Management of Hypernatraemic Dehydration

Definitions:

- **Hyponatraemia:** Serum Na+ < 135mmol/L.
- **Normal:** Serum Na+ 135-145 mmol/L.
- **Mild Hypernatraemia:** Serum Na+ 146-149 mmol/L.
- **Moderate Hypernatraemia:** Serum Na+ 150-169 mmol/L.
- **Severe hypernatraemia:** Serum sodium ≥ 170 mmol/L.

**Causes**

1. Water loss in excess of sodium ie severe diarrhoea, severe burns
2. Inability to swallow/obtain adequate water ie neonates with inadequate breast milk intake
3. Water deficit from impaired thirst ie hypothalamic lesions, DI.
4. Gain of sodium ie iatrogenic, ingestion of large amt of sodium
   - Rarely Munchausen’s by proxy

- Too rapid reduction of the sodium in hypernatraemia can cause cerebral oedema, convulsions and permanent brain injury
  - Close monitoring is critical
  - If shocked, bolus with 10-20 mls/kg of NS to stabilise
  - Aim to lower serum sodium (Na+) at a rate of no more than 12 mmol/L in 24 hrs (0.5 mmol/L per hr). Slower reduction may be required in infants with chronic hypernatraemia
  - Weigh every 6 hrs, strict input/output, frequent monitoring of U&E including Ca/Mg/PO4 and blood sugar. Will be required hrly to 2 hrly initially. Regular NeuroObs.
  - After initial resus, replace the fluid deficit plus maintenance slowly over a 48 hr period if serum Na+ 150-169mmol/L and over 72-96 hrs if serum Na+ ≥ 170mmol/L
  - Contact NICU/PICU to consider admission esp if serum Na+ ≥ 170mmol/L
  - Fluid of choice: Glucose 5% 0.9% NS
  - Adjust rate if sodium falling too rapidly
  - Replace ongoing severe losses (ie profuse diarrhoea) in addition to above
  - Seek Senior advice if:
    - Seizures/signs of cerebral oedema
    - Lethargy
    - Irritability
    - Skin feels “doughy”
    - Ataxia/tremor
    - Hyper-reflexia/seizures/reduced GCS
  - Maintenance fluids: 4mls/kg/hr for first 10kg, 2 mls/kg/hr for next 10 kg and 1ml/kg/hr for each kg above 20 kg. This formula also to be applied to neonates
  - Deficit best calculated on pre-illness weight. If not available, then calculate your deficit based on a clinical assessment (please refer to standard paediatric texts)

Severe symptoms mainly develop when serum Na+ > 160.
- Clinical signs may lead to underestimation of the true degree of dehydration
- Weight loss is a more reliable sign in this condition
- Infant may appear sicker than expected for the clinical signs of dehydration present
- Shock occurs late as intravascular volume relatively preserved.

**Signs (of intracellular dehydration and neurological dysfunction)**

- Lethargy
- Irritability
- Skin feels “doughy”
- Ataxia/tremor
- Hyper-reflexia/seizures/reduced GCS

**Investigations**

- Full set of Electrolytes
- Blood sugar
- Urine for sodium and osmolarity
- If seizures/neurological signs, recheck sodium urgently, consider neuroimaging, seek senior advice
- Seizures may be due to cerebral oedema but may also occur due to venous sinus thrombosis or cerebral infarction
This care pathway has been produced by the National Paediatric and Neonatology Clinical Programme. It is aimed at medical, nursing and allied health professionals working in Irish neonatal units.

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