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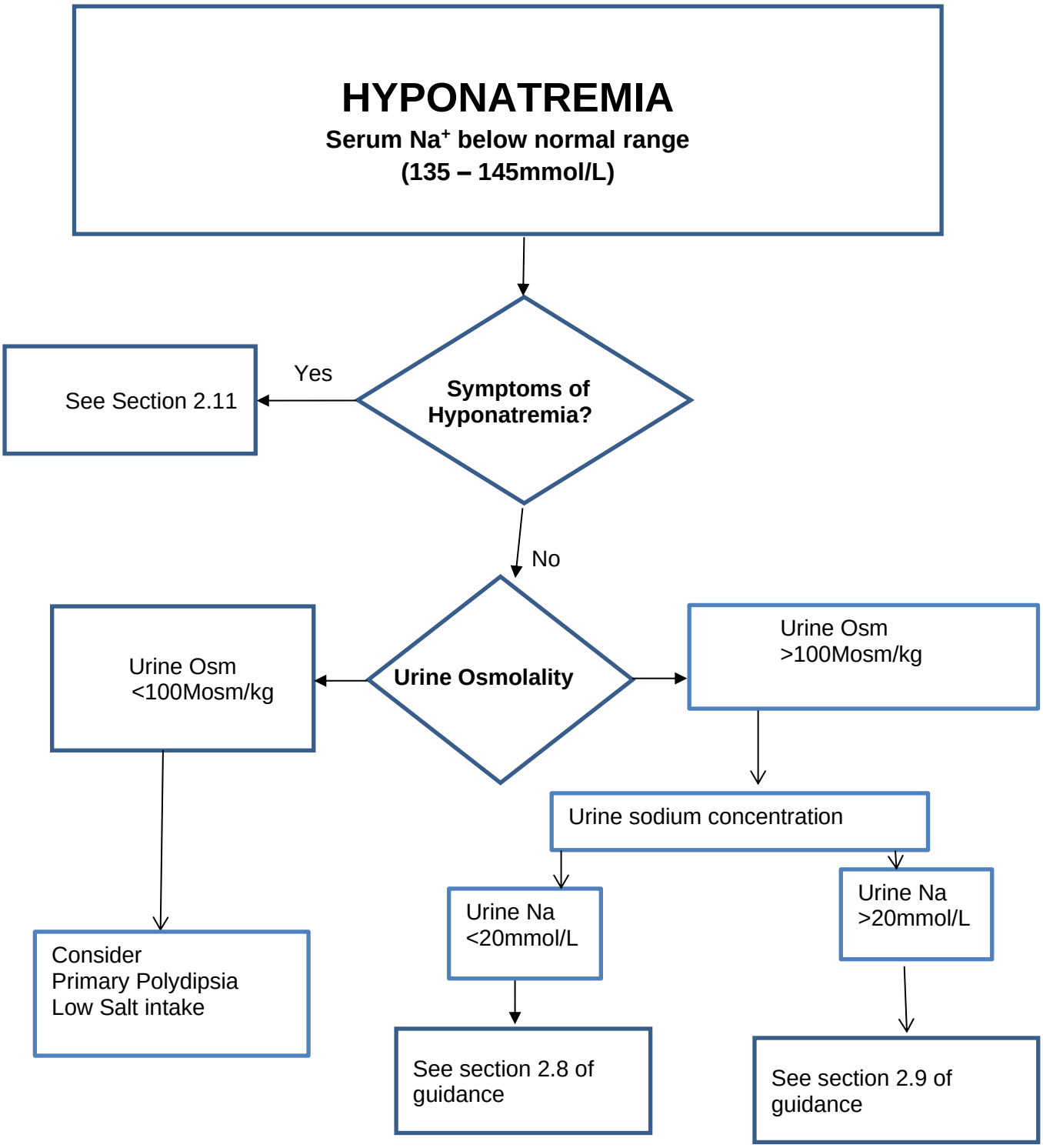
Royal Cornwall Hospitals NHS Trust

Management of Hyponatraemia Clinical Guideline

V2.0

July 2021

Summary


HYPONATREMIA
Serum Na+ below normal range
(135 – 145mmol/L)
Symptoms of Hyponatremia?
Yes
See Section 2.11
No
Urine Osmolality
Urine Osm <100Mosm/kg
Urine Osm >100Mosm/kg
Consider Primary Polydipsia Low Salt intake
Urine sodium concentration
Urine Na <20mmol/L
Urine Na >20mmol/L
See section 2.8 of guidance
See section 2.9 of guidance

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.

1.2. This version supersedes any previous versions of this document.

Data Protection Act 2018 (General Data Protection Regulation – GDPR) Legislation

The Trust has a duty under the DPA18 to ensure that there is a valid legal basis to process personal and sensitive data. The legal basis for processing must be identified and documented before the processing begins. In many cases we may need consent; this must be explicit, informed and documented. We cannot rely on opt out, it must be opt in.

DPA18 is applicable to all staff; this includes those working as contractors and providers of services.

For more information about your obligations under the DPA18 please see the *Information Use Framework Policy* or contact the Information Governance Team rch-tr.infogov@nhs.net

2. The Guidance

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.

2.3. Causes of hyponatraemia

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 2.4)
- 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

2.4. **Drug causes**

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

2.5. **Causes by volume status**

Hypovolaemic

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)

Euvolaemic

- Acute or chronic water overload
- SIADH
- Severe hypothyroidism
- Desmopressin
- Adrenal insufficiency
- Antidepressant therapy
- Glucocorticoid deficiency

Hypervolaemic

- Renal failure (acute or chronic)
- Cardiac failure
- Liver cirrhosis
- Nephrotic syndrome
- Hypoalbuminaemia

2.6. **Signs and Symptoms**

2.6.1 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.

2.6.2 Severity of hyponatraemia is usually classified as follows:

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

Initial Assessment

- Pulse, Postural BP, capillary blood glucose, weight, fluid balance chart

Investigations:

- Renal function, Liver function tests
- Paired Serum osmolality and Urine osmolality and urine Na+, K^+ before starting intravenous fluids
- Cortisol (9am level)
- Thyroid function tests
- Review drug charts and stop any contributing medications (see table 2.4)
- Review fluid charts
- Abbreviated mental test score (AMTS), assess volume status

Symptoms of hyponatraemia depend on severity and how acute onset:

- **Mild** – Headache, irritability, inability to concentrate, altered mood, unstable gait
- **Moderate** – Nausea, confusion, disorientation, altered mental status, falls
- **Severe** – Seizures, coma, respiratory distress, vomiting

2.7. **Treatment**

2.7.1 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.

2.7.2 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.

2.8. **Urinary sodium < 20mmol/L**

- Following correction of potential causes and serum sodium is not resolving, consider replacing sodium;
- Give 1 litre 0.9% NaCl (rate as per clinical need) and Ensure adequate salt intake (consider Slow Na 2 tablets QDS)
- Recheck U&E after;
  - 6 hrs if Na <120
  - 12 hrs if Na 120-126
  - Next morning if >126

2.9. **Urinary sodium > 20mmol/L**

2.9.1 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.

2.9.2 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.

2.9.3 Tolvaptan is a vasopressin receptor antagonist which is licensed for the treatment of hyponatraemia secondary to SIADH. Tolvaptan should ONLY be initiated by a Consultant Physician. For further advice contact a senior Endocrinologist or Oncologist.

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

Over rapid correction of hyponatraemia carries a risk of osmotic demyelination syndrome and long term neurological sequelae (see section 2.12).
Sodium levels must not increase by more than 8-10mmol/L in 24 hours and 18mmol in 48 hours.

2.10. **Further information/special instructions**

2.10.1 **Syndrome of inappropriate ADH (SIADH)**

An important but over-diagnosed cause of hyponatraemia. The diagnosis requires concentrated urine (Na >30mmol/L and osmolality >100mOsmol/kg), low plasma osmolality (<275mOsmol/kg) and the absence of hypovolaemia, oedema or hypokalaemia.

2.10.2 **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

2.10.3 **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)

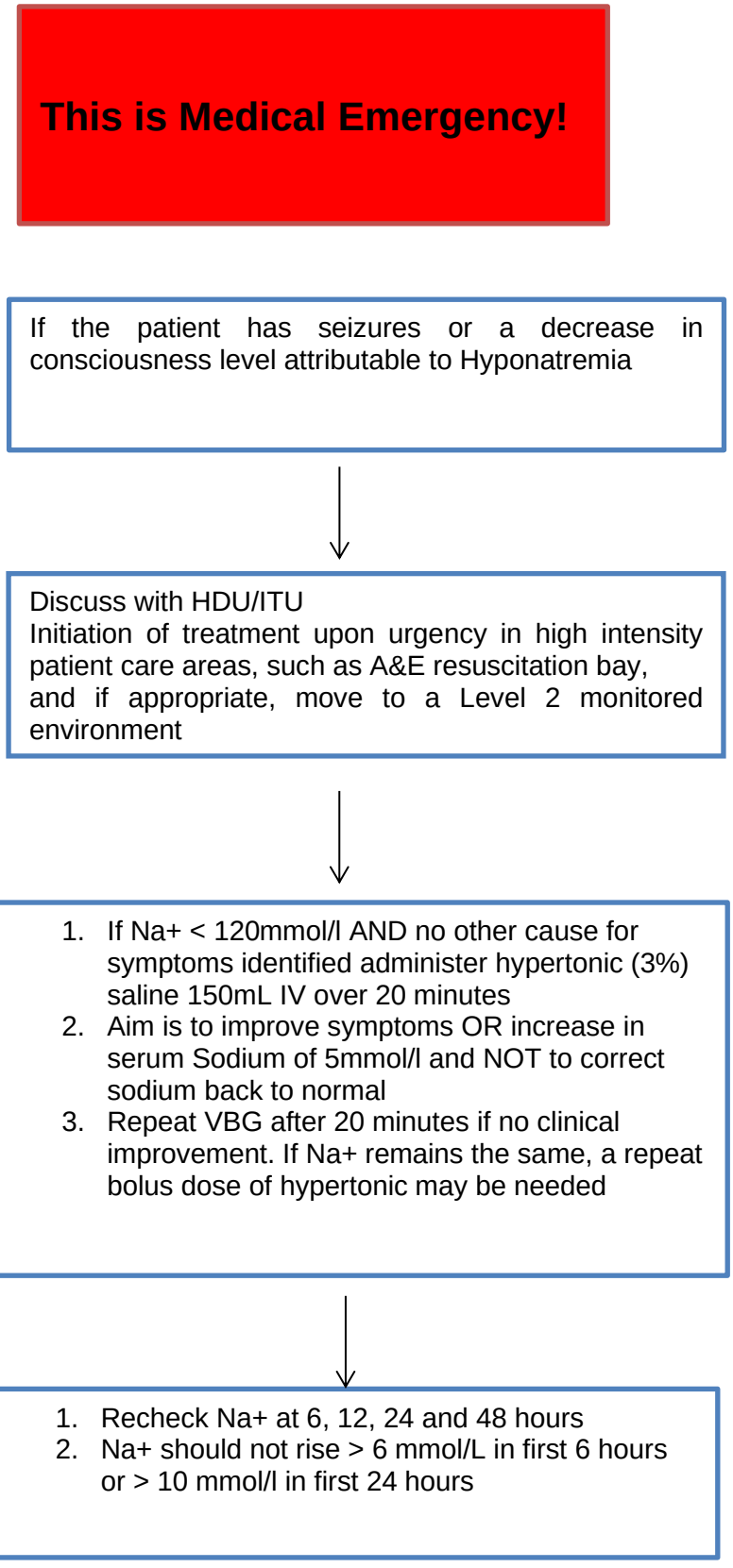
2.10.4 **Treatment (See Section 2.9)**

2.10.4.1 Treat the underlying cause

2.10.4.2 Consider fluid restricting to <1000mLs/day If this has no effect after 48 hours, restrictions should be tightened to 750mL

2.10.4.3 Oral salt tablets may be required if severe and un-resolving.

2.11. **Management of Acute Symptomatic Hyponatremia**



2.12. **Potential Complications**

2.12.1 **Osmotic demyelination syndrome**

2.12.1.1 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.

2.12.1.2 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.

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

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

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

2.12.1.6 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.

2.12.1.7 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.

2.12.1.8 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.

3 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.

4 Equality and Diversity

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

4.2 Equality Impact Assessment

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

Appendix 1. Governance Information

Document Title	Management of Hyponatraemia Clinical Guideline V2.0				
This document replaces (exact title of previous version):	Clinical Guideline for the Management of Hyponatraemia V1.0				
Date Issued/Approved:	12 July 2021				
Date Valid From:	July 2021				
Date Valid To:	July 2024				
Directorate / Department responsible (author/owner):	Dr Haidar Khan, Consultant Endocrinologist				
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	CFT	KCCG		
	✓				
Executive Director responsible for Policy:	Medical Director				
Approval route for consultation and ratification:	Endocrinology Governance Group Medication Practice Committee				
General Manager confirming approval processes	Rachael Pearce				
Name of Governance Lead confirming approval by specialty and care group management meetings	Becky Osborne				
Links to key external standards	None				
Related Documents:	None required				
Training Need Identified?	No				
Publication Location (refer to Policy on Policies – Approvals and Ratification):	Internet & Intranet	✓	Intranet Only		
Document Library Folder/Sub Folder	Clinical / Endocrinology				

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
Feb 2021	V2.0	Full Update	Dr Haidar Khan, Consultant Endocrinologist

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 for the Development and Management of Knowledge, Procedural and Web Documents (The Policy on Policies). 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 the strategy / policy /proposal / service function to be assessed Management of Hyponatraemia Clinical Guideline V2.0					
Directorate and service area: Endocrinology, Specialist Medicine			**Is this a new or existing Policy?** Existing		
Name of individual/group completing EIA Bronwin Staple, Pharmacist			**Contact details:** 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	Ongoing audit				
4. How will you measure the outcome?	Hyponatraemic patients and the clinical staff treating them				
5. Who is intended to benefit from the policy?	Staff and Patients				
6a). Who did you consult with?	Workforce	Patients	Local groups	External organisations	Other
	✓				
b). Please list any groups who have been consulted about this procedure.	Endocrinology Governance Group Medication Practice Committee				
c). What was the outcome of the consultation?	Agreed				

7. The Impact

Please complete the following table. If you are unsure/don't know if there is a negative impact you need to repeat the consultation step.

Are there concerns that the policy **could** have a positive/negative impact on:

Protected Characteristic	Yes	No	Unsure	Rationale for Assessment / Existing Evidence
Age		✓		Policy for all patients
Sex (male, female non-binary, asexual etc.)		✓		Policy for all patients
Gender reassignment		✓		Policy for all patients
Race/ethnic communities /groups		✓		Policy for all patients
Disability (learning disability, physical disability, sensory impairment, mental health problems and some long term health conditions)		✓		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

If all characteristics are ticked 'no', and this is not a major working or service change, you can end the assessment here as long as you have a robust rationale in place.

I am confident that section 2 of this EIA does not need completing as there are no highlighted risks of negative impact occurring because of this policy.

Name of person confirming result of initial impact assessment:	Dr Haidar Khan, Consultant Endocrinologist

If you have ticked 'yes' to any characteristic above OR this is a major working or service change, you will need to complete section 2 of the EIA form available here:

Section 2. Full Equality Analysis

For guidance please refer to the Equality Impact Assessments Policy (available from the document library) or contact the Human Rights, Equality and Inclusion Lead india.bundock@nhs.net