

Beechill House
42 Beechill Road
Belfast
BT8 7RL

Tel: 028 9040 0000
Fax: 028 9079 8312
Web: www.nimda.gov.uk

mgt/hyponatraemia@nimda.gov.uk

21 May 2008

Distribution: All Heads/Deputy Heads of:

*School of Anaesthesia / ICM
School of Emergency Medicine
School of Medicine
School of Obstetrics and Gynaecology
School of Paediatrics
School of Surgery*

Dear Colleagues

Re: Training in Reducing the Risk of Hyponatraemia when Administering Intravenous Fluids to Children

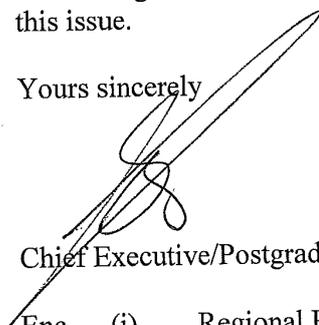
The development of Hyponatraemia in previously well children undergoing elective surgery or with mild illness may not be well recognised by clinicians. There have been a number of deaths in the UK and elsewhere but it is likely that incidents have gone unreported.

The National Patients' Safety Authority has produced a number of safer practice recommendations and supporting materials to aid implementation and imbed safer practice.

I enclose the Regional Paediatric Central Fluid Therapy Chart developed by the Department of Health and also a Workforce Competence Statement developed by the National Patients' Safety Agency to guide you in implementing and imbedding training in this area.

It is very important that training in this area is addressed by your specialty and I would be grateful if you can inform me as soon as possible how you mean to address this issue.

Yours sincerely


Chief Executive/Postgraduate Dean

- Enc (i) Regional Paediatric Central Fluid Therapy Chart & Information
(ii) Workforce Competence Statement (National Patient Safety Agency)

PAEDIATRIC PARENTERAL FLUID THERAPY (1 month – 16 yrs)

Initial management guideline

Sept 2007

Monitoring & observations essential

ALL CHILDREN

Admission Weight, U&E (unless child is well & for elective surgery)

12 Hourly – Assess In / Output, plasma glucose

Daily – Clinical reassessment, U&E (more often if abnormal; 4-6 hourly if $\text{Na}^+ < 130 \text{ mmol/L}$).

ILL CHILDREN

May need:

Hourly - HR, RR, BP, GCS, Fluid In/Output (urine osmolality if volume cannot be assessed)

2-4 hourly – glucose, U&E, +/- blood gas.

Daily – weight if possible

Each shift

Handover and review of fluid management plan.

If plasma $\text{Na}^+ < 130 \text{ mmol/L}$ or $> 160 \text{ mmol/L}$ or plasma Na^+ changes $> 5 \text{ mmol/L}$ in 24 hours ask for senior advice

CALCULATION OF 100% MAINTENANCE RATE

(a) for first 10 kg:

100 ml/kg/day \equiv 4ml/kg/hr

(b) for second 10 kg:

50 ml/kg/day \equiv 2ml/kg/hr

(c) for each kg over 20 kg: 20 ml/kg/day \equiv 1ml/kg/hr

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

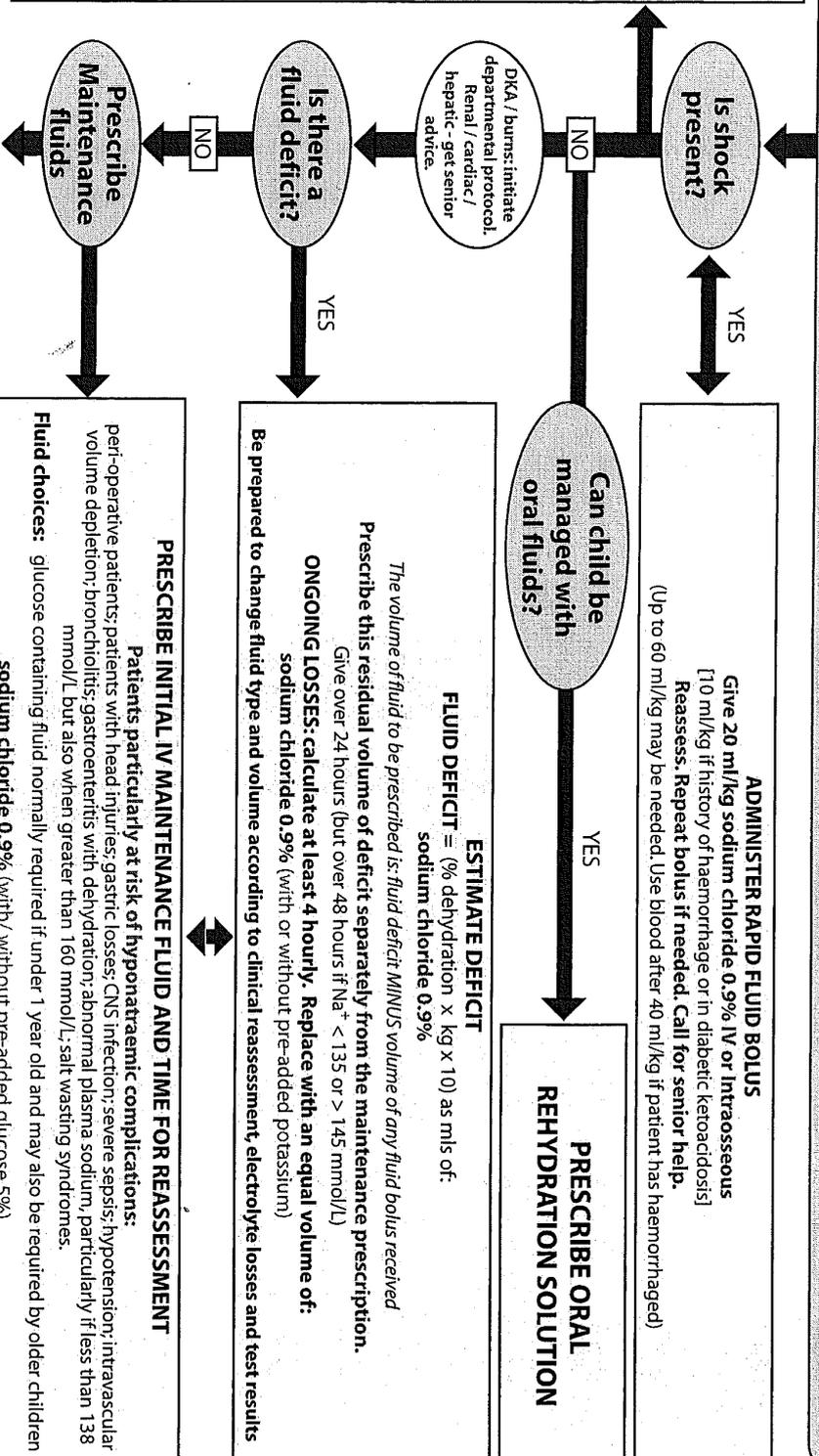
MAXIMUM: in females 80 mls per hour; in males 100 mls per hour
 If risk of hyponatraemia is high consider initially reducing maintenance volume to two thirds of maintenance

Hypokalaemia ($< 3.5 \text{ mmol/L}$): Check for initial deficit. Maintenance up to 40 mmol/L IV potassium usually needed after 24 hrs using pre-prepared potassium infusions as far as possible. Consult Trust Policy on IV potassium.

Oral intake and Medications: volumes of intake, medications & drug infusions must be considered in the fluid prescription.

Hypoglycaemia ($< 3 \text{ mmol/L}$): Medical Emergency: give 5 ml/kg bolus of glucose 10%. Review maintenance fluid, consult with senior and recheck level after 15-30 mins. **INTRA-OPERATIVE PATIENTS:** consider monitoring plasma glucose.

Symptomatic Hyponatraemia: check U&E if patient develops nausea, vomiting, headache, irritability, altered level of consciousness, seizures or apnoea. This is a Medical Emergency and must be corrected. Commence infusion of sodium chloride 2.7% at 2 ml/kg/hour in and get senior advice immediately.



PRESCRIBE INITIAL IV MAINTENANCE FLUID AND TIME FOR REASSESSMENT

Patients particularly at risk of hyponatraemic complications:

peri-operative patients; patients with head injuries; gastric losses; CNS infection; severe sepsis; hypotension; intravascular volume depletion; bronchiolitis; gastroenteritis with dehydration; abnormal plasma sodium, particularly if less than 138 mmol/L but also when greater than 160 mmol/L; salt wasting syndromes.

Fluid choices: glucose containing fluid normally required if under 1 year old and may also be required by older children

sodium chloride 0.9% (with/ without pre-added glucose 5%)

or

Hartmann's Solution

or

Solution Corporately Approved at Trust Level

Other Patients:

sodium chloride 0.45% with pre-added glucose 2.5% or 5%

All Patients:

After 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

Reducing the risk of hyponatraemia when administering intravenous infusions to children

The development of hyponatraemia (low blood sodium) in the previously well child undergoing elective surgery or with mild illness may not be well recognised by clinicians. There have been a number of deaths in the UK and elsewhere but it is likely that incidents have gone unreported.

The NPSA has produced a number of safer practice recommendations and supporting materials to aid implementation and embed safer practice.

All templates and exemplar documents provided as supporting materials for all patient safety alerts are drafts intended for local adaptation. Organisations should ensure that they are adapted locally and that they meet the requirements of specialist clinical areas and services and are ratified prior to use.

Key messages

- The use of intravenous hypotonic solutions puts children at a greater risk of developing life-threatening hyponatraemia than other types of fluid and should be prescribed with caution. All children are at risk. Wherever possible, carefully managed oral fluids are preferable to intravenous fluid therapy.
- Hyponatraemia can develop within a short time frame. A robust fluid monitoring regime is essential.
- Intravenous fluids should be prescribed with the same rigour as other prescription medicines, particularly in respect of the volume given.
- Hyponatraemic encephalopathy is a medical emergency and should be treated using hypertonic intravenous fluids under senior medical supervision.

Factors that increase the risk of hyponatraemia in children:

- the widespread use of hypotonic fluids for routine hydration therapy;
- clinical scenarios leading to predictable secretion of anti-diuretic hormone (ADH) in post-operative patients;
- some children are at greater risk of developing hyponatraemia. For example, where plasma sodium is at the lower normal reference range, and definitely if less than 135 mmol/L, intravascular volume depletion, peri- and post-operative patients, hypotension, central nervous system (CNS) infection, head injury, bronchiolitis, sepsis, excessive gastric or diarrhoeal losses, salt-wasting syndromes and chronic conditions such as diabetes, cystic fibrosis and pituitary deficits;
- prescriptions for intravenous fluid written by doctors-in-training who have not received adequate training or supervision;
- inadequate clinical and biochemical monitoring;
- poorly designed intravenous fluid prescriptions and fluid balance charts;
- absent, incomplete or wrongly completed fluid balance charts;
- a lack of effective audit to assure that the process is safe.

Elearning module

Registration with BMJ Learning is required - registration is free.

- Reducing the risk of hyponatraemia when administering intravenous fluids to children

Workforce competence statement

Prescribing intravenous fluids for administration to children

<p>Summary</p>	<p>This proposed workforce competence is directly applicable to healthcare professionals who undertake the prescribing of intravenous fluids for children. Its content is also relevant to healthcare professionals who are responsible for the delivery of healthcare to children. It covers initiation, prescribing and monitoring of intravenous fluid therapy for children. It includes the reviewing of indications and contraindications for use, calculation of administration volume and rate of administration, selection of intravenous fluid type and initiation of a monitoring regimen.</p>
<p>Indicative links to KSF Dimension and Level</p>	<p><i>Health and wellbeing HWB7: Interventions and treatments</i> <i>Level 3: Plan, deliver and evaluate interventions and/or treatments</i></p>
<p>Origin</p>	<p>This is a new practice competence proposed and developed by the National Patient Safety Agency.</p>
<p>Activity scope</p>	<p>Key words and concepts</p> <p><i>Prescription</i> The document which describes the medication determined by a properly authorised individual for an individually named patient. It includes the medication to be used, the dose, dilution, mode of delivery and time period for delivery.</p> <p><i>Monitoring regimen</i> A systematic plan for observing the physiological impact of prescribed medication therapy, enabling subsequent adjustment to maintain or improve the health of a patient.</p> <p><i>Communication</i> with professional colleagues includes communication within and between appropriate members of teams.</p> <p><i>Appropriate members of the team</i> Include: registered nurse, midwife, doctor, pharmacist, laboratory scientific officer, phlebotomist or any other member of the healthcare team.</p> <p><i>Adverse reactions related to any fluid or drugs given through a cannula</i> Include: neurogenic, anaphylactic and hypovolaemic shock, cardiogenic shock, septic shock, allergy.</p>
<p>Performance criteria</p>	<p>You need to:</p> <ol style="list-style-type: none"> 1. Read the patient's notes, prescription and relevant protocol or clinical guideline and identify any special instructions, investigations (including abnormal blood test results), baseline parameters, e.g. weight, or issues for which you need to seek advice. 2. Confirm that the intravenous route is the most appropriate route for administration of fluids to the patient (i.e. consider and exclude oral administration).

	<ol style="list-style-type: none"> 3. Determine the appropriate regimen for the patient, which type of intravenous fluids to prescribe, dose/volume, route, frequency, rate of administration and frequency of monitoring with reference to recent blood biochemistry test results and recent body weight measurements. 4. Assess the appropriateness of the intended treatment against the patient's current health status and concurrent medication. 5. Prescribe the intravenous fluid treatment according to legislation, national and local prescribing guidelines and relevant clinical information to ensure safe and optimal delivery of treatment. 6. Include in the intravenous fluid prescription: <ul style="list-style-type: none"> • date and time; • the reason for administration of intravenous fluids (i.e. resuscitation, deficit replacement, maintenance or loss replacement); • the name of the intravenous fluid (in full, do not abbreviate); • volume and rate of administration; • date and time of re-assessment of the prescription; • intravenous additives should be prescribed on the same prescription chart. • prescriber's signature 7. Process the prescription legibly, ensuring your intention for treatment is clear, accurate and complete and that there are no ambiguities. 8. Record requirements for monitoring the patient's response to treatment (e.g. frequency and type of blood tests, weight measurement) in the patient's notes and communicate requirements to professional colleagues. 9. Record the reason(s) for any deviations from the clinical guidelines on the prescription and in the patient's notes. 10. Explain the treatment and potential side effects and their management to the patient and/or carer and accurately answer any questions at a level and pace that is appropriate to: <ul style="list-style-type: none"> • their level of understanding; • their culture and background; • their preferred ways of communicating; • their needs. 11. Check that the patient and/or carer understand the treatment to be given and any potential side effects together with their management. 12. Modify any subsequent prescriptions in light of the patient's tolerance, side effects, complications and response to treatment. 13. Communicate with appropriate professional colleagues as required by local guidelines. 14. Recognise when you need help, and seek advice and support from an appropriate source when the needs of the individual and the complexity of the case are beyond your competence and capability.
<p>Knowledge and understanding</p>	<p>You need to apply:</p> <p><i>Legislation, regulations and guidelines</i></p> <ol style="list-style-type: none"> 1. An in-depth understanding of national and local paediatric intravenous fluid guidelines and their application. 2. A working understanding of the local guidelines for patient records, their storage and confidentiality of information. 3. An in-depth understanding of the national and local prescribing guidelines. 4. A working understanding of the Guidelines on the Administration of Medicines.

	<p>5. A working understanding of local guidelines for waste and sharps handling and disposal.</p> <p><i>Clinical knowledge</i></p> <p>6. A working understanding of the disease progression and the potential impact on physiological systems.</p> <p>7. A working understanding of the relevance of other treatment modalities and clinical conditions.</p> <p>8. An in-depth understanding of diagnosis, care plan, protocol and guidelines.</p> <p>9. An in-depth understanding of the principles and practice of prescribing injectable fluids.</p> <p>10. An in-depth understanding of the indications and contra-indications for injectable fluids.</p> <p>11. An in-depth understanding of drug calculations appropriate to the prescribed injectable fluids; dose dilution and length of delivery.</p> <p>12. An in-depth understanding of the side effects of injectable anticoagulant medicines, and their assessment, monitoring, prevention and management.</p> <p><i>Technical knowledge</i></p> <p>13. A working understanding of different venous access devices and their care.</p> <p>14. A working understanding of administration by the subcutaneous route, and intravenous bolus and/or infusions.</p> <p><i>Procedures and patient management</i></p> <p>15. A factual knowledge of the roles and responsibilities of other team members.</p> <p>16. A working understanding of the limits of one's own knowledge and experience and the importance of not operating beyond these.</p>
--	--