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A more palatable alternative to oral rehydration therapy for kids

Parents no longer need to struggle to get their kids to drink electrolyte solutions during episodes of mild gastroenteritis; apple juice works just as well.

PRACTICE CHANGER

Recommend that parents give half-strength apple juice to children ≥ 24 months of age who are minimally dehydrated following a case of simple viral gastroenteritis. The juice reduces the need for further interventions better than oral hydration therapy.

Freedman SB, Willan AB, Boutis K, et al. Effect of dilute apple juice and preferred fluids vs electrolyte maintenance solution on treatment failure among children with mild gastroenteritis: a randomized clinical trial. *JAMA*. 2016;315:1966-1974.¹

STRENGTH OF RECOMMENDATION

B: Based on a single, good quality randomized controlled trial.

ILLUSTRATIVE CASE

A 3-year-old boy is brought by his mother to the office for vomiting and diarrhea that started in the middle of the night. On examination he is slightly dehydrated, but does not have an acute abdomen or other source of infection. He is drinking out of a sippy cup. What fluids should you recommend?

Acute gastroenteritis is a common cause of vomiting and/or diarrhea in children, leading to 1.5 million outpatient visits and 200,000 hospital admissions annually in the United States.² Children with gastroenteritis are at risk for dehydration, and the recommended treatment for anything less than severe dehydration is oral rehydration therapy (ORT) and early resumption of

feeding upon rehydration.²

In 2002, the World Health Organization recommended an ORT with an osmolality of 245 mOsm/L.³ However, cultural preferences, cost,⁴ taste,⁵ availability, and caregiver and professional preference for intravenous hydration⁶⁻⁸ have all been barriers to the use of recommended ORT.² In fact, a study of ORT preferences in 66 children ages 5 to 10 years found that fewer than half of the children would voluntarily drink the ORT again.⁵ This study evaluated the use of diluted apple juice as a more palatable alternative to ORT in children with vomiting and/or diarrhea.

STUDY SUMMARY

In kids older than 2, apple juice will do

This study was a single-center, single-blind, non-inferiority randomized controlled trial conducted in the emergency department (ED) of a tertiary care pediatric hospital in Canada. The researchers compared the use of half-strength apple juice to a standard ORT for rehydration in simple gastroenteritis.¹ Participants were 6 months to 5 years of age, weighed more than 8 kg (17.7 lbs), and had vomiting and/or diarrhea for less than 96 hours (with ≥ 3 episodes over the last 24 hours). They also had a Clinical Dehydration Scale (CDS) Score⁹ < 5 and a capillary refill of < 2 seconds (TABLE). Of the total, 68% of the children had a CDS score of 0, 25.5% scored 1 to 2; and 6.4% scored 3 to 4. Children

TABLE

Clinical Dehydration Scale⁹

Characteristic	Score: 0	Score: 1	Score: 2
General appearance	Normal	Thirsty, restless, lethargic, but irritable when touched	Drowsy, limp, cold, or sweaty; may or may not be comatose
Eyes	Normal	Slightly sunken	Very sunken
Mucous membranes (tongue)	Moist	Sticky	Dry
Tears	Present	Decreased	Absent

Total CDS score: 0=no dehydration; 1-4=some dehydration; ≥5=moderate/severe dehydration.

with chronic gastrointestinal disease or other significant comorbidities that could affect the clinical state (eg, diabetes mellitus) and potential acute abdominal pathology were excluded.

Children were randomized to receive half-strength apple juice (AJ) (intervention group, n=323) or apple-flavored sucralose-sweetened Pediatric Electrolyte (Pharmascience) (control group, n=324), a common electrolyte maintenance solution (EMS). Immediately on triage, each child received 2 L of their assigned solution, to be used while in the ED and then at home. The children received 5 mL of fluid every 2 to 5 minutes. If a child vomited after starting the fluid, he or she was given oral ondansetron.

At discharge, caregivers were encouraged to replace 2 mL/kg of fluid for a vomiting episode and 10 mL/kg of fluid for a diarrhea episode. At home, children in the AJ group could also drink any other preferred fluid, including sports beverages. The EMS group was instructed to drink only the solution provided or a comparable ORT. Caregivers were contacted daily by phone until the child had no symptoms for 24 hours. They were also asked to keep a daily log of vomiting and diarrhea frequency and any subsequent health care visits. At least one follow-up contact occurred with 99.5% of the children.

The primary outcome was treatment failure defined as a composite measure of any of the following occurring within 7 days of the ED visit: hospitalization, intravenous rehydration, further health care visits for diarrhea/vomiting in any setting, protracted symptoms (ie, ≥3 episodes of vomiting or diarrhea within a 24-hour period occurring

>7 days after enrollment), 3% or greater weight loss, or CDS score ≥5 at follow-up.

Treatment failure occurred in 16.7% of the AJ group compared to 25% of the EMS group (difference, -8.3%; 97.5% confidence interval [CI], -∞ to -2; number needed to treat [NNT]=12), consistent with non-inferior effectiveness. The benefit was seen primarily in children ≥24 months of age. In children <24 months, the treatment failure for AJ was 23.9% compared to 24.1% in the EMS group (*P*=not significant). In older children (≥24 months to 5 years), the treatment failure with AJ was 9.8% compared to 25.9% in the EMS group (difference, -16.2%; 95% CI, -24.2% to -8%; NNT=6.2). Intravenous rehydration in the ED or within 7 days of the initial visit was needed in 2.5% of the AJ group and in 9% of the EMS group (difference, -6.5%; 99% CI, -11.6% to -1.8%; NNT=15.4). There were no differences in hospitalization rate or in diarrhea or vomiting frequency between the 2 groups.

WHAT'S NEW

Kids drink more of what they like

This study, in a developed country, found rehydration with diluted apple juice worked just as well as ORT. In children ≥24 months of age, there were fewer treatment failures.

CAVEATS

Infants may not benefit, and ondansetron played a role

In this study, children were only mildly dehydrated. Also, the study did not include infants younger than 6 months of age, and the great-



A study of oral rehydration therapy preferences in children found that fewer than half would voluntarily drink the solution again.

est benefit was in children ≥ 24 months of age.

Also noteworthy was the role that oral ondansetron played. Most (67.4%) of the children received an oral dose of ondansetron (0.1 mg/kg). Although expensive, if one dose prevents a hospitalization, it is cost-effective. Previous studies of oral ondansetron show it reduces vomiting (NNT=5); lowers the rate of intravenous hydration in the ED (NNT=5); and reduces the hospitalization rate from the ED (NNT=17).¹⁰

Lastly, there are a variety of fluid replacement guidelines. In this study, fluid replacement was 2 mL/kg for a vomiting episode and 10 mL/kg for a diarrhea episode.

CHALLENGES TO IMPLEMENTATION

Given the ease of swapping diluted apple juice for oral rehydration therapy, we see no barriers to implementation. **JFP**

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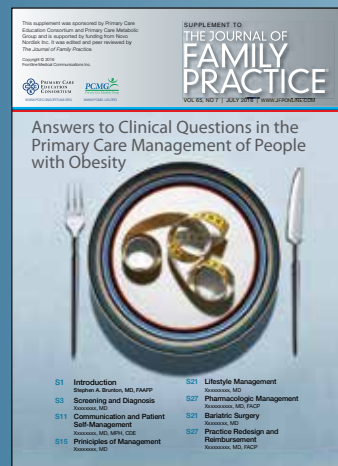
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