HYPERNATRAEMIC DEHYDRATION ● 1/4

DEFINITION

- Serum sodium >145 mmol/L
- mild: 146–149 mmol/L
- moderate: 150–160 mmol/L
- severe: >160 mmol/L

Most common cause is failure to establish adequate oral intake while attempting breastfeeding

AIM

To prevent/treat hypernatraemic dehydration while encouraging breastfeeding

Other causes of hypernatraemia

- Diarrhoea/vomiting
- Infection and poor feeding
- Renal dysplasia
- Obstructive uropathy
- Diuretic phase following acute kidney injury
- Osmotic diuresis
- Diabetes insipidus
- Idiopathic causes
- Sodium bicarbonate or sodium chloride administration
- Excessive insensible losses in extremely premature babies
- Improperly prepared formula

PREVENTION

Babies at high risk

- Preterm <37 weeks
- Born to primiparous women
- Maternal prolonged second stage of labour >1 hr
- Use of labour medications
- Caesarean section with delayed initiation of feeding
- Cleft lip and/or palate
- Maternal breast characteristics (flat, inverted nipples)/surgery
- Maternal illness, haemorrhage
- Maternal obesity
- Maternal diabetes
- Polycystic ovary syndrome
- Skin conditions that increase insensible water loss

Action

- Identify babies at risk
- Immediate skin-to-skin contact at birth and breastfeed within 1 hr of life
- Offer breastfeeding assistance within 6 hr of life
- Assess baby to ensure feeding adequate
- Ensure baby feeds ≥6 times within 24 hr
- If baby reluctant to feed, express breast milk (see **Breast milk expression** guideline) and offer by cup or syringe
- Calculate required volume of feeds (see **Nutrition and enteral feeding** guideline)
- Avoid bottle feeding as far as possible and avoid dummies
- Assess feeding, number of wet nappies and stools using **Table**
- Avoid early discharge of at-risk babies
- Early reweighing of at-risk babies (at 72–96 hr) with breastfeeding support can reduce severity of hypernatremic dehydration

HYPERNATRAEMIC DEHYDRATION ● 2/4

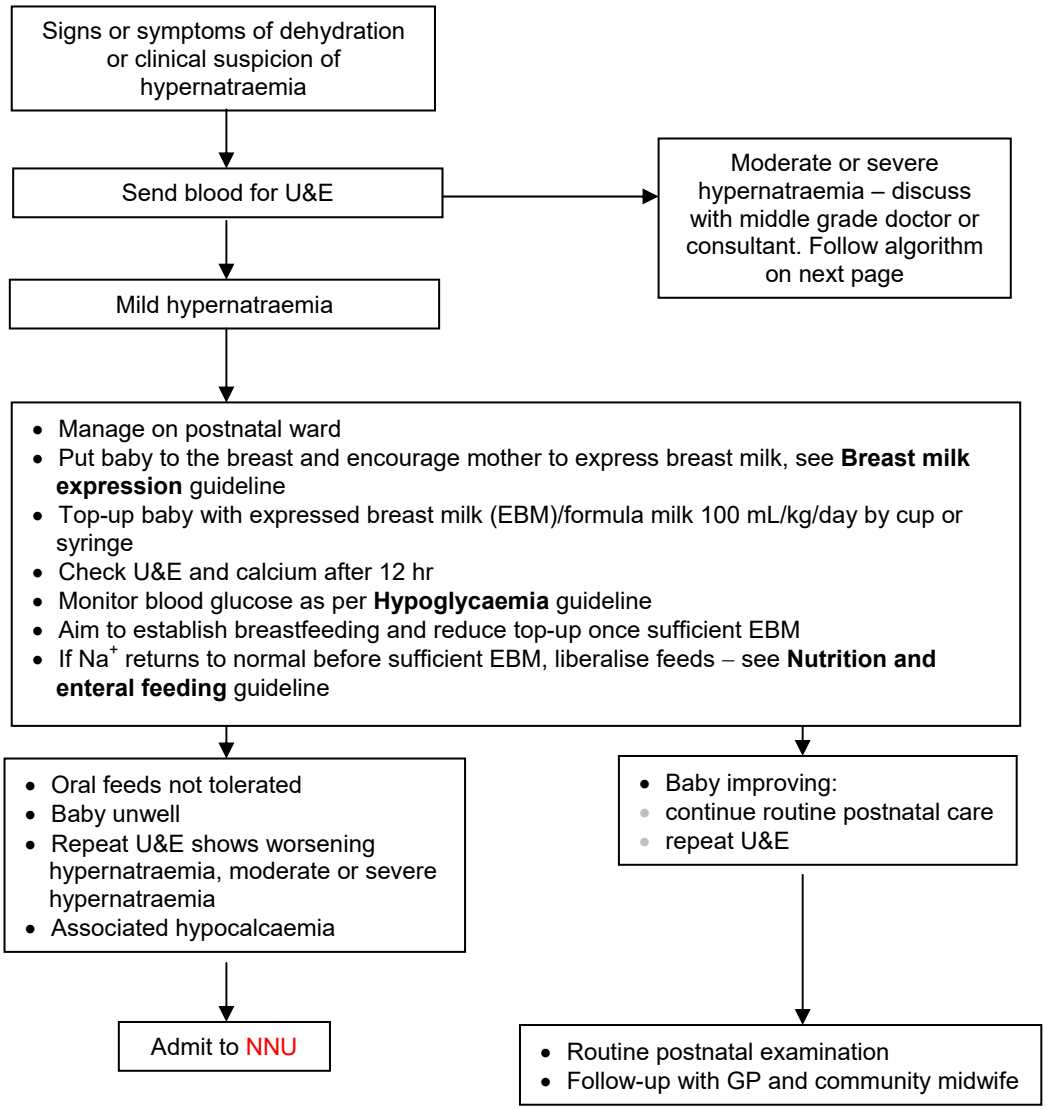
Day	Wet nappies	Stool
1–2	≥2/day	>1/day
3–4	≥3/day	≥2/day, changing in colour and consistency
5–6	≥5/day	≥2/day, yellow in colour
• Weigh between 72 and 96 hr • Refer all who have lost >10% weight • weight loss % = weight loss (g)/birth weight (g) × 100		

Symptoms and signs
- Irritability/high pitched cry: unsettled during breastfeeding
- Prolonged feeding >45 min
- Demanding <6 feeds in 24 hr
- Reduced urinary frequency
- Delayed change from meconium to transitional stools
- Weight loss
- Fever
- Jaundice
- Lethargy/altered level of consciousness
- Tremor
- Increased tone
- Doughy skin
- Seizures (usually during rehydration)
- Physical examination may be unremarkable
- Usual signs of dehydration (sunken fontanelle, dry mucous membrane and reduced skin turgor) may be absent

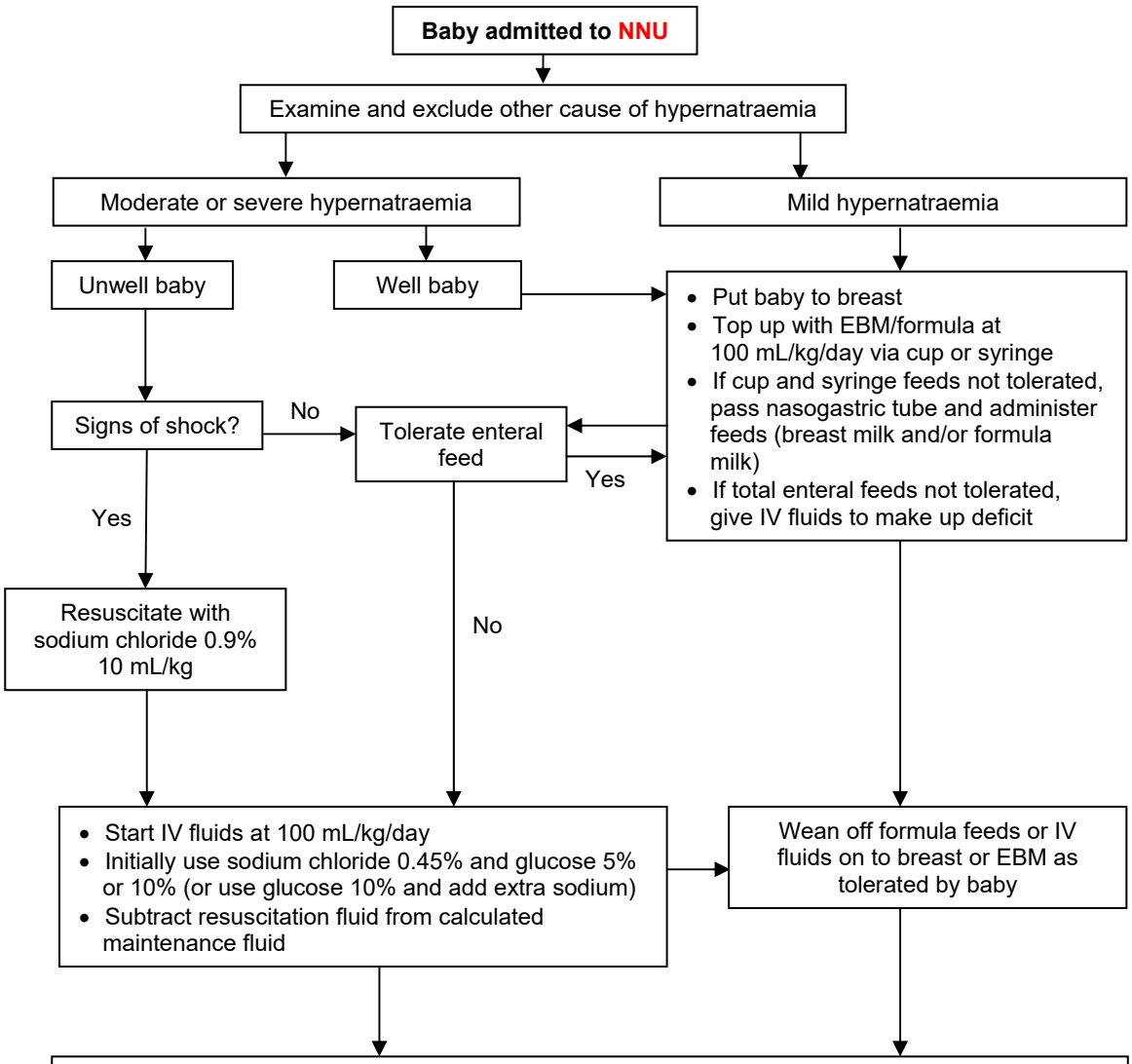
Complications
- Venous and arterial thrombosis
- Subdural and cerebral haemorrhage
- Cerebral oedema (especially during rehydration)
- Seizures (especially following rehydration)
- Apnoea and bradycardia
- Cognitive and motor deficits
- Hearing impairment – may be transient
- Hypertension
- Cerebral infarction
- Renal failure
- Death
- Long-term developmental delay

Investigations
- U&E
- Calcium
- Total bilirubin
- Blood glucose
- CRP
- Blood culture
- Paired urinary electrolytes
- If severe, cranial ultrasound

MANAGEMENT


Signs or symptoms of dehydration or clinical suspicion of hypernatraemia
Send blood for U&E
Moderate or severe hypernatraemia – discuss with middle grade doctor or consultant. Follow algorithm on next page
Mild hypernatraemia
• Manage on postnatal ward
• Put baby to the breast and encourage mother to express breast milk, see **Breast milk expression** guideline
• Top-up baby with expressed breast milk (EBM)/formula milk 100 mL/kg/day by cup or syringe
• Check U&E and calcium after 12 hr
• Monitor blood glucose as per **Hypoglycaemia** guideline
• Aim to establish breastfeeding and reduce top-up once sufficient EBM
• If Na^+ returns to normal before sufficient EBM, liberalise feeds – see **Nutrition and enteral feeding** guideline
• Oral feeds not tolerated
• Baby unwell
• Repeat U&E shows worsening hypernatraemia, moderate or severe hypernatraemia
• Associated hypocalcaemia
• Baby improving:
• continue routine postnatal care
• repeat U&E
Admit to NNU
• Routine postnatal examination
• Follow-up with GP and community midwife

HYPERNATRAEMIC DEHYDRATION ● 4/4



- Enteral rehydration is safe and effective if baby is clinically stable and should be used in preference to IV
- Repeat U&E 4-hrly
- Aim for rate of fall in Na^+ of 0.5 mmol/L/hr. If Na^+ falling any faster, reduce rate of rehydration or change fluids to sodium chloride 0.9% with glucose
- If severe hypernatraemia, contact consultant
- If low blood glucose, see **Hypoglycaemia** guideline
- If in renal failure, suspected renal cause or Na^+ >170 mmol/L, discuss with paediatric nephrologist – may need dialysis
- Monitor:
  - temperature
  - heart rate
  - blood pressure
- Keep strict fluid balance chart
- Monitor weight once or twice daily
- Aim to correct dehydration over 48–72 hr or slower in severe cases
- **Do not correct hyperglycaemia with insulin**, this can reduce plasma osmolality rapidly and precipitate cerebral oedema
- Once sufficient EBM available, aim to establish breastfeeding and reduce top-up
- Neurodevelopmental follow-up for all babies with moderate and severe hypernatraemia