Neonatal fluids & electrolytes

Neonatal e-handbook Victoria

Glucose

- 10% dextrose
  - 0.4kCal/ml

- Glucose infusion rates needs equate 4-6mg/kg/min

- Glucose calculator

Water requirements

- *What are the routes of water loss in neonates?*

Water requirements

- Major routes of water loss in the infant are:
  - Insensible fluid losses from the skin and lungs
  - Urinary losses
  - Abnormal fluid losses e.g. GIT

- Normal insensible loss is 0.7-1.6mL/kg/hr (17-38mL/kg/day)

- 2/3 of insensible (evaporative) water loss occurs via the skin and is related to surface area, skin maturity, air temperature

- 1/3 if losses are via the lungs

Water requirements

- *What situations result in increased losses?*

Water requirements

- Insensible fluid losses can be increased by:
  - Low birth weight <1.25kg
    - (increased surface area: volume)
  - Radiant heater
  - Phototherapy

Insensible fluid losses can be decreased by:

- Humidification of the environment

Water requirements

- Urine output
  - 2-4ml/kg/hr
  - Maintain adequate solute excretion

Fluid rates

Birth Weight	<1000 g	1000 - 1500 g	1500 - 2500 g
Day 0	60	60	60
Day 1	60-90	60-90	60
Day 2	80-120	80-120	90-110
Day 3	100-140	100-140	120-150

- Serum sodium (aim to keep < 150mmol/l)
- Body weight - net loss 10-15% in 1st week is “physiological”.

Electrolytes

- Newborn babies are always commenced on 10% dextrose as maintenance fluid

- Sodium and potassium is added to maintenance fluids from day 3 onwards, if a baby is still predominantly on intravenous fluids. Electrolytes should be checked on a daily basis.

- Pre-made bags containing 10mmol KCl in 0.225% NaCl & 10% Dextrose are now available.

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- Babies in level 2 nurseries like BHS seldom require intravenous corrections of electolyte abnormalities (including Ca and Mg) – always discuss with consultant.

Sodium

- Most infants require 2-3mmol/kg/day
  - VLBW infants requirements may be higher due to increased renal sodium losses.
- Sodium requirements are assessed by:
  - serum sodium levels (135-145mmol/l) and
  - where necessary, urinary sodium concentration (16-18mmol/l).
- Higher sodium losses are seen in small preterm infants
- Low total body sodium, as reflected in borderline low s-Na can be an important reason for **poor growth in a premature baby**
- Oral sodium supplements are appropriate (3 – 6 mmol/kg/d as 20%naCl (3.4mmol/ml)).

Potassium

- Requirement for most infants is 2-3mmol/kg/day
- Do not add to parenteral solutions until urine output is established
- The standard IV fluid used contains 10mmol/500ml
- If oral supplementation is appropriate, this can be given as 2 – 4 mmol/kg/d of 15% KCl (2mmol/ml)).
- Serum potassium levels should be monitored (3-6mmol/l)
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- A "spot" urine estimation may give some indication of urinary K+ losses (range 10-40mmol/l).

Calcium

- The daily requirement for most infants is 1-2mmol/kg/day.
- Asymptomatic hypocalcaemia (ionised <1.1mmol/l) is common in extremely premature.
- Provided the Ca2+ does not decrease to very low levels (<0.8mmol/l) these babies are not routinely supplemented with calcium during the first 5 days of life and the Ca2+ slowly returns to normal.

Osteopenia of prematurity/ metabolic bone disease (MBD)

- osteopenia of prematurity neonatal handbook

- Biochemical tests of osteopaenia of prematurity are **not definitive.**

Diagnosing MBD

- Test from week 3 (d21)/4 (d28) of life in those <32 weeks
  - Repeat every 2 weeks surveillance
  - Repeat weekly if treatment commences

- **Serum Phosphate**: suspicious if <1.5; likely if < 1.1 mmol/L

- The alkaline phosphatase **(ALP) is** more elevated than usual for preterm babies. Levels above 600 or 800 IU/L are quoted. However, the ALP only rises high if there is bone turnover. If the condition is very severe the ALP may not be very high

- The **calcium** level may be normal, elevated or even low

- A **bone x-ray** will show very poor mineralisation and as the infants grow can show changes of rickets or fractures

- An abnormal **Ca2+/PO4 ratio** in the urine. In normal infants it is less than 1.0 (both measured in mmol/L).

Other electrolytes

- For further information about Na, Ca, K and PO4 and in addition Cl- and Mg go to the online neonatal handbook

- neonatal handbook