NICE National Institute for Health and Care Excellence

NICE guideline

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

Clinical guideline

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Contents

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

Patient-centred care

This guideline offers best practice advice on the care of children younger than 5 years with diarrhoea and vomiting.

Treatment and care should take into account children's needs and preferences and those of their parents or carers. Parents and carers of children with diarrhoea and vomiting should have the opportunity to make informed decisions about their care and treatment, in partnership with their healthcare professionals. If parents or carers do not have the capacity to make decisions, healthcare professionals should follow the Department of Health's advice on consent and the code of practice that accompanies the Mental Capacity Act. In Wales, healthcare professionals should follow advice on consent from the Welsh Government.

If the patient is under 16, healthcare professionals should follow the guidelines in the Department of Health's Seeking consent: working with children.

Good communication between healthcare professionals and the parents and carers of children with diarrhoea and vomiting is essential. It should be supported by evidence-based written information tailored to their needs. Treatment and care of children with diarrhoea and vomiting, and the information parents and carers are given about it, should be culturally appropriate. It should also be accessible to people with additional needs such as physical, sensory or learning disabilities, and to people who do not speak or read English.

Parents and carers should have the opportunity to be involved in decisions about their child's treatment and care.

Parents and carers should also be given the information and support they need.

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:

Health Protection Agency (2006) Guidance on Infection Control In Schools and other Child Care Settings. London.

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).

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 *Escherichia coli* O157:H7 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 Notes on the scope of the guidance

NICE guidelines are developed in accordance with a scope that defines what the guideline will and will not cover.

The guideline covers infants and young children from birth up to their fifth birthday presenting with acute diarrhoea (lasting up to 14 days) with or without vomiting due to gastroenteritis.

It does not cover infants and young children with chronic diarrhoea and vomiting (lasting more than 14 days), those with disorders other than gastroenteritis that cause diarrhoea or vomiting, those with medical disorders that significantly alter the approach to their fluid management, or neonates who are admitted to the neonatal unit.

How this guideline was developed

NICE commissioned the National Collaborating Centre for Women's and Children's Health to develop this guideline. The Centre established a Guideline Development Group (see appendix A), which reviewed the evidence and developed the recommendations. An independent Guideline Review Panel oversaw the development of the guideline (see appendix B).

There is more information about how NICE clinical guidelines are developed on the NICE website. A booklet, 'How NICE clinical guidelines are developed: an overview for stakeholders, the public and the NHS' is available.

3 Implementation

NICE has developed tools to help organisations implement this guidance.

4 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).

4.1 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.

4.2 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.

4.3 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 starter 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.

4.4 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.

4.5 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

5 Other versions of this guideline

5.1 Full guideline

The full guideline, 'Diarrhoea and vomiting caused by gastroenteritis: diagnosis, assessment and management in children younger than 5 years' contains details of the methods and evidence used to develop the guideline. It is published by the National Collaborating Centre for Women's and Children's Health, and is available from our website.

5.2 Information for the public

NICE has produced information for the public explaining this guideline.

We encourage NHS and voluntary sector organisations to use text from this information in their own materials.

6 Related NICE guidance

Published

- Feverish illness in children: assessment and initial management in children younger than 5 years. NICE clinical guideline 47 (2007).

7 Updating the guideline

NICE clinical guidelines are updated so that recommendations take into account important new information. New evidence is checked 3 years after publication, and healthcare professionals and patients are asked for their views; we use this information to decide whether all or part of a guideline needs updating. If important new evidence is published at other times, we may decide to do a more rapid update of some recommendations.

Appendix A: The Guideline Development Group

Dr M Stephen Murphy (Chairman)
Senior Lecturer in Paediatrics and Child Health, College of Medical and Dental Sciences, University of Birmingham and Consultant Paediatric Gastroenterologist, Birmingham Children's Hospital NHS Foundation Trust

Dr Ed Abrahamson
Consultant in Paediatric Emergency Medicine, Chelsea and Westminster Hospital

Dr Richard Churchill
GP and Clinical Associate Professor, Universityof Nottingham Medical School

Miss Dianne L Cook
Children's Community Advanced Nurse Practitioner, Children's Community Nursing Service, Manchester NHS Primary Care Trust

Dr John Crimmins
General Practitioner, Vale of Glamorgan

Dr Saul Faust
Senior Lecturer/Honorary Consultant in Paediatric Immunology and Infectious Diseases, University of Southampton

Dr Alastair Hay
Consultant Senior Lecturer in Primary Health Care, University of Bristol and General Practitioner

Ms Naryndar Johal
Parent/Carer Member

Mrs Julie Marriott
Parent/Carer Member

Dr Nigel Meadows
Consultant Paediatric Gastroenterologist and Honorary Senior Lecturer, Barts and the London NHS Trust

Mr Simon Minford
Advanced Paediatric Nurse Practitioner and Lecturer, Alder Hey Children's Hospital, Liverpool

Dr Robert Moy
Senior Lecturer in Community Child Health, College of Medical and Dental Science, University of Birmingham

Mrs Enid Povey
National Clinical Development Manager, NHS Direct, Bolton

Dr Gyanranjan Sinha
Consultant Paediatrician, Walsall Hospitals NHS Trust

Mrs Jenny Taylor
Advanced Paediatric Nurse Practitioner, Calderdale and Huddersfield NHS Foundation Trust

The technical team, National Collaborating Centre for Women's and Children's Health (NCC-WCH)

Shona Burman-Roy
Research Fellow

Rosie Crossley
Work Programme Coordinator

Sjokvist Garcia-Stewart
Research Fellow

Eva Gautam-Aitken
Project Manager

Alyson Huntley
Freelance Researcher

Itrat Iqbal
Health Economist

Paul Jacklin
Senior Health Economist

Rajesh Khanna
Senior Research Fellow

Angela Kraut
Research Fellow

Dr Monica Lakhanpaul
Clinical Co-Director, NCC-WCH, and Senior Lecturer in Child Health/Consultant Paediatrician, University of Leicester

Ana Palanca
Research Fellow

Edmund Peston
Document Supply Co-ordinator

Andrew Welsh
Freelance Editor

Danielle Worster
Information Scientist

Appendix B: The Guideline Review Panel

The Guideline Review Panel is an independent panel that oversees the development of the guideline and takes responsibility for monitoring adherence to NICE guideline development processes. In particular, the panel ensures that stakeholder comments have been adequately considered and responded to. The panel includes members from the following perspectives: primary care, secondary care, lay, public health and industry.

Professor Mike Drummond (Chair)
Professor of Health Economics, Centre for Health Economics, University of York

Catherine Arkley
Chief Executive, Children's Liver Disease Foundation

Dr David Gillen
Medical Director, Pfizer Ltd

Dr Graham Archard
General Practitioner, Royal College of General Practitioners

About this guideline

NICE clinical guidelines are recommendations about the treatment and care of people with specific diseases and conditions in the NHS in England and Wales.

The guideline was developed by the National Collaborating Centre for Women's and Children's Health. The Collaborating Centre worked with a group of healthcare professionals (including consultants, GPs and nurses), patients and carers, and technical staff, who reviewed the evidence and drafted the recommendations. The recommendations were finalised after public consultation.

The methods and processes for developing NICE clinical guidelines are described in The guidelines manual.

We have produced information for the public explaining this guideline. Tools to help you put the guideline into practice and information about the evidence it is based on are also available.

Changes after publication

January 2012: minor maintenance

August 2013: minor maintenance

Your responsibility

This guidance represents the view of NICE, which was arrived at after careful consideration of the evidence available. Healthcare professionals are expected to take it fully into account when exercising their clinical judgement. However, the guidance does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient, in consultation with the patient and/or guardian or carer, and informed by the summary of product characteristics of any drugs they are considering.

Implementation of this guidance is the responsibility of local commissioners and/or providers. Commissioners and providers are reminded that it is their responsibility to implement the guidance, in their local context, in light of their duties to avoid unlawful discrimination and to have regard to promoting equality of opportunity. Nothing in this guidance should be interpreted in a way that would be inconsistent with compliance with those duties.

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Contact NICE

National Institute for Health and Clinical Excellence
Level 1A, City Tower, Piccadilly Plaza, Manchester M1 4BT

www.nice.org.uk
nice@nice.org.uk
0845 003 7780

Accreditation