

Hyponatraemia – Management

Scenario: Diagnosis and assessment of hyponatraemia

What are the clinical features of hyponatraemia?

- **Hyponatraemia is usually an incidental finding on routine blood tests.**
- **Most people with hyponatraemia are asymptomatic**, particularly if hyponatraemia is mild (serum sodium concentration of 130–135 mmol/L) and has developed slowly.
- **When symptoms of hyponatraemia are present, they are often non-specific and are related to both the severity of the hyponatraemia and its rate of onset.**
- **Early symptoms**
 - Anorexia.
 - Nausea.
 - Lethargy and apathy (associated with slow-onset hyponatraemia).
- **Late symptoms** (associated with severe or rapid-onset hyponatraemia).
 - Disorientation.
 - Agitation.
 - Seizures.
 - Coma.

Basis for recommendation

Most people are asymptomatic

- The information that most people with mild hyponatraemia are asymptomatic is from expert opinion in review articles [[Goh, 2004](#); [Reynolds et al, 2006](#); [Smellie et al, 2007](#)].

Symptoms are often non-specific

- This information is from expert opinion in a review article [[Goh, 2004](#)], and the guideline *Hyponatraemia in adults (on or after 16th birthday)*, published by the Guideline and Audit Implementation Network (GAIN) for the Northern Ireland Department of Health [[GAIN, 2010](#)].

The extent that symptoms are related to severity and rate of onset

- This information is derived from narrative reviews [[Goh, 2004](#); [Reynolds et al, 2006](#)], and the guideline *Hyponatraemia in adults (on or after 16th birthday)* published by the GAIN for the Northern Ireland Department of Health [[GAIN, 2010](#)].

- In primary care, most people present with hyponatraemia of an undetermined duration [[Verbalis et al, 2007](#)]. Therefore, for practical reasons, CKS have used the term 'developed slowly' rather than the recognized 'acute' or 'chronic' classification.

Clinical features

- The clinical features of hyponatraemia are derived from expert opinion from a narrative review [[Kumar and Berl, 1998](#)] and the guideline *Hyponatraemia in adults (on or after 16th birthday)*, published by the GAIN for the Northern Ireland Department of Health [[GAIN, 2010](#)].
- Advanced symptoms associated with severe hyponatraemia is described in two expert reviews [[Goh, 2004](#); [Reynolds et al, 2006](#)].
- The symptom of lethargy related to slow-onset hyponatraemia is described in an expert review [[Kugler and Hustead, 2000](#)].

How should I confirm a diagnosis of hyponatraemia?

- **If not already measured, or when hyponatraemia is an incidental finding on a routine blood test, take blood to measure the serum sodium concentration and plasma osmolality**, to confirm the diagnosis of hyponatraemia. Confirming hyponatraemia is important as borderline serum sodium concentrations may simply reflect a variation in laboratory measures.
- **If the plasma osmolality is normal (285–295 mOsmol/Kg) or high (greater than 295 mOsmol/Kg)**, take blood to measure serum lipid, glucose, and protein concentrations to exclude [fictitious and redistributive hyponatraemia](#).
- **If the plasma osmolality is low (less than 280 mOsmol/Kg)**, diagnose:
 - **Mild** hyponatraemia — when the serum sodium concentration is 125–134 mmol/L.
 - **Moderate** hyponatraemia — when the serum sodium concentration is 115–124 mmol/L.
 - **Severe** hyponatraemia — when the serum sodium concentration is less than 115 mmol/L.

Fictitious and redistributive hyponatraemia

- In fictitious hyponatraemia, normal plasma osmolality (285–295 mOsmol/kg) is associated with very high levels of serum lipids and proteins. The actual serum sodium concentration is normal (pseudo-hyponatraemia) but presents as low owing to the measurement technique used by the laboratory.
 - Newer methods of measuring serum sodium concentration make pseudo-hyponatraemia very unlikely nowadays.
- A high plasma osmolality (greater than 295 mOsmol/kg) is associated with very high levels of blood glucose. This type of hyponatraemia is called 'redistributive hyponatraemia' and is of no physiological importance.
 - However, a person with a high blood glucose level will require investigation for underlying diabetes and correction of their high blood glucose level. The serum sodium concentration will correct as the blood glucose level decreases. See the CKS topic on [Diabetes - type 2](#).

Basis for recommendation

Measurement of serum sodium concentration and plasma osmolality

- This recommendation is based on expert opinion from the guideline *Hyponatraemia in adults (on or after 16th birthday)* published by the Guideline and Audit Implementation Network for the Northern Ireland Department of Health [[GAIN, 2010](#)] and a review article, *Best practice in primary care pathology* [[Smellie et al, 2007](#)].

Mild, moderate, or severe hyponatraemia

- Diagnosis of hyponatraemia as mild, moderate, or severe is based on expert opinion from a review article [[Reynolds and Seckl, 2005](#)].

Normal or high plasma osmolality.

- Nowadays, most laboratories will use ion-selective electrodes to measure serum electrolytes. These newer methods avoid the risk of falsely low serum sodium readings related to high levels of lipids and proteins [[Nguyen et al, 2007](#)].
- A low serum sodium concentration can also occur in severe hyperglycaemia as the high levels of glucose draw intracellular water into the extracellular space diluting the serum sodium concentration [[Goh, 2004](#)]. This hypertonic hyponatraemia has no physiological importance, and the serum sodium concentration will correct itself as a normal blood glucose level is re-established [[Goh, 2004](#)].

How should I identify an underlying cause of hyponatraemia?

- **Do *not* routinely look for a cause of hyponatraemia in primary care if the person has hyponatraemia that is severe (serum sodium concentration of less than 115 mmol/L) or significantly [symptomatic](#).** These people should be admitted to hospital for urgent treatment. See [Secondary care management](#).
- **Seek advice from an endocrinologist if the person has asymptomatic, moderate hyponatraemia** (serum sodium concentration of 115–124 mmol/L).
- **Look for a cause of hyponatraemia in a person with asymptomatic, mild hyponatraemia** (serum sodium concentration greater than 125 mmol/L).
- **Repeat the serum sodium measurement and check for previously low serum sodium concentrations.** This will help determine whether the hyponatraemia is sudden and requires hospital admission. These people are at greatest risk of neurological complications.
- **Assess volume status** (check for postural changes in blood pressure, jugular venous pressure, and presence or absence of oedema or clinical signs of dehydration). Determining volume status can help identify the [causes](#) of hyponatraemia, however changes may be subtle and difficult to interpret.
- **Determine whether the person is taking any [drugs](#) that can cause hyponatraemia** (for example diuretics).

- **Ask about fluid intake and nocturnal polyuria** (suggesting a possible diagnosis of primary polydipsia).
- **Check for disorders that cause hyponatraemia. If clinically indicated, do the appropriate tests:**
 - Intercurrent illness (such as gastroenteritis, or pneumonia) or chronic illness (such as anorexia nervosa).
 - Renal disease — urinalysis for urine protein. See the CKS topic on [Chronic kidney disease - not diabetic](#).
 - Hypothyroidism — thyroid function tests. See the CKS topic on [Hypothyroidism](#).
 - Addison's disease — serum cortisol (morning sample, at 8–9 a.m.). See the CKS topic on [Addison's disease](#).
 - Heart failure and liver disease. See the CKS topic on [Heart failure - chronic](#).
 - Myeloma — serum and urine protein electrophoresis, including Bence–Jones proteins.
 - Cancer (especially lung and upper gastrointestinal cancers).
- **If no apparent cause can be identified clinically, send a spot urine to measure urinary sodium concentration and urinary osmolality together with a blood sample to measure serum sodium concentration and plasma osmolality.**
- Measurement of urinary osmolality and urinary sodium concentration may help to determine an underlying cause of hyponatraemia. See [Interpreting urinary sodium and urinary osmolality](#).

Basis for recommendation

Admission for severe or symptomatic hyponatraemia

- The recommendation to admit people with severe or symptomatic hyponatraemia is based on expert opinion from a review article, *Best practice in primary care pathology* [[Smellie et al, 2007](#)].
- Severe hyponatraemia (sodium concentration less than 115 mmol/L), particularly if of rapid onset, is associated with substantial morbidity and can be life threatening [[Asadollahi et al, 2006](#)].
- A prospective, randomized controlled trial investigating 204 hospitalized people with severe hyponatraemia found that a serum sodium concentration of less than 125 mmol/L was associated with a statistically significant prolonged admission and increased mortality compared with a normal serum sodium concentration. The authors concluded that these people may represent a 'sicker' group, and need increased monitoring and surveillance [[Gill et al, 2006](#)].

Investigation of asymptomatic mild hyponatraemia

- The recommendation to investigate asymptomatic mild or moderate hyponatraemia in primary care is based on a narrative review, *Best practice in primary care pathology* [[Smellie et al, 2007](#)].

Repeating serum sodium concentration measurement

- The recommendation to repeat the serum sodium concentration measurement to confirm hyponatraemia is based on expert opinion from a review article, *Best practice in primary care pathology* [[Smellie et al, 2007](#)].
- The review suggested that a persistent and stable serum sodium concentration of 132–135 mmol/L, in a clinically well person, may represent a statistical population outlier and may not require investigation unless there has been a recent large fall in the serum sodium concentration.

Assessment of fluid status

- The recommendation to assess fluid status is based on expert opinion from the guideline *Hyponatraemia in adults (on or after 16th birthday)* published by the Guideline and Audit Implementation Network (GAIN) for the Northern Ireland Department of Health [[GAIN, 2010](#)], and a several expert reviews [[Goh, 2004](#); [Reynolds et al, 2006](#); [Smellie et al, 2007](#)].
- Differentiating clinically between euvoalaemia and hypovolaemia can be difficult, especially if the classic features of volume depletion (such as tachycardia and low blood pressure) are not present [[McGee et al, 1999](#)].

Further investigations

- The recommendation to consider further investigations is based on expert opinion from the guideline *Hyponatraemia in adults (on or after 16th birthday)* published by the GAIN for the Northern Ireland Department of Health [[GAIN, 2010](#)] and on expert opinion in narrative reviews [[Goh, 2004](#); [Reynolds et al, 2006](#); [Smellie et al, 2007](#)].

Measuring urinary sodium concentration and urinary osmolality

- This recommendation is based on expert opinion from a review article, *Best practice in primary care pathology* [[Smellie et al, 2007](#)].
- Some reviews suggest that a urinary osmolality should not be requested as it can be misleading, and urinary sodium concentration can be difficult to interpret in clinical practice [[Reynolds et al, 2006](#)]. However, CKS believes that these tests are easy to request and can support a specialist in determining an underlying cause for hyponatraemia.

How should I interpret urinary sodium concentration and urinary osmolality?

- **Urinary results should always be interpreted in the clinical context.** For example, diuretic medication can cause a low or a high urinary sodium concentration, depending on the timing of the last dose.
- **Urinary sodium concentration** reflects renal perfusion and the person's effective circulating plasma volume.
 - **Urinary sodium concentration of less than 20–30 mmol/L** suggests:
 - Non-renal losses (for example gastrointestinal [diarrhoea], skin [sweating and burns], and third-space losses [pancreatitis]).
 - Diuretics (early recovery phase of diuretic use).

- Liver cirrhosis with ascites, nephrotic syndrome, congestive cardiac failure.
- Over-hydration with hypotonic fluids (usually parental administration in hospital).
- Low dietary salt intake (for example in alcoholism).
- **A urinary sodium concentration of greater than 20–30 mmol/L** suggests:
 - Renal losses (for example diuretics, aldosterone deficiency, cerebral wasting, salt-losing nephropathy, chronic renal failure).
 - Syndrome of inappropriate antidiuretic hormone secretion (SIADH). See [Suspecting a diagnosis of SIADH](#).
 - Reset osmostat syndrome.
 - Endocrine disorders (for example hypothyroidism, hypopituitarism, Addison's disease).
 - Primary polydipsia.
 - **Urinary osmolality** reflects the kidney's ability to concentrate urine.
 - **Urinary osmolality greater than 100 mOsmol/kg** is seen in all [causes](#) of hyponatraemia, except in primary polydipsia, reset osmostat syndrome, or when a person has a low dietary salt intake (such as in alcoholism).

Basis for recommendation

Urinary sodium concentration

- Owing to the inconsistency in the medical literature regarding the urinary sodium concentration to distinguish between causes of hyponatraemia, the recommendation to use a urinary sodium concentration of 20–30 mmol/L is based on expert opinion from several reviews [[Goh, 2004](#); [Reynolds et al, 2006](#); [Smellie et al, 2007](#)] and the *Oxford textbook of medicine* [[Aching and Ayus, 2010](#)].
- The expert review *Best practice in primary care pathology* [[Smellie et al, 2007](#)] used a urinary sodium concentration of 20 mmol/L as the lower cut off value.
- Another review also used a urinary sodium concentration of 20 mmol/L as the lower cut off value, but considered 40 mmol/L to be the upper cut off value [[Milionis et al, 2002](#)].
- The guideline *Hyponatraemia in adults (on or after 16th birthday)*, published by the Guideline and Audit Implementation Network (GAIN) for the Northern Ireland Department of Health, suggested urinary sodium concentrations of 15 mmol/L as the lower cut off value [[GAIN, 2010](#)].

Urinary osmolality

- The recommendation to use a urinary osmolality of 100 mOsmol/kg as a cut off to distinguish between primary polydipsia and reset osmostat syndrome from all other causes of hyponatraemia is based on expert opinion from several review articles [[Kugler and Hustead, 2000](#); [Milionis et al, 2002](#); [Reynolds et al, 2006](#); [Smellie et al, 2007](#)], the guideline *Hyponatraemia in adults (on or after 16th birthday)* published by GAIN for the Northern Ireland Department of Health [[GAIN, 2010](#)], and an

American guideline, *Hyponatraemia treatment guideline 2007: expert panel recommendations* [[Verbalis et al, 2007](#)].

When should I suspect a diagnosis of syndrome of inappropriate antidiuretic hormone secretion (SIADH)?

▪ **The diagnosis of syndrome of inappropriate antidiuretic hormone secretion (SIADH) is usually confirmed in secondary care.**

○ The diagnosis of SIADH will often require specialist procedures (for example a measurement of the person's fractional excretion of urate). See [Managing hyponatraemia in primary care](#).

○ Syndrome of inappropriate antidiuretic hormone secretion is a diagnosis of exclusion. Specialist investigations are required to determine an underlying [cause](#) of SIADH.

▪ **Suspect SIADH if all of the following diagnostic criteria are met:**

○ Hyponatraemia (serum sodium concentration less than 135 mmol/L).

○ Decreased plasma osmolality (less than 280 mOsmol/kg).

○ Increased urine osmolality (greater than 100 mOsmol/kg).

○ Increased urinary sodium concentration (greater than 30mmol/L).

○ No clinical or biochemical features of adrenal and thyroid dysfunction.

○ No dehydration on clinical examination.

○ No use or recent use of diuretic medication.

Basis for recommendation

Diagnosis of exclusion

▪ This recommendation is based on expert opinion from review articles [[Milionis et al, 2002](#); [Goh, 2004](#); [Reynolds et al, 2006](#); [Smellie et al, 2007](#); [Hannon and Thompson, 2010](#)].

The diagnosis of syndrome of inappropriate antidiuretic hormone secretion (SIADH) may require specialist tests

▪ This recommendation is based on expert opinion from reviews [[Milionis et al, 2002](#); [Goh, 2004](#); [Reynolds et al, 2006](#); [Smellie et al, 2007](#); [Hannon and Thompson, 2010](#)], and what CKS considers to be best practice due to the complicated process of diagnosing SIADH and managing the disorder.

○ Measuring fractional excretion of urate in SIADH has been derived from a narrative review [[Fenske et al, 2008](#)].

Diagnostic criteria

- This information has been derived from expert review articles [[Milionis et al, 2002](#); [Goh, 2004](#); [Reynolds et al, 2006](#); [Smellie et al, 2007](#); [Decaux and Musch, 2008](#); [Hannon and Thompson, 2010](#)] and the original criteria described [[Verbalis, 1989](#)].

Hyponatraemia – Management

Scenario: Hyponatraemia

When should I admit a person with hyponatraemia to hospital?

- **Admit the person with hyponatraemia to hospital immediately** for urgent treatment with intravenous fluids if they:
 - Have a serum sodium concentration of less than 115 mmol/L (severe hyponatraemia).
 - Are [symptomatic](#).
 - Have signs of [hypovolaemia](#).
- **Seek advice** from an endocrinologist, nephrologist, or clinical pathologist regarding admission to hospital *or* an urgent referral.
 - If the person has asymptomatic, moderate hyponatraemia (serum sodium concentration of 115–124 mmol/L).

Basis for recommendation

Admit if the person has hyponatraemia that is severe or symptomatic, or if they have signs of hypovolaemia

- This recommendation is based on expert opinion from several narrative reviews [[Goh, 2004](#); [Reynolds et al, 2006](#); [Smellie et al, 2007](#)], the American guideline *Hyponatraemia treatment guidelines 2007: Expert panel recommendations* [[Verbalis et al, 2007](#)], and the guideline *Hyponatraemia in adults (on or after 16th birthday)* published by the Guideline and Audit Implementation Network (GAIN) for the Northern Ireland Department of Health [[GAIN, 2010](#)].
 - If the person has hyponatraemia that is severe, or if they are significantly symptomatic (such as suffering from confusion), or have signs of hypovolaemia, they are at risk of cerebral oedema and require urgent intervention with intravenous fluids under specialist care.

Contact an endocrinologist if the person has asymptomatic, moderate hyponatraemia

- This recommendation is based on expert opinion from reviews [[Goh, 2004](#); [Smellie et al, 2007](#)] and the American guideline *Hyponatraemia treatment guidelines 2007: Expert panel recommendations* [[Verbalis et al, 2007](#)].
 - The American guideline recommends advice from secondary care if the person's serum sodium concentration is less than 125 mmol/L.

When should I refer a person with hyponatraemia?

- **Refer to an endocrinologist, nephrologist, or chemical pathologist:**
 - If the cause of hyponatraemia is not clear.

- If an [endocrine](#) disorder is suspected. Admission to hospital or urgent referral may be required if Addison's disease is suspected. See the CKS topic on [Addison's disease](#).
- If syndrome of inappropriate antidiuretic hormone secretion (SIADH) is suspected. Specialist advice is needed to confirm a [diagnosis](#), determine an underlying [cause](#), and initiate management.
- If cancer is suspected as an underlying cause of SIADH, refer urgently (to be seen within 2 weeks) to the appropriate specialist. See the CKS topics in the clinical speciality [Cancer - suspected \(NICE referral advice\)](#).
- If [primary polydipsia](#) is suspected.
- If [reset osmostat syndrome](#) or [cerebral salt-wasting](#) is suspected. Specialist advice is needed to confirm the diagnoses and initiate appropriate treatment.
- **Refer to the appropriate specialist**, to discuss management options.
- If the person has hyponatraemia thought to be caused by heart failure, renal failure, or liver failure. See the CKS topics on [Heart failure - chronic](#) and [Chronic kidney disease - not diabetic](#).

Basis for recommendation

Refer to an endocrinologist if the cause of hyponatraemia is not clear

- This recommendation is based on what CKS considers to be best practice. In most people, hyponatraemia is multifactorial, and interpretation of urinary sodium concentration and urinary osmolality can be difficult and unreliable [[Reynolds et al, 2006](#); [Chubb, 2009](#)]. Therefore, specialist advice is appropriate if hyponatraemia is persistent and no cause can be identified in primary care.

Refer to an endocrinologist if syndrome of inappropriate antidiuretic hormone secretion is suspected

- This recommendation is based on expert opinion from a review article, *Best practice in primary care pathology* [[Smellie et al, 2007](#)].

Refer to an endocrinologist if endocrine disease is suspected

- This recommendation is based on expert opinion from a review article, *Best practice in primary care pathology* [[Smellie et al, 2007](#)] and what CKS considers to be best practice.
- Hyponatraemia related to an [endocrine](#) disorder is uncommon, and will require specialist input to confirm the diagnosis and initiate treatment.

Refer to an endocrinologist if reset osmostat syndrome or cerebral salt-wasting is suspected

- This recommendation is extrapolated from expert opinion from a review [[Milionis et al, 2002](#)].
- Distinguishing SIADH from reset osmostat syndrome and cerebral salt-wasting can be difficult, and requires specialist interventions such as a fluid challenge or monitoring of renal uric acid handling. See [Cerebral salt-wasting](#) and [Reset osmostat syndrome](#).

Refer to the appropriate specialist if heart failure, renal failure, or liver failure is contributing to hyponatraemia

- This recommendation is based on expert opinion from several reviews [[Goh, 2004](#); [Reynolds et al, 2006](#); [Smellie et al, 2007](#)], the American guideline *Hyponatraemia treatment guidelines 2007: Expert panel recommendations* [[Verbalis et al, 2007](#)], and the guideline *Hyponatraemia in adults (on or after 16th birthday)* published by the Guideline and Audit Implementation Network (GAIN) for the Northern Ireland Department of Health [[GAIN, 2010](#)].
- There are no published guidelines on how to treat hyponatraemia in people with heart failure, renal failure, or liver failure. It is uncertain whether hyponatraemia is a marker of disease severity or an actual contributor to poor outcome in these disorders. Therefore, specialist advice is necessary before initiating any changes to management such as water and dietary salt restriction [[Verbalis et al, 2007](#)].

How should I manage a person with hyponatraemia not needing hospital admission or a referral to a specialist?

- **People with asymptomatic, mild hyponatraemia** (serum sodium concentration of 125 mmol/L or greater) *not* needing [admission to hospital](#) or [referral to a specialist](#) may be managed in primary care.
- **In all people**, repeat the serum sodium measurement after 1 week, to exclude a rapidly decreasing serum sodium concentration that will require admission to hospital.
- **If the person has an acute illness** that may be contributing to the hyponatraemia, treat the underlying problem and recheck the serum sodium concentration after 2 weeks.
- **If the person is taking drugs** that may be contributing to the hyponatraemia, stop them if appropriate, and recheck the serum sodium concentration after 2 weeks.
- If the person is taking a drug that cannot be stopped (for example an antipsychotic drug), contact their appropriate specialist to discuss whether to stop the drug, monitor the serum sodium concentration, or refer to an endocrinologist, nephrologist, or clinical pathologist. See [Referral to a specialist](#).
- If the serum sodium concentration remains low after discontinuation of the drug, look for another underlying [cause](#), or refer the person to an endocrinologist.

Basis for recommendation

Investigating a person with asymptomatic, mild hyponatraemia

- This recommendation is based on expert opinion from a review, *Best practice in primary care pathology* [[Smellie et al, 2007](#)]. The review states that chronic (duration greater than 48 hours), mild hyponatraemia can often be managed at home.

Repeat serum sodium measurement after 1 week

- This recommendation is practical advice extrapolated from reviews [[Goh, 2004](#); [Smellie et al, 2007](#)] and the American guideline *Hyponatraemia treatment guidelines 2007: Expert panel recommendations* [[Verbalis et al, 2007](#)].

- The literature suggests admitting people with rapidly decreasing serum sodium concentrations. These people are at high risk of cerebral oedema and death. Repeating the serum sodium measurement after one week will help detect vulnerable people needing admission.

Treat an acute illness that may be contributing to hyponatraemia

- This recommendation is based on expert opinion from a narrative review, *Best practice in primary care pathology* [[Smellie et al, 2007](#)].
- The review states that elderly people are vulnerable to hyponatraemia during an acute diarrhoeal illness. Treatment (such as oral rehydration) of the acute problem, may resolve the hyponatraemia without further investigation or intervention.

Stop any drugs contributing to hyponatraemia if appropriate and recheck serum sodium concentration

- This recommendation is based on expert opinion from several reviews [[Goh, 2004](#); [Reynolds et al, 2006](#); [Smellie et al, 2007](#)], the American guideline *Hyponatraemia treatment guidelines 2007: Expert panel recommendations* [[Verbalis et al, 2007](#)], and the guideline *Hyponatraemia in adults (on or after 16th birthday)* published by the Guideline and Audit Implementation Network (GAIN) for the Northern Ireland Department of Health [[GAIN, 2010](#)].
- Drug-induced hyponatraemia usually results from syndrome of inappropriate antidiuretic hormone secretion (SIADH), and will resolve following cessation of the offending drug [[Chan, 1997](#)].
- In a systematic (search date: December 2005) review to evaluate the role of selective serotonin reuptake inhibitors (SSRIs) in hyponatraemia, after discontinuation of SSRIs, most serum sodium concentrations returned to normal in 2 weeks [[Jacob and Spinler, 2006](#)].
- The recommendation to look for another underlying [cause](#) or refer the person to an endocrinologist if their serum sodium concentration remains low after discontinuation of the drug, is based on what CKS considers to be good clinical practice, and evidence from review articles state that hyponatraemia is often multifactorial.

How is hyponatraemia managed in secondary care?

- In secondary care, the overall management is aimed at determining and treating the underlying [cause](#) of hyponatraemia. Treatment will usually be based on the presence or absence of symptoms, the rate of onset of hyponatraemia, and the person's volume status. The person presenting in secondary care with:
 - **Symptomatic hyponatraemia (usually of rapid onset, less than 48 hours)** may be given hypertonic saline (3%) to restore their serum sodium concentration to a safe level (usually greater than 120 mmol/L).
 - Urgent treatment is needed to reduce neurological symptoms and avoid worsening complications (such as coma).
 - **Asymptomatic (or mild symptoms), hypovolaemic hyponatraemia** will be given intravenous normal saline (0.9%), which will be continued until the person's blood pressure is restored.

- The correction of serum sodium concentration should be limited to 8 mmol/L to 12 mmol/L in the first 24 hours or 18 mmol/L over a period of 48 hours, especially if the duration of hyponatraemia is undetermined.
- A more rapid correction of serum sodium concentration may cause central pontine myelinolysis. In central pontine myelinolysis, the brain cells shrink, causing irreversible neurological complications (usually a few days after the serum sodium concentration is corrected).
- **Asymptomatic (or mild symptoms), euvolaemic hyponatraemia** will usually be fluid restricted.
- Fluid intake must be restricted to around 500–1000 mL per day.
- Dietary salt is not restricted. These people will have a normal or low total body sodium level.
- Several days of fluid restriction is required before the serum sodium will start to rise.
- **Asymptomatic (or mild symptoms), hypervolaemic hyponatraemia** will have treatment focused on optimizing their underlying disorder (for example liver failure).
- Treatment usually involves fluid restriction *and* dietary salt restriction, with or without diuretic medication.
- **Refractory hyponatraemia** will have the underlying [cause\(s\)](#) of hyponatraemia reconsidered.
- In people with euvolaemic hyponatraemia, the specialist may give an intravenous fluid challenge to determine whether the person has clinically unapparent hypovolaemia. If the person is hypovolaemic, their serum sodium concentration will begin to rise when they are given intravenous fluids.
- In people with hyponatraemia associated with syndrome of inappropriate secretion of antidiuretic hormone (SIADH), liver cirrhosis, or heart failure, the specialist may use medication that blocks the action of ADH. For example, demeclocycline or a vasopressin antagonist (such as tolvaptan). These drugs promote water excretion. See the section on [Pathophysiology](#).

Basis for recommendation

Management of hyponatraemia in secondary care

- This information is derived from several reviews [[Goh, 2004](#); [Reynolds et al, 2006](#); [Smellie et al, 2007](#)], the American guideline *Hyponatraemia treatment guidelines 2007: Expert panel recommendations* [[Verbalis et al, 2007](#)], and the guideline *Hyponatraemia in adults (on or after 16th birthday)* published by the Guideline and Audit Implementation Network (GAIN) for the Northern Ireland Department of Health [[GAIN, 2010](#)].
- The strength of evidence on fluid repletion or fluid restriction for managing hyponatraemia is, at best, the outcome of retrospective analyses, or what experts consider to be logical and best practice [[Reynolds and Seckl, 2005](#)].