

**Acute Gastroenteritis (Emergency Department and Paediatrics - Full Paediatric
Clinical Guideline – Derby & Burton**

Reference no.: CH CLIN C55/Feb 21/v002

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1. Background

Acute gastroenteritis is characterised by an increase in stool frequency with decrease in consistency (usually at least 3 times in 24 hours) and/or the onset of vomiting. Other common features include nausea, fever, anorexia and abdominal pain, although the latter should not be the predominant presenting feature. Bouts of gastroenteritis normal last less than 7 days although persistence up to 14 days can be seen.

Differential diagnoses for diarrhoea/vomiting should include the following:

See chart below

Category	Examples
Infection	Gastroenteritis UTI

	Tonsillitis Pneumonia Upper respiratory tract infection
Surgical	Appendicitis Intussusception Obstruction
Endocrine	Diabetes MCADD Hyperthyroidism
Inflammation	Ulcerative Colitis Crohn's disease Enterocolitis
Malabsorption	Cystic fibrosis Coeliac disease
Miscellaneous	Food intolerance Constipation with overflow Toddler's diarrhoea Irritable Bowel Syndrome Antibiotic associated diarrhoea Raised ICP

Up to 80% of gastroenteritis cases in children are caused by viruses, with rotavirus, norovirus and adenovirus being the most common. Other causes include toxin related diarrhoea and vomiting from cooked or reheated meat and rice dishes (often lasting less than 12 hours) and infective bacterial gastroenteritis due to organisms like Campylobacter, E. coli, Salmonella and Shigella.

An alternative diagnosis should be considered if any of the following features are present:

- Fever:
 - Temperature of 38°C or more in children younger than 3 months of age.
 - Temperature of 39°C or more in children 3 months of age or older.
- Shortness of breath or tachypnoea.
- Altered conscious state.
- Neck stiffness.

- Bulging fontanelle in infants.
- Non-blanching rash.
- Blood and/or mucus in stool.
- Bilious (green) vomit.
- Severe or localized abdominal pain.
- Abdominal distension or rebound tenderness.

2. Initial Assessment/Triage

The diagnosis of acute gastroenteritis is based on the following:

- Decrease in consistency of stools with increase in stool frequency **AND/OR**
- Sudden onset of vomiting

Initial assessment should include a brief history of the illness, observations including heart rate, respiratory rate, oxygen saturations, temperature, blood pressure, and blood glucose. An assessment of hydration status using the following tool should then be done.

Characteristic	Score 0	Score 1	Score 2
General appearance	normal	thirsty, restless, decreased activity, irritable when touched	drowsy, limp, cold +/- comatose
Eyes	normal	slightly sunken	extremely sunken
Mucous membranes	moist	sticky	dry
Tears	normal	reduced tears	absent tears

This should give a score from 0-8:

- **Score 0** = no dehydration
- **Score 1-4** = some dehydration
- **Score 5-8** = moderate or severe dehydration

Based on this score initial fluid management or clinician assessment can be instigated as follows:

- **Score 0** – Not dehydrated
 - Start on 5ml every 5 minutes of ORS or dilute fruit squash (if ORS not tolerated).
- **Score 1-4** - Needs rehydration.

- Start with ORS at 50ml/kg over 4 hours
 - Calculate total needed over 4 hours and then divide by 48 to get volume needed every 5 minutes
 - *Example: 10kg child needs 500ml over four hours = 125ml per hour - approx. 10ml every 5 minutes*
- **Score 5-8** - Senior doctor to review
 - May need intravenous fluids (see section 3.3 for details)
 - Consider transfer to resuscitation area depending on clinical presentation
 - If giving oral fluids give ORS at 50ml/kg over 4 hours

Provide parents with fluid challenge sheet with volumes detailed on sheet and ask them to record times and volumes given, plus any vomits or diarrhoea. If the child appears unwell at triage then inform the senior doctor on duty in CED and ask for immediate review.

3. Clinician Assessment

Assessment is designed to confirm the diagnosis of gastroenteritis, or identify an alternative diagnosis. It is important to remember that diarrhoea and vomiting can be the presenting feature of sepsis or other conditions in some patients (See section 1).

3.1. History

History of the illness should include the following:

- What are the onset, sequence and duration of symptoms?
- Are other family members or contacts (including pets) unwell?
- Any recent foreign travel?
- Has there been consumption of possible unsafe foods e.g. BBQ / take away?
- Has the child visited any farms recently?
- Any recent medication use (particularly antibiotics)?
- Has the child had a recent weight? Any weight loss noted?
- Any immunodeficiency known?
- Does the child have any other significant medical co-morbidities, for example cardiac disease, ventriculo-peritoneal shunt, inborn errors of metabolism?

The history should also include the number of episodes of vomiting and loose stools, the number of times that the child has passed urine in the last 24 hours, and how long since the last urination.

3.2. Assessment of dehydration

A clinical diagnosis of dehydration is difficult and often inaccurate. The accepted gold standard is acute weight loss but this is often not possible due to lack of accurate pre-illness weight. A weight should be recorded at presentation and if possible, compared to any recent weight measurements.

The following guide can be used to help clinicians assess for dehydration and shock in a child. More numerous and more pronounced symptoms and/or signs of clinical dehydration indicate greater severity. For clinical shock, one or more symptoms or signs would be present. An overall assessment is more accurate than looking at individual symptoms & signs.

Red flag (*) symptoms and signs may help to identify children at increased risk of progression to shock. If in doubt, manage as red flag symptoms or signs are present.

	No clinically detectable dehydration	Clinical dehydration	Clinical Shock
Symptoms	Appears well	*Appears unwell and deteriorating	–
	Alert and responsive	* Altered responsiveness	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	Alert and responsive	* Altered responsiveness	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	Dry mucous membranes	–
	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)

3.3. - Investigations

Investigations for simple gastroenteritis are rarely necessary. However, the following investigations may be used.

3.3.1.- Blood tests

- Measure urea and electrolytes if
 - Signs/symptoms of hypernatraemia (severe dehydration, confusion, lethargy)
 - Intravenous fluids are required
- Check a venous blood gas if clinically shocked

3.3.2.– Stool samples

- **Perform** stool microbiology if:
 - Suspected septicaemia
 - Blood and/or mucus in stool
 - Child is immunocompromised
- **Consider** stool microbiology if:
 - Child has recently been abroad
 - No improvement after 7 days
 - Uncertainty about diagnosis

4. Management

4.1. No dehydration

- Continue breastfeeding and other milk feeds
- Encourage oral fluids. Can give children 5ml of fluid every 5 minutes to ensure able to tolerate oral fluids
- Discourage fruit juice and carbonated drinks until diarrhoea has resolved
- Offer ORS as supplementary fluid in those at increased risk of dehydration (see below)

Children at great risk of developing dehydration
Infants younger than 1 year of age, particularly if younger than 6 months
Passed 5 or more loose stools in the preceding 24 hours
Vomited 3 or more times in the preceding 24 hours
Have either not been offered or not tolerated supplemental fluids before presentation to medical professional
Infants of low birth weight
Infants who have stopped breastfeeding during this illness
Children with signs of malnutrition
Children who are normally fed through a PEG tube or nasogastric tube.

4.2. Mild-Moderate dehydration

- Low osmolarity ORS is the preferred fluid for rehydration. Dilute squash is not a substitute but can be used to disguise the taste of ORS
- Volume of ORS for rehydration is 50ml/kg given in small aliquots over 4 hours. For example a 20kg child will require 1000ml in 4 hours, or 20ml every 5 minutes, plus maintenance fluid.
- This fluid can be supplemented with normal fluid, such as breast milk, milk feeds or water, but not carbonated drinks or fruit juice, if not taking sufficient ORS
- If there is persistent vomiting or child is refusing to drink then consider use of a nasogastric tube to deliver ORS
- If there is persistent vomiting then oral ondansetron can be used in the absence of any contraindications (See section 4.4)
- Intravenous fluids may be indicated if a child continues to vomit persistently despite ondansetron and/or use of nasogastric tube. For information about fluid prescription see Appendix 1.

4.3. Shock

- Diarrhoea/vomiting lead to shock is rare
- Involve a senior (ST4 and above) early in the patient's care
- If child is shocked then give 20ml/kg of 0.9% NaCl as a rapid intravenous infusion (bolus)
- If child remains shocked after the first rapid intravenous infusion then
 - Give second rapid intravenous infusion of 20ml/kg 0.9%NaCl **AND**
 - Consider cause of shock other than dehydration
- If child remains shocked after the second fluid bolus then consider involving paediatric intensive care specialist
- Once signs and symptoms of shock have resolved then start intravenous fluids for rehydration (See Appendix 1). Measure plasma sodium, potassium, urea, creatinine and glucose at start of treatment and monitor regularly (at least every 24 hours).

4.4. Use of Anti-emetics

Oral ondansetron can be used at standard doses if there is evidence of dehydration and oral rehydration has failed, with no indications for immediate intravenous fluids. A Cochrane review (Carter and Fedorowicz, 2012) confirmed that use of oral ondansetron can significantly increase the rate of cessation of vomiting, reduce the need for intravenous rehydration and reduce hospital admissions. The Canadian Pediatric Society recommends a single dose of oral ondansetron in children aged 6 months to 12 years with vomiting associated with gastroenteritis, who have mild to moderate dehydration and have failed oral rehydration due to vomiting.

Ondansetron is licensed for the management of chemotherapy induced cause and vomiting in children aged 6 months or over, and in the prevention and treatment of post-operative nausea and vomiting in children aged at least 1 month. It is not licensed for the treatment of nausea and vomiting in gastroenteritis in children.

- **Ondansetron should not be used in children with diarrhoea as the predominant feature as one of the most common adverse effects of ondansetron is loose stools.**
- **Ondansetron should not be used in children who are known to have risk factors for QT prolongation**

Oral Ondansetron Doses for Child 6 months to 17 years	
Body weight up to 10.1kg	2mg
Body weight 10.1 - 40kg	4mg
Body weight 41kg and over	8mg

- The intravenous dose of ondansetron is 100micrograms/kg with a maximum dose of 4mg

5. Discharge

5.1. No dehydration

If there are no signs of dehydration and the child has tolerated some oral fluids they can be discharged home with safety netting advice and gastroenteritis advice leaflet. Children are likely to continue to vomit occasionally but as long as their fluid intake is supported parents should be reassured this is normal.

5.2. Mild-Moderate dehydration

Ensure that child has tolerated an appropriate volume of oral fluid and that signs of dehydration have improved. If child is tolerating oral fluids and dehydration is resolving then child may be discharged home with safety netting advice and gastroenteritis advice leaflet. If oral fluids are not being tolerated or the symptoms of dehydration are not improving then consider admission to the paediatric ward or observation unit depending on location. These cases should be discussed with the senior on duty.

5.3. Shock

These children will require admission to the paediatric ward. Ensure that shock has resolved prior to admission and if the child is requiring repeated fluid boluses to treat the shock then consider referral to PICU. Ensure that ongoing fluid requirements are being met prior to admission to the ward, either intravenous or oral maintenance fluids. These children must be discussed with the senior on duty.

5.4. Discharge advice

Advice leaflets should be available for parents on discharge. Most children with gastroenteritis can be managed at home, with advice from a healthcare professional as needed. Parents/carers need to contact a healthcare professional if any of the following signs and symptoms develop:

- Appearing to get more unwell
- Change in behaviour (for example irritable, lethargy)
- Decreased urine output
- Pale, mottled skin
- Cold extremities

After rehydration, parents should encourage the child to drink plenty of their usual fluids, including milk feeds. They may find that giving fluids little and often can help prevent further vomiting. Children who were dehydrated in CED may benefit from the ongoing use of ORS as a rehydration fluid at home. Fruit juice or carbonated drinks should be avoided until the diarrhoea has resolved. Normal diet can be re-introduced as tolerated once children are rehydrated.

Advise the carers/parents that diarrhoea usually lasts 5-7 days, and in most children should stop within 2 weeks. Vomiting usually lasts 1-2 days, and in most children should stop by 3 days. If the

child's symptoms do not resolve within these timeframes then they should seek advice from a healthcare professional.

To prevent the spread of diarrhoea and vomiting, advise the parents/carers and children that:

- Washing hands with soap (liquid if possible) in warm running water and careful drying are the most important factors in preventing the spread of gastroenteritis
- Hands should be washed after going to the toilet (children) or changing nappies (parents/carers) and before preparing, serving or eating food
- Towels used by infected children should not be shared
- Children should not attend any school or other childcare facility while they have diarrhoea or vomiting caused by gastroenteritis
- Children should not go back to their school or other childcare facility until at least 48 hours after the last episode of diarrhoea or vomiting
- Children should not swim in swimming pools for 2 weeks after the last episode of diarrhoea

6. References (including any links to NICE Guidance etc.)

- 1) <https://www.uptodate.com/contents/acute-viral-gastroenteritis-in-children-in-resource-rich-countries-clinical-features-and-diagnosis> MacGillivray, S., Fahey, T. and McGuire, W., (2013).
- 2) <https://cks.nice.org.uk/topics/gastroenteritis/background-information/causes/>
- 3) Diarrhoea and vomiting caused by gastroenteritis in under 5s: diagnosis and management: NICE Clinical Guideline 84; 2009
- 4) Management of vomiting in children and young people with gastroenteritis: ondansetron: NICE clinical evidence summary (EUSOM34); 2014
- 5) European Society for Pediatric Gastroenterology, Hepatology, and Nutrition/European Society for Pediatric Infectious Diseases Evidence-Based Guidelines for the Management of Acute Gastroenteritis in Children in Europe: Update 2014; Guarino et al, 2014: JPGN: 59 (1); 2014
- 6) Intravenous fluid therapy in children and young people in hospital: NICE Guideline 29; 2015
- 7) Intravenous (IV) Fluids - Paediatric Full Clinical Guideline - Joint Derby and Burton - Reference no.: CH CLIN G44/ Aug 20/v008
- 8) Armon K, Stephenson T, MacFaul R, Eccleston P and Werneke U An evidence and consensus based guideline for acute diarrhoea management. Arch Dis Child 2001;85:132-142
- 9) Murphy MS Guidelines for managing acute gastroenteritis based on a systemic review of published research Arch Dis Child 1998;79:279-284

7. Documentation Controls

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8. Appendices

Appendix 1 – Intravenous fluid prescription

For further information regarding intravenous fluid prescription please refer to the Intravenous (IV) Fluids - Paediatric Full Clinical Guideline - Joint Derby and Burton (CH CLIN G44)

The daily fluid requirement can be estimated using the following method.

Child's weight (kg)	Volume of fluid (ml/kg/day)
First 10kg	100
Second 10 kg	50
Every subsequent kg	20

Example – Child weighing 35kg requires maintenance fluids

- First 10kg: $10 \times 100\text{mls} = 1000\text{mls} +$
- Second 10kg: $10 \times 50\text{mls} = 500\text{mls} +$
- Every subsequent kg $15 \times 20\text{mls} = 300\text{mls}$
- = **1800mls** total daily requirement. Rate: $1800 / 24 \text{ hours} = 75 \text{ mls/hr}$

Type of intravenous fluids to use

- Use 0.9% NaCL for fluid boluses
- Use isotonic fluids for maintenance fluids
 - 0.9% sodium chloride with 5% glucose plus potassium chloride
- Amount of potassium depends upon patient's weight:
 - If under 20kg 10mmol potassium chloride per 500ml bag
 - If over 20kg 20mmol potassium chloride per 500ml bag

Measure urea and electrolytes as starting intravenous fluids and then monitor frequently whilst continuing on intravenous fluids - at least every 24 hours. If there is hypernatraemia (sodium over 145mmol/L) or hyponatraemia (sodium under 135mmol/L) seek guidance from senior medical staff.

If you are replacing a deficit with your maintenance fluids this will need to be calculated separately and is normally replaced over 48 hours. Additional ongoing losses also need to be considered. Please see the Intravenous (IV) Fluids - Paediatric Full Clinical Guideline - Joint Derby and Burton (CH CLIN G44) for more detail.