Master 10/1/02

ANY CHILD RECEIVING FLUIDS IS AT RISK OF HYPONATRAEMIA

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. Warning signs of hyponatraemia may be non-specific and include nausea, malaise and headache.

- ~~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 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 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 in both volume and composition (lab analysis of the Na content of fluid loss may be helpful).

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. ~~0.45% NaCl in glucose is often a satisfactory solution to use unless an alternative is indicated.~~

- Replacement fluids must reflect fluid lost. In most situations this implies a minimum sodium content of 130mmol/l (e.g. ~~Hartmann's solution or normal saline~~). ~~In simple vomiting, 0.45% sodium chloride in glucose may be satisfactory, considering the glucose requirements of very young children.~~

- The risk of hyponatraemia may be increased in a child receiving 4% glucose/0.18% saline as replacement fluid.

- In the resuscitation of 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.

Hyponatraemia may occur in any child receiving any IV fluid 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 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 samples from the same limb as the IV infusion.

DHSSPS

Capillary samples are adequate if venous sampling is not practical.
(early with near - patient testing)

Urine osmolarity/Na: Very useful in hyponatraemia. Compare to plasma osmolarity and consult a senior paediatrician or a chemical pathologist in interpreting results.

SEEK ADVICE

If a child is to remain on IV fluids 12 hours after commencing then
Advice and clinical input ~~may~~ be obtained ~~readily~~ from a senior member of medical staff including: should

Consultant Paediatrician
Consultant Anaesthetist
Consultant Chemical Pathologist
(In some cases this responsibility may be delegated to an experienced Specialist Registrar

- In the event of problems that cannot be resolved locally, help should be sought from consultant paediatricians/anaesthetists at the PICU, RBHSC. (or their experienced Specialist Registrar)