

Oral Rehydration Therapy vs IV Therapy in US

Dehydration due to diarrhea brings both the young and old to emergency rooms and hospitals in the United States yet we have known for nearly forty years that there is a simple, self administered way to prevent such events. Oral rehydration therapy (ORT) includes ORS, the scientific formula developed over 40 years ago combines a carbohydrate, electrolytes and water to match fluids lost from diarrhea and vomiting to prevent dehydration. ORT is used globally to save 3 to 4 million lives and avert painful and expensive intravenous (IV) therapy, which requires hospitalization or medical staff. ORT is a proven effective and inexpensive first line treatment for preventing dehydration in people of any age and most types of diarrhea, including chronic diarrhea (such as in Crohn's, ulcerative colitis, short bowel, or infectious diarrhea and vomiting, or that caused by many medications and post-antibiotic diarrhea). ORT would be the most effective and least expensive treatment in the USA, too, preventing IVs in many cases.

A number of reports indicate that ORS is underutilized and IV Therapy is overused in many countries, including the United States. According to Mackenzie and Barnes several factors that contribute to the overuse of IV Therapy include:

- ▶ The degree of dehydration is consistently over-estimated.
- ▶ Despite evidence that ORS is a safe and effective treatment for severe dehydration (provided that the patient is not in shock), it is widely believed that children with anything more than mild dehydration should be given IV Therapy.
- ▶ Administering ORS is believed to be more labor intensive.⁶

Oral Rehydration Solution (ORS) Products

The table below compares the formulas of the WHO/Unicef and other ORS preparations available in the U.S.¹⁷ Note the differences between products with regard to carbohydrate, sodium, and osmolarity:

- ▶ CeraLyte® 70 and CeraLyte® 50 have the lowest osmolarity.
- ▶ CeraLyte® 70, CeraLyte® 50, and CeraLyte® 90 have greater amounts of carbohydrate than the WHO/Unicef ORS and more than other pediatric oral rehydration solutions. The mixed chain rice-carbohydrate in CeraLyte® means more effective and efficient hydration. CeraLyte® has a small amount of simple carbohydrate and more longer chained carbohydrate to provide sustained hydration and more calories for recovery.
- ▶ CeraLyte® 70 and CeraLyte® 50 have greater carbohydrate and sodium content as compared to Pedialyte® and without the insulin spike that simple sugars can cause. CeraLyte® can be used by diabetics (still need to count calories) and those with celiac disease.

Comparison of ORS Product Compositions

	Carbohydrate (gm/L)	Sodium mEq/L	Potassium mEq/L	Base mEq/L	Osmolarity mOsm/L	Calories
WHO Standard ORS	glucose 20	90	20	30	310	80
WHO Reduced Osmolar ORS	glucose 13.5	75	20	30	245	54
CeraLyte® 50	rice starch/maltodextrin 40	50	20	30	200	160
CeraLyte® 70	rice starch/maltodextrin 40	70	20	30	220-235	160
CeraLyte® 90	rice starch/maltodextrin 40	90	20	30	260	160
Pedialyte®	glucose, fructose 25	45	20	30	250	100
Gatorade®*	sucrose, glucose-fructose 60	20	3	3	330-380	250

*Not appropriate for use as an ORS for diarrheal disease.

Administration of ORS

- ▶ ORS is recommended for minimal or no dehydration, mild dehydration and moderate dehydration.
- ▶ ORS with 70mEq/L sodium can be used for both rehydration and maintenance in nearly all patients, even those who present with hypo- or hypernatremia.¹⁴
- ▶ ORS with 90mEq/L of sodium is recommended for patients with severe watery diarrhea.
- ▶ Vomiting does not rule out using ORS; very small amounts of liquid can be given frequently (5-10ml every 1-2 minutes).
- ▶ Oral rehydration is contraindicated when there is impaired consciousness, intestinal obstruction, or shock.
- ▶ Recommended foods with the administration of ORS include; cereal, potatoes, crackers, yogurt, and bananas.
- ▶ AVOID foods high in sugar and fat with the administration of ORS.



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Current Guidelines and Recommendations for Patients with Acute Gastroenteritis

	Minimal to No Dehydration	Mild Dehydration (3-5% fluid loss)	Moderate Dehydration (6-9% fluid loss)	Severe Dehydration (6-9% fluid loss)
Phase I Fluid Replacement	Initial rehydration is unnecessary	ORS should be initiated with 50ml/kg and 100mg/kg, respectively, over a 3-4 hour period	ORS should be initiated with 50ml/kg and 100mg/kg, respectively, over a 3-4 hour period	Ringers Lactate IV (20ml/kg)**
Phase II Maintenance	<p><10 kg BW 60-120ml per Diarrheal Stool or Vomiting Episode</p> <p>>10kg BW 120-240ml/kg per Diarrheal Stool or Vomiting Episode</p>	<p>-Thirst is best guide for alert patients</p> <p>-When nausea/vomiting are present: 10ml/kg of ORS/loose stool</p> <p>-The amount of fluid being lost should be replaced^{4,13}</p>	<p>-Thirst is best guide for alert patients</p> <p>-When nausea/vomiting are present: 10ml/kg of ORS/loose stool</p> <p>-The amount of fluid being lost should be replaced^{4,13}</p>	

*BW = Body Weight

**When mental status improves ORS can be given (100ml/kg) over 4 hours or D5½NS can be given intravenously.⁴

Benefits of Rice-Based Oral Rehydration Therapy

- ▶ **Cost Effective** (IV vs. Oral)
- ▶ Lack of Complications
- ▶ Lack of Pain
- ▶ Provides calories from complex carbohydrates
- ▶ Less worry when mixing because rice-based ORS has a lower osmolarity than glucose-based ORS
- ▶ Lower osmolarity also means better absorption
- ▶ Always works as well as glucose-based ORS and is even more effective in severe cases of dehydration
- ▶ Sustained hydration (larger molecule, more substrate)
- ▶ Tastes better

In summary, dehydration remains a significant problem in the United States. Oral Rehydration Therapy is an effective, inexpensive and simple-to-use treatment for patients suffering from dehydration. The administration of ORS can improve the health and well-being of individuals suffering from diarrheal illness, vomiting and other conditions that lead to dehydration, such as Crohn's, ulcerative colitis, short-gut, or medications for cancer or HIV/AIDS treatments or other medications, including antibiotics, that may lead to diarrhea.

When choosing an ORS product, CeraLyte® is superior to others. While glucose-based ORS preparations appear to be at least as effective as IV rehydration, CeraLyte® rice-based ORS has the advantage of low osmolarity with more carbohydrates for more efficient hydration without sacrificing electrolyte content. CeraLyte's patented rice-based ORS does not contain added sugars for sustained, effective hydration.

ORS Treatment—Proven Safe, Cost-Effective

In a 1986 study, infants with acute gastroenteritis were randomly assigned to receive ORS or intravenous rehydration. This study, according to the author, demonstrated that oral rehydration is a safe and cost-effective means of treating dehydrated infants in an emergency department holding room.⁵

A randomized trial was conducted in 52 Australian children given rehydration fluids by mouth or via nasogastric administration and another 52 children were given rehydration intravenously. It was concluded that rehydration by mouth or nasogastric tube is safe and effective for the treatment of moderately dehydrated children with gastroenteritis.⁶

In a randomized controlled trial in an urban emergency department, investigators compared ORS with IV therapy for the treatment of moderate dehydration in children with acute gastroenteritis. From this study perceived barriers for the use of ORS were not supported by the evidence, as oral rehydration performed better than IV therapy on all measured outcomes.⁷

In another meta-analysis of 16 trials involving 1545 children and conducted in 11 countries, those treated with oral rehydration had significantly fewer major adverse events, including seizures or death (relative risk 0.36), and a significant reduction in length of hospital stay (mean 21 hours).⁸

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