Worcestershire Acute Hospitals NHS Trust

Guideline for Fluid Administration and Management of Hyponatraemia in Labour and the Immediate Postpartum Period

This guidance does not override the individual responsibility of health professionals to make appropriate decision according to the circumstances of the individual patient in consultation with the patient and /or carer. Health care professionals must be prepared to justify any deviation from this guidance.

Introduction

This guideline outlines the process for monitoring and preventing hyponatraemia

This guideline is for use by the following staff groups:

All maternity staff caring for women in labour and postnatal.

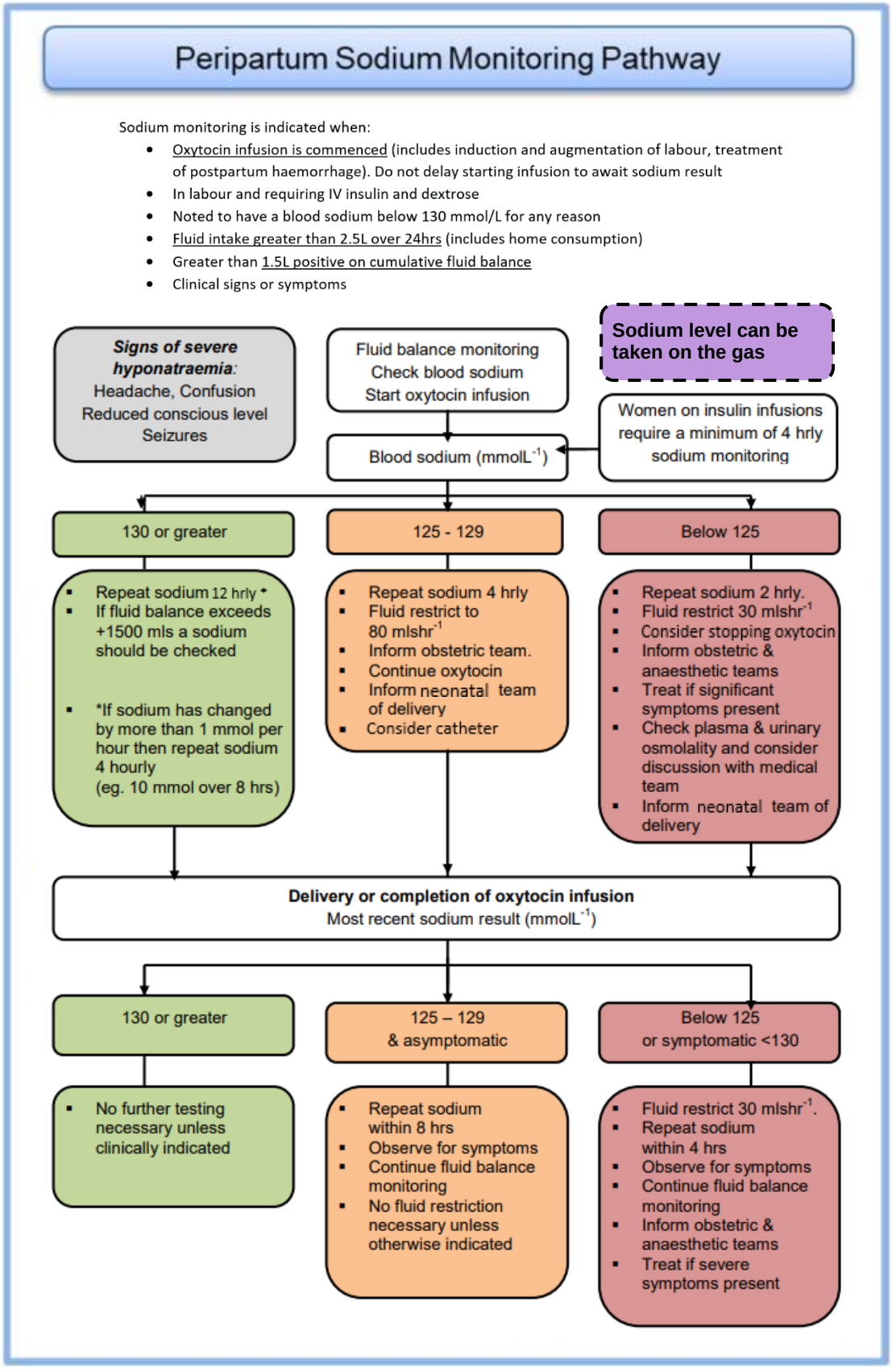
Lead Clinician(s)

Naveed Kordmahalleh	ST6 Anaesthetist
Jaime Greenwood	Consultant Anaesthetist
Ramy Labib	Consultant Anaesthetist
Laura Veal	Consultant Obstetrician – Clinical Director
Approved by *Maternity Governance Meeting* on:	19th January 2024
Approved by Medicines Safety Committee on:	N/A
Review Date: This is the most current document and should be used until a revised version is in place	19th January 2027

Key amendments to this guideline

Date	Amendment	Approved by:
Jan 2024	New Guideline	MGM

1.0 Peripartum Sodium monitoring pathway



2.0 Introduction

Peripartum hyponatraemia (serum sodium less than 130mmol/L) is an important and under-reported cause of maternal and neonatal morbidity. An acute fall in the sodium level can result in cerebral oedema and life-threatening symptoms, including both maternal and neonatal seizures. It is reported that 26% of low-risk mothers having a fluid input of 2500 ml or more during labour may be hyponatraemic.

3.0 Background

Women in labour are at a greater risk of developing hyponatraemia than non-pregnant women because of a lower baseline plasma sodium (lower normal range of 130mmol/L compared with 135mmol/L in non-pregnant population), an impaired ability to excrete water in the third trimester and exposure to the anti-diuretic effect of oxytocin.

These physiological factors predispose pregnant women to hyponatraemia, especially when additional risk factors such as excessive oral intake, intravenous fluids and exogenous oxytocin are present. Nulliparous mothers treated with oxytocin infusions in labour have the highest chance of becoming hyponatraemic.

Maternal hyponatraemia has serious implications for the foetus. Water freely diffuses across the placenta causing foetal blood sodium concentration and osmolality to reflect that of the mother. Worryingly, the majority of the mothers of hyponatraemic neonates appear to have been asymptomatic or shown only mild non-specific symptoms despite having severe hyponatraemia.

An important peripartum risk factor is the total volume of fluid intake during labour, both intravenous and oral. This has the potential to affect both low and high-risk labours. Healthy women with a neutral fluid balance and up to 1L fluid intake in labour are at low risk of developing hyponatraemia (1%). This increases to 5% in those women who have a fluid intake of 1-2.5L, and 26% in those with intake above 2.5L.

Hyponatraemia has also been reported as a result of excessive oral fluid intake in low-risk labours with no iatrogenic fluids. A repetitive theme in these cases is the absence of accurate fluid balance monitoring and recording.

The purpose of this guideline is to reduce the risk of hyponatraemia through the expedients of:

- Increased awareness
- Accurate fluid balance monitoring
- Earlier detection

4.0 Signs and Symptoms of Hyponatraemia

Signs and symptoms of hyponatraemia are primarily related to dysfunction of the central nervous system. Early symptoms are non-specific. The HSIB cohort review (2022) identified that many of the symptoms reported were attributed to labour at the time. Symptoms may also be attributed to more common conditions such as pre-eclampsia.

Early manifestations of hyponatraemia include:

- Anorexia
- Nausea
- Lethargy
- Apathy
- Headache
- Anxiety
- Malaise
- Cold and shivering

More advanced signs and symptoms (often related to cerebral oedema) include:

- Disorientation
- Agitation
- Seizures
- Depressed reflexes
- Focal neurological deficits
- Cheyne-Stokes respiration
- Coma

Symptoms correlate with the severity of hyponatraemia and the speed of change in sodium concentration.

5.0 Prevention and Diagnosis of Hyponatraemia in Labour

5.1 Fluid balance in labour

Maternal dilutional (hypervolaemic) hyponatraemia during labour can be prevented by keeping a neutral fluid balance and can be recognised by fluid balance monitoring and clear documentation with blood sodium testing when necessary.
Information shared with mothers during the antenatal and intrapartum periods around oral hydration in labour should include optimal amounts of fluid to drink. Women should be advised to drink to thirst (unless any contraindications).

5.2 Guidance for IV fluid administration (not resuscitation)

Intravenous fluids should be prescribed for labouring mothers only if there is an appropriate indication and should be administered with care. IV fluids are not routinely required with epidural analgesia. IV fluids should not routinely be prescribed for the treatment of ketosis in non-diabetic women.

If IV fluid is required, use the following guidance:

- Calculate daily maintenance: 25ml/Kg (up to a maximum of 2.5L per day)
- Add losses: Blood, vomit, diarrhoea, etc…
- Subtract oral intake.
- Give the calculated volume over 24 hours.
- Use Hartmann's solution.

IV fluid over 24 hours = Maintenance + Losses – Oral intake

Refer to the relevant guidelines and ask for expert help in the following situations:

- Severe Pre-eclampsia
- Severe Sepsis
- Haemorrhage
- Heart failure / Cardiomyopathy
- Renal / Liver impairment
- Diabetic Ketoacidosis

5.3 Monitoring fluid balance

Women should have oral intake recorded at least four hourly.
Women should have intravenous (IV) fluid intake documented hourly.
Women should be encouraged to void 2-4 hourly and should have urine output measured and recorded.
Women should have other fluid losses measured and recorded e.g., vomit
A cumulative fluid balance should be recorded four hourly (and before transfer to another clinical area)

5.4 Indications for Sodium monitoring

Sodium monitoring is indicated when:

- Oxytocin infusion is commenced (includes induction and augmentation of labour, treatment of postpartum haemorrhage). Do not delay starting infusion to await sodium result.
- In labour and requiring IV insulin and dextrose
- Noted to have a blood sodium below 130 mmol/L for any reason
- Fluid intake greater than 2.5L over 24hrs (includes home consumption)
- Greater than 1.5L positive on cumulative fluid balance
- Clinical signs or symptoms

Hyponatraemia can be diagnosed on POCT (Venous Blood Gas). Formal lab U&Es should also be sent.

Where an oxytocin infusion is commenced as prophylaxis against uterine atony in the setting of elective Caesarean section, sodium monitoring is not routinely required.

6.0 Management of Hyponatraemia

6.1 Clinical review

Obstetric or anaesthetic review should take place with a thorough clinical review of the clinical history, medications, volume status, fluid input and output to establish the cause. Most cases will be dilutional (hypervolaemic) and the management flow chart should be followed.
Alternative causes of hyponatraemia should always be considered, particularly in severe hyponatraemia, where concurrent illness exists, or symptoms and laboratory results pre-date labour. Blood osmolality, urine sodium and urine osmolality tests are useful in determining the cause of hyponatraemia in more complex cases (and referral to the medical team is advised).
The paediatric team should be informed as neonatal hyponatraemia may be present.

6.2 Significant Symptomatic Hyponatraemia

A Multidisciplinary (MDT) approach is required. The Consultant Obstetrician and Consultant Anaesthetist on call should be informed.

- Admit to a higher dependency bed on labour ward for monitoring post-delivery
- IV access
- Consider stopping any oxytocin and fluid restrict (if cause dilutional)
- Follow sodium monitoring flow chart
- The on call medical team (Medical Registrar) may need to be involved if the patient has additional comorbidities or if there is a suspicion of other causes of hyponatraemia such as Syndrome of inappropriate ADH secretion (SIADH)

6.3 Severe neurological symptoms or signs

Involve Critical Care Outreach (CCOT) or ICU in the event of severe neurological symptoms believed to be due to hyponatraemia such as seizures, significant confusion or loss of consciousness. Neuroimaging should be considered to exclude other causes.
Hypertonic saline may be needed in some cases although fluid restriction and expectant management may be an appropriate plan after senior MDT review and critical care input.
Hypertonic saline regime: 200mls of 2.7% saline should be given as an IV bolus over 30 minutes. Consider co-administration of 20 mg IV furosemide if there is any evidence of fluid overload. This will raise serum sodium by approximately 2 – 4 mmol/L and will reduce cerebral oedema.
Rapid correction of sodium can cause serious harm (central pontine myelinolysis) therefore 2-4 hourly sodium monitoring will be required after administration of hypertonic saline. This will be managed in a critical care setting. Sodium levels should not rise by more than 12mmol/L in 24 hours.

6.4 Hypovolemic Hyponatraemia

In these cases, the hyponatraemia is caused by the loss of both volume and sodium. This is less common but requires a different management approach with treatment of the underlying cause. Fluid restriction is not indicated.
Find the cause of the hypovolemia:

- Blood loss (PPH, intra-abdominal bleeding)

- Bowel obstruction (post CS)
- Diarrhoea or vomiting
- Reduced oral intake/dehydration/fluid restriction
- Use of diuretics (not common in our patient population)
- Pancreatitis (in which fluid moves into third space)

Once cause is established, aim to treat the cause itself. Blood transfusion and IV fluids may be required. Consider liaising with Anaesthetist and Medical registrar for slow correction with IV sodium chloride. Most cases (if due to dehydration) will correct themselves once patient is eating and drinking normally. Detailed information on diagnosis and management of hyponatraemia is available in the 2010 GAIN guideline Hyponatraemia in Adults (see references).

References

1. Guideline for the Prevention, Diagnosis and Management of Hyponatraemia in Labour and the Immediate Postpartum Period. March 2017. GAIN working group RQIA
2. Peripartum Hyponatraemia: Findings from the HSIB cohort Chandrima Biswas and Louise Page on behalf of HSIB BicSoc 2022
3. GAIN Hyponatraemia in Adults (on or after 16th birthday). February 2010. RQIA

Monitoring

Page/ Section of Key Document	Key control:	Checks to be carried out to confirm compliance with the Policy:	How often the check will be carried out:	Responsible for carrying out the check:	Results of check reported to: *(Responsible for also ensuring actions are developed to address any areas of non-compliance)*	Frequency of reporting:
	WHAT?	**HOW?**	**WHEN?**	**WHO?**	**WHERE?**	**WHEN?**
	Fluid Balance compliance	Audit	Monthly	LW Leads	Governance W2B	Monthly
	Hyponatraemia bloods	Audit	Monthly	LW Leads	Governance W2B	Monthly

Contribution List

This key document has been circulated to the following individuals for consultation;

Designation

This key document has been circulated to the chair(s) of the following committee's / groups for comments;

Committee
Maternity Quality Governance Meeting