Gastroenteritis - Emergency management in children

Purpose

This document provides clinical guidance for all staff involved in the care and management of a child presenting to an Emergency Department (ED) with gastroenteritis in Queensland.

This guideline has been developed by senior ED clinicians and Paediatricians across Queensland and endorsed for statewide use by the Queensland Emergency Care of Children Working Group in partnership with the Queensland Emergency Department Strategic Advisory Panel and the Healthcare Improvement Unit, Clinical Excellence Queensland.

Key points

- Gastroenteritis is usually characterised by a sudden onset of diarrhoea, with or without vomiting, fever or abdominal pain
- Management is primarily aimed at rehydration or prevention of dehydration.
- Where possible, enteral methods of fluid administration are preferable to intravenous (IV).
- Oral rehydration is effective in the majority of cases.

Introduction

Acute gastroenteritis accounts for approximately 6.3% of emergency presentations in Australia and New Zealand. It is usually characterised by a sudden onset of diarrhoea, with or without vomiting, fever or abdominal pain. There is often a history of contact with another person with similar symptoms.

Viral pathogens including norovirus are responsible for approximately 70% of episodes of acute infectious diarrhoea in children. Bacterial infections (most commonly Campylobacter and Salmonella) account for approximately 15% of episodes.

Dehydration can occur secondary to gastroenteritis. While untreated or poorly treated dehydration may be fatal, there are also risks associated with over-hydration and/or inappropriate electrolyte replacement, which can result in death from cerebral oedema.

Hypernatraemia is a complication of gastroenteritis most commonly seen in infants less than one year of age, particularly those who have been given inappropriately concentrated formula or hyperosmolar homemade rehydration solutions, or in children who are unable to express the feeling of thirst and self-regulate fluid intake.
Oral rehydration therapy
Acute gastroenteritis can often be managed effectively with oral rehydration therapy (ORT). This has been shown to reduce inpatient admissions when used in ED.\(^8\)

Oral rehydration solutions use the principle of glucose-facilitated sodium transport whereby glucose enhances sodium and secondarily water transport across the mucosa of the upper intestine. Water absorption across the lumen of the gut is maximised when solutions with a sodium to glucose ratio of 1:1.4, and a sodium concentration of 60mmol/L are used.\(^9\) Appropriate rehydration solutions include Glucolyte, Gastrolyte\textsuperscript{TM}, HYDRAlyte\textsuperscript{TM} and Pedialyte\textsuperscript{TM}.

Assessment
The purpose of the assessment (history-taking and physical examination) is to:

- confirm the diagnosis of gastroenteritis
- understand extent of/potential for dehydration

History
History should include information on:

- gastrointestinal symptoms (including date/time of onset, frequency, presence of blood in stools, bile stained vomiting, location and severity of abdominal pain)
- other symptoms including fever, rash, headache
- feeding
- previous medical history
- known illness in contacts

Examination
The aim of the physical examination is to assess hydration level, identify comorbidities and exclude other non-infectious causes of vomiting/diarrhoea. A careful assessment of conscious state and abdominal examination is required.

Hydration status
In the absence of the ability to accurately measure weight loss, a combination of clinical signs and symptoms are used to estimate the degree of dehydration.

Risk factors for dehydration
- age less than one year, particularly pre-term infants and those less than six months
- infants with low birth weight and failure to thrive
- greater than five diarrhoeal stools in last 24 hours, especially in infants
- stopped breast feeding during illness
- signs of malnutrition
- immunocompromised
- underlying chronic medical conditions
Recognising the severity of dehydration (especially mild to moderate) can be challenging as parental report of vomiting, diarrhoea, and oral intake is unreliable and clinical signs can be imprecise and incorrect. Consider seeking senior emergency/paediatric advice as per local practice if uncertain of hydration status. Seek senior emergency/paediatric advice as per local practice for a child in shock.

### Hydration assessment

<table>
<thead>
<tr>
<th></th>
<th>None</th>
<th>Clinical dehydration (5-10% fluid loss)</th>
<th>Clinical shock (over 10% fluid loss)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of consciousness</td>
<td>Alert and responsive</td>
<td>Altered responsiveness</td>
<td>Decreased level of consciousness</td>
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<td>Skin colour</td>
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<td>Increased RR</td>
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</tr>
<tr>
<td>Peripheral pulses</td>
<td>Peripheral pulses normal</td>
<td>Normal peripheral pulses</td>
<td>Weak peripheral pulses</td>
</tr>
<tr>
<td>Capillary refill</td>
<td>Capillary refill normal</td>
<td>Capillary refill normal</td>
<td>Prolong capillary refill (greater than 2 seconds)</td>
</tr>
<tr>
<td>Skin turgor</td>
<td>Skin turgor normal</td>
<td>Decreased skin turgor</td>
<td>Decreased skin turgor</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>BP normal</td>
<td>BP normal</td>
<td>Decreased BP (decompensated shock)</td>
</tr>
</tbody>
</table>

- More numerous/pronounced symptoms and signs indicate greater severity.
- For clinical shock, one or more of the symptoms or signs will be present.
- If in doubt, manage as if dehydration falls into the more severe category.

### Differential diagnoses

**Differential diagnoses for child presenting with gastrointestinal symptoms**

<table>
<thead>
<tr>
<th>Surgical conditions</th>
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<td>Other</td>
<td>Haemolytic uremic syndrome, inflammatory bowel disease, raised ICP</td>
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</table>
Red flags to suggest an alternative diagnosis

- severe or localised abdominal pain
- abdominal distension
- isolated vomiting
- bilious (green) vomit
- blood in stool or vomit
- child appears very unwell or is very drowsy
- high grade fever – over 39°C or 38.5°C if aged less than three months
- headache
- rash

The very young infant and the malnourished child are more likely to have another diagnosis.

Consider seeking senior emergency/paediatric advice as per local practice if red flags are identified on assessment

Investigations

No investigations are routinely recommended. Tests to differentiate between bacterial and viral aetiology are not recommended as this will not influence management.

Other investigations may be considered based on possible alternative diagnoses.

<table>
<thead>
<tr>
<th>Investigations that may be considered for children with gastroenteritis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Investigation type</strong></td>
</tr>
<tr>
<td>Blood glucose level</td>
</tr>
</tbody>
</table>
| Biochemistry (Na⁺, K⁺, urea, creatinine, and glucose) and venous blood gas | Consider for the following children:  
  - require IV therapy  
  - clinical suspicion of hypernatraemia (jittery movements, increased muscle tone, hyperflexia, convulsions, drowsiness or coma)  
  - an altered level of consciousness  
  - acute change in clinical condition  
  - renal disease or taking diuretics  
  - hyper or hypotonic fluids given orally at home |
| Point of care ketone testing | Urinary or blood ketones can be used as a surrogate biochemical marker of a starvation state. Ketosis will also exacerbate nausea and vomiting. If available, may help guide decisions around the need/length of fluid trial/rehydration but should be used in conjunction with clinical picture. |
| Stool MCS | Recommended for the following children:  
  - suspected septicaemia  
  - blood and/or mucous in stool  
  - immunocompromised state |

Consider for a child with a recent history of overseas travel, diarrhoea greater than seven days or uncertain gastroenteritis diagnosis.
Management

Refer to Appendix 1 for a summary of the emergency management for children presenting with symptoms of gastroenteritis.

Fluid management is the mainstay of therapy directed by the degree of hydration. Medication is not routinely recommended.\(^2,6\)

Most children presenting to an ED with symptoms of gastroenteritis can be managed conservatively with an oral fluid trial as outlined below. For any child who requires nasogastric (NG) or IV rehydration, strict fluid balance must be recorded, with weighing of all nappies if relevant and at least daily weights.

Fluids

Child in shock

Seek senior emergency/paediatric advice as per local practice for a child in shock. Consider contacting paediatric critical care (onsite or via Retrieval Services Queensland (RSQ)) if signs of shock persist after two fluid boluses.

<table>
<thead>
<tr>
<th>Fluid resuscitation for the management of shocked children</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bolus dose (IV or IO)</strong></td>
</tr>
<tr>
<td><strong>Maintenance Fluid</strong></td>
</tr>
</tbody>
</table>

Consider sepsis in child with persisting signs of shock following fluid bolus.

Child with clinical signs of dehydration

In children with clinical signs of dehydration, the focus is on rehydration.

The most appropriate route of fluid administration (oral, NG or IV) is influenced by the age of the child and the severity of dehydration. Where possible enteral (NG and oral) rehydration is preferred. In comparison with IV administration, enteral rehydration has been associated with better health outcomes (quicker return to normal diet, less vomiting and diarrhoea and improved weight gain at discharge), fewer complications, shorter hospital stay, and is more cost effective. NG rehydration is usually successful regardless of vomiting (though vomiting usually ceases following commencement of NG fluids).\(^3,12\)

Breastfeeding should always be continued throughout the rehydration phase.
### Recommended routes of fluid administration for children with clinical signs of dehydration

<table>
<thead>
<tr>
<th>Oral</th>
<th>NG</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Routinely recommended as initial route of choice for children with mild to moderate clinical dehydration.</td>
<td>• Consider for children aged less than two years:</td>
<td>• Consider for children aged more than two years:</td>
</tr>
<tr>
<td>• Contraindicated in children with reduced level of consciousness (due to risk of aspiration) or ileus.</td>
<td>o with more severe dehydration</td>
<td>o with more severe dehydration</td>
</tr>
<tr>
<td></td>
<td>o unable to tolerate oral rehydration (due to persistent vomiting/fluid refusal)</td>
<td>o unable to tolerate oral rehydration (due to persistent vomiting/fluid refusal)</td>
</tr>
<tr>
<td></td>
<td>• May be considered for older children but generally not well tolerated.</td>
<td>• Consider for children aged less than two years if NG fluids have failed.</td>
</tr>
<tr>
<td></td>
<td>• Contraindicated in children with reduced level of consciousness (due to risk of aspiration) or ileus.</td>
<td></td>
</tr>
</tbody>
</table>

### Fluid administration for children with clinical signs of dehydration

<table>
<thead>
<tr>
<th>Oral</th>
<th>NG/IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Offer small amounts of oral rehydration solution (0.5 mL/kg) every five minutes via syringe/cup (better tolerated than larger volumes).</td>
<td>• Rapid rehydration (50 mL/kg over 4 hours) using oral rehydration solution (NG) or Sodium Chloride 0.9% + Glucose 5% (IV) is routinely recommended.</td>
</tr>
<tr>
<td>• Appropriate rehydration solutions include Glucolyte, Gastrolyte™, HYDRAlyte™ and Pedialyte™</td>
<td>• Slower rate (over 8-12 hours) is recommended in children</td>
</tr>
<tr>
<td>• Dilute apple juice, although not electrolyte replete, has been shown to have fewer treatment failures than oral rehydration solutions in mild gastroenteritis.</td>
<td>o with significant co-morbidities (e.g. renal disease, cardiac disease, diabetes, on diuretics)</td>
</tr>
<tr>
<td>• Soft drinks and cordials should preferably not be used as rehydration fluid due to the minimal sodium content.</td>
<td>o infants less than 6 months of age to avoid fluid overload.</td>
</tr>
</tbody>
</table>

Regular reassessment is recommended. Rehydration therapy is regarded as successful if the clinical signs of dehydration have resolved.

Persistence of signs after four hours may be due to:
- initial underestimation of the fluid deficit
- persistent vomiting and/or diarrhoea
- alternative/additional diagnosis

If signs of dehydration persist, further rehydration via NG or IV therapy is recommended. Consider testing for electrolyte abnormality.

Seek senior emergency/paediatric advice as per local practice if electrolyte abnormalities are identified on blood testing (as fluid adjustments may be required).
Feeding (using usual fluids) should be reintroduced after the acute phase of rehydration (two to four hours) or earlier if indicated by the child. Refer to [Gastroenteritis Factsheet](#) for further advice on feeding for parents/caregivers.

**Child with no clinical signs of dehydration**

In children with gastroenteritis without clinical signs of dehydration the focus is on prevention of dehydration.

Children should receive a fluid challenge with an oral rehydration solution at triage while awaiting medical assessment. Small amounts of oral rehydration solution (0.5 mL/kg) should be offered every five minutes via syringe/cup (better tolerated than larger volumes).

Where relevant, breastfeeding should be encouraged.

**Ondansetron**

A single dose of oral ondansetron is recommended to reduce vomiting.

Ondansetron has been shown to reduce the need for IV rehydration, rate of representation and length of hospital stay in children with gastroenteritis.

<table>
<thead>
<tr>
<th>Ondansetron for the management of vomiting in children with gastroenteritis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dose</strong></td>
</tr>
<tr>
<td>8-15 kg</td>
</tr>
<tr>
<td>15-30 kg</td>
</tr>
<tr>
<td>greater than 30 kg</td>
</tr>
<tr>
<td><strong>Considerations</strong></td>
</tr>
</tbody>
</table>

**Antibiotics**

Antibiotics are not routinely recommended. Aetiology is commonly viral and there is no evidence of benefit and potential harm in uncomplicated bacterial gastroenteritis.

Antibiotic therapy is recommended for the following children:

- suspected or confirmed septicaemia
- Clostridium difficile-associated pseudomembranous enterocolitis
- giardiasis, shigellosis, dysenteric amoebiasis or cholera

Consider antibiotic therapy for malnourished or immunocompromised children or infants aged less than six months with salmonellosis (refer to [CHQ Non-typhoidal Salmonellosis in Children Guideline](#)).

Seek senior emergency/paediatric advice as per local practice regarding antibiotic prescription.
Other medications
The following medications are not routinely recommended:

- other anti-emetics including metoclopramide, prochlorperazine or dexamethasone – no evidence to support use and associated with significant side effects (e.g. dystonic reactions).
- anti-diarrhoeal agents including Loperamide – associated with adverse consequences including lethargy, paralytic ileus, toxic mega-colon, CNS depression, coma and even death.

Escalation outside of ED
Clinicians can contact the services below if escalation of care outside of senior clinicians within the ED is needed, as per local practices. Transfer is recommended if the child requires a higher level of care.

**Critically unwell or rapidly deteriorating child**

<table>
<thead>
<tr>
<th>Service</th>
<th>Reason for contact</th>
<th>Contact</th>
</tr>
</thead>
</table>
| Paediatric critical care     | For urgent advice/assistance in a child with persistent signs of shock despite two fluid boluses | Onsite or via Retrieval Services Queensland (RSQ). If no onsite service contact RSQ (1300 799 127):
  - for access to paediatric critical care telephone advice
  - to coordinate the retrieval of a critically unwell child
  RSQ (access via QH intranet)
  Notify early of children potentially requiring transfer.
  In the event of retrieval, inform your local Paediatric service. |

**Non-critical child**

<table>
<thead>
<tr>
<th>Reason for contact by clinician</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>For specialist advice on the management, disposition and follow-up of the following children:</td>
<td></td>
</tr>
<tr>
<td>- if considering admission</td>
<td>Onsite/local paediatric service as per local practice.</td>
</tr>
<tr>
<td>- antibiotic therapy if discharging home</td>
<td></td>
</tr>
<tr>
<td>For assistance with local inter-hospital transfers of non-critical patients.</td>
<td>Onsite/local paediatric service as per local practice.</td>
</tr>
<tr>
<td>For assistance with inter-hospital transfer of non-critical patients into and out of Queensland Children's Hospital. View the <a href="#">QH Inter-hospital transfer request form</a> (QH only).</td>
<td><strong>Children's Advice and Transport Coordination Hub (CATCH)</strong> (07) 3068 4510 (24-hour service)</td>
</tr>
<tr>
<td>For assistance with decision making regarding safe and appropriate inter-hospital transfer of children in Queensland.</td>
<td>View the <strong>Queensland Paediatric Transport Triage tool – Medical</strong> or call <strong>CATCH</strong> (07) 3068 4510 (24-hours)</td>
</tr>
<tr>
<td>For access to generalist and specialist acute support and advice via videoconferencing, as per locally agreed pathways, in regional, rural and remote areas in Queensland.</td>
<td>Telehealth Emergency Management Support Unit (TEMSU) 1800 11 44 14 (24-hour service) <strong>TEMSU</strong> (access via QH intranet)</td>
</tr>
<tr>
<td>To request aeromedical inter-hospital transfer in Queensland.</td>
<td>Retrieval Services Queensland (RSQ) 1300 799 127 (24-hour service) <strong>RSQ</strong> (access via QH intranet)</td>
</tr>
</tbody>
</table>
When to consider discharge from ED

The majority of children with gastroenteritis who present with no or mild signs of clinical dehydration can be safely discharged home following a short period of observation.

Consider discharge for the following children:
- no signs of clinical dehydration
- demonstrated capacity to maintain hydration during trial of oral fluids
- parents/caregivers received education regarding management at home
- alternate diagnoses considered and excluded

A longer period of observation in SSU or inpatient service may be considered for children with risk factors for dehydration including children aged less than one year especially if pre-term or failure to thrive, signs of malnutrition, immunocompromised or other underlying chronic medical conditions.

On discharge, parents/caregivers should be provided with a Gastroenteritis Factsheet.

Follow-up

With GP if symptoms worsen or persist after two to three days.

When to consider admission

Admission to an inpatient service or SSU (where relevant) is recommended for the following children:
- require NG or IV rehydration
- concerns regarding ability to maintain adequate hydration at home

Related documents

Factsheet
- Gastroenteritis

References

Guideline approval

<table>
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<tr>
<th>Document ID</th>
<th>CHQ-GDL-60015</th>
<th>Version no.</th>
<th>1.0</th>
<th>Approval date</th>
<th>19/06/2019</th>
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<td>Executive Director Medical Services</td>
<td></td>
<td></td>
<td>Effective date</td>
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<tr>
<td>Author/custodian</td>
<td>Queensland Emergency Care Children Working Group</td>
<td></td>
<td></td>
<td>Review date</td>
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<td>Supersedes</td>
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Keywords
Gastro, gastroenteritis, diarrhoea, paediatric, emergency, guideline, children, 60015

Accreditation references
NSQHS Standards (1-8): 1, 4, 8

Disclaimer
This guideline is intended as a guide and provided for information purposes only. The information has been prepared using a multidisciplinary approach with reference to the best information and evidence available at the time of preparation. No assurance is given that the information is entirely complete, current, or accurate in every respect.

The guideline is not a substitute for clinical judgement, knowledge and expertise, or medical advice. Variation from the guideline, taking into account individual circumstances may be appropriate.

This guideline does not address all elements of standard practice and accepts that individual clinicians are responsible for:

- Providing care within the context of locally available resources, expertise, and scope of practice
- Supporting consumer rights and informed decision making in partnership with healthcare practitioners including the right to decline intervention or ongoing management
- Advising consumers of their choices in an environment that is culturally appropriate and which enables comfortable and confidential discussion. This includes the use of interpreter services where necessary
- Ensuring informed consent is obtained prior to delivering care
- Meeting all legislative requirements and professional standards
- Applying standard precautions, and additional precautions as necessary, when delivering care
- Documenting all care in accordance with mandatory and local requirements

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Child presents to ED with suspected acute gastroenteritis

Assessment
(aim to exclude alternative diagnoses (Box A#) and ascertain hydration status (Box B#)

Red flags? (Box C#)

Management as clinically indicated

No clinical dehydration

Prevent dehydration
Encourage fluid intake
- Appropriate fluids:
  - ORS (preferred)
  - dilute apple juice
  - milk (breastmilk/other)
- Inappropriate fluids:
  - soft drink
  - cordial

↑risk of dehydration? (see guideline)

Response to treatment?

Observation period (1-4 hours)
- Oral fluids (0.5 mL/kg every five minutes) with ORS
- Consider SSU admission (where available)

Maintain hydration?

Discharge with advice

Consider discharge

Clinical dehydration

Rehydration required
Fluid administration route dependent on illness severity & age.
- +/- U&Es
- Consider Ondansetron (age more than 6 months)

Mild to moderate:
Rapid rehydration (50 mL/kg over four hours)*
Usual first-line route:
- age ≤ 2 years: ORS via NG
- age > 2 years: Sodium Chloride 0.9% + Glucose 5% IV or NG

Severe:
Rapid rehydration (50 mL/kg over four hours)*
Usual first-line route:
- age ≤ 2 years: ORS via NG
- age > 2 years: Sodium Chloride 0.9% + Glucose 5% IV or NG

Responding to treatment?

Responding to treatment?

Consider:
- longer period of rehydration at maintenance
- IV vs NG
- alternative diagnosis
Seek senior advice if Na < 130 mmol/L or > 150 mmol/L

Reassess hourly
Replace significant fluid losses

Shock

Resuscitate using ABCD
- Oxygen via NRBM
- Support ventilation (BVM)
- +/- ETT
- IV or IO access
- VBG, U&Es
- IV fluid bolus 20 mL/kg Sodium Chloride 0.9% as needed
- Check BGL - Glucose 10% (2 mL/kg) IV if ≤2.6 mmol/L on VBG or iSTAT

Shock after 2 fluid boluses?

Sodium Chloride 0.9% + Glucose 5% IV (100 mL/kg) over eight hours
Commence fluid balance chart
Repeat VBG, U&Es, BGL

Shock after 2 fluid boluses?

Sodium Chloride 0.9% + Glucose 5% IV (100 mL/kg) over eight hours
Commence fluid balance chart
Repeat VBG, U&Es, BGL

Reassess hourly
Replace significant fluid losses

Seek senior emergency/paediatric advice as per local practices

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*Slower rate (50 mL/kg over 8-12 hours) is recommended in infants (age < 6 months) and children with significant co-morbidities

#See next page for Box A, B, C

Consider seeking senior emergency/paediatric advice as per local practices
Appendix 1

Box A: Differential diagnoses for child presenting with gastrointestinal symptoms

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Box B: Hydration assessment

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<tr>
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</tr>
<tr>
<td>Heart rate</td>
<td>HR normal</td>
<td>HR normal</td>
<td>Increased HR</td>
</tr>
<tr>
<td>Breathing</td>
<td>RR normal</td>
<td>Increased RR</td>
<td>Increased RR</td>
</tr>
<tr>
<td>Peripheral pulses</td>
<td>Normal</td>
<td>Normal</td>
<td>Weak</td>
</tr>
<tr>
<td>Capillary refill</td>
<td>Capillary refill normal</td>
<td>Capillary refill normal</td>
<td>Prolonged (more than two seconds)</td>
</tr>
<tr>
<td>Skin turgor</td>
<td>Skin turgor normal</td>
<td>Decreased skin turgor</td>
<td>Decreased skin turgor</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>BP normal</td>
<td>BP normal</td>
<td>Decreased BP (decompensated shock)</td>
</tr>
</tbody>
</table>

- More numerous/pronounced symptoms and signs indicate greater severity.
- For clinical shock, one or more of the symptoms or signs will be present.
- If in doubt, manage as if dehydration falls into the more severe category.

Box C: Red flags to suggest an alternative diagnosis

- severe or localised abdominal pain
- abdominal distension
- isolated vomiting
- bilious (green) vomit
- blood in stool or vomit
- child appears very unwell or is very drowsy
- high grade fever > 38.5°C if < 3 months of age, or > 39°C if > 3 months of age
- headache
- rash

The very young infant and the malnourished child are more likely to have another diagnosis.