University Hospitals Sussex
NHS Foundation Trust

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TRUST CLINICAL GUIDELINE

Diabetes in Pregnancy

Overview

The purpose of this guideline is to provide good practice evidence for staff in the care of pregnant women and birthing people with diabetes and gestational diabetes.

This guideline applies to all medical, obstetric and midwifery staff caring for pregnant women and birthing people with pre-existing and gestational diabetes.

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Diabetes in Pregnancy

1.0 Introduction

To ensure optimal outcomes for pregnant women and birthing people with diabetes and to act as a resource for staff caring for pregnant women and birthing people whose needs fall within the scope of this guideline.

This guideline is intended to provide high quality, evidence-based care to pregnant women and birthing people and babies under the care of the maternity units in University Hospitals Sussex across all four sites. The interpretation and application of clinical guidelines will remain the responsibility of the individual clinician. If in doubt, contact a senior colleague or expert.

2.0 Scope

This guideline applies to all medical, obstetric and midwifery staff caring for pregnant women and birthing people with pre-existing and gestational diabetes.

3.0 Roles and responsibilities

It is the responsibility of all midwifery and medical staff to:

- Access, read, understand and apply this guidance.
- Attend any mandatory training pertaining to this guidance.

It is the responsibility of the division to:

- Ensure the guideline is reviewed as required in line with Trust and national recommendations.
- Ensure the guideline is accessible to all relevant staff.

4.0 Definitions and abbreviations used within this guideline

ACE Angiotensin-converting enzyme	**IOL** Induction of Labour
ACR Albumin to creatinine ratio	**IV** Intravenous
ANC Antenatal Clinic	**JDC** Joint Diabetes Clinic
BP Blood Pressure	**KCl** Potassium Chloride
CBG Capillary Blood Glucose	**mg** Milligrams
CCU Critical Care Unit	**mmol/L** Millimoles per litre
CGM Continuous Glucose Monitoring	**NaCL** Sodium Chloride

CMW - Community Midwife	**PRH** Princess Royal Hospital
cm Centimeters	**RSCH** Royal Sussex County Hospital
DAU Day Assessment Unit	**SFH** Symphysis Fundal Height
DKA Diabetic Ketoacidosis	**SRH** St Richards Hospital
DSM Diabetes Specialist Midwife	**T1D** Type 1 Diabetes
DSN Diabetes Specialist Nurse	**T2D** Type 2 Diabetes
GDM Gestational Diabetes	**U&Es** Urea and Electrolytes
GTT Glucose Tolerance Test	**VRII** Variable rate Infusion
HCL Hybrid closed Loop	**WOR** Worthing Hospital

5.0 Pre-pregnancy counselling for women and birthing people with pre-existing diabetes

Pre-pregnancy Counselling

Discuss risks and how diabetes affects pregnancies

- Increased risk of congenital anomalies, perinatal mortality, worsening of complications, risks of hypoglycaemia and hypoglycaemia unawareness.
- Increased incidence of obstetric and neonatal complications and need for good diabetes control to reduce these risks.
- Offer up to monthly measurement of HbA1c levels for pregnant women and birthing people with diabetes who are planning a pregnancy (improving HbA1c reduces chance of congenital malformations in the baby).

Aim for HbA1c:

- Less than 48mmol/mol (6.5%) without problematic hypoglycaemia.
- More than 86mmol/mol (10%) avoid unplanned pregnancy due to risk of congenital malformations in the baby.

Aim for blood glucose targets:

- Fasting (on first waking) 5-7 mmol/L
- Pre-meal (at other times of the day) 4-7 mmol/L
- 2hrs post meal less than 7.8 mmol/L
- Offer continuous glucose monitoring aim is for 70% time in range (TIR). Targets of 3.5mmol/l - 7.8mmol/l. Arrange for ketone testing strips and a capillary ketone meter for pregnant women and birthing people with type 1 diabetes, with advice to test for blood ketones if they become hyperglycaemic or unwell.

Review medications	• ACE inhibitor should ideally be **stopped** as soon as pregnancy is detected and, if appropriate, alternative treatment should be started. • Stop other oral hypoglycaemics and replace with insulin, pre-conceptually if required. Discuss need to rotate insulin injection sites to avoid lipohypertrophy or cutaneous amyloidosis. See Lipid Lowering Therapy in Pregnancy for further information. • Stop injectable GLP1-RA medications. • Refer to Maternal Medicine Network if needed.
Folic Acid 5mg daily	Preconception until 12 weeks' gestation.
Aspirin 150mg daily	Start at booking to reduce risk of pre-eclampsia. Advise to take in the evening with food from 12 weeks to 36 weeks.
Dietitian	Global review of diet.
Weight Management	Offer pregnant women and birthing people who have a BMI above 27 kg/m^2 advice on how to lose weight. Refer them to Weight Management Service if wanted.
Obstetrician	All patients with previous complicated obstetric history, established diabetic nephropathy or other past medical history.
Screen for complications including diabetic retinopathy	Renal function, urine ACR, retinal screening if not carried out in the past 6 months. Refer to a nephrologist if serum creatinine is 120 mmol/L or more or urinary albumin:creatinine ratio is greater than 30 mg/mmol. Consider referral to local Maternal Medicine Network.
Information	Provide information about antenatal care pathway including contact details for Diabetes Nurse/Midwife.

6.0 Screening for gestational diabetes (GDM)

Screening criteria

Before screening for gestational diabetes discuss:

- That gestational diabetes can be controlled with diet and exercise in some pregnant women and birthing people, but glucose-lowering medication or insulin may be required.
- If gestational diabetes is not detected and controlled, there is a small increase in the risk of serious adverse birth complications such as shoulder dystocia.
- Pregnant women and birthing people with gestational diabetes will need more monitoring and may need more interventions during pregnancy and labour.

Previous GDM:

- HbA1c and GTT at booking. HbA1c is taken to rule out Pre-diabetes and Type 2.
- If HbA1c ≥ 42mmol, refer to Diabetes Team to start testing.
- If negative for GDM with a GTT, request a follow up GTT at 26 weeks.
- Referral to the Diabetes Team if positive for GDM.

Risk factors:

- BMI 30kg/m^2 or more.
- Previous birth weight ≥ 4.5 kg
- First degree relative with Type 1 or Type 2 diabetes only (Not GDM)
- Ethnicity (See list in Appendix 4)
- Polycystic Ovarian Syndrome
- Age ≥ 40
- Multiple pregnancy
- Antipsychotic medication: olanzapine, clozapine, and quetiapine (100mg or above)
- Previous stillbirth
- Currently on long term high dose steroids > 5mg/day for > 1 month

Take an HbA1c at booking. If ≥ 37mmol book GTT immediately. If negative for GDM request a follow up GTT at 26 weeks.

If HbA1c is ≥ 42mmol, refer to Diabetes Team.

Diagnose GDM if the pregnant woman or birthing person has either fasting glucose level of 5.6mmol/L or a 2-hour glucose level of 7.8mmol/L.

Offer GCK MODY testing for those who meet the criteria- diagnosed with GDM, fasting glucose >5.5mmols and BMI <30 (<27 for high prevalence Type 2 diabetes ethnic group).

Offer pregnant women and birthing people with diagnosis of GDM a review with the Diabetes Team within 1 week.

Consider GTT in low-risk pregnant women and birthing people if less than 36 weeks gestation and evidence of:

- Polyhydramnios.
- Macrosomia (AC and/or EFW 95th centile or more).
- AC ≥ 95th centile at 20 week scan – book GTT for 26/40
- Glycosuria: 2+ or above on 1 occasion or 1+ or above on 2 or more occasions.

- Recurrent infection (especially thrush).
- Anti-retroviral medication (consider testing at 26/40)

After 36 weeks:

Take a venous blood sample for an HbA1c.

A raised HbA1c of ≥39mmol/mol indicates GDM which is important in terms of making a birth plan which is appropriate, as well as offering CBG monitoring in labour, and testing of the baby after birth.

If the HbA1c is raised, request a growth scan if this hasn't been carried out within the last 2 weeks and refer to the Diabetes Team. Make an ANC appointment in the diabetes clinic either with the registrar or the consultant.

Do not carry out a random blood glucose or commence BG monitoring.

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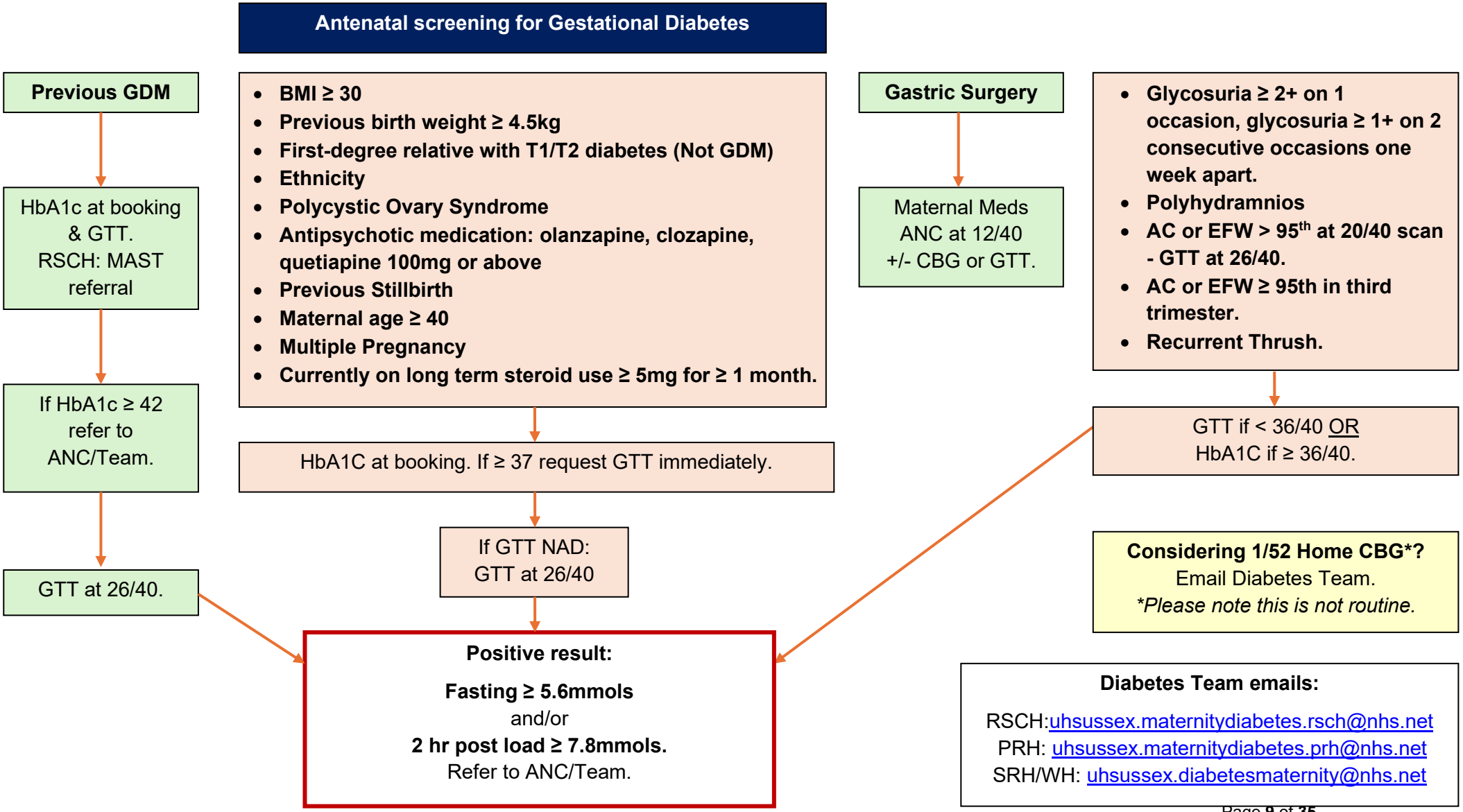
6.1 Antenatal screening for diabetes



Results	Actions
HbA1c: At booking ≥ 42 mmol/l = Pre-diabetes After 36/40 ≥ 39 mmol/l = GDM	Refer to ANC/Diabetes Team – person to commence CBG Refer to ANC/Diabetes Team
Risk Factors: HbA1c at booking ≥ 37mmol/l	Request GTT immediately
GTT: Fasting ≥ 5.6mmol/l or 2hr ≥ 7.8mmol/l = GDM	GTT results followed by up ANC MW daily (Mon-Fri). CMW to check results at next ANC contact. If no referral made, refer to ANC/Diabetes Team
Normal results	MW to publish result on BadgerNet Maternity
CBG ≥ 3 readings ≥ GTT target ranges in 1 week = GDM	Refer to ANC/Diabetes Team

Arranging GTT: MW to specify if a GTT is required on ANC booking referral or make a referral via Badgernet

Home CBG monitoring: Only if agreed by the diabetes team. This is for women/people who have had Bariatric surgery or those with sever hyperemesis

GDM diagnosis:

- MW checking results to call patient to inform them of GDM diagnosis and book into the weekly education session (SRH/WH - email diabetes team to book appointment).
- Refer high results to the ANC/Diabetes Team immediately.
- Publish results to BadgerNet Maternity.
- Update Risk Assessment.

6.2 Schedule for pregnant women and birthing people with pre-existing diabetes requiring medication

Antenatal care schedule for pregnant women and birthing people with pre-existing diabetes. Timing of birth: Pre-existing diabetes 37 - 38+6 weeks.		
Approx. Gestation	**Diabetic & Obstetric review**	**Scans**
First appointment	**Diabetes ANC** • Offer information, advice and support in relation to optimising glycaemic control including advice on: – Good control reduces risks to the pregnant woman or birthing person and baby. – Blood glucose monitoring targets without increasing hypoglycaemia. – Hypoglycaemia and possible impaired awareness. – Provide Glucagon Kit if required. – Offer pregnant women and birthing people with Type 1 diabetes blood ketone testing meter and advise when to test/seek medical help. – Advise all pregnant women and birthing people with pre-existing diabetes to seek urgent medical advice if they become hyperglycaemic or unwell (Triage, GP or 111). – UK government advice on Diabetes and driving - GOV.UK. – Offer all pregnant women and birthing people with Type 1 diabetes hybrid closed loop insulin pump therapy using a pregnancy specific device. – Offer all all those with problematic hypoglycaemia or those with T2D / LADA / MODY, carrying out multiple daily fingerpricking, continuous glucose monitoring (CGM, funding for 12 months only) Signpost to videos Best Practice Guides and Top Tips | The Association of British Clinical Diabetologists (abcd.care) • Establish the extent of diabetes related complications. (Including neuropathy, renal and vascular disease and consider specialist referral). • Review insulin/medication with regards to pregnancy. Discontinue medication not suitable for pregnancy. • Check taking folic acid 5 mg.	Viability scan

	• Offer retinal assessment if not done in last 3 months. • Discuss plans for pregnancy. • Dietician referral. • Discuss taking 150mg aspirin in the evening with food for pre-eclampsia prophylaxis from 12 weeks to 36 weeks and arrange prescription if needed.	
Booking **8-10 weeks**	**Refer to antenatal schedule of care**	
	Diabetes ANC	
	• HbA1c & micro albuminuria, U&E's, TSH	
Booking: other things to consider	• Provide an individualised approach to monitoring fetal growth and wellbeing where there is a risk of fetal growth restriction (macrovascular disease or nephropathy). • Consider thromboprophylaxis if nephrotic range proteinuria above 5 g/day (albumin:creatinine ratio greater than 220 mg/mmol).	
11+2 – 14+1 weeks	Refer to antenatal schedule of care	Combined USS/Bloods
16-17 weeks	**Diabetes ANC**	
	• Ensure the pregnant woman or birthing person has been referred for retinal assessment. • Book serial scans from 28 weeks.	
18 to 20+6 weeks	• At anomaly scan, four chamber view and outflow tract views and 3 vessels as standard at UHSussex.	Anomaly scan+/- uterine artery Doppler scan
25 weeks	Refer to antenatal schedule of care	
28 weeks	• Refer to antenatal schedule of care • SFH measurements should not be taken if growth scans have been commenced. • Take an HbA1c with 28-week bloods.	
	Diabetes ANC	
	Check HbA1c has been requested/actioned as per SBLCBv3.2 point 6.4	Growth & liquor volume
31 weeks	Refer to antenatal schedule of care	

32 weeks	**Diabetes ANC** • Discuss and provide information about timing, mode of birth and management plan for hospital birth, and postnatal contraception. • Make and document changes to medication for intrapartum and postpartum management.	Growth & liquor volume
36 weeks	**Diabetes ANC** • Discuss and provide information about timing, mode of birth and management plan for hospital birth and postnatal contraception. • Make and document changes to medication for intrapartum and postpartum management. • Discuss care of baby post-birth including initiation of feeding and effect on neonatal blood glucose control. • Discuss breastfeeding and effect on blood glucose control (e.g. increased risk of hypoglycaemia in women and birthing people with pre-existing diabetes). • Discuss colostrum harvesting. • Discuss membrane sweeps • Discuss contraception. • **Timing of birth: pre-existing diabetes 37 - 38+6 weeks.** • Finalise need for insulin in labour or elective section. • Finalise postnatal treatment plan.	Growth & liquor volume No further scans unless clinically indicated
38 weeks	• Refer to antenatal schedule of care	
	Diabetes ANC Consultant review if not delivered	
40 weeks	**Diabetes ANC** • BP & urinalysis Measure and plot SFH. • Consultant review if not delivered.	
Steroid Therapy	• Individualised plan – do not routinely give for elective LSCS more than 37 weeks.	
Anaesthetic review	• For pregnant women and birthing people with diabetes and comorbidities such as obesity or autonomic neuropathy, offer an anaesthetic assessment in the third trimester of pregnancy.	

Pregnant women and birthing people with diabetes should also receive routine care according to the schedule of appointments in NICE guideline on antenatal care, including appointments at 25 weeks (for nulliparous women and people) and 34 weeks, but with the exception of the appointment for nulliparous women and people at 31 weeks.

Please note once regular growth scans have been commenced, SFH measurements do not need to be performed.

6.3 Schedule for pregnant women and people with gestational diabetes

Antenatal care schedule for pregnant women and birthing people with gestational diabetes

Timings for birth:

Offer IOL/ELCS between 38+0 and 39+6 for those on medication.

Diet controlled GDM with a normal size baby aim for birth by 40+6 weeks (unless other risk factors for earlier IOL e.g. maternal age >40, high BMI, IVF etc)

Approximate Gestation	Diabetic & Obstetric Review	Scans
Pregnant women and birthing people with gestational diabetes controlled by diet alone should receive routine antenatal care but with the additional diabetic support detailed below. **If not already, HbA1c to be taken at time of diagnosis to identify pregnant women and birthing people who may have pre-existing diabetes.**		
First diabetes appointment	**Refer to Diabetes Team for care** Offer information, advice and support on: • Recommended blood glucose targets. • Good control reduces complications for the woman and birthing person and their baby. • Take regular exercise (for example, walking for 30 minutes after a meal). • Implications both short and long term of diagnosis for them and their baby. • Plans for pregnancy and management of diabetes. That treatment includes changes in diet, exercise and could involve medication. • Teach blood glucose monitoring and target levels - less than 5.3mmol/L fasting and less than 7.8mmol/L 1h after food. Dietitian review. • Book consultant appointments for after anomaly scan.	

	• Book serial scans from 28/40. • Advise pregnant women and birthing people with gestational diabetes to seek urgent medical advice if they become hyperglycaemic or unwell.	
28 weeks	Refer to antenatal schedule of care	Growth scan & ANC
32 weeks	Refer to antenatal schedule of care	Growth scan & ANC
	Diabetes ANC	Growth and Liquor volume
34-36 weeks	• Discuss recommending hospital birth, mode of birth and birth plan and contraception. • **Offer IOL/ELCS between 38+0 and 39+6 for those on medication.** • Refer to antenatal schedule of care. • Antenatal expression of colostrum.	Growth scan & ANC
38 weeks	Refer to antenatal schedule of care	
40 weeks	• Refer to antenatal schedule of care • **Diet controlled GDM with a normal size baby aim for birth by 40+6 weeks** (unless other risk factors for earlier IOL e.g. maternal age >40, high BMI, IVF etc)	
GDM requiring treatment		
Insulin or Metformin if needed	• If blood glucose targets are not met with diet and exercise changes within 1–2 weeks, offer metformin/insulin. If metformin is contraindicated or unacceptable to the woman or birthing person, offer insulin. • If fasting plasma glucose is 7.0 mmol/L or above at diagnosis, offer immediate treatment with insulin, with or without metformin and diet and exercise changes. • If fasting plasma glucose level is between 6.0 and 6.9 mmol/L and complications such as macrosomia or polyhydramnios are present, consider immediate treatment with insulin, with or without metformin and diet and exercise changes.	

7.0 Antenatal expression of colostrum

All pregnant women and birthing people are advised to learn the skill of hand expressing and to collect any colostrum from 36 weeks that may be present. This is especially important for babies born to a woman or birthing parent with diabetes due to risk of newborn hypoglycaemia. Please reassure that if colostrum cannot be obtained then this is not a sign of poor milk supply once baby is born.

This ensures that colostrum is available immediately after the birth for the baby, which can help maintain neonatal blood glucose and may reduce need for prolonged stay in NNU.

8.0 Caring for a pregnant woman or birthing person using CGM or flash blood glucose monitoring

- There is a lag of up to 15 minutes between current blood glucose and the sensor reading.
- It is not reliable when there are large swings in glucose measurements e.g. corticosteroids, hypoglycaemia, recovery from hypoglycaemia, DKA and labour or when the pregnant woman or birthing person is unwell.
- In any of the above situations CBG (fingerprick) testing MUST be carried out and the sensor can remain in situ.
- Whenever VRII is required CBG testing MUST be carried out and the sensor can remain in situ.
- Any CGM or flash technology is expensive and must be stored in a safe place if removed.

9.0 Antenatal Corticosteroids

9.1 Risks and benefits of antenatal corticosteroids for planned caesarean birth between 37+0 and 38+6 weeks

If a previous baby had TTN (Transient Tachypnoea of the Newborn) or RDS (respiratory distress syndrome) consider antenatal corticosteroids.

Prior to the administration of steroids, the risks and benefits of corticosteroids, should be discussed with the pregnant woman or birthing person (and their family members or carers as appropriate) using the RCOG infographic in Appendix 4.

This discussion should be documented on BadgerNet Maternity. RCOG (2022). Antenatal corticosteroids may reduce admission to the neonatal unit for respiratory morbidity, but it is uncertain if there is any reduction in RDS, TTN, or neonatal unit admission overall, and antenatal corticosteroids may result in harm to the neonate which includes hypoglycaemia and potential developmental delay.

9.2 Care during antenatal corticosteroid administration

- Patients may need to be admitted to Labour Ward and may need to remain in hospital for 24 hours after the last corticosteroid dose or until their blood glucose levels are stable.
- **In certain well controlled people with diabetes, corticosteroid administration may be organised as outpatient. This decision is to be made by Pregnancy Diabetes Team only.**
- For out-patient steroid administration, consider increasing long-acting insulin by 30% on the evening after the first dose of steroid is administered, increase short acting insulin before meals by 10%. Continue for next 48 hours then return to pre-steroid administration doses. Liaise with Diabetes Pregnancy Team for an individualised plan.
- Women and birthing people who are on insulin pumps or other automated insulin delivery systems may choose to remain on these during or after steroid administration. Contact the diabetes team for advice on adjusting insulin pump settings.
- Steroids are administered: Dexamethasone 12mg intramuscular (IM) 24 hours apart (2 doses required) – or betamethasone if dexamethasone not available.
- Measure blood glucose every 2 hours and start VRIII (variable rate intravenous insulin infusion) once the capillary glucose (CBG) rises **to 7.0mmol/L or above on 2 readings more than 1 hour apart or 1 CBG is 11mmol/L or above.**
- For those on HCL see Appendix 5 and Appendix 6.
- Pregnant women and birthing people on CGM or flash monitoring can leave their sensor in situ but must still have capillary (fingerprick) glucose monitoring with or without VRII if admitted to hospital during steroid administration.
- Make up a solution of insulin at 1 unit per ml (50 units Actrapid made up to 50ml with Sodium Chloride 0.9%) in a 50 ml syringe that fits the insulin pump.
- Check U&Es prior to starting VRIII to monitor fluid balance and electrolyte abnormalities. Repeat 4 hourly.
- Intravenous fluids should be given to avoid hypoglycaemia, hyponatraemia and hypokalaemia even if a patient is eating and drinking. 500mls 0.9% sodium chloride (NaCl) with 5% glucose and 0.15% potassium chloride (KCl) at 50mls/hour is recommended but the fluid status of the patient needs to be considered (additional fluids intravenously may be needed if the patient is not eating or drinking reliably).
- Fluids, particularly glucose containing fluids, may have to be restricted in patients who are at risk of or already have hyponatraemia. In some cases insulin without substrate fluids may have to be used (difficult IV access, fluid overload states, hyponatraemia or risk of hyponatraemia). Please consult Diabetes Team/senior obstetric staff as needed.
- Mix the contents and connect the syringe pump via a 3-way tap to the glucose infusion. Make sure that the tubing is flushed with the insulin infusion solution as far as the cannula. Start insulin infusion at the rate given by the sliding scale below for the measured capillary blood glucose.

- Continue their normal basal-bolus insulin regime whilst on VRII.
- Once the pregnant woman or birthing person is on VRIII check blood glucose **every hour** and adjust intravenous insulin according to blood glucose. Target blood glucose 4-7.0mmol/L
- Both IV fluids and Actrapid infusions MUST be prescribed on EPMA and charted on the fluid balance monitoring on BadgerNet Maternity. (See Hyponatraemia in Labour).
- After the first hour adjust insulin infusion rates according to the VRII in Appendix 1.
- VRII can be stopped 12 hours after the last dose of steroids if CBGs are between 5-5.9mmol/L on two consecutive occasions if the pregnant woman or birthing person is fasting, or 7-8mmols/L at 1 and 2hours post-meal.

10.0 Hyperemesis

- Pregnant women and birthing people on insulin will need hospital admission for medical assessment and insulin management.
- Early rehydration ensuring fluid management based on daily U&Es.
- Check urine for ketones to detect ketoacidosis early.
- Check blood ketone if type 1 diabetes (if more than 1.5, see section 14.1 for links to Trust DKA guideline).
- Check Thyroid Function Tests.
- Ultrasound scan to confirm normal pregnancy (if no scan done previously).
- Pregnant women and birthing people to continue their normal insulin; contact Diabetes Team regarding dose adjustment (do not stop usual insulin or insulin pump).
- Early liaison with Diabetic and Obstetric teams.
- Pregnant women and birthing people on CGM or flash monitoring can leave their sensor in situ but must still have capillary (fingerprick) glucose monitoring hourly if needing a VRIII, large swings in blood glucose or hypoglycaemia or suspected DKA.

(For general care with hyperemesis see Sussex Health & Care: Nausea & vomiting - management in pregnancy and hyperemesis gravidarum)

11.0 Care during labour

- Refer to the intrapartum management plan on BadgerNet Maternity.
- Switch to hourly CBG monitoring once established in labour if not on HCL. For HCL users please see Appendix 5 and Appendix 6. Aim for blood glucose 4-7 (NICE targets).
- Pregnant women and birthing people on insulin may continue with their usual insulin until in established labour. Continue long-acting insulin (eg.Humulin I, Levemir, Lantus,

Insulatard) throughout labour but stop short acting or mixed insulins (e.g. Novomix 30, Novorapid or Humalog).

Women and birthing people who are on insulin pumps or other automated insulin delivery systems (HCL) may choose to remain on these during and after labour. See Appendix 5 and Appendix 6. Contact the diabetes team for advice if needed. At delivery of the placenta, change pump settings to pre-pregnancy rates or rates as set out in diabetes birth plan.

- Consider intravenous glucose and insulin infusion from the onset of established labour for pregnant women and people with type 1 diabetes if diabetes unstable.
- Monitor CBG hourly and commence VRII if at least 2 CBG 7.0 mmol/L or above, more than 1 hour apart, or 1 CBG 11mmol/L or above.
- Pregnant women and birthing people on CGM monitoring must still have capillary (fingerprick) glucose monitoring hourly (not needed if on HCL) but can leave their sensor in situ.
- Newly birthed women and birthing people with a CGM can recommence using their sensor postnatally.
- Pregnant women and birthing people with pre-existing or unstable diabetes (those needing a VRIII) should be considered for continuous electronic fetal monitoring once labour is established.
- Pregnant women and birthing people with GDM treated by diet alone can be managed as for normal labour but monitor blood glucose as above.
- Some women and birthing people require a VRII regardless of blood glucose levels. This will be clearly documented on BadgerNet Maternity.
- Commence fluid balance monitoring on BadgerNet Maternity. (See Hyponatraemia in Labour).
- Pregnant women and birthing people with insulin pumps may continue to self-manage their diabetes with the use of the pump. They do not require an insulin sliding scale. If they become unable to manage the pump, then keep pump running on the basal (background) rate and commence a VRII according to plan on BadgerNet Maternity (see Appendix 3).
- Inform the neonatal unit team at/after birth.

11.1 If a VRII is required

(see Appendix 2)

Make up a solution of insulin at 1 unit per ml (50 units of Actrapid made up to 50ml with Sodium Chloride 0.9%) **in a 50ml syringe that fits the insulin pump.**
500mls 0.9% sodium chloride (NaCl) with 5% glucose and 0.15% potassium chloride (KCl) at 50mls/hour should run alongside this to avoid hypoglycaemia, hyponatraemia and hypokalaemia.
U&Es should be checked prior to starting VRII and repeated 4hrly during labour when in labour to monitor fluid balance and electrolyte abnormalities.

12.0 Planned caesarean birth (CS)

- Plan to have the patient first on a morning list.
- If on long-acting insulin (e.g. Levemir, Lantus, Insulatard) in the morning, instruct patient to continue this, but omit short acting insulin (e.g. Novorapid, Humalog, Actrapid).
- Measure blood glucose on admission and hourly thereafter. **VRII** only as required **if glucose remains 7.0mmol/L or above** just prior to CS.
- If general anaesthesia is used, monitoring should be every half an hour from induction of general anaesthesia until the baby is born, and the newly birthed mother or birthing person is fully conscious.
- Continue monitoring blood glucose hourly post CS until ready to eat and drink.
- Women and birthing people using CGM or flash can leave their sensor in situ during CS.
- Recommence pre-pregnancy treatment once ready to eat and drink (see postnatal care section below).

13.0 Postnatal care management plan

13.1 Pre-existing diabetes

13.1.1 Type 1 diabetes or type 2 diabetes on insulin

- If on an HCL, please see management plan on BadgerNet Maternity.
- Following birth of the placenta the insulin infusion rate should be reduced by 50% and stopped 30-60mins after the first meal. Commence pre-pregnancy dose of insulin when eating and drinking (up to 10% less if breast feeding). If pre-pregnancy dose is unclear,

reduce total daily dose in pregnancy by 25% of first trimester dose or contact diabetes team.

- Continue hourly blood glucose monitoring until first meal. Subsequently test pre-meals and pre-bedtime or as per usual practice and aim for 6-10mmol/L to avoid hypoglycaemia.
- Monitor blood glucose levels between 01.00 and 03.00 during the first night after birth due to increased risk of hypoglycaemia. Ensure that the woman or birthing person has hypo treatment nearby for possible hypoglycaemic episodes.
- Discuss/implement contraception and the importance of planning a subsequent pregnancy.
- 6-12 weeks postnatal: Follow-up in the Diabetes Centre.

13.1.2 Type 2 diabetics on oral glucose lowering drugs before pregnancy

- Stop VRII when the placenta is delivered.
- Four hourly blood glucose monitoring until first meal. Subsequently test pre-meals and pre-bedtime or as per usual practice and aim for 6-10mmol/L to avoid hypoglycaemia.
- For women and birthing people with Type 2 diabetes, diabetes treatment management plan will have been made and documented on BadgerNet Maternity. There is no contraindication to breastfeeding if on metformin or sulphonylureas (e.g. glibenclamide). Contact the Diabetes Team if there are any concerns.
- Discuss contraception and the importance of planning a subsequent pregnancy.
- 6-12 weeks postnatal: follow-up in Diabetes Centre.

13.2 Gestational Diabetes

- If on VRII stop when the placenta is delivered.
- CBG monitoring should be performed for 24 hours post birth to capture pre-existing diabetes. This should consist of:
    - One fasting test (fasting is usually for 6hrs ie as soon as the woman or birthing person wakes up in the morning) and/or a pre/meal blood glucose. This should be under 7mmols/L.
    - Blood glucose monitoring 2 hours post meals. These should be under 11mmols/L.
- If normal, then discontinue testing and follow up with GP surgery after 12 weeks post birth.
- Patients with fasting of more than 7mmol/L or 2 hours post meal readings more than 11mmol/L need diabetes review by the Diabetic Team as they may have pre-existing or new onset diabetes.
- Do not require medication unless indicated by Diabetes Team.

- Advise women and birthing people to have an HbA1c at 12 weeks postnatally at their GP surgery. Advise annual HbA1c with GP due to increased risk of developing Type 2 diabetes. Remind the woman and birthing person of the symptoms of hyperglycaemia.
- Advise early referral to diabetes team in subsequent pregnancy due to the risks of recurrence and offer them diabetes testing when planning future pregnancies.

13.3 Breastfeeding

- Breastfeeding people need to eat more to compensate for the calories utilised during feeding.
- A snack of 10-15g carbohydrate (for example one slice of toast or one biscuit) and a drink each time they feed or express milk, including night feeds is recommended.
- Insulin requirements will be lower in breastfeeding women and birthing people. Hypoglycaemia is common and undesirable and should be avoided.
- Encourage women and birthing people to check their blood glucose levels more frequently when breastfeeding.
- Women and birthing people should be advised that breastfeeding might cause thirst. This is not necessarily a sign of elevated blood glucose levels.
- Women and birthing people taking metformin /glibenclamide / glicazide may continue / resume taking it whilst breastfeeding – no other diabetic tablets are recommended whilst breastfeeding.

Neonatal care should follow maternity guidance on neonatal hypoglycaemia.

14.0 Management of diabetic emergencies

14.1 Ketoacidosis

Please refer to hospital-wide guideline on the management of Diabetic ketoacidosis in adults:

PRH&RSCH - Please follow Diabetic Ketoacidosis Treatment (DKA).pdf

WH&SRH - Please follow Management of diabetic ketoacidosis in adults.pdf

- During pregnancy, women and birthing people with Type 1 diabetes who become unwell must have diabetic ketoacidosis excluded as a matter of urgency. It can also occur rarely in those with T2DM.
- Pregnant women and birthing people with gestational diabetes who have blood glucose reading more than 10mmol/L **and** are unwell should have blood ketones tested to exclude diabetic ketoacidosis.
- All pregnant women and birthing people who are suspected of having diabetic ketoacidosis must be admitted immediately for urgent medical and obstetric care in the most appropriate care setting.

- Commence fluid balance monitoring on BadgerNet Maternity. (See Hyponatraemia in Labour)
- Early involvement of outreach team is required.
- Untreated ketoacidosis is associated with a 50-80% fetal mortality.
- On call medical registrar should be contacted immediately if a diagnosis of Ketoacidosis is suspected.
- Specialist help from consultant endocrinologists should be sought and they are contactable via hospital switchboard if required.
- Pregnant women and birthing people on CGM or flash monitoring can leave their sensor in situ but must still have capillary (fingerprick) glucose monitoring hourly.
- Incidents of DKA should have a DATIX raised.

14.2 Hypoglycaemia

- Hypoglycaemia (less than 4mmol/L) is undesirable during pregnancy and should be avoided. Pregnant women and birthing people with diabetes will be given advice regarding maintaining glycaemic control in pregnancy at their first appointment with the Diabetic Team or for pregnant women and birthing people with gestational diabetes, at time of commencing insulin.
- If CGM or flash measures glucose less than 4mmol/L check with CBG.
- When in hospital, ensure that women and people with diabetes on insulin keep fast-acting glucose on their locker.
- If hypoglycaemia is suspected and woman or birthing person is taking insulin, check blood glucose and if less than 4mmol/L follow trust guidelines on management of hypoglycaemia.

Give fast-acting-juice, check blood glucose after 10 minutes:

- If above 4mmol/L, give a slow acting carbohydrate such as 2 biscuits or 1 slice of toast.
- If less than 4mmol/L give further fast-acting glucose, this can be given up to 3 times.
- **Do not give carbohydrates until above** 4mmol/L.
- Follow Trust guidelines for treatment of hypoglycaemia.
  SRH&WH - Please follow Hypoglycaemia (in adults with diabetes who have blood glucose of under 4mmol l).pdf
  PRH&RSCH - Please follow: How to manage low blood glucose - Hypoglycaemia.pdf

15.0 Monitoring

Issue being monitored	**Monitoring method**	**Responsibility**	**Frequency**	**Reviewed by and actions arising followed up by**
Incidence of DKA / Transfer to CCU.	DATIX – case review	Maternity Patient Safety Team	On-going	W&C Quality & Safety Meeting

Appendix 1: Variable Rate Intravenous Insulin Infusion (VRII) antenatally

For use when administering antenatal corticosteroids if 2x CBGs 7mmol or more 1h apart, or 1 reading 11mmol or above.

- Make up a solution of insulin at 1 unit per ml (50 units Actrapid made up to 50ml with Sodium Chloride 0.9%) in a 50ml syringe that fits the insulin pump.
- Check U&Es prior to starting VRII to monitor fluid balance and electrolyte abnormalities. Repeat 4 hourly.
- Prescribe VRII and 500mls 0.9% sodium chloride (NaCl) with 5% glucose and 0.15% potassium chloride (KCl) at 50mls/hour – IV fluids should run with all VRII's to prevent hypoglycaemia, hyponatraemia and hypokalaemia.
- Continue background long-acting insulin and continue quick acting insulin pre meals.
- If on HCL see Appendix 5 and Appendix 6.

DOSING ALGORITHM			
Algorithm:	**A**	**B**	**C**
	For most pregnant women and birthing people.	**For pregnant women and birthing people not controlled on algorithm A or needing more than 80units/day of insulin.**	**For pregnant women and birthing people not controlled on algorithm B (after specialist advice).**
CBG levels (mmol/L):	**Infusion rate (units/hr=mls/hr)**		
Less than 4	STOP INSULIN FOR 20 MINUTES (Treat as hypo as per guideline and re-check CBG in 10 mins)		
4.0-5.5	0.2	0.5	1.0
5.6-7.0	0.5	1.0	2.0
7.1-8.5	1.0	1.5	3.0
8.6-11.0	1.5	2.0	4.0
11.1-14.0	2.0	2.5	5.0
14.1-17.0	2.5	3.0	6.0
17.1-20.0	3.0	4.0	7.0
Above 20.1	4.0	6.0	8.0

Algorithm A – Most women and birthing people will start here.

Algorithm B – Use this algorithm for women and birthing people who are likely to require more insulin (on more than 80 units of insulin or those not achieving target on algorithm A).

Algorithm C – For those pregnant women and birthing people not achieving target on algorithm C – only start in discussion with Diabetes Team.

- Target CBG level = 4-7mmol/L
- Check CBG every hour while on VRIII and every half hour if under anaesthetic.
- Move to higher algorithm if CBG more than target range and not dropping.
- Move to lower algorithm if CBG falls below 4mmol/L or is dropping too fast.
- Maintain IV insulin infusion for 30minutes after re-starting original insulin regime – IV insulin has a half-life of 5minutes.

Appendix 2: Variable Rate Intravenous Insulin Infusion (VRII) in Labour

For use IN LABOUR if 2x CBGs 7mmols or more 1h apart, or 1 reading 11mmol or above.

- Make up a solution of insulin at 1 unit per ml (50 units Actrapid made up to 50ml with Sodium Chloride 0.9%) in a 50ml syringe that fits the insulin pump.
- Prescribe VRII and 500mls 0.9% sodium chloride (NaCl) with 5% glucose and 0.15% potassium chloride (KCl) at 50mls/hour – IV fluids should run with all VRII's to prevent hypoglycaemia, hyponatraemia and hypokalaemia.
- Check U&Es prior to starting VRIII to monitor fluid balance and electrolyte abnormalities. Repeat 4 hourly.
- Consider intravenous glucose and insulin infusion from the onset of established labour for women with type 1 diabetes if diabetes unstable.
- Continue background long acting insulin.
- If on HCL see Appendix 5 and Appendix 6.

DOSING ALGORITHM			
Algorithm:	**A**	**B**	**C**
	For most pregnant women and birthing people.	**For pregnant women and birthing people not controlled on algorithm A or needing more than 80units/day of insulin.**	**For pregnant women and birthing people not controlled on algorithm B (after specialist advice).**
CBG levels (mmol/L):	**Infusion rate (units/hr=mls/hr)**		
Less than 4	STOP INSULIN FOR 20 MINUTES (Treat as hypo as per guideline and re-check CBG in 10 mins)		
4.0-5.5	0.2	0.5	1.0
5.6-7.0	0.5	1.0	2.0
7.1-8.5	1.0	1.5	3.0
8.6-11.0	1.5	2.0	4.0
11.1-14.0	2.0	2.5	5.0
14.1-17.0	2.5	3.0	6.0
17.1-20.0	3.0	4.0	7.0
Above 20.1	4.0	6.0	8.0

Algorithm A – Most women and birthing people will start here.

Algorithm B – Use this algorithm for women and birthing people who are likely to require more insulin (on more than 80 units of insulin or those not achieving target on algorithm A).

Algorithm C – For those pregnant women and people not achieving target on algorithm B – only start in discussion with Diabetes Team.

- Target CBG level = 4-7mmol/L.
- Check CBG every hour while on VRII and every half hour if under anaesthetic.
- Move to higher algorithm if CBG more than target range and not dropping.
- Move to lower algorithm if CBG falls below 4mmol/L or is dropping too fast.

- Maintain IV insulin infusion for 30minutes after re-starting original insulin regime – IV insulin has a half-life of 5minutes.

Postnatally:

- GDM – STOP VRII and IV fluids when the placenta is delivered.
- T1DM and Insulin treated T2DM – Reduce the rate of the VRIII to HALF once the placenta is delivered and STOP 30-60mins after the first meal.

Appendix 3: Antenatal Corticosteroids to reduce neonatal morbidity and mortality

Antenatal Corticosteroids to reduce neonatal morbidity and mortality

Royal College of Obstetricians & Gynaecologists

Green-top Guideline no. 74
Published February 2022

A course of **antenatal corticosteroids** given **within the seven days prior** to **preterm birth reduces perinatal and neonatal death and respiratory distress syndrome**. (Grade A)

For women undergoing **planned caesarean birth between 37+0 and 38+6 weeks** an **informed discussion** should take place with the woman **about the potential risks and benefits** of a course of antenatal corticosteroids. Although antenatal corticosteroids may reduce admission to the neonatal unit for respiratory morbidity, **it is uncertain** if there is any reduction in Respiratory Distress Syndrome, Transient Tachypnoea of the Newborn or Neonatal Unit admission overall, and antenatal **corticosteroids may result in harm to the neonate which includes hypoglycaemia and potential developmental delay**. (Grade B)

Corticosteroids should be offered to women **between 24+0 and 34+6 weeks'** gestation in whom **imminent preterm birth** is anticipated (either due to established preterm labour, preterm prelabour rupture of membranes [PPROM] or planned preterm birth. (Grade A)

Women with twins and triplets should be offered targeted antenatal corticosteroids for early birth in line with recommendations for singletons. (Grade D)

Birth should not be delayed for antenatal corticosteroids **if the indication for birth is impacting the health of the woman or her baby**. (Good Practice Point)

Antenatal corticosteroids should be offered to women with **PPROM**, who are at **increased risk of preterm birth**. (Grade A)

Antenatal corticosteroid use **reduces neonatal death** when the **first dose** is given within the **48 hours prior to birth**. (Grade D)

Benefits are also seen **when the first does is given within 24 hours of birth** and antenatal corticosteroids should still be given if birth is expected within this time. (Grade D)

For further information please see full text at **rcog.org.uk/gtg74**

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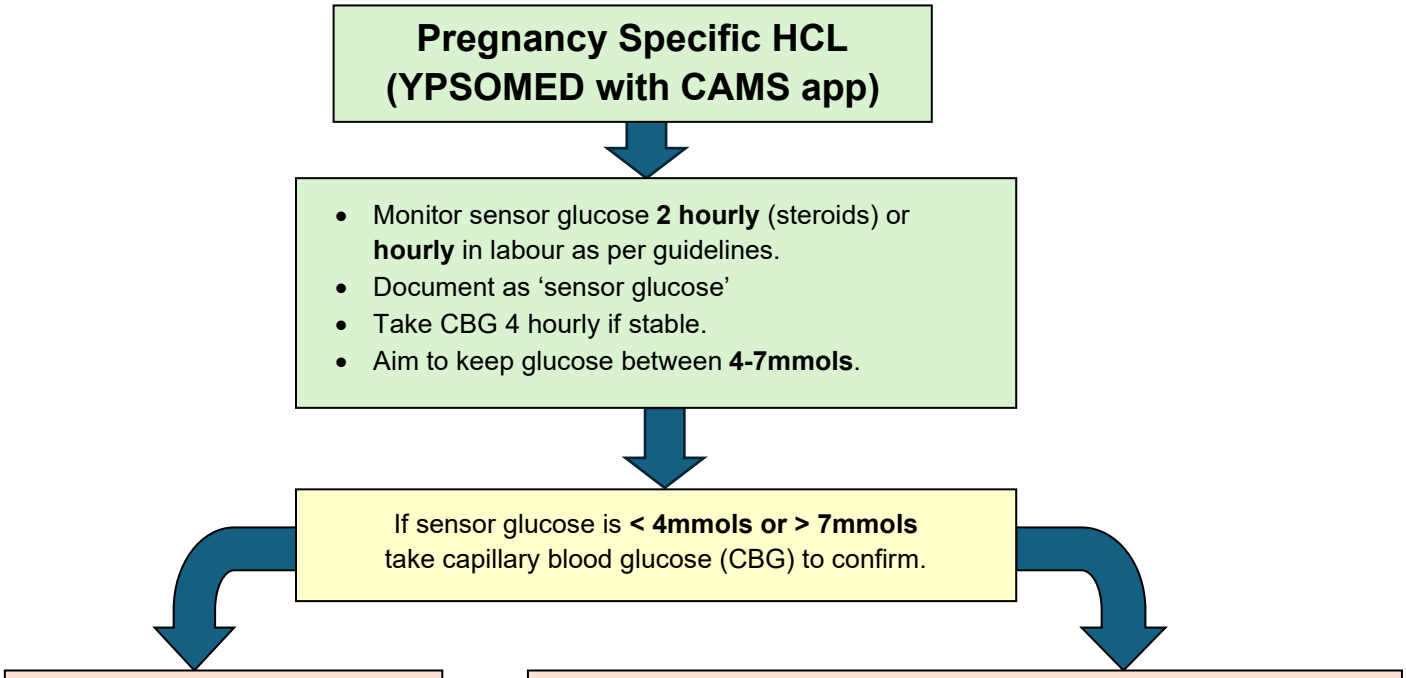
Appendix 4: Ethnicity - Family origins with a high prevalence of gestational diabetes

South Asian - specifically women and birthing people whose country of family origin is India, Pakistan or Bangladesh.
Black Caribbean and Middle Eastern - specifically women and birthing people whose country of family origin is Saudi Arabia, Bahrain, United Arab Emirates, Iran, Iraq, Jordan, Syria, Oman, Qatar, Kuwait, Lebanon, Turkey or Egypt.
Black African.
Chinese
Any black or brown mixed ethnicity

NICE 2020

Appendix 5: Type 1 Diabetes on Hybrid Closed Loop System (HCL) (Pregnancy Specific)

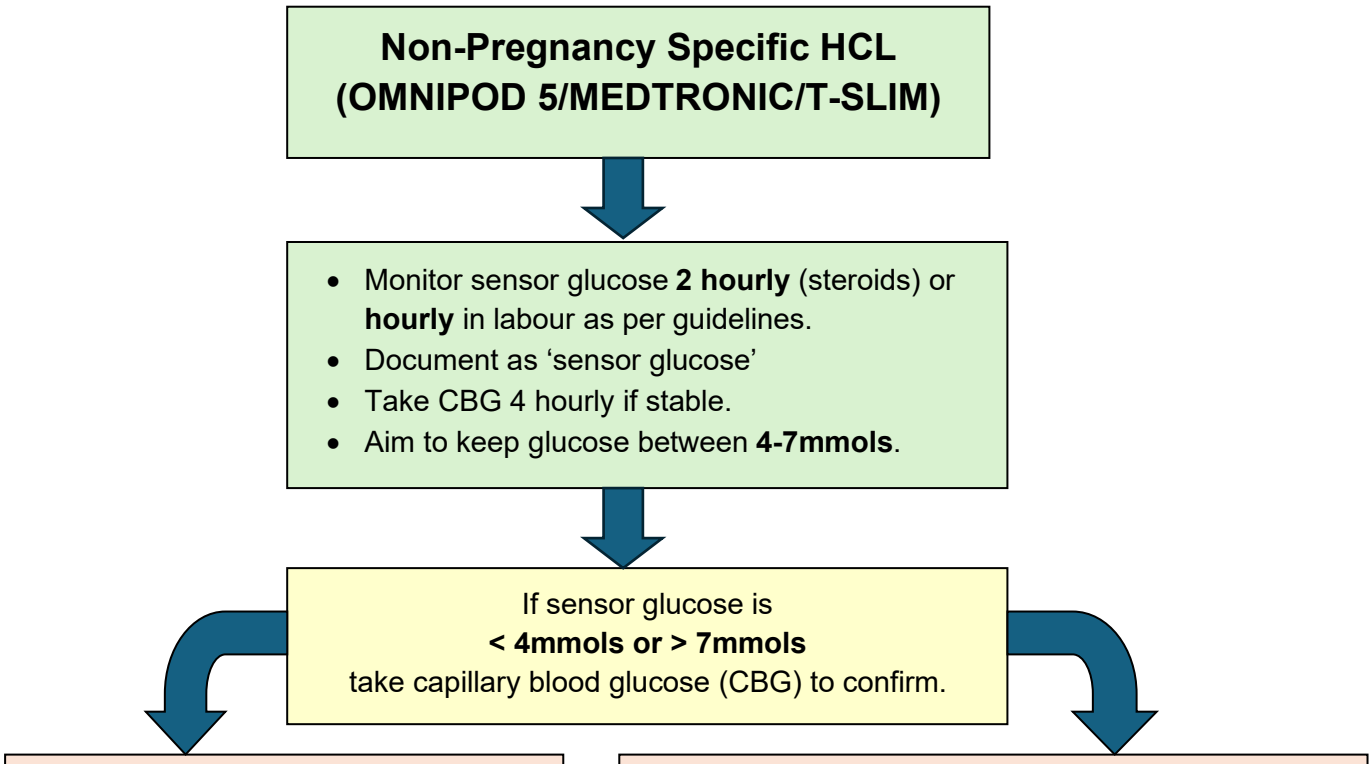
HCL – consists of an insulin pump, glucose sensor and algorithm that will adjust insulin doses according to need. Person needs to bolus for ANY carbohydrates.



- Postnatal settings to be started ASAP. individual plan will be on BadgerNet Maternity.
- Aim for glucose between 6-10mmols
- Pregnant women and birthing people can self-monitor closely and contact diabetes team if concerns.
- Email contacts-
  - SRH/WH: uhsussex.diabetesmaternity@nhs.net
  - RSCH: uhsussex.maternitydiabetes.rsch@nhs.net
  - PRH: uhsussex.maternitydiabetes.prh@nhs.net

Appendix 6: Type 1 Diabetes on Hybrid Closed Loop System (HCL) (Non-Pregnancy Specific)

HCL – consists of an insulin pump, glucose sensor and algorithm that will adjust insulin doses according to need. Person needs to bolus for ANY carbohydrates.



- Postnatal settings to be started ASAP. individual plan will be on BadgerNet Maternity.
- Aim for glucose between 6-10mmols
- Pregnant women and birthing people can self-monitor closely and contact diabetes team if concerns.
- Email contacts-
  - SRH/WH: uhsussex.diabetesmaternity@nhs.net
  - RSCH: uhsussex.maternitydiabetes.rsch@nhs.net
  - PRH: uhsussex.maternitydiabetes.prh@nhs.net

Guideline Version Control Log

Version	Date	Author	Comment
1.0	July 2025	C.Goumalatsou, Obstetric Consultant N Bailey, Diabetes Specialist Midwife K Coats, Diabetes Specialist Midwife	New Trust wide guideline replacing: • CG1109 Diabetes in Pregnancy (SRH&WH) • MP018 Diabetes in Pregnancy (PRH&RSCH)

Due Regard Assessment Tool

To be completed and attached to any guideline when submitted to the appropriate committee for consideration and approval.

		Yes/No	Comments
1.	**Does the document/guidance affect one group less or more favourably than another on the basis of:**		
	Age	*No*	
	· Disability	*No*	
	· Gender (Sex)	*No*	
	· Gender Identity	*No*	
	· Marriage and civil partnership	*No*	
	· Pregnancy and maternity	*No*	
	· Race (ethnicity, nationality, colour)	*No*	
	· Religion or Belief	*No*	
	· Sexual orientation, including lesbian, gay and bisexual people	*No*	
2.	**Is there any evidence that some groups are affected differently and what is/are the evidence source(s)?**	*No*	
3.	**If you have identified potential discrimination, are there any exceptions valid, legal and/or justifiable?**	*NA*	
4.	**Is the impact of the document likely to be negative?**	*No*	
5.	**If so, can the impact be avoided?**	*NA*	
6.	**What alternative is there to achieving the intent of the document without the impact?**	*NA*	
7.	**Can we reduce the impact by taking different action and, if not, what, if any, are the reasons why the guideline should continue in its current form?**	*NA*	
8.	**Has the document been assessed to ensure service users, staff and other stakeholders are treated in line with Human Rights FREDA principles (fairness, respect, equality, dignity and autonomy)?**	*Yes*	

If you have identified a potential discriminatory impact of this guideline, please refer it to [Insert Name], together with any suggestions as to the action required to avoid/reduce this impact. For advice in respect of answering the above questions, please contact uhsussex.equality@nhs.net 01273 664685).

Dissemination, Implementation and Access Plan

To be completed and attached to any guideline when submitted to Corporate Governance for consideration and TMB approval.

	Dissemination Plan	**Comments**
1.	Identify:	
	Which members of staff or staff groups will be affected by this guideline?	Midwives and obstetricians
	How will you confirm that they have received the guideline and understood its implications?	Dissemination through the usual communication channels and highlighted at Safety Huddles.
	How have you linked the dissemination of the guideline with induction training, continuous professional development, and clinical supervision as appropriate?	All new members of staff are shown where to access Clinical documents that are relevant to their area of practice.
2.	How and where will staff access the document (at operational level)?	Accessed by staff via Sharepoint.

		Yes/No	**Comments**
3.	Have you made any plans to remove old versions of the guideline or related documents from circulation?	Yes	Previous versions will be archived as part of the uploading onto sharepoint process.
4.	Have you ensured staff are aware the document is logged on the organisation's register?	Yes	Dissemination plan includes notifying staff via email, departmental noticeboards, and safety huddles.

Additional guidance and information

JBDS-IP Managing Diabetes and hyperglycaemia during labour and birth February 2023

JBDS_12_Managing_diabetes_and_hyperglycaemia_during_labour_and_birth_with_QR_code_February_2023.pdf (abcd.care)

NICE. NG3 Diabetes in Pregnancy: Management of diabetes and its complications from pre-conception to the postnatal period. NICE Clinical Guidelines 3. Updated December 2020. NICE NG3 Diabetes in pregnancy (updated 2020)

RCOG (2022) GTG no.74 Antenatal Corticosteroids to reduce neonatal morbidity and mortality

Diabetes in pregnancy quality standard [QS109]

https://www.nice.org.uk/guidance/qs109

https://www.nice.org.uk/guidance/ng3/evidence/full-guideline-pdf-3784285

NHS England » Saving babies' lives: version 3.2

Patient Information

https://www.rcog.org.uk/globalassets/documents/patients/patient-information-leaflets/pregnancy/pi-gestational-diabetes.pdf (2021)

Women and birthing people should receive the RCOG (link) patient information leaflet at diagnosis via BadgerNet Maternity