

ANY CHILD NEEDS IV FLUIDS IS AT RISK OF HYPONATRAEMIA

FLUID COLLECTION

REDAINED

Any child on IV fluids or oral rehydration is potentially at risk of hyponatraemia.

Hypotonaemia 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.

Hypotonaemia 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.

Hypotonaemia may also occur in a child receiving excess or inappropriate oral rehydration fluids.

Hypotonaemia 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

CLINICAL 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&Es: take serum sodium into consideration.

FLUID REQUIREMENTS

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

Maintenance Fluid

- 100ml/kg for first 10kg body wt. plus
 - 50ml/kg for the next 10kg, plus
 - 20ml/kg for each kg thereafter, up to max of 70kg.
- [This provides the total 24 hr calculation; divide by 24 to get the ml/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 individual sodium and potassium requirements. The glucose requirements, particularly of very young children, must also be met.

Replacement fluids must reflect fluid lost in the situation; this implies a minimum sodium content of 130mmol/l.

When replacing 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.

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

MONITORING

- Clinical status 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, stool, vomit, 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&Es is essential at least once a day - more often if there are significant 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 a stop site as this is impractical.

Capillary samples are adequate if venous sampling is impractical.

Urine osmolality/sodium: Very useful in hyponatraemia. Compare to plasma osmolality and consult a senior paediatrician or a Clinical Pathologist for interpretation of 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, extra help should be sought from Consultant Paediatrician Anaesthetists at the PICU, RBHSC.