

Agenda for the CREST Sub-Group meeting on the Management of Hyponatraemia in the Adult Patient, to be held on Wednesday 27 February 2002, at 2.00pm in Conference Room 414, Dundonald House.

AGENDA

1. Introduction and apologies.
2. Setting the Scene.
3. Prevention of Hyponatraemia in Children Receiving Intravenous Fluids. (To be tabled)
4. Open forum.
5. Plan of Action & Work Schedule.
6. Any other business.
7. Date of the next meeting.

FB2/02
Dr M McCarthy

PREVENTION OF HYPONATRAEMIA IN CHILDREN RECEIVING INTRAVENOUS FLUIDS

INTRODUCTION

- 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.
- Hyponatraemia is potentially extremely serious, a rapid fall in sodium leading to cerebral oedema, seizures and death.
- Complications of hyponatraemia most often occur due to the administration of excess or inappropriate fluid to sick children, usually intravenously, but potentially with excess dilute oral fluids.
- Hyponatraemia can occur in a variety of clinical situations, even in children who are not overtly "sick". Those at particular risk include:
 - Post-operative patients.
 - CNS injuries
 - Bronchiolitis
 - Burns
 - Vomiting

BASELINE ASSESSMENT

Before starting IV fluids:

- **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 needs:** calculate accurately including:

Maintenance Fluid 100mls/kg for first 10kg body weight plus
 50mls/kg for the next 10kg body weight 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.
 Must replace loss with most appropriate fluid.

MONITOR

- **Clinical state:** including hydrational status. Pain, vomiting, general well-being should be documented.
- **Fluid balance:** must be assessed at least daily 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

- **Biochemistry:** Regular blood sampling for U&E may be difficult but remains **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 Na⁺ falls is as important as the actual plasma level. A Na⁺ 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 sample from the same limb as the IV infusion.
- Capillary samples are adequate if venous sampling is not practical.
- **Urine osmolarity/Na:** Very useful in hyponatraemia. Compare to plasma osmolarity and consult a chemical pathologist in interpreting results.

CHOICE OF FLUID

Fluid and electrolyte requirements vary as a function of metabolic activity.

- The choice of maintenance fluids will be influenced by anticipated sodium, potassium and glucose requirements.
- The choice of replacement IV fluids will depend on replacement needs, eg fluid loss for vomiting etc.

Hyponatraemia may occur in children receiving **any** IV fluid. Vigilance is needed for all children receiving fluids.

SEEK ADVICE

Advice and clinical input may be obtained readily from a senior member of medical staff including:

Consultant Paediatrician
Consultant Anaesthetist
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.

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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

BASELINE 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 hydration 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 osmolality/sodium: Very useful in hyponatraemia. Compare to plasma osmolality 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.

Minutes of the meeting of the CREST Sub-Group on the Management of Hyponatraemia in the Adult Patient, held on Wednesday 27 February 2002, at 2.00pm in Conference Room 414, Dundonald House.

Present: Dr C Russell (Chair)
 Dr E Bergin
 Ms R Devlin
 Dr P Flanagan
 Dr G McVeigh
 Dr A Montgomery
 Dr T Trinick
 Mr G Hannan } Secretariat
 Miss A Lowry }

Apology: Dr K Fitzpatrick

In attendance: Dr M McCarthy

1. Introduction and apologies

Dr Russell welcomed those present. The apology was noted.

2. Setting the Scene

Dr Russell explained that the Department had approached CREST regarding the dissemination and 'kite-marking' of guidelines on the Prevention of Hyponatraemia in Children Receiving Intravenous Fluids. After debate on the guidelines at the CREST meeting on 8 November 2001, it had been agreed that a small working group, to include the relevant Consultant and Nursing specialties, should be convened to look at Hyponatraemia in Adult Patients.

Dr Russell felt that, after the presentation by Dr McCarthy, the group should consider if it was sufficient to bring the problem of Hyponatraemia to the attention of those specialists who were likely to encounter it or to produce management guidance.

3. Prevention of Hyponatraemia in Children Receiving Intravenous Fluids

Dr McCarthy, Senior Medical Officer, DHSSPS, reported that some months ago, the Department had been approached by Paediatricians, expressing concerns over an increase in the condition of Hyponatraemia and had felt in need of urgent guidance. Consequently a small multi-professional group comprising Paediatric Anaesthetists and Surgeons, Public Health Medicine, Nursing and Chemical Pathology specialties had been convened.

The outcome was the production of an A2 sized laminated wall chart, targeted at junior staff and non-specialists. This chart was intended to raise awareness of the problem with the recommendation that each Unit should draw up its own protocol, using the guidelines as advice. Dr McCarthy said that the wall chart would be published shortly and would be distributed to all units treating children as in-patients.

4. Open Forum

Dr Russell thanked Dr McCarthy and asked members for suggestions on a suitable approach the group could take; do we need to produce Management guidelines or would it suffice to bring the prevalence of Hyponatraemia to the attention of staff?

Issues raised included:

Dr Bergin felt that the risk of Hyponatraemia in adults was higher in certain populations and that it was not as big a prevention risk in adults as in children.

Dr Flanagan suggested that post-operative prevention measures, eg in elderly fracture patients, could be put in place.

Dr Trinick felt that there were differences in GP and hospital and indeed, inter-hospital practice and these issues should be addressed. He said that in his Trust, all patients undergo a U&E analysis every other day and as such, the condition would be hard to miss.

Dr McVeigh expressed concerns over the management of acute and chronic cases, especially elderly people presented from nursing homes. Here, there was no readily available case history and clinicians were unsure of how rapidly to raise the sodium levels of patients.

Ms Devlin felt that from a junior doctor's point of view, they would not have the time to look up blood and U&Es. She said nursing staff would also recognise potassium levels quicker than sodium levels.

Dr Montgomery reported that most problems in her specialty arose from the use of anti-depressants and SSRI's.

Dr McCarthy indicated that the Departmental Working Group had stressed that prescribing and monitoring of fluid balance was often delegated to the most junior member of staff.

5. Plan of Action and Work Schedule

After deliberation, the following plan of action was agreed.

Dr Trinick undertook to verify the number of cases of Hyponatraemia at the Ulster and to ask colleagues in other hospitals to do the same.

All members agreed to research the literature base and forward papers to the Secretariat.

Dr McVeigh undertook to provide a list of drugs which could cause Hyponatraemia.

Each member to highlight, where they see Hyponatraemia as being a problem in their specialty, for discussion at the next meeting.

This should include investigations which may be required:

A physical examination (vomiting, diarrhoea and diabetes).
Fluid Balance – from a junior doctor and nursing viewpoint.

Types of fluid to be prescribed.

Urinomolarity and urinary sodium levels to be analysed.

A work-up of the 'well' patient to include: Thyroid function tests (glucose, lipids and protein).

High-risk patients to be highlighted to include diabetics on anti-diuretics and pneumonia in the elderly.

Drs McVeigh and Russell to forward flow charts to the Secretariat.

It was also agreed to consider the guidelines from a GP and nursing 'out-of-hours' viewpoint to include 'causes' and 'who to contact'. Dr McVeigh also said it was essential to stress that it was water balance and not salt balance that was the cause of the condition.

Dr Russell also agreed to approach the Eastern Board to ask if the finalised guidance could be published in one of their future issues of the GP Formulary. He also emphasised that it was essential and indeed was standard practice in all recent CREST guidelines, that the guidance should include an audit tool.

Members envisaged that the group should only need to further meet on 2 or 3 occasions and most communication would be by e-mail. It was agreed that a draft outline document would be circulated to members, who should then complete their relevant sections within the next 6 weeks.

6. Date of the next meeting

The next meeting of the group was arranged for Wednesday 24 April 2002, at 2.30pm in Conference Room 414, Dundonald House.