Hypernatraemia in Primary Care

Medscape UK X Guidelines
Primary Care Hacks

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What Is Hypernatraemia?

- Hypernatraemia is defined as a serum sodium concentration of **>145 mmol/l**
- The clinical effects of hypernatraemia depend on speed of onset, severity, and underlying cause
- Hypernatraemia occurs due to net water loss or excess sodium intake
- The most common cause of hyponatraemia is **dehydration**. Even in mild cases, hypernatraemia is a **potent stimulator of thirst**. It can also present with confusion, headache, nausea and vomiting, lethargy, irritability, seizures, or coma
- Individuals over 65 years of age, those with dementia, and those in residential care are at increased risk of hypernatraemia
- Hypernatraemia is always associated with an **elevated serum osmolality >295 mmol/kg.**

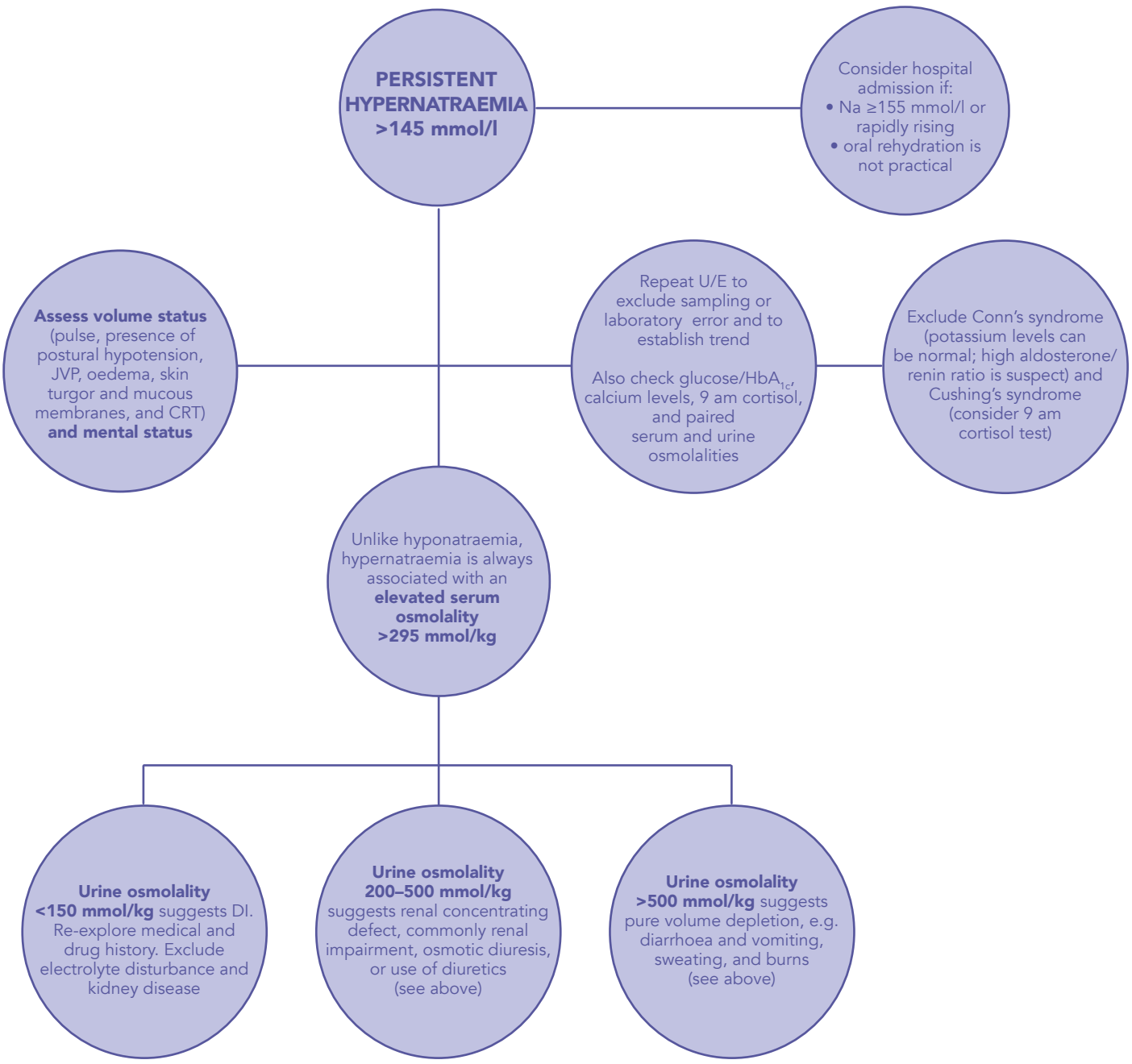
Causes of Hypernatraemia

- Low fluid intake and dehydration
- GI and transdermal water loss, e.g. diarrhoea and vomiting, sweating and burns
- Renal water loss, e.g. osmotic diuretics, diabetes (see below), polyuria of acute tubular necrosis
- Osmotic diuresis due to undiagnosed or suboptimally controlled diabetes or HHS (formerly HONK)
  - HHS is a life-threatening diabetic emergency characterised by severe hyperglycaemia and dehydration and high serum osmolality
- DI (rare, 1:25000)
  - central DI usually results from pituitary pathology affecting ADH production, e.g. brain tumour or head injury
  - nephrogenic DI is a renal resistance to ADH, e.g. electrolyte disturbance (hypercalacaemia or hypokalaemia), kidney disease, or drug toxicity (commonly lithium)
- Conditions leading to hyperaldosteronism/ sodium excess such as Conn's syndrome (primary aldosteronism), Cushing's syndrome (persistently and inappropriately elevated levels of cortisol), chronic heart failure, nephrotic syndrome, or use of steroids
- Excess sodium intake (rare).

Investigations for Hypernatraemia

- **Serum osmolality** is a measure of the concentration of different solutes in plasma and is primarily determined by sodium, glucose, and urea. NR is usually **275–295 mmol/kg** and is tightly maintained by ADH, which regulates fluid balance. An increase in serum osmolality results in secretion of ADH, which increases water reabsorption in the kidneys to return serum osmolality to baseline
- **Urine osmolality** is a measure of urine concentration and whether this is appropriate for the clinical state of the individual. It provides an estimate of ADH activity. NR is usually **300–900 mmol/kg water**. If osmolality ≤100 mOsm/kg (dilute urine), ADH is not acting. If osmolality is >100 mOsm/kg (concentrated urine), ADH is acting. After 12–14 hours' fluid restriction, urinary osmolality should be >850 mmol/kg water
- **Urinary sodium** is a measure of the concentration of sodium in a litre of urine. It is useful for the differential diagnosis of hyponatraemia but must be interpreted alongside volume status, and is therefore difficult to interpret in those taking diuretics
- **Serum urea** is a marker of **extracellular fluid volume.** A raised urea may suggest dehydration.

Investigating Hypernatraemia



Abbreviations
ADH=antidiuretic hormone; **CRT**=capillary refill time; **DH**=diuretic hormone; **DI**=diabetes insipidus; **HbA_{1c}**=haemoglobin A_{1c}; **HONK**=hyperosmolar non-ketotic syndrome; **HHS**=hypersomolar hyperglycaemic state; **U/E**=urea and electrolytes; **JVP**=jugular venous pressure; **Na**=sodium

References
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3. Karslioglu French E, Donihi A, Korytkowski M. Diabetic ketoacidosis and hyperosmolar hyperglycemic syndrome: review of acute decompensated diabetes in adult patients. *Br Med J* 2019; **365**: l1114.