

# 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.<sup>1</sup> It is usually characterised by a sudden onset of diarrhoea (loose or liquid stools that occur more frequently than usual), with or without vomiting, fever or abdominal pain.<sup>2</sup> 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.<sup>3,4,5</sup> Bacterial infections (most commonly *Campylobacter* and *Salmonella*) account for approximately 15% of episodes.<sup>3,4</sup>

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.<sup>6</sup>

Hyponatraemia 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 home-made rehydration solutions, or in children who are unable to express the feeling of thirst and self-regulate fluid intake.<sup>7</sup>



## 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
  - date/time of onset
  - frequency of stools
  - presence of blood in stools
  - frequency of vomiting
  - features of vomitus; in particular contents and colour such bile stained (forest green in colour)
  - location and severity of abdominal pain
- other symptoms including fever, rash, headache
- intake (diet and fluids with amounts taken)
- urine output
- previous medical history
- known illness in contacts
  - unwell family members at home
  - daycare or school attendance
- travel history

## 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.

### 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



## 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.

Recognising the severity of dehydration (especially mild to moderate) can be challenging as parental report of vomiting, diarrhoea, and oral intake is unreliable<sup>6</sup> and clinical signs can be imprecise and incorrect.<sup>3,8,9</sup>



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			
	None	Clinical dehydration (5-10% fluid loss)	Clinical shock (over 10% fluid loss)
<b>Level of consciousness</b>	Alert and responsive	Altered responsiveness	Decreased level of consciousness
<b>Skin colour</b>	Skin colour unchanged	Skin colour unchanged	Pale or mottled skin
<b>Extremities</b>	Warm extremities	Warm extremities	Cold extremities
<b>Eyes</b>	Eyes not sunken	Sunken eyes	Sunken eyes
<b>Mucous membranes</b>	Moist mucous membranes	Dry mucous membranes	Dry mucous membranes
<b>Heart rate</b>	HR normal	HR normal	Increased HR
<b>Breathing</b>	RR normal	Increased RR	Increased RR
<b>Peripheral pulses</b>	Peripheral pulses normal	Normal peripheral pulses	Weak peripheral pulses
<b>Capillary refill</b>	Capillary refill normal	Capillary refill normal	Prolong capillary refill (greater than 2 seconds)
<b>Skin turgor</b>	Skin turgor normal	Decreased skin turgor	Decreased skin turgor
<b>Blood pressure</b>	BP normal	BP normal	Decreased BP (decompensated shock)

- 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	
<b>Surgical conditions</b>	Appendicitis, intussusception, bowel obstruction, malrotation with volvulus, strangulated hernia, testicular torsion
<b>Non-enteric infections</b>	<a href="#">Sepsis</a> , <a href="#">UTI</a> , <a href="#">meningitis</a> , pneumonia, <a href="#">otitis media</a> , toxic shock syndrome, <a href="#">endemic infection in returned traveller</a> , other focal infections
<b>Metabolic disease</b>	<a href="#">DKA</a> and inborn errors of metabolism
<b>Other</b>	Haemolytic uremic syndrome, inflammatory bowel disease, raised ICP, <a href="#">foreign body ingestion</a>



## 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
- previous GI/surgical history or complex medical history
- representation
- failure to respond to standard therapy
- returned traveller

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

Most patients with gastroenteritis do not require any investigations and tests to differentiate between bacterial and viral aetiology are not recommended as they will not influence management.

If there is clinical suspicion for Salmonella (for example bloody stools or a close contact), a stool sample should be collected. Dependent on the age of the patient, further investigations may also be required and clinicians should refer to the [Salmonella guideline](#).

Those who have returned from overseas should have investigations to exclude diseases endemic in the region of travel. Consider discussion with Infectious Diseases in such cases.

Other investigations may be considered based on possible alternative diagnoses.



Investigations that may be considered for children with gastroenteritis	
Investigation type	Indication
<b>Blood glucose level</b>	Consider as part of initial assessment for children who are very lethargic or have had very little oral intake.
<b>Point of care ketone testing</b>	Urinary or blood ketones can be used as a surrogate biochemical marker of a starvation state. If available, may help guide decisions around the need/length of fluid trial/rehydration but should be used in conjunction with clinical picture.
<b>Biochemistry (Na<sup>+</sup>, K<sup>+</sup>, urea, creatinine, and glucose) and venous blood gas</b>	Consider for the following children: <ul style="list-style-type: none"> <li>• require IV therapy</li> <li>• clinical suspicion of hypernatraemia (jittery movements, increased muscle tone, hyperreflexia, convulsions, drowsiness or coma)</li> <li>• an altered level of consciousness</li> <li>• acute change in clinical condition</li> <li>• renal disease or taking diuretics</li> <li>• hyper or hypotonic fluids given orally at home</li> </ul>
<b>Urine dipstick</b> <b>MCS only required if:</b> <ul style="list-style-type: none"> <li>- <b>&lt;3months</b></li> <li>- <b>&gt;3months and dip positive for leucs and/or nitrites)</b></li> </ul>	Recommended for the following children: <ul style="list-style-type: none"> <li>• urinary symptoms</li> <li>• previous UTI or known renal tract abnormality</li> <li>• fever &gt;48hrs and the absence of diarrhoea</li> </ul>
<b>Stool MCS</b>	Recommended for the following children: <ul style="list-style-type: none"> <li>• suspected septicaemia</li> <li>• blood and/or mucous in stool</li> <li>• immunocompromised state</li> </ul> Consider in the following children: <ul style="list-style-type: none"> <li>• recent history of overseas travel</li> <li>• diarrhoea greater than seven days</li> <li>• uncertain gastroenteritis diagnosis</li> </ul>

## 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.<sup>2,6</sup>

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.

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

### Fluid resuscitation for the management of shocked children

<b>Bolus dose (IV or IO)</b>	Sodium Chloride 0.9% administered rapidly in 20 mL/kg bolus. Repeat in 20 mL/kg boluses as clinically indicated.
<b>Ongoing fluid therapy</b>	Sodium chloride 0.9% and 5% glucose running at maintenance plus correction of estimated deficit (usually 10% in the shocked patient) over 24hrs  Use potassium containing fluids in children who are hypokalaemic and consider in children with significant ongoing losses (see <a href="#">potassium prescribing guideline</a> )  Reassess frequently and replace significant ongoing losses.  Rate may be revised on senior emergency/paediatric advice following identification of an electrolyte disturbance.

### Calculating fluid Rates

Maintenance fluids:

First 10kg	4ml/kg/hr
Second 10kg	2ml/kg/hr
Every kg after 20kg	1ml/kg/hr

PLUS

Replacement of deficit:

$\frac{\% \text{ dehydration} \times \text{weight (in kg)} \times 10}{\text{replacement time (usually 24-48hrs)}}$

Example:

25kg child  
10% dehydration

Maintenance fluids:  
 $40 + 20 + 5 = 65\text{ml/hr}$

PLUS

Replacement of 10% deficit:

$\frac{10 \times 25 \times 10}{24} = 104\text{ml/hr}$

TOTAL: 169ml/hr

### Child with clinical signs of dehydration

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



Acute gastroenteritis can often be managed effectively with oral rehydration therapy (ORT). This has been shown to reduce inpatient admissions when used in ED.<sup>10</sup> 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.<sup>11</sup> Appropriate rehydration solutions include Glucolyte, Gastrolyte™, HYDRAlite™ and Pedialyte™.

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 (see [Trial of fluids form](#)). 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).<sup>3,12</sup>

Breastfeeding should always be continued throughout the rehydration phase.

Recommended routes of fluid administration for children with clinical signs of dehydration		
Oral	NG	IV
<ul style="list-style-type: none"> <li>Routinely recommended as initial route of choice for children with mild to moderate clinical dehydration.</li> <li>Contraindicated in children with reduced level of consciousness (due to risk of aspiration) or ileus.</li> </ul>	<ul style="list-style-type: none"> <li>Consider for children aged less than three years:                             <ul style="list-style-type: none"> <li>with more severe dehydration</li> <li>unable to tolerate oral rehydration (due to persistent vomiting/fluid refusal)</li> </ul> </li> <li>May be considered for older children but generally not well tolerated.</li> <li>Contraindicated in children with reduced level of consciousness (due to risk of aspiration) or ileus.</li> </ul>	<ul style="list-style-type: none"> <li>Consider for children aged more than three years:                             <ul style="list-style-type: none"> <li>with more severe dehydration</li> <li>unable to tolerate oral rehydration (due to persistent vomiting/fluid refusal)</li> </ul> </li> <li>Consider for children aged less than three years if NG fluids have failed.</li> </ul>



Fluid administration for children with clinical signs of dehydration	
Oral	NG/IV
<ul style="list-style-type: none"> <li>• Offer small amounts of oral rehydration solution frequently via syringe/cup, aiming for 12.5mL/kg/hr (small volumes are better tolerated than larger volumes)<sup>13-16</sup></li> <li>• Appropriate rehydration solutions include Glucolyte, Gastrolyte™, HYDRALyte™ and Pedialyte™</li> <li>• Dilute apple juice, although not electrolyte replete, has been shown to have fewer treatment failures than oral rehydration solutions in mild gastroenteritis.<sup>17</sup></li> <li>• Soft drinks, cordials and sports drinks (Gatorade/Powerade) should preferably not be used as rehydration fluid due to the minimal sodium content.</li> <li>• Water alone is NOT recommended.</li> </ul>	<ul style="list-style-type: none"> <li>• Rapid rehydration (50 mL/kg over 4 hours) using oral rehydration solution (NG) or Sodium Chloride 0.9% + Glucose 5% (IV) is routinely recommended.</li> <li>• Slower rate (over 8-12 hours) is recommended in children <ul style="list-style-type: none"> <li>○ with significant co-morbidities (e.g. renal disease, cardiac disease, diabetes, on diuretics)</li> <li>○ infants less than 6 months of age to avoid fluid overload.</li> <li>○ who continue to vomit during rapid rehydration</li> <li>○ who are being admitted overnight</li> </ul> </li> <li>• Replace significant losses due to vomiting and diarrhoea (add volume loss to replacement and administer over next hour).</li> </ul>

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. Offer small amounts of oral rehydration solution frequently via syringe/cup, aiming for 10ml/kg/hour (small volumes are better tolerated than larger volumes)<sup>13-16</sup> See [Trial of fluids form](#).

Following medical assessment, children who have no risk factors for dehydration can be safely discharged home with reassurance, advice (including the [Gastroenteritis Factsheet](#)) and safety netting.



Children with risk factors for dehydration (see above), should have an extended period of observation and complete a trial of fluids over 1-4hrs.

Where relevant, breastfeeding should be encouraged.

## Ondansetron

A single dose of oral ondansetron can be prescribed 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<sup>16, 20</sup>.

Ondansetron for the management of vomiting in children with gastroenteritis	
<b>Dose</b>	<p>Given orally or sublingually at a dose of 0.15 mg/kg (maximum 8 mg).</p> <p>Tablets and wafers are available in 4 mg and 8 mg doses. Recommended doses are as follows:</p> <ul style="list-style-type: none"> <li>• 8-15 kg: 2 mg (half tablet or wafer)</li> <li>• 15-30 kg: 4 mg</li> <li>• greater than 30 kg: 8 mg (clinician may choose to dose at 6mg if this is more consistent with a calculated dose of 0.15mg/kg)</li> </ul> <p>Not recommended for children aged less than 6 months, weight less than 8 kg or with ileus.</p>
<b>Considerations</b>	<p>Ondansetron prolongs the QT interval in a dose-dependent manner. Exercise caution in children who have or may develop prolongation of QTc (such as those with electrolyte disturbances, family history of long QT syndrome, heart failure or those on medications that may lead to a prolongation of the QTc).<sup>18,19</sup></p>

## Antibiotics

Antibiotics are not routinely recommended as gastroenteritis is commonly viral in aetiology. In cases of uncomplicated bacterial gastroenteritis, there is no evidence of benefit but evidence of potential harm related to the use of antibiotic therapy.

Antibiotic therapy is recommended for:

- suspected or confirmed septicaemia
- Clostridium difficile-associated pseudomembranous enterocolitis
- giardiasis, shigellosis, dysenteric amoebiasis or cholera
- certain children with confirmed Salmonella on stool (refer to [CHQ Non-typhoidal Salmonellosis in Children Guideline](#))

Consider antibiotic therapy for malnourished or immunocompromised children.



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 and advice 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.



### Child is critically unwell or rapidly deteriorating

#### Includes the following children (as a guide)

- persistent signs of shock despite two fluid boluses
- physiological triggers based on age (see below)

Less than 1 year	1-4 years	5-11 years	Over 12 years
<ul style="list-style-type: none"> <li>• RR &gt;50</li> <li>• HR &lt;90 or &gt;170</li> <li>• sBP &lt;65</li> <li>• SpO2 &lt;93% in oxygen or &lt;85% in air</li> <li>• GCS ≤12</li> </ul>	<ul style="list-style-type: none"> <li>• RR &gt;40</li> <li>• HR &lt;80 or &gt;160</li> <li>• sBP &lt;70</li> <li>• SpO2 &lt;93% in oxygen or &lt;85% in air</li> <li>• GCS ≤12</li> </ul>	<ul style="list-style-type: none"> <li>• RR &gt;40</li> <li>• HR &lt;70 or &gt;150</li> <li>• sBP &lt;75</li> <li>• SpO2 &lt;93% in oxygen or &lt;85% in air</li> <li>• GCS ≤12</li> </ul>	<ul style="list-style-type: none"> <li>• RR &gt;30</li> <li>• HR &lt;50 or &gt;130</li> <li>• sBP &lt;85</li> <li>• SpO2 &lt;93% in oxygen or &lt;85% in air</li> <li>• GCS ≤12</li> </ul>

#### Reason for contact

#### Who to contact

**For immediate onsite assistance including airway management**

The most senior resources available onsite at the time as per local practices.

Options may include:

- paediatric critical care
- critical care
- anaesthetics
- paediatrics
- Senior Medical Officer (or similar)

**Paediatric critical care advice and assistance**

Onsite or via Retrieval Services Queensland (RSQ).

If no onsite paediatric critical care service contact RSQ on **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 child potentially requiring transfer.**

**Consider early involvement of local paediatric/critical care service.**

In the event of retrieval, inform your local paediatric service.





## Non-critical child

Reason for contact	Who to contact
<b>Advice</b> (including management, disposition or follow-up)	Follow local practice. Options: <ul style="list-style-type: none"> <li>onsite/local paediatric service</li> <li>Queensland Children's Hospital experts via <a href="#">Children's Advice and Transport Coordination Hub (CATCH)</a> on 13 CATCH (13 22 82) (24-hour service)</li> <li>local and regional paediatric videoconference support via Telehealth Emergency Management Support Unit <a href="#">TEMSU</a> (access via QH intranet) on 1800 11 44 14 (24-hour service)</li> </ul>
<b>Referral</b>	First point of call is the onsite/local paediatric service

## Inter-hospital transfers

<b>Do I need a critical transfer?</b>	<ul style="list-style-type: none"> <li>discuss with onsite/local paediatric service</li> <li>view <a href="#">Queensland Paediatric Transport Triage Tool</a></li> </ul>
<b>Request a non-critical inter-hospital transfer</b>	<ul style="list-style-type: none"> <li>contact onsite/local paediatric service</li> <li>contact RSQ on 1300 799 127 for aeromedical transfers</li> <li>contact <a href="#">Children's Advice and Transport Coordination Hub (CATCH)</a> on 13 CATCH (13 22 82) for transfers to Queensland Children's Hospital</li> </ul>
<b>Non-critical transfer forms</b>	<ul style="list-style-type: none"> <li><a href="#">QH Inter-hospital transfer request form</a> (access via QH intranet)</li> <li><a href="#">aeromedical stepdown</a> (access via QH intranet)</li> <li>commercial aeromedical transfers:               <ul style="list-style-type: none"> <li><a href="#">Qantas</a></li> <li><a href="#">Virgin</a></li> <li><a href="#">Jetstar</a></li> </ul> </li> </ul>

## 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.

Consider discharge for the following children:

- no signs of clinical dehydration
- 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](#)

### Other resources

- [Trial of fluid form](#)
- [Clinical pathway: Management of children >9months presenting with acute vomiting \(<72hrs\)](#)

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## Guideline approval

<b>Document ID</b>	CHQ-GDL-60015	<b>Version no.</b>	4.0	<b>Approval date</b>	02/03/2023
<b>Executive sponsor</b>	Executive Director Medical Services			<b>Effective date</b>	02/03/2023
<b>Author/custodian</b>	Queensland Emergency Care Children Working Group	<b>Review date</b>	02/03/2027		
<b>Supersedes</b>	3.0				
<b>Applicable to</b>	Queensland Health Medical and nursing staff				
<b>Document source</b>	Internal (QHEPS) + External				
<b>Authorisation</b>	Executive Director Clinical Services				

<b>Keywords</b>	Gastro, gastroenteritis, diarrhoea, paediatric, emergency, guideline, children, 60015
<b>Accreditation references</b>	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. We recommend hospitals follow their usual practice for endorsement locally including presenting it to their local Medicines Advisory Committee (or equivalent) prior to use.

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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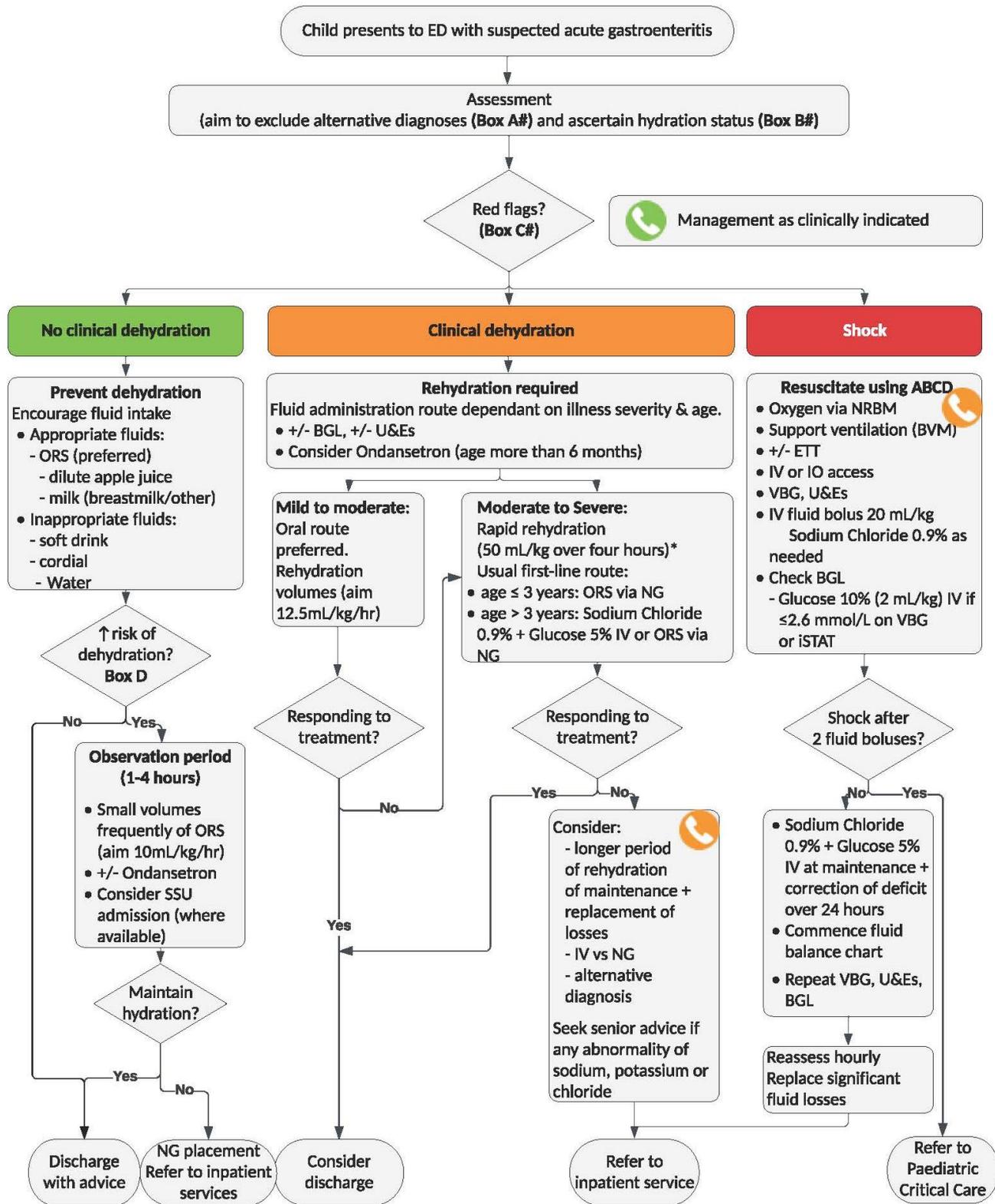


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\*Slower rate (50 mL/kg over 8-12 hours) is recommended in infants (age < 6 months) and children with significant co-morbidities  
#See next page for Box A, B, C, D

Consider seeking senior emergency/paediatric advice as per local practices

Seek senior emergency/paediatric advice as per local practices



Box A: Differential diagnoses for child presenting with gastrointestinal symptoms	
Surgical conditions	Appendicitis, intussusception, bowel obstruction, malrotation with volvulus, strangulated hernia, testicular torsion
Non-enteric infections	Sepsis, UTI, meningitis, pneumonia, otitis media, toxic shock syndrome, endemic infections in returned traveller, other focal infections
Metabolic disease	DKA and inborn errors of metabolism
Other	Haemolytic uremic syndrome, inflammatory bowel disease, raised ICP, ingested foreign body (link guideline)

Box B: Hydration assessment			
	None	Clinical dehydration (5-10% fluid loss)	Clinical shock (over 10% fluid loss)
<b>Level of consciousness</b>	Alert and responsive	Altered responsiveness	Decreased level of consciousness
<b>Skin colour</b>	Skin colour unchanged	Skin colour unchanged	Pale or mottled skin
<b>Extremities</b>	Warm extremities	Warm extremities	Cold extremities
<b>Eyes</b>	Eyes not sunken	Sunken eyes	Sunken eyes
<b>Mucous membranes</b>	Moist	Dry	Dry
<b>Heart rate</b>	HR normal	HR normal	Increased HR
<b>Breathing</b>	RR normal	Increased RR	Increased RR
<b>Peripheral pulses</b>	Normal	Normal	Weak
<b>Capillary refill</b>	Capillary refill normal	Capillary refill normal	Prolonged (more than two seconds)
<b>Skin turgor</b>	Skin turgor normal	Decreased skin turgor	Decreased skin turgor
<b>Blood pressure</b>	BP normal	BP normal	Decreased BP (decompensated shock)

- 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  $> 38.5^{\circ}\text{C}$  if  $< 3$  months of age, or  $> 39^{\circ}\text{C}$  if  $> 3$  months of age
- headache
- rash
- previous GI/surgical history or complex medical history
- representation
- failure to respond to standard therapy
- returned traveller

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

## Box D: 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

