

*De Loughney*

## 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:

<u>Maintenance Fluid</u>	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].
<u>Replacement Fluid</u>	Must always be considered and prescribed separately. Must reflect fluid loss in both volume and composition.

DHSSPS



## CHOICE OF FLUID

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

- In the immediate resuscitation of a child with clinical signs of shock, if a decision is made to administer a crystalloid, normal (0.9%) saline would be an appropriate choice, while awaiting the serum sodium.
- The choice of maintenance fluids will be influenced by anticipated sodium, potassium and glucose requirements. 0.45% NaCl in dextrose is often a satisfactory solution to use unless an alternative is indicated.
- Replacement fluids must contain a safe sodium content, ideally  $>140\text{mmol/l}$ , and adequate glucose, particularly in the very young. *130 glucose*
- The risk of hyponatraemia may be increased in a child receiving 4% glucose/0.18% saline as replacement fluid. *The glucose requirements of very young child should also be best - and*
- 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  $\text{Na}^+$  falls is as important as the actual plasma level. A  $\text{Na}^+$  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.

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**

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.

**DHSSPS**