



University Hospitals Sussex
NHS Foundation Trust

Hyponatraemia in Labour

Maternity Protocol: MP064

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Key Principles

This guide is a set of measurable, objective standards to determine a course of action. Professional judgment may be used in the application of such guidance.

Scope

This guideline applies to:

- All women and women and people receiving labour care.

Responsibilities*Midwives & Obstetricians*

- To access, read, understand and follow this guidance
- To use their professional judgement in application of this guidance

Management

- To ensure the guidance is reviewed as required in line with Trust and National recommendations
- To ensure the guidance is accessible to all relevant staff

1 Background and Hyponatraemia in Labour

- 1.1 Hyponatraemia, defined during pregnancy as a serum sodium concentration of below 130mmol/L, is the most common electrolyte abnormality in hospitalised patients. It is most commonly either:
 - *Hypervolaemic hyponatraemia*: caused by an excess of total body water usually resulting from an excessive intake of water alongside impairment of water excretion, leading to dilution of serum sodium concentration.
 - *Or Hypovolaemic hyponatraemia*: caused by a depletion of both water and sodium, leading to a relative excess of sodium loss.
- 1.2 Hyponatraemia can cause both morbidity and mortality, so must be recognised and treated appropriately.
- 1.3 While symptoms of hyponatraemia can often initially be non-specific, they are likely to include:
 - Headache
 - Lethargy
 - Drowsiness
 - Confusion/Disorientation
 - Agitation
 - Seizure
 - Coma
- 1.4 Pregnant women and people are at greater risk of developing hyponatraemia than the non-pregnant population as they become less able to excrete excess free water in the third trimester, and have a lower baseline plasma sodium. Labour also further compounds the risk as pain, stress and fear can cause an increase in anti-diuretic hormone (ADH), sweating and vomiting are common (which can lead to hypovolaemic hyponatraemia), use of Entonox® (nitrous oxide) can cause increased feelings of dry mouth and thirst leading to excess water intake, and oxytocin itself (either endogenous or synthetic) has an anti-diuretic effect. Women and people in labour are also often given IV fluids alongside their oral intake, leading to an excessive amount of water being taken in.

- 1.5 Maternal or parental hyponatraemia also has serious implications for the fetus. Water freely diffuses across the placenta causing fetal blood sodium concentration to reflect that of the pregnant woman or person. Therefore maternal or parental hyponatraemia can lead to neonatal hyponatraemia. Knowing the signs and symptoms of fluid imbalance in the body is a crucial aspect of care. It is assessed in 3 ways: **fluid balance charts, physical assessment of fluid balance, and monitoring of blood results.** It is important to identify either a positive (increased input) or negative (increased output) balance swiftly, in order to either restrict or replace fluids and achieve stability.

2 General Prevention of Hyponatraemia in Labour

- 2.1 While oral intake should be encouraged in labour to prevent dehydration, women and people should not be encouraged to drink beyond their own body's thirst impulse.
- 2.2 All labouring women and people should be made aware of the need for good fluid balance, and of the risks of drinking in excess.
 - 2.2.1 While it is difficult to monitor exact fluid balance in the latent phase of labour while the birthing woman or person is at home, all women and people in the latent phase should be given advice on maintaining good fluid balance, the risks of drinking in excess and encouraged to roughly monitor their own input and output while at home.
- 2.3 Sports drinks are preferable to water for consumption in labour. However, while these drinks are often described as "isotonic" on their labelling, their osmolality is largely made up of carbohydrates, and they still have a low sodium content. Therefore they can still lead to hyponatraemia if consumed in excess.
- 2.4 Food and snacks with higher sodium content (such as crisps or salted nuts) should be suggested in labour, alongside oral fluid intake.
- 2.5 A fluid balance chart should be kept for all women and people in labour. For high-risk women and people, input and output should be accurately measured and calculated. For low-risk women and people, input and output can be more roughly estimated, but should still be monitored closely. See sections 3 and 4 below for more details.
- 2.6 Good bladder care should be practised in labour. See MP040 Bladder Care for further information on good bladder care principles.
 - 2.6.1 Women and people in labour may be unaware of a need to empty their bladder, either due to epidural analgesia, or the pain associated with labour masking the sensation of a full bladder. They should be actively encouraged to void their bladder at least 2-4 hourly.

- 2.6.2 If women and people are unable to void their bladder in labour, or they are only voiding small amounts and have a palpable bladder, there should be a low threshold for catheterisation. Catheterise using an in/out catheter as first choice, but if an in/out catheter is required a second time, and then consider an indwelling catheter.
- 2.7 Urine may appear concentrated in labour due to oxytocin (either endogenous or synthetic) acting as an ADH, preventing water excretion. Therefore, excess water intake should not be encouraged in order to dilute the appearance of urine.
- 2.8 Urinary ketones are common in labour due to physical exertion. Urinary ketones should not be treated with IV fluids or oral water intake alone, but with sports drinks and sugary or salty foods/snacks as well.

3 Care of Low-risk Women and People in Labour

The following is to be implemented in addition to the points in section 2 above.

- 3.1 Fluid balance should be monitored and documented on the labour partogram at least every 4 hours, but exact input and output can be roughly estimated.
 - 3.1.1 If a woman or person changes from low-risk to high-risk at any time (e.g following commencement of oxytocin infusion, or insertion of an epidural), a more accurate and detailed fluid balance chart should then be commenced.
 - 3.1.2 If a positive fluid balance of more than 1500mls is identified or suspected, a more accurate and detailed fluid balance chart should then be commenced.
- 3.2 Women and people should be encouraged to void their bladder at least 2-4 hourly. Urine output should be monitored. See MP040 Bladder Care and point 2.6 above for further information.
- 3.3 Any other fluid losses (e.g vomit) should also be monitored and noted on the fluid balance.

- 3.4 If a positive fluid balance of more than 1500mls is suspected or confirmed, a venous blood sample must be taken and sent for Urea and Electrolytes (Us+Es) to check sodium levels. If at home, discuss the risks and inform that transfer into hospital is indicated at this stage. Contact the Labour ward coordinator to inform of plan.
 - 3.4.1 If the sodium result is within normal range ($>130\text{mmol/L}$), then continue low-risk care as above.
 - 3.4.2 If the sodium result is outside of normal range ($<130\text{mmol/L}$), inform registrar and anaesthetist for review and see sections 5 & 6 below for treatment.
 - 3.4.3 The blood gas analyser may be used to check sodium levels quickly, if a VBG (venous blood gas) sample is obtained by a doctor.
- 3.5 Inform neonatal team of any babies born to women and people with hyponatraemia.

4 Care of High-risk Women and People in Labour

The following is to be implemented in addition to the points in section 2 above.

High-risk women and people include those with: epidural analgesia, oxytocin infusion, variable rate insulin infusion (sliding scale), IV fluids, preeclampsia, long latent phase, any other obstetric or medical risk factors.

- 4.1 An accurate and detailed fluid balance chart should be commenced within the electronic notes. All fluid input and output should be measured and calculated hourly.
 - 4.1.1 Urine voids should be measured and documented
 - 4.1.2 All other fluid losses (e.g vomit) should be measured and documented on electronic fluid balance chart
 - 4.1.3 Input from IV fluids should be accurately calculated and documented.
- 4.2 A clinical indication for any IV fluids should be clearly documented.
- 4.3 All IV fluids should be run via a volumetric pump, except in a resuscitation scenario.
- 4.4 IV fluids commenced solely due to insertion of an epidural run as per Epidural Protocol (*see MP042: epidurals in labour*)
- 4.5 Women and people should be encouraged to void their bladder at least 2-4 hourly. Urine output should be measured and documented. See MP040 Bladder Care and point 2.6 above for further information.

- 4.6 A venous blood sample must be taken and sent for Urea and Electrolytes (Us+Es) to check sodium levels if: a positive fluid balance of >1500mls is found or the 3rd bag of IV fluids is commenced or an oxytocin infusion is commenced. If at home, discuss the risks and inform that transfer into hospital is indicated at this stage. Contact the Labour ward coordinator to inform of plan.
- 4.6.1 Blood samples should be taken from an upper limb which does not have IV fluids running through it. If both upper limbs have IV fluids, one should be paused for approximately 10 minutes (if possible) before the sample is then taken from that side.
 - 4.6.2 If the sodium result is within normal range (>130mmol/L), then continue care as above. Repeat the test 8 hourly, unless positive fluids balance of >1500mls is identified, in which case repeat the test immediately at this point.
 - 4.6.3 If the sodium result is outside of normal range (<130mmol/L), inform registrar and anaesthetist for review and see sections 5 & 6 below for treatment.
 - 4.6.4 It is not necessary to await the results of the blood sample before commencing the oxytocin infusion.
 - 4.6.5 The blood gas analyser may be used to check sodium levels quickly, if a VBG (venous blood gas) sample is obtained by a doctor.
- 4.7 Sodium level should be checked every 4 hours if a woman or person is on a variable rate insulin infusion (VRII).
- 4.8 If cord gases are taken after delivery and baby's sodium is outside normal range (<130mmol/L) a venous sample should be sent for Us+Es to check maternal sodium level.
- 4.9 Inform neonatal team of any babies born to women and people with hyponatraemia

5 Use of Oxytocin

5.1 Augmentation Oxytocin regime

- 5.1.1 Dilute 10 units of Oxytocin (1ml) with 49 ml Normal Saline and run through a syringe driver at the following rates:

FIRST STAGE OF LABOUR

Time after starting (mins)	dose (mu/min)	pump rate (mls/hr)
0	1	0.3
30	2	0.6
60	4	1.2
90	8	2.4
120	12	3.6
150	16	4.8
180	20	6.0
210	24	7.2
240	28	8.4
270	32	9.6

5.2 Second stage Oxytocin Augmentation

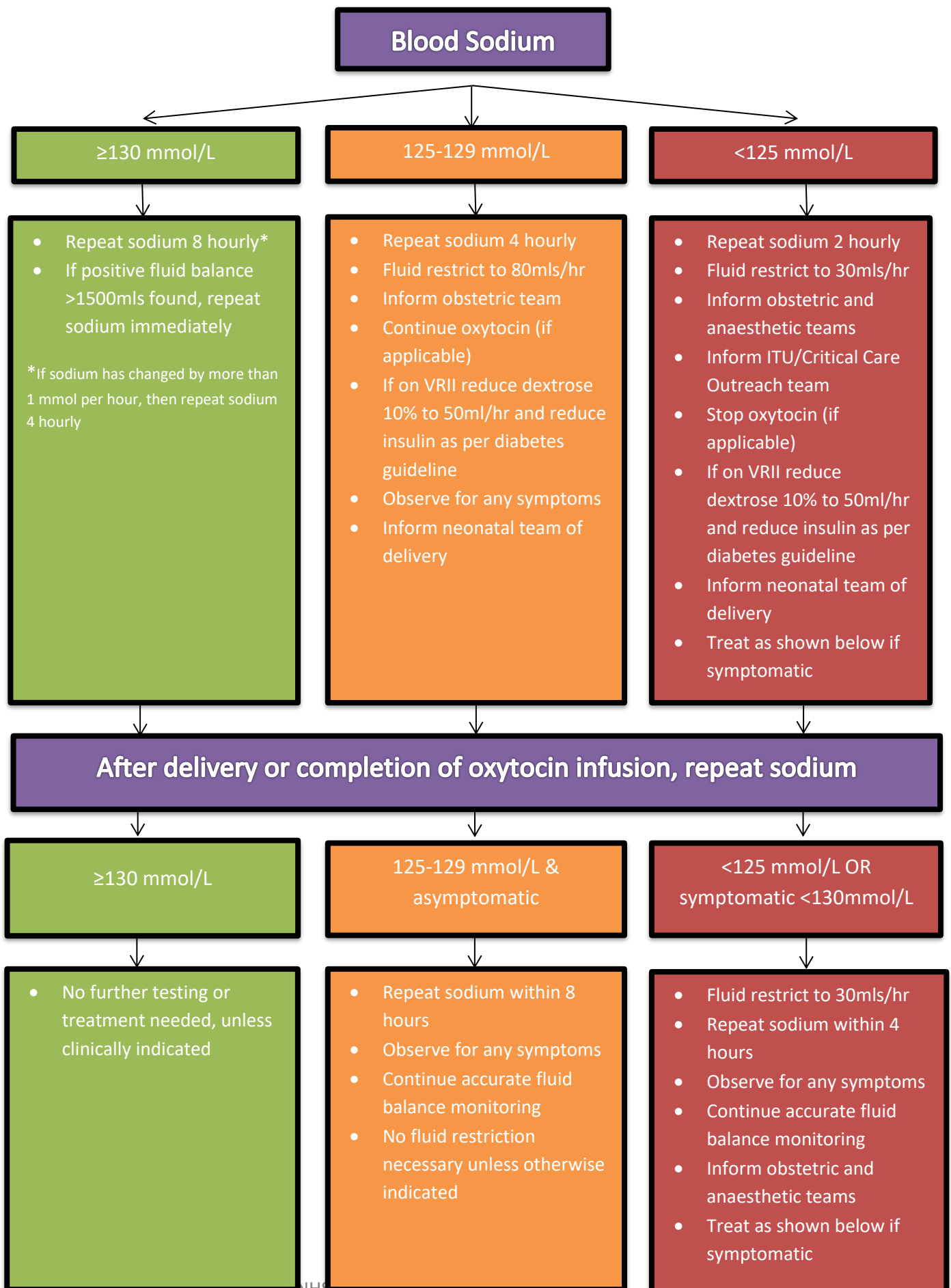
Second Stage of Labour		
Time after starting (mins)	Oxytocin dose (mu/min)	Oxytocin pump rate (mls/hr)
0	10	3.0
10	12	3.6
20	14	4.2
30	16	4.8
40	18	5.4
50	20	6.0
60	22	6.6

5.3 Oxytocin regime in management of Postpartum Haemorrhage

5.3.1 Dilute 40 units of Oxytocin (1ml) with 49 ml Normal Saline and run through a syringe driver at the following rates:

Management of PPH		
40iu Oxytocin	49ml Normal Saline	Pump rate 12.5 (ml/hr)

6 Flowchart for Management of Hyponatraemia



7 Treatment of Severe Hyponatraemia

Severe hyponatraemia (sodium $<125\text{mmol/L}$ + symptoms) is a **medical emergency**.

The aim of treatment is to improve symptoms and not to correct the sodium to normal.

- Urgent senior obstetric and anaesthetic review
- Inform ITU/Critical Care Outreach team
- Consider transfer to Level 2 care in ITU if possible
- Check sodium concentration
- Continue strict fluid restriction of 30mls/hr
- Continue accurate fluid balance monitoring
- Repeat sodium hourly
- Request 1.8% Sodium Chloride bags from ITU
- 1.8% Sodium Chloride given in 150ml bolus ONLY under instruction or supervision from ITU
- If no improvement consider 2nd bolus 150mls 1.8% Sodium Chloride ONLY under instruction or supervision from ITU
- Continue fluid restriction and fluid balance monitoring until asymptomatic
- Aim to increase sodium by no greater than 10mmol/L in 24 hours

References

Dineen R, Thompson C, Sherlock M. Hyponatraemia- Presentations and Management. Clin Med (Lond). 2017 Jun; 17(3): 263–269.

Johansson S, Lindow S, Kapadia H, Norman M. Perinatal Water Intoxication Due to Excessive Oral Intake During Labour. Acta Paediatr. 2002; 91(7):811-4.

Kearney R, Cutner A. Post-partum Voiding Dysfunction. Obs & Gynaecol. 2008; 10(2):71-74.

Moen V, Brudin L, Rundgren M, Irestedt L. Hyponatremia Complicating Labour—Rare or Unrecognised? A Prospective Observational Study. BJOG. 2009 Mar; 116(4): 552–561.

Ophir E, Solt I, Odeh M, Bornstein J. Water Intoxication- A Dangerous Condition in Labor and Delivery Rooms. Obstet Gynecol Surv. 2007 Nov; 62(11):731-8.

Paul S, Smith B, Luthra K. A Pinch of Salt. Pract Midwife. 2013 Feb; 16(2):13-6.

The Regulation and Quality Improvement Authority (RQIA): Guideline and Audit Implementation Network. Guideline for the Prevention, Diagnosis and Management of Hyponatraemia in Labour and the Immediate Postpartum Period. Belfast: RQIA; 2017.

The Regulation and Quality Improvement Authority (RQIA): Guideline and Audit Implementation Network. Hyponatraemia in Adults (on or after 16th birthday). Belfast: RQIA; 2010.

Solomon N, Many A, Orbach R, Mandel D, Shinar S. Maternal and Neonatal Hyponatremia During Labour: A Case Series. J Matern Fetal Neonatal Med. 2019 Aug; 32(16):2711-2715.