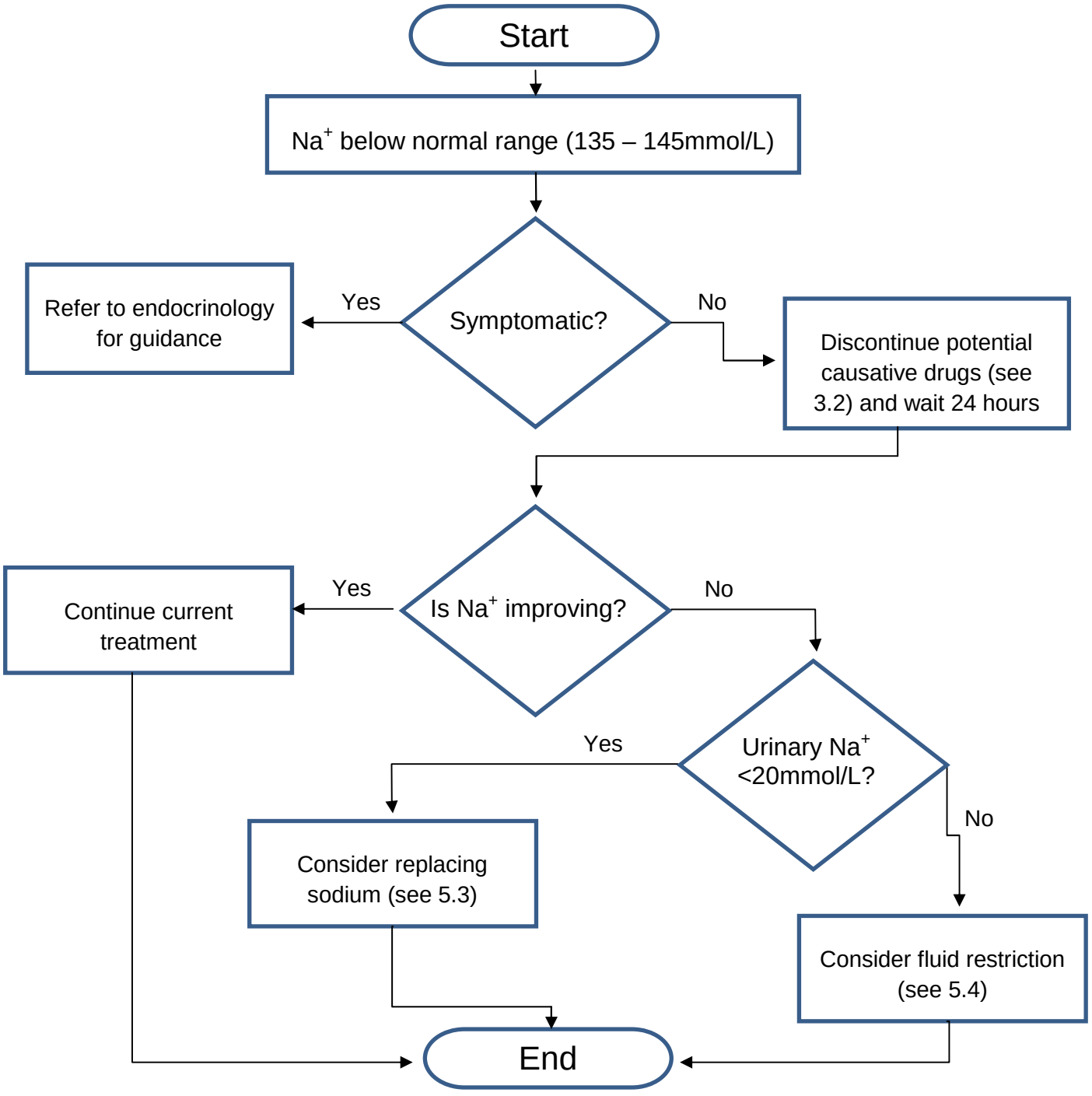
CLINICAL GUIDELINE FOR THE MANAGEMENT OF HYPONATRAEMIA

Summary

Key:

General Notes | GP/SWASFT

ED/MAU/SRU/Acute GP/Amb-Care | In-patient wards



1. Aim/Purpose of this Guideline

1.1. This guideline has been written to inform doctors, pharmacists and nursing staff and provide a reference in the management of hyponatraemia in adults.

2. Introduction

2.1. Serum sodium content is regulated by volume receptors; water content is adjusted to maintain normal osmolality and a normal sodium concentration. Therefore, disturbances of sodium concentration are usually caused by disturbances of water balance.

2.2. Hyponatraemia (Na^+ <135mmol/L), an abnormal fall in the plasma-sodium concentration, usually with a simultaneous fall in the plasma osmolality, is not uncommon. Therapy is guided by the rate of development and degree of hyponatraemia, accompanying symptoms, and the state of water balance, and should also take into account the underlying cause.

3. Causes of hyponatraemia

3.1. In almost all patients hyponatraemia results from the intake (oral or IV) and/or subsequent retention of water. Abnormal losses of water are less common. Hyponatraemia may be exacerbated by:

- Drugs (see 3.2)
- Water excess, either orally or as excess 5% dextrose IV
- Excess losses due to diarrhoea or vomiting
- SIADH
- Cirrhosis and liver failure
- Heart failure
- Chronic malnutrition or salt depletion

3.2. Drug causes

3.2.1. Common drugs causing hyponatraemia include:

Thiazide diuretics (most common cause)	Bendroflumethiazide
	Indapamide
	Metolazone
Loop diuretics (particularly if also hypokalaemic)	Bumetanide
	Furosemide
Potassium-sparing diuretics	Amiloride
	Eplerenone
	Spironolactone
Combined diuretics	Co-amilofruse
	Co-amilozide
Angiotensin II receptor blockers and ACE inhibitors	Candesartan
	Irbesartan
	Losartan
	Captopril
	Enalapril
	Lisinopril
	Ramipril
Tricyclic (and related) antidepressants	Amitriptyline
	Clomipramine
	Dosulepin
	Imipramine
	Nortriptyline
	Trazodone
	Trimipramine

SSRIs	Citalopram
	Fluoxetine
	Fluvoxamine
	Paroxetine
	Sertraline
MAO inhibitors	Isocarboxazid
	Moclobemide
	Phenelzine
	Tranylcypromine
Proton pump inhibitors	Lansoprazole
	Omeprazole
Anticonvulsants	Carbamazepine
	Valproate
Others	Amiodarone
	Duloxetine
	Glimeripide
	Glipizide
	Haloperidol
	NSAIDs
	Opiates
	Theophylline
	Venlafaxine

3.3. Causes by volume status

Hypovolaemic	Euvolaemic	Hypervolaemic
Urine Na^+ <20mmol/L • GI: vomiting/diarrhoea/fistula • Fluid shifts (e.g. pancreatitis) • Haemorrhage • Burns/sweating • Cystic fibrosis ***Urine Na^+ >20mmol/L*** • Diuretics • Osmotic diuresis (hyperglycaemia, severe uraemia) • Adrenal insufficiency • Renal diseases (salt-wasting nephropathies or nephrocalcinosis)	• Acute or chronic water overload • SIADH • Severe hypothyroidism • Desmopressin • Adrenal insufficiency • Antidepressant therapy • Glucocorticoid deficiency	• Renal failure (acute or chronic) • Cardiac failure • Liver cirrhosis • Nephrotic syndrome • Hypoalbuminaemia

4. Signs and Symptoms

4.1. Patients are often asymptomatic or have non-specific symptoms. However, symptoms of hyponatraemia can include:

Anorexia, nausea, malaise, headache, confusion, drowsiness, weakness, irritability and gait disturbances.

In more severe cases, this can progress to seizures, coma and respiratory arrest.

4.2. Severity of hyponatraemia is usually classified as follows:

Mild	Moderate	Severe
Na^+ 134-130mmol/L	Na^+ 129-120mmol/L	Na^+ <120mmol/L

5. Treatment

5.1. Treatment should NOT be based on plasma sodium concentration alone. The presence of symptoms, duration of hyponatraemia and state of hydration will all influence treatment. Where possible, correct the underlying cause.

5.2. In asymptomatic hyponatraemia, the first step should be to discontinue potential causative drugs. If this has not been effective after 24h, urine sodium should be measured to determine further treatment.

5.3. Urinary sodium < 20mmol/L

5.3.1. If urinary sodium is less than 20mmol/L following correction of potential causes and serum sodium is not resolving, consider replacing sodium.

5.3.2. Sodium levels should be taken twice daily and must not increase by more than 7-10mmol/L in 24 hours. If serum sodium rises more quickly, active treatment with 5% dextrose will be needed to keep total sodium rise lower than 10mmol. After the first day, sodium should not rise by more than 8mmol/L/24h.

5.3.3. **Note:** The use of hypertonic saline (concentrations > 0.9%) requires 6 hourly monitoring of sodium levels and should therefore only be carried out in an HDU/ITU setting.

5.4. Urinary sodium > 20mmol/L

5.4.1. If urinary sodium is greater than 20mmol/L following correction of potential causes and serum sodium is not resolving, patients should be fluid restricted to 1L. If this has no effect after 48 hours, restrictions should be tightened to 750mL.

5.4.2. If this is ineffective, demeclocycline may be indicated, however this is highly nephrotoxic. Fluid restricted patients receiving demeclocycline will need daily monitoring of renal function as well as sodium levels.

5.5. **In all cases, refer for endocrine review if serum sodium is less than 120-125mmol/L.**

6. Further information/special instructions

6.1. Syndrome of inappropriate ADH (SIADH)

6.1.1. An important but over-diagnosed cause of hyponatraemia. The diagnosis requires concentrated urine (Na >30mmol/L and osmolality >100mOsmol/kg), low plasma osmolality (<260mOsmol/kg) and the absence of hypovolaemia, oedema or hypokalaemia.

6.1.2. **Diagnosis:**

- Urinary Na >30mmol/L
- Low plasma osmolality and high urine osmolality (>100mOsm/kg)
- Euvolaemia
- Exclude thyroid, renal, adrenal and pituitary causes
- Exclude diuretics and other drugs as causes

6.1.3. **Causes:**

- Malignancy - small cell lung, pancreas, prostate, thymus or lymphoma
- CNS disorders - meningoencephalitis, abcess, stroke, subarachnoid or subdural haemorrhage, head injury, neurosurgery, Guillain-Barré, vasculitis
- Chest disease - TB, pneumonia, abscess, aspergillosis
- Other - acute intermittent porphyria, trauma, major abdominal or thoracic surgery, symptomatic HIV
- Drugs (ecstasy, opiates, psychotropics, SSRI's, cytotoxics)

6.1.4. **Treatment**

6.1.4.1. Treat the cause. Consider fluid restricting to <1000mLs/day.

6.1.4.2. Oral salt tablets may be required if severe and unresolving.

7. Potential complications

7.1. Osmotic demyelination syndrome

7.1.1. A rapid rise in extracellular osmolality, particularly if there is an 'overshoot' to high serum sodium and osmolality, will result in severe shrinking of brain cells characterised by focal demyelination in the pons and extrapontine areas.

7.1.2. Pathophysiology is controversial: often appears to develop when chronic hyponatraemia is complicated by hypoxia, so may be a form of hypoxic encepthalopathy associated with hyponatraemia.

7.1.3. Symptoms include dysarthria, dysphagia, seizures, altered mental status, quadriparesis, and hypotension. These typically begin 2-4 days after correction of serum sodium level.

7.1.4. Typically irreversible (although not always), and often devastating.

7.1.5. More common in patients with hypokalaemia, females, patients with liver disease, malnutrition, a history of alcoholism or a liver transplant.

7.1.6. Prevention is by ensuring adequate oxygenation, and a gradual increase in serum sodium level to 120-125mmol/L. Serum sodium should **not** normalise within the first 48 hours.

7.1.7. Risk is less where chronic hyponatraemia is corrected at no more than 7-10mmol/L in the first 24 hours and no more than 18mmol/L in the first 48 hours.

7.1.8. Patients with chronic hyponatraemia and severe symptoms (e.g. severe confusion, coma, seizures) should receive only enough hypertonic saline to stop seizures and raise serum sodium by 4-6mmol/L over 24 hours.

7.1.9. Therapeutic relowering of serum sodium with hypotonic fluids (e.g 5% dextrose) and desmopressin (DDAVP) may help avert neurologic sequelae if chronic hyponatraemia is inadvertently corrected too quickly.

6. Monitoring compliance and effectiveness

Element to be monitored	The prescribing and monitoring of hyponatraemia.
Lead	Medications Safety Pharmacist
Tool	An audit tool will be developed to monitor compliance Datix will be used to identify clinical incidents
Frequency	The policy will be monitored every three years, or sooner as clinical incidents dictate
Reporting arrangements	The audit results will be reported to the Medication Practice Committee (MPC) and the individual areas audited Clinical incidents on Datix will be reported to the senior nurse/manager in that area and will also be reported to the Medication Safety Group
Acting on recommendations and Lead(s)	The MPC will co-ordinate the actions to the audit results. Actions from incident reports will be at a local level and may also resulting broader actions, co-ordinated by the Medication Safety Group.
Change in practice and lessons to be shared	Required changes to practice will be identified and actioned within the time frame specified in the action plan.

7. Equality and Diversity

7.1. This document complies with the Royal Cornwall Hospitals NHS Trust service Equality and Diversity statement which can be found in the 'Equality, Diversity & Human Rights Policy' or the Equality and Diversity website.

7.2. ***Equality Impact Assessment***

The Initial Equality Impact Assessment Screening Form is at Appendix 2.

Appendix 1. Governance Information

Document Title	Clinical Guideline for the Management of Hyponatraemia			
Date Issued/Approved:	August 2017			
Date Valid From:	4 August 2017			
Date Valid To:	4 August 2020			
Directorate / Department responsible (author/owner):	Liam Kelly, Medicines Information Bronwin Staple, Medicines Information Steven Creely, Consultant Endocinologist Simon Fleming, Consultant Biochemist Ann Cardell, Medication Safety			
Contact details:	01872 252587			
Brief summary of contents	Guideline on the diagnosis and treatment of hyponatraemia.			
Suggested Keywords:	Hyponatraemia, sodium, electrolyte, electrolytes			
Target Audience	RCHT	PCH	CFT	KCCG
	✓			
Executive Director responsible for Policy:	Medical Director			
Date revised:	N/A			
This document replaces (exact title of previous version):	N/A			
Approval route (names of committees)/consultation:	Medication Practice Committee, Pharmacy, Endocrinology, Biochemistry			
Divisional Manager confirming approval processes	*Head of relevant Division*			
Name and Post Title of additional signatories	Not required			
Name and Signature of Divisional/Directorate Governance Lead confirming approval by specialty and divisional management meetings	{Original Copy Signed}			
	Name:			
Signature of Executive Director giving approval	{Original Copy Signed}			
Publication Location (refer to Policy	Internet & Intranet		Intranet Only	✓

on Policies – Approvals and Ratification):				
Document Library Folder/Sub Folder	Clinical / Pharmacy			
Links to key external standards	None			
Related Documents:				
Training Need Identified?	No			

Version Control Table

Date	Version No	Summary of Changes	Changes Made by *(Name and Job Title)*
Aug 2017	V1.0	Initial Issue	Bronwin Staple Lead Pharmacist Medicines Information

All or part of this document can be released under the Freedom of Information Act 2000

This document is to be retained for 10 years from the date of expiry.

This document is only valid on the day of printing

Controlled Document

This document has been created following the Royal Cornwall Hospitals NHS Trust Policy on Document Production. It should not be altered in any way without the express permission of the author or their Line Manager.

Appendix 2. Initial Equality Impact Assessment Form

Name of Name of the strategy / policy /proposal / service function to be assessed (hereafter referred to as *policy*) (Provide brief description): Clinical guideline for the treatment of hyponatraemia	
Directorate and service area All clinical areas:	Is this a new or existing Policy? New policy
Name of individual completing assessment: Bronwin Staple	Telephone: 01872 252587
1. Policy Aim* Who is the strategy / policy / proposal / service function aimed at?	To provide guidance on the diagnosis and management of hyponatraemia
2. Policy Objectives*	To ensure the safe treatment of hyponatraemia
3. Policy – intended Outcomes*	Treatment of hyponatraemia complies with the guidance set out in this document
4. *How will you measure the outcome?	Ongoing audit
5. Who is intended to benefit from the policy?	Hyponatraemic patients and the clinical staff treating them
6a) Is consultation required with the workforce, equality groups, local interest groups etc. around this policy? b) If yes, have these *groups been consulted? C). Please list any groups who have been consulted about this procedure.	No Medications Safety Group, Medicines Information, Biochemistry, Endocrinology.

7. The Impact Please complete the following table.			
Are there concerns that the policy **could** have differential impact on:			
Equality Strands:	Yes	No	Rationale for Assessment / Existing Evidence
Age		✓	Policy for all patients
Sex (male, female, trans-gender / gender reassignment)		✓	Policy for all patients
Race / Ethnic communities /groups		✓	Policy for all patients

Disability - Learning disability, physical disability, sensory impairment and mental health problems		✓	Policy for all patients
Religion / other beliefs		✓	Policy for all patients
Marriage and civil partnership		✓	Policy for all patients
Pregnancy and maternity		✓	Policy for all patients
Sexual Orientation, Bisexual, Gay, heterosexual, Lesbian		✓	Policy for all patients

You will need to continue to a full Equality Impact Assessment if the following have been highlighted:

- You have ticked "Yes" in any column above and
- No consultation or evidence of there being consultation- this excludes any *policies* which have been identified as not requiring consultation**. or**
- Major service redesign or development

8. Please indicate if a full equality analysis is recommended.	**Yes**	**No** ✓

9. If you are not recommending a Full Impact assessment please explain why.

Signature of policy developer / lead manager / director	Date of completion and submission August 2017

Names and signatures of members carrying out the Screening Assessment	1. Liam Kelly 2. Bronwin Staple 3. Steven Creely 4. Simon Fleming	

Keep one copy and send a copy to the Human Rights, Equality and Inclusion Lead, c/o Royal Cornwall Hospitals NHS Trust, Human Resources Department, Knowledge Spa, Truro, Cornwall, TR1 3HD

A summary of the results will be published on the Trust's web site.

Signed _____

Date _____