

Department of Health, Social Services & Public Safety
An Roinn Sláinte, Seirbhísí Sóisialta agus Sábháilteachta Poiblí

From The Chief Medical Officer:
Dr Henrietta Campbell CB

Castle Buildings
Upper Newtownards Road
Belfast BT4 3SJ

Telephone: [REDACTED]
Fax: [REDACTED]

E-Mail: henrietta.campbell [REDACTED]

Medical Directors of Acute Trusts
Directors of Nursing in Acute Trusts
Consultant Paediatricians
Consultant Surgeons
Consultant Neurosurgeons
Consultant Anaesthetists/Intensivists
Consultants in Plastic Surgery/Burns
Consultants in A&E Medicine
Consultant Pathologists

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Dear Colleagues

PREVENTION OF HYPONATRAEMIA IN CHILDREN

Guidance on the Prevention of Hyponatraemia in Children has been published and will be forwarded to you under separate cover. It has been prepared as an A2 sized poster and I ask you to ensure that the posters are prominently displayed in all units that may accommodate children. The Guidance has been developed by a multidisciplinary working group established by the Department and the work has been supported and endorsed by CREST.

Hyponatraemia can be extremely serious and has in the past few years been responsible for two deaths among children in Northern Ireland. Hyponatraemia is a problem of water balance and most often reflects the failure to excrete water. Stress, pain and nausea are all potential stimulators of the antidiuretic hormone ADH which inhibits water excretion.

Any child receiving IV fluids or oral rehydration is potentially at risk of hyponatraemia. The administration of excess or inappropriate fluid to a sick child may result in serious or life threatening hyponatraemia. There is a particular concern about the use of 0.18% Sodium Chloride in Glucose among children as it has been implicated in cases of hyponatraemia. While it may pose a risk because of the relatively low sodium content no specific fluid is without risk. This has been emphasised in a recent letter received from the Medicines Control Agency which stated that while hyponatraemia is a risk with 0.18% Sodium Chloride, electrolyte imbalance is a risk with all intravenous solutions.

The Guidance emphasises that every child receiving intravenous fluids requires a thorough baseline assessment, that fluid requirements must be calculated accurately and fluid balance must be rigorously monitored. Following this simple advice will prevent children from developing hyponatraemia.

The Guidance is designed to provide general advice and does not specify particular fluid choices. Fluid protocols should be developed locally to complement the Guidance and provide more specific direction to junior staff. This is particularly important in subspecialty areas such as renal medicine, burns units and



neurosurgery. It will be important to audit compliance with the guidance and locally developed protocols and to learn from clinical experiences.

I would like to extend my thanks to all members of the multidisciplinary group who have worked together to provide clear and practical guidance to improve the care of sick children. The Guidance is also available on the Departmental website www.dhsspsni.gov.uk.

Yours sincerely



HENRIETTA CAMPBELL (Dr)

ANY CHILD RECEIVING PRESCRIBED FLUIDS IS AT RISK OF HYPONATRAEMIA

INTRODUCTION

- Any child on IV fluids or oral rehydration is potentially at risk of hyponatraemia.
- Hyponatraemia is potentially extremely serious, a rapid fall in sodium leading to cerebral oedema, seizures and death. Warning signs of hyponatraemia may be non-specific and include nausea, malaise and headache.
- Hyponatraemia most often reflects failure to excrete water. Stress, pain and nausea are all potent stimulators of anti-diuretic hormone (ADH), which inhibits water excretion.
- Complications of hyponatraemia most often occur due to the administration of excess or inappropriate fluid to a sick child, usually intravenously.
- Hyponatraemia may also occur in a child receiving excess or inappropriate oral rehydration fluids.
- Hyponatraemia can occur in a variety of clinical situations, even in a child who is not overtly "sick". Particular risks include:
 - Post-operative patients
 - CNS injuries
 - Bronchiolitis
 - Burns
 - Vomiting

BASILINE ASSESSMENT

Before starting IV fluids, the following must be measured and recorded:

- **Weight:** accurately in kg. [In a bed-bound child use best estimate.] Plot on centile chart or refer to normal range.
- **U&E:** take serum sodium into consideration.

FLUID REQUIREMENTS

Fluid needs should be assessed by a doctor competent in determining a child's fluid requirement. Accurate calculation is essential and includes:

Maintenance Fluid

- 100mls/kg for first 10kg body wt, plus
- 50mls/kg for the next 10kg, plus
- 20mls/kg for each kg thereafter, up to max of 70kg. [This provides the total 24 hr calculation; divide by 24 to get the mls/hr].

Replacement Fluid

- Must always be considered and prescribed separately.
- Must reflect fluid loss in both volume and composition (lab analysis of the sodium content of fluid loss may be helpful).

CHOICE OF FLUID

- **Maintenance fluids** must in all instances be dictated by the anticipated sodium and potassium requirements. The glucose requirements, particularly of very young children, must also be met.
- **Replacement fluids** must reflect fluid lost. In most situations this implies a minimum sodium content of 130mmol/l.
- **When resuscitating** a child with clinical signs of shock, if a decision is made to administer a crystalloid, normal (0.9%) saline is an appropriate choice, while awaiting the serum sodium.
- The composition of oral rehydration fluids should also be carefully considered in light of the U&E analysis.

Hyponatraemia may occur in any child receiving any IV fluids or oral rehydration. Vigilance is needed for all children receiving fluids.

MONITOR

- **Clinical state:** including hydrational status. Pain, vomiting and general well-being should be documented.
- **Fluid balance:** must be assessed at least every 12 hours by an experienced member of clinical staff.
 - Intake:** All oral fluids (including medicines) must be recorded and IV intake reduced by equivalent amount.
 - Output:** Measure and record all losses (urine, vomiting, diarrhoea, etc.) as accurately as possible.
- If a child still needs prescribed fluids after 12 hours of starting, their requirements should be reassessed by a senior member of medical staff.
- **Biochemistry:** Blood sampling for U&E is essential at least once a day - more often if there are significant fluid losses or if clinical course is not as expected.
 - The rate at which sodium falls is as important as the plasma level. A sodium that falls quickly may be accompanied by rapid fluid shifts with major clinical consequences.
 - Consider using an indwelling heparinised cannula to facilitate repeat U&Es.
 - Do not take samples from the same limb as the IV infusion.
 - Capillary samples are adequate if venous sampling is not practical.
 - Urine osmolarity/sodium: Very useful in hyponatraemia. Compare to plasma osmolarity and consult a senior Paediatrician or a Chemical Pathologist in interpreting results.

SEEK ADVICE

Advice and clinical input should be obtained from a senior member of medical staff, for example a Consultant Paediatrician, Consultant Anaesthetist or Consultant Chemical Pathologist

- In the event of problems that cannot be resolved locally, help should be sought from Consultant Paediatricians/Anaesthetists at the PICU, RBHSC.