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Rehydration in acute gastro-enteritis – the value of going rapid and enteral

Acute gastro-enteritis (AGE) is a leading post-neonatal cause of death among South Africa's children.[1] Almost all these deaths are caused by the consequences of dehydration. Many of these deaths occur in hospitals.[2] AGE is also a significant nutritional insult at a critical time of growth.

When the literature on therapy for AGE is reviewed, only four interventions recommend themselves for universal application for uncomplicated disease: rapid rehydration within 4 - 6 hours with hypotonic solutions, preferably via the gut;[3-7] continuation of breastfeeding throughout the episode;[8] early re-introduction of full-strength feeds;[8-10] and zinc therapy.[11]

This article explores the first of these, but will show how its application enhances the positive effects of feeding on the diarrhoea as well as the child's nutritional status.

AGE produces dehydration through vomiting and loss of the fluid into the gut through osmotic (usually hypotonic) and secretory (usually isotonic) mechanisms. Nutrient malabsorption occurs through varying degrees of damage to the intestinal brush border. This is aggravated by intestinal hurry, and itself aggravates osmotic fluid losses. Dehydration aggravates the vomiting.

It has long been recognised that, in almost all cases of AGE, the intestinal mucosa retains the ability to absorb water and electrolytes in the presence of glucose, providing the basis for oral rehydration therapy.[12]

Consideration of these facts has led to the international recommendation that hypotonic solutions by the oral route be used to prevent dehydration, and that the oral or nasogastric (NG) routes be used to treat mild and moderate dehydration (presence of signs of dehydration).[6,8,13] Intravenous fluids are largely reserved for severe dehydration (marked signs of dehydration) and circulatory shock.

A dehydrated child needs to be returned to a normal state of fluid balance as soon as possible, for the following reasons:

- dehydration promotes vomiting
- vomiting delays re-introduction of feeds
- feeds, especially semi-solids, reduce stool output, shortening time to recovery
- feeds decrease the negative energy balance in AGE
- negative energy balance may have long-term consequences for the child
- dehydration leads to complications such as renal failure
- the chances of hospital-acquired infection or other medical misadventure rise the longer the child stays in hospital.

Rehydration of children with mild-to-moderate dehydration over 4 - 6 hours has been shown in a number of settings to be effective and safe.[3-5] Importantly, it reduces time to re-introduction of full feeds, thus promoting the return to positive energy balance. Oral or NG rehydration can be initiated faster than intravenous therapy,[14] and they are safer.[4] NG rehydration fails in about 5% of cases.[3] Hospital stays are shortened.[4,5] These experiences have led to this form of rehydration (sometimes known as rapid rehydration) being internationally accepted – although not always practised. Apart from the inherent pain and dangers associated with intravenous therapy, in the South African context not having to set up an intravenous line abolishes the risk of inadvertent needlestick injury and possible HIV exposure for the health worker.

In essence, therefore, children with mild to moderate dehydration should receive hypotonic fluids by the oral or NG routes over 4 - 6 hours. The recommended volume of 15 - 20 ml/kg over this period reflects both an estimate of the child's fluid deficit, and also the ongoing fluid requirements during the rehydration phase. Orally these volumes are given as sugar-salt solution or oral rehydration solution (ORS) in 'small amounts, frequently'. For the NG route, ORS (using made up commercially available sachets in a feeding or other bottle attached to an enteral giving set) is given as a continuous infusion using in-line or electronic controllers where available. (Half strength Darrow's-dextrose solution, though not containing the ideal concentration of sugar, can be used enterally with intravenous giving sets where enteral equipment is not available.) Both approaches aim to minimise vomiting and expedite fluid replacement. As with all rehydration regimens, regular review is required as the initial fluid prescription is always an estimate. After the rapid rehydration period, a rapid transition to oral replacement of any further losses (10 ml/kg for each loose stool passed), and re-introduction of full feeds, including semi-solid or solid food for children over 6 months of age, is usually possible.

Exceptions to this method of rapid rehydration cover conditions in which the gut is unable to process the fluid (e.g. a paralytic ileus secondary to AGE, circulatory insufficiency), where profuse diarrhoea is encountered, or where rapid influx of the fluid might be dangerous (e.g. severe malnutrition, concomitant pneumonia or cardiac disease, hypertonic dehydration).

In the case of severe dehydration, quicker is also wiser as complications of the fluid deficit are more likely, and the progression to circulatory shock is more likely. In this situation, more frequent review including laboratory testing is required and senior experienced opinion recommended.

The NG route for rehydration is not commonly used in South Africa, though experience has been documented,[15] despite its usefulness where oral rehydration cannot be guaranteed (e.g. failed trial of oral rehydration, exhausted or absent caregiver) and intravenous fluids are unnecessary. The letter in this issue of the journal[16] is reassuring in that, even where NG fluids were given in greater amounts than prescribed, no complications were experienced.

There seems little reason for South Africa not to adopt rapid rehydration by the NG route for uncomplicated AGE where oral rehydration has failed or is unlikely to succeed. Training of medical staff and nurses in the setting up of rapid rehydration, its monitoring and the assessment of the child's response should be a mainstay of children's health care in emergency units and wards at all levels of the public and private health care services.

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