Infectious gastroenteritis

Author: Dr Emily Walton, Dr Nuha Basheer, Dr Miki Lazner
Publication date: August 2018. Approved by the Drug & Therapeutics Committee September 2018
Review date: August 2020

See also: Intravenous fluids in paediatric medical patients

Background

- Sudden onset of diarrhoea (change in consistency and/or frequency of stools) +/-
  - Fever (usually low grade)
  - Abdominal pain (usually mild)
  - Vomiting - often precedes diarrhoea but be cautious diagnosing gastroenteritis if isolated vomiting in the absence of diarrhoea
- Vast majority are viral and no specific investigations are required for diagnosis.
- Look for an alternative diagnosis if red flag features are present:

<table>
<thead>
<tr>
<th>Red Flag Features (especially if isolated vomiting)</th>
<th>Alternative Diagnoses</th>
</tr>
</thead>
<tbody>
<tr>
<td>High grade fever (Temp &gt;38 in &lt;3mth; Temp &gt;39 in &gt;3mth)</td>
<td>Appendicitis</td>
</tr>
<tr>
<td>Severe or localised abdominal pain</td>
<td>Intussusception</td>
</tr>
<tr>
<td>Abdominal distension or rebound tenderness</td>
<td>Strangulated hernia</td>
</tr>
<tr>
<td>Bilious vomiting</td>
<td>Bowel obstruction</td>
</tr>
<tr>
<td>Bloody diarrhoea</td>
<td>UTI</td>
</tr>
<tr>
<td>Non-blanching rash</td>
<td>Meningitis</td>
</tr>
<tr>
<td>Headache</td>
<td>Sepsis</td>
</tr>
<tr>
<td>Bulging fontanelle in infants</td>
<td>DKA</td>
</tr>
<tr>
<td>Neck stiffness</td>
<td>Inborn error of metabolism</td>
</tr>
<tr>
<td>Altered conscious state</td>
<td>Inflammatory bowel disease</td>
</tr>
<tr>
<td>Tachypnoea</td>
<td>Haemolytic uraemic syndrome</td>
</tr>
<tr>
<td></td>
<td>Raised intracranial pressure</td>
</tr>
</tbody>
</table>

Assessment

Assess degree of dehydration using table on next page.

Factors associated with increased risk of dehydration

- Children younger than 1 year (especially younger than 6mths)
- Infants who were of low birthweight
- >5 diarrhoeal stools in the previous 24 hours
- Significant chronic disease (e.g. short gut, renal insufficiency, on diuretics)
Assessment of dehydration:

<table>
<thead>
<tr>
<th></th>
<th>No clinically detectable dehydration (&lt;5% dehydrated)</th>
<th>Clinical dehydration (5-10% dehydrated)</th>
<th>Hypovolaemic shock (&gt;10% dehydrated)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consciousness</td>
<td>Alert &amp; responsive</td>
<td>Irritable/lethargic</td>
<td>Decreased level of consciousness</td>
</tr>
<tr>
<td>Appearance</td>
<td>Appears well</td>
<td>Appears unwell or deteriorating</td>
<td></td>
</tr>
<tr>
<td>Eyes</td>
<td>Normal</td>
<td>Sunken</td>
<td></td>
</tr>
<tr>
<td>Mucous membranes</td>
<td>moist</td>
<td>Dry</td>
<td></td>
</tr>
<tr>
<td>Breathing pattern</td>
<td>normal</td>
<td>Tachypnoea</td>
<td>Tachypnoea</td>
</tr>
<tr>
<td>Perfusion</td>
<td>Normal CRT, normal peripheral pulses, normal skin colour</td>
<td>Normal CRT, normal peripheral pulses, normal skin colour</td>
<td>CRT&gt;2 secs, weak peripheral pulses, cold extremities, pale or mottled skin</td>
</tr>
<tr>
<td>Heart rate</td>
<td>normal</td>
<td>Tachycardia</td>
<td>Tachycardia</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>normal</td>
<td>normal</td>
<td>Hypotension (if decompensated)</td>
</tr>
<tr>
<td>Skin turgor</td>
<td>normal</td>
<td>decreased</td>
<td>Decreased with tenting</td>
</tr>
<tr>
<td>Urine output</td>
<td>normal</td>
<td>oliguric</td>
<td>anuric</td>
</tr>
</tbody>
</table>

Investigations

- Stool microbiology is indicated if bloody diarrhoea, suspicion of septicaemia or immunocompromised patient.
- Consider if history of foreign travel, diarrhoea > 3 weeks or diagnostic dilemma
- Consider checking a blood sugar (particularly in young children).
- Routine laboratory bloods (FBC, U&E) are not indicated unless:-
  - IV fluids are required (see below)
  - Features suggestive of hypernatraemia (jittery movements, increased muscle tone, hyperreflexia, convulsions, drowsiness or coma)

Management

- The mainstay of management is preventing +/- treating dehydration.
- In the vast majority of cases this can be achieved by oral hydration/rehydration
- Antibiotics are rarely indicated – exceptions:-
  - Suspected septicaemia
  - Extra-intestinal spread of bacterial infection
  - Salmonella gastroenteritis if malnourished, immunocompromised or <6mths age
- Discuss with micro / ID if considering antibiotics
1. Prevention of Dehydration

Children with no clinical features of dehydration and who are not at high risk of developing dehydration do not always need to undergo a fluid challenge whilst in CED (but can sometimes be useful for parental education and reassurance).

Discharge with advice re: prevention of dehydration:-
- Continue breastfeeding and other milk feeds
- Encourage fluid intake - frequent, small amounts (avoid carbonated drinks)
- Offer oral rehydration solution (ORS) as supplemental fluid

Provide CED Diarrhoea & Vomiting leaflet

2. Oral / NG rehydration

Children who have features of clinical dehydration (but not shock) should be given oral rehydration via a fluid challenge

Oral rehydration solution
- Give small, frequent volumes starting with 1 ml/kg every 10 minutes
- Aim for 50ml/kg over 4hrs (10-15ml/kg per hour)

Oral fluid tolerated
Complete rehydration period at home with instructions above.

Oral fluid not tolerated
Give ondansetron 0.1 mg/kg if:
- > 1 year old
- clear diagnosis of gastroenteritis

Consider giving fluids through a NG tube
- Use ORS
- Give rapid rehydration if appropriate with 25 ml/kg/hour for 4 hours. See RCH Melbourne guideline
- Give slower rehydration if < 6 months, co-morbidities or significant abdo pain – use 24 hr rate of maintenance + deficit
3. Intravenous Rehydration

Intravenous fluids should be used if:
- Child is in shock
- A child with signs of clinical dehydration deteriorates despite ORS
- A child persistently vomits ORS given orally (or if ondansetron +/- NG rehydration is not felt to be feasible or is not successful)

**Clinically shocked?**

- **Yes**
  - Take initial bloods for FBC, U&E, glucose
  - 10 – 20 ml/kg bolus of 0.9% saline
    - Repeat as required – if >40 ml/kg
    - seek senior advice

- **No**
  - Calculate maintenance requirements

<table>
<thead>
<tr>
<th>Patient’s weight</th>
<th>mls / day</th>
<th>mls / hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-10kg</td>
<td>100 x weight</td>
<td>4 x weight</td>
</tr>
<tr>
<td>10-20kg</td>
<td>1000 + 50 x (weight-10)</td>
<td>40 + 2 x (weight-10)</td>
</tr>
<tr>
<td>&gt;20kg</td>
<td>1500 + 20 x (weight-20)</td>
<td>60 + 1 x (weight-20)</td>
</tr>
</tbody>
</table>

**100mls/hour or 2500mls/day is the maximum**

- **Add 50 ml/kg** for children with clinical dehydration, or **100 ml/kg** for those requiring initial fluid boluses for shock
- **Use 0.9% saline (+/- KCl depending on circumstance and U&Es) over 24 hours**
- **Plus full maintenance with 0.9% saline and 5% glucose**

**NB. If a child has hypernatraemic dehydration** fluid deficit should be replaced slowly with frequent monitoring to prevent a too rapid fall in serum sodium. See I.V fluids guideline
4. Ongoing Care

- Children who have successfully rehydrated can be discharged with home care advice as above. Children should continue to be offered ORS while diarrhoea persists to prevent recurrence of dehydration (~5ml/kg of ORS after each large watery stool).
- Vomiting usually lasts 1-2 days and in most stops within 3 days
- Diarrhoea usually lasts 5-7 days and in most stops within 2 weeks

Some children develop prolonged diarrhoea due to a secondary transient lactose intolerance that can last up to 6 weeks. This can be managed with the temporary use of a lactose free formula (eg. Aptamil Lactose Free, Enfamil O-Lac, SMA Lactofree). If diarrhoea is due to lactose intolerance it should resolve in 2-3 days and lactose can be re-introduced in 4-6 weeks.

Acute infectious bloody diarrhoea

Always consider Haemolytic Uraemic Syndrome (HUS) if bloody diarrhoea is present

It is crucial to consider / exclude E coli VTEC infection due to the link with HUS

Management of bloody diarrhoea

Child presents with acute bloody diarrhoea

**Investigations**
- Blood: FBC & film, U+Es, LFT, CRP, LDH, clotting screen
- Stool: M,C+S
- Urine: dip for protein / blood and microscopy
- Blood pressure

**Manage child according to clinical condition** using gastroenteritis guidance above

Ensure stool culture goes into CED results book
Discuss positive results with CED Consultant / Registrar and Microbiology / Public Health England as appropriate
**Haemolytic Uraemic Syndrome**

- **Triad of:**
  - Microangiopathic haemolytic anaemia
  - Thrombocytopenia
  - Acute renal failure

- **Can be caused by verotoxins produced by VTEC E coli organisms (~15% of cases of VTEC infection will develop HUS)**

- **Have a high suspicion of VTEC +/- HUS if bloody diarrhoea is present + any of:**
  - Abdominal pain
  - Fever
  - Oliguria
  - Petechiae
  - Pallor
  - Recent (<21 days) contact with farm animals
  - Contact with other VTEC cases or living in an area with suspected or confirmed cases

**Management of suspected or confirmed VTEC cases:-**

- Careful attention to hydration and urine output - low threshold for use of IV fluids to ensure adequate hydration.

- **Avoid NSAIDs**, opiate analgesics, anti-motility agents and antibiotics.

- **Low threshold for admission for monitoring** or if discharging, clear safety net advice to carers regarding the features that should prompt reassessment (lethargy, pallor, reduced urine output) and consideration to repeating blood tests (see below).

- HUS can develop up to 2 weeks after the onset of diarrhoea and initial investigations may be falsely reassuring – blood tests should therefore be repeated in the event of any clinical deterioration.

**Confirmed HUS is potentially life-threatening and a renal emergency.** Cases require urgent discussion with CED Consultant / Registrar as well as the paediatric renal team at Evelina Children’s Hospital London. They will guide further management.