

Management of childhood gastroenteritis

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This CME contribution has been selected from the guideline for the *Management of Childhood Gastroenteritis* (November 2004) prepared by the New Traditions team at Waikato Hospital and is published with permission. It is the result of a collaborative effort by primary and secondary health providers in the Waikato region to develop a useful tool for practitioners. The guideline represents current evidence-based best practice.

The aim of the guideline package is to provide comprehensive advice on childhood gastroenteritis in both primary and secondary care that will be of use to all health professionals involved in the care of children with gastroenteritis.

The original guideline has been published as two flowcharts with further supporting material including:

- Assessment Record
- Nurse Standing Orders
- Nurse Initiated Management of Childhood Gastroenteritis
- Frequently Asked Questions
- Information for Parents including home management guidelines.

Acknowledgements

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Table 1. Key messages of the guideline

| | |
|--|--|
| Assessment | <ul style="list-style-type: none"> • Children with gastroenteritis are not usually significantly dehydrated • Dehydration in gastroenteritis is best assessed with a limited number of reproducible clinical findings |
| Treatment | <ul style="list-style-type: none"> • Children with gastroenteritis who are not dehydrated: <ul style="list-style-type: none"> – do not need oral rehydration solution (ORS) – will usually not drink ORS – can continue with normal fluids, and solids as tolerated • Most children with gastroenteritis who are dehydrated will tolerate oral rehydration, with ORS either orally or nasogastrically, even if they are vomiting • Parents can give oral rehydration. |
| Nurse Initiated Management | <ul style="list-style-type: none"> • Is safe, practical, and effective • Management begins more quickly • Empowers nurses • Empowers parents |
| Potentially Adverse Interventions | <ul style="list-style-type: none"> • When children with gastroenteritis are dehydrated, many fluids other than ORS (e.g. sports drinks) may be harmful • There is almost always never any place for medications (anti-emetics, antidiarrhoeals, antibiotics) in childhood gastroenteritis |
| Investigations | <ul style="list-style-type: none"> • There is only a limited place for investigations in childhood gastroenteritis • Lactose intolerance is rare in childhood gastroenteritis |

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The complete guideline is available as a 'Guideline Pack'. These can be ordered by contacting:

The PrintShop, Waikato Hospital; Tel: (07) 839 8884. The cost of the guideline is \$13.20+GST per guideline pack.

Nurse Initiated Management of Childhood Gastroenteritis

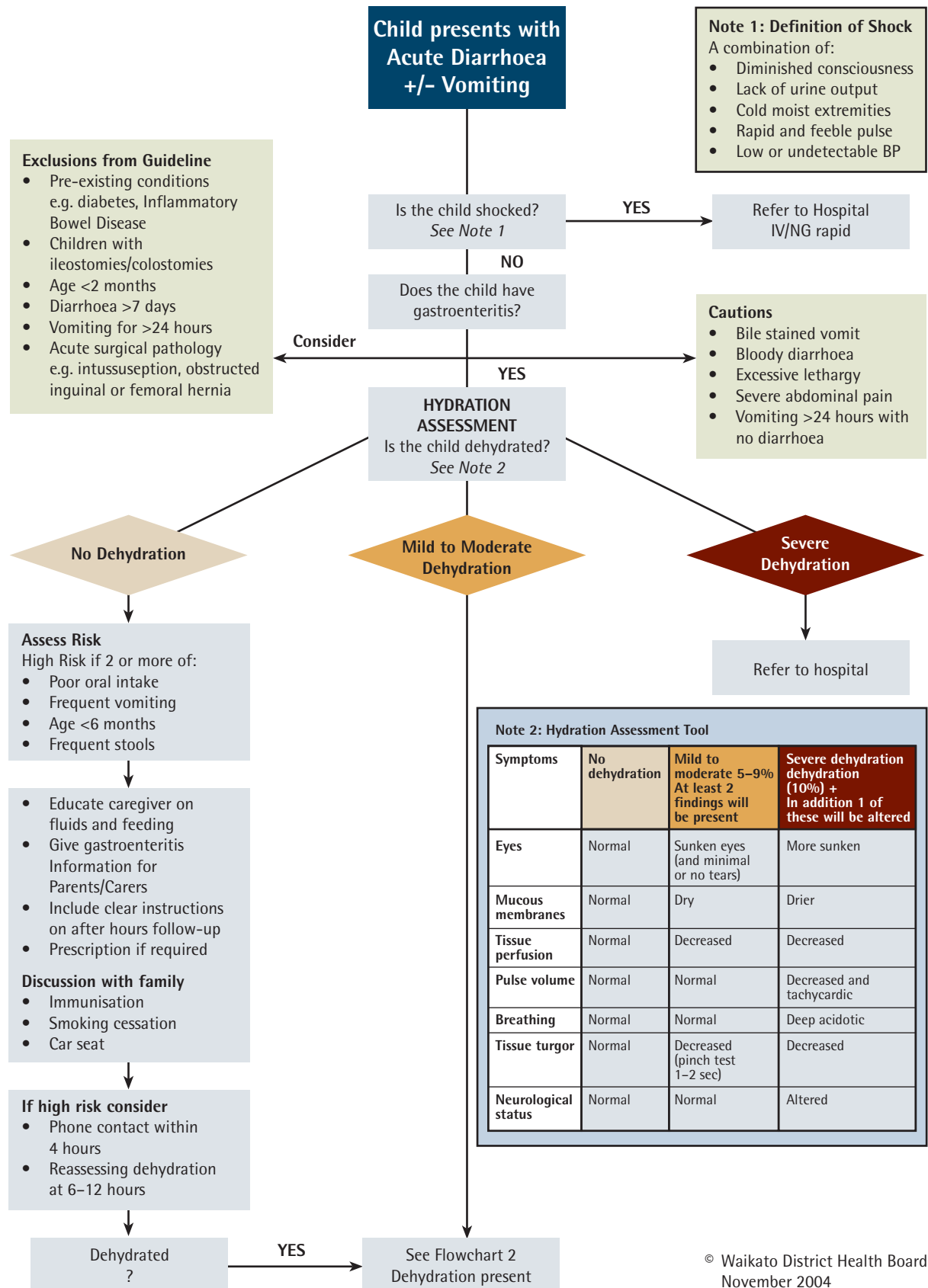
| | |
|-------------------------|---|
| If | Child presents diarrhoea +/- vomiting Age >2 months and not shocked (see Flowchart 1) |
| Then | Weight TPR Assess dehydration (see Flowchart 1 Note 2) If concerned or child age <2 months inform doctor If no dehydration go through caregiver information handout on fluids and feeding |
| Oral Rehydration | If moderate to severe dehydration Calculate fluid requirements as mls per 5 mins (see table Flowchart 2) Start fluid balance chart, start hydration Nurse gives first sips of fluid using teaspoon, bottle, straw, sipper cup, syringe |
| Learning | Carers observe the nurse giving first fluids, with explanation Carers administer the next fluids, initially with supervision Nurse goes through education handout with the caregiver |
| Review | Reassess after 1 hour If after 2 hours child not taking fluids consider alternative rehydration method Insert nasogastric and observe for 2–4 hours Reassess admit to ward or discharge Remove nasogastric tube before discharge <ul style="list-style-type: none"> Consider using paracetamol for fever or distress |
| Medical Review | Prior to discharge to be seen by a doctor |

Note 2: Hydration Assessment Tool

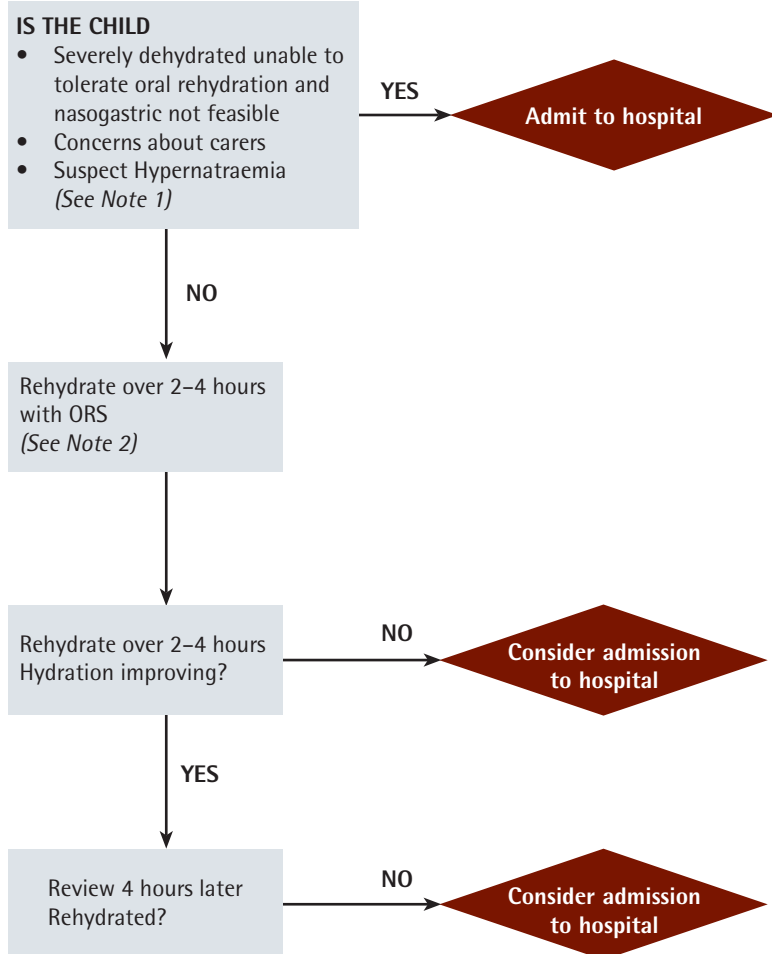
| Symptoms | No dehydration | Mild to moderate 5–9% At least 2 findings will be present | Severe dehydration (10%)+ In addition 1 of these will be altered |
|---------------------|----------------|---|--|
| Eyes | Normal | Sunken eyes (and minimal or no tears) | More sunken |
| Mucous membranes | Normal | Dry | Drier |
| Tissue perfusion | Normal | Decreased | Decreased |
| Pulse volume | Normal | Normal | Decreased and tachycardic |
| Breathing | Normal | Normal | Deep acidotic |
| Tissue turgor | Normal | Decreased (pinch test 1–2 sec) | Decreased |
| Neurological status | Normal | Normal | Altered |

In Hypernatraemic dehydration, signs of dehydration may be less obvious

Childhood Gastroenteritis Flowchart 1



Childhood Gastroenteritis Flowchart 2



Note 1: Signs of Hypernatraemia

- More lethargic than expected from level of dehydration
- More thirsty than expected from level of dehydration
- 'Doughy' skin
- No reduced skin turgor
- Always moderately or severely dehydrated

Note 2: Oral Rehydration Solution (ORS)

- ORS is safe and effective for rehydrating children
- Information to caregivers

Estimate percentage dehydration

5% 50ml/kg

9% 90ml/kg

Replace deficit over 2–4 hours

Give small amounts frequently via spoon, cup, bottle or syringe

- Consider nasogastric if unable to tolerate oral rehydration
- Small volumes decrease the chance of vomiting
- As an example, 25ml/kg/hour replaces 5% dehydration over 2 hours
- If maximal replacement rates are exceeded by ongoing losses, the child is likely to need nasogastric or IV fluids.

Vomiting is not a contraindication for ORS

Vomiting rarely prevents successful oral rehydration as most of the fluid is absorbed. If a child vomits, wait 5–10 minutes and start giving ORS but more slowly.

Rehydration / Maintenance Fluid table

Based on 5% dehydration with oral or nasogastric rehydration over 4 hrs.

Note: for every runny poo add 50–100ml to the total fluid requirements for that hour

| Weight kg | Fluid for the first 4 hours | | Fluid subsequent to the first 4 hrs/rehydration | |
|--------------|-----------------------------|--------|---|--------|
| | Rehydration + maintenance | | Maintenance only | |
| | ml/hr | tsp/hr | ml/hr | tsp/hr |
| 5 | 83 | 17 | 20 | 4 |
| 10 | 165 | 33 | 40 | 8 |
| 15 | 238 | 48 | 50 | 10 |
| 20 | 310 | 63 | 60 | 12 |
| 25 | 383 | 78 | 70 | 14 |
| 30 | 450 | 91 | 75 | 15 |

1 cup = 250ml

1 teaspoon = 5ml

1 tablespoon = 15ml

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Frequently Asked Questions for Children with Gastroenteritis

How is hydration best assessed?

Most children with gastroenteritis are not dehydrated. Use of subjective assessment criteria tends to overestimate dehydration. The best piece of research done on the value of clinical exam in dehydration is Gorelick et al, in which 4 individual signs were found on logistic regression to be independent predictors of 5% dehydration:

- General appearance
- Dry mucous membranes
- Reduced tears
- Capillary refill > 2 seconds

The presence of two or more of these signs had a sensitivity of 79% and a specificity of 87% in predicting 5% dehydration. As an isolated finding, reduced capillary refill was the strongest predictor. Reduced urinary output was a very poor predictor of dehydration.

Gorelick MH, Shaw KN, Murphy KO. Validity and reliability of clinical signs in the diagnosis of dehydration in children. *Pediatrics* 1997;99(5):e6.

Do children who are not dehydrated need Oral Rehydration Solution?

No.

Oral rehydration solution, with emphasis on a mix of sodium, glucose and water in correct ratios, is designed to actively pump water across the bowel wall in children who are dehydrated. It has no advantage in maintaining hydration in well-hydrated children. In general, children who are well-hydrated will not drink ORS, which is fairly unpalatable.

<http://www.cincinnatichildrens.org/NR/rdonlyres/167EED11-E72C-49EC-8CC1-39C2F4CF3429/0/GasGL.pdf>

Should children with gastroenteritis stop eating food and drinking milk?

Glucose-based ORS does not reduce the duration of illness or the volume of stool output. Early feeding, however, can reduce the severity, duration, and nutritional consequences of diarrhoea.

Food-based fluids (e.g. cereals or gruel) or other plain fluids can be used to prevent dehydration. Regardless of the type of fluid used, an appropriate diet should be administered as well.

There is also some evidence that, even in children who are dehydrated, continued feeding with small frequent volumes of milk improves recovery rates.

Children who have diarrhoea and are not dehydrated should continue to be fed age-appropriate diets. Children who require rehydration should be fed age-appropriate diets as soon as they have been rehydrated (based on evaluation of controlled clinical studies documenting the benefits of early feeding of liquid and solid foods).

Practice parameter: the management of acute gastroenteritis in young children. American Academy of Pediatrics, Provisional Committee on Quality Improvement, Subcommittee on Acute Gastroenteritis *Pediatrics* 1996 97: 424-435.

Centers for Disease Control and Prevention. The management of acute diarrhoea in children: oral rehydration, maintenance, and nutritional therapy. *MMWR* 1992;41 (No. RR-16)1-20

Household Management of Diarrhoea and Acute Respiratory Infections. Report of a scientific meeting at the Johns Hopkins School of Hygiene and Public Health in collaboration with the United Nations Children's Fund and the Diarrhoeal Diseases and Acute Respiratory Infections Control Programmes of the World Health Organization. Occasional Paper No. 12. November 1990.

Wan, C., et al., Randomised trial of different rates of feeding in acute diarrhoea. *Arch. Dis. Child.*, 1999. 81(6): p. 487-491.

Can children with gastroenteritis who are vomiting be treated with ORS?

Yes.

ORS can be used successfully to orally rehydrate most children who are vomiting - the key is to use small amounts of fluid frequently. Palatability is improved by chilling the ORS.

Armon K, Stephenson T, MacFaul R, et al. An evidence and consensus based guidelines for acute diarrhoea management. *Arch Dis Child* 2001;85:132-42

What about nasogastric rehydration in childhood gastroenteritis?

Nasogastric rehydration is at least as effective as intravenous rehydration, in dehydrated children who are unable to be rehydrated orally. There is less potential for complications using nasogastric rehydration, compared to intravenous rehydration. Children who are vomiting can be successfully rehydrated nasogastrically, if oral rehydration is unsuccessful.

Comparison of nasogastric and intravenous methods of rehydration in pediatric patients with acute dehydration. Author(s): Nager AL; Wang VJ; *Pediatrics* 2002 Apr; 109(4).pp. 566-72.

What about rapid intravenous rehydration in childhood gastroenteritis?

A systematic review found that rapid IV rehydration was effective in terms of reducing hospital admission, but noted disadvantages (practical, economic) compared to ORS, given either orally or via nasogastric tube. A retrospective case-controlled study found that either IV or nasogastric rehydration was more effective than slow IV rehydration, but should be reserved for children who fail oral rehydration.

Gorelick MH. Rapid Intravenous Rehydration In The Emergency Department: A Systematic Review. Pediatric Emergency Medicine Database, PemDatabase.Org researchinpem.homestead.com/files/rapid_iv_hydration_23.07.doc

Phin SJ, McCaskill ME, Browne GJ, Tam LT. Clinical pathway using rapid rehydration for children with gastroenteritis. *J Paediatr Child Health* (2003) 39, 343-348

Is there a place for anti-diarrhoeal agents in childhood gastroenteritis?

No.

The American Academy of Pediatrics notes that data on antidiarrhoeal agents were not sufficient to demonstrate efficacy, therefore the routine use of antidiarrhoeal agents is not recommended, because many of these agents have potentially serious adverse effects in infants and young children. Similar conclusions were reached in the Murphy evidence based review, and finally Armon et al concluded that infants and children with acute gastroenteritis should not be treated with antidiarrhoeal agents.

Practice parameter: the management of acute gastroenteritis in young children. American Academy of Pediatrics, Provisional Committee on Quality Improvement, Subcommittee on Acute Gastroenteritis *Pediatrics* 1996 97: 424-435.

Murphy MS. Guidelines for managing acute gastroenteritis based on a systematic review of published research. *Arch Dis Child* 1998;79:279-84

Armon K, Stephenson T, MacFaul R et al. An evidence and consensus based guidelines for acute diarrhoea management. *Arch Dis Child* 2001;85:132-42

Is there a place for anti-emetic agents in childhood gastroenteritis?

Standard practice guidelines discourage the use of anti-emetics in childhood gastroenteritis on the basis of potential harm (direct side-effects, masking other conditions) and lack of proven benefit. There is little published data.

Su-Ting et al undertook a retrospective study of anti-emetic use for gastroenteritis and adverse effects, using Medicaid claim data among children (1 month to 18 years). 8.9% received an anti-emetic. The children who received anti-emetics were likely to be older (5.45 years compared to 3.64 years). Side-effects were similar to controls. However, given the retrospective nature of the study, the low anti-emetic usage, lack of efficacy data, and likelihood of incomplete data capture, this information should be interpreted with caution. Kwon et al surveyed anti-emetic use, and in a low-return survey (35.6%), found 60.9% of responders had used anti-emetics "at least once" in the preceding year. Again, the authors recommended "given the absence of literature on efficacy or safety, these drugs should be used only with careful consideration to potential side-effects."

Antiemetic use for acute gastroenteritis in children. Su-Ting T Li. David L DiGiuseppe, Dimitri A Christakis. *Archives of Pediatrics & Adolescent Medicine*. Chicago: May 2003. Vol. 157, Iss. 5; p. 475 (5 pages)

Antiemetic use in pediatric gastroenteritis: a national survey of emergency physicians, pediatric emergency physicians. Kwon KT, Rudkin SE, Langdorf MI. *Clin Pediatr (Phila)*. 2002 Nov-Dec;41(9):641-52.

Is paracetamol use of value in gastroenteritis?

A Medline search and a Google search failed to find any research trials evaluating safety and efficacy of paracetamol in gastroenteritis. A single observational series noted that paracetamol was used by families in up to 27% of children with gastroenteritis.

Home-based management of children hospitalized with acute gastroenteritis. O'Loughlin EV; Notaras E; McCullough C; Halliday J; Henry RL *J Paediatr Child Health* 1995 Jun; 31 (3)189-91.

When should stool microbiological testing be undertaken in childhood gastroenteritis?

Sometimes.

The Armon et al evidence-based review recommends that stool should be sent for microscopy, culture, sensitivity and virology in acute diarrhoea in the following circumstances:

- A history of blood with or without mucus in the stool
- Systemically unwell, severe or prolonged diarrhoea
- A history suggestive of food poisoning
- Recent travel abroad

In addition, Waikato Public Health advice is:

"No diagnostic testing is required for most patients with cases of mild diarrhoea. From a Public health per-

spective, it is important to investigate if the patient has come (back) from overseas or when containment of outbreaks, especially in institutions and day care centres, may depend on the identification of the pathogen”

“Investigation should also be contemplated when illness is prolonged or recurrent or if patient is a food handler, professional child carer or health carer.”

“Recent treatment with a broad spectrum antibiotic raises the risk of Clostridia to 15-25%. Clostridium difficile may occur one to ten days after antibiotic treatment has ceased, and occasionally up to 6 weeks post-exposure.”

“Under the Health Act 1956, medical practitioners are required to notify the Medical Officer of Health of any notifiable disease they suspect or diagnose.”

Armon K, Stephenson T, MacFaul R, et al. An evidence and consensus based guidelines for acute diarrhoea management. Arch Dis Child 2001;85:132-42

Dr Dell Hood, Medical Officer of Health, Health Waikato. Personal Communication 2003.

When should lactose intolerance be considered in childhood gastroenteritis?

Less than 3% of children with acute gastroenteritis have clinically significant or persistent lactose intolerance. Infants and children who have persisting very loose bowel motions 3 days after clinical recovery and on a lactose containing diet, particularly with perianal excoriation, should have a reducing substances test.

Trounce, J. and J. Walker-Smith, Sugar intolerance complicating acute gastroenteritis. Arch. Dis. Child., 1985. 60(10): p. 986-990.

What is the place of antibiotic treatment in acute gastroenteritis?

There is no place for empirical treatment with antibiotics in acute gastroenteritis. There is no evidence for benefit, and potential for increased risk of C Difficile infection, and for Haemolytic-Uraemic Syndrome in children infected with Verocytotoxin-producing E. coli (ref NEJM).

There is very rarely an indication for treating with antibiotics on an-organism-specific basis.

What is the place of sports drinks in acute gastroenteritis?

Sports drinks should not be used as rehydration fluid.

Sports drinks are relatively hyponatraemic compared to ORS. They have minimal or no glucose, instead having complex carbohydrates contributing to osmolality. There is no advantage in sports drinks compared to a bland diet for children with acute gastroenteritis who are not dehydrated.

In children who are dehydrated, the lack of sodium and glucose means the sodium/glucose pump cannot work effectively, and the complex carbohydrate load may contribute to an osmotic diarrhoea.

Dousma, M., A.J. Barker, and T.W. de Vries, [Sport drinks: not a suitable rehydration solution for children]. Nederlands tijdschrift voor geneeskunde, 2003. 147(5): p. 213-214.

Opportunities for transatlantic learning in health care

What the US might learn from the UK

1. The effectiveness and efficiency of ensuring health care without regard to ability to pay
2. Paying general practitioners for quality and outcomes
3. National Institute for Clinical Excellence – particularly its use of cost utility data to help decide which innovations should be introduced into the NHS, how it incorporates public values into its decisions, and how it is beginning to regulate surgical procedures
4. National Patient Safety Agency – one of few examples of a national programme to make health care safer

What the UK might learn from the US

1. Institute of Medicine-how medicine can speak with one highly respected and well informed voice
2. Building a network of high performance, low cost centres for complex healthcare procedures
3. Getting maximum value for money through knowing much more about the costs and benefits of different procedures
4. Management of patients with long term conditions'

The full list of examples considered is on bmj.com

Quam L, Smith R. What can the UK and US health systems learn from each other? BMJ 2005;330:530-533.