CPD Article

Gastroenteritis in young children

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Abstract

Acute diarrhoea is due to intestinal infection. The patient ingests the pathogen which has contaminated water, food, drink, toys or anything that can be placed in the mouth. An inadequate and unsafe water supply, and poor application and practice of hygiene leads to faecal contamination.

The most important complication is dehydration, with a poor correlation between the clinical features and actual dehydration. The management of the dehydrated patient depends on a careful assessment of the state of the circulation and the need for resuscitation. In most instances, oral rehydration is appropriate and fully effective if the solution is offered in small quantities at a time. Normally nourished infants do not require modification of their feeds beyond adapting the quantity offered as tolerated, but if diarrhoea persists, there is a risk of intestinal mucosal damage with malabsorption and nutritional consequences.

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Introduction

Every young child seems to suffer from an occasional attack of diarrhoea. This is most likely to strike while travelling or on holiday, after joining a crèche or pre-school, after a feed change and when other members of the family are also affected. Most often diarrhoea is a short-lived messy irritation, but when severe, it can result in frighteningly rapid progression into a severe, "washed-out" illness with an urgent need for hospitalisation, and some children die from dehydrated shock even before the parents have become aware of the diarrhoea.

This paper will place acute infective diarrhoea into an epidemiological perspective and provide an overview of prevention and management.

What causes diarrhoea?

In the vast majority of cases, acute diarrhoea is due to an acute intestinal infection. Faecal contamination of water, food, drink, toys or anything that can be placed in the mouth arises from a human or animal source.

This explains why an inadequate, unsafe water supply and poor practice of hygiene in waste disposal and personal care are very important in transmitting enteral infections. Acute infective diarrhoea is predominantly a disease of poverty and slum dwelling because that predisposes to the above factors. On the other hand, poor personal hygiene practices are found also among affluent people. The risk of environmental contamination increases with crowding.

Young children explore by placing objects in their mouths. Hand-washing routines are often difficult to maintain with toddlers and young children. Accordingly, acute diarrhoea is also a disease of young children after weaning, who lack the immune defence of prior exposure.

A viral or bacterial pathogen can be identified in 70 – 80% of cases of acute diarrhoea. Differing seasonal and other local epidemiological factors determine the relative prevalence of responsible pathogens that include *bacteria* such as *Escherichia coli,* salmonellae, shigellae, *vibrio cholerae*, clostridia and yersinia, *viruses* such as rotavirus, astrovirus, caliciviruses and enteroviruses, and *parasites and protozoa* such as cryptosporidia. Viruses are responsible for the majority of cases, chiefly rotavirus. In temperate climates, a distinct winter peak can be observed for rotavirus incidence, while developing countries tend to have a high year-round prevalence of gastroenteritis.

Prevention of diarrhoea

Close attention to all those factors that predispose to faecal-oral transmission will reduce the incidence of infective diarrhoea. A sufficient

Table I: Progressive signs of dehydration

Features of progressive worsening of dehydration →			
Potential dehydration	Moderate dehydration	Severe dehydration with Compensated ---------- Uncompensated circulatory failure and shock	
Losing water in stools faster than intake	Dry mouth and mucosa Reduced urine and secretions Sunken eyes and fontanel Decreased skin turgor Irritability	Much reduced skin turgor Vasoconstricted (CFT >3 sec) Tachycardia Metabolic acidosis Apathy	Deep acidotic breathing Feeble pulses Hypotension Depressed consciousness level

* CFT = Capillary filling time

supply of fresh water "dilutes" any contamination. Intrafamilial spread can be limited by very careful attention to hygiene including hand washing and having separate feeding utensils. Public health measures include notification of epidemic outbreaks. A rotavirus vaccine is becoming available and is likely to reduce the incidence of severe gastroenteritis.

Clinical features and differentiation

Some clinical features point to a particular pathogen, but in general, the clinical presentation does not allow a confident aetiological diagnosis to be made. After a variable incubation period, there is an abrupt onset of vomiting followed by the development of watery diarrhoea. There may be fever and some cramp-like abdominal pain. Patients with rotavirus infections often have respiratory symptoms at the onset. Where the large gut is also involved, mucus and blood are seen in the stool and pain is more prominent. This is the picture of dysentery, when stool culture for shigella or *E.coli* or the search for *Clostridium difficile* becomes mandatory.

The chief danger of acute gastroenteritis lies in the development of dehydration. Each watery stool represents fluid already lost to the body. The clinical signs of dehydration lag behind the actual amount of fluid lost, so the number and size of watery stools is a better guide to the requirement for extra fluids than clinical assessment.

Management

In holistic management of a child with gastroenteritis, the following principles apply, and will be discussed individually:

- Replace the fluids and electrolytes which are lost
- Remember nutritional management
- Investigations may be needed
- Drug therapy has limited value
- Follow-up to ensure recovery

Dehydration and Fluid Therapy (see Table II)

The best guide to dehydration is the history of observed water loss in stools. There is a poor correlation between the clinically observed features of dehydration and the degree of actual dehydration[1,2]. Table 1 lists the commonly seen features of dehydration. A continuously progressive spectrum of features depends on the nutritional state, body sodium, and type and speed of fluid losses in the stool, but no single parameter accurately defines either the presence or severity of dehydration. Dehydration involves all body water compartments and will ultimately result in circulatory insufficiency and shock. In managing a patient with severe dehydration one must assess the state of the circulation for shock because that calls for resuscitation rather than just rehydration.

The management of the dehydrated patient[3] depends on a careful assessment of the state of the circulation and the need for resuscitation. A number of criteria can be applied to decide on the need for an intravenous drip:

Indications for intravenous drip in dehydration

- Shock and peripheral circulatory failure
- Severe acidosis with vasoconstriction
- Encephalopathy
- Significant abdominal distension (ileus or intestinal obstruction)
- Deterioration or lack of improvement after adequate oral fluids for 2 – 4 hours
- Persistent severe vomiting after 2 – 4 hours of adequate oral fluids

In most instances, oral rehydration is appropriate and fully effective. Commercial rehydration solutions contain a sugar (eg glucose), sodium, potassium and a base eg citrate or bicarbonate to replace the losses. Infants may refuse to drink because of intestinal discomfort or because they do not like the taste, but if they are significantly dehydrated they may be so thirsty that they gulp down large quantities of solution too fast and then vomit. In the first instance, the taste

Table II: Outline of practical fluid therapy of dehydrating watery diarrhoea

	Severe dehydration with shock *Needs urgent fluids and resuscitation*	**Moderate dehydration** *Needs oral rehydration*	**Not obviously dehydrated** *Potential dehydration for home treatment*
Evaluation	■ General condition? *Lethargic or unconscious* *Deep breathing* ■ Capillary filling time? Peripheral pulse? *More than 3 seconds, weak fast pulse* ■ Skin pinch, eyes? *Much reduced, sunken* ■ Can the child drink? *Not able to drink*	■ General condition? *Restless or irritable* ■ Capillary filling? Pulse and circulation? *Less than 4 seconds* *Pulse and blood pressure maintained* ■ Skin pinch, eyes? *Reduced, sunken* ■ Can the child drink? *Thirsty, drinks eagerly*	■ General condition? *Still reasonable* ■ Capillary filling? *Normal, less than 2 seconds* ■ Skin pinch, eyes? *Not abnormal* ■ Can the child drink? *Yes, not overly thirsty*
Action	***Start iv drip and give Ringers Lactate, 30 ml/kg in 1 hour*** ***After 1 hr : Reassess pulse, circulation, capillary filling time: Still in shock? Do blood tests as below*** ■ ***YES :*** *Repeat bolus of Ringer Lactate, 20 ml/Kg; Refer to ICU if not responding* ■ ***IMPROVED, passing urine:*** ***Change drip to ½ Darrows/Dextrose 5%, 10 ml/kg/hr*** ***Reassess in 4 hours : General state better, able to take oral fluids?*** ■ ***YES :*** *Reduce drip rate to 5 ml/kg/hr and start oral rehydration (next column)* ■ ***NO :*** *Evaluate blood test results, stool and urine output, increase drip rate to 10 – 15 ml/kg/hr if necessary* ***Reassess in 4 hours: Hydration better, able to take oral fluids?*** ■ ***YES :*** *Reduce drip rate by 5 ml/kg/hr and start oral rehydration (next column)*	***Give supervised ORS for 4 – 6 hrs :*** *Sorol ® or other commercial ORS : Start with small amounts; increase to offer 15 – 20 ml / kg / hr in small frequent sips* *If he wants more, offer more. Do not allow child to drink large volumes because of risk of vomiting* *If he vomits, wait 10 minutes and give again in small frequent quantities* ***Reassess after 4 hours: Hydration better, not vomiting, wanting food?*** ■ ***YES :*** *Start small feeds including breastfeeds, follow with additional ORS as in next column* *If hydration maintained well on drip rate < 5ml/kg/hr, consider stopping the drip* ■ ***NO :*** *Evidence of shock? Resuscitate as before* *Hydration worse? Check fluid administration (how much given?), consider drip or increase oral fluids*	***Give extra fluids after small feeds and after each diarrhoeal stool*** *Continue breastfeeding or formula and give food as tolerated. Offer ORS after each stool and after feeds :Offer 10 ml/kg, but if patient wants more, offer more in frequent small sips to avoid vomiting* *May need to disguise the taste of ORS with juice etc* *Explain how ORT works: replacement of water losses but not treatment of diarrhoea per se* *Explain natural history of disease* ***In hospital:*** *Review hydration twice daily. Weigh daily: Weight loss reflects dehydration. Discharge once hydration maintained without drip and stools becoming less watery* ***Home management:*** *Diarrhoea must stop within a week. Give extra food for nutritional recovery.* *To come back if stools become bloodstained, diarrhoea not stopping in a week or if she is still worried*
Investigation	Do U&E, blood gases after resuscitation. Do finger prick blood glucose. Check urine by dipstick.	Do finger prick blood glucose. Check urine by dipstick.	*Check urine by dipstick.*

may be hidden with the addition of sweetened juices, and in all cases the solution should be offered in small quantities at a time (eg 50 ml every 15 minutes rather than 200 ml every hour.)

Table 2 shows a practical approach to rehydration based on the initial assessment of circulation and dehydration. The aim is to resuscitate and then to proceed to oral rehydration as soon as is feasible.

Nutritional management

Normally nourished infants with acute onset diarrhea do not require modification of their feeds. In particular, breastfeeding should be continued or even increased. In the

acute phase, the feed quantity offered should be adapted as tolerated, but once vomiting has ceased, food should not be withheld. Malnourished and very young infants have a higher risk of intestinal mucosal damage with gastroenteritis and should be evaluated for digestive disturbance such as lactose intolerance if the diarrhoea persists beyond 5 – 7 days.

Drug therapy

Antibiotics need to be used only if the child is significantly malnourished, if fever persists after 24 hours, if the stools are bloodstained or a bacterial infection is suspected. The choice of antibiotic depends on the suspected organism. In patients with blood-stained stools choose ceftriaxone, a macrolide or quinolones for suspected shigella or E.coli. *Antidiarrhoea medication* is used in selected cases under specialist supervision only.

In malnourished children, potassium and zinc supplementation is indicated.

Nosocomial or antibiotic-associated diarrhoea is an indication for the consideration of probiotic use.

Follow-up to ensure recovery

Even though acute gastroenteritis is a self-limited condition in the majority of instances, each child should be followed up to ensure recovery with normal stools and resumption of normal weight gain. Persistent diarrhoea due to intestinal mucosal damage is an important cause of nutritional deterioration, morbidity and mortality. Therefore, it is usual to recommend additional meals daily for about 2 weeks after recovery from the diarrhoea episode to make up for the period of weight loss during the acute illness.

See CPD Questionnaire, page 52

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