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Maternity Fluid Management as an In-Patient or During Labour

Summary statement: How does the document support patient care?	The purpose of this guideline is to reduce the risk of hyponatraemia through increased awareness; accurate fluid balance management and monitoring; earlier detection.
Staff/stakeholders involved in development: *Job titles only*	Labour Ward Leads (Obstetric and Midwifery), Consultant Obstetricians, Consultant Anaesthetists, Senior midwives, Joint Obstetric Guidelines Group.
Division:	Women and Children's
Department:	Maternity
Responsible Person:	Chief of Service
Author:	Senior Midwifery Manager
For use by:	All obstetric and midwifery staff
Purpose:	To provide evidence based guidance for fluid balance management of maternity in-patients and pregnant women/people in labour.
This document supports: *Standards and legislation*	NG121 Intrapartum care for women with existing medical conditions or obstetric complications (2019) CG190 Intrapartum care for healthy women and babies (2017) GAIN (2017)
Key related documents:	**UH Sussex (SRH & WH) Maternity Guidelines**: CG21008 Management of High Risk Maternal Medicine conditions. CG12004 APH & Intrapartum Haemorrhage. CG13003 Management of Hyperemesis. CG1137 Bladder Care. CG12030 Caesarean Section. CG1196 Care in Labour. CG1119 Induction & Augmentation of Labour. CG12029 PPH.
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Version	Date	Author	Status	Comment
1.0	September 2021	T. Mudd, Senior Midwifery Manager	Live	New UH Sussex (SRH & WH) guideline for maternity fluid management as an in-patient or in labour.

The interpretation and application of clinical guidelines will remain the responsibility of the individual clinician.
If in doubt contact a senior colleague or expert.

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Maternity Fluid Management as an In-Patient & During Labour

1.0 Aim

To reduce the risk of hyponatraemia through:

- Increased awareness.
- Accurate fluid balance management and monitoring.
- Earlier detection.

2.0 Scope

This guideline is for use by:

- Obstetricians
- Anaesthetists
- Clinical maternity staff

3.0 Responsibilities

The guideline[1] is relevant to all healthcare professionals who come into contact with all pregnant women/people in labour and the immediate post-partum period, as well as to the women themselves and their carers.

4.0 Introduction

The need for accurate monitoring of physiological status is strongly recommended by both the National Patient Safety Agency (NPSA 2008) and the National Institute for Clinical Excellence (NICE 2017, NICE 2020). The elements within this guideline are therefore aimed at achieving this through the accurate measurement of fluid balance in conjunction with the Trusts Fluid Balance Policy (2021). The need for accurate fluid balance is also a key component of the Acutely Ill competencies produced by NICE guideline 50 (2020).

Women/people in labour are at greater risk of developing hyponatraemia than non-pregnant women/people because of lower baseline plasma sodium[1], an impaired ability to excrete water in the third trimester[2] and exposure to the anti-diuretic effect of oxytocin [3]. An acute fall in the sodium level can result in cerebral oedema and life threatening symptoms. It can also lead to neonatal hyponatraemia, as water freely diffuses across the placenta, causing fetal blood sodium concentration and osmolality to reflect that of the mother [4,5,6,7.]

Additional risk factors are the total volume of fluid intake during labour, both intravenous and oral, and exogenous oxytocin. This risk is significantly increased in women/people with prolonged labour [8]. The association between hyponatraemia and the use of large volumes of hypotonic intravenous fluids and oxytocin for induction and augmentation of labour has long been recognised [9,10,11]. However, in recent cases, hyponatraemia occurred as a result of

excessive oral fluid intake in a setting where little or no oxytocin or intravenous fluids had been given [12,13,14,15].

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:

- Increased awareness.
- Accurate fluid balance management and monitoring.
- Earlier detection.

Indications for commencement of fluid balance monitoring
• Actual or potential acute illness: AKI, Hyperemesis, known Hyponatraemia, Eclampsia, PET, APH & Intrapartum Haemorrhage, PPH, Sepsis. • Commencing or prescribed IV fluids / IV oxytocin. • Induction of Labour. • Post-Operative management: elective or emergency caesarean section, operative birth. • Urinary catheter in situ. • Labour.

5.0 Signs and symptoms of hyponatraemia

Signs and symptoms of hyponatraemia are primarily related to dysfunction of the central nervous system. Cerebral oedema may develop and early manifestations of hyponatraemia include:

- Anorexia
- Nausea
- Lethargy
- Apathy
- Headache

Early symptoms are non-specific and may be attributed to pregnancy, labour and common conditions such as pre-eclampsia. More advanced signs and symptoms 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. Rapid changes can cause fluid shifts between extracellular and intracellular compartments with no opportunity for physiological compensation, leading to acute symptoms.

6.0 Fluid and electrolyte balance in pregnancy

Blood sodium concentration and osmolality are lower in pregnancy with 130 - 140 mmol/l being considered the normal range, compared to 135 - 145 mmol/l in non-pregnant adults. Blood osmolality is also lower at around 280mOsm/kg. In this guideline hyponatraemia in pregnancy is defined as a blood sodium concentration less than **130 mmol/l.**

7.0 Prevention and diagnosis of hyponatraemia in labour

Maternal dilutional 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.

- Pregnant women/people should not be encouraged to drink excessively beyond their body's own thirst impulse, and should be encouraged to drink isotonic/sports drinks instead of water.
- Women/people should be made aware of the potential dangers of drinking in excess, especially if not passing urine.
- Ketones in the urine should not be treated with fluid alone, but with sugary food and drinks.

Healthy women/people in labour who are in a neutral fluid balance are at low risk of developing hyponatraemia. As fluid intake in labour increases, so does the risk of hyponatraemia.

Women/people who have a fluid balance of up to 1 litre positive in labour will have a 1% incidence of hyponatraemia at delivery, between 1 to 2.5 litres increases this to 5% and above 2.5 litres 26% will be hyponatraemic[16].

8.0 Peripartum fluid balance

8.1 Pregnant women/people having midwife led care

- The importance of accurate fluid balance monitoring during labour should be explained to all women/people.
- In normal spontaneous labour, fluid balance observations should be commenced and recorded on the chart. A cumulative fluid balance of any oral intake should be documented every 4 hours in mls.
- Women/people should be encouraged to void 4 hourly and to have urine output volume measured and recorded.
- All other fluid losses should also be measured and recorded e.g. vomit, blood.

- If a low risk woman/person has less than 1500mls positive balance they would be unlikely to have hyponatraemia.
- A 1500mls positive balance or over, should be discussed with the senior obstetrician first and the whole clinical picture should be taken into consideration e.g. partogram, history, before taking a blood test to check her sodium levels. Normal blood sodium (equal to or greater than 130 mmol/l) requires no action and fluids do not require restriction, however continue to closely monitor and record the fluid balance.
- A sodium level less than 130 mmol/l or if sodium testing is not readily available, the on call obstetric registrar should be contacted and clinical judgement used, particularly with regard to parity and progress in labour, to decide whether transfer to obstetric care is required.
- If intrapartum transfer of care to another clinical area is required, a cumulative fluid balance total should be handed over.
- In the low risk woman/person the Fluid Balance Chart should be an aide memoire to think about fluids. It is important that this information is shared with the midwife when transferring between clinical areas and the balance is checked and aim for a neutral balance.

8.1.2 Fluid management in homebirth setting

- In a homebirth setting, if the pregnant person has not birthed or birth is not imminent within two hours of the community midwives attendance then a fluid balance should be monitored, taking into consideration the whole clinical picture (e.g. progress in labour, maternal and fetal well-being). Should the pregnant person be in positive fluid balance (more than 1500mls) consider transfer into the labour ward.

8.2 Pregnant women/people undergoing induction of labour (IOL) and high risk labour

- The importance of accurate fluid balance monitoring during labour should be explained to all pregnant women/people.
- Fluid balance observations should be commenced and recorded on the fluid balance chart. This should include all fluid losses measured and recorded e.g. vomit, blood loss, urine output.

Low risk IOL:

- Pregnant women/people, without intravenous (IV) fluids, indwelling catheters or a medical history requiring close fluid balance should be encouraged to record their own oral fluid intake four hourly on a fluid balance chart.
- Women/people should be encouraged to void 4 hourly and record their own urine output.

High risk IOL and high risk labour:

- For PET follow guidance in CG1112 Management of severe pre-eclampsia & eclampsia.
- All women/people with IV fluids, indwelling catheters or a medical history requiring close fluid balance should have their fluid balance observations recorded on the hourly fluid balance chart by a clinician.
- If an in-dwelling catheter in situ output volume recorded when emptied or 4 hourly.
- IV fluids must have a prescribed reason documented on the fluid balance chart (Refer to EPMA).
- IV fluids must be prescribed in millilitres (ml) per hour.
- IV fluids should be administered via volumetric pumps (with the exception of circumstances such as fluid resuscitation during haemorrhage or hypotension).

Fluid balance totals:

- If a woman/person's fluid balance exceeds **1500mls positive**, a blood sodium level should be checked and the patient commenced on the Peripartum Sodium Monitoring Pathway. (See Appendix 1)
- Before transfer following the induction area to the ward, a cumulative fluid balance total should be recorded on the fluid balance chart.

For women/people with epidural analgesia:

- All women/pregnant people having an epidural must have a cannula sited.
- The cannula must be flushed to ensure patency and connected to the IV line.
- **But** the fluid can be switched off as not routinely required unless the anaesthetist requests it to be given based on clinical indication, such as to treat sudden hypotension, or other epidural related emergencies.

To 'improve the CTG' in normotensive women/people with no signs of dehydration, refer to the treatment of ketosis in non-diabetic women/people. (See Section 11.0)

9.0 Sodium Monitoring

9.1 Peripartum Sodium Monitoring

Women/people require sodium monitoring (Peripartum Sodium Monitoring Pathway - Appendix 2) if they are:

- In labour and require IV insulin and dextrose.
- Baseline sodium to be taken if commencing oxytocinon IV in labour or after birth.
- Noted to have a blood sodium below 130 mmol/l for any reason.
- Greater than 1500 mls positive on their fluid balance.

A blood sodium level can be checked using a venous sample in the labour ward blood gas machine or sent to the lab. It is essential that blood samples are not taken from a limb attached to an intravenous infusion as this may lead to inaccurate results.

Results should be referenced against the Peripartum Sodium Monitoring Pathway (see Appendix 1) to guide frequency of repeat testing and further management.

All women/people requiring intravenous insulin and dextrose infusions during labour should have a blood sodium level checked 6 - 8 hourly depending on stage of labour.

Oxytocin should be stopped in cases where the maternal sodium is below 125mmol/l and senior clinical advice sought. The decision regarding further oxytocin administration should be made following assessment of the woman/person's clinical condition and circumstances after discussion with a consultant obstetrician.

9.2 Postpartum Sodium Monitoring

- The paediatric team should be made aware of babies born to hyponatremia mothers/parents[17,18] .
- Once a woman/person has a blood sodium level equal to or greater than 130 mmol/l no further sodium checks are necessary unless clinically indicated.
- If a woman/person has a sodium level below 130 mmol/l, they should be reviewed by the obstetric team and consideration given to alternative causes, the patient's clinical condition and the severity of the hyponatraemia, and a decision made as to whether they are suitable for discharge.

10.0 Management of symptomatic hyponatraemia[19]

An experienced clinician should be involved to guide further treatment. Severe hyponatraemia is a medical emergency. Senior members of obstetric, anaesthetic and medical teams should be involved and the patient transferred to HDU/ICU for ongoing management. **If sodium is less than 120mmol/L, team to inform ITU even if asymptomatic.** If no improvement in sodium despite treatment, inform ITU.

- Commence fluid restriction (30ml/hour) and 2 hourly sodium monitoring until asymptomatic.
- If sodium less than 125mmol/L & symptoms of severe hyponatraemia – **(headache, confusion, reduced GCS, seizures**, give 150-200 mls of 2.7% saline immediately through a large bore cannula or central line over 30 minutes.
- Check sodium concentration.
- If no improvement in symptoms or deterioration, consider further 150ml 2.7% sodium chloride (rarely needed as patients self-correct rapidly after delivery).
- Rapid increases in blood sodium concentration can cause serious harm including central pontine myelinolysis. Sodium level should rise by no more than 10 mmol/l in a 24 hour period.

- 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.

11.0 Management of ketonuria in labour in non-diabetic pregnant women/people

In labour, ketosis (the elevation of ketone bodies in the blood) is a common occurrence, due to increased physical stress, which is often compounded by reduced oral intake.

The effect of ketosis on the pregnant woman/person and baby during labour is not clear, therefore, there is uncertainty as to whether ketosis is a normal physiological response or whether women/people with ketosis in labour require intervention (such as intravenous fluids or increased oral intake) for maternal and infant wellbeing. This uncertainty has resulted in differences in opinion and practice by those providing care for women/people in labour. [20]

Ketonuria can be mild (>/=1+), moderate (>/=2+) or severe (>/=3+).

Women/people with a positive urine dipstick for ketones should have a clinical assessment for signs of dehydration. Signs of dehydration:

- Thirst
- Tachycardia
- Hypotension
- Dry mucous membranes
- Reduced skin turgor / elasticity of skin
- Reduced urine output

Ketonuria in early labour:

- Women/people with mild to moderate ketonuria in early labour should be encouraged to have food as tolerated, specifically carbohydrates, and encouraged to drink to thirst.
- Intravenous fluid should only be prescribed after a clinical assessment and/or if vomiting and unable to tolerate food.
- The volume of fluid given, whether oral or intravenous, should be recorded and a cumulative fluid balance sheet should be completed.

Ketonuria in those fasting for caesarean section or in established labour:

Nutricia Pre-op (200mls) a high carbohydrate drink or equivalent eg sports drink, may be given to women up to 2 hours prior to regional anaesthesia. Nutricia Preop may be given to reduce ketones and hypoglycaemia in:

- Women/people in established labour if operative delivery is not anticipated within 2 hours.
- Women/people who are fasting for over 12hrs for elective and semi elective caesarean section.

12.0 Audit

Suggested auditable points:

A cumulative fluid balance total should be recorded on the fluid balance chart before transfer between clinical areas.

Women/people having midwifery led care:

- Have a cumulative fluid balance of any oral intake documented every 4 hours in mls.
- Documented that they have been encouraged to void 4 hourly and to have urine output volume measured and recorded.
- Any 1500 positive fluid balance should have a documented review by senior obstetrician.

Women/people undergoing high risk IOL/labour:

- Hourly fluid balance observations recorded on the fluid balance chart for those with IV fluids, indwelling catheters or a medical history requiring close fluid balance monitoring.
- If an in-dwelling catheter in situ output volume recorded when emptied or 4 hourly.
- If a woman/person's fluid balance exceeds **1500mls positive**, a blood sodium level should be checked and the patient commenced on the Peripartum Sodium Monitoring Pathway.
- Peripartum Sodium Pathway is commenced for any women/people in labour and require IV insulin and dextrose, noted to have a blood sodium below 130 mmol/l for any reason, or greater than 1500 mls positive on their fluid balance.
- All women/people requiring intravenous insulin and dextrose infusions during labour should have a blood sodium level checked 6 - 8 hourly depending on stage of labour.
- If a woman/person has a sodium level below 130 mmol/l, they should be reviewed by the obstetric team and consideration given to alternative causes, the patient's clinical condition and the severity of the hyponatraemia, and a decision made as to whether they are suitable for discharge.

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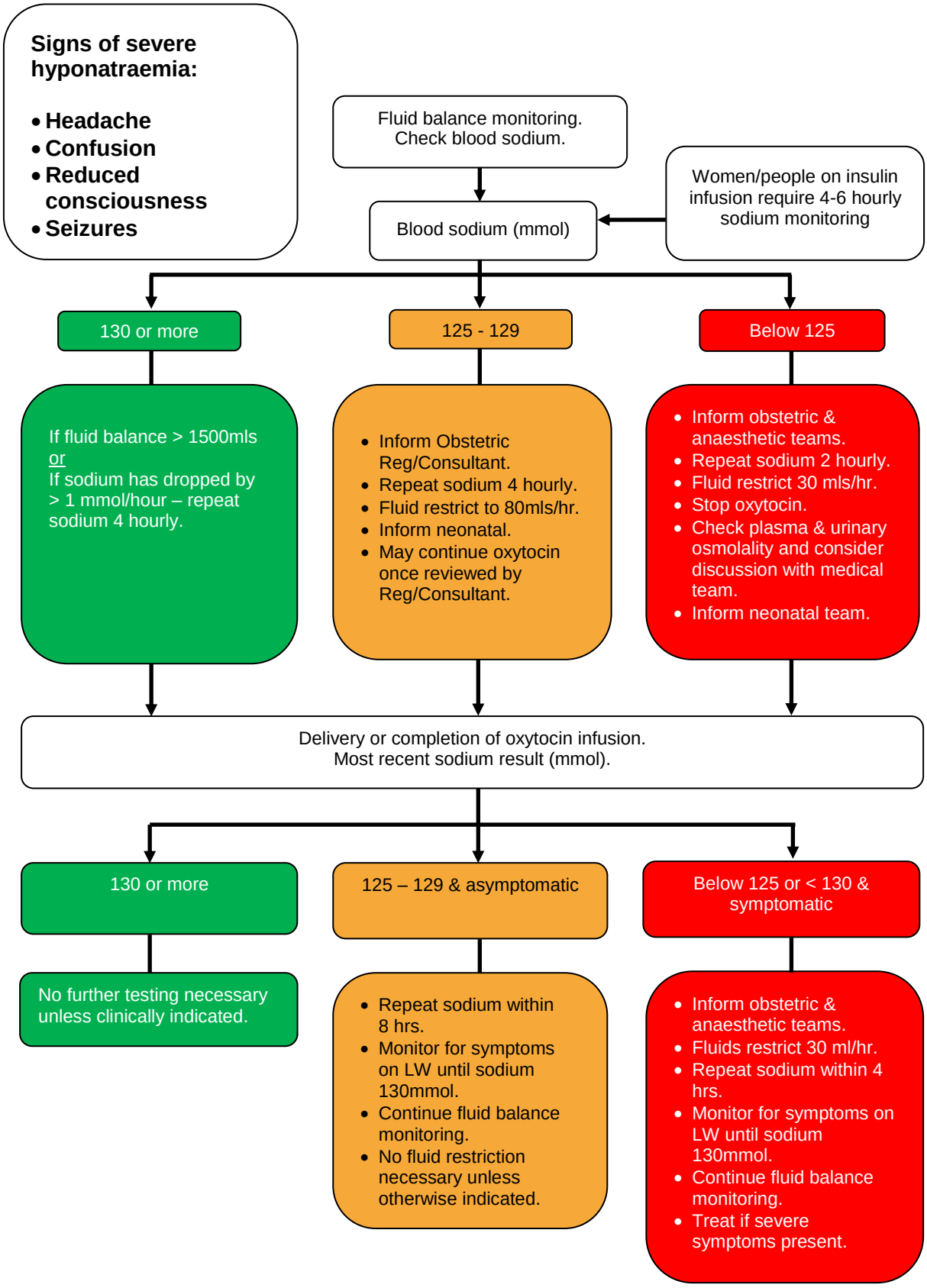
Appendix 1: Peripartum sodium monitoring pathway



Appendix 2: Management of ketonuria in labour in non-diabetic pregnant women/people

ALL WOMEN/PEOPLE

Discuss with woman/person importance of accurate fluid balance monitoring during labour.

A cumulative fluid balance total must be recorded before transfer to another clinical area.

HAVING MIDWIFE-LED CARE

- Record fluid balance observations on fluid balance chart.

In labour:

- Record fluid balance in the comments section of the partogram:
  - 4 hourly oral fluid intake.
  - 4 hourly urine output and all other fluid losses eg vomit.
  - 4 hourly cumulative fluid balance on the partogram.
- If fluid balance exceeds positive 1500mls discuss with senior obstetrician whether to check serum sodium and commence the Peripartum Sodium Monitoring Pathway. (See appendix 1)
- In homebirth setting restrict fluid intake for the next 2-4 hours and consider the whole clinical picture. If continues in a positive fluid balance (more than 1500mls) discuss transfer into the labour ward with co-ordinator.

UNDERGOING INDUCTION OF LABOUR – LOW RISK

- Record fluid balance observation on fluid balance chart:
  - 4 hourly oral fluid intake and urine output. (Encourage pregnant women/people to record this)
  - All other fluid losses eg vomit.
- If fluid balance exceeds positive 1500mls check serum sodium and commence the Peripartum Sodium Monitoring Pathway. (See appendix 1)

HIGH RISK INDUCTION OF LABOUR / HIGH RISK LABOUR

For PET follow guidance in CG1112 Management of Severe Pre-eclampsia & Eclampsia.

- Record fluid balance observation on fluid balance chart:
  - 4 hourly oral fluid intake.
  - 4 hourly urine output and all other fluid losses e.g. vomit.
  - 1 hourly intravenous (IV) fluid intake.
- **IV fluids:**
  - Record reason for IV fluids prescribed on the fluid balance chart.
  - Prescribed in millilitres (ml) per hour.
  - Must be administered via volumetric pumps (unless fluid resuscitation during haemorrhage/hypotension).
  - Not routinely required with epidural analgesia but patent cannula must be in situ.
  - IV fluids should not routinely be prescribed for the treatment of ketosis in non-diabetic women/people. See section 11.0 on management of ketones.
- **Sodium Monitoring Pathway** required if (See appendix 1) if they are:
  - In labour and require IV insulin and dextrose.
  - Noted to have blood sodium below 130 mmol/l for any reason.
  - Greater than 1500mls positive on their fluid balance.