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# Considerations for the Pharmacist About Oral Rehydration Therapy

Dehydration is a deficiency of body fluids that results when the amount of fluid lost from the body exceeds the amount of fluid taken in.<sup>1,2</sup> Dehydration may be caused by medical illness (eg, acute gastroenteritis), fluid loss (eg, by sweating too much, vomiting, or diarrhea), medications (eg, diuretics), excessive urination (eg, uncontrolled diabetes), or inadequate fluid intake (eg, due to nausea, illness, or sore throat).<sup>1,3</sup> The symptoms of mild to moderate dehydration include thirst, fatigue, restlessness, irritability, headaches, and decreased urine output, while severe dehydration is a life-threatening emergency characterized by confusion, lethargy, apathy, dizziness, unconsciousness, and rapid heartbeat and breathing.<sup>1,4</sup>

## Treating Dehydration with an Oral Rehydration Solution

Mild dehydration can be effectively treated by drinking regular water or beverages that contain electrolytes.<sup>1</sup> However, the treatment of mild to moderate dehydration may require use of an oral rehydration solution (ORS). In cases of severe dehydration, more intensive, invasive therapy in the form of intravenous (IV) fluid administration may be required.<sup>1,5</sup> While IV fluid administration has been used for decades to treat dehydration, a number of practical limitations have restricted its use and prompted the development of oral therapies for rehydration.<sup>5</sup>

In the 1960s, pathophysiologist Robert A. Phillips noted that oral fluids were not absorbed in patients with cholera, but instead contributed to the volume of diarrhea. However, when Phillips gave

patients an oral electrolyte solution supplemented with glucose, they experienced less diarrhea.<sup>5</sup> Following this observation, research into the pathophysiology of glucose and electrolyte absorption has demonstrated that the sodium-glucose cotransport system facilitates electrolyte absorption in the small intestine and colon. Cotransporters present in the membranes of cells that make up the intestinal lumen move 1 glucose molecule into the cells along with 1 sodium ion. When sodium ions are absorbed into the intestine, water follows via osmosis. Osmotic pressure thus facilitates the absorption of water, which flows from an area of low sodium concentration (intestinal lumen) to higher sodium concentration (intestinal cells).<sup>4,6</sup> Therefore, the presence of glucose in ORS facilitates the uptake of water and electrolytes.

Clinical trials have established that the administration of ORS containing a mixture of salts and glucose results in decreased diarrhea and rapid rehydration.<sup>5</sup> Based on the safety and efficacy of ORS, the World Health Organization (WHO) recommends ORS for the treatment of clinical dehydration,<sup>7</sup> and guidelines from the Centers for Disease Control and Prevention (endorsed by the American Academy of Pediatrics) recommend ORS for the management of acute gastroenteritis in children.<sup>4</sup>

Factors that should be considered when selecting an ORS for the treatment of dehydration include sodium level, osmolality, and taste. The presence of an appropriate amount of sodium and glucose promotes electrolyte and water absorption via the sodium-glucose cotransport sys-

tem in the intestine.<sup>4,6</sup> Regarding osmolality, studies have demonstrated that a low-osmolality ORS is associated with decreased stool output and less vomiting compared with a standard ORS in patients with dehydration due to diarrhea.<sup>7</sup> The WHO recommends a low-osmolality ORS (245 mOsmol/L) with a sodium concentration of 75 mEq/L for the management of children and adults with diarrhea,<sup>7</sup> and the European Society for Pediatric Gastroenterology, Hepatology, and Nutrition (ESPGHAN) recommends an ORS containing 60 mEq/L of sodium with reduced osmolality for the management of children with acute gastroenteritis.<sup>8</sup>

Poor taste may be a barrier to patient compliance with ORS use and successful rehydration. Thus, there is a need for a pleasant-tasting ORS that also meets the recommendations for sodium level and osmolality.

## About DripDrop Medical-Grade Hydration Solution

DripDrop medical-grade hydration solution treats and prevents mild to moderate dehydration, and has been formulated to improve upon the taste of previous ORS formulations. DripDrop is a medical food for use in children and adults that contains electrolytes and sugars to provide an efficient rehydration treatment.<sup>9,10</sup> It is available in packets of 10 g of powder for reconstitution in 8 oz (237 mL) of clean water, and packets of 21 g of powder for reconstitution in 16.9 oz (500 mL) of clean water.<sup>9</sup>

The components of DripDrop include sodium, potassium, chloride, citrate, mag-

**TABLE: WHO GUIDELINES FOR TREATING CHILDREN AND ADULTS WITH SOME DEHYDRATION<sup>11</sup>**

Approximate Amount of ORS to Give in the First 4 Hours						
Age <sup>a</sup>	Less than 4 months	4-11 months	12-23 months	2-4 years	5-14 years	15 years or older
Weight	Less than 5 kg (11 lb)	5-7.9 kg (11-17.5 lb)	8-10.9 kg (17.6-24 lb)	11-15.9 kg (24.1-35 lb)	16-29.9 kg (35.1-65.9 lb)	30 kg (66 lb) or more
Approximate amount of ORS <sup>b</sup>	200-400 mL (6.8-13.5 oz)	400-600 mL (13.5-20.3 oz)	600-800 mL (20.3-27 oz)	800-1200 mL (27-40.6 oz)	1200-2200 mL (40.6-74.4 oz)	2200-4000 mL (74.4 oz-135.3 oz)

ORS = oral rehydration solution; WHO = World Health Organization.

<sup>a</sup>Use the patient's age only when the patient's weight is not known. The approximate amount of ORS required (in mL) can also be calculated by multiplying the patient's weight in kg by 75.

<sup>b</sup>If the patient wants more ORS than shown, give more. Encourage the mother to continue breastfeeding her child.

For infants under 6 months of age who are not breastfed, if using the old WHO ORS solution containing 90 mmol/L of sodium, also give 100 to 200 mL (3.4-6.8 oz) of clean water during this period. However, if using the new reduced (low) osmolarity ORS solution containing 75 mmol/L of sodium, this is not necessary. During the initial stages of therapy, while still dehydrated, adults can consume up to 750 mL (25.4 oz) of ORS per hour, if necessary, and children up to 20 mL (0.68 oz) per kg (2.2 lb) of body weight per hour.

nesium, and zinc. All of the ingredients in DripDrop are generally recognized as safe per FDA regulations. DripDrop has no artificial colors or preservatives; it contains a very small amount of the artificial sweetener sucralose for taste. The product is in line with the WHO and ESPGHAN recommendations for sodium level and osmolarity, with a sodium concentration of 60 mEq/L and an osmolarity of 235 mOsm/L. The WHO-recommended ORS does not contain magnesium or zinc.<sup>7</sup> DripDrop provides 5 mg/L of zinc and 166 mg/L of magnesium.

**Role of the Pharmacist**

As members of the health care team who are readily accessible in the community setting, pharmacists can help address the needs of patients who experience dehydration due to everyday nonmedical causes (eg, due to excessive sweating on a hot summer day) and patients who experience dehydration due to common medical conditions (eg, acute gastroenteritis). Patients experiencing dehydration may not always receive counseling regarding appropriate therapy. An ORS is an effective treatment for mild to moderate dehydration.<sup>5</sup> Pharmacists should be aware of the symptoms of dehydration and the need for an ORS, and provide patients

with appropriate education and guidance. The Table shows guidelines from the WHO regarding the approximate amount of ORS to give in the first 4 hours to children and adults with some dehydration.<sup>11</sup>

Pharmacists can also play a role in identifying and screening for patients with medical conditions that may make use of an ORS inappropriate. Patients with kidney disease, heart disease, electrolyte disturbance, or patients who require fluid restrictions should be advised to consult a physician before using DripDrop. Pharmacists should identify patients with salt sensitivity and patients taking medications that disrupt electrolyte balance, because DripDrop should be used with caution in these patients. Parents should be advised that use in children under 1 year of age should be discussed with a doctor.<sup>9</sup> Pharmacists should also counsel patients regarding when to seek immediate medical attention, such as in the case of severe dehydration.<sup>4</sup> By providing appropriate counseling regarding the management of dehydration, pharmacists can help improve outcomes.

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