TREATMENT OF SEVERE DIARRHOEA

Gastroenteritis is the most common childhood disease worldwide, its occurrence is facilitated by a lack of basic sanitation, improper food handling, and poor nutrition.

Diarrhoeal diseases as a public health problem

• The annual incidence of acute diarrhoea is not declining. Vaccines are available for only a few types of intestinal infections, and not the most common ones. Attempts over the years to immunize against cholera have been unsuccessful, whereas a vaccine against rotavirus - the most important cause of diarrhoeal illness in early life - was approved in 1998, but later withdrawn due to safety concerns.

• Until the 1980s, diarhoea was also the leading infectious cause of child mortality. It has since taken a secondary position to respiratory infections with the advent of oral rehydration therapy 25 years ago. One can often prevent mild and moderate diarrhoea's progression to the severe category through the prudent, early use of oral rehydration solutions.

Diarrhoeal dehydration of a severe degree

• Although diarrhoea classifiable as "severe" occurs only in a small fraction of cases, it cannot be ignored in favour of the much more frequent mild and moderate varieties. Diarhoea is a frequent event in the life of most of the world's disadvantaged children; these youngsters can have 10 or more episodes per year. If only 5 to 10% of such episodes were severe in nature, children with these high recurrences of gastroenteritis would have at least one high-risk bout every year or two. Moreover, an underlying marginal or nutritional status predisposes to more severe, prolonged and potentially lethal infections.

• The Centers for Disease Control and Prevention state: "Severe dehydration constitutes a medical emergency requiring immediate IV rehydration". Thus, when diarrhoea is classified as severe, a series of therapeutic measures that are generally uncommon - but vital and life-saving - should come into play. These include the use of fluid replacement through a direct intravenous route and electrolytic and acid-base imbalance in the circulation. The most commonly listed causes of death when a child dies of diarrhoea's progression to the severe category through the prudent, early use of oral rehydration solutions.

Recognizing and diagnosing the more severe degrees of diarrhoea

• The first step to appropriate treatment of any diarrhoeal episode is to recognize its severity. Table 1 provides a classifica-

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<th>Diagnostic Signs for Detecting and Differentiating Distinct Grades of Severity of Dehydration in Diarrhoea</th>
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Adapted after King et al (2003), MMWR Recommendations and Reports 2003 Nov 21;52(RR 16):1-16

Table 2:

Three cardinal principles of treating diarrhoeal dehydration

1. Re-establish the appropriate fluid volume in the circulation (rehydration phase)
2. Replace ongoing diarrhoeal purging (maintenance phase)
3. Maintain adequate offer of nutrients (nutrition)

Rehydrating severe dehydration

Three cardinal principles apply for therapy of diarrhoeal dehydration, whether it be minimal, mild-to-moderate or severe (Table 2). When the degree of dehydration is classified as severe, however, administration of oral rehydration solution (ORS) is no longer an option and one is obliged to use intravenous fluids.

■ Procedures:
• A hypodermic needle or catheter must be inserted in a sterile manner into a large vein to allow for infusion of intravenous solutions. When children are small and the degree of circulatory collapse is severe, great difficulty, is often encountered in locating
a peripheral vein, and deep veins in the neck or chest may have to be cannulated. Conventional balanced intravenous fluids - some with added glucose to maintain normal blood glucose, and others just with electrolytes (salts), so as not surpass the need for glucose - are infused to re-expand the circulation.

- The rehydration phase should be as rapid as possible, without overloading the circulation in the other direction.

**Monitoring treatment:**
- The monitoring of the patient's condition during the rehydration effort has several dimensions. The primary focus is on the vital signs and hydration status. Blood pressure must be restored and maintained. One should look for the signs of severe dehydration (Table 1) to improve and recede.
- The next focus is on fluid balance; and here volumes and weights are important. One needs to record the volumes of intravenous fluids administered. Weighing the child provides a convenient manner of gauging the expected increase to usual body weight.
- After normal hydration is achieved, the maintenance solution dosage is guided by weighing the volume of fecal fluid losses and replacing it ounce for ounce with IV fluids. At this point, IVs can usually be discontinued in favor of oral or tube-fed ORS.

**Nourishment:**
- Glucose in the infusion is the basic nutrient early on. It would be dangerous to provide oral or tube feeding when the child is prostrate. However, as soon as an alert sensory level is restored, sanitary beverages (breast milk, formulas, juices) should be offered to the child as tolerated.
- Restoring the normal diet in normal amounts as the final goal of treatment should not be forgotten.

**Other severe consequences of diarrhoea**

When diarrhoeal pathogens invade intestinal tissues, or pass into the bloodstream and move to other parts of the body additional settings for a grave threat to life can emerge.

**Counteracting the Systemic Dissemination of Diarrhoeal Organisms:**
- Risk to life also occurs in situations in which the infective microbes act in a more virulent manner and spread - or their effects - beyond the confines of the gastrointestinal tract, entering the general circulation and the tissues of the body. The signs of this will be fever and shaking chills. Blood should be collected for cultures to identify the organism. Meanwhile, injectable antibiotics with action against a range of bacteria should be started when systemic infection is suspected; the dose and type of antimicrobial can be tailored when the pathogen is isolated.
- In situations of weakened responses of the immune defence response, such as occurs with severe general malnutrition or in Human Immunodeficiency Virus (HIV) infection, moreover, microbes that do not commonly produce problems can escape containment and produce grave systemic consequences.
- Antibiotics can be useful in several specific types of diarrhoea, even if the infection is confined to the intestines. These are the particular gastrointestinal illnesses for which the course can be shortened and fluid losses reduced by action against the causative agent. Infections by the bacteria that causes typhoid fever, cholera, and shigellosis are examples of such situations where antibiotics decrease severity and duration of the episode.

**Responding to Severe Blood Loss in Bloody Diarrhoea:**
- Dysentery is the term applied to profuse diarrhoea with blood. It is caused by aggressive invasion of the lining membrane of the intestine by microbes seeking the iron in blood. The common causative agents are amoeba and an invasive variety of the Shigella bacterium. Also, the invasion of the large bowel by an intestinal worm (whipworm) can produce profuse bleeding in rare instances.
- Any form of severe blood loss can cause life-threatening hemorrhagic shock, and transfusions of whole blood are the indicated response to rapid hemorrhage. Of course, assuring host compatibility and freedom from blood-borne pathogens is a primary consideration for blood transfusion, and this requires added vigilance in low-income settings.

**Conclusion**

- Diarrhoeal infections are common in populations around the world. The incidence is not decreasing, while the population of young children in low-income societies continues to expand, leading to a net increase in occurrence.
- A small percentage of diarrhoeal episodes produce extreme purging of body fluids through the intestinal wall or involve systemic invasion of organisms from the bowel or result in active severe bleeding. These situations threaten the life of the patients. They must first be recognized for the gravity they represent, and then skilled practitioners, medications and facilities must be mobilized to resolve the situation and remove the patient from the hazard of a fatal outcome.
- The general population should be taught to recognize the grave symptoms and danger signs that are indications to move beyond the routine oral rehydration measures. Meanwhile, all communities must have ready access to the personnel and infrastructure that will prove life-saving in the event of severe diarrhoea.

**Suggested reading:**

5. Srobinshaw NS. Historical concepts of interactions, synergism and antagonism between nutrition and infection. Journal of Nutrition. 2003;133:316S-321S.