

Diarrhoea and vomiting caused by gastroenteritis in under 5s: diagnosis and management

Clinical guideline

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Your responsibility

The recommendations in this guideline represent the view of NICE, arrived at after careful consideration of the evidence available. When exercising their judgement, professionals and practitioners are expected to take this guideline fully into account, alongside the individual needs, preferences and values of their patients or the people using their service. It is not mandatory to apply the recommendations, and the guideline does not override the responsibility to make decisions appropriate to the circumstances of the individual, in consultation with them and their families and carers or guardian.

Local commissioners and providers of healthcare have a responsibility to enable the guideline to be applied when individual professionals and people using services wish to use it. They should do so in the context of local and national priorities for funding and developing services, and in light of their duties to have due regard to the need to eliminate unlawful discrimination, to advance equality of opportunity and to reduce health inequalities. Nothing in this guideline should be interpreted in a way that would be inconsistent with complying with those duties.

Commissioners and providers have a responsibility to promote an environmentally sustainable health and care system and should assess and reduce the environmental impact of implementing NICE recommendations wherever possible.

Contents

Introduction	4
Key priorities for implementation	5
Diagnosis	5
Assessing dehydration and shock.....	5
Fluid management	5
Nutritional management.....	6
Information and advice for parents and carers.....	7
1 Guidance	8
1.1 Diagnosis.....	8
1.2 Assessing dehydration and shock	10
1.3 Fluid management.....	13
1.4 Nutritional management	16
1.5 Antibiotic therapy.....	16
1.6 Other therapies	17
1.7 Escalation of care.....	17
1.8 Information and advice for parents and carers	18
2 Research recommendations	22
2.1 Assessing dehydration and shock	22
2.2 Administration of ORS solution by nasogastric tube	22
2.3 Fluid management.....	23
2.4 Other therapies: ondansetron.....	23
2.5 Other therapies: probiotics	24
Finding more information and resources	25
Update information.....	26

Introduction

Infective gastroenteritis in young children is characterised by the sudden onset of diarrhoea, with or without vomiting. Most cases are due to an enteric virus, but some are caused by bacterial or protozoal infections. The illness usually resolves without treatment within days; however, symptoms are unpleasant and affect both the child and family or carers. Severe diarrhoea can quickly cause dehydration, which may be life threatening.

Gastroenteritis is very common, with many children having more than one episode a year. Parents and carers often manage their child's illness at home, and may not seek professional advice. However, many parents and carers do seek advice from healthcare professionals either remotely (for example, through NHS Direct), in the community, or in primary or secondary care. Approximately 10% of children younger than 5 years present to healthcare services with gastroenteritis each year^[1]. In a UK study, diarrhoeal illness accounted for 16% of medical presentations to a major paediatric emergency department^[2]. Although most children with gastroenteritis do not need to be admitted to hospital, many are treated as inpatients each year and often remain in hospital for several days – thereby exposing other vulnerable hospitalised children to the illness. Gastroenteritis is a significant burden on health service resources.

The management of gastroenteritis in children is multifaceted. There is evidence of variation in clinical practice, which may have a major impact on the use of healthcare resources.

This guideline applies to children younger than 5 years who present to a healthcare professional for advice in any setting. It covers diagnosis, assessment of dehydration, fluid management, nutritional management and the role of antibiotics and other therapies. It provides recommendations on the advice to be given to parents and carers, and also considers when care should be escalated – from home management through to hospital admission.

The guideline will assume that prescribers will use a drug's summary of product characteristics to inform their decisions for individual patients.

^[1] Van Damme P, Giaquinto C, Huet F et al. (2007) Multicenter prospective study of the burden of rotavirus acute gastroenteritis in Europe, 2004-2005: the REVEAL study. *Journal of Infectious Diseases*.195 Suppl 1:S4–S16.

^[2] K Armon, T Stephenson, V Gabriel et al. (2001) Determining the common medical presenting problems to an accident and emergency department. *Arch Dis Child* 84:390–392

Key priorities for implementation

Diagnosis

- Perform stool microbiological investigations if:
 - you suspect septicaemia or
 - there is blood and/or mucus in the stool or
 - the child is immunocompromised.

Assessing dehydration and shock

- Use table 1 to detect clinical dehydration and shock.

Fluid management

- In children with gastroenteritis but without clinical dehydration:
 - continue breastfeeding and other milk feeds
 - encourage fluid intake
 - discourage the drinking of fruit juices and carbonated drinks, especially in those at increased risk of dehydration (see 1.2.1.2)
 - offer oral rehydration salt (ORS) solution as supplemental fluid to those at increased risk of dehydration (see 1.2.1.2).
- In children with clinical dehydration, including hypernatraemic dehydration:
 - use low-osmolarity ORS solution (240–250 mOsm/l)^[3] for oral rehydration therapy
 - give 50 ml/kg for fluid deficit replacement over 4 hours as well as maintenance fluid
 - give the ORS solution frequently and in small amounts
 - consider supplementation with their usual fluids (including milk feeds or water, but not fruit juices or carbonated drinks) if they refuse to take sufficient quantities of ORS solution and do not have red flag symptoms or signs (see table 1)
 - consider giving the ORS solution via a nasogastric tube if they are unable to drink it or if

- – they vomit persistently
 - monitor the response to oral rehydration therapy by regular clinical assessment.
- Use intravenous fluid therapy for clinical dehydration if:
 - shock is suspected or confirmed
 - a child with red flag symptoms or signs (see table 1) shows clinical evidence of deterioration despite oral rehydration therapy
 - a child persistently vomits the ORS solution, given orally or via a nasogastric tube.
- If intravenous fluid therapy is required for rehydration (and the child is not hypernatraemic at presentation):
 - use an isotonic solution, such as 0.9% sodium chloride, or 0.9% sodium chloride with 5% glucose, for both fluid deficit replacement and maintenance
 - for those who required initial rapid intravenous fluid boluses for suspected or confirmed shock, add 100 ml/kg for fluid deficit replacement to maintenance fluid requirements, and monitor the clinical response
 - for those who were not shocked at presentation, add 50 ml/kg for fluid deficit replacement to maintenance fluid requirements, and monitor the clinical response
 - measure plasma sodium, potassium, urea, creatinine and glucose at the outset, monitor regularly, and alter the fluid composition or rate of administration if necessary
 - consider providing intravenous potassium supplementation once the plasma potassium level is known.

Nutritional management

- After rehydration:
 - give full-strength milk straight away
 - reintroduce the child's usual solid food
 - avoid giving fruit juices and carbonated drinks until the diarrhoea has stopped.

Information and advice for parents and carers

- Advise parents, carers and children that^[4]:
 - washing hands with soap (liquid if possible) in warm running water and careful drying is the most important factor 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.

^[3]The 'BNF for children' (BNFC) 2008 edition lists the following products with this composition: Dioralyte, Dioralyte Relief, Electrolade and Rapolyte.

^[4]This recommendation is adapted from the following guidelines commissioned by the Department of Health:

Public Health England (2017) [Health protection in schools and other childcare facilities](#)

Working Group of the former PHLS Advisory Committee on Gastrointestinal Infections (2004) Preventing person-to-person spread following gastrointestinal infections: guidelines for public health physicians and environmental health officers. *Communicable Disease and Public Health* 7(4):362–384.

1 Guidance

The following guidance is based on the best available evidence. The [full guideline](#) gives details of the methods and the evidence used to develop the guidance.

For the purposes of this guideline, an 'infant' is defined as a child younger than 1 year. 'Remote assessment' refers to situations in which a child is assessed by a healthcare professional who is unable to examine the child because the child is geographically remote from the assessor (for example, telephone calls to NHS Direct).

People have the right to be involved in discussions and make informed decisions about their care, as described in [your care](#).

[Making decisions using NICE guidelines](#) explains how we use words to show the strength (or certainty) of our recommendations, and has information about professional guidelines, standards and laws (including on consent and mental capacity), and safeguarding.

1.1 *Diagnosis*

1.1.1 Clinical diagnosis

1.1.1.1 Suspect gastroenteritis if there is a sudden change in stool consistency to loose or watery stools, and/or a sudden onset of vomiting.

1.1.1.2 If you suspect gastroenteritis, ask about:

- recent contact with someone with acute diarrhoea and/or vomiting **and**
- exposure to a known source of enteric infection (possibly contaminated water or food) **and**
- recent travel abroad.

1.1.1.3 Be aware that in children with gastroenteritis:

- diarrhoea usually lasts for 5–7 days, and in most it stops within 2 weeks
- vomiting usually lasts for 1–2 days, and in most it stops within 3 days.

1.1.1.4 Consider any of the following as possible indicators of diagnoses other than gastroenteritis:

- fever:
 - temperature of 38°C or higher in children younger than 3 months
 - temperature of 39°C or higher in children aged 3 months 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 localised abdominal pain
- abdominal distension or rebound tenderness.

1.1.2 Laboratory investigations

1.1.2.1 Consider performing stool microbiological investigations if:

- the child has recently been abroad or
- the diarrhoea has not improved by day 7 or
- there is uncertainty about the diagnosis of gastroenteritis.

1.1.2.2 Perform stool microbiological investigations if:

- you suspect septicaemia or
- there is blood and/or mucus in the stool or
- the child is immunocompromised.

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

1.1.2.4 If stool microbiology is performed:

- collect, store and transport stool specimens as advised by the investigating laboratory
- provide the laboratory with relevant clinical information.

1.1.2.5 Perform a blood culture if giving antibiotic therapy.

1.1.2.6 In children with Shiga toxin-producing *Escherichia coli* (STEC) infection, seek specialist advice on monitoring for haemolytic uraemic syndrome.

1.2 *Assessing dehydration and shock*

1.2.1 Clinical assessment

1.2.1.1 During remote or face-to-face assessment ask whether the child:

- appears unwell
- has altered responsiveness, for example is irritable or lethargic
- has decreased urine output
- has pale or mottled skin
- has cold extremities.

1.2.1.2 Recognise that the following are at increased risk of dehydration:

- children younger than 1 year, particularly those younger than 6 months
- infants who were of low birth weight
- children who have passed more than five diarrhoeal stools in the previous 24 hours
- children who have vomited more than twice in the previous 24 hours
- children who have not been offered or have not been able to tolerate supplementary fluids before presentation
- infants who have stopped breastfeeding during the illness
- children with signs of malnutrition.

1.2.1.3 Use table 1 to detect clinical dehydration and shock.

Table 1 Symptoms and signs of clinical dehydration and shock

Interpret symptoms and signs taking risk factors for dehydration into account (see 1.2.1.2). Within the category of 'clinical dehydration' there is a spectrum of severity indicated by increasingly numerous and more pronounced symptoms and signs. For clinical shock, one or more of the symptoms and/or signs listed would be expected to be present. Dashes (–) indicate that these clinical features do not specifically indicate shock. Symptoms and signs with red flags may help to identify children at increased risk of progression to shock. If in doubt, manage as if there are symptoms and/or signs with red flags.

Increasing severity of dehydration			
	No clinically detectable dehydration	Clinical dehydration	Clinical shock
Symptoms (remote and face-to-face assessments)	Appears well	Red flag Appears to be unwell or deteriorating	–
	Alert and responsive	Red flag 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	Red flag 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	Red flag Sunken eyes	–

	Moist mucous membranes (except after a drink)	Dry mucous membranes (except for 'mouth breather')	-
	Normal heart rate	Red flag Tachycardia	Tachycardia
	Normal breathing pattern	Red flag 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	Red flag Reduced skin turgor	-
	Normal blood pressure	Normal blood pressure	Hypotension (decompensated shock)

1.2.1.4 Suspect hypernatraemic dehydration if there are any of the following:

- jittery movements
- increased muscle tone
- hyperreflexia
- convulsions
- drowsiness or coma.

1.2.2 Laboratory investigations for assessing dehydration

1.2.2.1 Do not routinely perform blood biochemical testing.

1.2.2.2 Measure plasma sodium, potassium, urea, creatinine and glucose concentrations if:

- intravenous fluid therapy is required or

- there are symptoms and/or signs that suggest hypernatraemia.

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

1.3 *Fluid management*

1.3.1 Primary prevention of dehydration

1.3.1.1 In children with gastroenteritis but without clinical dehydration:

- continue breastfeeding and other milk feeds
- encourage fluid intake
- discourage the drinking of fruit juices and carbonated drinks, especially in those at increased risk of dehydration (see 1.2.1.2)
- offer ORS solution as supplemental fluid to those at increased risk of dehydration (see 1.2.1.2).

1.3.2 Treating dehydration

1.3.2.1 Use ORS solution to rehydrate children, including those with hypernatraemia, unless intravenous fluid therapy is indicated (see 1.3.3.1 and 1.3.3.5).

1.3.2.2 In children with clinical dehydration, including hypernatraemic dehydration:

- use low-osmolarity ORS solution (240–250 mOsm/l)^[5] for oral rehydration therapy
- give 50 ml/kg for fluid deficit replacement over 4 hours as well as maintenance fluid
- give the ORS solution frequently and in small amounts
- consider supplementation with their usual fluids (including milk feeds or water, but not fruit juices or carbonated drinks) if they refuse to take sufficient quantities of ORS solution and do not have red flag symptoms or signs (see table 1)
- consider giving the ORS solution via a nasogastric tube if they are unable to drink it or if they vomit persistently
- monitor the response to oral rehydration therapy by regular clinical assessment.

1.3.3 Intravenous fluid therapy

1.3.3.1 Use intravenous fluid therapy for clinical dehydration if:

- shock is suspected or confirmed
- a child with red flag symptoms or signs (see table 1) shows clinical evidence of deterioration despite oral rehydration therapy
- a child persistently vomits the ORS solution, given orally or via a nasogastric tube.

1.3.3.2 Treat suspected or confirmed shock with a rapid intravenous infusion of 20 ml/kg of 0.9% sodium chloride solution.

1.3.3.3 If a child remains shocked after the first rapid intravenous infusion:

- immediately give another rapid intravenous infusion of 20 ml/kg of 0.9% sodium chloride solution and
- consider possible causes of shock other than dehydration.

1.3.3.4 Consider consulting a paediatric intensive care specialist if a child remains shocked after the second rapid intravenous infusion.

1.3.3.5 When symptoms and/or signs of shock resolve after rapid intravenous infusions, start rehydration with intravenous fluid therapy (see 1.3.3.6).

1.3.3.6 If intravenous fluid therapy is required for rehydration (and the child is not hypernatraemic at presentation):

- use an isotonic solution such as 0.9% sodium chloride, or 0.9% sodium chloride with 5% glucose, for fluid deficit replacement and maintenance
- for those who required initial rapid intravenous fluid boluses for suspected or confirmed shock, add 100 ml/kg for fluid deficit replacement to maintenance fluid requirements, and monitor the clinical response
- for those who were not shocked at presentation, add 50 ml/kg for fluid deficit replacement to maintenance fluid requirements, and monitor the clinical response
- measure plasma sodium, potassium, urea, creatinine and glucose at the outset, monitor

- regularly, and alter the fluid composition or rate of administration if necessary
- consider providing intravenous potassium supplementation once the plasma potassium level is known.

1.3.3.7 If intravenous fluid therapy is required in a child presenting with hypernatraemic dehydration:

1.3.3.8 obtain urgent expert advice on fluid management

1.3.3.9 use an isotonic solution such as 0.9% sodium chloride, or 0.9% sodium chloride with 5% glucose for fluid deficit replacement and maintenance

1.3.3.10 replace the fluid deficit slowly – typically over 48 hours

- monitor the plasma sodium frequently, aiming to reduce it at a rate of less than 0.5 mmol/l per hour.

1.3.3.11 Attempt early and gradual introduction of oral rehydration therapy during intravenous fluid therapy. If tolerated, stop intravenous fluids and complete rehydration with oral rehydration therapy.

1.3.4 Fluid management after rehydration

1.3.4.1 After rehydration:

- encourage breastfeeding and other milk feeds
- encourage fluid intake
- in children at increased risk of dehydration recurring, consider giving 5 ml/kg of ORS solution after each large watery stool. These include:
 - children younger than 1 year, particularly those younger than 6 months
 - infants who were of low birth weight
 - children who have passed more than five diarrhoeal stools in the previous 24 hours
 - children who have vomited more than twice in the previous 24 hours.

1.3.4.2 Restart oral rehydration therapy if dehydration recurs after rehydration.

1.4 *Nutritional management*

1.4.1.1 During rehydration therapy:

- continue breastfeeding
- do not give solid foods
- in children with red flag symptoms or signs (see table 1), do not give oral fluids other than ORS solution
- in children without red flag symptoms or signs (see table 1), do not routinely give oral fluids other than ORS solution; however, consider supplementation with the child's usual fluids (including milk feeds or water, but not fruit juices or carbonated drinks) if they consistently refuse ORS solution.

1.4.1.2 After rehydration:

- give full-strength milk straight away
- reintroduce the child's usual solid food
- avoid giving fruit juices and carbonated drinks until the diarrhoea has stopped.

1.5 *Antibiotic therapy*

1.5.1.1 Do not routinely give antibiotics to children with gastroenteritis.

1.5.1.2 Give antibiotic treatment to all children:

- with suspected or confirmed septicaemia
- with extra-intestinal spread of bacterial infection
- younger than 6 months with salmonella gastroenteritis
- who are malnourished or immunocompromised with salmonella gastroenteritis
- with *Clostridium difficile*-associated pseudomembranous enterocolitis, giardiasis, dysenteric shigellosis, dysenteric amoebiasis or cholera.

1.5.1.3 For children who have recently been abroad, seek specialist advice about antibiotic therapy.

1.6 *Other therapies*

1.6.1.1 Do not use antidiarrhoeal medications.

1.7 *Escalation of care*

1.7.1.1 During remote assessment:

- arrange emergency transfer to secondary care for children with symptoms suggesting shock (see table 1)
- refer for face-to-face assessment children:
 - with symptoms suggesting an alternative serious diagnosis (see 1.1.1.4) or
 - at high risk of dehydration, taking into account the risk factors listed in 1.2.1.2 or
 - with symptoms suggesting clinical dehydration (see table 1) or
 - whose social circumstances make remote assessment unreliable
- provide a 'safety net' for children who do not require referral. The safety net should include information for parents and carers on how to:
 - recognise developing red flag symptoms (see table 1) and
 - get immediate help from an appropriate healthcare professional if red flag symptoms develop.

1.7.1.2 During face-to-face assessment:

- arrange emergency transfer to secondary care for children with symptoms or signs suggesting shock (see table 1)
- consider repeat face-to-face assessment or referral to secondary care for children:
 - with symptoms and/or signs suggesting an alternative serious diagnosis (see 1.1.1.4) or

- – with red flag symptoms and/or signs (see table 1) or
 - whose social circumstances require continued involvement of healthcare professionals
- provide a safety net for children who will be managed at home. The safety net should include:
 - information for parents and carers on how to recognise developing red flag symptoms (see table 1) and
 - information on how to get immediate help from an appropriate healthcare professional if red flag symptoms develop and
 - arrangements for follow-up at a specified time and place, if necessary.

1.8 *Information and advice for parents and carers*

1.8.1 **Caring for a child with diarrhoea and vomiting at home**

1.8.1.1 Inform parents and carers that:

- most children with gastroenteritis can be safely managed at home, with advice and support from a healthcare professional if necessary
- the following symptoms may indicate dehydration:
 - appearing to get more unwell
 - changing responsiveness (for example, irritability, lethargy)
 - decreased urine output
 - pale or mottled skin
 - cold extremities
- they should contact a healthcare professional if symptoms of dehydration develop.

1.8.1.2 Advise parents and carers of children:

- who are not clinically dehydrated and are **not** at increased risk of dehydration (see 1.2.1.2):

- – to continue usual feeds, including breast or other milk feeds
- to encourage the child to drink plenty of fluids
- to discourage the drinking of fruit juices and carbonated drinks
- who are not clinically dehydrated but who are at increased risk of dehydration (see 1.2.1.2):
 - to continue usual feeds, including breast or other milk feeds
 - to encourage the child to drink plenty of fluids
 - to discourage the drinking of fruit juices and carbonated drinks
 - to offer ORS solution as supplemental fluid
- with clinical dehydration:
 - that rehydration is usually possible with ORS solution
 - to make up the ORS solution according to the instructions on the packaging
 - to give 50 ml/kg of ORS solution for rehydration plus maintenance volume over a 4-hour period
 - to give this amount of ORS solution in small amounts, frequently
 - to seek advice if the child refuses to drink the ORS solution or vomits persistently
 - to continue breastfeeding as well as giving the ORS solution
 - not to give other oral fluids unless advised
 - not to give solid foods.

1.8.1.3 Advise parents and carers that after rehydration:

- the child should be encouraged to drink plenty of their usual fluids, including milk feeds if these were stopped
- they should avoid giving the child fruit juices and carbonated drinks until the diarrhoea has stopped

- they should reintroduce the child's usual diet
- they should give 5 ml/kg ORS solution after each large watery stool if you consider that the child is at increased risk of dehydration (see 1.2.1.2).

1.8.1.4 Advise parents and carers that:

- the usual duration of diarrhoea is 5–7 days and in most children it stops within 2 weeks
- the usual duration of vomiting is 1 or 2 days and in most children it stops within 3 days
- they should seek advice from a specified healthcare professional if the child's symptoms do not resolve within these timeframes.

1.8.2 Preventing primary spread of diarrhoea and vomiting

1.8.2.1 Advise parents, carers and children that^[6]:

- 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.

^[5] The 'BNF for children' (BNFC) 2008 edition lists the following products with this composition: Dioralyte, Dioralyte Relief, Electrolade and Rapolyte.

^[6] This recommendation is adapted from the following guidelines commissioned by the Department of Health:

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2 Research recommendations

The Guideline Development Group has made the following recommendations for research, based on its review of evidence, to improve NICE guidance and patient care in the future. The Guideline Development Group's full set of research recommendations is detailed in the full guideline (see section 5).

2.1 *Assessing dehydration and shock*

In children with gastroenteritis, what is the predictive value of clinical symptoms and signs in assessing the severity of dehydration, using post-rehydration weight gain as the reference standard, in primary and secondary care settings?

Why this is important

Evidence from a systematic review^[7] suggests that some symptoms and signs (for example, prolonged capillary refill time, abnormal skin turgor and abnormal respiratory pattern) are associated with dehydration, measured using the accepted 'gold standard' of the difference between pre-hydration and post-hydration weight. However, 10 of the 13 included studies were not blinded and had ill-defined selection criteria. Moreover, all these studies were conducted in secondary care where children with more severe dehydration are managed.

Most children with gastroenteritis can and should be managed in the community^[8] but there is a lack of evidence to help primary care healthcare professionals correctly identify children with more severe dehydration. Symptoms and signs that researchers may wish to investigate include overall appearance, irritability/lethargy, urine output, sunken eyes, absence of tears, changes in skin colour or warmth of extremities, dry mucous membranes, depressed fontanelle, heart rate, respiratory rate and effort, character of peripheral pulses, capillary refill time, skin turgor and blood pressure.

2.2 *Administration of ORS solution by nasogastric tube*

In children who do not tolerate oral rehydration therapy, is ORS solution administration via nasogastric tube cost effective, safe and acceptable in treating dehydration compared with intravenous fluid therapy?

Why this is important

Oral rehydration therapy is normally preferable to intravenous fluid therapy for rehydration in children with gastroenteritis. However, some children may not tolerate oral rehydration therapy,

either because they are unable to drink ORS solution in adequate quantities or because they persistently vomit. In such cases, ORS solution could be administered via a nasogastric tube, rather than changing to intravenous fluid therapy. This overcomes the problem of ORS solution refusal. Continuous infusion of ORS solution via a nasogastric tube might reduce the risk of vomiting. A well-conducted randomised controlled trial is needed to assess the cost effectiveness, safety and acceptability of rehydration using nasogastric tube administration of ORS solution compared with intravenous fluid therapy.

2.3 *Fluid management*

In children who require intravenous fluid therapy for the treatment of dehydration, is rapid rehydration safe and cost effective compared with the common practice of rehydration over 24 hours?

Why this is important

Most children with clinical dehydration should be treated with oral rehydration therapy, but some require intravenous fluid therapy because they are shocked or they cannot tolerate oral rehydration therapy. Rehydration with oral rehydration therapy is usually carried out over a period of 4 hours. Rehydration with intravenous fluid therapy has traditionally been undertaken slowly – typically over 24 hours. The National Patient Safety Agency has advised^[9] that intravenous fluid deficit replacement should be over 24 hours or longer. Consequently, children will remain dehydrated and in hospital for a prolonged period. The WHO recommends that intravenous rehydration should be completed in 3–6 hours^[10]. Many experts now support rapid intravenous rehydration, suggesting that it allows oral fluids to be started earlier and can shorten the duration of hospital treatment. Randomised controlled trials are needed urgently to examine the safety and cost effectiveness of rapid intravenous rehydration regimens compared with slow intravenous rehydration.

2.4 *Other therapies: ondansetron*

In children with persistent vomiting caused by gastroenteritis, is oral ondansetron cost effective and safe compared with placebo therapy?

Why this is important

Several randomised controlled trials have shown that in children with persistent vomiting during oral rehydration therapy, administration of oral ondansetron, an anti-emetic agent, can increase the likelihood of successful oral rehydration. However, in two of these there was evidence suggesting

that diarrhoea was more pronounced in those given ondansetron than in those in the placebo groups. In one, in children given ondansetron, the number of stools passed during the rehydration phase was significantly greater, and in the other the number of stools passed in the first and second 24-hour period after rehydration was significantly greater. In those studies, diarrhoea was not a primary outcome, and it was reported as an adverse event. The reliability of the finding was therefore somewhat uncertain. If ondansetron does worsen diarrhoea it would be crucially important to determine the clinical significance of this effect, for example in relation to the risk of dehydration recurring or re-admission to hospital. If ondansetron is shown to be both effective and safe in secondary care then studies should also be undertaken to evaluate its use in primary care.

2.5 *Other therapies: probiotics*

Are probiotics effective and safe compared with a placebo in the treatment of children with gastroenteritis in the UK? Which specific probiotic is most effective and in what specific treatment regimen?

Why this is important

The available studies of probiotic therapy frequently report benefits, particularly in terms of reduced duration of diarrhoea or stool frequency. However, most of the published studies have methodological limitations. Moreover, there is great variation in the specific probiotics evaluated and in the treatment regimens used. Many of these studies were conducted in developing countries where the response to probiotic therapy may differ. Good-quality randomised controlled trials should be conducted in the UK to evaluate the effectiveness and safety of specific probiotics, using clearly defined treatment regimens and outcome measures.

^[7] Steiner MJ, DeWalt DA, Byerley JS (2004) Is this child dehydrated? *JAMA: the Journal of the American Medical Association*. 291(22):2746–54.

^[8] Hay AD, Heron J, Ness A; the ALSPAC study team (2005) The prevalence of symptoms and consultations in pre-school children in the Avon Longitudinal Study of Parents and Children (ALSPAC): a prospective cohort study. *Family Practice*. 22(4):367–74.

^[9] Reducing the risk of hyponatraemia when administering intravenous infusions to children. National Patient Safety Agency, Alert no. 22, Ref: NPSA/2007/22, Issued: 28 Mar 2007

^[10] World Health Organization (2005) [The treatment of diarrhoea: a manual for physicians and other senior health workers](#)

Finding more information and resources

You can see everything NICE says on diarrhoea and vomiting caused by gastroenteritis in under 5s in our interactive flowchart on [diarrhoea and vomiting in children](#).

To find out what NICE has said on topics related to this guideline, see our web page on [diarrhoea and vomiting](#). NICE has also produced diagnostics guidance related to this topic on [integrated multiplex PCR tests for identifying gastrointestinal pathogens in people with suspected gastroenteritis \(xTAG Gastrointestinal Pathogen Panel, FilmArray GI Panel and Faecal Pathogens B assay\)](#).

For full details of the evidence and the guideline committee's discussions, see the [full version](#). You can also find information about [how the guideline was developed](#), including details of the committee.

NICE has produced [tools and resources](#) to help you put this guideline into practice. For general help and advice on putting NICE guidelines into practice, see [resources to help you put guidance into practice](#).

Update information

Minor changes since publication

November 2018: After a surveillance review, recommendation 1.1.2.6 on monitoring for haemolytic uraemic syndrome has been updated and some links to external sources have been updated throughout.

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