KIDS clinical guideline:
Fluid and electrolyte therapy

Principles of management:

Fluid therapy comprises 3 main elements:

1. Restoring **deficits** (e.g. resuscitation of shock / correction of dehydration)
2. **Maintenance** therapy (i.e. replacement of water and electrolyte losses resulting from metabolism)
3. Replacement of **non-physiological losses** (e.g. diarrhoea)

1. Restoring deficits:

Volume resuscitation:

- Always use isotonic fluid without potassium or glucose (e.g. 0.9% saline)
- Use aliquots of 20ml/kg
- Monitor closely for signs of fluid overload: be cautious with fluid if raised intracranial pressure (e.g. DKA) or congestive cardiac failure

Correcting dehydration:

- Replace estimated deficit in addition to maintenance replacement.
- Correct dehydration over 48 hrs.
- Use isotonic fluid as default fluid.

2. Maintenance fluid:

Holliday-Segar method calculates fluid requirement based on estimated energy expenditure:

Body weight (kg)	Maintenance fluid requirement
<10	100ml/kg/day
10-20	1000ml + 50ml/kg/day for every kg > 10kg
>20	1500ml + 20ml/kg/day for every kg > 20kg

Adjust maintenance fluid according to individual factors – e.g.:

- Fever / hypothermia (+/- 12% per degree C)
- Ventilation in humidified gases (-25%)
- Non-osmotic ADH (-30-50%)
- Neuromuscular blocking drugs (-30%)

Rules of thumb:

- In most cases, maintenance fluid should be **restricted** to 60-80% of calculated requirement.
- Use isotonic crystalloid, or 0.45% saline as first choice maintenance iv fluid
- Add glucose: 5% in infants and small children, or 10% in neonates

3. Replacement of losses:

Anticipate measure (if possible) and replace non-physiological losses such as diarrhoea, vomiting, large diuresis, burns-related fluid loss.

Electrolyte emergencies:

Hyperkalaemia ([K+]>5.5mmol/l):

Identify and treat the cause (e.g. acute renal failure). Monitor ECG (Long PR interval or Tall T waves).

- **Emergency Management (Discuss with KIDS team):**
  - **Calcium Gluconate 10%** , 0.5-1ml/kg over 5-10 min
    - *Use 5-fold dilution for peripheral us. See BCH monograph for details*
  - **Sodium Bicarbonate 8.4%** 1-2mmol/kg over 20 min
    - *Use 4-fold dilution (i.e. 2.1%) for peripheral use*
  - **Insulin and Glucose**: Bolus 0.1Units/kg Actrapid with 1g/kg of Glucose (10ml/kg of 10% Glucose). Give over 10 minutes. Monitor Blood glucose for hypoglycaemia. *See BCH monograph for details*.
  - **Salbutamol** IV 4 micrograms/kg over 10 min or nebulised (2.5mg for <10kg, 5 mg for > 10Kg)
  - Forced Saline diuresis – **Furosemide** 1mg/kg i.v.
  - **Calcium resonium** 125-250mg/kg orally or rectally

Symptomatic hyponatraemia:

Hyponatraemia (Na<125 mmol/L) with CNS symptoms (seizures, coma or respiratory depression).

Emergency management (discuss with KIDS team):

- Give 3% Sodium chloride: 4ml/kg over 15-30 minutes
- Measure plasma sodium at end of bolus
- If still seizing intubate and give further 2ml/kg 3% sodium chloride over 15 minutes.
- Aim to raise plasma sodium by no more than 0.5mmol/L/hour.
- Review therapy when symptoms resolve, or when plasma sodium >125mmol/L

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