Royal Hospital for Women (RHW) BUSINESS RULE COVER SHEET



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AUTHOR	Dr A Beech (Obstetric Physician)
	M Anderson (Midwifery Educator)
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Within this document we will use the term woman, this is not to exclude those who give birth and do not identify as female. It is crucial to use the preferred language and terminology as described and guided by each individual person when providing care.

1 BACKGROUND

Hyponatraemia is defined as a serum sodium (Na) concentration <135 mmol/L non-pregnant, and <130 mmol/L in pregnancy. It is the most common disorder of body fluid and electrolyte balance encountered in clinical practice. It can lead to a wide spectrum of clinical symptoms, from subtle to severe or even life-threatening neurological changes, and is associated with increased mortality, morbidity and length of hospital stay.

The normal range of the serum or plasma sodium concentration is 135 to 145 mmol/L. In pregnancy, the lower limit of normal is 130mmol/L.

The aim of this CBR is to guide clinicians in the recognition, differential diagnosis, classification, and appropriate management of woman with hyponatremia.

2 RESPONSIBILITIES

- 2.1 Medical Staff review, treatment and escalation of care when required
- 2.2 **Midwifery and Nursing Staff –** monitoring of fluid intake and observations, care and escalation to medical team as required



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3 PROCEDURE

3.1 Clinical Practice

- Identity woman with:
 - Mild hyponatremia: serum sodium 130-135mmol/L or if pregnant 130-132mmol/L (normal sodium in pregnancy is >132mmol/L)
 - Moderate hyponatremia: serum sodium 120-129 mmol/L with no cerebral symptoms
 - Severe hyponatremia: serum sodium < 120 mmol/L or with cerebral symptoms
- Take careful clinical and medication history
- Assess and document the woman's volume status by physical examination (skin turgor, evaluation of mucous membrane or review of fluid balance chart), and her neurological status using the Glasgow Coma Scale (GCS)
- Collect blood for measurement of serum osmolality (serum blood tube) and a spot urine for measurement of urine osmolality and urine sodium
- Identify and treat any potentially reversible underlying cause of hyponatremia as outlined in Table 1 in educational notes
- Discuss moderate and severe hyponatremia woman with obstetric medicine team
- Be aware that acute symptomatic and/or severe hyponatremia is a medical emergency and take the following actions while undertaking the above assessments:
- Initiate Clinical Emergency Response System (CERS)
- Notify the anaesthetic team, obstetric physician on call +/- refer to Prince of Wales Hospital (POWH) intensive care unit (ICU) on-call team

3.1.1 Treatment

General Principles

- Administer treatment dependent on the chronicity, the underlying cause, the clinical and biochemical severity, and the woman's co-morbidities. Harm often follows inappropriate or rapid treatment of hyponatremia in asymptomatic patients
- Assume hyponatremia is chronic, if in doubt
- Identify and treat any underlying cause in addition to direct treatment for hyponatremia
- Cease any drugs implicated in hyponatremia
- Instigate treatment strategies which are dependent on volume status, symptoms, and severity



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- Consult obstetric medicine to determine recommendations for treatment of moderate and severe hyponatremia (volume status, symptoms or severity)
- Be aware only acute (<48 hours), symptomatic hyponatremia should be reversed rapidly

Recommendations for treatment by volume status

Hypovolaemic hyponatremia:

- Cease any drugs implicated as a cause of hypovolaemic hyponatremia before IV treatment begins
- Replace fluid volume, if volume depleted, for severe or chronic hyponatremia with:
- 250mL boluses of 0.9% sodium chloride
- frequent (2-4 hourly) assessment of sodium and water balance
- Avoid continuous infusion, since rapid correction can depress antidiuretic hormone (ADH) and lead to sudden massive diuresis and an overly rapid increase in sodium

Hypervolemic hyponatremia:

- Restrict fluids to a woman who is oedematous due to heart, liver, or kidney failure
- Consider using a loop diuretic as long as IV volume is not depleted further

Euvolemic hyponatremia:

- Evaluate treatment dependent on:
 - presence of central nervous system symptoms e.g. unconsciousness, seizure, drowsiness, headache
 - \circ severity
 - rate of development
- Be aware 0.9% sodium chloride is generally not helpful in euvolemic hyponatremia and will usually worsen hyponatremia in Syndrome of Inappropriate Antidiuretic Hormone Secretion (SIADH). This is because the sodium will be lost in the urine whilst the water will be retained in proportion to the urine: plasma osmolality ratio



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Recommendations for treatment by severity of hyponatremia

Mild hyponatremia (130-135mmol/L, pregnant 130-132mmol/L)

- Manage on ward
- Restrict fluid to 1000mL per 24 hours for the non-pregnant woman only with euvolemic or hypervolemic hyponatremia
- Monitor serum electrolytes, creatinine once daily
- Be aware of considerations in pregnancy (see below)

Moderate hyponatremia (120-129mmol/L)

- Manage woman with moderate hyponatremia after discussion with obstetric medicine
- Manage on ward
- Restrict fluid to 800mL per 24 hours for woman with euvolemic or hypervolemic hyponatremia
- Commence strict fluid balance
- Monitor serum electrolytes, creatinine twice daily
- Be aware more aggressive intervention to increase the serum sodium concentration above 120 mmol/L is generally not indicated

Severe hyponatremia

- Manage woman with severe hyponatremia after discussion with obstetric medicine or ICU
- Discuss treatment plans with the Close Observation Unit Nurse in charge and the Access and Demand Manager/After Hours Nurse Manager (ADM/AHNM) as transfer to Close Observation Unit (COU) or POWH ICU is mandatory for this woman
- Identify woman with acute, symptomatic and/or severe hyponatremia who may require treatment with 3% sodium chloride. If 3% sodium chloride (hypertonic saline) is to be given this must occur in POWH ICU (not COU ward) as rapid correction of hyponatremia may produce permanent central nervous system injury, due to osmotic demyelination and requires critical care monitoring.
- Manage severe hyponatremia in POWH ICU
- Manage as outlined in appendix 1
- Document a detailed plan in the medical record
- Avoid complications related to rapid correction of serum sodium particularly osmotic demyelination, by aiming for a maximum rate of change in the serum sodium concentration of not more than 4-8 mmol/L in the first 24 hours and an additional 4-6 mmol/24 hours thereafter



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- Review all existing medications and modify if required
- Commence fluid restriction (oral and intravenous), aiming for 500-800 mL per 24 hours
- Monitor the woman's fluid status, including urine output, until hyponatremia is corrected
- Monitor the woman's neurological status until hyponatremia is corrected
- Monitor serum electrolytes and creatinine twice daily until the hyponatremia has resolved

Administration of 3% Sodium Chloride for severe symptomatic hyponatremia

- Discuss with physician on call or ICU prior to administration (this may only be commenced if transfer to ICU has been approved and planned, but there is a delay in transfer occurring)
- Aim to acutely raise the serum sodium concentration by 4-6 mmol/L to prevent neurological damage secondary to brain herniation, swelling and cerebral ischemia
- Commence cardiac monitoring, Heart Rate (HR), Blood Pressure (BP), Respiratory Rate (RR), oxygen saturations, and neurological observations including GCS, at a minimum frequency every of 2-4 hours and ensure strict fluid balance is maintained
- Administer 3% sodium chloride (hypertonic saline) 150 mL IV over 20 minutes via infusion pump
- Recheck serum sodium every 2-4 hours depending on GCS and clinical status scores
- Repeat infusion as needed up to a maximum of 2 infusions in ICU only
- Cease 3% sodium chloride infusion when either of the following criteria are met:
 - o symptoms improve
 - o target increase in serum sodium has been achieved
- Continue ongoing care as per physician on call

Considerations for Pregnancy (normal serum sodium 130-132mmol/L)

- Monitor fluid intake during labour as excessive oral fluid intake can cause hyponatremia.
- Encourage woman to drink to thirst only and NOT consume large volumes of water
- Commence Continuous Electronic Fetal Monitoring (CEFM) if hyponatremia diagnosed and woman is still pregnant
- Ensure cord blood gas is collected for pH and sodium level if hyponatremia is diagnosed during labour or birth and paediatric team notified of result
- Ensure neonate serum sodium is collected if hyponatremia is diagnosed postnatally
- Notify paediatric team of maternal hyponatremia



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3.2 Documentation

Medical Record

3.3 Education Notes

Table 1: Clinical classification of causes of hyponatremia³

Volume status	Cause of low serum sodium concentration	
Hypervolaemia ("wet")	heart failure	
	liver cirrhosis	
	kidney failure	
	nephrotic syndrome	
Euvolemia	 "Water toxicity": sodium loss with free water intake, including excess fluid intake during labour (oral and intravenous) Syndrome of Inappropriate Antidiuretic Hormone Secretion (SIADH) drug induced (e.g. carbamazepine, selective serotonin reuptake inhibitors (SSRIs), serotonin and noradrenaline reuptake inhibitors (SNRIs)) cerebral or pulmonary pathology 	
	malignancy associated SIADH	
	hypothyroidism	
	psychogenic polydipsia	
	• pain	
	nausea	
	surgery and anaesthesia	
	adrenal insufficiency	
Hypovolaemia ("dry")	 "Water toxicity": sodium loss with free water intake, including excess fluid intake during labour (oral and intravenous) vomiting and/or diarrhoea burns 	
	thiazides and related diuretic drugs e.g. indapamide,	
	nydrochlorothlazide, chlorthalidone	
	other sodium-wasting states bungerit uiteriem	
Othoro	• hypopituliansm	
	a covera hunortrial veridemia	
 osmotic dilution 	 hyperglycemia mannitol or glycine administration (gynaecological and prostotic surgery) 	
 mechanism uncertain 	• HIV	



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- labour. Fluid balance monitoring is essential to avoid higher fluid volumes. This is
 particularly important if the woman is on Intravenous oxytocin or requires fluid
 resuscitation, as large volumes of fluid intravenous and oral in labour, significantly
 increases the risk of hyponatraemia⁴
- Hyponatraemia is NOT primarily a disorder of SODIUM but a disorder of water balance. Whether the patient is hypovolaemic or euvolemic, there is a relative excess of body water compared to total body sodium and potassium content. True hyponatraemia is always associated with either an appropriate or inappropriate activation of the hormone vasopressin (also called antidiuretic hormone)
- Symptoms range from nausea and malaise, with mild reduction in the serum sodium, to lethargy, decreased level of consciousness, headache, and, if severe, seizures and coma
- Patients with chronic hyponatremia (i.e. known duration more than 48 hours) are particularly at risk. Additional factors that increase this risk include:
 - o serum sodium concentration ≤105 mmol/L
 - o hypokalaemia
 - o alcoholism
 - \circ malnutrition
 - o advanced liver disease
- To avoid osmotic demyelination, the maximum rate of change in the serum sodium concentration in chronic hyponatraemia should be:
 - o not more than 8-10 mmol/L in the first 24 hours
 - o and an additional 8 mmol/24 hours thereafter6
- To reduce the risk of overcorrection, the initial goal of therapy should be even lower: 4-8 mmol/L daily. For patients with the additional risk factors listed above, the goal should be 4-6 mmol/L daily6
- This infusion should be given with critical care monitoring i.e. HR, BP, oxygen saturations, strict fluid balance and daily weights
- More rapid initial correction can be considered in patients with:
 - o seizures or coma, regardless of whether the hyponatraemia is known to be chronic
 - self-induced acute water intoxication (e.g. psychiatric conditions, endurance exercise)
 - o known hyponatraemia for less than 24 to 48 hours
 - o intracranial pathology or increased intracranial pressure
- Often it is difficult to assess whether severe hyponatraemia is acute or chronic. Unless it is clearly acute, a slower rate of correction is essential. The volume of



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bolus sodium chloride and the patient's response must be considered when calculating the remaining volume and infusion rate in chronic hyponatraemia

3.4 CBR should include implementation, communication and education plan

The revised CBR will be distributed to all medical, nursing and midwifery staff via @health email. The CBR will be discussed at ward meetings, education and patient quality and safety meetings. Education will occur through in-services, open forum and local ward implementation strategies to address changes to practice. The CBR will be uploaded to the CBR tab on the intranet and staff are informed how to access

3.5 Related Policies/procedures

- RHW Close Observation Unit: Admission, Escalation, Transfer and Discharge
- Insertion and Management of Urethral Catheters for adult patients GL2021_015
- Fetal Heart Rate Monitoring Maternity MoH GL2018/025
- Admission of Neonate to Newborn Care Centre (NCC)
- Management of the Deteriorating Neonatal inpatient SESLHDPR340
- Clinical Emergency Response System (CERS) Management of the deteriorating patient
- Management of the Deteriorating Adult inpatient (excluding maternity) -SESLHDPR/697
- Management of the Deteriorating Maternity woman SESLHDPR/705

3.6 References

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- 4. NICE, Clinical Guideline (NG235)) Intrapartum care. 2023.
- Moen V, Brudin L, Rundgren M & Irestedt L, Hyponatraemia complicating labour rare or unrecognised? A prospective observational study, BJOG, 2009, vol 116, issue 4, pp 552-561
- Sterns, R. M, Rondon-Berrios H., Adrogue, H,J, Berl, T, Burst, V, et al Treatment Guidelines for Hyponatraemia: Stay the course. Clin J Am Soc Nephrol. 2024, 19(1): 129-135. Doi:10.2215/CJN 00000000000244.



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4 ABORIGINAL HEALTH IMPACT STATEMENT DOCUMENTATION

- Considerations for culturally safe and appropriate care provision have been made in the development of this Business Rule and will be accounted for in its implementation.
- When clinical risks are identified for an Aboriginal and/or Torres Strait Islander woman or family, they may require additional supports. This may include Aboriginal health professionals such as Aboriginal liaison officers, health workers or other culturally specific services

5 CULTURAL SUPPORT

- For a Culturally and Linguistically Diverse CALD woman, notify the nominated cross-cultural health worker during Monday to Friday business hours
- If the woman is from a non-English speaking background, call the interpreter service: <u>NSW</u> <u>Ministry of Health Policy Directive PD2017_044-Interpreters Standard Procedures for</u> <u>Working with Health Care Interpreters.</u>

6 REVISION AND APPROVAL HISTORY

Date	Revision No.	Author and Approval
Reviewed and endorsed Maternity Services LOPs 26/10/21		
Approved Quality & Patient Care Committee 7/7/16		
Endorsed Therapeutic & Drug Utilisation Committee 18/12/16		



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Appendix 1 **Overview of the initial treatment of adults with moderate to** severe hyponatremia (serum sodium <130 mEq/L)⁶



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IV: intravenous; SIADH: syndrome of inappropriate antidiuretic hormone secretion.

* Severe symptoms of hyponatremia include seizures, obtundation, coma, and respiratory arrest.

¶ Autocorrection of hyponatremia is present if the serum sodium is rising spontaneously without intervention or treatment. Autocorrection should be suspected, even before a spontaneous rise in serum sodium is noted, in the following hyponatremic patients: those with a rapidly reversible cause of hyponatremia who have a brisk urine output and those with a urine output that is increasing over time and a urine cation concentration (ie, the sum of the urine sodium and potassium concentration) that is lower than the serum sodium.

Δ Vomiting, nausea, fatigue, lethargy, confusion, forgetfulness, headache, dizziness, gait disturbance, muscle cramps.

https://www.uptodate.com.acs.hcn.com.au/contents/image/print?imageKey=NEPH/115886&topicKey=2350&search=inital treatment of hyponatremia&rank=3~150&source=GraphicModalSidebar