

Witness Statement Ref. No.

118/1

**NAME OF CHILD:** Adam Strain

**Name:** Susan Beattie

**Title:** Mrs

**Present position and institution:**

Allergy Nurse Band 6(secondment), Royal Group of Hospitals, Belfast.

**Previous position and institution:**

*[As at the time of the child's death]*

Staff Nurse (d grade) Paediatric Intensive Care Unit, RBHSC

**Membership of Advisory Panels and Committees:**

*[Identify by date and title all of those between January 1995-December 2010]*

None

**Previous Statements, Depositions and Reports:**

*[Identify by date and title all those made in relation to the child's death]*

None

**OFFICIAL USE:**

List of previous statement, depositions and reports attached:

**Ref:**

**Date:**

**IMPORTANT INSTRUCTIONS FOR ANSWERING:**

*Please attach additional sheets if more space is required. Please identify clearly any document to which you refer or rely upon for your answer. If the document has an Inquiry reference number, e.g. Ref: 049-001-001 which is 'Chart No.1 Old Notes', then please provide it. If the document does not have such a number then please provide a copy of it*

- (1) State the times at which you were on duty between 26<sup>th</sup> and 28<sup>th</sup> November 1995 and in particular:-

(a) Whether you were present in the hospital or

(b) Whether you were on call

I was on duty in the hospital on the afternoon/evening of the 27<sup>th</sup> November 1995.

I do not recall the start time of the shift worked on that day but it would have ended at 8pm. I do not recall if I worked on either the 26<sup>th</sup> or 28<sup>th</sup> of November.

- (2) Describe what you considered to be your role in relation to and responsibilities towards Adam Strain and his family whilst you were on duty

I was involved in the nursing care of Adam and his family. I do not recall details of my involvement in his care. I was present when Dr Savage and Dr Taylor spoke with Adam's mother following his admission to the paediatric intensive care unit on the 27<sup>th</sup> November 1995 and I have recorded this in the counselling record of the nursing notes. I confirm that I also signed the drug Kardex for checking an H2 Antagonist at 16.00hrs and the fluid balance sheet at 20.00hrs.

- (3) Describe any contact you had with Adam or his family including when, where and what occurred during that contact

I do not recall details of my contact with Adam or his family. I have recorded in the nursing notes that I was present when Dr Savage and Dr Taylor spoke with Adam's mother at some time after his admission to the paediatric intensive care unit on the 27<sup>th</sup> November 1995. I also confirm that I signed for checking a H2 Antagonist at 16.00hrs and signed the fluid balance chart at 20.00hrs.

- (4) Describe and explain any discussions you had with any medical personnel in relation to Adam whilst you were on duty

I do not recall any discussions I had with medical staff in relation to Adam Strain whilst I was on duty.

- (5) Describe in detail the education and training you received in fluid management (in particular hyponatraemia) and record keeping through the following, providing dates and names of the institutions/bodies:

(a) Pre-registration education

I received basic nurse training with regard to fluid management and NMC (previously

UKCC) guidelines on record keeping during my pre-registration training. I was a student nurse (Registered General Nurse/Registered Sick Children's Nurse) from October 1989 until January 1994.

**(b) Post-registration education and training**

I do not recall having undertaken any specific post registration education and training with regard to this at that time.

I have attended the following courses since that time:

Administration of Medicines, Legal Issues and Record Keeping. Rosemary Wilson. RVH. December 2008.

One Day Paediatric Life Support Course. Advanced Life Support Group. As far as I can recall this was held in the Royal Group of Hospitals. March 2004

BMJ e-learning module Hyponatraemia. March 2011

**(c) Hospital induction programmes**

None

**(d) Continuous professional development**

I do not recall having undertaken any continuous professional development with regard to this at that time.

I have attended the following courses since then:

Administration of Medicines, Legal Issues and Record Keeping. Rosemary Wilson. RVH. December 2008.

One Day Paediatric Life Support Course. Advanced Life Support Group. As far as I can recall this was held in the Royal Group of Hospitals. March 2004

BMJ e-learning module Hyponatraemia. March 2011

**(6) Prior to 26<sup>th</sup> November 1995, describe in detail your experience of children with hyponatraemia, including the:**

**(a) Estimated total number of such cases, together with the dates and where they took place**

I do not recall

**(b) Number of the children who were aged less than 6 years old**

I do not recall

**(c) Number of children who were polyuric**

I do not recall

(d) Nature of your involvement

I do not recall

(e) Outcome for the children

I do not recall

(7) Identify any 'Protocols' and/or 'Guidelines' which governed your actions in relation to Adam and his family whilst you were on duty

UKCC Code of Professional Conduct for the Nurse, Midwife and Health Visitor. Third Edition. June 1992

UKCC Scope of Professional Practice. June 1992

UKCC Exercising Accountability. March 1989

UKCC Standards for the Administration of Medicines. October 1992

(8) Identify precisely on Adam's medical notes and records the entries that you made or which were made on your direction and state below:

(a) When each of the identified entries was made

Relative counselling record from the afternoon of November 27<sup>th</sup> 1995. Dr Taylor and Dr Savage spoke with Adam's mother to explain Adam's condition - I was present. I have not documented the time of this record but from reading my record in the medical notes it appears to have been made between the time Adam was admitted to the Paediatric Intensive Care Unit and prior to the neurologist assessing Adam's condition that evening. REF: 058-038-180

I checked and signed Adam Strain's drug Kardex for the administration of an H2 Antagonist at 16.00hrs on the 27<sup>th</sup> November 1995. REF 058-005-013

I signed Adam's fluid balance sheet at 20.00hrs on 27<sup>th</sup> November 1995 REF 057-018-026 and countersigned erection of Mannitol (untimed) REF 057-018-027

(b) The source of the information recorded in the entry

I was present when Dr Savage and Dr Taylor spoke with Adam's mother on 27<sup>th</sup> November 1995. I have written in the counselling section of the nursing notes my record of the conversation which occurred. REF 058-038-180

(9) Provide any further points and comments that you wish to make, together with any documents, in relation to:

(a) Care and treatment of Adam from his admission for the renal transplant surgery on 26<sup>th</sup> November 1995 to his death on 28<sup>th</sup> November 1995 ; no comment

(b) Record keeping; no comment

(c) Communications with Adam's family about his care and treatment in respect of the renal transplant surgery;  
no comment

(d) Lessons learned from Adam's death and its effect on your practice  
No comment

(e) Current 'protocols' and procedures

BHSCT: Policy for the administration of intravenous fluids to children aged from 1 month until the 16<sup>th</sup> birthday: reducing the risk of hyponatraemia.2010

BHSCT: Hyponatraemia Paediatric Fluid Prescription Chart Presentation. 2010

BHSCT: Hyponatraemia Adult Fluid Prescription Chart Presentation. 2010

BHSCT: Paediatric I.V. Fluid Therapy Presentation Show. 2010

Hyponatraemia: Sources of Advice regarding paediatric fluid therapy.

The Paediatric Parental Fluid Therapy initial management guideline, DHSSPSNI 2007

(f) Any other relevant matter

No comment.

THIS STATEMENT IS TRUE TO THE BEST OF MY KNOWLEDGE AND BELIEF

Signed:

*A. B. C.*

Dated: 21/04/11

**Standards and Guidelines Committee**

***Policy for the administration of intravenous fluids to children aged from 1 month until the 16<sup>th</sup> birthday: reducing the risk of hyponatraemia.***

<b>Summary</b>	<p>This policy outlines the BHSCT approach for administration of intravenous fluids to children aged from 1 month until the 16<sup>th</sup> birthday with particular reference to reducing the risk of hyponatraemia.</p> <p>It maps the advice issued in March 2007 from the National Patient Safety Agency (NPSA) and September 2007 from the Northern Ireland Regional Paediatric Fluid Therapy Working Group on how to reduce the risks associated with administering intravenous infusions to children.</p> <p>This is fundamentally a document aimed at prevention of hyponatraemia and not treatment.</p>
<b>Purpose</b>	To improve the safe use of intravenous fluid in children and reduce the risk of hyponatraemia.
<b>Operational date</b>	March 2008
<b>Review date</b>	March 2010
<b>Version Number</b>	V4
<b>Supersedes previous</b>	V3
<b>Director Responsible</b>	Medical Director
<b>Lead Author</b>	Dr. Peter Crean
<b>Lead Author, Position</b>	Consultant Paediatric Anaesthetist, RBHSC.
<b>Additional Author(s)</b>	Dr H Steen, Associate Medical Director.
<b>Department / Service Group</b>	Social Services, Family and Child Care
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<b>Reference Number</b>	
<b>Supercedes</b>	

Standards & Guidelines Committee – Hyponatraemia + IV fluids for children – V3.6 – 17/09/2009

Date	Version	Author	Comments
25 August 2009	V 3.1	JR Johnston	Draft version 3
14 September 2009	V 3.2	JR Johnston	Minor RMcL amendments
16 September 2009	V 3.3	JR Johnston	8.3.4; Appendix 6 changes Final Draft for RQIA
17 September 2009	V 3.4	JR Johnston	4.1; 8.4 - DKA Fluid chart change
17 September 2009	V 3.5	JR Johnston	Appendix 4 changes
February 2010	V 3.6	JR Johnston	Trigger list

**Policy Record**

		Date	Version
Author (s)	Approval	27/03/2008	1.2
Director Responsible - Dr A Stevens	Approval	27/03/2008	1.2

**Approval Process – Trust Policies**

Policy Committee	Approval		
Executive Team	Authorise		
Chief Executive	Sign Off		

**Approval Process – Clinical Standards and Guidelines**

Standards and Guidelines Committee	Approval		1.2
Policy Committee	Approval		
Executive Team	Authorise		
Appropriate Director	Sign Off		

Standards & Guidelines Committee – Hyponatraemia + IV fluids for children – V3.6 – 17/09/2009



**Summary****Reference No:** SG001/08**Title:*****Policy for the administration of intravenous fluids to children aged from 1 month until the 16<sup>th</sup> birthday: reducing the risk of hyponatraemia.*****Purpose:**

To improve the safe use of intravenous fluid in children and reduce the risk of hyponatraemia.

**Objectives:**

This Policy sets out recommended practice for everyone who looks after children receiving intravenous fluids. It is based on regional and national guidance, ongoing clinical audit, published literature and is also aimed at specifically reducing the risk of hyponatraemia.

It should be considered alongside the guidance from the National Patient Safety Agency Patient Safety Alert 22<sup>1</sup>, and the Regional Paediatric Fluid Therapy Group wallchart<sup>2</sup>.**Policy Statement(s):**

1. The Paediatric Parenteral Fluid Therapy wallchart<sup>2</sup> forms the basis of BHSCT guidance on fluid prescription in paediatric patients aged from 1 month until the 16<sup>th</sup> birthday.
2. Sodium chloride 0.18% with glucose 4% will be withdrawn from general use in all BHSCT ward areas that treat children and the availability of these fluids will be restricted to critical care areas and other specialist wards such as renal, liver and cardiac units.
3. This policy and wallchart will be disseminated throughout the BHSCT.
4. Information about the availability of infusion fluids throughout the BHSCT will be attached to the Paediatric Fluid Guideline wall chart<sup>2</sup>.
5. A new fluid prescription/ balance chart will be developed for the prescription of fluids for all children treated in the BHSCT.
6. All staff involved in prescribing, administering and monitoring IV fluids to such children will be made aware of this policy and the Paediatric Parenteral Fluid Therapy wallchart<sup>2</sup> through the BHSCT intranet and Service Group dissemination.
7. The BHSCT will implement the following governance measures – incident reporting using a set of reporting 'triggers' and formal auditing.

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**Chief Executive/ Director**  
*(delete as appropriate)*
**Author****Date:****Date:**

Standards &amp; Guidelines Committee – Hyponatraemia + IV fluids for children – V3.6 – 17/09/2009

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**Full Description**

Reference No: SG001/08

**1. Policy for the administration of intravenous fluids to children aged from 1 month until the 16<sup>th</sup> birthday: reducing the risk of hyponatraemia.****2. Introduction:**

The development of fluid-induced hyponatraemia in the previously well child undergoing elective surgery or with mild illness may not be well recognised by clinicians.<sup>1</sup>

Since 2000, there have been four child deaths following neurological injury from hospital-acquired hyponatraemia reported in the UK.<sup>1</sup> International literature cites more than 50 cases of serious injury or child death from the same cause, and associated with the administration of hypotonic infusions.<sup>1</sup>

In March 2007 the National Patient Safety Agency (NPSA), with Alert 22, issued advice on how to reduce the risks associated with administering infusions to children<sup>1</sup>.

In April 2007, with DHSSPSNI circulars<sup>3,4</sup>, NHS organisations in Northern Ireland were tasked to produce and disseminate local clinical guidelines for the fluid management of paediatric patients based on the suggested NPSA guidelines template. The Northern Ireland Regional Paediatric Fluid Therapy Working Group produced an intravenous fluid clinical guideline in accordance with NPSA guidance<sup>1</sup>. This was disseminated to each HSC Trust for local implementation and monitoring.

In February 2009 the Regulation and Quality Improvement Authority (RQIA) published an independent review "Reducing the risk of hyponatraemia when administering intravenous infusions to children" which dealt with the implementation of recommended actions outlined within the NPSA Alert 22 and dissemination of the clinical guidelines / wall chart throughout HSC Trusts and independent hospitals. (see appendix 7.)

This document, using both the NPSA guidance and the RQIA recommendations, outlines the BHSCCT policy for administration of intravenous fluids to children aged from 1 month until the 16<sup>th</sup> birthday with particular reference to reducing the risk of hyponatraemia; it is fundamentally a document aimed at prevention of hyponatraemia and not treatment.

**3. Purpose:**

To improve the safe use of intravenous fluid in children and reduce the risk of hyponatraemia.

**4. The scope:****4.1** Applicable to all children more than 1 month and until their 16<sup>th</sup> birthday throughout the Belfast Health and Social Services Trust (BHSCCT).

It is relevant for all general inpatient areas that treat patients from this age range (even if it is only occasionally) and includes the post-operative scenario, emergency departments, day case departments and the ambulance service.

This policy (and attendant fluid prescription chart) is not intended to apply to paediatric

and neonatal intensive care units, specialist areas such as renal, liver and cardiac units where it is used to replace ongoing losses of hypotonic fluids, or those suffering from burns or diabetic keto-acidosis (DKA) where hypotonic solutions may have specialist indications.

Children receiving long term Total Parenteral Nutrition (TPN) are not covered by the conditions of this policy.

#### 4.2 Young people

As a child progresses through the teenage years there is a transitional stage of physical development i.e. adolescence, as that child progresses through towards adulthood. They will be referred to as 'young people' and many are cared for in adult wards by staff who generally treat adults.

The DHSSPSNI indicates that this paediatric fluid therapy guidance relates to all children from 1 month until their 16<sup>th</sup> birthday, regardless of the ward setting, except in the ICU and specialist areas mentioned above.

#### 5. **Objectives:**

This policy sets out recommended practice for everyone who looks after children receiving intravenous fluids. It is based on regional and national guidance, ongoing clinical audit, the published literature and is also aimed at specifically reducing the risk of hyponatraemia.

It should be considered alongside the guidance from the National Patient Safety Agency Patient Safety Alert 22<sup>1</sup>, and the Regional Paediatric Fluid Therapy Group wallchart<sup>2</sup> and the RQIA recommendations<sup>5</sup>.

#### 6. **Roles and Responsibilities:**

All professionals caring for children must:-

- be familiar with the signs of hyponatraemia.
- be familiar with its emergency management.
- ensure that they have received adequate training in intravenous fluids appropriate to their role.
- if they exclusively care for young people in an adult ward, know where to obtain expert paediatric should it be needed. (Appendix 5).
- be familiar with the guidance on intravenous fluids for children outlined by the Regional Paediatric Fluid Therapy Group wallchart<sup>2</sup>.

#### 7. **The definition and background of the policy:**

A child, for the purposes of this policy, is defined as being aged from 1 month up to their 16<sup>th</sup> birthday.

Hyponatraemia is an abnormally low concentration of sodium (Na) in serum. The normal range is generally agreed to be 135 – 145 mmol/L.

Hyponatraemia is defined as a plasma Na of less than 135 mmol/L. It represents an excess of water in relation to sodium in extracellular fluid and is described as severe or significant if below 130 mmol/L.

Significant acute hyponatraemia is defined as a decrease in plasma sodium from normal to less than 130 mmol/L in less than 48 hours.

Symptoms are likely with serum Na <125 mmol/L or if the serum Na has fallen rapidly; greater than 5 mmol/L decline in 24 hours.

The main causes of hyponatraemia in children are:

- Administration of hypotonic fluids, intravenous or enteral (e.g. excessively dilute formula or sodium chloride 0.18% and glucose 4% (No 18 solution))
- Conditions with impaired free water excretion and high anti-diuretic hormone levels
  - Meningitis, encephalitis, pneumonia, bronchiolitis, sepsis
  - Surgery, pain, nausea and vomiting
- Gastrointestinal fluid losses

Less common but important causes are:

- Adrenal insufficiency (Congenital Adrenal Hyperplasia, Addison's Disease)
- Defect in renal tubular absorption, including obstructive uropathy
- Psychogenic polydipsia

The main symptoms of hyponatraemia relate to its central nervous system effects; cerebral oedema, seizures and death. Warning signs may be non-specific and include nausea, malaise and headache.

All children are potentially at risk, even those not considered to be obviously 'sick'. The complications of hyponatraemia often occur because of the inappropriate management of intravenous fluids but they can also occur with inappropriately managed oral fluid regimes. Vigilance is required for all children receiving fluids.

Children particularly at risk are those who are postoperative, have gastrointestinal fluid losses or who have bronchiolitis, CNS injuries or burns. These risk factors also apply to young people.

#### 8. Policy / Guideline description:

The NPSA recommended in Alert 22 the following actions:-

1. Remove 'No. 18 solution' from general areas that treat children and restrict availability to specialist areas except in critical care and specialist wards such as renal, liver and cardiac units.
2. Produce and disseminate **clinical guidelines** for the fluid management of paediatric patients.
3. Provide adequate **training** and supervision for all staff involved in the prescribing, administering and monitoring of intravenous infusions for children.
4. Review and improve the design of existing intravenous fluid prescriptions and **fluid balance charts** for children.
5. Promote reporting of hospital acquired hyponatraemia **incidents** via local risk management reporting systems. Implement an **audit** programme to ensure adherence to the above.

The 16 RQIA recommendations (appendix 7) map to the above NPSA recommendations:-

NPSA	RQIA
1	1, 2
2	3, (4), 5, 7
3	6, 7, 8, 9, 10
4	11
5	12, 13, 14,
6	15, 16

The specific actions that the BHSCT will institute in order to limit the production of hospital acquired hyponatraemia are detailed below and are mapped to the RQIA recommendations.

- 8.1.1 *Remove 'No. 18 Solution'*  
NPSA 1  
RQIA 1  
Sodium chloride 0.18% with glucose 4% has been withdrawn from general use in all BHSCT ward areas that treat children and the availability of these fluids is restricted to critical care areas and other specialist wards such as renal, liver and cardiac units. A table showing areas permitted to stock or order 'No.18 solution' is given in Appendix 6.
- 8.1.2  
NPSA 1  
RQIA 2  
Any area that is still permitted to stock 'No. 18 solution will arrange for the provision of additional labelling or separate storage.
- 8.1.3  
NPSA 2  
RQIA 5  
Information about the availability of infusion fluids throughout the BHSCT (Appendix 4) will be attached to the Paediatric Fluid Guideline wall chart<sup>2</sup>.
- 8.1.4  
The BHSCT's list of sanctioned standard maintenance fluids is given in Appendix 4.
- Where a senior clinician(s) considers that a "special" maintenance infusion fluid is required, then this alternative choice for fluid maintenance must be endorsed by the Chief Executive of the Trust with clear documentation of the reasons for that endorsement.
- 8.2 *Clinical Guideline*  
NPSA 2  
RQIA 3,5,7  
The Paediatric Parenteral Fluid Therapy wallchart<sup>2</sup> forms the basis of BHSCT guidance on fluid prescription in paediatric patients within the previously defined age range. This policy and wall chart will be disseminated and displayed throughout the BHSCT; to all wards that accommodate children aged from one month until their 16<sup>th</sup> Birthday including Emergency Departments, Adult Wards, Theatre and Intensive Care Units.
- This will replace any previous wallchart including the 2002 wallchart issued by CMO entitled "Any Child Receiving Prescribed Fluids is at Risk of Hyponatraemia". All previous versions of the chart should be removed.
- 8.2.1  
NPSA 2  
RQIA 7  
The BHSCT will develop policy and guidelines on the general principles of intravenous therapy for adults and children.
- Until then, this policy will form the basis of guidance on fluid therapy in children within the BHSCT and, as for all BHSCT policies, it will be reviewed and implemented throughout the organisation.
- 8.2.3  
NPSA 2  
RQIA 3  
All medical and nursing staff should base their intravenous fluid practice for children, young people (and indeed adults) on the following best practice model of:-
- administer appropriate therapy for shock such as fluid boluses
  - measure/estimate and correct any fluid deficit
  - prescribe a fluid maintenance fluid regime.
- Treatment of these elements of the overall fluid status is outlined in the Paediatric Parenteral Fluid Therapy wallchart<sup>2</sup>.
- The fundamental layout selected for this guideline complements a structured approach to patient clinical assessment. A sequence of questions is offered that prompts the clinician to

- assess for the presence of shock and guides treatment, if required;
- further assessment of whether there is also a deficit to be considered and then
- calculation and prescribing for maintenance requirements is also included.

- 8.2.4 This policy, centred on children, has many features that indicate good practice for young people and adults. An intravenous fluid therapy practice based on using
- an individual patient's weight in kilograms
  - fluid administration based on a millilitres/hour prescription

is commended rather than blanket prescriptions based only on fluid volume.

#### 8.2.5 Baseline Assessment

Good practice guidelines on monitoring body weight, electrolytes/urea and fluid balance should be followed. Again, these recommendations apply to adults as well as children.

An essential preliminary to these assessments is to accurately measure the body weight in kilograms or failing this, to make an estimate. This must be cross-referenced with the child's age to minimize the risk of error.

In the emergency situation an estimation of the child's weight should be made and an accurate weight obtained as soon as practically possible.

Baseline measurement of electrolytes and urea should be made unless the child is healthy and scheduled for elective surgery when it may be considered unnecessary.

#### 8.2.6 Shock therapy

Shocked or collapsed children must immediately receive fluid boluses as outlined on the Regional Paediatric Fluid Therapy Group wallchart<sup>2</sup>.

Good practice would indicate that the response to fluid therapy is closely observed and if there is no response by the time 40 ml/kg has been administered, senior medical advice and help is required.

Note that special treatment is needed for children with diabetic coma and trauma and the need to obtain senior advice and help is highlighted.

#### 8.2.7 Fluid Deficit management

Calculation of the overall fluid deficit and the prescription of deficit replacement should only be undertaken by a doctor experienced in caring for dehydrated patients. The recommended fluid is sodium chloride 0.9% and it must be prescribed separately. The rate at which it is given is determined by the degree of dehydration and a relevant electrolyte sample.

For those caring for young people in a general adult ward, and who may not have such experience, they should ensure that they can avail themselves of advice from the sources as detailed in Appendix 5.

- 8.2.8 For advice regarding the estimation of the percentage of dehydration which is required for the fluid deficit calculation, the table in Appendix 2 should be consulted.

### 8.2.9 Maintenance fluid therapy

When prescribing maintenance fluids to children, young people and adults, the following scheme would be standard practice. For

- children use the calculations as indicated in the Regional Paediatric Fluid Therapy Group wallchart<sup>2</sup>.
- young people and adults prescribe
  - 2 litres fluid for females over the weight of 40 kg.
  - 2.5 litres fluid for males over the weight of 60 kg.

8.2.10 The type of fluid selected must be tailored to the patient's needs as set out in the guideline. For example, following surgery, children who require intravenous fluids will be prescribed either sodium chloride 0.9% with or without pre-added glucose or Hartmann's solution in the post-operative period for maintenance fluid needs.

8.2.11 Children must not receive intravenous fluids unnecessarily. This guideline emphasises that assessment of each patient should include a decision on whether oral fluid therapy could be appropriately initiated instead of intravenous therapy and further prompts reconsideration of this question when IV therapy is reviewed.

8.2.12 This advice does not override or replace the individual responsibility of health professionals to make appropriate decisions in the circumstances of their individual patients, in consultation with the patient and/or guardian or carer or for consultation with a more senior clinician. This would, for example, include situations where individual patients have other conditions or complications that need to be taken into account in determining whether the guidance as detailed in the wallchart<sup>4</sup> is fully appropriate in their case.

8.3  
NPSA 3  
RQIA  
3,6,8,10

### Training

The BHSCT will use various forms of training on paediatric fluid management; didactic lectures, staff induction training and computer based training:-

1. a training presentation in the policies and guidelines section of the Intranet. This multidisciplinary presentation is accessible from any computer terminal within the BHSCT.
2. BMJ e-learning module
3. 'Training Tracker' (Multimedia Design Studio Limited).

The BHSCT advocates the adoption of a regional computer based educational tool that allows:-

- creation of an unlimited number of educational and training courses; to include mandatory modules.
- 'training' of all grades of staff.
- content of the training to be tailored to our own needs.
- tracking
  - who has taken each module.
  - who has not taken each module.
  - who has passed and who has failed.
  - precisely which questions each trainee got right and wrong.
- competency assessment tools.
- training record to be obtained at any time.
- to award personalised certificates to those who reach a stated passmark.



- 8.3.1  
NPSA 3  
RQIA 6,8,10
- All staff involved in prescribing, administering and monitoring IV fluids to children will be made aware of this policy and the Paediatric Parenteral Fluid Therapy wallchart<sup>2</sup> through the BHSCT intranet and Service Group dissemination.
- All staff working exclusively with children and especially those prescribing fluids to children will be encouraged to ensure they are conversant with the knowledge required to prescribe intravenous fluids to children and that it is within their scope of practice.
- They will be encouraged to use the intranet training presentation and the BMJ learning module on hyponatraemia -  
<http://learning.bmj.com/learning/search-result.html?moduleId=5003358>
- The production of the certificate on completion of the above module may be sought at staff assessments, RITAs, performance review, personal development plans and appraisals.
- The future BHSCT policy and guideline on the general principles of intravenous therapy (8.2.1) will also be available in the various training modules.
- 8.3.2  
NPSA 3  
RQIA 6,8
- All professionals caring for children must be familiar with the signs of hyponatraemia and its emergency management.
- 8.3.3  
NPSA 3  
RQIA 6,8
- For those caring for young people, they should either have received adequate training in intravenous fluids or if they exclusively care for young people in an adult ward, they should know where to obtain such expertise on children should it be needed. (Appendix 5).
- Furthermore, they should be familiar with the guidance on intravenous fluids for children outlined in this policy and Regional Paediatric Fluid Therapy Group wallchart<sup>2</sup>.
- 8.3.4  
NPSA 3  
RQIA 9
- The BHSCT has identified that young people aged 14 - 16 years old can be cared for (even if only occasionally) on most wards that are generally regarded as adult wards with the obvious exceptions of wards like Care of the Elderly. Staff in those locations will be made aware of the training opportunities mentioned in 8.3 and 8.3.1.
- BHSCT Service groups will consider cohorting young people in dedicated wards - where this can be done safely and will not lead to any diminution in the level of care.
- 8.3.5
- The BHSCT will work with the NIMDTA to ensure that the principles of paediatric fluid therapy and its potential risks, as highlighted in the National Patient Safety Agency Alert, are highlighted in postgraduate training programmes.
- 8.3.6
- All professionals caring for children must be able to diagnose and manage acute hypoglycaemia.
- 8.4  
NPSA 4  
RQIA 11
- Fluid prescription/ balance chart  
A new fluid prescription/ balance chart has been developed within the Royal Belfast Hospital for Sick Children (RBHSC) with guidance from all other areas in the BHSCT that treat children. It will be used for the prescription of fluids for all children and young people treated in the BHSCT with the exception of treatment of diabetic ketoacidosis (DKA) when a specialised fluid prescription chart may be used.
- If needed, they should avail themselves of advice from the sources as detailed in Appendix 5.

8.4.1 All children, other than emergencies, must have a blood sample taken for electrolyte and blood glucose estimation before intravenous maintenance fluids are started. This must be repeated at least 24 hourly, more often in the circumstances described. Clinical and other methods of monitoring are outlined in the guidance.

#### 8.4.2 Monitoring

Monitoring of the child receiving parenteral fluid will include considerations of:-

- Body weight to be measured or assessed as a baseline and at least daily thereafter.
- Clinical state to be closely monitored and recorded on a regular basis.
- All fluid intake of any kind (intravenous, oral and medicines) must be measured and recorded on the fluid balance chart.
- All fluid output must be assessed and, if clinically indicated, measured and recorded on the fluid balance chart.
- An assessment of input/output and need for plasma glucose estimation should be made and documented every 12 hours.
- A formal reassessment of the fluid prescription and the need for intravenous fluids must be made and documented every 12 hours.
- Measurement of E&U and blood glucose/BM should be made at least daily.
- If hyponatraemia exists, these measurements should be 4 – 6 hourly.
- Urinary osmolarity and electrolytes measurements should be considered when dealing with hyponatraemia.
- The ill child will require more frequent and detailed investigations.

For more detailed information about the monitoring requirements the wallchart<sup>2</sup> should be consulted.

#### 8.5 Audit

*NPSA 5  
RQIA 12*

The BHSCT will implement the following governance measures.

8.5.1  
*NPSA 5  
RQIA 13*

The BHSCT clinical biochemistry department will collate, analyse and report quarterly on paediatric hyponatraemia incidents to designated clinicians for children and young people. They will regularly audit these incidents, collate them with the Trust Adverse Incident Reporting System and instigate actions linked to the NPSA Alert 22. Appendix 3 outlines this audit process.

8.5.2  
*NPSA 5  
RQIA 14*

#### Incident reporting

The BHSCT will report these potential adverse incidents related to intravenous infusion through the Trust Adverse Incident Reporting System.

A system of 'triggers' (adapted from those developed by the NHSCT) will be used to

- generate a list of hospital acquired hyponatraemia episodes
- highlight variance from best practice guidance as highlighted in this document
- generate a Trust Adverse Incident Form whenever such incidents occur.

These triggers (Appendix 3) will cover the choice of fluid prescribed at ward level, charting relevant findings in the medical notes, the frequency of electrolyte analysis and the detection of biochemical abnormalities.

8.5.3  
*NPSA 5  
RQIA 15,16*

#### Audit

The BHSCT will implement an audit programme for intravenous infusion therapy in children throughout the trust.

The audits will be based on the

- NPSA audit checklist  
<http://www.npsa.nhs.uk/EasySiteWeb/GatewayLink.aspx?allid=5308>
- the BHSCT trigger list (Appendix 3).
- Regional GAIN hyponatraemia audit

8.5.4 Where young people are cared for in general adult wards, special audit arrangements will be put in place to ensure they receive appropriate and safe fluid management.

## 9. Additional policy statements:

- 9.1 Senior medical advice must be sought when treating the child with hyponatraemia.
- 9.2 Where additional electrolytes are required, they should only be administered as supplied by the manufacturer and in line with guidance.

Children at or below the age of 13 years must not have electrolytes added to bags of intravenous fluids.

Ordinarily children from 13 to 16 should also not have electrolytes added to bags of intravenous fluids; in certain, predominantly adult areas, children of this age group may have magnesium sulphate or phosphates added.

- 9.3 Apart from boluses for shocked patients, fluids may only be administered by way of an infusion device. Details of the pump must be recorded on the fluid prescription and balance chart.
- 9.4 When referring to this policy, staff should consult the BHSCT policy on the management of strong intravenous potassium solutions and/or injections.

## 10. Implementation / Resource requirements:

The implementation requirements for this policy include:-

- Wallchart production and distribution
- Fluid prescription/ balance chart production and distribution
- Staff training costs – induction, postgraduate courses.

Raising staff awareness of the issues surrounding hyponatraemia and the subsequent staff training will be encouraged, as suggested by DHSSPSNI circular<sup>4</sup>, by using the [BMJ e-learning module](#).

## 11. Source(s) / Evidence Base:

The following sources were used:-

- NPSA Alert 22
- NPSA background information  
<http://www.npsa.nhs.uk/EasySiteWeb/GatewayLink.aspx?allid=5310>
- HSC (SQSD) 20-07 - reducing risk of Hyponatraemia in children (27/04/2007)
- HSC (SQSD) 20-07 - addendum (16/10/2007)
- Paediatric Parenteral Fluid Therapy wallchart.

## 12. References, including relevant external guidelines:

- Reducing the risk of hyponatraemia when administering intravenous infusions to children. National Patient Safety Agency, Patient Safety Alert 22, March 2007.
- Paediatric Parenteral Fluid Therapy initial management guideline, DHSSPSNI 2007.  
[http://www.dhsspsni.gov.uk/hsc\\_sqsd\\_20-07\\_wallchart.pdf](http://www.dhsspsni.gov.uk/hsc_sqsd_20-07_wallchart.pdf).
- HSC (SQSD) 20-07 reducing risk of Hyponatraemia in children
- [http://www.dhsspsni.gov.uk/hsc\\_sqsd\\_20-07\\_-\\_addendum.pdf](http://www.dhsspsni.gov.uk/hsc_sqsd_20-07_-_addendum.pdf)

5. Regulation and Quality Improvement Authority (RQIA). Reducing the risk of hyponatraemia when administering intravenous infusions to children - September 2008.  
[http://www.rqia.org.uk/cms\\_resources/NI%20%20report%20Hyponatraemia%20FINAL%20v%203%200.pdf](http://www.rqia.org.uk/cms_resources/NI%20%20report%20Hyponatraemia%20FINAL%20v%203%200.pdf)

**13. Consultation Process:**

This policy is adapted from the

- NPSA Alert 22,
- Northern Ireland Regional Paediatric Fluid Therapy Working Group
- HSC (SQS) 20/2007 and its addendum documentation from the DHSSPSNI.

It has been assured through the Standards and Guidelines committee.

**14. Equality and Human Rights screening carried out:**

In line with duties under the equality legislation (Section 75 of the Northern Ireland Act 1998), Targeting Social Need Initiative, Disability discrimination and the Human Rights Act 1998, the Belfast Trust has carried out an initial screening exercise to ascertain if this policy should be subject to a full impact assessment.

Screening completed       Full impact assessment to be carried out.

No action required.

**15. Procedures:**

Appendix 1 - Paediatric Parenteral Fluid Therapy wallchart

Appendix 2 - Estimating the percentage dehydration based upon physical examination findings.

Appendix 3 - Paediatric Hospital Acquired Hyponatraemia Audit

- Triggers for potential adverse events

Appendix 4 - Availability of intravenous fluids throughout the BHSCT (500ml bags)

Appendix 5 - Sources of advice regarding Paediatric fluid therapy

Appendix 6 - Areas where it is permitted to stock/order No. 18 Solution\* - as of August 2009

Appendix 7 - RQIA independent review - September 2008 - Recommendations

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**Director**

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**Author**

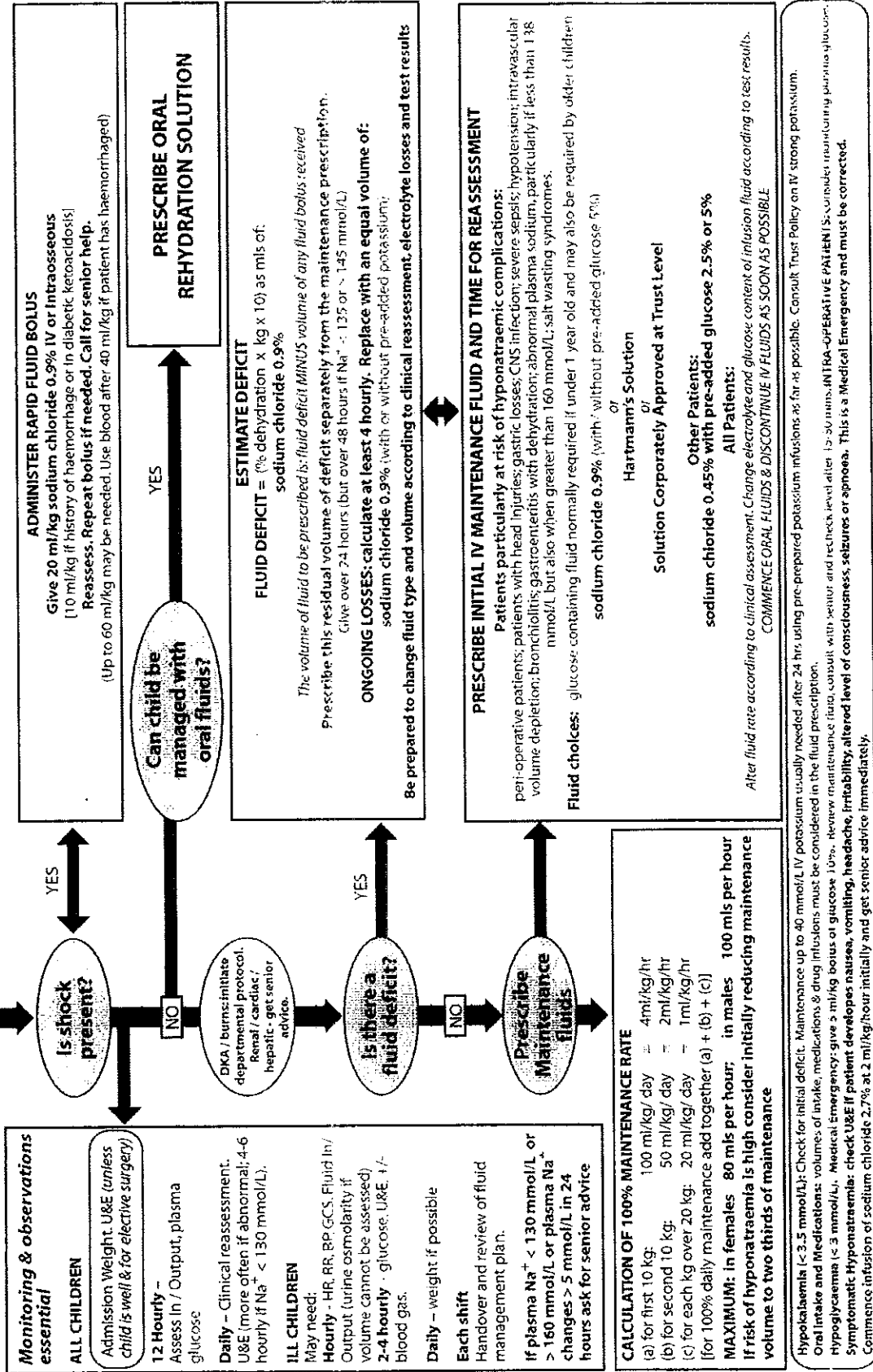
**Date:**

**Date:**

# PAEDIATRIC PARENTERAL FLUID THERAPY ( 1 month – 16 yrs )

## Initial management guideline

Sept 2007



Appendix 2**Estimating the percentage dehydration based upon physical examination findings.**

<b>Estimated Percentage Dehydration</b>	<b>Physical Examination Findings</b>
<3	History of fluid loss but no findings on physical examination
5	Dry oral mucous membranes but no panting or pathological tachycardia
7	Mild to moderate decreased skin turgor, dry oral mucous membranes, slight tachycardia, and normal pulse pressure.
10	Moderate to marked degree of decreased skin turgor, dry oral mucous membranes, tachycardia, and decreased pulse pressure.
12	Marked loss of skin turgor, dry oral mucous membranes, and significant signs of shock, pallor, cool peripheries, prolonged capillary refill time, hypotension, confusion.

Appendix 3PAEDIATRIC HOSPITAL ACQUIRED HYPONATRAEMIA AUDITLaboratory Report Details (to be completed by audit dept)

Patient No. Patient Date of Birth:  
 Date of specimen: Time of specimen: Result :

Admission Details

Date of admission: Time of admission:

Diagnosis: 1.  
2.

Hospital acquired hyponatramia (defn)

- Na  $\geq$ 130mmol/l at time of admission, & a subsequent Na of  $<$  130mmol/l whilst on IV fluids.
- Na  $<$  130mmol/l on their initial U&E's. where the U&E's are done  $>$ 48hrs after admission and they are on IV fluids.
- Admitted from another hospital with Na  $<$  130mmol/l at time of admission whilst on IV fluids.

1. Is this hospital acquired hyponatraemia? Yes / No

If no, reason: \_\_\_\_\_

If yes, was it acquired whilst in this trust? Yes / No

If no, patient transferred from: \_\_\_\_\_

Treatment and monitoring of hyponatraemia

2. Was the fluid prescribed appropriate? Yes / No

If no, details: \_\_\_\_\_

3. Was IV fluid prescription reviewed 12hrly whilst on IV fluids? Yes / No

4. Were U&E done 24hrly whilst on IV fluids? Yes / No

Following the Na of  $<$ 130mmol/l,

5. Was appropriate advice sought? Yes / No

Grade: \_\_\_\_\_ Speciality: \_\_\_\_\_

6. Was the frequency of repeat U&Es appropriate? Yes / No

If No, details: \_\_\_\_\_

Recording and communication of incidents (to be completed by Audit dept)

7. If yes to Q1, was adverse incident form completed? Yes / No

8. Was copy of form sent to other trust if acquired outside BHSCT? Yes / No

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**Triggers for potential adverse events related to the administration of intravenous fluids to children (1 month – 16 years old)**

(adapted from Northern H&SCT policy)

CHOICE OF IV FLUID

1. Bolus fluid: use of a solution with sodium concentration of  $<131\text{mmol/L}$  for treatment of shock.
2. Deficit fluid: use of a solution with sodium concentration of  $<131\text{mmol/L}$  for correction.
3. Maintenance fluid: use of a solution with sodium concentration of  $<131\text{mmol/L}$  in a peri-operative patient (intraoperative period and first 24 hours following surgery).

BIOCHEMICAL ABNORMALITIES

4. Any episode of symptomatic hyponatraemia while in receipt of IV fluids.
5. Any episode of hypoglycaemia (blood glucose less than  $3\text{mmol/L}$ ) while in receipt of IV fluids.
6. Any episode of severe acute hyponatraemia (i.e. sodium level dropping from  $135\text{mmol/L}$  or above to  $<130\text{mmol/L}$  within 24hrs of starting IV treatment).

ASSESSMENT

7. Electrolytes not checked at least once per 24 hours in any patient receiving IV fluids exclusively.
8. Failure to record the calculations for fluid requirements on the prescription sheet.
9. Failure to note in the case notes/ prescription sheet a serum sodium of less than  $130\text{mmol/L}$ .
10. Failure to document in the case notes the steps taken to correct a serum sodium of less than  $130\text{mmol/L}$ .

**If any of the above occurs an IR1 Form must be completed.**

October 2010

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## Appendix 4

AVAILABILITY OF INTRAVENOUS FLUIDS THROUGHOUT THE BHSCT (500ML BAGS)

SITE	R G H	B C H	M P H	M A T E R
<b>Sodium chloride</b>				
Sodium chloride 0.45%	√	√		√
Sodium chloride 0.9%	√	√	√	√
Sodium chloride 1.8%	√	√	√	√
Sodium chloride 2.7%	√		√	√
<b>Combined solutions</b>				
Sodium chloride 0.45% Glucose 2.5%	√	√	√	
Sodium chloride 0.45% Glucose 5%	√		√	
Sodium chloride 0.9% Glucose 5%	√			
<b>Glucose solutions</b>				
Glucose 5%	√	√	√	√
Glucose 10%	√	√	√	√
Glucose 15%	√			
Glucose 20%	√	√		
<b>Potassium containing solutions</b>				
Glucose 5% 10mmol Potassium chloride	√			
Glucose 5% 20mmol Potassium chloride	√	√	√	
Glucose 5% 40mmol Potassium chloride	√	√	√	
Glucose 10% 10mmol Potassium chloride	√			√
Glucose 10% Sodium chloride 0.18% 10mmol Potassium chloride*	√			
Sodium chloride 0.45% Glucose 2.5% 10mmol Potassium chloride	√	√		
Sodium chloride 0.45% Glucose 2.5% 20mmol Potassium chloride	√			
Sodium chloride 0.45% Glucose 5% 10mmol Potassium chloride	√			
Sodium chloride 0.45% Glucose 5% 20mmol Potassium chloride	√			
Sodium chloride 0.9% 10mmol Potassium chloride	√			
Sodium chloride 0.9% 20mmol potassium chloride	√	√	√	√
Sodium chloride 0.9% 40mmol potassium chloride	√	√		

\* commonly known as Basic solution

Sites: RGH = Royal Hospitals  
BCH = Belfast City Hospital

MPH = Musgrave Park Hospital  
MATER = Mater Hospital

Appendix 5**Sources of advice regarding Paediatric fluid therapy**

For help and advice regarding

- management of fluid therapy
- especially to prevent and/or treat hyponatraemia

in all children, but especially for those children aged 13 – 16 years old being managed in adult wards,

please use the following sources of help and advice. Ordinarily, advice should be for complex cases and should be Consultant to Consultant discussions even though contact will often have to be made through trainee on-call rotas.

Team		Address	Extension
<b>RBHSC Paediatricians</b>	Paediatric On Call Rota	Allen Ward Musgrave Ward	Bleep 2277
<b>RBHSC Paediatric ICU</b>	Paediatric ICU		2449
<b>Musgrave Park</b>	Orthopaedic theatre – Anaesthesia team during working hours.		
<b>BCH Dufferin theatres</b>	ENT theatre – Anaesthesia team during working hours.		
<b>General Biochemistry</b>	<b>Clinical Biochemistry</b>		
		<b>Inside working hours</b>	<b>Outside working hours</b>
RVH Tie line:7222 Ext.3798	Ext.4714	Contact Medical doctor on call either via the laboratory or via switchboard.	
BCH Tie line:7111 Ext. 3096/2926/3628	Ext.3497/3136/3160	Ext.3216 or Contact Medical doctor on call either via the laboratory or via switchboard	
MIH Tie line: 7231 Ext. 2223/2229	Ext.2326/2228	Contact Medical doctor on call either via the laboratory or via switchboard	

Other sources of help are:

- 1 APA consensus guideline on perioperative fluid management in Children  
[http://www.apaqbi.org.uk/docs/Perioperative\\_Fluid\\_Management\\_2007.pdf](http://www.apaqbi.org.uk/docs/Perioperative_Fluid_Management_2007.pdf)
- 2 Royal Children's hospital Melbourne Clinical Practice Guidelines  
Intravenous fluids  
[http://www.rch.org.au/clinicalguide/cpg.cfm?doc\\_id=5203#Other%20Resources](http://www.rch.org.au/clinicalguide/cpg.cfm?doc_id=5203#Other%20Resources)
- 3 Royal Children's hospital Melbourne Clinical Practice Guidelines  
Hyponatraemia  
[http://www.rch.org.au/clinicalguide/cpg.cfm?doc\\_id=8348](http://www.rch.org.au/clinicalguide/cpg.cfm?doc_id=8348)

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## Appendix 6

Areas where it is permitted to stock/order No. 18 Solution\* - as of August 2009

SERVICE GROUP	SITE	SPECIALITY	Stock on Ward	Named patient supply – consultant request only.
Clinical Services	RGH, BCH	High Dependency Unit	X	
Clinical Services	RGH, BCH, MATER	Intensive Care	X	
Clinical Services	Mater, BCH, RGH	Recovery Wards		X
Clinical Services	Mater, RGH	Theatres		X
Clinical Services	BCH	Tower Theatres		X
Clinical Services / OPMS	Mater, RGH, BCH	Day Procedure Units		X
Specialist Serv	RGH	Wards 4E and 4F (Neurosciences)		X
OPMS T&O	MPH	Recovery Ward - Orthopaedics		X
OPMS T&O	MPH	High Dependency Unit		X
OPMS T&O	MPH	Theatres - Orthopaedics		X
SS, Women, family and childcare	RBHSC	Barbour Renal	X	
SS, Women, family and childcare	RBHSC	PICU	X	

\* "No. 18 Solution" = sodium chloride 0.18% and glucose 4%

## Appendix 7

**RQIA INDEPENDENT REVIEW - SEPTEMBER 2008 - RECOMMENDATIONS**

- Recommendation 1 All hospitals should monitor the ongoing use of No. 18 solution to enable assurance that infusions are removed from stock and general use in areas that treat children.
- Recommendation 2 Where appropriate, hospitals must be able to demonstrate that an active strategy is in place for minimising risk of use in clinical areas that continue to stock No 18 solution and where children are accommodated. For example, provision of additional labelling or separate storage for those No.18 solution bags still stocked in such clinical areas.
- Recommendation 3 All hospitals should continue with the ongoing work of disseminating clinical guidelines. This should be undertaken in conjunction with multidisciplinary awareness-raising and education on the use of the guidance and wall chart in all settings where children may be treated. This is particularly important in adult wards where older children are treated.
- Recommendation 4 Independent hospitals must be assured that all visiting doctors who may manage patients up to 16 years old use the clinical guidelines when managing children being treated with intravenous infusions.
- Recommendation 5 All hospitals should ensure that only the DHSSPS Paediatric Parenteral Fluid Therapy wall-chart *issued by DHSSPS in October 2007* is displayed in clinical areas where children may be treated, with a list of available local fluids available alongside it. All previous versions of the wall chart should be removed from clinical areas.
- Recommendation 6 Hospitals should assure themselves that staff have the appropriate skill and knowledge in this clinical area. Competency assessment tools in administration of intravenous infusion to children should be developed, formalised and implemented for all relevant, multi-professional staff.
- Recommendation 7 Hospitals should continue to review, collaborate and implement organisation wide policy and guidelines, in relation to intravenous infusion for children.
- Recommendation 8 All hospitals should ensure that the development and provision of multidisciplinary education opportunities in administration of intravenous infusion to children and that all relevant clinical staff uptake this education.
- Recommendation 9 Hospitals should develop mechanisms to identify the location of patients aged 14-16 years who are in adult wards and ensure staff who care for those children are provided with competency based, assessed education in administration of intravenous infusion to children.
- Recommendation 10 All hospitals should make wider use of training sources available such as BMJ E-Learning Module on Hyponatraemia to address different learning styles and devise a mechanism to ensure 100% multi-professional uptake of such learning.
- Recommendation 11 Priority must be given to the completion of a Trust-wide review, and implementation of revised paediatric intravenous fluid prescription and

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fluid balance charts in all settings where children may be treated including adult wards where children are treated.

- Recommendation 12 All hospitals should develop a culture of incident reporting, analysis and learning generally and specifically in respect of intravenous fluids and hyponatraemia.
- Recommendation 13 Plans for development of systems for reporting, analysing and monitoring incidents to assure organisations of safe practice and that actions linked to NPSA Alert 22 should be implemented and regularly audited by all hospitals to ensure adherence to the process.
- Recommendation 14 The development of 'trigger lists' that have been adopted by a the Antrim Area Hospital to aid understanding of the types of incidents to be reported should be shared and taken up more widely .
- Recommendation 15 The development of an audit tool which may include wider aspects but should address as a minimum aspects of NPSA Alert 22 should continue to be progressed and used at least annually.
- Recommendation 16 Trusts should continue to seek approval and funding for a regional audit (GAIN proposal) on the uptake of the Paediatric Parenteral Fluid Therapy guideline and potential unexpected clinical consequences of the guideline.

**Standards and Guidelines Committee**

***Policy for the administration of intravenous fluids to children aged from 1 month until the 16<sup>th</sup> birthday: reducing the risk of hyponatraemia.***

<b>Summary</b>	<p>This policy outlines the BHSCT approach for administration of intravenous fluids to children aged from 1 month until the 16<sup>th</sup> birthday with particular reference to reducing the risk of hyponatraemia.</p> <p>It maps the advice issued in March 2007 from the National Patient Safety Agency (NPSA) and September 2007 from the Northern Ireland Regional Paediatric Fluid Therapy Working Group on how to reduce the risks associated with administering intravenous infusions to children.</p> <p>This is fundamentally a document aimed at prevention of hyponatraemia and not treatment.</p>
<b>Purpose</b>	To improve the safe use of intravenous fluid in children and reduce the risk of hyponatraemia.
<b>Operational date</b>	March 2008
<b>Review date</b>	March 2010
<b>Version Number</b>	V4
<b>Supersedes previous</b>	V3
<b>Director Responsible</b>	Medical Director
<b>Lead Author</b>	Dr. Peter Crean
<b>Lead Author, Position</b>	Consultant Paediatric Anaesthetist, RBHSC.
<b>Additional Author(s)</b>	Dr H Steen, Associate Medical Director.
<b>Department / Service Group</b>	Social Services, Family and Child Care
<b>Contact details</b>	<p>Dr Peter Crean            Paediatric Intensive Care Unit            Royal Belfast Hospital for Sick Children            028 9063 2449  <a href="mailto:Peter.crean@belfasttrust.hscni.net">Peter.crean@belfasttrust.hscni.net</a></p>

<b>Reference Number</b>	SG001/08
<b>Supercedes</b>	V3

Standards & Guidelines Committee – Hyponatraemia + IV fluids for children – V4 – March 2010

Date	Version	Author	Comments
25 August 2009	V 3.1	JR Johnston	Draft version 3
14 September 2009	V 3.2	JR Johnston	Minor RMcL amendments
16 September 2009	V 3.3	JR Johnston	8.3.4; Appendix 6 changes Final Draft for RQIA
17 September 2009	V 3.4	JR Johnston	4.1; 8.4 - DKA Fluid chart change
17 September 2009	V 3.5	JR Johnston	Appendix 4 changes
February 2010	V 3.6	JR Johnston	Trigger list
March 2010	V4	JR Johnston	Issue post approval

#### Policy Record

		Date	Version
Author (s)	Approval	27/03/2008	1.2
Director Responsible - Dr A Stevens	Approval	27/03/2008	1.2

#### Approval Process – Trust Policies

Policy Committee	Approval		
Executive Team	Authorise		
Chief Executive	Sign Off		

#### Approval Process – Clinical Standards and Guidelines

Standards and Guidelines Committee	Approval	April 2010	V4
Policy Committee	Approval	May 2010	V4
Executive Team	Authorise	May 2010	V4
Appropriate Director	Sign Off	June 2010	V4

Standards & Guidelines Committee – Hyponatraemia + IV fluids for children – V4 – March 2010

## **Summary**

**Reference No:** SG001/08

**Title:**  
***Policy for the administration of intravenous fluids to children aged from 1 month until the 16<sup>th</sup> birthday: reducing the risk of hyponatraemia.***

**Purpose:**  
To improve the safe use of intravenous fluid in children and reduce the risk of hyponatraemia.

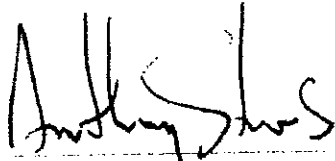
**Objectives:**  
This Policy sets out recommended practice for everyone who looks after children receiving intravenous fluids. It is based on regional and national guidance, ongoing clinical audit, published literature and is also aimed at specifically reducing the risk of hyponatraemia.

It should be considered alongside the guidance from the National Patient Safety Agency Patient Safety Alert 22<sup>1</sup>, and the Regional Paediatric Fluid Therapy Group wallchart<sup>2</sup>.

**Policy Statement(s):**

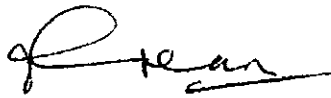
1. The Paediatric Parenteral Fluid Therapy wallchart<sup>2</sup> forms the basis of BHSCT guidance on fluid prescription in paediatric patients aged from 1 month until the 16<sup>th</sup> birthday.
2. Sodium chloride 0.18% with glucose 4% will be withdrawn from general use in all BHSCT ward areas that treat children and the availability of these fluids will be restricted to critical care areas and other specialist wards such as renal, liver and cardiac units.
3. This policy and wallchart will be disseminated throughout the BHSCT.
4. Information about the availability of infusion fluids throughout the BHSCT will be attached to the Paediatric Fluid Guideline wall chart<sup>2</sup>.
5. A new fluid prescription/ balance chart will be developed for the prescription of fluids for all children treated in the BHSCT.
6. All staff involved in prescribing, administering and monitoring IV fluids to such children will be made aware of this policy and the Paediatric Parenteral Fluid Therapy wallchart<sup>2</sup> through the BHSCT intranet and Service Group dissemination.
7. The BHSCT will implement the following governance measures – incident reporting using a set of reporting 'triggers' and formal auditing.





Chief Executive/ Director  
(delete as appropriate)

Date: 21/10/09



Author

Date: 20 October 2009

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**Full Description**

Reference No: SG001/08

1. ***Policy for the administration of intravenous fluids to children aged from 1 month until the 16<sup>th</sup> birthday: reducing the risk of hyponatraemia.***

2. **Introduction:**

The development of fluid-induced hyponatraemia in the previously well child undergoing elective surgery or with mild illness may not be well recognised by clinicians.<sup>1</sup>

Since 2000, there have been four child deaths following neurological injury from hospital-acquired hyponatraemia reported in the UK.<sup>1</sup> International literature cites more than 50 cases of serious injury or child death from the same cause, and associated with the administration of hypotonic infusions.<sup>1</sup>

In March 2007 the National Patient Safety Agency (NPSA), with Alert 22, issued advice on how to reduce the risks associated with administering infusions to children<sup>1</sup>.

In April 2007, with DHSSPSNI circulars<sup>3,4</sup>, NHS organisations in Northern Ireland were tasked to produce and disseminate local clinical guidelines for the fluid management of paediatric patients based on the suggested NPSA guidelines template. The Northern Ireland Regional Paediatric Fluid Therapy Working Group produced an intravenous fluid clinical guideline in accordance with NPSA guidance<sup>1</sup>. This was disseminated to each HSC Trust for local implementation and monitoring.

In February 2009 the Regulation and Quality Improvement Authority (RQIA) published an independent review "Reducing the risk of hyponatraemia when administering intravenous infusions to children" which dealt with the implementation of recommended actions outlined within the NPSA Alert 22 and dissemination of the clinical guidelines / wall chart throughout HSC Trusts and independent hospitals. (see appendix 7.)

This document, using both the NPSA guidance and the RQIA recommendations, outlines the BHSCT policy for administration of intravenous fluids to children aged from 1 month until the 16<sup>th</sup> birthday with particular reference to reducing the risk of hyponatraemia; it is fundamentally a document aimed at prevention of hyponatraemia and not treatment.

3. **Purpose:**

To improve the safe use of intravenous fluid in children and reduce the risk of hyponatraemia.

4. **The scope:**

- 4.1 Applicable to all children more than 1 month and until their 16<sup>th</sup> birthday throughout the Belfast Health and Social Services Trust (BHSCT).

It is relevant for all general inpatient areas that treat patients from this age range (even if it is only occasionally) and includes the post-operative scenario, emergency departments, day case departments and the ambulance service.

This policy (and attendant fluid prescription chart) is not intended to apply to paediatric

and neonatal intensive care units, specialist areas such as renal, liver and cardiac units where it is used to replace ongoing losses of hypotonic fluids, or those suffering from burns or diabetic keto-acidosis (DKA) where hypotonic solutions may have specialist indications.

Children receiving long term Total Parenteral Nutrition (TPN) are not covered by the conditions of this policy.

#### 4.2 Young people

As a child progresses through the teenage years there is a transitional stage of physical development i.e. adolescence, as that child progresses through towards adulthood. They will be referred to as 'young people' and many are cared for in adult wards by staff who generally treat adults.

The DHSSPSNI indicates that this paediatric fluid therapy guidance relates to all children from 1 month until their 16<sup>th</sup> birthday, regardless of the ward setting, except in the ICU and specialist areas mentioned above.

#### 5. **Objectives:**

This policy sets out recommended practice for everyone who looks after children receiving intravenous fluids. It is based on regional and national guidance, ongoing clinical audit, the published literature and is also aimed at specifically reducing the risk of hyponatraemia.

It should be considered alongside the guidance from the National Patient Safety Agency Patient Safety Alert 22<sup>1</sup>, and the Regional Paediatric Fluid Therapy Group wallchart<sup>2</sup> and the RQIA recommendations<sup>5</sup>.

#### 6. **Roles and Responsibilities:**

All professionals caring for children must:-

- be familiar with the signs of hyponatraemia.
- be familiar with its emergency management.
- ensure that they have received adequate training in intravenous fluids appropriate to their role.
- if they exclusively care for young people in an adult ward, know where to obtain expert paediatric should it be needed. (Appendix 5).
- be familiar with the guidance on intravenous fluids for children outlined by the Regional Paediatric Fluid Therapy Group wallchart<sup>2</sup>.

#### 7. **The definition and background of the policy:**

A child, for the purposes of this policy, is defined as being aged from 1 month up to their 16<sup>th</sup> birthday.

Hyponatraemia is an abnormally low concentration of sodium (Na) in serum. The normal range is generally agreed to be 135 – 145 mmol/L.

Hyponatraemia is defined as a plasma Na of less than 135 mmol/L. It represents an excess of water in relation to sodium in extracellular fluid and is described as severe or significant if below 130 mmol/L.

Significant acute hyponatraemia is defined as a decrease in plasma sodium from normal to less than 130 mmol/L in less than 48 hours.

Symptoms are likely with serum Na <125 mmol/L or if the serum Na has fallen rapidly; greater than 5 mmol/L decline in 24 hours.

The main causes of hyponatraemia in children are:

- Administration of hypotonic fluids, intravenous or enteral (e.g. excessively dilute formula or sodium chloride 0.18% and glucose 4% (No 18 solution))
- Conditions with impaired free water excretion and high anti-diuretic hormone levels
  - Meningitis, encephalitis, pneumonia, bronchiolitis, sepsis
  - Surgery, pain, nausea and vomiting
- Gastrointestinal fluid losses

Less common but important causes are:

- Adrenal insufficiency (Congenital Adrenal Hyperplasia, Addison's Disease )
- Defect in renal tubular absorption, including obstructive uropathy
- Psychogenic polydipsia

The main symptoms of hyponatraemia relate to its central nervous system effects; cerebral oedema, seizures and death. Warning signs may be non-specific and include nausea, malaise and headache.

All children are potentially at risk, even those not considered to be obviously 'sick'. The complications of hyponatraemia often occur because of the inappropriate management of intravenous fluids but they can also occur with inappropriately managed oral fluid regimes. Vigilance is required for all children receiving fluids.

Children particularly at risk are those who are postoperative, have gastrointestinal fluid losses or who have bronchiolitis, CNS injuries or burns. These risk factors also apply to young people.

#### 8. Policy / Guideline description:

The NPSA recommended in Alert 22 the following actions:-

1. Remove 'No. 18 solution' from general areas that treat children and restrict availability to specialist areas except in critical care and specialist wards such as renal, liver and cardiac units.
2. Produce and disseminate **clinical guidelines** for the fluid management of paediatric patients.
3. Provide adequate **training** and supervision for all staff involved in the prescribing, administering and monitoring of intravenous infusions for children.
4. Review and improve the design of existing intravenous fluid prescriptions and **fluid balance charts** for children.
5. Promote reporting of hospital acquired hyponatraemia **incidents** via local risk management reporting systems. Implement an **audit** programme to ensure adherence to the above.

The 16 RQIA recommendations (appendix 7) map to the above NPSA recommendations:-

NPSA	RQIA
1	1, 2
2	3, (4), 5, 7
3	6, 7, 8, 9, 10
4	11
5	12, 13, 14,
6	15, 16

The specific actions that the BHSCT will institute in order to limit the production of hospital acquired hyponatraemia are detailed below and are mapped to the RQIA recommendations.

8.1.1  
NPSA 1  
RQIA 1

Remove 'No. 18 Solution'

Sodium chloride 0.18% with glucose 4% has been withdrawn from general use in all BHSCT ward areas that treat children and the availability of these fluids is restricted to critical care areas and other specialist wards such as renal, liver and cardiac units. A table showing areas permitted to stock or order 'No.18 solution' is given in Appendix 6.

8.1.2  
NPSA 1  
RQIA 2

Any area that is still permitted to stock 'No. 18 solution' will arrange for the provision of additional labelling or separate storage.

8.1.3  
NPSA 2  
RQIA 5

Information about the availability of infusion fluids throughout the BHSCT (Appendix 4) will be attached to the Paediatric Fluid Guideline wall chart<sup>2</sup>.

8.1.4

The BHSCT's list of sanctioned standard maintenance fluids is given in Appendix 4.

Where a senior clinician(s) considers that a "special" maintenance infusion fluid is required, then this alternative choice for fluid maintenance must be endorsed by the Chief Executive of the Trust with clear documentation of the reasons for that endorsement.

8.2  
NPSA 2  
RQIA 3,5,7

Clinical Guideline

The Paediatric Parenteral Fluid Therapy wallchart<sup>2</sup> forms the basis of BHSCT guidance on fluid prescription in paediatric patients within the previously defined age range. This policy and wall chart will be disseminated and displayed throughout the BHSCT; to all wards that accommodate children aged from one month until their 16<sup>th</sup> Birthday including Emergency Departments, Adult Wards, Theatre and Intensive Care Units.

This will replace any previous wallchart including the 2002 wallchart issued by CMO entitled "Any Child Receiving Prescribed Fluids is at Risk of Hyponatraemia". All previous versions of the chart should be removed.

8.2.1  
NPSA 2  
RQIA 7

The BHSCT will develop policy and guidelines on the general principles of intravenous therapy for adults and children.

Until then, this policy will form the basis of guidance on fluid therapy in children within the BHSCT and, as for all BHSCT policies, it will be reviewed and implemented throughout the organisation.

8.2.3  
NPSA 2  
RQIA 3

All medical and nursing staff should base their intravenous fluid practice for children, young people (and indeed adults) on the following best practice model of:-

- administer appropriate therapy for shock such as fluid boluses
- measure/estimate and correct any fluid deficit
- prescribe a fluid maintenance fluid regime.

Treatment of these elements of the overall fluid status is outlined in the Paediatric Parenteral Fluid Therapy wallchart<sup>2</sup>.

The fundamental layout selected for this guideline complements a structured approach to patient clinical assessment. A sequence of questions is offered that prompts the clinician to

- assess for the presence of shock and guides treatment, if required;
- further assessment of whether there is also a deficit to be considered and then
- calculation and prescribing for maintenance requirements is also included.

8.2.4 This policy, centred on children, has many features that indicate good practice for young people and adults. An intravenous fluid therapy practice based on using

- an individual patient's weight in kilograms
- fluid administration based on a millilitres/hour prescription

is commended rather than blanket prescriptions based only on fluid volume.

#### 8.2.5 Baseline Assessment

Good practice guidelines on monitoring body weight, electrolytes/urea and fluid balance should be followed. Again, these recommendations apply to adults as well as children.

An essential preliminary to these assessments is to accurately measure the body weight in kilograms or failing this, to make an estimate. This must be cross-referenced with the child's age to minimize the risk of error.

In the emergency situation an estimation of the child's weight should be made and an accurate weight obtained as soon as practically possible.

Baseline measurement of electrolytes and urea should be made unless the child is healthy and scheduled for elective surgery when it may be considered unnecessary.

#### 8.2.6 Shock therapy

Shocked or collapsed children must immediately receive fluid boluses as outlined on the Regional Paediatric Fluid Therapy Group wallchart<sup>2</sup>.

Good practice would indicate that the response to fluid therapy is closely observed and if there is no response by the time 40 mls/kg has been administered, senior medical advice and help is required.

Note that special treatment is needed for children with diabetic coma and trauma and the need to obtain senior advice and help is highlighted.

#### 8.2.7 Fluid Deficit management

Calculation of the overall fluid deficit and the prescription of deficit replacement should only be undertaken by a doctor experienced in caring for dehydrated patients. The recommended fluid is sodium chloride 0.9% and it must be prescribed separately. The rate at which it is given is determined by the degree of dehydration and a relevant electrolyte sample.

For those caring for young people in a general adult ward, and who may not have such experience, they should ensure that they can avail themselves of advice from the sources as detailed in Appendix 5.

8.2.8 For advice regarding the estimation of the percentage of dehydration which is required for the fluid deficit calculation, the table in Appendix 2 should be consulted.

### 8.2.9 Maintenance fluid therapy

When prescribing maintenance fluids to children, young people and adults, the following scheme would be standard practice. For

- children use the calculations as indicated in the Regional Paediatric Fluid Therapy Group wallchart<sup>2</sup>.
- young people and adults prescribe
  - 2 litres fluid for females over the weight of 40 kg.
  - 2.5 litres fluid for males over the weight of 60 kg.

8.2.10 The type of fluid selected must be tailored to the patient's needs as set out in the guideline. For example, following surgery, children who require intravenous fluids will be prescribed either sodium chloride 0.9% with or without pre-added glucose or Hartmann's solution in the post-operative period for maintenance fluid needs.

8.2.11 Children must not receive intravenous fluids unnecessarily. This guideline emphasises that assessment of each patient should include a decision on whether oral fluid therapy could be appropriately initiated instead of intravenous therapy and further prompts reconsideration of this question when IV therapy is reviewed.

8.2.12 This advice does not override or replace the individual responsibility of health professionals to make appropriate decisions in the circumstances of their individual patients, in consultation with the patient and/or guardian or carer or for consultation with a more senior clinician. This would, for example, include situations where individual patients have other conditions or complications that need to be taken into account in determining whether the guidance as detailed in the wallchart<sup>4</sup> is fully appropriate in their case.

### 8.3

NPSA 3  
RQIA  
3,6,8,10

#### Training

The BHSCT will use various forms of training on paediatric fluid management; didactic lectures, staff induction training and computer based training:-

1. a training presentation in the policies and guidelines section of the Intranet. This multidisciplinary presentation is accessible from any computer terminal within the BHSCT.
2. BMJ e-learning module
3. 'Training Tracker' (Multimedia Design Studio Limited).

The BHSCT advocates the adoption of a regional computer based educational tool that allows:-

- creation of an unlimited number of educational and training courses; to include mandatory modules.
- 'training' of all grades of staff.
- content of the training to be tailored to our own needs.
- tracking
  - who has taken each module.
  - who has not taken each module.
  - who has passed and who has failed.
  - precisely which questions each trainee got right and wrong.
- competency assessment tools.
- training record to be obtained at any time.
- to award personalised certificates to those who reach a stated passmark.



- 8.3.1  
NPSA 3  
RQIA 6,8,10
- All staff involved in prescribing, administering and monitoring IV fluids to children will be made aware of this policy and the Paediatric Parenteral Fluid Therapy wallchart<sup>2</sup> through the BHSCT intranet and Service Group dissemination.
- All staff working exclusively with children and especially those prescribing fluids to children will be encouraged to ensure they are conversant with the knowledge required to prescribe intravenous fluids to children and that it is within their scope of practice.
- They will be encouraged to use the intranet training presentation and the BMJ learning module on hyponatraemia - <http://learning.bmj.com/learning/search-result.html?moduleId=5003358>
- The production of the certificate on completion of the above module may be sought at staff assessments, RITAs, performance review, personal development plans and appraisals.
- The future BHSCT policy and guideline on the general principles of intravenous therapy (8.2.1) will also be available in the various training modules.
- 8.3.2  
NPSA 3  
RQIA 6,8
- All professionals caring for children must be familiar with the signs of hyponatraemia and its emergency management.
- 8.3.3  
NPSA 3  
RQIA 6,8
- For those caring for young people, they should either have received adequate training in intravenous fluids or if they exclusively care for young people in an adult ward, they should know where to obtain such expertise on children should it be needed. (Appendix 5).
- Furthermore, they should be familiar with the guidance on intravenous fluids for children outlined in this policy and Regional Paediatric Fluid Therapy Group wallchart<sup>2</sup>.
- 8.3.4  
NPSA 3  
RQIA 9
- The BHSCT has identified that young people aged 14 - 16 years old can be cared for (even if only occasionally) on most wards that are generally regarded as adult wards with the obvious exceptions of wards like Care of the Elderly. Staff in those locations will be made aware of the training opportunities mentioned in 8.3 and 8.3.1.
- BHSCT Service groups will consider cohorting young people in dedicated wards - where this can be done safely and will not lead to any diminution in the level of care.
- 8.3.5
- The BHSCT will work with the NIMDTA to ensure that the principles of paediatric fluid therapy and its potential risks, as highlighted in the National Patient Safety Agency Alert, are highlighted in postgraduate training programmes.
- 8.3.6
- All professionals caring for children must be able to diagnose and manage acute hypoglycaemia.
- 8.4  
NPSA 4  
RQIA 11
- Fluid prescription/ balance chart  
A new fluid prescription/ balance chart has been developed within the Royal Belfast Hospital for Sick Children (RBHSC) with guidance from all other areas in the BHSCT that treat children. It will be used for the prescription of fluids for all children and young people treated in the BHSCT with the exception of treatment of diabetic ketoacidosis (DKA) when a specialised fluid prescription chart may be used.
- If needed, they should avail themselves of advice from the sources as detailed in Appendix 5.

8.4.1 All children, other than emergencies, must have a blood sample taken for electrolyte and blood glucose estimation before intravenous maintenance fluids are started. This must be repeated at least 24 hourly, more often in the circumstances described. Clinical and other methods of monitoring are outlined in the guidance.

#### 8.4.2 Monitoring

Monitoring of the child receiving parenteral fluid will include considerations of:-

- Body weight to be measured or assessed as a baseline and at least daily thereafter.
- Clinical state to be closely monitored and recorded on a regular basis.
- All fluid intake of any kind (intravenous, oral and medicines) must be measured and recorded on the fluid balance chart.
- All fluid output must be assessed and, if clinically indicated, measured and recorded on the fluid balance chart.
- An assessment of input/output and need for plasma glucose estimation should be made and documented every 12 hours.
- A formal reassessment of the fluid prescription and the need for intravenous fluids must be made and documented every 12 hours.
- Measurement of E&U and blood glucose/BM should be made at least daily.
- If hyponatraemia exists, these measurements should be 4 – 6 hourly.
- Urinary osmolarity and electrolytes measurements should be considered when dealing with hyponatraemia.
- The ill child will require more frequent and detailed investigations.

For more detailed information about the monitoring requirements the wallchart<sup>2</sup> should be consulted.

#### 8.5 Audit

NPSA 5  
RQIA 12

The BHSCT will implement the following governance measures.

8.5.1  
NPSA 5  
RQIA 13

The BHSCT clinical biochemistry department will collate, analyse and report quarterly on paediatric hyponatraemia incidents to designated clinicians for children and young people. They will regularly audit these incidents, collate them with the Trust Adverse Incident Reporting System and instigate actions linked to the NPSA Alert 22. Appendix 3 outlines this audit process.

8.5.2  
NPSA 5  
RQIA 14

#### Incident reporting

The BHSCT will report these potential adverse incidents related to intravenous infusion through the Trust Adverse Incident Reporting System.

A system of 'triggers' (adapted from those developed by the NHSCT) will be used to

- generate a list of hospital acquired hyponatraemia episodes
- highlight variance from best practice guidance as highlighted in this document
- generate a Trust Adverse Incident Form whenever such incidents occur.

These triggers (Appendix 3) will cover the choice of fluid prescribed at ward level, charting relevant findings in the medical notes, the frequency of electrolyte analysis and the detection of biochemical abnormalities.

#### 8.5.3 Audit

NPSA 5  
RQIA 15,16

The BHSCT will implement an audit programme for intravenous infusion therapy in children throughout the trust.

The audits will be based on the

- NPSA audit checklist  
<http://www.npsa.nhs.uk/EasySiteWeb/GatewayLink.aspx?allid=5308>
- the BHSCT trigger list (Appendix 3).
- Regional GAIN hyponatraemia audit

8.5.4 Where young people are cared for in general adult wards, special audit arrangements will be put in place to ensure they receive appropriate and safe fluid management.

## 9. Additional policy statements:

9.1 Senior medical advice must be sought when treating the child with hyponatraemia.

9.2 Where additional electrolytes are required, they should only be administered as supplied by the manufacturer and in line with guidance.

Children at or below the age of 13 years must not have electrolytes added to bags of intravenous fluids.

Ordinarily children from 13 to 16 should also not have electrolytes added to bags of intravenous fluids; in certain, predominantly adult areas, children of this age group may have magnesium sulphate or phosphates added.

9.3 Apart from boluses for shocked patients, fluids may only be administered by way of an infusion device. Details of the pump must be recorded on the fluid prescription and balance chart.

9.4 When referring to this policy, staff should consult the BHSCT policy on the management of strong intravenous potassium solutions and/or injections.

## 10. Implementation / Resource requirements:

The implementation requirements for this policy include:-

- Wallchart production and distribution
- Fluid prescription/ balance chart production and distribution
- Staff training costs – induction, postgraduate courses.

Raising staff awareness of the issues surrounding hyponatraemia and the subsequent staff training will be encouraged, as suggested by DHSSPSNI circular<sup>4</sup>, by using the [BMJ e-learning module](#).

## 11. Source(s) / Evidence Base:

The following sources were used:-

- NPSA Alert 22
- NPSA background information  
<http://www.npsa.nhs.uk/EasySiteWeb/GatewayLink.aspx?allid=5310>
- HSC (SQSD) 20-07 - reducing risk of Hyponatraemia in children (27/04/2007)
- HSC (SQSD) 20-07 - addendum (16/10/2007)
- Paediatric Parenteral Fluid Therapy wallchart.

## 12. References, including relevant external guidelines:

- Reducing the risk of hyponatraemia when administering intravenous infusions to children. National Patient Safety Agency, Patient Safety Alert 22, March 2007.
- Paediatric Parenteral Fluid Therapy initial management guideline, DHSSPSNI 2007  
[http://www.dhsspsni.gov.uk/hsc\\_sqsd\\_20-07\\_wallchart.pdf](http://www.dhsspsni.gov.uk/hsc_sqsd_20-07_wallchart.pdf).
- HSC (SQSD) 20-07 reducing risk of Hyponatraemia in children
- [http://www.dhsspsni.gov.uk/hsc\\_sqsd\\_20-07\\_addendum.pdf](http://www.dhsspsni.gov.uk/hsc_sqsd_20-07_addendum.pdf)

5. Regulation and Quality Improvement Authority (RQIA). Reducing the risk of hyponatraemia when administering intravenous infusions to children - September 2008.  
[http://www.rqia.org.uk/cms\\_resources/NI%20%20report%20Hyponatraemia%20FINAL%20v%203%200.pdf](http://www.rqia.org.uk/cms_resources/NI%20%20report%20Hyponatraemia%20FINAL%20v%203%200.pdf)

**13. Consultation Process:**

This policy is adapted from the

- NPSA Alert 22,
- Northern Ireland Regional Paediatric Fluid Therapy Working Group
- HSC (SQS) 20/2007 and its addendum documentation from the DHSSPSNI.

It has been assured through the Standards and Guidelines committee.

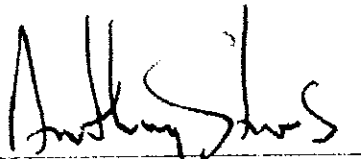
**14. Equality and Human Rights screening carried out:**

In line with duties under the equality legislation (Section 75 of the Northern Ireland Act 1998), Targeting Social Need Initiative, Disability discrimination and the Human Rights Act 1998, the Belfast Trust has carried out an initial screening exercise to ascertain if this policy should be subject to a full impact assessment.

- Screening completed       Full impact assessment to be carried out  
No action required.

**15. Procedures:**

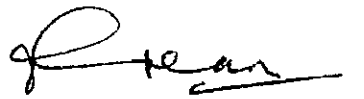
- Appendix 1 - Paediatric Parenteral Fluid Therapy wallchart
- Appendix 2 - Estimating the percentage dehydration based upon physical examination findings.
- Appendix 3 - Paediatric Hospital Acquired Hyponatraemia Audit
  - Triggers for potential adverse events
- Appendix 4 - Availability of intravenous fluids throughout the BHSC (500ml bags)
- Appendix 5 - Sources of advice regarding Paediatric fluid therapy
- Appendix 6 - Areas where it is permitted to stock/order No. 18 Solution\* - as of August 2009
- Appendix 7 - RQIA independent review - September 2008 - Recommendations



Chief Executive/ Director  
(delete as appropriate)

Date:

21/10/09



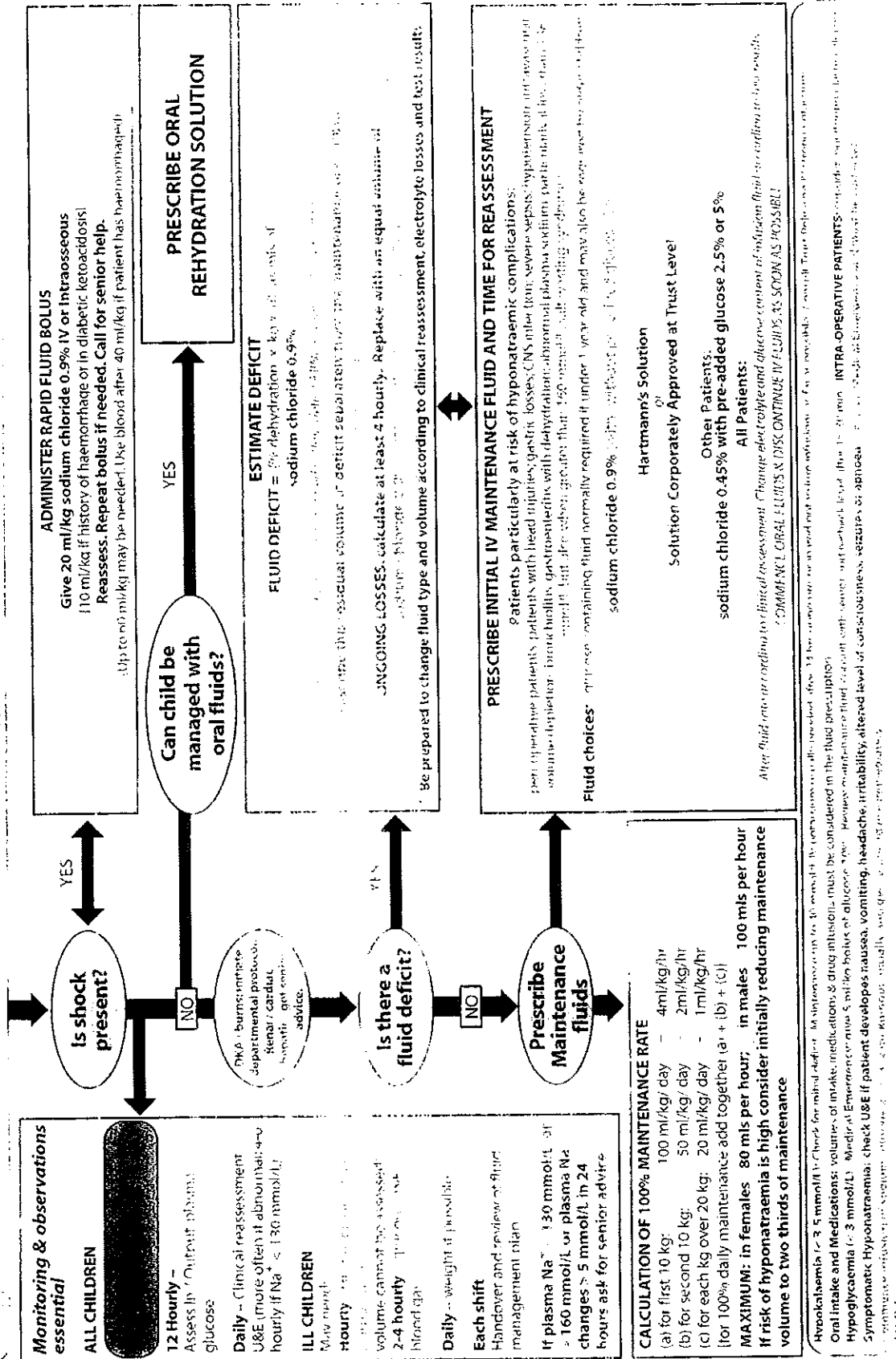
Author

Date:

20 October 2009

# PAEDIATRIC PARENTERAL FLUID THERAPY ( 1 month – 16 yrs )

## Initial management guideline



Appendix 2**Estimating the percentage dehydration based upon physical examination findings.**

<b>Estimated Percentage Dehydration</b>	<b>Physical Examination Findings</b>
<3	History of fluid loss but no findings on physical examination
5	Dry oral mucous membranes but no panting or pathological tachycardia
7	Mild to moderate decreased skin turgor, dry oral mucous membranes, slight tachycardia, and normal pulse pressure.
10	Moderate to marked degree of decreased skin turgor, dry oral mucous membranes, tachycardia, and decreased pulse pressure.
12	Marked loss of skin turgor, dry oral mucous membranes, and significant signs of shock, pallor, cool peripheries, prolonged capillary refill time, hypotension, confusion.

**PAEDIATRIC HOSPITAL ACQUIRED HYPONATRAEMIA AUDIT****Laboratory Report Details (to be completed by audit dept)**

Patient No. Patient Date of Birth:  
 Date of specimen: Time of specimen: Result :

**Admission Details**

Date of admission: Time of admission:

Diagnosis: 1.  
 2.

**Hospital acquired hyponatramia (defn)**

- Na  $\geq$  130mmol/l at time of admission, & a subsequent Na of  $<$  130mmol/l whilst on IV fluids
- Na  $<$  130mmol/l on their initial U&E's, where the U&E's are done  $>$ 48hrs after admission and they are on IV fluids.
- Admitted from another hospital with Na  $<$  130mmol/l at time of admission whilst on IV fluids.

1. Is this hospital acquired hyponatraemia? Yes / No

If no, reason: \_\_\_\_\_

If yes, was it acquired whilst in this trust? Yes / No

If no, patient transferred from: \_\_\_\_\_

**Treatment and monitoring of hyponatraemia**

2. Was the fluid prescribed appropriate? Yes / No

If no, details: \_\_\_\_\_

3. Was IV fluid prescription reviewed 12hrly whilst on IV fluids? Yes / No

4. Were U&E done 24hrly whilst on IV fluids? Yes / No

Following the Na of  $<$ 130mmol/l,

5. Was appropriate advice sought? Yes / No

Grade: \_\_\_\_\_ Speciality: \_\_\_\_\_

6. Was the frequency of repeat U&Es appropriate? Yes / No

If No, details: \_\_\_\_\_

**Recording and communication of incidents (to be completed by Audit dept)**

7. If yes to Q1, was adverse incident form completed? Yes / No

8. Was copy of form sent to other trust if acquired outside BHSCT? Yes / No

Standards & Guidelines Committee – Hyponatraemia + IV fluids for children – V4 – March 2010

**Triggers for potential adverse events related to the administration of intravenous fluids to children (1 month – 16 years old)**

(adapted from Northern H&SCT policy)

CHOICE OF IV FLUID

1. Bolus fluid: use of a solution with sodium concentration of  $<131\text{mmol/L}$  for treatment of shock.
2. Deficit fluid: use of a solution with sodium concentration of  $<131\text{mmol/L}$  for correction.
3. Maintenance fluid: use of a solution with sodium concentration of  $<131\text{mmol/L}$  in a peri-operative patient (intraoperative period and first 24 hours following surgery).

BIOCHEMICAL ABNORMALITIES

4. Any episode of symptomatic hyponatraemia while in receipt of IV fluids.
5. Any episode of hypoglycaemia (blood glucose less than  $3\text{mmol/L}$ ) while in receipt of IV fluids.
6. Any episode of severe acute hyponatraemia (i.e. sodium level dropping from  $135\text{mmol/L}$  or above to  $<130\text{mmol/L}$  within 24hrs of starting IV treatment).

ASSESSMENT

7. Electrolytes not checked at least once per 24 hours in any patient receiving IV fluids exclusively.
8. Failure to record the calculations for fluid requirements on the prescription sheet.
9. Failure to note in the case notes/ prescription sheet a serum sodium of less than  $130\text{mmol/L}$ .
10. Failure to document in the case notes the steps taken to correct a serum sodium of less than  $130\text{mmol/L}$ .

**If any of the above occurs an IR1 Form must be completed.**

October 2010

Standards & Guidelines Committee – Hyponatraemia + IV fluids for children – V4 – March 2010



## Appendix 4

AVAILABILITY OF INTRAVENOUS FLUIDS THROUGHOUT THE BHSCT (500ML BAGS)

SITE	R G H	B C H	M P H	M A T E R
<b>Sodium chloride</b>				
Sodium chloride 0.45%	√	√		√
Sodium chloride 0.9%	√	√	√	√
Sodium chloride 1.8%	√	√	√	√
Sodium chloride 2.7%	√		√	√
<b>Combined solutions</b>				
Sodium chloride 0.45% Glucose 2.5%	√	√	√	
Sodium chloride 0.45% Glucose 5%	√		√	
Sodium chloride 0.9% Glucose 5%	√			
<b>Glucose solutions</b>				
Glucose 5%	√	√	√	√
Glucose 10%	√	√	√	√
Glucose 15%	√			
Glucose 20%	√	√		
<b>Potassium containing solutions</b>				
Glucose 5% 10mmol Potassium chloride	√			
Glucose 5% 20mmol Potassium chloride	√	√	√	
Glucose 5% 40mmol Potassium chloride	√	√	√	
Glucose 10% 10mmol Potassium chloride	√			√
Glucose 10% Sodium chloride 0.18% 10mmol Potassium chloride*	√			
Sodium chloride 0.45% Glucose 2.5% 10mmol Potassium chloride	√	√		
Sodium chloride 0.45% Glucose 2.5% 20mmol Potassium chloride	√			
Sodium chloride 0.45% Glucose 5% 10mmol Potassium chloride	√			
Sodium chloride 0.45% Glucose 5% 20mmol Potassium chloride	√			
Sodium chloride 0.9% 10mmol Potassium chloride	√			
Sodium chloride 0.9% 20mmol potassium chloride	√	√	√	√
Sodium chloride 0.9% 40mmol potassium chloride	√	√		

\* commonly known as Basic solution

Sites: RGH = Royal Hospitals  
BCH = Belfast City Hospital

MPH = Musgrave Park Hospital  
MATER = Mater Hospital

## Appendix 5

**Sources of advice regarding Paediatric fluid therapy**

For help and advice regarding

- management of fluid therapy
- especially to prevent and/or treat hyponatraemia

in all children, but especially for those children aged 13 – 16 years old being managed in adult wards,

please use the following sources of help and advice. Ordinarily, advice should be for complex cases and should be Consultant to Consultant discussions even though contact will often have to be made through trainee on-call rotas.

Team		Address	Extension
<b>RBHSC Paediatricians</b>	Paediatric On Call Rota	Allen Ward Musgrave Ward	Bleep 2277
<b>RBHSC Paediatric ICU</b>	Paediatric ICU		2449
<b>Musgrave Park</b>	Orthopaedic theatre – Anaesthesia team during working hours.		
<b>BCH Dufferin theatres</b>	ENT theatre – Anaesthesia team during working hours.		
<b>General Biochemistry</b>	<b>Clinical Biochemistry</b>		
	<b>Inside working hours</b>	<b>Outside working hours</b>	
RVH Tie line: 7222 Ext. 3798	Ext. 4714	Contact Medical doctor on call either via the laboratory or via switchboard.	
BCH Tie line: 7111 Ext. 3096/2926/3628	Ext. 3497/3136/3160	Ext. 3216 or Contact Medical doctor on call either via the laboratory or via switchboard	
MIH Tie line: 7231 Ext. 2223/2229	Ext. 2326/2228	Contact Medical doctor on call either via the laboratory or via switchboard	

Other sources of help are:

- 1 APA consensus guideline on perioperative fluid management in Children  
[http://www.apagbi.org.uk/docs/Perioperative\\_Fluid\\_Management\\_2007.pdf](http://www.apagbi.org.uk/docs/Perioperative_Fluid_Management_2007.pdf)
- 2 Royal Children's hospital Melbourne Clinical Practice Guidelines  
Intravenous fluids  
[http://www.rch.org.au/clinicalguide/cpg.cfm?doc\\_id=5203#Other%20Resources](http://www.rch.org.au/clinicalguide/cpg.cfm?doc_id=5203#Other%20Resources)
- 3 Royal Children's hospital Melbourne Clinical Practice Guidelines  
Hyponatraemia  
[http://www.rch.org.au/clinicalguide/cpg.cfm?doc\\_id=8348](http://www.rch.org.au/clinicalguide/cpg.cfm?doc_id=8348)

Standards & Guidelines Committee – Hyponatraemia + IV fluids for children – V4 – March 2010

## Appendix 6

Areas where it is permitted to stock/order No. 18 Solution\* - as of August 2009

SERVICE GROUP	SITE	SPECIALITY	Stock on Ward	Named patient supply – consultant request only.
Clinical Services	RGH, BCH	High Dependency Unit	X	
Clinical Services	RGH, BCH, MATER	Intensive Care	X	
Clinical Services	Mater, BCH, RGH	Recovery Wards		X
Clinical Services	Mater, RGH	Theatres		X
Clinical Services	BCH	Tower Theatres		X
Clinical Services / OPMS	Mater, RGH, BCH	Day Procedure Units		X
Specialist Serv	RGH	Wards 4E and 4F (Neurosciences)		X
OPMS T&O	MPH	Recovery Ward - Orthopaedics		X
OPMS T&O	MPH	High Dependency Unit		X
OPMS T&O	MPH	Theatres - Orthopaedics		X
SS, Women, family and childcare	RBHSC	Barbour Renal	X	
SS, Women, family and childcare	RBHSC	PICU	X	

\* "No. 18 Solution" = sodium chloride 0.18% and glucose 4%

Standards & Guidelines Committee – Hyponatraemia + IV fluids for children – V4 – March 2010

**RQIA INDEPENDENT REVIEW - SEPTEMBER 2008 - RECOMMENDATIONS**

- Recommendation 1 All hospitals should monitor the ongoing use of No. 18 solution to enable assurance that infusions are removed from stock and general use in areas that treat children.
- Recommendation 2 Where appropriate, hospitals must be able to demonstrate that an active strategy is in place for minimising risk of use in clinical areas that continue to stock No 18 solution and where children are accommodated. For example, provision of additional labelling or separate storage for those No.18 solution bags still stocked in such clinical areas.
- Recommendation 3 All hospitals should continue with the ongoing work of disseminating clinical guidelines. This should be undertaken in conjunction with multidisciplinary awareness-raising and education on the use of the guidance and wall chart in all settings where children may be treated. This is particularly important in adult wards where older children are treated.
- Recommendation 4 Independent hospitals must be assured that all visiting doctors who may manage patients up to 16 years old use the clinical guidelines when managing children being treated with intravenous infusions.
- Recommendation 5 All hospitals should ensure that only the DHSSPS Paediatric Parenteral Fluid Therapy wall-chart issued by DHSSPS in October 2007 is displayed in clinical areas where children may be treated, with a list of available local fluids available alongside it. All previous versions of the wall chart should be removed from clinical areas.
- Recommendation 6 Hospitals should assure themselves that staff have the appropriate skill and knowledge in this clinical area. Competency assessment tools in administration of intravenous infusion to children should be developed, formalised and implemented for all relevant, multi-professional staff.
- Recommendation 7 Hospitals should continue to review, collaborate and implement organisation wide policy and guidelines, in relation to intravenous infusion for children.
- Recommendation 8 All hospitals should ensure that the development and provision of multidisciplinary education opportunities in administration of intravenous infusion to children and that all relevant clinical staff uptake this education.
- Recommendation 9 Hospitals should develop mechanisms to identify the location of patients aged 14-16 years who are in adult wards and ensure staff who care for those children are provided with competency based, assessed education in administration of intravenous infusion to children.
- Recommendation 10 All hospitals should make wider use of training sources available such as BMJ E-Learning Module on Hyponatraemia to address different learning styles and devise a mechanism to ensure 100% multi-professional uptake of such learning.
- Recommendation 11 Priority must be given to the completion of a Trust-wide review, and implementation of revised paediatric intravenous fluid prescription and

Standards & Guidelines Committee – Hyponatraemia + IV fluids for children – V4 – March 2010

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fluid balance charts in all settings where children may be treated including adult wards where children are treated.

- Recommendation 12 All hospitals should develop a culture of incident reporting, analysis and learning generally and specifically in respect of intravenous fluids and hyponatraemia.
- Recommendation 13 Plans for development of systems for reporting, analysing and monitoring incidents to assure organisations of safe practice and that actions linked to NPSA Alert 22 should be implemented and regularly audited by all hospitals to ensure adherence to the process.
- Recommendation 14 The development of 'trigger lists' that have been adopted by a the Antrim Area Hospital to aid understanding of the types of incidents to be reported should be shared and taken up more widely .
- Recommendation 15 The development of an audit tool which may include wider aspects but should address as a minimum aspects of NPSA Alert 22 should continue to be progressed and used at least annually.
- Recommendation 16 Trusts should continue to seek approval and funding for a regional audit (GAIN proposal) on the uptake of the Paediatric Parenteral Fluid Therapy guideline and potential unexpected clinical consequences of the guideline.

### Sources of advice regarding Paediatric fluid therapy

For help and advice regarding

- management of fluid therapy
- especially to prevent and/or treat hyponatraemia

in all children, but especially for those children aged 13 – 16 years old being managed in adult wards,

please use the following sources of help and advice. Ordinarily, advice should be for complex cases and should be Consultant to Consultant discussions even though contact will often have to be made through trainee on-call rotas.

Team		Address	Extension
<b>RBHSC Paediatricians</b>	Paediatric On Call Rota	Allen Ward Musgrave Ward	Bleep 2277
<b>RBHSC Paediatric ICU</b>	Paediatric ICU		2449
<b>Musgrave Park</b>	Orthopaedic theatre – Anaesthesia team during working hours.		
<b>BCH Dufferin theatres</b>	ENT theatre – Anaesthesia team during working hours.		
<b>General Biochemistry</b>	<b>Clinical Biochemistry</b>		
	<b>Inside working hours</b>	<b>Outside working hours</b>	
RVH Tie line:7222 Ext.3798	Ext.4714	Contact Medical doctor on call either via the laboratory or via switchboard.	
BCH Tie line:7111 Ext. 3096/2926/3628	Ext.3497/3136/3160	Ext.3216 or Contact Medical doctor on call either via the laboratory or via switchboard	
MIH Tie line: 7231 Ext. 2223/2229	Ext.2326/2228	Contact Medical doctor on call either via the laboratory or via switchboard	

Other sources of help are:

- 1 APA consensus guideline on perioperative fluid management in Children  
[http://www.apaqbi.org.uk/docs/Perioperative\\_Fluid\\_Management\\_2007.pdf](http://www.apaqbi.org.uk/docs/Perioperative_Fluid_Management_2007.pdf)
- 2 Royal Children's hospital Melbourne Clinical Practice Guidelines  
Intravenous fluids  
[http://www.rch.org.au/clinicalguide/cpg.cfm?doc\\_id=5203#Other%20Resources](http://www.rch.org.au/clinicalguide/cpg.cfm?doc_id=5203#Other%20Resources)
- 3 Royal Children's hospital Melbourne Clinical Practice Guidelines  
Hyponatraemia  
[http://www.rch.org.au/clinicalguide/cpg.cfm?doc\\_id=8348](http://www.rch.org.au/clinicalguide/cpg.cfm?doc_id=8348)

**Paediatric  
Fluid Prescription / Balance Chart**

## **Aims and outcomes of session.**

### **Aim:**

- ❖ To instruct staff on the correct completion of the paediatric fluid balance chart.

### **Outcomes:**

- ❖ Demonstrate the ability to correctly complete and calculate a fluid balance chart.
- ❖ Explain the need for correct and accurate completion to colleagues in the clinical environment.



# NPSA alert 22

NPSA

## Patient safety alert



### Alert

28 March 2007

#### Reducing the risk of hyponatraemia when administering intravenous infusions to children

The National Patient Safety Agency (NPSA) is issuing advice to healthcare organisations on how to minimise the risks associated with administering infusions to children.

The development of fluid-induced hyponatraemia in the previously well child undergoing elective surgery or with illness may not be well recognised by clinicians. To date, the NPSA's National Reporting and Learning System (NRLS) has received only one incident report that resulted in no harm, but it is likely that incidents have gone unreported in the UK.

Since 2000, there have been four child deaths and one near miss involving hyponatraemia in children hospitalised in Great Britain. Four deaths have been reported in the child registration register (two of these were in children aged 10 years and 11 years) and one in a child aged 12 years. The administration of hyponatremic fluid and

#### Action for the NHS and the independent sector

The NPSA recommends that NHS and independent sector organisations prescribing, administering and monitoring intravenous fluids for children:

- 4 Reinforce safer practice by reviewing and improving the design of existing intravenous fluid prescriptions and fluid balance charts for children.
- 5 Promote the reporting of hospital-acquired hyponatraemia incidents via local prescribing, administering and monitoring of intravenous fluids and for children intravenous fluid prescriptions and fluid balance charts for children.

4. To reinforce safer practice by reviewing and improving the design of existing intravenous fluid prescriptions and fluid balance charts for children.

5. To promote the reporting of hospital-acquired hyponatraemia incidents via local risk management reporting systems, implement an audit programme to ensure NPSA recommendations and local procedures are being adhered to.

<p><b>On receiving the alert:</b></p> <ul style="list-style-type: none"> <li>• All local and independent sector organisations in England and Wales.</li> <li>• The local pharmaceutical manufacturer who supplies the intravenous fluids to the medical sector, surgery, anaesthetics and intensive care units.</li> <li>• Local governance and risk management.</li> <li>• Pharmacy staff.</li> <li>• Intensive care and anaesthetics teams.</li> <li>• Accident and emergency.</li> </ul>	<p><b>The NHS has introduced:</b></p> <ul style="list-style-type: none"> <li>• Fluid balance charts with primary care organisations, ambulance trusts, mental health trusts and local authority health services.</li> <li>• Local governance and risk management systems.</li> <li>• Clinical education, surgery and intensive care units.</li> <li>• Pharmacy staff.</li> <li>• Intensive care and anaesthetics teams.</li> <li>• Accident and emergency.</li> </ul>
<p><b>Other organisations that also receive the alert:</b></p> <ul style="list-style-type: none"> <li>• Local governance and risk management systems.</li> <li>• Pharmacy staff.</li> <li>• Intensive care and anaesthetics teams.</li> <li>• Accident and emergency.</li> </ul>	<p><b>Other organisations that also receive the alert:</b></p> <ul style="list-style-type: none"> <li>• Local governance and risk management systems.</li> <li>• Pharmacy staff.</li> <li>• Intensive care and anaesthetics teams.</li> <li>• Accident and emergency.</li> </ul>



Belfast Health and Social Care Trust

Paediatric Fluid Prescription / Balance Chart

5 October 2010

# Fluid Prescription/Balance Chart

- ❖ A new paediatric fluid prescription/balance chart has been developed within RBHSC.
- ❖ It has been trialled in a small number of wards that care for children outside of RBHSC.
- ❖ It is now being rolled out in a larger group of wards using the QWIT.
- ❖ Ultimately, it will be used for the prescription of all fluids for children treated throughout the BHSC.

5 October 2010

*Paediatric Fluid Prescription / Balance Chart*



Belfast Health and  
Social Care Trust 4

THIS CHART MUST BE USED FOR CHILDREN UP TO THEIR 16th BIRTHDAY

FLUID INPUT (ml) | FLUID OUTPUT (ml)

INTRAVENOUS FLUID						ORAL					Overall Fluid Balance	Comment	Blank Space
Amount	Sp. Total Amount	Sp. Total Amount	Sp. Total Amount	Sp. Total Amount	Sp. Total Amount	Liquids Total Amount	SOLIDS Total	External Total In	Gastric	Aspirate			
98.00													
99.00													
10.00													
11.00													
12.00													
13.00													
14.00													
15.00													
16.00													
17.00													
18.00													
19.00													
20.00													
21.00													
22.00													
23.00													
24.00													
01.00													
02.00													
03.00													
04.00													
05.00													
06.00													
07.00													

\* To include estimate of daily flush volume

24 hour intake (ml)

Intravenous total*	
Oral total	
Total overall in	

24 hour output (ml)

Urine	
Aspirate	
Drains	
Total overall out	

24 hour Fluid Balance (ml)

Total in	
Total out	
Balance	

5 October 2010

Paediatric Fluid Prescription / Balance Chart

Best at 100% of calculated fluid

Signs/Symptoms	Mild	Moderate	Severe	Notes
Dehydrated in the mouth				Loss of skin turgor, sunken fontanelle, dry mucous membranes
Dehydrated in the skin				Loss of skin turgor, sunken fontanelle, dry mucous membranes
Stricken mucous membranes				Loss of skin turgor, sunken fontanelle, dry mucous membranes
Sunken eyes				Loss of skin turgor, sunken fontanelle, dry mucous membranes

**Back**

Date

Weight

Fluid bolus for shocked patients  
 Required volume (ml) = body weight (kg) x 20 \_\_\_\_\_ x 10 (in setting of trauma)  
 Use only volume that is 0.9% sodium and report if necessary and call for senior help  
 Maintenance fluid - in females - 10kg max 200ml/day, in males - 30kg max 250ml/day (respective to 100 & 100 ml/hour respectively)  
 First 10kg 100ml/kg/day  
 Second 10kg 50ml/kg/day  
 For each kg over 20kg 20ml/kg/day  
 Maintenance total (A+B+C)  
 Maintenance total divided by 24 hours

A	ml/day
B	ml/day
C	ml/day
D	ml/day
E	ml/hour

SB Serum sodium. If children with increased VPH secretion may benefit from restriction of their maintenance fluid requirement to two thirds of the normal recommended volume.

Fluid deficit calculations (maximum 10%)

% of dehydration \_\_\_\_\_ x body weight in kg \_\_\_\_\_ x 10

Volume given as fluid bolus

Residual deficit for 24 hours (F-G)

Residual deficit per hour (divide by 24 or 48)

Ongoing losses (e.g. vomiting, drainage, diarrhoea)

calculated at least every 4 hours (unless otherwise instructed)

Replaces lost volume with an equal volume of fluid (usually 0.9% saline)

Total fluid per hour (E + F + G)

(Maintenance + residual deficit + ongoing losses)

F	ml
G	ml
H	ml
I	ml/hour
J	ml/hour

Date	Time	Volume (kg)	Infusion fluid	Infusion rate (ml/hour)	Prescribers Signature	Administered by (Name)	Start Time	Finish Time	Volume given (ml)	Batch No	Expiry Date

Infused medicines must be Referred in Drug Cardex

12 hour reassessment: Is infusion prescription still suitable? Are oral fluids now appropriate? Is potassium needed? What about urine output?

Date \_\_\_\_\_ Time \_\_\_\_\_ Yes / No \_\_\_\_\_

Doctors Signature \_\_\_\_\_

5 October 2010

Paediatric Fluid Prescription / Balance Chart

Date:

# Belfast Health and Social Care Trust

## DAILY FLUID BALANCE & PRESCRIPTION SHEET FOR CHILDREN

Please affix patient label

THIS CHART MUST BE USED FOR CHILDREN UP TO THEIR 16th BIRTHDAY

### FLUID INPUT (ltr)

### FLUID OUTPUT (ml)

INTRAVENOUS FLUID		ORAL		Gastric Aspiration		Blow		Total		Actual		Revised
Amount	Type	Amount	Type	Amount	Type	Amount	Type	Amount	Type	Amount	Type	
09.00												
10.00												
11.00												
12.00												
13.00												
14.00												
15.00												
16.00												
17.00												
18.00												
19.00												
20.00												
21.00												
22.00												
23.00												
24.00												
01.00												
02.00												
03.00												
04.00												
05.00												
06.00												
07.00												

24 hour Fluid Balance (ml)

Total In
Total out
Balance

24 hour output (ml)

Aspirate
Drains
Total overall out

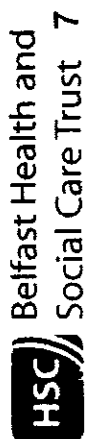
24 hour intake (ml)

Intravenous total
Oral total
Total overall in

To include estimate of daily flush volume

5 October 2010

Paediatric Fluid Prescription / Balance Chart



## Belfast Health and Social Care Trust

**DAILY FLUID BALANCE & PRESCRIPTION SHEET FOR CHILDREN**

THIS CHART MUST BE USED FOR CHILDREN UP TO THEIR 16<sup>th</sup> BIRTHDAY

- ❖ Chart must be used for children
- ❖ aged from 1 month up to their 16<sup>th</sup> birthday
- ❖ throughout the BHSC
- ❖ wherever their care is provided.
- ❖ Except for patients with
  - ❖ diabetic ketoacidosis
  - ❖ acute burns.
- ❖ who may use different fluid prescription charts.


5 October 2010

*Paediatric Fluid Prescription / Balance Chart*



Belfast Health and  
Social Care Trust 8

# 1. Labelling

<p>Date _____</p>  <p style="text-align: center;">FLUID</p> <p style="text-align: center;">INTRAVENOUS FLUID AND TYPE</p>	<p>Signs/symptoms:</p> <p>Decreased urine output</p> <p>Dry mouth</p> <p>Decreased skin turgor</p> <p>Sunken anterior fontanelle</p> <p>Sunken eyes</p>
--	---

- ❖ Stick on labels and complete today's date
- ❖ on both sides of chart

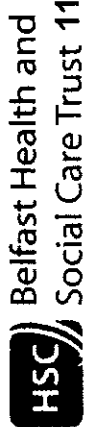




### 3. Prescribe fluids

Date	Time 21.00 clock	Volume	Infusion Fluid	Additives *	Rate ml/hour	Prescriber's Signature

\* Infused medicines must be referenced in Drug Kardex



### 3. Prescribe fluids

Date	Time	Volume	Infusion
	21:00	100ml	

A	Infusion Fluid
	<i>Hartmann's Solution</i>
	<i>0.9% Saline</i>
	<i>5% Dextrose Solution</i>

Infusion fluids can be identified by Letter

5 October 2010

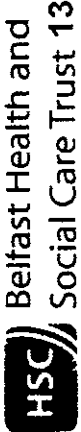
Paediatric Fluid Prescription / Balance Chart

# 4. Administer fluids

Administered By	Checked By	Start Time	Finish Time	Volume given (ml)	Batch No & Expiry Date

5 October 2010

Paediatric Fluid Prescription / Balance Chart



# 5. Record Intake

Time	INTRAVENOUS FLUID				ORAL			
	16G Right hand		20G Left ACF		LIQUIDS		ENTERAL SOLIDS	
	Type	Total Amount	Type	Total Amount	Type	Total Amount	Type	Total
08.00								
09.00								
10.00								
11.00	HARTMANN'S							
12.00	100							
13.00	100							
14.00	100							
15.00	100							
16.00	100							
17.00	N Saline							
18.00	40						40	
19.00	40						40	
20.00	40		DSW					
21.00	40		100					
22.00	40		100					
23.00	40		100					
24.00	40		100					
01.00	40							
02.00	40							
03.00	40							
04.00	40							
05.00	40							
06.00	40							
07.00	40							

❖ Record

❖ Site

❖ Type\*

❖ Volume

❖ for each type of fluid

❖ every hour

# 5. Record Intake

Time	INTRAVENOUS FLUID						ORAL			
	16G Right hand		20G Left ACF		LIQUIDS		ENTERAL		SOLIDS	
	Type	Total Amount	Type	Total Amount	Type	Total Amount	Type	Total	NG tube	Enteral
	Amount		Amount		Amount		Amount		Amount	Amount
08.00										
09.00									Enteral	
10.00									40	
11.00									40	
12.00	100								40	
13.00	100								40	
14.00	100								40	
15.00	100								40	
16.00	100								40	
17.00									40	
18.00	40								40	
19.00	40								40	
20.00	40								40	
21.00	40									
22.00	40									
23.00	40									
24.00	40									
01.00	40									
02.00	40									
03.00	40									
04.00	40									
05.00	40									
06.00	40									
07.00	40									

- ❖ Record
- ❖ Site
- ❖ Type\*
- ❖ Volume
- ❖ for each type of fluid
- ❖ every hour

\* = identify with letter if wish

# 6. Calculate intake – Cumulative totals

- ❖ Cumulative totals for
- ❖ each type of fluid

Time	INTRAVENOUS FLUID						ORAL			
	LEG Right hand		20G Left ACF		LIQUIDS		ENTERAL		SOLIDS	
	Type	Total Amount	Type	Total Amount	Type	Total Amount	Type	Total		
08.00										Grand Total in
09.00										
10.00										
11.00	Hartmann's									
12.00	100									
13.00	100									
14.00	100									
15.00	100									
16.00	100									
17.00	N Saline									
18.00	40									
19.00	40									
20.00	40									
21.00	40									
22.00	40									
23.00	40									
24.00	40									
01.00	40									
02.00	40									
03.00	40									
04.00	40									
05.00	40									
06.00	40									
07.00	40									

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Paediatric Fluid Prescription / Balance Chart



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# 6. Record Intake – Cumulative totals

- ❖ Cumulative totals for
- ❖ each type of fluid

	INTRAVENOUS FLUID				ORAL			
	16G Right hand		20G Left ACF		LIQUIDS		ENTERAL SOLIDS	
	Type / Amount	Total Amount	Type / Total Amount	Total Amount	Type / Total Amount	Total	NG tube	Grand Total in
08.00								
09.00							Enture	
10.00							40	40
11.00	Hartmann's						40	
12.00	100	100					40	120
13.00	100	200					40	160
14.00	100	300					40	
15.00	100	400					40	240
16.00	100	500					40	280
17.00	N.Saline						40	
18.00	40	540					40	360
19.00	40	580	D5W				40	400
20.00	40	620	100				40	440
21.00	40	660	100	200				
22.00	40	700	100	300				
23.00	40	740	100	400				
24.00	40	780	100	500				
01.00	40	820						
02.00	40	860						
03.00	40	900						
04.00	40	940						
05.00	40	980						
06.00	40	1020						
07.00	40	1060						

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Paediatric Fluid Prescription / Balance Chart

# 7. Calculate intake – Cumulative totals

- ❖ Then,
- ❖ Cumulative totals to be calculated
- ❖ each hour
- ❖ to get a

**Grand Total in**

INTRAVENOUS FLUID						ORAL				Grand Total in
16G Right hand		20G Left AOF		LIQUIDS		ENTERAL		NG tube		
Type	Total Amount	Type	Total Amount	Type	Total Amount	Type	Total			
	08.00									
	09.00									
	10.00									
	11.00									
	12.00									
	13.00									
	14.00									
	15.00									
	16.00									
	17.00									
	18.00									
	19.00									
	20.00									
	21.00									
	22.00									
	23.00									
	24.00									
	01.00									
	02.00									
	03.00									
	04.00									
	05.00									
	06.00									
	07.00									



# 7. Record Intake – Cumulative totals

❖ Worked example

	INTRAVENOUS FLUID						ORAL			
	16G Right hand		20G Left ACF		LIQUIDS		ENTERAL		SOLIDS	Grand Total In
	Type	Total Amount	Type	Total Amount	Type	Total Amount	NG Tube	Enteral		
08.00										
09.00										
10.00								40	40	40
11.00	Hartmann's							40	40	80
12.00	100	100						40	120	220
13.00	100	200						40	160	360
14.00	100	300						40	200	500
15.00	100	400						40	240	640
16.00	100	500						40	280	780
17.00	N Saline							40	320	820
18.00	40	540						40	360	900
19.00	40	580	D5W					40	400	980
20.00	40	620	100	100				40	440	1160
21.00	40	660	100	200						1300
22.00	40	700	100	300						1440
23.00	40	740	100	400						1580
24.00	40	780	100	500						1720
01.00	40	820								1760
02.00	40	860								1800
03.00	40	900								1840
04.00	40	940								1880
05.00	40	980								1920
06.00	40	1020								1960
07.00	40	1060								2000

# 8. Record Cumulative intake totals


24 hour intake (ml)

volume

Intravenous total *	1560
Oral total	440
Total overall in	2000

# 9. Record outputs

- ❖ Record
- ❖ Site if necessary
- ❖ Type
- ❖ Volume
- ❖ for each type of fluid.

FLUID OUTPUT (ml)

Bowels	Castric Aspiration		Urine		Drainage		Grand Total Output	Overall Balance	Comments	Blood Sugar
	Total	Amount	Total	Amount	Total	Amount				
		40		40		100				
				10						
				10						
				30						
		50		50						
				80						
				100		120				
		60		120						
				100						
				150						
		40								
				150		200				
		0								
				200						
						50				
		10								
				200						

# 10. Calculate outputs – Cumulative totals

- ❖ Cumulative totals to be calculated for
- ❖ each type of fluid

FLUID OUTPUT (ml)

Bowels	Gastric Aspiration		Urine		Drains		Overall Fluid Output	Overall Comment	Blood Sugar
	Amount	Total	Amount	Total	Amount	Total			
	40		40		100				
			20						
			10						
			30						
			50						
			50						
			80						
			100						
	60		120						
			100						
			150						
			40						
			150						
			200						
			10						
			200						

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Paediatric Fluid Prescription / Balance Chart



# 10. Record outputs – Cumulative totals

- ❖ Cumulative totals to be calculated for
- ❖ each type of fluid

FLUID OUTPUT (ml)

Bowels	Gastric Aspiration		Urine		Drains		Grand Total Output	Overall Fluid Balance	Comment	Blood Sugar
	Amount	Total	Amount	Total	Amount	Total				
	40	40	40	40	100	100				
			20	60						
			10	70						
			10	80						
			30	110						
	50	90	50	160						
			50	210						
			80	290						
			100	390	120	220				
	60	150	120	510						
			100	610						
			150	760						
	40	190								
			150		200	420				
	0	190								
			200	1110						
					50	470				
	10	200								
			200	1310						

# 11. Record outputs – Cumulative totals

- ❖ Cumulative totals to be calculated for
- ❖ each hour
- ❖ to get a

## Grand Total out

FLUID OUTPUT (ml)

Bowel Amount	Gastric Aspirate		Urine		Dysuria		Grand Total out Balance	Ureae Counteur	Blood Sugar
	Total Amount	Total Amount	Total Amount	Total Amount	Total Amount	Total Amount			
	40	40	40	40	60	100			
			10	80					
			30	110					
	50	90	50	160					
			50	210					
			80	290					
			100	390	120	220			
	60	150	120	510					
			100	610					
			150	760					
	40	190							
			150		200	420			
	0	190							
			200	1110					
	10	200			50	470			
			200	1310					

# 11. Record outputs – Cumulative totals

- ❖ Cumulative totals to be calculated for
- ❖ each hour
- ❖ to get a

## Grand Total out

FLUID OUTPUT (ml)

Amount	Bowels		Gastric Aspirate		Urine		Drainage		Grand Total out	Overall Balance	Comment	Blood Sugar
	Total	Amount	Total	Amount	Total	Amount	Total	Amount				
		40			40	40			40			
		40	40	20	60	100			200			
					10	80			280			
					30	110			250			
		50	90	50	160				350			
				50	210				400			
				80	290				480			
				100	390	120	220		700			
		60	150	100	510				880			
				100	610				980			
				150	760				1130			
		40	190						1170			
				150				200	1520			
		0	190									
				200	1110				1720			
		10	200			50	470		1770			
									1780			
				200	1310				1980			

# 12. Record Cumulative output totals


24 hour output (ml)

Urine	1310
Aspirate	200
Drains	470
Total overall out	1980



# 13. Calculate overall hourly balance

- ❖ Calculate the overall balance
- ❖ each hour

INPUT (ml)		ORAL		OUTPUT (ml)		Overall Balance
Type	Total					
						40
						-200
						200
						210
						220
						-140
						250
						-30
						350
						10
						400
						100
						480
						160
						700
						80
						880
						-60
						980
						20
						1180
						150
						30
						1300
						1170
						130
						270
						60
						1520
						200
						240
						280
						120
						1720
						110
						1770
						140
						1780
						180
						1980
						20
						2000

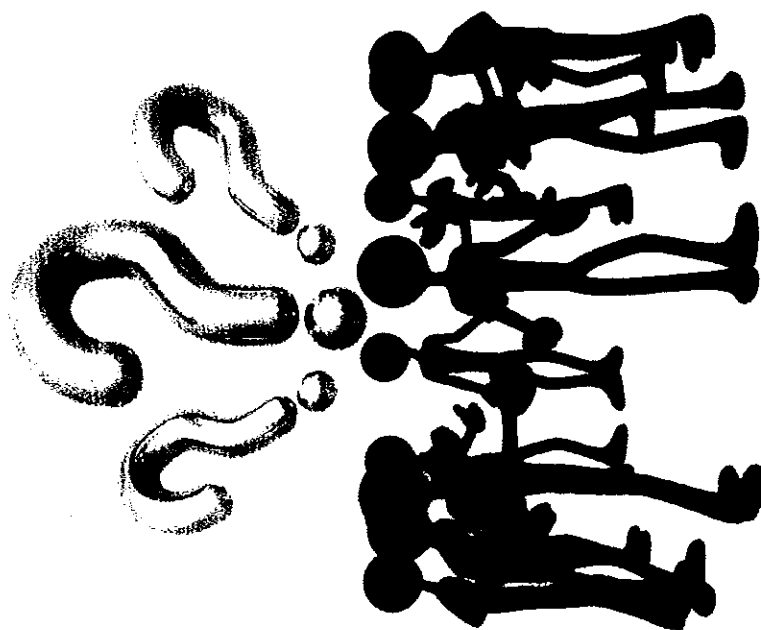
# 14. Complete overall 24 hour balance



24 hour Fluid Balance (ml)

Total in	2000
Total out	1980
Balance	20

# Fluid Prescription/Balance Chart



5 October 2010

*Paediatric Fluid Prescription / Balance Chart*



Belfast Health and  
Social Care Trust 29

therapy

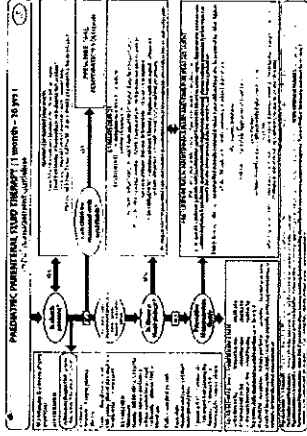
# Standards & Guidelines Committee



20 October 2009

# Warning !

- ❖ This presentation outlines the **basics** of paediatric fluid prescription.
- ❖ It is based on the Paediatric Parenteral Fluid Therapy wallchart.
- ❖ It will
  - ❖ make the reader aware of the changes required after NPSA alert 22.
  - ❖ outline the symptoms and signs of hyponatraemia
  - ❖ describe the principles of basic paediatric fluid management
  - ❖ introduce the new paediatric fluid prescription chart
  - ❖ indicate the criteria for local incident reporting
  - ❖ Provide the sources of help and advice



❖ Please refer to the wallchart for more **detailed** guidance.

❖ This advice does not override or replace the individual responsibility of health professionals to make appropriate decisions in the circumstances of their individual patients, in consultation with the patient and/or guardian or carer or for consultation with a more senior clinician.

20 October 2010

# Background

- ❖ Paediatric deaths
- ❖ Inquests
- ❖ Public inquiries: O'Hara
- ❖ RQIA
- ❖ CMO
- ❖ GAIN
- ❖ NPSA Alert 22

20 October 2010

# NPSA alert 22

## Patient safety alert

- 1** Remove sodium chloride 0.18% with glucose 4% intravenous infusions from stock and general use in areas that treat children. Suitable alternatives must be available. Restrict availability of these intravenous infusions to critical care and specialist wards such as renal, liver and cardiac units.
- 2** Produce and disseminate clinical guidelines for the fluid management of paediatric patients. These should give clear recommendations for fluid selection, and clinical and laboratory monitoring.
- 3** Provide adequate training and supervision for all staff involved in the prescribing, administering and monitoring of intravenous infusions for children.
- 4** Reinforce safer practice by reviewing and improving the design of existing intravenous fluid prescriptions and fluid balance charts for children.
- 5** Promote the reporting of hospital-acquired hyponatraemia incidents via local risk management reporting systems. Implement an audit programme to ensure NPSA recommendations and local procedures are being adhered to.

**Local actions to be taken:**

- 1. Local directors, clinical and service governance lead or clinical governance lead to ensure that the following actions are taken:
- 2. Review stock of sodium chloride 0.18% with glucose 4% intravenous infusions.
- 3. Review clinical guidelines for the fluid management of paediatric patients.
- 4. Review local procedures for the prescribing, administering and monitoring of intravenous infusions for children.
- 5. Review local procedures for the reporting of hospital-acquired hyponatraemia incidents.
- 6. Review local procedures for the implementation of an audit programme to ensure NPSA recommendations and local procedures are being adhered to.

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# NPSA alert 22

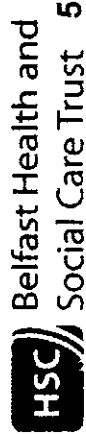
## Patient safety alert

- 1** Restrict the use of intravenous 40% intravenous infusions from stock and general use in areas that treat children. Suitable alternatives must be available. Restrict availability of these intravenous infusions to critical care and specialist wards such as renal, liver and cardiac units.
- 2** Produce and disseminate clinical guidelines for the fluid management of paediatric patients. These should give clear recommendations for fluid selection, and clinical and laboratory monitoring.
- 3** Provide adequate training and supervision for all staff involved in the prescribing, administering and monitoring of intravenous infusions for children.
- 4** Reinforce safer practice by reviewing and improving the design of existing intravenous fluid prescriptions and fluid management programmes for children.
- 5** Promote the reporting of hospital-acquired hyponatraemia incidents via local fluid management reporting systems. Implement an audit programme to ensure NPSA recommendations and local procedures are being adhered to.

**Notes:**

- Local clinical governance arrangements should be used to ensure that the above recommendations are fully implemented by the appropriate clinical systems in each trust.
- Advice on the use of intravenous fluids should be available to all staff involved in prescribing, administering and monitoring of intravenous infusions for children.
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20 October 2010





# DHSSPSNI Wallchart

Safety, Quality and Standards Directorate  
Office of the Chief Medical Officer



Department of  
**Health, Social Services  
and Public Safety**

AN POINN  
[www.dhsspsni.gov.uk](http://www.dhsspsni.gov.uk)

AN POINN  
**Sláinte, Seirbhísí Sóisialta  
agus Sábháilteachta Poiblí**

MAONSTRIO  
AN POINN

**Póistíe, Resydënter Heisin  
an Fowk Sívcar**

Castle Buildings  
Stormont Estate  
Belfast  
BT4 3SQ

**For Action:**

Medical Directors, HSC Trusts – for immediate cascade of wallchart

Chief Executive, RQIA – for immediate cascade to independent Hospitals, Hospices and relevant regulated establishments

**For Information:**

Chief Executives, HSS Boards & HSC Trusts  
Directors of Pharmacy, HSS Boards & HSC Trusts  
Directors of Nursing, HSS Boards & HSC Trusts  
Chair, Regional Paediatric Fluid Therapy Group  
NI Medicines Governance Team  
Chief Executive, RQIA  
Chief Executive, NIMDTA

Tel: 02890 520724

Fax: 02890 520725

Email:

[maura.briscoe@dhsspsni.gov.uk](mailto:maura.briscoe@dhsspsni.gov.uk)

Our Ref: HSC (SQSD) 20/07

Date: 05 March 2008

Dear Colleague

**HSC (SQSD) 20/07 – NPSA Patient Safety Alert 22: Reducing the Risk of Hyponatraemia when Administering Intravenous Infusions to Children.**

Further to my letter of 27 April 2007 on the above and addendum of 16 October 2007, [http://www.dhsspsni.gov.uk/hsc\\_sqsd\\_20-07\\_wallchart.pdf](http://www.dhsspsni.gov.uk/hsc_sqsd_20-07_wallchart.pdf), please find attached in poster format, the Paediatric Parenteral Fluid Therapy Wallchart developed in collaboration with the Regional Paediatric Fluid Therapy Working Group.

20 October 2010

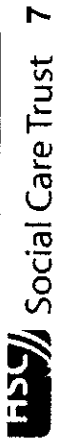
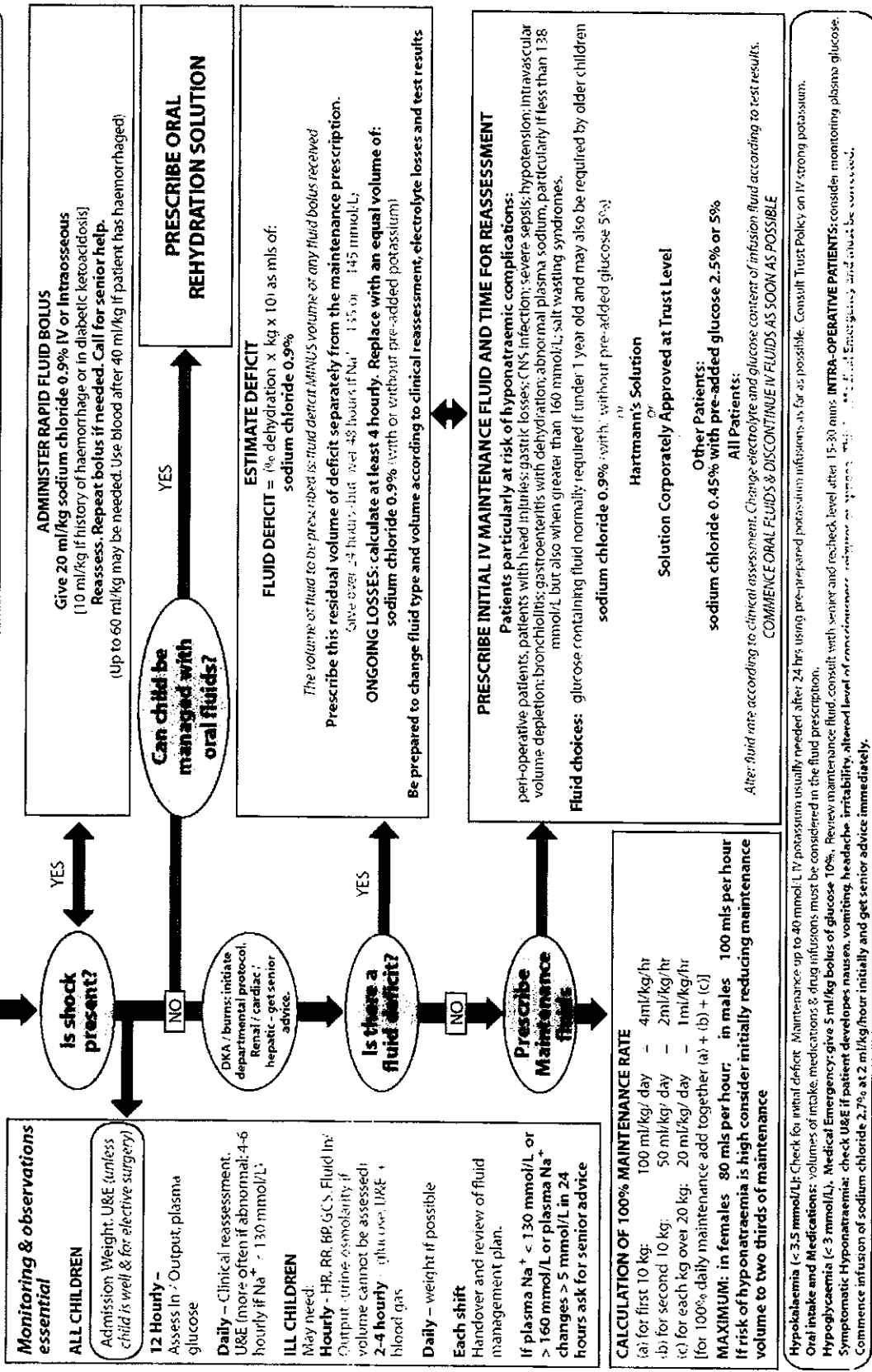


**Belfast Health and  
Social Care Trust 6**

# PAEDIATRIC PARENTERAL FLUID THERAPY ( 1 month – 16 yrs )

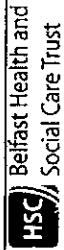
## Initial management guideline

Sept 2007



20 October 2010

# BHSCT policy



Belfast Health and Social Care Trust

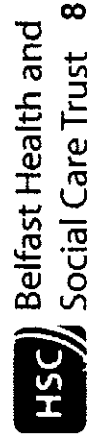
**Standards and Guidelines Committee**

**Policy for the administration of intravenous fluids to children aged from 1 month until the 16<sup>th</sup> birthday: reducing the risk of hyponatraemia.**

Summary	<p>This policy outlines the BHSCT approach for administration of intravenous fluids to children aged from 1 month until the 16<sup>th</sup> birthday with particular reference to reducing the risk of hyponatraemia.</p> <p>It maps the advice issued in March 2007 from the National Patient Safety Agency (NPSA) and September 2007 from the Northern Ireland Regional Paediatric Fluid Therapy Working Group on how to reduce the risks associated with administering intravenous infusions to children.</p> <p>This is fundamentally a document aimed at prevention of hyponatraemia and not treatment.</p>
Purpose	To improve the safe use of intravenous fluid in children and reduce the risk of hyponatraemia.
Operational date	March 2008
Review date	March 2010
Version Number	V3.5
Supersedes previous	V2.4
Director Responsible	Medical Director
Lead Author	Dr. Peter Crean
Lead Author, Position	Consultant Paediatric Anaesthetist, RBHSC.
Additional Author(s)	Dr. H. Steen, Associate Medical Director.
Department/ Service Group	Social Services, Family and Child Care
Contact details	Dr Peter Crean Paediatric Intensive Care Unit Royal Belfast Hospital for Sick Children 028 9063 2449 Peter.crean@belfasthsc.nhs.uk

Reference Number	
Supersedes	N/A

20 October 2010



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## Introduction

- ❖ Intravenous fluid-induced hyponatraemia in the previously well child undergoing elective surgery or with mild illness may not be well recognised by clinicians.
- ❖ This policy outlines the BHSCCT policy approach for
  - ❖ administration of intravenous fluids
  - ❖ to children aged 1 month to 16<sup>th</sup> birthday
  - ❖ especially reducing the risk of hyponatraemia.

20 October 2010

# The Scope

- ❖ children more than 1 month and up to 16<sup>th</sup> birthday
- ❖ **throughout** the Belfast Health and Social Services Trust (BHSCT).
- ❖ It is relevant for all general inpatient areas that treat patients from this age range (even if it is only occasionally) and includes the post-operative scenario, accident and emergency, day case departments and the ambulance service.
- ❖ not intended to apply to
  - ❖ paediatric and neonatal intensive care units,
  - ❖ specialist areas such as renal, liver and cardiac units
  - ❖ those suffering from acute burns or diabetic keto-acidosis (DKA).
- ❖ based on National NPSA guidance

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## Definition and background of the policy

- ❖ Hyponatraemia = plasma Na of less than 135 mmol/L.
- ❖ severe or significant if below 130 mmol/L.
- ❖ Significant acute hyponatraemia is defined as a decrease in plasma sodium from normal to less than 130 mmol/L in less than 48 hours.

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## Definition and background of the policy

- ❖ Symptoms are likely with serum Na <125 mmol/L

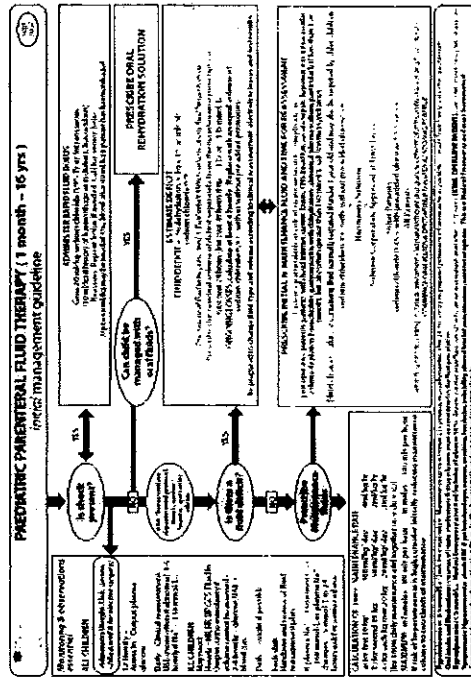
or

- ❖ if the serum Na has fallen rapidly;
  - ❖ greater than 5 mmol/L decline in 24 hours.

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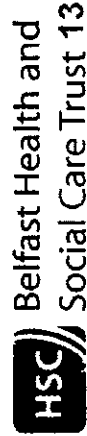
# Policy Statements

❖ The Paediatric Parenteral Fluid Therapy wallchart forms the basis of BHSCCT guidance.



❖ Sodium chloride 0.18% with glucose 4% will be *withdrawn* from general use in all BHSCCT ward areas that treat children and the availability of these fluids will be restricted to critical care areas and other specialist wards such as renal, liver and cardiac units.

20 October 2010





# Symptoms of Hyponatraemia

- ❖ Relate to its central nervous system effects;
  - ❖ Lethargy, anorexia, agitation, disorientation, cerebral oedema, seizures, death.
  - ❖ warning signs may be non-specific and include nausea, malaise and headache. (See BMJ e-learning module)
- ❖ All children are potentially at risk, even those not considered to be obviously 'sick'.
- ❖ Complications often occur because of inappropriate management on intravenous fluids but can also occur with inappropriately managed oral fluid regimes.

## Children particularly at risk

- ❖ Those who are or have
  - ❖ Peri-operative,
  - ❖ Bronchiolitis,
  - ❖ CNS injuries,
  - ❖ CNS infection,
  - ❖ Burns,
  - ❖ Severe sepsis
  - ❖ Vomiting, gastric losses, gastroenteritis with dehydration.

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## Baseline Assessment

- ❖ Accurately measure the **body weight** in kilograms
- ❖ or failing this, to make an estimate.
- ❖ This should be cross-referenced with the child's age to minimise the risk of error.
- ❖ Measurement of **electrolytes and urea** should be made unless the child is healthy and scheduled for elective surgery when it may be considered unnecessary.

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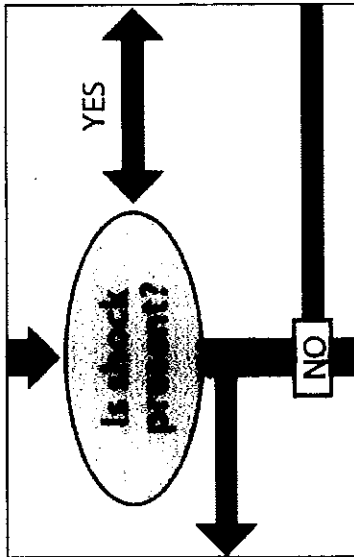
## Policy/Guideline Description

❖ All children who are to receive parenteral fluid therapy should have the following assessments made of their fluid status:

1. Haemodynamic check. Is Shock present?
2. Fluid deficit assessment.
3. Maintenance fluid requirement.  
Include ongoing losses

20 October 2010

# 1. Haemodynamic check. Is Shock present?



# 1. Haemodynamic check. Is Shock present?

YES

**ADMINISTER RAPID FLUID BOLUS**

Give 20 ml/kg sodium chloride 0.9% IV or Intraosseous  
[10 ml/kg if history of haemorrhage or in diabetic ketoacidosis]

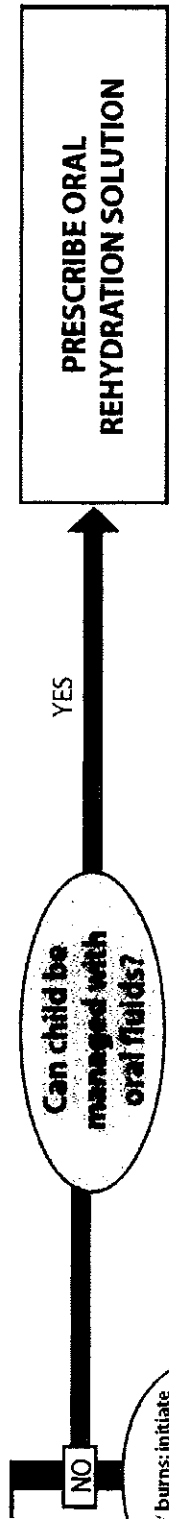
Reassess. Repeat bolus if needed. Call for senior help.

(Up to 60 ml/kg may be needed. Use blood after 40 ml/kg if patient has haemorrhaged)

- ❖ If YES,
- ❖ Administer Rapid fluid bolus
- ❖ 20 ml/kg Sodium Chloride intravenously = G mls
- ❖ Reassess
- ❖ Repeat if needed
- ❖ Call for senior help

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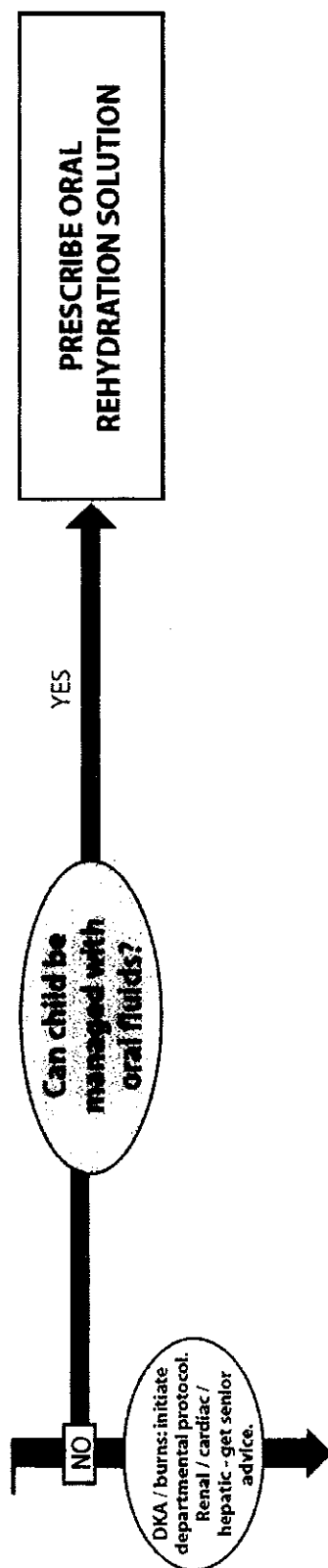
# 1. Haemodynamic check. Is Shock present?



- ❖ If No,
- ❖ Can child be managed with oral fluids?

20 October 2010

# 1. Haemodynamic check. Is Shock present?

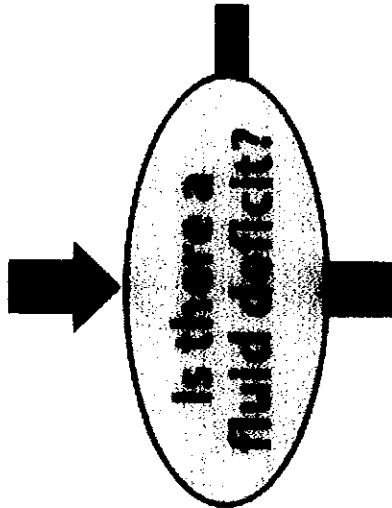


- ❖ If No,
- ❖ Can child be managed with oral fluids?
- ❖ If DKA or burns – initiate appropriate protocols
- ❖ If Renal, Cardiac or Hepatic – get senior advice.

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## 2. Fluid deficit assessment



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## 2. Fluid deficit assessment

YES 

**ESTIMATE DEFICIT**

**FLUID DEFICIT** = (% dehydration x kg x 10) as mls of:  
**sodium chloride 0.9%**

*The volume of fluid to be prescribed is: fluid deficit MINUS volume of any fluid bolus received*

**Prescribe this residual volume of deficit separately from the maintenance prescription.**  
Give over 24 hours (but over 48 hours if Na<sup>+</sup> < 135 or > 145 mmol/L)

**ONGOING LOSSES: calculate at least 4 hourly. Replace with an equal volume of:**  
**sodium chloride 0.9%** (with or without pre-added potassium)

**Be prepared to change fluid type and volume according to clinical reassessment, electrolyte losses and test results**

- ❖ If Yes,
- ❖ Estimate deficit
- ❖ = % dehydration x kg x 10 = F mls
- ❖ as mls of 0.9% Sodium chloride

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## 2. Fluid deficit assessment

❖ % dehydration – maximum used should be 10%

Clinical signs of dehydration

Signs/symptoms	Mild < 5%	Moderate 5 - 10%	Severe > 10%	Notes/ caveats
Decreased urine output	+	+	+	Beware watery diarrhoea
Dry mouth	+/-	+	+	Mouth breathers may be dry, while fluid ingestion may moisten mouth
Decreased skin turgor	-	+/-	+	Difficult to interpret in malnourished children. Particularly unreliable in fat children and in hypernatraemic dehydration
Sunken anterior fontanelle	-	+	+	Only useful if fontanelle well patent and in absence of disorders such as meningitis
Sunken eyes	-	+	+	Very difficult to assess, although mothers may give accurate assessment

## 2. Fluid deficit assessment

**ESTIMATE DEFICIT**


**FLUID DEFICIT** = (% dehydration x kg x 10) as mls of:  
**sodium chloride 0.9%**

*The volume of fluid to be prescribed is: fluid deficit MINUS volume of any fluid bolus received*

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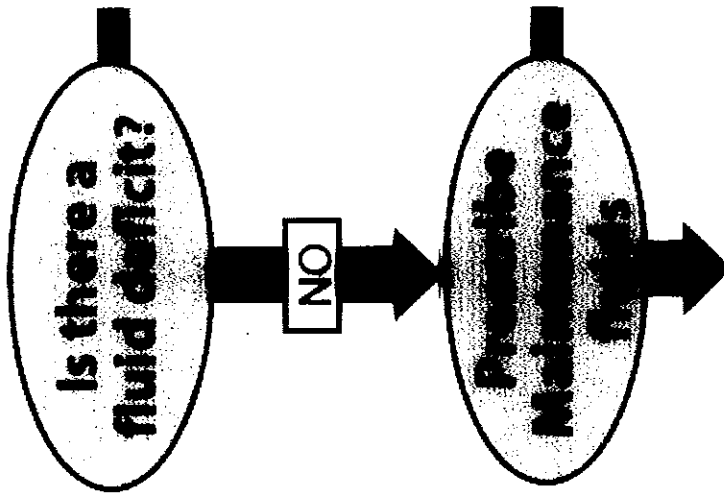
**Be prepared to change fluid type and volume according to clinical reassessment, electrolyte losses and test results**

YES 

- ❖ Volume to be prescribed (H) mls  
= Fluid deficit (F) – Fluid (shock) bolus (G)
- ❖ Give over 24 or 48 hours = (I) mls/hour

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## 2. Fluid deficit assessment



### 3. Maintenance fluid requirement

#### **CALCULATION OF 100% MAINTENANCE RATE**

(a) for first 10 kg: 100 ml/kg/ day = **A**

(b) for second 10 kg: 50 ml/kg/ day = **B**

(c) for each kg over 20 kg: 20 ml/kg/ day = **C**

[for 100% daily maintenance add together (a) + (b) + (c)]

**MAXIMUM: in females 80 mls per hour; in males 100 mls per hour**  
**If risk of hyponatraemia is high consider initially reducing maintenance volume to two thirds of maintenance**

- ❖ i.e.
- ❖ 1000 mls for the first 10 kg = **A** ml/day
- ❖ 500 mls for the next 10 kg = **B** ml/day
- ❖ 20 ml for each kg over 20 kg = **C** ml/day

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### 3. Maintenance fluid requirement

#### CALCULATION OF 100% MAINTENANCE RATE

(a) for first 10 kg:            100 ml/kg/ day            = **A**

(b) for second 10 kg:        50 ml/kg/ day            = **B**

(c) for each kg over 20 kg: 20 ml/kg/ day            = **C**

[for 100% daily maintenance add together (a) + (b) + (c)]

**MAXIMUM: in females 80 mls per hour; in males 100 mls per hour**  
**If risk of hyponatraemia is high consider initially reducing maintenance volume to two thirds of maintenance**

❖ Calculated as a total (**D**) mls/day = (**A** + **B** + **C**)

❖ Give over 24 hours = (**E**) mls/hour

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### 3. Maintenance fluid requirement

- ❖ Ongoing losses
  - ❖ Vomiting, drainage, diarrhoea - estimated or measured
  - ❖ Calculate as mls/hour (**J**)
  - ❖ Replace with equal volume of (usually) 0.9% saline.

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# Total fluid per hour

❖ Maintenance + Residual deficit + ongoing losses

$$= \mathbf{E} + \mathbf{I} + \mathbf{J} \text{ mls/hour}$$

- ❖ Alter fluid rate according to clinical assessment.
- ❖ Change electrolyte and glucose content of infusion fluid according to test results.
- ❖ Commence oral fluids & discontinue iv fluids as soon as possible

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## Fluid Prescription/Balance Chart

- ❖ A **new** paediatric fluid prescription/balance chart has been developed within RBHSC.
- ❖ It is being trialled in other areas that care for children.
- ❖ Ultimately, it will be used for the prescription of **all** fluids for **all** children treated throughout the BHSC – except those with acute burns and diabetic ketoacidosis.
- ❖ A separate presentation is available regarding the new fluid prescription chart.

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# Belfast Health and Social Care Trust

## DAIY FLUID BALANCE & PRESCRIPTION SHEET FOR CHILDREN

Please affix patient label

THIS CHART MUST BE USED FOR CHILDREN UP TO THEIR 16th BIRTHDAY

### FLUID INPUT (ml) FLUID OUTPUT (ml)

	INTRAVENOUS FLUID AND TYPE							ORAL FEEDINGS										Overall Total		Grand Total in		
								LIQUIDS					SOLIDS					Total	Amount	Total	Amount	Total
	Amount	Total	Amount	Total	Amount	Total	Amount	Total	Amount	Total	Amount	Total	Amount	Total	Amount	Total						
08.00																						
09.00																						
10.00																						
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07.00																						

24 hour intake (ml)

Intravenous total	
Oral total	
Total overall in	

24 hour output (ml)

Urine	
Aspirate	
Drains	
Total overall out	

24 hour Fluid Balance (ml)

Total in	
Total out	
Balance	

I.V. Site Check

- Skin Intact
- Redness at Site
- Leaking
- Redness and Leaking
- Bleeding



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**Weight**

Fluid balance for shocked patients  
 Required volume (ml) = body weight (kg) x 20 (ml) is volume of fluid  
 Use only sodium chloride 0.9%, reservoir and output (Bicarbonate and Fall for water help)

Maintenance fluid - in females - 40kg max 2500 ml/day in males - 60kg max 2500 ml/day equivalent to 90 to 100 ml/hour respectively  
 First 10kg 100ml/kg/day  
 Second 10kg 20ml/kg/day  
 For each kg over 20kg 20ml/kg/day  
 Maintenance need (A+B+C)  
 Maintenance total divided by 24 hours

NS 0.9% is only if children with increased ADH secretion due to hypotension from prescription of their maintenance fluid requirement to two-thirds of the normal recommended volume  
 Fluid deficit calculation (mmol/L) (mmol/L) (mmol/L)  
 % of dehydration = bodyweight in kg x 10  
 Volume given as fluid in ml  
 Fluid deficit for 24 hours or 48 hours (F, G)  
 Pre-hydral deficit per hour (divide by 24 or 48)  
 (Ongoing losses (e.g. vomiting, diarrhoea, diuresis) calculated at least every 4 hours unless otherwise instructed)  
 Replace lost volume with an equal volume of fluid (usually 0.9% sodium chloride) per hour (F + 1 + P)  
 Maintenance = (total deficit) / 24 hours

Please affix patient label

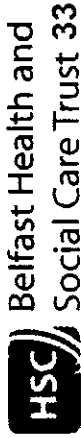
Date	Time	Weight (kg)	Na (mmol/L)	K (mmol/L)	Urea (mmol/L)	Creatinine (mmol/L)	Degree of dehydration			Notes
							Mild	Moderate	Severe	
										Signs symptoms
										Decreased urine output
										Dry mouth
										Decreased skin turgor
										Sunken anterior fontanelle
										Sunken eyes

Date	Time	Volume	Infusion Fluid	Rate (ml/hour)	Type	Prescriber Signature	Administered (kg)	Rate (ml/kg/hr)	Start Time	Finish Time	Total Volume given (ml)	Part 118 No. (K Expiry Date)

12 hour reassessment is indication prescription will continue. All vital fluids now appropriate is potassium needed? What about urine output?

Date: \_\_\_\_\_ Time: \_\_\_\_\_  
 No. / Nil: \_\_\_\_\_  
 Doctor's Signature: \_\_\_\_\_

\* Infused medicines must be released in Drug Kardex



20 October 2010

# Monitoring

- ❖ Body weight to be measured or assessed as a baseline and at least daily thereafter.
- ❖ All fluid intake of any kind (intravenous, oral and medicines) must be measured and recorded on the fluid balance chart.
- ❖ All fluid output must be assessed and, if clinically indicated, measured and recorded on the fluid balance chart.
- ❖ An assessment of
  - ❖ input/output
  - ❖ need for intravenous fluids
  - ❖ need for plasma glucose estimation
  - ❖ should be made and documented every 12 hours.

20 October 2010

## Monitoring

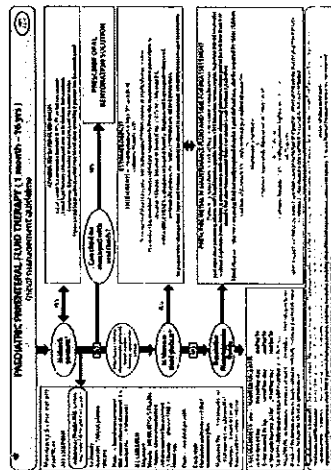
- ❖ Measurement of electrolytes, urea and blood glucose/BM should be made at least daily.
- ❖ If hyponatraemia exists, these measurements should be 4-6 hourly.
- ❖ Urinary osmolality and electrolytes measurements should be considered when dealing with hyponatraemia.
- ❖ The ill child will require more frequent and detailed investigations.

20 October 2010

# Roles and Responsibilities

- ❖ It is the professional responsibility of all who look after children to ensure that they have received adequate training in intravenous fluids appropriate to their role.
- ❖ Furthermore they should be familiar with the guidance on intravenous fluids for children outlined by the Regional Paediatric Fluid Therapy Group wallchart.

❖ [http://www.dhsspsni.gov.uk/hsc\\_sqsd\\_20-07\\_wallchart.pdf](http://www.dhsspsni.gov.uk/hsc_sqsd_20-07_wallchart.pdf)



20 October 2010

# Training

- ❖ Intravenous therapy will be incorporated into all staff induction programmes. This will complement the teaching received in undergraduate medical and nursing curricula.
- ❖ Regarding postgraduate staff, all staff, and especially those prescribing fluids to children, will be encouraged to ensure they are conversant with the knowledge required to prescribe intravenous fluids to children and that it is within their scope of practice.

20 October 2010



# Training

- ❖ All staff are encouraged to use the BMJ learning module on hyponatraemia.
- ❖ <http://learning.bmj.com/learning/search-result.html?moduleId=5003358>
- ❖ The production of the certificate on completion of the above module will be sought at staff assessments, RITAs, performance review, personal development plans and appraisals.
- ❖ This presentation concludes with an assessment section.

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## Audit

- ❖ The following situations require a local incident report form (IR1) to be completed:
  - ❖ All children with a hospital acquired,  $[\text{Na}^+] < 130\text{mmol/l}$ .
  - ❖ use of a solution with serum Na of  $<131\text{mmol/L}$  for treatment of shock, maintenance fluid in a peri-operative patient , deficit fluid.
  - ❖ episode of symptomatic hyponatraemia while in receipt of IV fluids.

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## Policy Statements

- ❖ Apart from boluses for shocked patients, fluids may only be administered by way of an infusion device.
- ❖ Children at or below the age of 13 years must not have electrolytes added to bags of intravenous fluids.
- ❖ Ordinarily children from 13 to 16 should also not have electrolytes added to bags of intravenous fluids; in certain, predominantly adult areas, children of this age group may have magnesium sulphate or phosphates added.

20 October 2010

## Sources of help

- ❖ For help and advice regarding management of fluid therapy
- ❖ especially to prevent and/or treat hyponatraemia
- ❖ in all children, but especially for those children aged 13 – 16 years old being managed in adult wards,
- ❖ please use the following sources of help and advice.
- ❖ Ordinarily, advice should be for
  - ❖ complex cases
  - ❖ and should be Consultant to Consultant discussions even though contact will often have to be made through trainee on-call rotas.

20 October 2010

# Sources of help

Team	Address	Extension
<b>RBHSC Paediatricians</b>	Paediatric On Call Rota Allen Ward Musgrave Ward	Bleep 2277
<b>RBHSC Paediatric ICU</b>	Paediatric ICU	2449
<b>Musgrave Park</b>	Orthopaedic theatre – Anaesthesia team during working hours.	
<b>BCH Dufferin theatres</b>	ENT theatre – Anaesthesia team during working hours.	
<b>General Biochemistry</b>	<b>Clinical Biochemistry</b>	
	<b>Inside working hours</b>	<b>Outside working hours</b>
RVH Tie line: 7222 Ext. 3798	Ext. 4714	Contact Medical doctor on call either via the laboratory or via switchboard.
BCH Tie line: 7111 Ext. 3096/2926/3628	Ext. 3497/3136/3160	Ext. 3216 or Contact Medical doctor on call either via the laboratory or via switchboard
MIH Tie line: 7231 Ext. 2223/2229	Ext. 2326/2228	Contact Medical doctor on call either via the laboratory or via switchboard

20 October 2010

# Sources of help

## ❖ Other sources of help are:

1. APA consensus guideline on perioperative fluid management in Children  
[http://www.apagbi.org.uk/docs/Perioperative\\_Fluid\\_Management\\_2007.pdf](http://www.apagbi.org.uk/docs/Perioperative_Fluid_Management_2007.pdf)
2. Royal Children's hospital Melbourne Clinical Practice Guidelines - Intravenous fluids  
[http://www.rch.org.au/clinicalguide/cpg.cfm?doc\\_id=5203#Other%20Resources](http://www.rch.org.au/clinicalguide/cpg.cfm?doc_id=5203#Other%20Resources)
3. Royal Children's hospital Melbourne Clinical Practice Guidelines - Hyponatraemia  
[http://www.rch.org.au/clinicalguide/cpg.cfm?doc\\_id=8348](http://www.rch.org.au/clinicalguide/cpg.cfm?doc_id=8348)

20 October 2010

## Remember

- ❖ If plasma Na<sup>+</sup> < 130 mmol/L
- or
- ❖ > 160 mmol/L
- or
- ❖ plasma Na<sup>+</sup> changes > 5 mmol/L in 24 hours
- ❖ **ask for senior advice.**

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## Symptomatic Hyponatraemia:

- ❖ check U&E if patient develops
  - ❖ nausea, vomiting,
  - ❖ headache,
  - ❖ irritability,
  - ❖ altered level of consciousness,
  - ❖ seizures
  - ❖ apnoea.
- ❖ This is a **Medical Emergency** and must be corrected.
- ❖ Commence infusion of sodium chloride 2.7% at 2 ml/kg/hour initially
- ❖ Get senior advice immediately.

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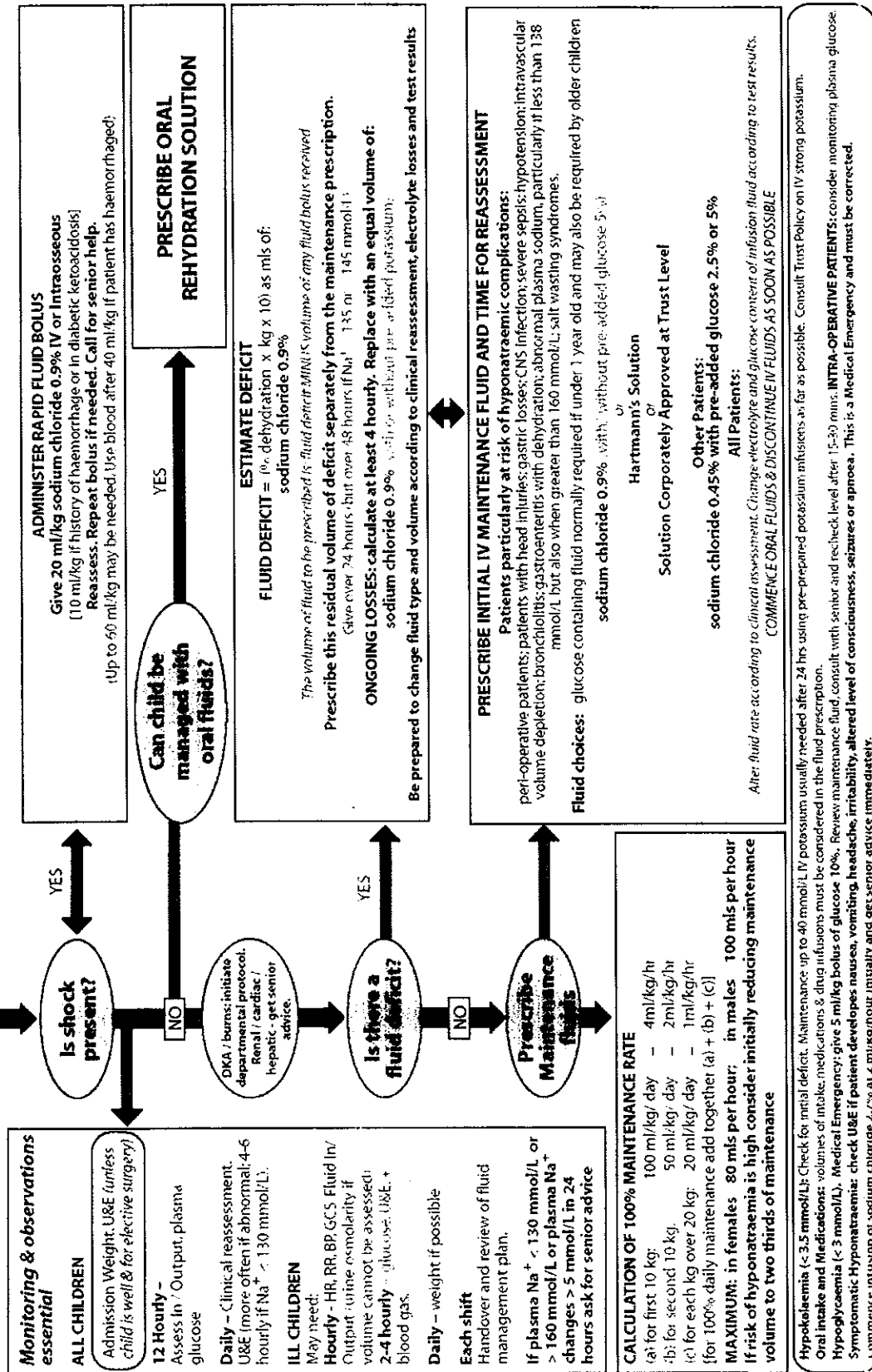
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# PAEDIATRIC PARENTERAL FLUID THERAPY ( 1 month – 16 yrs )

## Initial management guideline

Sept 2007



20 October 2010

# Assessment

- ❖ Please complete the following questions.
- ❖ They are adapted from the eBMJ learning site
- ❖ <http://learning.bmj.com/learning/search-result.html?moduleId=50033358>
- ❖ This free module written by Dr. Stephen Playfor is named “Reducing the risk of hyponatraemia when administering intravenous fluids to children.”
- ❖ It gives information about safely prescribing, administering, and monitoring intravenous fluids for children. It aims to highlight the main risks and key issues that you should consider. It looks in detail at the risk of children developing acute hyponatraemia as a result of receiving intravenous fluids.

20 October 2010

# Question 1

Which one of the following statements about children in hospital who are able to drink oral fluids is correct?

1. You can safely exclude volumes of oral fluids consumed from fluid balance calculations.
2. Hyponatraemia may develop even if no intravenous fluids are being administered.
3. You do not need to measure plasma electrolytes.
4. Fluid balance will be maintained because volumes of oral fluids consumed will be equalled by the urine output.

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❖ **Only click when you have you have picked an answer!**

# Question 1

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1. You can safely exclude volumes of oral fluids consumed from fluid balance calculations.
2. Hyponatraemia may develop even if no intravenous fluids are being administered. ❖ **Correct** ✓
3. You do not need to measure plasma electrolytes.
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20 October 2010

# Question 1

Which one of the following statements about children in hospital who are able to drink oral fluids is correct?

1. You can safely exclude volumes of oral fluids consumed from fluid balance calculations. ❖
  2. Hyponatraemia may develop even if no intravenous fluids are being administered. ❖ **Correct ✓**
  3. You do not need to measure plasma electrolytes. ❖
  4. Fluid balance will be maintained because volumes of oral fluids consumed will be equalled by the urine output. ❖
- ❖ You must include oral fluids in fluid balance calculations.
- ❖ You should measure plasma electrolytes every 24 hours while intravenous fluids are being administered or if there is clinical suspicion of an electrolyte abnormality.
- ❖ You cannot assume that urine output equals the oral fluid intake.

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## Question 2

Which one of the following groups of children is most at risk of developing acute symptomatic hyponatraemia while in hospital?

1. Children administered sodium chloride 0.9% with glucose 5% at standard maintenance fluid volumes.
2. Children administered oral fluids at standard maintenance fluid volumes.
3. Critically ill children admitted to paediatric intensive care units.
4. Previously well children admitted for elective surgery and administered hypotonic intravenous fluids.

❖ Only click when you have you have picked an answer!

adapted from: <http://www.rcpa.ac.uk/learning-centre/clinical-questions/clinical-questions-2010>

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## Question 2

Which one of the following groups of children is most at risk of developing acute symptomatic hyponatraemia while in hospital?

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2. Children administered oral fluids at standard maintenance fluid volumes.
3. Critically ill children admitted to paediatric intensive care units.
4. Previously well children admitted for elective surgery and administered hypotonic intravenous fluids. ❖ Correct ✓

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## Question 2

Which one of the following groups of children is most at risk of developing acute symptomatic hyponatraemia while in hospital?

1. Children administered sodium chloride 0.9% with glucose 5% at standard maintenance fluid volumes. ❖ Although symptomatic hyponatraemia may occur as a complication of any fluid regime, including situations where there is uncontrolled intake of oral fluids, the children most at risk appear to be those admitted with gastroenteritis or for elective surgery and administered hypotonic intravenous fluids.
2. Children administered oral fluids at standard maintenance fluid volumes.
3. Critically ill children admitted to paediatric intensive care units.
4. Previously well children admitted for elective surgery and administered hypotonic intravenous fluids. ❖ **Correct ✓**

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Social Care Trust 54

## Question 3

Which one of the following statements about monitoring children receiving intravenous fluids is correct?

1. You should measure plasma electrolytes every 24 hours while intravenous fluids are being administered.
2. Weighing children is rarely helpful.
3. You should measure plasma electrolytes before all elective surgery.
4. It is easy to document accurate fluid balance in most patients.

❖ Only click when you have you have picked an answer!

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## Question 3

Which one of the following statements about monitoring children receiving intravenous fluids is correct?

1. You should measure plasma electrolytes every 24 hours while intravenous fluids are being administered. ❖ **Correct** ✓
2. Weighing children is rarely helpful.
3. You should measure plasma electrolytes before all elective surgery.
4. It is easy to document accurate fluid balance in most patients.

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**Belfast Health and  
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## Question 3

Which one of the following statements about monitoring children receiving intravenous fluids is correct?

1. You should measure plasma electrolytes every 24 hours while intravenous fluids are being administered.
  - ❖ **Correct ✓** You should measure plasma electrolytes every 24 hours while intravenous fluids are being administered. You should also check them before starting an infusion, except in most children undergoing elective surgery.
2. Weighing children is rarely helpful.
  - ❖ Where possible, you should weigh all children on intravenous fluids before starting therapy and then reweigh them each day.
3. You should measure plasma electrolytes before all elective surgery.
  - ❖ Accurate fluid balance is difficult, but you should monitor this daily.
4. It is easy to document accurate fluid balance in most patients.

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## Question 4

A 9 year old boy weighing 27 kg is admitted for an elective hernia repair. He needs intravenous fluids. What volume of maintenance fluid should you prescribe over 24 hours?

1. 1240 ml
2. 1440 ml
3. 1640 ml
4. 1840 ml

❖ Only click when you have you have picked an answer!

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**20 October 2010**



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## Question 4

A 9 year old boy weighing 27 kg is admitted for an elective hernia repair. He needs intravenous fluids. What volume of maintenance fluid should you prescribe over 24 hours?

1. 1240 ml
2. 1440 ml
3. 1640 ml
4. 1840 ml

❖ **Correct** ✓

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## Question 4

A 9 year old boy weighing 27 kg is admitted for an elective hernia repair. He needs intravenous fluids. What volume of maintenance fluid should you prescribe over 24 hours?

### CALCULATION OF 100% MAINTENANCE RATE

(a) for first 10 kg: 100 ml/kg/ day = **A**

(b) for second 10 kg: 50 ml/kg/ day = **B**

(c) for each kg over 20 kg: 20 ml/kg/ day = **C**

[for 100% daily maintenance add together (a) + (b) + (c)]

**A** 100 x 10 for the first 10 kg = 1000 ml

**B** 50 x 10 for the next 10 kg = 500 ml

**C** 20 x 7 for the next 7 kg = 140 ml

= 27 kg = 1640 ml      **Correct ✓**

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If you have had difficulty with any of these answers you may get further information and help from the website as below.

- ❖ **eBMJ learning site**
- ❖ <http://learning.bmj.com/learning/search-result.html?moduleId=5003358>
- ❖ This free module written by Dr. Stephen Playfor is named “Reducing the risk of hyponatraemia when administering intravenous fluids to children.”
- ❖ It gives information about safely prescribing, administering, and monitoring intravenous fluids for children. It aims to highlight the main risks and key issues that you should consider. It looks in detail at the risk of children developing acute hyponatraemia as a result of receiving intravenous fluids.

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**Adult**

**Fluid Prescription / Balance**

**Quality Ward Improvement Team**

**Role out - 2010**

## **Aims and outcomes of session.**

### **Aim:**

- ❖ To instruct staff on the correct completion of the adult fluid prescription chart.

### **Outcomes:**

- ❖ Demonstrate the ability to correctly complete and calculate a fluid prescription chart.
- ❖ Explain the need for correct and accurate completion to colleagues in the clinical environment.

# Front Balance & Prescription Sheet



Adult

From their 14th birthday

HOSPITAL	Use address on top of envelope or on label
WARD	Block
DATE	Ward No. / Hospital No.
DOB	

INTRAVENOUS FLUID AND TYPE*				ORAL FEEDING			FLUID OUTPUT (ml)				
Type	Amount	Type	Total Amount	ORAL	ENTERAL	URINE	GASTRIC	BOWEL	Losemics		
Amount	Type	Amount	Total Amount	Amount	Total	Amount	Total	Amount	Total	Amount	Total
08.00											
10.00											
11.00											
12.00											
13.00											
14.00											
15.00											
16.00											
17.00											
18.00											
19.00											
20.00											
21.00											
22.00											
23.00											
24.00											
01.00											
02.00											
03.00											
04.00											
05.00											
06.00											
07.00											

\*Include volume of infused medicines e.g. analgesics, antibiotics

\*\* Include estimate of daily nasogastric flush volume

Urine	
Gastric	
Bowel	
Other	
Grand total out	

Balance	
---------	--

27 September 2010

Adult Fluid Prescription / Balance chart



# Daily Fluid Balance & Prescription Sheet



**Adult**

From their last birthday

Use additional sheets if appropriate write in capitals

HOSPITAL: \_\_\_\_\_ WARD: \_\_\_\_\_ DATE: \_\_\_\_\_

Age: \_\_\_\_\_ Sex: \_\_\_\_\_

Height: \_\_\_\_\_ Weight: \_\_\_\_\_

ECG: \_\_\_\_\_

FLUID INPUT (ml)				FLUID OUTPUT (ml)																					
INTRAVENOUS FLUID AND TYPE				ORAL FEEDING				URINE				GASTRIC				BOWEL				Other					
Time	Amount	Total Amount	Total	Time	Amount	Total Amount	Total	Time	Amount	Total Amount	Total	Time	Amount	Total Amount	Total	Time	Amount	Total Amount	Total	Time	Amount	Total Amount	Total		
09.00																									
10.00																									
11.00																									
12.00																									
13.00																									
14.00																									
15.00																									
16.00																									
17.00																									
18.00																									
19.00																									
20.00																									
21.00																									
22.00																									
23.00																									
24.00																									
01.00																									
02.00																									
03.00																									
04.00																									
05.00																									
06.00																									
07.00																									
<b>24 hour intake (ml)</b>				<b>24 hour output (ml)</b>				<b>24 hour Fluid Balance (ml)</b>				<b>Balance</b>													
Intravenous total				Urine				Gastric				Bowel													
Oral total				Other				Grand total in				Grand total out													

\*Include volume of infused medicines e.g. analgesics not bottles

\*\* Include estimate of daily cannula flush volume

27 September 2010

Adult Fluid Prescription / Balance chart

# Daily Fluid Balance & Prescription Sheet



**Adult**

From their 16th birthday

Use appropriate information where in capital letters

Ward:

Diagnosis:

Room:

DOB:

FLUID INPUT (ml)				FLUID OUTPUT (ml)									
INTRAVENOUS FLUID AND TYPE				ORAL FEEDING		URINE		GASTRIC		BOWEL		Grand Total	
Type	Amount	Total Amount	Total Amount	Oral	Enteral	Amount	Total	Amount	Total	Amount	Total	Amount	Total
08.00													
09.00													
10.00													
11.00													
12.00													
13.00													
14.00													
15.00													
16.00													
17.00													
18.00													
19.00													
20.00													
21.00													
22.00													
23.00													
24.00													
01.00													
02.00													
03.00													
04.00													
05.00													
06.00													
07.00													

\*Include volume of infused medicines e.g. analgesics and beta2

**24 hour intake (ml)**

Intravenous total	
Oral total	
<b>Grand total in</b>	

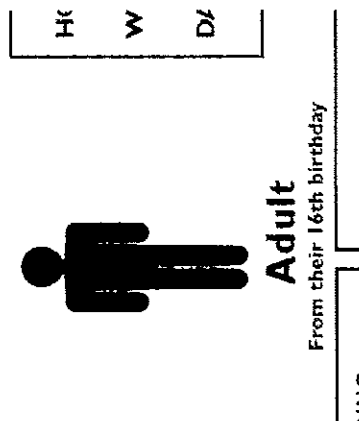
**24 hour output (ml)**

Urine	
Gastric	
Bowel	
Other	
<b>Grand total out</b>	

\*\* Include estimate of daily catheter flush volume

**24 hour Fluid Balance (ml)**

<b>Balance</b>	
----------------	--



- ❖ Chart must be used for adults
- ❖ from their 16<sup>th</sup> birthday
- ❖ throughout the BHSCCT
- ❖ wherever their care is provided.
- ❖ Except for patients with
  - ❖ diabetic ketoacidosis
  - ❖ acute burns.
- ❖ who may use different fluid prescription charts.

# 1. Labelling

HOSPITAL	_____
WARD	_____
DATE	_____

Use addressograph - otherwise write in capitals	
Surname	_____
Ward	_____
Hospital no:	_____
DOB:	_____

HOSPITAL	_____
WARD	_____
DATE	_____

Use addressograph - otherwise write in capitals	
_____	_____
_____	Ward
_____	_____
DOB:	_____

- ❖ Stick on labels and complete hospital, ward & today's date
- ❖ on both sides of chart



# 2. Insert patient's weight in kgs

HOSPITAL WARD DATE		Use address/graph-otherwise write in capital Surname First Name Sex (M/F) Height DOB		Light <input type="text"/> kg
Yesterday's Date	Grand total in	Grand total out	Balance	

Date	Time	Admission	Discharge	Check in	Check out	By	By	Special	Special	Special	Special	Special	Special	Special	Special	Special



# 3. Insert yesterday's fluid balance details

**HOSPITAL** \_\_\_\_\_ **Weight:** \_\_\_\_\_ **kg**

**WARD** \_\_\_\_\_

**DATE** \_\_\_\_\_

**Use addressograph-intervolve write in capital**

Surname \_\_\_\_\_  
Prescription \_\_\_\_\_  
Specialist \_\_\_\_\_  
Ward/Department \_\_\_\_\_  
DCR \_\_\_\_\_

Yesterday's Date \_\_\_\_\_ **Grand total in** \_\_\_\_\_ **Grand total out** \_\_\_\_\_ **Balance** \_\_\_\_\_

Time	Urine	Stool	Vomit	Other	Drugs	Fluids	Inlet	Output	Balance	Remarks

THE ABOVE BALANCE SHEET SHOULD BE  
FURNISHED TO THE PATIENT'S NURSE  
ON THE PATIENT'S DEPARTURE FROM THE HOSPITAL.  
It is a condition of use that the patient's name and  
number be written in the top right-hand corner.

27 September 2010

Adult Fluid Prescription / Balance chart



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# 4. Prescribe fluids

Order	Time	Volume	Infusion Fluid	Address	Rate	Prescriber
			*	**		

**\*\*** Infused medicines must be referenced in Drug Kardex

**\*** Certain infused medicines should be prescribed here e.g. analgesics, antibiotics in order that their volumes are recorded.

## 4. Prescribe fluids

Date	Time	Volume	Infusion Fbr

Infusion Fluid	A
<i>Hartmann's Solution</i>	
<i>0.9% Saline</i>	
<i>5% Dextrose Solution</i>	

Infusion fluids can be identified by Letter

# 5. Record intake

From the

FLUID INPUT (ml)									
INTRAVENOUS FLUID AND TYPE*					ORAL FEEDING				
Time	Type	Amount	Type	Amount	Type	Amount	Type	Amount	Total
08.00									
09.00									
10.00									
11.00	Hartmann's	100							
12.00		100							
13.00		100							
14.00		100							
15.00		100							
16.00		100							
17.00	0.9% Saline	40							
18.00		40							
19.00		40	DSW						
20.00		40		100					
21.00		40		100					
22.00		40		100					
23.00		40		100					
24.00		40		100					
01.00		40							
02.00		40							
03.00		40							
04.00		40							
05.00		40							
06.00		40							
07.00		40							

- ❖ Record
- ❖ Site
- ❖ Type\*
- ❖ Volume
- ❖ for each type of fluid
- ❖ every hour

# 5. Record intake

FLUID INPUT (ml)												From the	
INTRAVENOUS FLUID AND TYPE*						ORAL FEEDING							
Time	Right hand		20G Left ACF		Type/Amount		Type/Amount		Type/Amount		Type/Amount		Grand Total
	Type	Amount	Type	Amount	Type	Amount	Type	Amount	Type	Amount	Type	Amount	
08.00													
09.00													
10.00													
11.00			A										
12.00		100											
13.00		100											
14.00		100											
15.00		100											
16.00		100											
17.00			B										
18.00		40											
19.00		40											
20.00		40											
21.00		40											
22.00		40											
23.00		40											
24.00		40											
01.00		40											
02.00		40											
03.00		40											
04.00		40											
05.00		40											
06.00		40											
07.00		40											

❖ Record

❖ Site

❖ Type\*

❖ Volume

❖ for each type of fluid

❖ every hour

\* = identify with letter if wish

# 6. Calculate intake – Cumulative totals

- ❖ Cumulative totals for
- ❖ each type of fluid

From the

FLUID INPUT (ml)									
INTRAVENOUS FLUID AND TYPE*					ORAL FEEDING				
Right hand		20G Left ACF				ORAL		ENTERAL NG tube	
Type	Amount	Type	Amount	Type	Amount	Type	Amount	Type	Amount
	08.00								
	09.00								
	10.00								
	11.00	A	100					Ensurre	40
	12.00		100						40
	13.00		100						40
	14.00		100						40
	15.00		100						40
	16.00		100						40
	17.00	B							40
	18.00		40						40
	19.00		40						40
	20.00		40						40
	21.00		40						40
	22.00		40						40
	23.00		40						40
	24.00		40						40
	01.00		40						
	02.00		40						
	03.00		40						
	04.00		40						
	05.00		40						
	06.00		40						
	07.00		40						

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# 6. Calculate intake – Cumulative totals

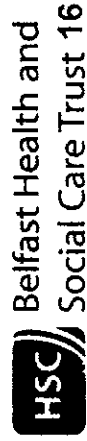
- ❖ Cumulative totals for
- ❖ each type of fluid

From the

		FLUID INPUT (ml)						ORAL FEEDING					
		INTRAVENOUS FLUID AND TYPE*						ORAL					
		Right hand		20G Left ACF				Type/Amount		Type/Amount		Grand Total (ml)	
Time	Amount	Type	Amount	Type	Amount	Type	Amount	Type	Amount	Type	Amount	Type	Amount
08.00													
09.00													
10.00													
11.00		A											
12.00	100		100										
13.00	100		200										
14.00	100		300										
15.00	100		400										
16.00	100		500										
17.00		B											
18.00	40		540										
19.00	40		580										
20.00	40		620			C	100						
21.00	40		660				200						
22.00	40		700				100						
23.00	40		740				400						
24.00	40		780				500						
01.00	40		820										
02.00	40		860										
03.00	40		900										
04.00	40		940										
05.00	40		980										
06.00	40		1020										
07.00	40		1060										

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# 7. Calculate intake – Cumulative totals

- ❖ Then,
- ❖ Cumulative totals to be calculated
- ❖ each hour
- ❖ to get a

**Grand Total in**

From the

	FLUID INPUT (ml)						ORAL FEEDING			Grand Total (ml)	
	INTRAVENOUS FLUID AND TYPE*			ORAL			ENTERAL NG/EG/DE				
	LEG	RIGHT HAND	20G LEFT ACF	Type/Amount	Type/Amount	Type/Amount	Type/Amount	Type/Amount	Type/Amount		
08:00											
09:00											
10:00											
11:00											
12:00											
13:00											
14:00											
15:00											
16:00											
17:00											
18:00											
19:00											
20:00											
21:00											
22:00											
23:00											
24:00											
01:00											
02:00											
03:00											
04:00											
05:00											
06:00											
07:00											

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# 7. Calculate intake – Cumulative totals

## ❖ Worked example

From the

FLUID INPUT (ml)										
INTRAVENOUS FLUID AND TYPE*					ORAL FEEDING					
Time	Right hand		20G Left ACF		Type	Amount	Type	Amount	Type	Amount
	Type	Amount	Type	Amount						
08.00										
09.00									ENTERAL	40
10.00									ENTERAL	40
11.00	HAYOMAN'S	100							ENTERAL	80
12.00		100							ENTERAL	120
13.00		100							ENTERAL	160
14.00		100							ENTERAL	200
15.00		100							ENTERAL	240
16.00		100							ENTERAL	280
17.00	0.9% Saline	500							ENTERAL	320
18.00		40							ENTERAL	360
19.00		40			DSW				ENTERAL	400
20.00		40	100						ENTERAL	440
21.00		40	100	200					ENTERAL	480
22.00		40	100	300					ENTERAL	520
23.00		40	100	400					ENTERAL	560
24.00		40	100	500					ENTERAL	600
01.00		40	820						ENTERAL	640
02.00		40	860						ENTERAL	680
03.00		40	900						ENTERAL	720
04.00		40	940						ENTERAL	760
05.00		40	980						ENTERAL	800
06.00		40	1020						ENTERAL	840
07.00		40	1060						ENTERAL	880
									ENTERAL	920
									ENTERAL	960
									ENTERAL	1000

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# 8. Record Cumulative intake totals

esics, antibiotics

## 24 hour intake (ml)

Intravenous total**	1560
Oral total	440
<b>Grand total in</b>	<b>2000</b>

ne

—

# 9. Record outputs

- ❖ Record
  - ❖ Site if necessary
  - ❖ Type
  - ❖ Volume
- ❖ for each type of fluid.

Output for 16th birthday		FLUID OUTPUT (ml)										Overall Balance	Comment
		URINE		GASTRIC		BOWEL		DIALYSIS		Grand Total			
Amount	Total	Amount	Total	Amount	Total	Amount	Total	Amount	Total	Amount	Total		
40		40						100					
10													
10													
30													
50		50											
50													
80													
100								120					
120		60											
100													
150													
				40									
				0						200			
200													
										50			
				10									
200													

# 10. Calculate outputs – Cumulative totals

- ❖ Cumulative totals to be calculated for
- ❖ each type of fluid

CLUE  
16th birthday

FLUID OUTPUT (ml)

Amount	URINE		GASTRIC		BOWEL		DRAINAGE		Grand Total out	Comment
	Total	Amount	Total	Amount	Total	Amount	Total	Amount		
40										
20	40							100		
10										
10										
20										
50				50						
50										
80										
100								120		
120				60						
100										
150										
				40						
150								200		
200				0						
				10				50		
200										

# 10. Calculate outputs – Cumulative totals

DATE  
or 16th birthday

FLUID OUTPUT (ml)

Amount	Total	GASTRIC		BOWEL		DIPLOID		Total	Gastric Total	Overall Balance	Comment
		Amount	Total	Amount	Total	Amount	Total				
40	40										
20	60	40	40			100	100				
10	70										
10	80										
30	110										
50	160	50	90								
50	210										
80	290										
100	390					120	220				
120	510	60	150								
100	610										
150	760										
		40	190								
150	910					200	420				
		0	190								
200	1110					50	470				
		10	200								
200	1310										

- ❖ Cumulative totals to be calculated for
- ❖ each type of fluid

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# 11. Calculate outputs – Cumulative totals

- ❖ Cumulative totals to be calculated for
- ❖ each hour
- ❖ to get a

**Grand Total out**

**Output** for 16th birthday

FLUID OUTPUT (ml)											
URINE	GASTRIC		BOWEL		DRAINAGE		Grand Total out	Comments			
	Amount	Total	Amount	Total	Amount	Total		Overall Balance			
40	40										
20	60	40		40		100	100				
10	70										
10	80										
50	110										
50	210										
80	290										
100	390										
120	510	60	150		120	220					
100	610										
150	760										
		40	190								
150	910					200	420				
		0	190								
200	1110										
		10	200			50	470				
200	1310										

# 11. Calculate outputs – Cumulative totals

- ❖ Cumulative totals to be calculated for
- ❖ each hour
- ❖ to get a

**Grand Total out**

**QUIT**  
for 16th birthday

FLUID OUTPUT (ml)												Overall Balance	Comment	
URINE		GASTRIC		BOWEL		DRAIN-1		Grand Total out		Total				
Amount	Total	Amount	Total	Amount	Total	Amount	Total	Amount	Total	Amount	Total			
40	40		40								40			
20	60	40	40							100	100			200
10	70													210
10	80													220
30	110													250
50	160													210
50	210													400
80	290													480
100	390					120	220							700
120	510	60	150											880
100	610													980
150	760													1130
		40	190											1170
								200	420					1520
150	910													
		0	190											
200	1110													1720
								50	1720					1770
		10	200											1780
200	1310													1980



# 12. Record Cumulative output totals

24 hour output (ml)

Urine	1210
Gastric	200
Bowel	470
Other	
<b>Grand total out</b>	<b>1980</b>

— =

# 13. Calculate overall hourly balance

- ❖ Calculate the overall balance
- ❖ each hour

(ml)

ORAL FEEDING				Grand Total in	Grand Total out	Overall Balance
ORAL	ENTERAL		Output			
Amount	Type	Total	Total			
				40		-40
				40	200	-200
				80	210	-170
				220	220	-140
				220	250	30
				360	350	10
				500	400	100
				640	480	160
				780	700	80
				820	880	-60
				900	980	-80
				980	1130	-150
				1160	30	1130
				1200	1170	130
				1440	270	1170
				1580	60	1520
				1720	200	1520
				1760	240	1520
				1800	280	1520
				1840	120	1720
				1880	110	1770
				1920	1780	140
				1960	180	1780
				2000	1980	20

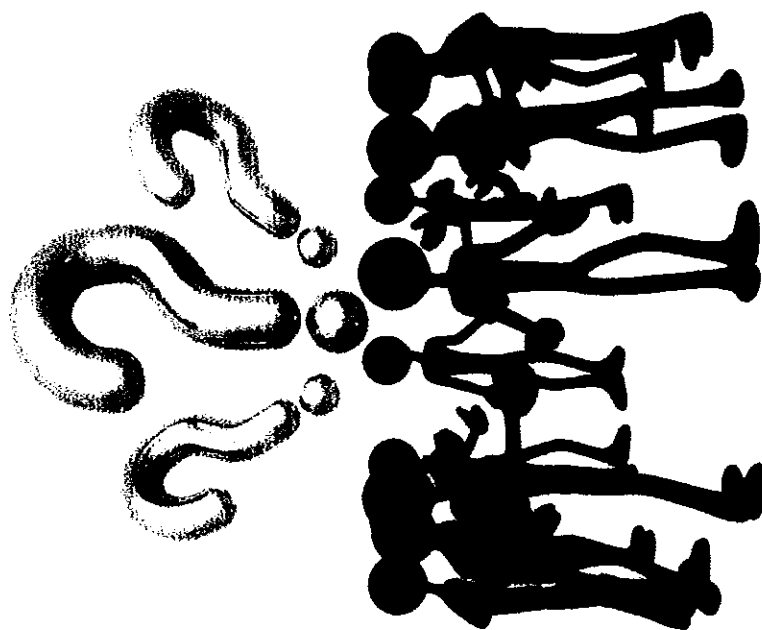
# 14. Complete overall 24 hour balance

Ural total			
Grand total in	2000	—	
Other			
Grand total out	1980	=	
Balance			20

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# Fluid Prescription/Balance Chart



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*Adult Fluid Prescription / Balance chart*