1.Introduction

- Hypernatraemia is defined as plasma Na > 150 mmol/ L
- It results from pure water loss, hypotonic fluid loss or less commonly, salt gain (e.g. administration of hypertonic saline or sodium bicarbonate)
- Clinical assessment of volume status is important in the diagnosis and management. Extracellular fluid volume (ECFV) is reduced by loss of water or hypotonic fluids, but ECFV is increased by salt gain
- Hypernatraemia should be corrected gradually over 48-72 hours to avoid Central Nervous System complications, alongside treatment of the underlying cause

2.Scope

This guideline applies to all staff when they are investigating and managing hypernatraemia in an adult patient.

3.Recommendations, Standards and Procedural Statements

- Urine osmolality, plasma osmolality and urine output should be measured
- If urine output is low and urine osmolality > 800 mosmol/Kg, the likely cause is extra-renal water loss or reduced intake
- If urine output is high and urine osmolality low, (i.e. urine osmolality < serum osmolality) the likely cause is diabetes insipidus (cranial or nephrogenic)
- If urine output is high and urine osmolality high, the likely cause is osmotic diuresis (urea, glucose, mannitol)
- Fluid management should correct both circulating volume & water deficits
- If the patient is hypovolaemic, 0.9% saline should be administered first to correct hypovolaemia; it is *relatively* hypotonic in hypernatraemic patients
- Dextrose 5% or dextrose 4%/saline 0.18% can be given to correct water deficit once volume depletion has been corrected
- As a general rule, aim to reduce Na^+ by no more than 12 mmol/l in 24h

Management

Mild hypernatraemia (Na 145 – 150 mmol / L)

- Assess clinical hydration status, and urine output
- Check U&Es, serum glucose, serum osmolality and urine osmolality
- Calculate water deficit to assess severity of water depletion*
- Ensure adequate IV access and treat cause of hypernatraemia
- If hypovolaemia present, give normal saline as fluid replacement
- If/once ECFV is normal, give 5% dextrose or dextrose saline
- Reassess clinically and repeat sodium and serum osmolality in 8 hours

Moderate hypernatraemia (Na 150-159 mmol / L)

- Discuss with on-call medical SpR for advice
- Calculate water deficit to assess severity of water depletion*
- If hypovolaemic, give normal saline as initial fluid replacement in addition to maintenance requirements and ongoing losses until ECFV restored
- Hourly input and output fluid charts and EWS chart
- Keep up with on-going fluid losses and treat cause
- If high urine output and low urine osmolality, consider diabetes inspidus
- Reassess clinically & repeat serum Na & serum osmolality every 4-6 hours
- If patient deteriorating and / or biochemistry worsening, treat as severe hypernatraemia

Severe hypernatraemia (Na > 160 mmol / L)

- Discuss with on-call medical SpR; refer to ICU if clinically appropriate - this group has a high mortality whatever the cause
- If uncorrected, the patient is at risk of an intracranial catastrophe
- Close monitoring of fluid balance and electrolytes in HDU or ICU is advised
- If known cranial diabetes insipidus, ensure desmopressin is being administered. Consider referral to endocrinology

***Calculation of water deficit**

Water deficit = (measured $[Na^+]/140 \times TBW) - TBW$**
Thus in a 75 kg patient with a serum sodium of 170 mmol L^{-1}:
Water deficit = $(170/140 \times 0.6 \times 75) - (0.6 \times 75)$
$= 54.6 - 45 = 9.6$ L
Correct hypovolaemia first and aim to replace the water deficit over 24-48 h

** TBW = Total Body Water (0.6 x weight of patient in Kg)

4.Education and Training

None except dissemination of guideline

5.Monitoring and Audit Criteria

key performance indicators will be reduced morbidity and mortality caused by hypernatraemia.

Monitoring will be achieved by CMG mortality and morbidity reviews.

6.**Supporting Documents and Key References**

None

7.**Key Words**

Adult patient, management, hypernatraemia

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CONTACT AND REVIEW DETAILS	
Name of author: Miles Levy, J Thompson	**Executive Lead: Andrew Furlong Medical Director**
Details of Changes made during review: Definition of Total Body Water	