg/dL or BUN–creatinine ratio of >40, serum bicarbonate of ≤18 mmol/L and an anion gap of ≥13, or urine specific gravity of >1.025.

Study Protocol
Data were collected by reviewing the electronic ED visit records and written nursing notes by using a standard data collection sheet. The data collection sheet with rules for coding variables was developed by both authors before the study. All charts were primarily reviewed by a single reviewer (J.L.), and any ambiguities of the medical record were reviewed and coded by both authors. Blinding as to whether a chart was that of a case or control patient was not possible with a single reviewer because second ED visits were reviewed for case patients. Demographic data included gender and date of birth. Historical data included date of visit; date of return visit; presence of vomiting, diarrhea, or both; length of symptoms; parental report of urine output or weight loss; and whether the patient was referred by their primary care physician. Physical exam data abstracted included triage vital signs and weight, presence of dry mucous membranes, sunken fontanel, sunken eyes, decreased tears, poor perfusion as indicated by capillary refill (>2 seconds), and skin elasticity. Missing data for historical variables were coded as missing. If a physical-examination variable was not listed in the emergency physician note, it was coded as not present or as normal. All historical and physical exam data except vital signs were abstracted from the emergency physician's note. Laboratory data abstracted included serum electrolytes and urinalysis results. Data related to clinical management included type and amount of IV fluid, use of antiemetics, and documentation of the patient's ability to tolerate oral liquids before discharge. IV fluid type and volume were collected from nursing notes, order sheets, and emergency physician notes. If discrepancies existed, the nursing record was considered to be the most reliable, followed by order sheets, and the physician notes. To determine reliability for key variables, 10% of charts were reviewed independently by both authors; key variables included type of IV solution, volume (mL/kg) of IV fluid, and the amount (mg/kg) of IV dextrose administered. Medical records with incomplete data on the volume and type of IV fluid administered were excluded from the analysis.

Data Analysis
Univariate analyses comparing cases and controls were conducted by using SPSS statistical software (version 11.5; SPSS Inc, Chicago, IL). Eighteen a priori–selected historical, physical exam, and laboratory parameters

were analyzed for their association with having a return visit with admission. Chi-square analysis was used for comparing categorical variables. The Student's t-test was used to compare means for normally distributed data, and the Mann-Whitney U test was used to compare nonparametric variables. Binary logistic regression was performed to analyze the independent effect of dextrose administration on return visit with admission while adjusting for other covariates.

For secondary analyses with a total of 18 comparisons across history, physical exam, and laboratory values, a p-value of ≤ 0.003 was considered significant by using the Bonferroni correction. Continuous variables were also dichotomized at logical cutoff points for additional analysis. Cutoff points (500, 750, and 1,000 mg/kg) were chosen at equal intervals and on the basis of the distribution of dextrose administration. A sample size of 48 cases and 96 controls would be required to have 80% power to detect a difference of 0.5 SDs in mean amounts of dextrose per kilogram between cases and controls.

RESULTS

Demographic Data
For the defined study period, 68 patients who met inclusion criteria were identified. Twelve were excluded because of incomplete documentation regarding IV fluid administration, leaving 56 cases to be matched with 112 controls for analysis. One hundred thirty-one controls were identified, and 19 were excluded because of incomplete documentation. Characteristics of the patient population are shown in Table 1. For patients who had a return visit requiring admission, the median time to return was 29 hours (interquartile range, 22 to 40 h).

Ten percent of charts were reviewed in duplicate to assess interrater agreement. There was 100% simple agreement with respect to fluid type and amount of dextrose administered and 89% simple agreement with respect to fluid volume.

Clinical and Treatment Parameters
Cases and controls were required to have a minimum of two predetermined criteria for dehydration (see Methods). Of 168 total patients, 154 (92%) had at least three dehydration variables, and 99 (59%) had four or more dehydration variables.

All but one patient received a bolus of normal saline, and 136 (81%) received some IV dextrose. Mean amount of fluid received was 35.9 mL/kg (SD $\pm$ 14.0), and mean amount of dextrose received was 630 mg/kg (SD $\pm$ 528). Sixteen percent of patients received IV antiemetics. All but one patient tolerated oral fluids before discharge at the initial visit.

Table 1
Characteristics of Cases and Controls

Patient Characteristic	All Patients	Patients with RVA (Cases = 56)	Patients without RVA (Controls = 112)	p-value
Demographics				
Median age in yr (IQR)	1.8 (1.1, 2.6)	1.8 (1.3, 2.5)	1.6 (1.0, 2.7)	0.83
Male gender (%)	56.5%	51.7%	58.9%	0.38
Historical factors				
Primary care referral	38.1%	30.4%	42.0%	0.14
Vomiting only	23.8%	28.6%	20.5%	0.16
Length of symptoms $\leq$ 24 h	47.6%	64.3%	39.3%	0.003
Decreased urine output	92.1%	88.1%	93.9%	0.24
History of weight loss	6.5%	3.6%	8.0%	0.07
Physical exam				
Decreased tears	20.2%	8.9%	25.9%	0.01
Dry mucous membranes	56.0%	48.2%	59.8%	0.15
Sunken fontanelle	0.6%	0%	0.9%	0.48
Poor perfusion	2.4%	0%	3.6%	0.15
Poor skin turgor	2.4%	0%	3.6%	0.15
Sunken eyes	7.7%	3.7%	9.8%	0.15
Appeared "dry" or "dehydrated"	32.1%	30.4%	33.0%	0.73
Fever	47.6%	42.9%	50.0%	0.38
Laboratory (n = 154)				
Mean [Na] (SD)	137 ($\pm$2.8)	138 ($\pm$2.7)	137 ($\pm$2.8)	0.12
Mean glucose, mg/dL (SD)	81.7 ($\pm$17.7)	81.7 ($\pm$17.2)	81.7 ($\pm$18.0)	1.0
Hypoglycemia (% < 60 mg/dL)	8.6%	9.8%	8.0%	0.71
% $HCO_3 \leq$ 18 mmol/L and AG $\geq$ 13	90.9%	93.5%	89.7%	0.67
Mean HCO_3 in mmol/L (SD)	16.8 ($\pm$2.2)	16.8 ($\pm$1.8)	16.8 ($\pm$2.4)	0.98
% BUN $\geq$ 18 mg/dL	37.0%	46.8%	32.5%	0.16
% BUN–creatinine $\geq$ 40	64.9%	74.0%	60.4%	0.20
Mean BUN in mg/dL ($\pm$ SD)	16.4 ($\pm$6.4)	18.2 ($\pm$5.4)	15.5 ($\pm$6.8)	0.01
% Urine SG $\geq$ 1.025*	53.3%	66.7%	45.5%	0.15
% Ketonuria*	87.5%	87.5%	87.5%	1.0

RVA = return visit with admission; IQR = interquartile range; BUN = blood urea nitrogen, Na = sodium, SG = specific gravity, HCO_3 = serum bicarbonate; AG = anion gap.
* Of 33 patients who had urinalysis performed.

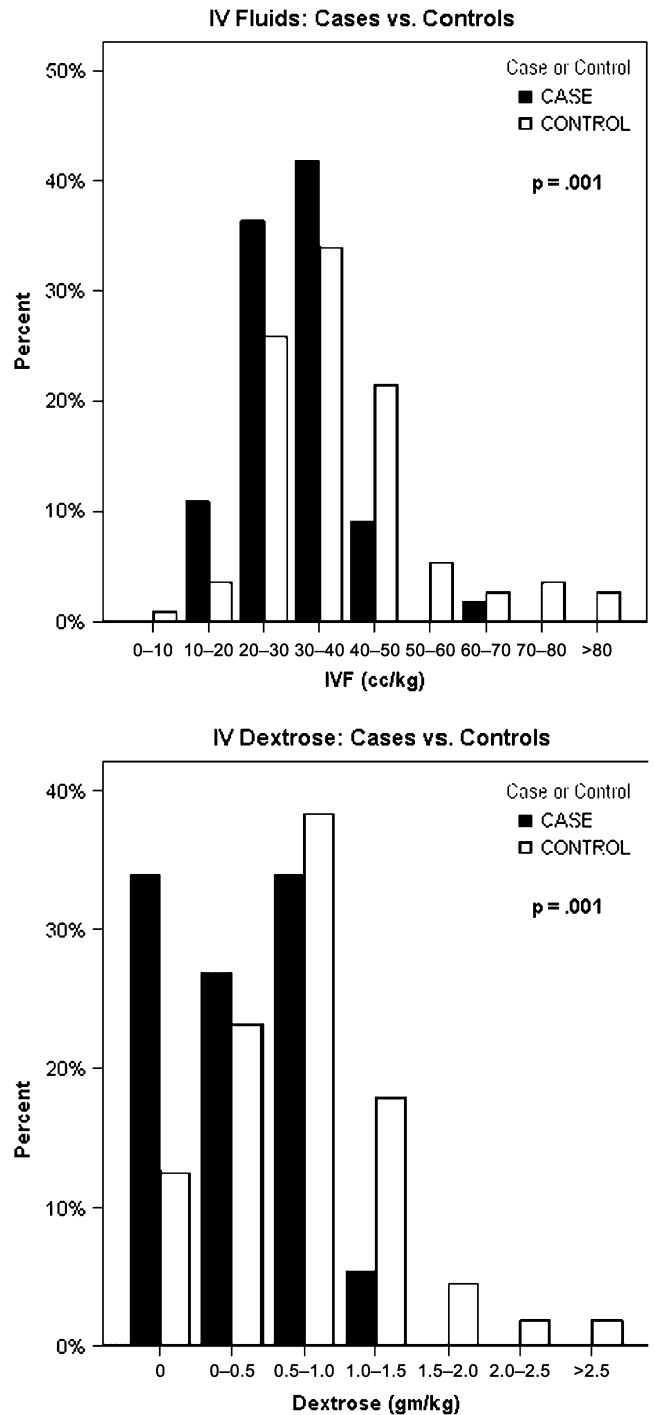### Predictors of Return Visit Requiring Admission: Cases vs. Controls

Our primary objective was to determine the association between dextrose administration and having a return visit with admission. Those patients who did not receive any IV dextrose (i.e., only saline bolus) were more likely to have a return visit with admission (p = 0.001; OR, 3.9; 95% CI = 1.8 to 8.7). The distribution of IV fluids and dextrose administered to cases and controls is shown in Figure 1. The mean amounts of IV fluid and IV dextrose administered to cases and controls were 30.7 mL/kg (SD ± 9.7) vs. 38.5 mL/kg (SD ± 15.1) and 399 mg/kg (SD ± 372) vs. 747 mg/kg (SD ± 556), p = 0.001 and p < 0.001, respectively. To address the greater proportion of cases who received only normal saline, we analyzed the subset of patients who received any dextrose (i.e., not a saline bolus only). In this group, mean amount of IV dextrose administered to cases and controls was 605 mg/kg (SD ± 290) and 845 mg/kg (SD ± 517), respectively (p = 0.001).

To further assess the relationship between dextrose and return visits with admission, we dichotomized subjects around three cutoff points for the amount of IV dextrose administered. Patients who received less than 500 mg/kg of dextrose, when compared with those who received more than 500 mg/kg, were significantly more likely to have a return visit with admission [OR 3.0 (95% CI = 1.6 to 5.8)]. This association held true for dextrose amounts of 750 mg/kg [OR 3.7 (95% CI = 1.7 to 8.1)] and 1,000 mg/kg [OR 5.0 (95% CI = 1.7 to 14.9)], as shown in Table 2.

To account for the influence of IV fluid, we performed logistic regression controlling for fluid volume. The amount of dextrose administered remained significantly different by logistic regression; for every 500 mg/kg of IV dextrose administered, the patient was less likely to have a return visit with admission with an adjusted OR of 1.9 (95% CI = 1.1 to 3.4). We also performed logistic regression adjusting for other important variables including age, length of symptoms, and use of antiemetics. Again, the amount of dextrose administered remained significantly different between cases and controls (p = 0.003).

In addition, we analyzed only those patients who received more than 40 mL/kg of IV fluids. We found that in this subset of patients, there still existed a significant association between dextrose administration and a return visit with admission (Table 2); because of a smaller sample size, however, confidence intervals were wide and approached 1.

Our second objective was to determine which a priori–selected clinical variables were associated with a return visit with admission. Features of cases versus controls are presented in Table 1. Patients who had length of symptoms less than or equal to one day were more likely to have a return visit requiring admission (p = 0.003; OR, 2.7; 95% CI = 1.4 to 5.3). There was no difference in mean serum bicarbonate or mean serum glucose levels between cases and controls. Patients who received antiemetics were more likely to have a return visit with admission (p = 0.001; OR, 4.4; 95% CI = 1.9 to 10.5); however, significance was not maintained in the subset of patients with more than five episodes of vomiting. No

Figure 1. Bar graph representation of total IV fluids and IV dextrose administered to cases and controls.

other demographic, clinical, or laboratory factors were associated with greater odds of having a return visit requiring admission (Table 1).

DISCUSSION

Gastroenteritis with dehydration is one of the most common reasons for evaluation in the pediatric ED. At our institution, approximately 3,700 patients with a primary diagnosis of gastroenteritis are seen yearly, and about one

Table 2
Odds for Return Visit Requiring Admission Stratified by Amount of Dextrose Administered

Dextrose Cutoff Points (mg/kg)	OR for RVA* (95% CI)	
	All Patients	Received > 40 mL/kg IVF (n = 48)
No dextrose	3.9 (1.8, 8.7)	‡
<500	3.0 (1.6, 5.8)	9.0 (1.6, 50.7)
<750	3.7 (1.7, 8.1)	9.0 (1.6, 50.7)
<1,000	5.0 (1.7, 14.9)	5.0 (1.0, 24.8)

RVA = return visit with admission; IVF = intravenous fluids.
* Odds ratios (ORs) compare groups on either side of cutoff points. For example, patients who received less than 500 mg/kg of IV dextrose had 3.0 times greater odds of having an RVA than did those who received more than 500 mg/kg of IV dextrose.
‡ All patients who received more than 40 mL/kg of fluid received some dextrose.

third of those are admitted. Currently, oral rehydration therapy is the preferred method of rehydration in these children and has been proven to be efficacious.[1,4–6,19] In cases of severe dehydration, or when ORT fails despite administration of small, frequent feeds, IV fluid therapy may be warranted. In 1977, Sperotto et al. first described rapid parenteral fluid therapy.[20] Since then, other studies have had similar conclusions about the safety and efficacy of rapid IV rehydration.[21–26] Reid and Bonadio prospectively identified 58 patients with vomiting and dehydration and found that all demonstrated improvement in hydration status after rapid IV rehydration.[25] Similarly, Moineau and Newman described 17 patients, all of whom had vomiting before receiving rapid IV rehydration; all patients improved after therapy and only 6 of 17 had any vomiting after therapy.[23]

Although many pediatric EDs use IV rehydration, there is no standard method or published guideline. Thus, considerable variation exists in the literature and in practice as to what constitutes rapid IV rehydration. Rosenstein and Baker showed that in a single pediatric ED, fluid resuscitation volume ranged from 14–103 mL/kg, and patients received a variety of IV fluid solutions.[21] Moineau and Newman had similar variability with respect to variation in fluid amount.[23]

Children who receive rapid IV rehydration in the ED are often discharged. A certain percentage of these children will return for ongoing symptoms and recurrence of dehydration. Reid and Bonadio found that statistical analysis, however, "did not identify presenting characteristics that would distinguish patients who would require subsequent medical evaluation after rapid IV rehydration from those who would not."[25] Wathen et al. found that children who had low serum glucose levels (<60 mmol/L) were more likely to have an unscheduled return visit but found no other defining characteristics of this population.[14] In a review of the literature, further published data are lacking to determine which clinical, laboratory, or treatment parameters are associated with return visits requiring admission in this population.

Our primary study objective was to determine whether the amount of IV dextrose administered is related to

return visits requiring admission in children with AGE and dehydration. First, to assess for confounding by indication, mean serum glucose levels were calculated for cases and controls and found to be equivalent. In addition, there was no difference in proportion of patients with hypoglycemia between groups.

In our study population, we found that children who received smaller amounts of IV dextrose were significantly more likely to have a return visit with admission. Difference between mean amounts of dextrose administered to cases and controls was approximately 350 mg/kg, which is equivalent to 90 minutes of 1½ times maintenance of a 5% dextrose solution for a 20-kg child. One theory as to why this may be true is that many children who have gastroenteritis and dehydration often have acidosis from excess ketones, which we feel likely contributes to persistent nausea and vomiting. Similar to patients with diabetes, in whom both IV fluids and insulin are necessary to correct ketoacidosis, we hypothesize that administration of larger amounts of dextrose to children who have AGE and dehydration with acidosis will stimulate insulin release and thereby reduce free fatty acid breakdown. Thus, dextrose, independent of fluid volume, may contribute to faster resolution of ketosis and improved clinical outcome. Indeed, in our study population, using logistic regression to adjust for fluid volume, and in the subset of children who received more than 40 mL/kg of fluid, the amount of dextrose received was still significantly different between patients who had a return visit requiring admission and those who did not. Thus, in trying to develop a standard protocol for rapid IV rehydration therapy, these results imply that IV dextrose may be important.

The second objective of this study was to determine which clinical, laboratory, or management parameters may be related to a return visit requiring admission. We found that patients who had length of symptoms of less than one day may be more likely to return to the ED and be admitted for ongoing gastrointestinal symptoms and recurrence of dehydration. Certainly, patients who become dehydrated early in their disease course may become dehydrated again by virtue of time alone. Alternatively, this may represent a subset of patients with more severe disease, or there may be a more subtle feature of this group of patients that we were unable to identify retrospectively.

There was no difference in mean serum bicarbonate level between patients with and without a return visit requiring admission. This is similar to the findings of Reid and Bonadio, who found that although patients with serum bicarbonate levels of <13 were less likely to tolerate oral fluids after rapid IV rehydration therapy, of those patients who were discharged, there was no difference in serum bicarbonate level between those who required further medical care and those who did not.[25] Similarly, Wathen et al. found that although children with serum bicarbonate levels of ≤13 were more likely to undergo observation than were children with serum bicarbonate levels of >13, all patients who had unscheduled return visits had serum bicarbonate levels of >13.[14] By using p = 0.05, a statistically significant difference of mean serum BUN did exist between cases and controls (18.2 mg/dL vs. 15.5 mg/dL, respectively); however, this did

not reach significance when the Bonferroni correction was used. Furthermore, we do not feel this difference is clinically useful when applied to individual patients.

LIMITATIONS

Both gastroenteritis and dehydration are difficult to define retrospectively, and thus, it was difficult to identify a homogenous patient population. To account for this, patients were included only if they met a priori criteria for dehydration that were based on prior studies.[7–18] In addition, patients in the control group may have received follow-up care and possibly IV fluid therapy at another institution. Finally, blinding was not possible because there was only a single reviewer.

Another limitation arises from the collinear relationship between IV fluid volume and dextrose amount. Because most patients received a solution containing 5% dextrose, those who received more dextrose also received more fluid volume. Thus, it is difficult to delineate the separate effects. By using logistic regression, however, we found that the amount of IV dextrose administered was still significantly related to having a return visit with admission when adjusting for the amount of IV fluids. Furthermore, some patients received a larger volume of bolus fluids (normal saline) and thus received lower relative amounts of dextrose. We were able to show that even in those patients who received more than 40 mL/kg of fluid, there still existed a statistically significant difference in the amount of IV dextrose administered between cases and controls.

In our study population, children who received IV antiemetics were more likely to have a return visit requiring admission. One possible explanation is that antiemetic use could temporarily improve symptoms long enough for the patient to tolerate oral fluids and then be sent home, whereas those who had persistent emesis were admitted. This finding differs from that of Reeves et al., however, who reported no increase in ED reevaluation or readmission rates in children who received IV ondansetron as compared with those who received placebo in a randomized controlled trial.[27] This discrepancy is most likely explained by selection bias inherent in our study; a greater percentage of children who received antiemetics had more than five episodes of vomiting in the prior 24 hours and thus may have had more severe disease. Indeed, in this subpopulation of patients, use of antiemetics was not significantly different between cases and controls.

Although the ability to tolerate oral fluids at all was well documented, the volume of oral intake was not, and thus we could not record oral intake amounts during the ED visit. We believe, however, that the differences between cases and controls would not have been significantly different, given that all but one of the study patients tolerated oral fluids before discharge.

Finally, the primary outcome, return visit requiring admission, may have confounding factors and is a reflection not only of failed outpatient therapy but also of parental comfort level and anxiety and of variations in physician practice. These variables, however, are pervasive in pediatric EDs, and we do not believe that our results would be affected in any one direction.

CONCLUSIONS

There is no standard guideline for rapid IV rehydration therapy for children with acute gastroenteritis and dehydration. In our study population, children who received more IV dextrose, independent of fluid amount, were less likely to have a return visit requiring admission. Our data imply that dextrose may be an important factor in the treatment of dehydration in children with gastroenteritis and should be considered in the discussion of rapid parenteral rehydration. Because of the study's retrospective design, however, a causal relationship between dextrose administration and return visits with admission cannot be inferred, and thus, standing alone, this study is not meant to change clinical practice. Because of the inherent limitations of a retrospective study, these results should be further investigated with a prospective randomized control trial.

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REFLECTIONS

I Need This Like I Need a Hole in My Head

We face death every day in the emergency department (ED), at least the possibility of it. However, we do not usually face our own mortality. I had that opportunity—as a second-year medical student. After what I thought was a routine fall in a soccer game, a sport I had played for 15 years, something just did not feel right. Two days later, when my symptoms persisted, my friend took me to the ED. I had paresthesias and a crushing occipital headache that was continuing to get worse. I was praying for what I thought of in those days as a stun injury to my spinal cord, or better yet, for medical-student syndrome, in which I was sure death was imminent but nothing was really wrong. I was not prepared for what they told me, a diagnosis that would land me in the operating room within the week. Now, I am months away from graduating from an emergency-medicine residency. I am years away from the physical pain and emotional struggle of that time, but it will never leave me. I will not let it. Nothing that I learned in medical school or residency taught me the lessons of those days. When I face the fear of death or serious illness or injury with my patients and their families now, I remember…

Symptoms: Throbbing headache, Tingling arms, Terrible fear
Diagnosis: Arnold Chiari Malformation
Treatment: Surgery
Surgeon: Dr. K.M.
Procedure: 2 × 1 inch craniectomy, C1 laminectomy, duraplasty, arachnoidplasty, 17 stitches, 6-in. scar
Recovery:
Talk to my patients, talk *with* my patients
Explain carefully: Update them—often
Think of things they might not know to ask; answer the unasked
Be available: Smile
Touch a shoulder
Let friends sit with patients—on the cot
Apologize
Acknowledge that you have kept a patient waiting; tell him or her that there was another case; sadness exists
for both; don't ignore how important your patient is to your patient
Draw pictures
Remember faces