Guideline

Gastroenteritis in children

Reason for development

- To standardise/improve patient care

1 Scope

Children within the trust

2 Aim

The aim of this guideline is to help junior or non-medical staff to diagnose and manage dehydration in children presenting with gastroenteritis and to help decision making in terms of method of fluid replacement, admission to hospital and investigations.

3 Introduction

The most important problem associated with diarrhoea and vomiting in childhood is dehydration. Worldwide this is the leading cause of mortality in children.

4 Clinical features

Important: Vomiting alone should not be diagnosed as gastroenteritis.
If an accurate pre-illness weight is available, calculate deficit from weight loss.
The table on the following page will help to assess deficit based on clinical signs.
Remember: Clinical assessment tends to underestimate dehydration

4.1 Assessment of severity of dehydration

No dehydration <3% weight loss	Mild to moderate dehydration 3–8% weight loss	Severe dehydration >9% weight loss
No signs	• Dry mucous membranes • Reduced urine output • Sunken eyes • Minimal or no tears • Diminished skin turgor (pinch test 1-2 seconds*) • Altered neurological state (drowsiness, irritability) • Deep (acidotic) breathing	• Increasingly marked signs from the mild to moderate group, **plus** • Decreased peripheral perfusion (cool/mottled/pale) capillary refill time >2 sec. • Anuria • Hypotension • Circulatory collapse

* Pinch skin of abdomen: if recoils instantly = normal,
1-2sec. = mild to moderate dehydrations
>2 sec.= severe dehydration

4.2 Differential Diagnosis

Enteric infection	Viruses	Rotavirus **most common causes** Adenovirus
	Bacteria	Salmonella Campylobacter E. Coli Shigella
	Protozoa	Giardia Cryptosporidium Entamoeba
Food poisoning		Several bacteria and bacterial toxins
Systemic infection		Urinary tract infection, pneumonia, septicaemia
Surgical conditions		Appendicitis, intussusception, partial bowel obstruction, malrotation
Other		Diabetes mellitus, antibiotic related colitis, haemolytic uraemic syndrome, congenital adrenal hyperplasia, enteropathy, migraine, raised intracranial pressure, porphyria

Features suggestive of a diagnosis **other** than viral gastroenteritis:

- Abdominal pain with significant tenderness/distension/mass/guarding.
- Hepatomegaly
- Vomiting of blood or bile
- Bloody diarrhoea
- Pallor/jaundice
- Systematically unwell out of proportion to the degree of dehydration
- Shock
- Neonate with diarrhoea

5 Management

5.1 Investigations

Blood tests are **not** usually required with the following exceptions:

- Severe dehydration with circulatory compromise (Urea and electrolytes, bloodgases).
- Moderate dehydration with a doughy feel to the skin suggestive of hypernatraemia.
- Moderately dehydrated children whose history and physical findings are inconsistent with straightforward gastroenteritis.
- Bloody diarrhoea

(consider U+E and also full blood count and film to rule out haemolytic uraemic syndrome).

- Any child receiving intravenous rehydration.

Urine analysis (clean catch) should be tested in every child by dipstick but sent off to the lab for further analysis **only if** abnormal.

Stool microbiology should be requested in the following cases:

- Blood in stool.
- Suspected epidemic or food poisoning.
- Severe or prolonged diarrhoea (>2 weeks).
- Recent overseas travel.
- Child residing in an institution.

5.2 Recommendations for admission

The following children should be admitted to the **Children's Observation Unit:**

- Any child with mild to moderate dehydration to ensure successful rehydration.
- Children aged less than 6 months.
- Children with frequent diarrhoea (>8 per 24hrs) and vomiting who are showing signs of dehydration and are at risk of becoming more dehydrated.
- Children whose carers are thought to be unable to manage the child's condition at home.

Children with **severe dehydration** should be admitted to the **ward as inpatients**.

5.3 Fluid requirements

The aims of treatment are:

- Restoration and maintenance of fluid and electrolyte balance.
- Replacement of ongoing losses (diarrhoea, vomiting).
- Restoration of normal nutrition

Calculation of **maintenance fluid** requirements:

- **100ml/kg** per 24 hours for the 1st 10kg of body weight

Add

- **50ml/kg** per 24 hours for the next 10kg of body weight
- **20ml/kg** per 24 hours for the remaining kg of body weight

Example: A child weighing 22kg has maintenance requirements of
(100ml x 10) + (50ml x 10) + (20ml x 2) = 1540ml per 24 hours

Calculation of **rehydration volume** requirements:
This is based on the estimated percentage of dehydration (see table above)

- **% dehydration x body weight (kg) x 10**

Example: A child weighing 22kg is thought to be 5% dehydrated
Rehydration volume is 5% x 22kg x 10 =1100ml

Total fluid requirements: 1100ml deficit + 1540ml/24hrs maintenance + ongoing losses

Note: In the case of a shocked child, once circulating volume has been restored, dehydration is then assumed to be a **maximum of 10%**, resulting in a maximum rehydration volume of 100ml/kg.

Oral rehydration solution (ORS) is **preferred** to intravenous fluids/rehydration because:

- It avoids the risks associated with rapid fluid and electrolyte shifts.
- It corrects acidosis and dehydration as quick as intravenous rehydration.
- It reduces the risk of seizures and cerebral oedema in hypernatraemia.
- Vomiting and diarrhoea settle more quickly.

Children who refuse ORS can have water but should not be given drinks with a high sugar content (fruit juice, lemonade or cola) since this will create an osmotic effect which will worsen the diarrhoea. Breast milk should be continued but extra fluids may be required.

5.4 Management overview

	No dehydration <3% weight loss	Mild to moderate dehydration 3–8% weight loss	Severe dehydration ≥9% weight loss
Investigations	• Document weight • Clean catch urine • Stool microbiology as indicated (see above)	• Document weight • Clean catch urine • Stool microbiology as indicated (see above) Consider blood tests if: • Suspected ↑Na • Unusual presentation • Bloody diarrhoea	• Document weight • Clean catch urine • Stool microbiology as indicated (see above) • Intravenous access • U+Es, FBC, glucose, blood gases, • Keep an open mind with regards to the diagnosis and consider infectious, endocrine and other causes
Management	• Ensure adequate fluid intake • Appropriate advice to carers • Continue normal feeds as tolerated • Discharge home with written patient information	**Able to drink** • Oral fluid trial* • Discharge home if successful • Restart normal feeds once rehydrated **Unable to drink** • Rapid **enteral** rehydration via nasogastric tube** • Discharge home if successful with written patient information • Admit for intravenous rehydration if not successfully rehydrated after rapid oral rehydration	• Treat shock (fluid bolus of 20ml/kg of normal saline over 10 min) • Consider PICU admission if ≥40ml/kg bolus required • Chase serum Na concentration urgently • Assume 10% de-hydration and replace deficit over **12-24hrs**, if hypernatraemic over 48-72 hours • Give maintenance fluids in addition to deficit • 0.45% saline with 2.5% dextrose is the fluid of choice (unless ↑Na, use normal saline instead with added dextrose) • Potassium supplementation may be necessary. Add once urine output established

*see next page for oral fluid trial
**and rapid enteral rehydration via nasogastric tube

5.5 Oral fluid trial

When to start	As soon as the child is seen at triage
What fluid	**ORS** (Dioralyte® relief) or water
How much	**1ml/kg** every 5 minutes
How long	Able to tolerate this for **1-2 hours**
Measure of success	Meeting fluid goal and clinical evidence of rehydration

If an oral fluid trial is successful the child can be discharged to continue their rehydration at home and appropriate follow up should be arranged for 12-24 hours time, usually this can be done by the General Practitioner.
If unsuccessful, progress to rapid **enteral** rehydration.

5.6 Rapid enteral rehydration

- ORS is used in all cases.
- A reasonable starting volume is **50ml/kg** (based on 5% dehydration).
- This total is given over **4 hours**.
- Administration is via **nasogastric** tube.
- The calculated infusion rate can be commenced immediately, there is no need to slowly upgrade the rate.
- There is no upper age limit for a nasogastric tube. Remember, this is a safer, more effective and les invasive means of rehydration than intravenous fluids.
- Children receiving enteral fluid may continue to **vomit** and may even have a transient increase in stool frequency. This does not necessarily imply failure of therapy. Success of therapy is judged by success of rehydration, not resolution of symptoms nor by willingness to drink subsequently.

During the 4 hour rehydration period:

- Continue to assess degree of dehydration 2 hourly.
- Record fluid losses (vomiting, diarrhoea).
- Record urine out put and test urine specific gravity.

After the 4 hour rehydration period

- Record the weight and compare it to the pre-hydration weight.
- Assess the clinical degree of dehydration
- If still dehydrated consider to continue nasogastric rehydration for a longer period and/or at a higher infusion rate or admit for intravenous rehydration.

5.7 Discharge and advice

If the child is successfully rehydrated, it can be discharged home. There is no need to ensure that vomiting and diarrhoea have settled or to undergo a trial of drinking.
Provide the carers with a plan for home management:

- Allow unrestricted fluids, but continue the principle of small volumes frequently.
- Initially use ORS, then introduce water or milk. Drinks with a high sugar content should be avoided. Provide the parents with sufficient ORS if necessary.
- Encourage an additional **10ml/kg** of ORS for each watery stool at home.
- Normal age appropriate diet can be introduced once the child is hungry, avoiding foods with a high sugar or fat content
- Appropriate follow up should be arranged and the carers about what features they need to look out for at home in order to seek medical advice again.

6 References

Murphy A S. Guidelines for managing acute gastroenteritis based on a systematic review of published research. *Arch Dis Child 1998*;79:279–284.

Spandorfer P R, Alessandrini E A, Joffe M D et al. Oral versus intravenous rehydration of moderately dehydrated children: a randomized, controlled trial. *Pediatrics 2005;* 115:295-302.

Fonseca B K, Holdgate A, Craig J C et al. Enteral vs Intravenous Rehydration Therapy for Children with Gastroenteritis. A Meta-analysis of Randomized Controlled Trials. *Arch Pediatr Adolesc Med 2004;*158:483-490

Hoorn E J, Geary D, Robb M et al. Acute Hyponatremia Related to Intravenous Fluid Administration in Hospitalized Children: An Observational Study. *Pediatrics 2004*;113:1279-1284

Geelhoed G, Mews C.Princess Margaret Hospital for Children. Gastroenteritis. Management guideline Emergency Department 2003.

Equality and Diversity Statement

This document complies with the Cambridge University Hospitals NHS Foundation Trust service Equality and Diversity statement.

Disclaimer

It is **your** responsibility to check against the electronic library that this printed out copy is the most recent issue of this document.

Document management

Document control/change history					
Version	**Author (S)**	**Owner**	**Date**	**Circulation**	**Comments**
Draft 1	Peter Heinz	Children's services	October 2005	All paeds and A+E consultants and senior nurses	Final draft
Draft 2					
Draft 3					
Draft 4					

The chart above can be removed when the document has been ratified.

Document ratification and history	
Approved by:	
Date approved:	
Date placed on electronic library:	
Ratified by:	Clinical and Corporate Governance Committee
Date ratified:	
Review date:	2 years (or earlier in the light of new evidence)
Obsolete date:	
Authors:	
Owning Department:	Department name
File name:	
Version number:	
Unique identifier no.:	

Keep this chart in your final document.