

**Garrett, Elizabeth**

**From:** Loughrey, Clodagh [Clodagh.Loughrey@  
**Sent:** 23 October 2001 12:21  
**To:** 'Garrett, Elizabeth'  
**Subject:** RE: PREVENTION OF HYPONATRAEMIA IN CHILDREN RECEIVING INTRAVENOUS FLUIDS



LowNa guidelines.doc

Miriam

Updated version, with "how-to-interpret-urine-osmolarity/Na" guide. I think this is an extremely valuable thing to look at in hyponatraemia, it highlights the people who are inappropriately retaining water, and they are exactly the patients who are going to run into trouble. So I hope you can find room for it, even in smaller font than the rest. I'd be interested in Mary's (O'Connor) comments too.

All the best

Clodagh

AUDIT GOAL

Names -

DORS -

Diagnosis

URINE ASSESSMENT

British Assoc  
of Paed.  
R. College  
CPSP

# 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 For first 10kg – 4 mls/kg/hr  
For second 10kg – 40mls + 2mls/kg/hr  
For each additional kg – 60 mls + 1ml/kg/hr

Replacement Fluid Must always be considered and prescribed separately.  
Must reflect fluid loss.  
Must replace loss with most appropriate fluid.

- 24 hours

## 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 but more often if there are significant fluid losses or if clinical course is not as expected.
- The rate at which Na<sup>+</sup> falls is as important as the actual plasma level. A Na<sup>+</sup> 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 (measure or calculate:  $2Na + 2K + glucose + urea$ )

Urine Osm	Urine Na	Interpretation
<200	>40	H <sub>2</sub> O excretion. <b>Appropriate</b> response to hypotonic fluid excess. Normal situation.
>300	<20	H <sub>2</sub> O conservation. <b>Appropriate</b> response to ↓ circulating volume / dehydration.
>300	>40	H <sub>2</sub> O conservation. <b>Inappropriate</b> response to normal circulating volume (i.e. SIADH). (Intermediate values less easy to interpret. Not valid in diuretic Rx, renal, thyroid or adrenal disease)

*Consult chemical pathologist in interpretation of results*

• Hyponatraemic complications most likely with last pattern i.e. H<sub>2</sub>O retention in setting of good hydration.

### 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 Pathologists

• In the event of problems that cannot be resolved locally, help should be sought from consultant paediatricians/anaesthetists at the PICU, RBHSC.