

Diarrhoea and Vomiting in Children

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Purpose

To guide the management of diarrhoea and vomiting in children.

Intended Audience

Clinicians involved in the management of diarrhoea and vomiting

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1. Introduction

Acute gastroenteritis is defined as a decrease in the consistency of stools (loose or liquid), and/or increase in the frequency of evacuations (typically >3 in 24 hours), with or without fever or vomiting which may last anything from a few hours up to 14 days.

This is a common problem worldwide, causing over 2 million deaths per year in children under 5 years of age. . Of these deaths, up to 600,000 are caused by rotavirus. Gastroenteritis leads to hospital admission in 7/1000 children and 204/1000 general practitioner consultations in children under 5 years in the UK.

Acute gastroenteritis is a common problem in childhood, which results from infection of the gastrointestinal tract, most commonly with a virus.

It is characterized by rapid onset of diarrhoea with or without vomiting, nausea, fever, and abdominal pain. In children, the symptoms and signs can be non-specific.

Severe diarrhoea and vomiting can lead to dehydration, which may require hospital admission, but gastroenteritis can usually be managed at home with advice from healthcare professionals. Regardless of the cause, the mainstay of management of acute gastroenteritis is provision of adequate fluids to prevent and treat dehydration.

2. Intended Audience

Clinicians involved in the management of diarrhoea and vomiting

3. Guideline Content

A. AETIOLOGY

Viral (87%) – rotavirus (70%)

Bacterial – Salmonella, shigella, campylobacter, enteropathic E.Coli

Protozoal – amoeba histolytica, giardia

B. DIAGNOSIS

Take an accurate history.

There is often a history of contact with another person with the same symptoms or exposure to known source of enteric infection or recent travel abroad.

The following features (Box 1) may occur in gastroenteritis, but alternative diagnoses (Table 1) need to be considered, investigated and a review by a senior doctor should occur.

Box 1	
Temperature of 38°C or higher (younger than 3 months)	Bulging fontanelle (in infants)
Temperature of 39°C or higher (3 months or older)	Non-blanching rash
Shortness of breath or tachypnoea	Blood and/or mucus in stool
altered conscious state	Bilious (green) vomit
Neck stiffness	Severe or localised abdominal pain
Abdominal distension or rebound tenderness	

Table 1	
Infections	Enteral: Viral, bacterial, parasitic Non enteric (UTI, Pneumonia, Otitis media)
Surgical	Appendicitis, Intussusception, Obstruction, Short Bowel syndrome
Systemic illness	Endocrinopathy (Diabetes, Hyperthyroidism, Congenital Adrenal Hyperplasia, Addison's disease, Hypoparathyroidism), immunodeficiency
Antibiotic associated	Pseudomembranous colitis
Dietary disturbance	Food allergy/ Intolerance
Malabsorption	Cystic fibrosis, Coeliac disease
Inflammation	Inflammatory bowel disease, Hirschsprung's enterocolitis
Miscellaneous	Constipation with overflow, Toxins, Haemolytic-uraemic syndrome (HUS), Toddler diarrhoea, Child abuse (Munchausen by proxy, sexual)
Idiopathic/ Psychogenic	Irritable bowel syndrome

Notify and act on the advice of the public health authorities if you suspect an outbreak of gastroenteritis.

C. ASSESSMENT**Assessment for dehydration and shock:**

Assess percentage dehydration by percentage loss of body weight, which is the best measure of dehydration (if known) and clinical findings.

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Parental report of normal urine output indicates a low likelihood of dehydration. Capillary refill time, skin turgor and respiratory time are the three best individual signs for the assessment of dehydration with CRT being the most useful individual sign for predicting severe dehydration.

Recognise the following risk factors or co-morbidities that increases the risk of dehydration (Box 2)

Box 2
<ul style="list-style-type: none">• Younger than 1 year, especially those younger than 6 months• Infants who were of low birth weight• Passed six or more stools in the previous 24 hours• Vomited three times or more in the previous 24 hours• Have not been offered or unable to tolerate, supplementary fluids before presentation• Infants who have stopped breast feeding during the illness• Signs of malnutrition• Short gut syndrome• Ileostomy• Complex/cyanotic congenital heart disease• Renal transplants or renal insufficiency• Recent use of potentially hypertonic fluids (eg Lucozade)• Other chronic conditions• Repeated presentations for same/similar symptoms

Table 2 helps to detect clinical dehydration and shock. More numerous and more pronounced symptoms and/or signs of clinical dehydration indicate greater severity.










Red flag () symptoms and signs may help to identify children at increased risk of progression to shock. If in doubt, manage as if there are red flag symptoms or signs. Dashes (–) indicate that these clinical features do not specifically indicate shock.

Table 2

Increasing severity of dehydration 			
Symptoms (remote and face-to-face assessments)	No clinically detectable dehydration	Clinical dehydration	Clinical shock
	Appears well	 Appears to be unwell or deteriorating	-
	Alert and responsive	 Altered responsiveness (for example, irritable, lethargic)	Decreased level of consciousness
	Normal urine output	Decreased urine output	-
	Skin colour unchanged	Skin colour unchanged	Pale or mottled skin
	Warm extremities	Warm extremities	Cold extremities
Signs (face-to-face assessments)	Alert and responsive	 Altered responsiveness (for example, irritable, lethargic)	Decreased level of consciousness
	Skin colour unchanged	Skin colour unchanged	Pale or mottled skin
	Warm extremities	Warm extremities	Cold extremities
	Eyes not sunken	 Sunken eyes	-
	Moist mucous membranes (except after a drink)	Dry mucous membranes (except for 'mouth breather')	-
	Normal heart rate	 Tachycardia	Tachycardia
	Normal breathing pattern	 Tachypnoea	Tachypnoea
	Normal peripheral pulses	Normal peripheral pulses	Weak peripheral pulses
	Normal capillary refill time	Normal capillary refill time	Prolonged capillary refill time
	Normal skin turgor	 Reduced skin turgor	-
Normal blood pressure	Normal blood pressure	Hypotension (indicates decompensated shock)	

Hypernatraemia is uncommon but suspect in those with history and physical findings that seem unusual for straightforward gastroenteritis and if there are any of the following:

- jittery movements
- doughy feel to the skin
- increased muscle tone
- hyperreflexia

- convulsions
- drowsiness or coma.

D. INVESTIGATIONS

Laboratory investigations:

In most children with gastroenteritis who are well enough to be discharged, no investigations are required.

Stools for M,C&S, electron microscopy or ELISA for viruses if admitted, blood or mucus in the stool or child is immunocompromised

Consider MC&S including Giardia if:

recently travel abroad or the diarrhoea has not improved by day 7

Blood tests are not necessary in simple gastroenteritis but measure serum electrolytes including glucose if:

- severe dehydration
- intravenous fluid therapy required
- symptoms and/or signs suggesting hyponatraemia
- altered conscious state
- co-morbidity of renal disease or on diuretics
- ileostomy

There is no haematological marker that reliably differentiates between bacterial and nonbacterial acute gastroenteritis and is of little value.

Measure venous blood acid–base status and chloride concentration if shock is suspected or confirmed.

Urine for culture.

Other investigations as indicated.

E. TREATMENT

Indications for Hospital Admission

- Shocked
- Severe dehydration
- Intractable or bilious vomiting
- ORS treatment failure (e.g. vomiting or refusing).
- Neurological abnormalities (lethargy, seizures etc)
- Suspected surgical condition
- <6 months in some cases – have a lower threshold for admission.
- Parents or cares unable to manage the child's condition at home successfully or social concerns
- Other reasons for concern

Rehydration therapy:

Oral fluids, oral rehydration solution (ORS) should be used as first-line treatment

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whenever possible. If oral rehydration is not feasible, then nasogastric route should be attempted. Nasogastric tube rehydration is associated with significantly fewer major adverse events and a shorter hospital stay compared with intravenous therapy and is successful in most children. Most children stop vomiting after NGT fluids are started. Children who are able to receive oral rehydration therapy should not be given intravenous fluids.

For children without clinical dehydration:

- Advise continuing with usual feeds, including breastfeeding and other milk feeds
- Encourage fluid intake
- Discourage drinking fruit juice and carbonated drinks
- Offer low osmolarity ORS (oral rehydration solution eg Dioralyte or equivalent as a supplemental fluid to children at increased risk of dehydration

Dioralyte (240-250 mOsm/L) contains the following:

Na ⁺ 60 mmol/L	citrate 10 mmol/L
K ⁺ 20 mmol/L	glucose 90 mmol/L
Cl ⁻ 60 mmol/L	

In children with clinical symptoms or signs of dehydration (including hypernatraemic):

Use low osmolarity ORS solution to rehydrate:

- In children age 5 years and younger, give 50mL/kg over 4 hours plus maintenance volume
- In children older than age 5 years, give 200mL ORS solution after each loose stool plus child's normal fluid intake
- Try giving ORS frequently and in small amounts
- Consider supplementation with the child's usual fluids if they refuse to take sufficient quantities of ORS solution, and do not have serious symptoms and signs
- Monitor response to rehydration by regular clinical assessment
- Consider giving ORS via a nasogastric tube if a child is unable to drink it or vomits persistently.

Maintenance fluid volume requirements:

- less than 10kg body weight – 100ml/kg per day
- 10-20kg body weight – 1000ml plus 50ml/kg for each kg over 10kg
- over 20kg body weight – 1500ml plus 20ml/kg for each kg over 20kg

Calculation of fluid volume requirements:

Deficit (replace over 4 hours) + maintenance (give over 24 hours)

Deficit:

- Mild to moderate dehydration 50 mls/kg + maintenance
- Severe dehydration 100 mls/kg + maintenance

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e.g.

A 15 kg child who shows clinical signs of dehydration would require:

- Deficit= 50mls/kg over 4 hours = 750 mls (187.5mls/hour for the first 4 hours)
- Maintenance= (1000ml) + (5×50) = 1250mls over 24 hours or 52mls/hour

Therefore 239.5mls/hour for the first 4 hours then 52mls/hour

Decrease to maintenance fluids if no signs of dehydration

Ongoing or additional losses, give a drink of ORS, 10ml/kg each time the child has large vomit or a loose stool. If hydration state is inadequate at reassessment, give a further 4 hours rehydration as above and reassess.

Treatment of shock:

Use a rapid intravenous infusion of 20mL/kg of 0.9% sodium chloride solution, if:

- shock is suspected or confirmed
- a child with red flag symptoms or signs shows clinical deterioration despite oral rehydration therapy
- a child persistently vomits the ORS given orally or via a nasogastric tube

If the child remains shocked after the first infusion:

- immediately give another rapid intravenous infusion of 20mL/kg of 0.9% sodium chloride solution
- consider possible causes of shock other than dehydration
- consider consulting a paediatric intensive care specialist

Where signs and symptoms of shock resolve, start rehydration with intravenous fluid therapy

Intravenous fluid therapy for rehydration:

If child is not hypernatraemic:

- Use isotonic solution, such as sodium chloride 0.9% with or without glucose 5%
- Add 100ml/kg for children who required treatment for shock, or 50ml/kg for children who were not shocked to maintenance fluid requirements given over 24hours and monitor clinical response
- Measure at start and regularly thereafter plasma levels of sodium, potassium, urea, creatinine and glucose, and alter fluid composition or rate of administration as necessary
- Consider IV potassium supplementation if necessary
- Continue breastfeeding if possible and change to oral fluids as soon as possible.

In children with hypernatraemic (sodium above 150mmol/L) dehydration:

- obtain urgent specialist advice on fluid management

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- use isotonic solution, such as sodium chloride 0.9% with or without glucose 5%
- replace the fluid deficit slowly as rapid rehydration may lead to cerebral oedema – typically over 48 hours
- monitor plasma sodium frequently
- Check urea & electrolytes and acid/base 6 hourly and aim for a sodium reduction rate of less than 0.5mmol/L per hour. Use additional K⁺ containing fluids according to results of biochemistry.
- Haemolysis and hypoproteinaemia may occur.

For all children, attempt early and gradual introduction of oral rehydration during intravenous fluid therapy.

Potassium:

As a first line, it is not usually necessary to start with a potassium containing fluid, but be guided by blood biochemistry. Once the patient is on IV fluids, and there are ongoing GI losses, it will be necessary to add K⁺ containing fluid in the first 24 hours.

Monitoring of rehydration:

A careful reassessment after 4 hours, then 6-8 hourly needs to occur to guide ongoing fluid therapy looking particularly for:

- Weight change
- Clinical signs of dehydration
- Urine output
- Ongoing losses
- Signs of fluid overload

Active treatment:

Medications:

- Antidiarrhoeal are not recommended for children with gastroenteritis.
- Recent evidence suggests some children may benefit from Ondansetron in terms of reducing vomiting and likelihood of hospital admission. However the evidence is weak and there is also evidence that Ondansetron increases the frequency of diarrhoea. For these reasons we are not currently recommending its routine use.
- Do not routinely give antibiotics to children with gastroenteritis – seek specialist advice when:
 - the child has recently been abroad
 - stool culture reveals a causative organism
- Antibiotic treatment is indicated for:
 - children younger than age 6 months, malnourished, or immunocompromised and who have Salmonella gastroenteritis
 - Clostridium difficile associated pseudomembranous enterocolitis
 - Giardiasis

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- Dysenteric shigellosis
- Dysenteric amoebiasis
- cholera
- probiotics are not recommended for management of children with gastroenteritis

Criteria for hospital discharge:

- rehydration achieved
- weight gain and/or clinical status improved
- intravenous or nasogastric fluids are not required
- oral intake of fluids equals or exceeds losses
- parents/carers are able to provide adequate management
- medical follow-up is available if needed

After rehydration, advise parents to

- Ensure the child drinks plenty of their usual fluids, including milk feeds
- Avoid giving the child fruit juices and carbonated drinks until the diarrhoea has stopped
- Reintroduce the child's usual diet
- Give children at increased risk of dehydration recurring 5ml/kg of ORS solution after each large watery stool
- Restart oral rehydration therapy if dehydration recurs after rehydration.

If diarrhoea recurs on reintroduction of milk the child may have developed secondary lactose intolerance and empirical use of lactose free formula can be administered. Advise cautious reintroduction after 4 weeks.

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