Diabetes in Pregnancy Guideline

Summary statement: How does the document support patient care?	The purpose of this guideline is to provide good practice evidence for staff in the care of pregnant women/people with diabetes and gestational diabetes
Staff/stakeholders involved in development:	Obstetric Anaesthetists, Obstetric Consultants, Diabetes Consultants, Diabetes Specialist Nurses and Midwives and Senior Midwifery Staff
Division:	Women and Children's
Department:	Maternity
Responsible Person:	Chief of Service
Author:	Consultant Obstetricians and Consultant Diabetologists
For use by:	Medical, Obstetric and Midwifery staff
Purpose:	To provide high quality, evidence based care to pregnant women/people with diabetes and gestation diabetes
This document supports:	NICE NG3 Diabetes in pregnancy (updated 2020)
Key related documents:	Care Record for Pregnancy with Diabetes UH Sussex (SRH & WH): Antenatal and Labour risk assessments, Management of Neonatal Hypoglycaemia, Induction of labour
Approved by:	Joint Obstetric Guideline Group
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If you require this document in another format such as Braille, large print, audio or another language please contact the Trusts Communications Team	
Reference Number:	CG1109

Version	Date	Author	Status	Comment
1.0	January 2011	Consultant Endocrinologists and Consultant Obstetrician	Archived	New Trustwide Guideline
2.0	February 2011	Clinical Governance (CNST Lead)	Archived	Admin. amendment
3.0	May 2011	Consultant Endocrinologists	Archived	Minor amendments to guideline
4.0	November 2012	CNST Midwife	Archived	Guideline updated to match version 4 of Care Record- Pregnancy with Diabetes
5.0	January 2013	CNST Midwife	Archived	Minor clarifications
5.1	December 2013	Consultant Endocrinologist, Consultant Obstetrician and Diabetes Specialist Nurse	Archived	3 year update-minor updates
5.2	August 2014	Consultant Endocrinologist, Consultant Obstetrician and Diabetes Nurse Specialist	Archived	Updated to include management of unwell diabetic women admitted in pregnancy and use of Trust Adult Insulin prescription chart for prescribing insulin for in-patients.
6.0	April 2016	Consultant Diabetologist, Consultant Obstetrician and Diabetes Specialist Nurse	Archived	Guideline updated in accordance with NICE 2015 (NG 3)
7.0	June 2016	Consultant Diabetologist, Consultant Obstetrician and Diabetes Specialist Nurse (DSN)	Archived	Guideline updated in accordance with NICE 2015 (NG 3) Minor grammatical changes
8.0	June 2017	Consultant Diabetologist, Consultant Obstetrician and DSN	Archived	Changes to the guideline and Glucose Load Test
9.0	January 2019	Consultant obstetrician, DSN	Archived	Change to pathway from GLT to GTT in line with NICE recommendations
10.0	March 2021	Maternal Medicine Consultant Obstetrician, Diabetes specialist midwife, Clinical Effectiveness Support Midwife	Archived	Information about CGM or flash glucose monitoring added. Guideline reviewed and updated in line with NICE NG3 Diabetes in pregnancy: management from preconception to the postnatal period (updated Dec 2020).
10.1	July 2022	C. Goumalatsou, Obstetric Registrar. J. Collard, Clinical Effectiveness Support Midwife	LIVE	Updated regarding discussing risks and benefits for corticosteroids and connected appendix in line with RCOG (2022) GTG no.74 Antenatal Corticosteroids to reduce neonatal morbidity and mortality

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

Contents

Diabetes in Pregnancy Guideline

1.0 Aim

To ensure optimal outcomes for pregnant women/people with diabetes and to act as a resource for staff caring for pregnant women/people whose needs fall within the scope of this guideline. These guidelines are intended to provide high quality, evidence based care to pregnant women/people and babies under the care of the maternity units in University Hospitals Sussex (SRH & WH). This guideline has been registered on the Trust Intranet Site. Clinical guidelines are guidelines only and 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/people with pre-existing and gestational diabetes.

3.0 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.

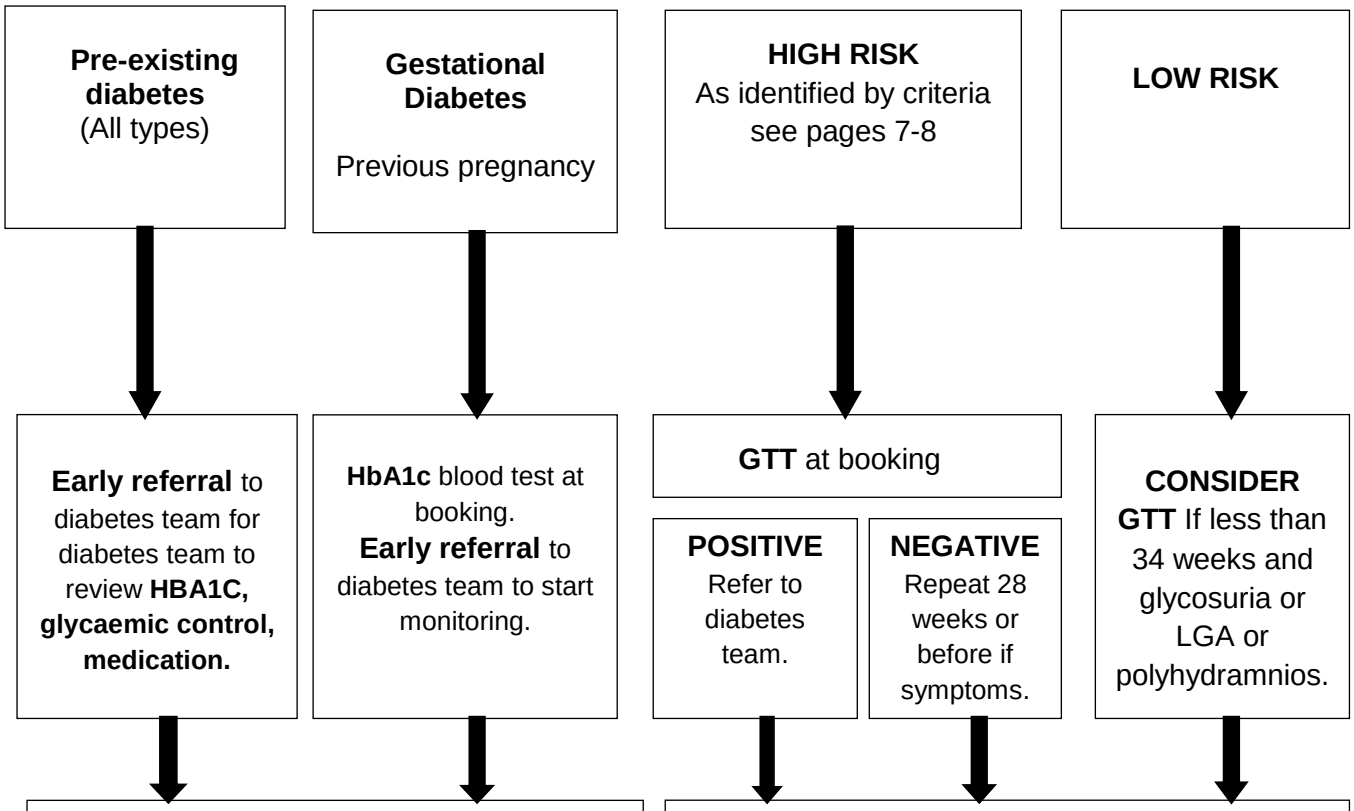
It is the responsibility of the division to:

- 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 Abbreviations used within this guideline

DAU - Day Assessment Unit	**mmol/L -** Millimoles per litre
SRH - St Richards	**WH -** Worthing
GDM - Gestational Diabetes	**ACE -** Angiotensin-converting enzyme
ACR - Albumin to creatinine ratio	**GTT -** Glucose Tolerance Test
OGTT - Oral Glucose Tolerance Test	**DSM -** Diabetes Specialist Midwife
JDC - Joint Diabetic Clinic	**T1D -** Type 1 Diabetes
T2D - Type 2 Diabetes	**CMW -** Community Midwife
mg - Micrograms	**cms -** Centimeters
BP - Blood Pressure	**ANC -** Antenatal Clinc
SFH - Symphesis Funal Height	**IOL -** Induction of Labour
DKA - Diabetic Ketoacidosis	**CBG -** Continuous Blood Glucose
CGM - Continuous Glucose Monitoring	**KCl -** Potassium Chloride
NaCl - Sodium Chloride	**IV -** Intravenous
U&Es - Urea and Elecrolytes	**VRIII -** Variable Rate Intravenous Insulin Infusion
CCU - Critical Care Unit	

4.0 Antenatal care pathway at booking:



- As outlined in schedule on pages 7-9 for pre-existing and GDM on treatment.
- Diet controlled GDM to be reviewed and birth plan discussed by DSM at 34 weeks.
- **Review by dietician** as required.
- Individualised review and management.

- All pregnant women/people with diabetes in pregnancy require 'Diabetes in Pregnancy' booklet filed in their antenatal notes.
- Care is individualised.
- Plan for birth is completed at 36 week appointment.

5.0 Pre-pregnancy counselling for women/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 women/people with diabetes who are planning a pregnancy (improving HbA1c reduces chance of congenital malformations in the baby). **Aim for HbA1c:** • Less than 6.5% without problematic hypoglycaemia. • More than 10% avoid unplanned pregnancy due to risk of congenital malformations in the baby. **Aim blood glucose targets:** • Fasting 5-7 mmol/L • Pre-meal 4-7 mmol/L • 2hrs Post meal less than 7.8 mmol/L • Offer blood glucose meters for self-monitoring. • Arrange for ketone testing strips and a meter for women/people with type 1 diabetes, with advice to test for ketonaemia if they become hyperglycaemic or unwell.
Review medications	• Stop ACE inhibitors and statins, review diabetes medications. Stop oral hypoglycaemics and replace with insulin, pre-conceptually if required. Metformin may be continued. • Discuss need to rotate insulin injection sites within the same body area to avoid cutaneous amyloidosis.
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 to 36 weeks. (For GP letter to prescribe aspirin prophylaxis see appendix 3 of CG1198 Management of hypertensive disorders of pregnancy.)
Dietician	Global review of diet.
Weight Management	Offer women/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.
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 in diet and exercise in some women/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.
- Women/people with gestational diabetes will need more monitoring, and may need more interventions during pregnancy and labour.

Glucose Tolerance Test – 75g Glucose (Polycal) in GTT clinic at booking (see Appendix 1) if any of following risk factors present and repeat at 28 weeks if negative at booking:

- BMI more than 30 kg/m
- Previous birth weight 4.5 kg or above
- Family history first degree relative
- Ethnic origin with high prevalence of diabetes
- Polycystic Ovarian Syndrome

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

Offer women/people with diagnosis of GDM a review with the Diabetes Pregnancy Team within 1 week.

Consider GTT in low risk pregnant women/people if less than 34 weeks gestation and evidence of:

- Polyhydramnios.
- Macrosomia more than 97th centile.
- Glycosuria: 2+ or above on 1 occasion or 1+ or above on 2 or more occasions.
- Recurrent infection (especially thrush).
- Anti-psychotic medication or anti-retroviral medication (consider testing at 28 weeks).

After 34 weeks

After 34 weeks, a GTT or blood glucose monitoring is rarely indicated. If the pregnant woman/person has had a previous normal OGTT in this pregnancy, they will not have significant gestational diabetes and treatment at this late stage is unlikely to have significant effect. A repeat OGTT is unlikely to be helpful and is often misleading. Please discuss with the Diabetes Team.

No previous GTT but concerns about new diabetes – check random blood glucose

(or capillary sample).

If less than 7mmol/L no significant diabetes (gestational or other), and no further action or tests are required. If 7mmol/L or more, please discuss the result with Diabetes Pregnancy Team.

For pregnant women/people with gestational diabetes who have a fasting plasma glucose level below 7mmol/L at diagnosis, offer a trial of diet and exercise changes.

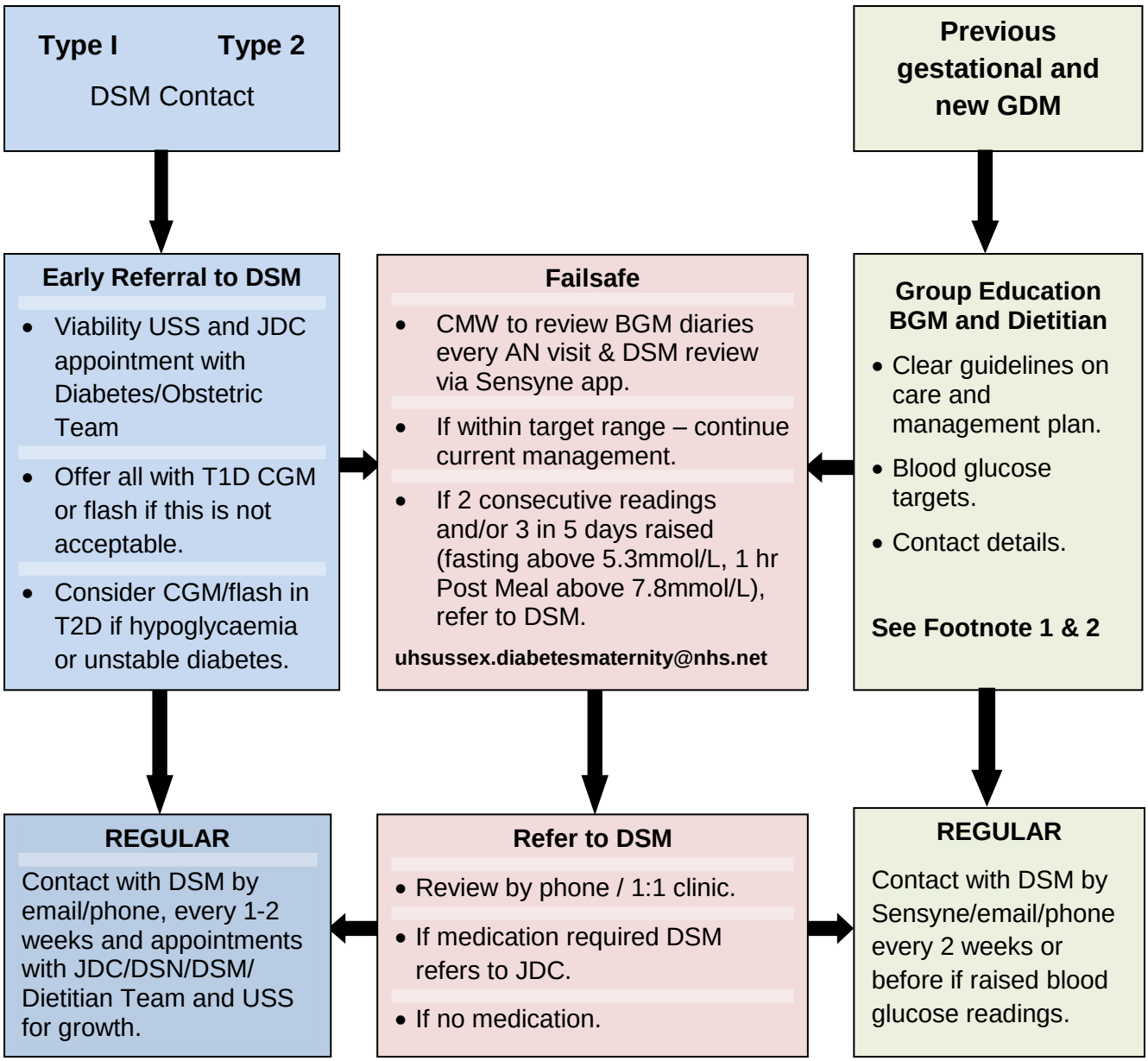
Diagnosis of GDM without a GTT

- Any glucose (fasting or non-fasting) more than 11.0mmol/L.
- Fasting (true fasting i.e. overnight) glucose 5.6mmol/L or more.

If these occur, no need to perform an OGTT. Refer urgently to Diabetes Pregnancy Team.

7.0 Schedules of care

7.1 Monitoring pathway



Foot note 1

Stickers on Notes:

Please note it is your responsibility to contact the Diabetes Team either by email/telephone every 2 weeks, or sooner, if you have 2 consecutive high readings or 3 in 5 days.

Footnote 2

Email reminders to contact Diabetes Team. Provide contact details every 2 weeks.

7.2 Schedule for pregnant women/people with diabetes requiring medication

Antenatal care schedule for pregnant women/people with diabetes requiring medication		
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/person and baby.
	  ○ Blood glucose monitoring targets without increasing hypoglycaemia.
	  ○ Hypoglycaemia and possible impaired awareness.
	  ○ Provide Glucagon Kit if required.
	  ○ Offer pregnant women/people with Type 1 diabetes blood ketone testing meter and advise when to test/seek medical help.
	  ○ Advise all pregnant women/people with pre-existing diabetes to seek urgent medical advice if they become hyperglycaemic or unwell.
	  ○ UK government advice on Diabetes and driving - GOV.UK.
	  ○ Offer all pregnant women/people with type 1 diabetes and all those with problematic hypoglycaemia or unstable type 2 diabetes continuous glucose monitoring (CGM, funding for 12 months only), or flash if this is not acceptable to the woman. Signpost to videos 'Continuous Glucose Monitoring'.
	• 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.
	• 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 (For GP letter to prescribe aspirin prophylaxis see appendix 3 of CG1198 Management of hypertensive disorders of pregnancy.).
		Viability scan

Booking 8-10 weeks	**Refer to antenatal notes**	
	Diabetes ANC • HbA1c & micro albumin.	
12 weeks		Combined USS/Bloods
16 weeks	• BP & urinalysis – review test results. • Give breastfeeding information and invite to parent	

	education & infant feeding classes.	
	Diabetes ANC	
	• Offer retinal assessment if diabetic retinopathy was present at 1st antenatal visit, book serial scans and refer for anaesthetic review. • Assess need for additional scans based on obstetric and medical history.	
18 to 22 weeks	• BP & urinalysis, maternal and fetal wellbeing. • Four chamber view and outflow tract views and 3 vessels standard at University Hospitals Sussex West.	Anomaly scan+/- uterine artery Doppler scan
	Diabetes ANC	
24 weeks	• Measure and plot SFH in cms, BP & urinalysis. • MAT B1, review parent education needs and ensure infant feeding checklist completed.	
28 weeks	• FBC & antibodies, offer anti- D if Rh Neg. • Measure and plot SFH/scan, weigh.	
	Diabetes ANC	
	• Offer retinal assessment if showed **no** diabetic retinopathy previously. • HbA1c.	Growth & liquor volume
30 weeks	• BP & urinalysis, weigh. Measure and plot SFH/scan as required.	
32 weeks	• BP and urinalysis, Measure and plot SFH/scan.	
	Diabetes ANC	Growth & liquor volume
34-36 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 (eg increased risk of hypoglycaemia in women/people with pre-existing diabetes). • Discuss contraception. • Discuss colostrum harvesting. • HbA1c. • Timing of birth pre-existing diabetes 37 - 38+6 weeks. • Gestational diabetes on treatment 38 - 39+6 weeks. • Finalise need for insulin in labour or elective section in Diabetes in Pregnancy care plan. • Finalise postnatal treatment plan. • MRSA screening.	Growth & liquor volume No further scans unless clinically indicated

	• BP & urinalysis, weigh. Measure and plot SFH/scan.	
38 weeks	• BP & urinalysis, Measure and plot SFH.	
	Diabetes ANC	
39 weeks	• BP & urinalysis, Measure and plot SFH.	
40 weeks	**Diabetes ANC** • BP & urinalysis, Measure and plot SFH.	
Steroid Therapy	• Individualised plan – may not be required for elective LSCS more than 37 weeks or IOL more than 36 weeks.	
Anaesthetic review	For pregnant women/people with diabetes and comorbidities such as obesity or autonomic neuropathy, offer an anaesthetic assessment in the third trimester of pregnancy.	
Other considerations	• 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).	

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

7.3 Schedule for pregnant women/people with current or previous gestational diabetes

Antenatal care schedule for pregnant women/people with previous or gestational diabetes <u>NOT</u> requiring medication (previous or current pregnancy)		
Approximate Gestation	**Diabetic & Obstetric Review**	**Scans**
Pregnant women/people with gestational diabetes controlled by diet alone should receive routine antenatal care but with the additional diabetic support detailed below. **HbA1c to be taken at time of diagnosis to identify pregnant women/people who may have pre-existing type 2 diabetes.**		
Booking and first diabetes appointment (by 12+6 weeks)	**REFER TO GREEN ANTENATAL NOTES**	
	Refer to Diabetes Nurse Specialist for care	
	Offer information, advice and support on: • Recommended blood glucose targets. • Good control reduces complications for than woman/person and their baby. • 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 and exercise, and could involve medicines. • Teach blood glucose monitoring and target levels, establish follow up arrangements (less than 5.3mmol/L before and less than 7.8mmol/L 1h after food). • Dietician review for global review of diet.	

	• Based on glucose targets, regimen chosen individually by the diabetes specialist team. • Pregnant women/people needing treatment will undergo same schedule of care as for pregnant women/person with pre-existing diabetes. • Diet controlled gestational diabetics will continue their care under their named Obstetrician with regular review and advice by diabetes specialist nurse/midwife. • Advise pregnant women/people with gestational diabetes to seek urgent medical advice if they become hyperglycaemic or unwell. • Pregnant women/people with gestational diabetes should be offered a Covid-19 vaccination. The community midwife should notify the GP as soon as possible after diagnosis of gestational diabetes (See appendix 5 for GP letter).	
16-20 weeks	• Review screening tests to date, BP & urinalysis, maternal and fetal wellbeing, invite to parent education & infant feeding classes, breastfeeding information.	
22 weeks		Anomaly scan
24 weeks	• Measure and plot SFH in cms, BP & urinalysis. • MAT B1, review parent education needs and ensure infant feeding checklist completed.	
28 weeks	• FBC & antibodies, offer anti- D if Rh Neg. • Measure and plot SFH+/-scan, weigh.	
30 weeks	• BP and urinalysis, Measure and plot SFH.	
32 weeks	• BP and urinalysis, Measure and plot SFH .	
Diabetic Multi-disciplinary Team Care		
34 weeks	• One off appointment at diabetic/obstetric clinic for discussion recommending hospital birth, mode of birth and birth plan and contraception. • BP and urinalysis, Measure and plot SFH+/-scan.	
36 weeks	• BP & urinalysis, weigh. Measure and plot SFH, FBC, MRSA screening. • Antenatal expression of colostrum.	
38 weeks	• BP & urinalysis, Measure and plot SFH.	
39 weeks	• BP & urinalysis, Measure and plot SFH.	
40 weeks	• BP & urinalysis, Measure and plot SFH. • Aim for birth by 40+6 days.	
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. *NB Metformin is an 0ff-label use in pregnancy.* • If metformin is contraindicated or unacceptable to the woman, offer insulin. • If blood glucose targets are not met with diet and exercise changes	

	plus metformin, offer insulin as well. • 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 hydramnios are present, consider immediate treatment with insulin, with or without metformin and diet and exercise changes.	

8.0 Antenatal expression of colostrum

All pregnant women/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 diabetic birthing parent due to risk of newborn hypoglycaemia. Please reassure that if colostrum cannot be obtained then this is not a sign of 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.

9.0 Caring for a pregnant woman/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 eg corticosteroids, hypoglycaemia, recovery from hypoglycaemia, DKA and labour or when the pregnant woman/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.

10.0 Antenatal Corticosteroids

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

Prior to the administration of steroids, the risks and benefits of corticosteroids, should be discussed with the pregnant woman/person (and their family members or carers as appropriate using the RCOG info graphic in Appendix 6.

This discussion should be documented in the woman/person's notes. 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.

10.2 Care during antenatal corticosteroid administration

- Patient to be admitted to Labour Ward/Antenatal Ward and may need to remain in hospital for 24 hours after the last corticosteroid dose or until their blood glucose are stable. In certain well controlled diabetic patients, corticosteroid administration may be organised as outpatient, this decision is to be made by Pregnancy Diabetes Team only.
- 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.
- Steroids are administered: Dexamethasone 12mg intramuscular (IM) x 2 doses 24 hours apart – 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 8 mmol/L or above on 2 readings more than 1 hour apart or 1 CBG is 11mmol/L or above.**
- Pregnant women/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 following 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 24 hourly.
- Intravenous fluids should be given to avoid hypoglycaemia, hyponatraemia and hypokalaemia even if a patient is eating and drinking. 500mls 0.9% NaCl with 5% glucose and 0.15% 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 dextrose 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.
- Once the pregnant woman/person is on VRIII check blood glucose **every hour** and adjust intravenous insulin according to blood glucose. Target blood glucose 4-7.8mmol/L pre and post meal.
- Both IV fluids and Actrapid infusions MUST be prescribed on the prescription chart and charted on the fluid balance chart. Please see CG21009 Maternity fluid management as an in-patient or in labour
- After the first hour adjust insulin infusion rates according to the sliding scale in Appendix 2.
- Sliding scale 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 woman is fasting, or 7-8mmols/L 1 and 2 hours post-meal.

11.0 Hyperemesis

- Pregnant women/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, refer to Trust DKA guideline).
- Check Thyroid Function Tests.
- Ultrasound scan to confirm normal pregnancy (if no scan done previously).
- Pregnant woman/person to continue their normal insulin; contact Diabetes Team regarding dose adjustment (do not stop normal insulin).
- Early liaison with Diabetic and Obstetric teams.
- Pregnant women/people on CGM or flash monitoring can leave their sensor in situ but must still have capillary (fingerprick) glucose monitoring hourly if needing a VRII, large swings in blood glucose or hypoglycaemia or suspected DKA.

12.0 Care during labour

- Inform the Diabetes Team of any diabetic pregnant woman/person admitted to labour ward at an appropriate time.
- Refer to the intrapartum management plan in the diabetes handheld notes.
- Switch to hourly monitoring once established in labour. Aim for blood glucose 4-7 mmols/L.
- Pregnant women/people on insulin may continue with their usual insulin until in established labour. Continue long acting insulin (e.g.Humulin I, Levemir, Lantus, Insulatard) throughout labour but stop short acting or mixed insulins (e.g. Novomix 30, Novorapid or Humalog).
- Consider intravenous dextrose and insulin infusion from the onset of established labour for pregnant women/people with type 1 diabetes if diabetes unstable.
- Monitor glucose hourly and commence VRIII if at least 2 CBG 8.0mmol/L or above, more than 1 hour apart, or 1 CBG 11mmol/L or above.
- Pregnant women/people on CGM or flash monitoring must still have capillary (fingerprick) glucose monitoring hourly but can leave their sensor in situ.
- Newly birthed women/people with a CGM or flash can recommence using their sensor postnatally.
- Pregnant women/people with pre-existing or unstable diabetes should be considered for continuous electronic fetal monitoring once labour is established.
- Pregnant women/people with GDM treated by diet alone can be managed as for normal labour, but monitor blood glucose as above.
- Some women/people require a VRIII regardless of blood glucose levels. This will be clearly documented in the notes.
- If a VRIII is required 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% NaCl with 5% glucose and 0.15% KCl at 50mls/hour should run alongside this in order to avoid hypoglycaemia, hyponatraemia and hypokalaemia (see Appendix 2).
- U&Es should be checked 4-6hrly during labour when on VRIII to maintain potassium and bicarbonate.
- Commence fluid balance chart. Please see CG21009 Maternity fluid management as an in-patient or in labour

- Pregnant women/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 VRIII according to antenatal notes (see Appendix 4).
- Inform the neonatal unit team at/after birth.

13.0 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. **VRIII** only required **if glucose remains 8.0mmol/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/person is fully conscious.
- Continue monitoring blood glucose hourly post CS until ready to eat and drink.
- Women/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).

14.0 Postnatal care management plan

14.1 Pre-existing diabetes

Type 1 diabetes or type 2 diabetes on insulin:

- 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 at 01.00 and 03.00 during the first night after birth due to increased risk of hypoglycaemia. Ensure that the patient has Gluco-juice nearby for possible hypoglycaemic episodes.
- Discuss/implement contraception and the importance of planning a subsequent pregnancy.
- 6-12 weeks postnatal: follow-up in Diabetes Centre and transfer off CGM / flash.

Type 2 diabetics on oral glucose lowering drugs before pregnancy:

- Stop VRIII 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/people with Type 2 diabetes, diabetes treatment management plan will have been made and documented in the Diabetes Care Information Booklet. There is no

contraindication to breastfeeding if on metformin or sulphonylureas (e.g. glibenclamide). Contact the Diabetes Team if there are any concerns. *NB metformin is an off-label use in pregnancy.*

- Discuss contraception and the importance of planning a subsequent pregnancy.
- 6-12 weeks postnatal: follow-up in Diabetes Centre and if relevant transfer off CGM / flash.

14.2 Gestational Diabetes

- If on VRIII stop when the placenta is delivered.
- 4 hourly blood glucose monitoring until first meal. Continue to monitor blood glucose before and 1 hour after meal for up to 24h after birth to capture pre-existing diabetes.
- Patients with pre-meal readings of more than 7mmol/L or post meal readings more than 11.1mmol/L need diabetes review as they may have pre-existing or new onset diabetes.
- Do not require medication unless indicated by Diabetes Team.
- Advise to have a fasting blood glucose test at 6 weeks postnatal at their GP surgery. Advise annual fasting blood glucose test with GP due to increased risk of developing Type 2 diabetes. Remind the woman/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.
- Offer lifestyle advice (including weight control, diet and exercise). Women/people with a BMI of 25 or more should be informed that they can make a self-referral to West Sussex Wellbeing - Healthy Eating Services if they would like support with managing their weight and healthy eating (NICE (Updated 2015) PH42.

14.3 Breastfeeding

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

Neonatal care should follow CG1104 Neonatal hypoglycaemia guideline

15.0 Management of diabetic emergencies

15.1 Ketoacidosis

(Please refer to hospital-wide guideline on the management of **Management of Diabetic Ketoacidosis in adults**).

- During pregnancy, women/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/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/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 chart. Please see CG21009 Maternity fluid management as an in-patient or in labour.
- Early involvement of CCU 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/people on CGM or flash monitoring can leave their sensor in situ but must still have capillary (fingerprick) glucose monitoring hourly.

15.2 Hypoglycaemia

- Hypoglycaemia (less than 4mmol/L) is undesirable during pregnancy and should be avoided. Pregnant women/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/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/people with diabetes on insulin keep a bottle of Gluco-juice on their locker.
- If hypoglycaemia suspected check blood glucose and if less than 4mmol/L follow trust guidelines on management of hypoglycaemia.

  Give Gluco-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 Gluco-juice, this can be given up to 3 times.
  - **Do not give carboydrates until above** 4mmol/L.
  - Follow Trust guidelines for treatment of hypoglycaemia: Management of Hypoglycaemia in Adults.

16.0 Audit

- Pregnant women/people with pre-existing diabetes are seen by members of the joint diabetes and antenatal care team within 1 week of their pregnancy being confirmed.

- Pregnant women/people with pre-existing diabetes are referred at their booking appointment for retinal assessment.

- Pregnant women/people with pre-existing diabetes have their HbA1c levels measured at their booking appointment.

- Pregnant women/people with pre-existing diabetes should have involvement of the multi-disciplinary team – obstetrician, midwife, diabetologist, diabetes nurse/ midwife specialist and dietician (as appropriate) and this should been documented.

- Pregnant women/people with pre-existing diabetes should have a timetable of antenatal appointments documented.

- Pregnant women/people diagnosed with gestational diabetes are seen by members of the joint diabetes and antenatal care team within 1 week of diagnosis.

- Pregnant women/people with pre-existing diabetes should be offered ultrasound scanning and four chamber view of the fetal heart and outflow tracts and three vessels at 20 week anomaly Scan.

- Pregnant women/people with diabetes are supported to self-monitor their blood glucose levels.

- Pregnant women/people who are being offered antenatal corticosteroids have a documented discussion of risks and benefits using appendix 6.

17.0 References

Caroline A Crowther, Janet E Hiller, John R Moss, Andrew J McPhee, William S Jeffries, Jeffrey S Robinson. Effect of treatment of gestational diabetes mellitus on pregnancy outcomes: Australian Carbohydrate Intolerance Study in Pregnant Women (ACHOIS) Trial Group. N Engl J Med 2005: 352: 2477-86.

Confidential Enquiry into Maternal & Child Health: Pregnancy in women with Type 1 and Type 2 Diabetes in 2002-03, England, Wales & Northern Ireland. London: CEMACH: 2005.

Confidential Enquiry into Maternal & Child Health. Diabetes in Pregnancy; are we providing the best care? Findings of a National Enquiry: England, Wales & Northern Ireland. CEMACH: London: 2007.

JBDS-IP. Management of glycaemic control in pregnant women with diabetes on obstetric wards and delivery units May 2017 JBDS 12 www.diabetologistsabcd.org.uk/JBDS/JBDS.htm

NHS Diabetes April 2011 Management of adults with diabetes undergoing surgery and elective procedures. www.diabetes.nhs.uk/our_work_areas/inpatient_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

Appendix 1: Oral Glucose Tolerance Test Protocol

Purpose: The oral glucose tolerance test (GTT) is used, in this case, for the diagnosis of gestational diabetes mellitus (GDM).

Indications: see above for indications and rationale.

Contraindications: Capillary blood glucose more than 10mmol/L.

Patient preparation: Diet should be normal for at least 3 days and patient fasted for more than 8 hours but no more than 14 hours. No smoking the morning of the test and during the test and preferably no alcohol for 48 hours. During the test the patient must sit quietly in the department. Equipment: measuring cylinder, measuring jug, drinking water, polycal. Venesection equipment and grey bottles (fluoride oxalate tubes), vomit bowls, pens and paper, clocks (possibly a stop watch), request forms. Chairs for patients and venepuncture area.

Procedure:

1. Prepare polycal – 113 ml of polycal must be measured out and diluted up to 200 ml with tap water.
2. Confirm patient information and their fasting status. Check they haven't smoked that morning.
3. Check patient aware of protocol (two blood samples and a glucose drink).
4. Check capillary glucose, if above 10 mmol/L send a venous sample to the lab and immediately contact diabetes pregnancy team by phone or email with patient details**. DO NOT GO AHEAD WITH OGTT** If patient well, allow home to await appointment with diabetes pregnancy team. If not well, refer to DAU for review.
5. Take fluoride oxalate (grey top) sample and label with time AND '0 min'.
6. Administer Polycal; all of it should be drunk within 5 mins. Up to 300 ml of water is allowed therefore a 100 ml of water can be drunk by patient if required after the 200 ml of Polycal.
7. Record the time Polycal given at the 'start time'.
8. Two hours after the 'start time' collect a second grey top sample, label fully including the time and '120 mins'.
9. Test has finished so the patient may eat and drink and go home. Package both tubes up in the sample bag with 'pregnancy' clear in the clinical details and '?GDM'. Request a 'GTT'. Samples can all come up to laboratory together at the end of the clinic.

Interpretation: GDM = fasting glucose 5.6mmol/L or above and/or 2 hours 7.8mmol/L or above.

Actions: If normal, reassure patient, if high please contact the diabetes pregnancy team by email as soon as possible WSHNT.DiabetesMaternity@nhs.net with patient details.

Laboratory team to email to the diabetes pregnancy team all GTT test results at end of each week.

Contacts: SRH laboratory ext 33591 Worthing lab 85564.

Polycal is gluten, lactose and fat free. Just sugars and water i.e. vegan/vegetarian also.

Note when measuring please measure at the bottom of the meniscus, this should be read as 20 ml for example.

Appendix 2: Variable Rate Intravenous Insulin Infusion (VRIII)

For use when administering antenatal corticosteroids if 2x CBGs 8mmol 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 VRIII to monitor fluid balance and electrolyte abnormalities. Repeat 24 hourly.
- Prescribe VRIII on JAC.
- Prescribe 500mls 0.9% NaCl with 5% glucose and 0.15% KCl at 50mls/hour – IV fluids should run with all VRIII's to prevent hypoglycaemia, hyponatraemia and hypokalaemia.
- Continue background long acting insulin.

	DOSING ALGORITHM		
Algorithm above	**1**	**2**	**3**
	For most pregnant women/people	For pregnant women/people not controlled on algorithm 1 or needing more than 80units/day of insulin	For pregnant women/people not controlled on algorithm 2 (after specialist advise)
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 1 – Most women will start here.

Algorithm 2 – Use this algorithm for women who are likely to require more insulin (on more than 80 units of insulin or those not achieving target on algorithm 1).

Algorithm 3 – For those pregnant women/people not achieving target on algorithm 2 – only start in discussion with Diabetes Team.

- **Target CBG level = 4-7.8 mmol/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 3: Variable Rate Intravenous Insulin Infusion (VRIII)

For use IN LABOUR if 2x CBGs 8.0mmol 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 VRIII on JAC/EPMA.
- Check U&Es prior to starting VRIII to monitor fluid balance and electrolyte abnormalities. Repeat 24 hourly.
- Prescribe 500mls 0.9% NaCl with 5% glucose and 0.15% KCl at 50mls/hour – IV fluids should run with all VRIII's to prevent hypoglycaemia, hyponatraemia and hypokalaemia.
- Consider intravenous dextrose and insulin infusion from the onset of established labour for women with type 1 diabetes if diabetes unstable.
- Continue background long acting insulin.

	DOSING ALGORITHM		
Algorithm above	**1**	**2**	**3**
	For most pregnant women/people	For pregnant women/people not controlled on algorithm 1 or needing more than 80units/day of insulin	For pregnant women/people not controlled on algorithm 2 (after specialist advise)
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

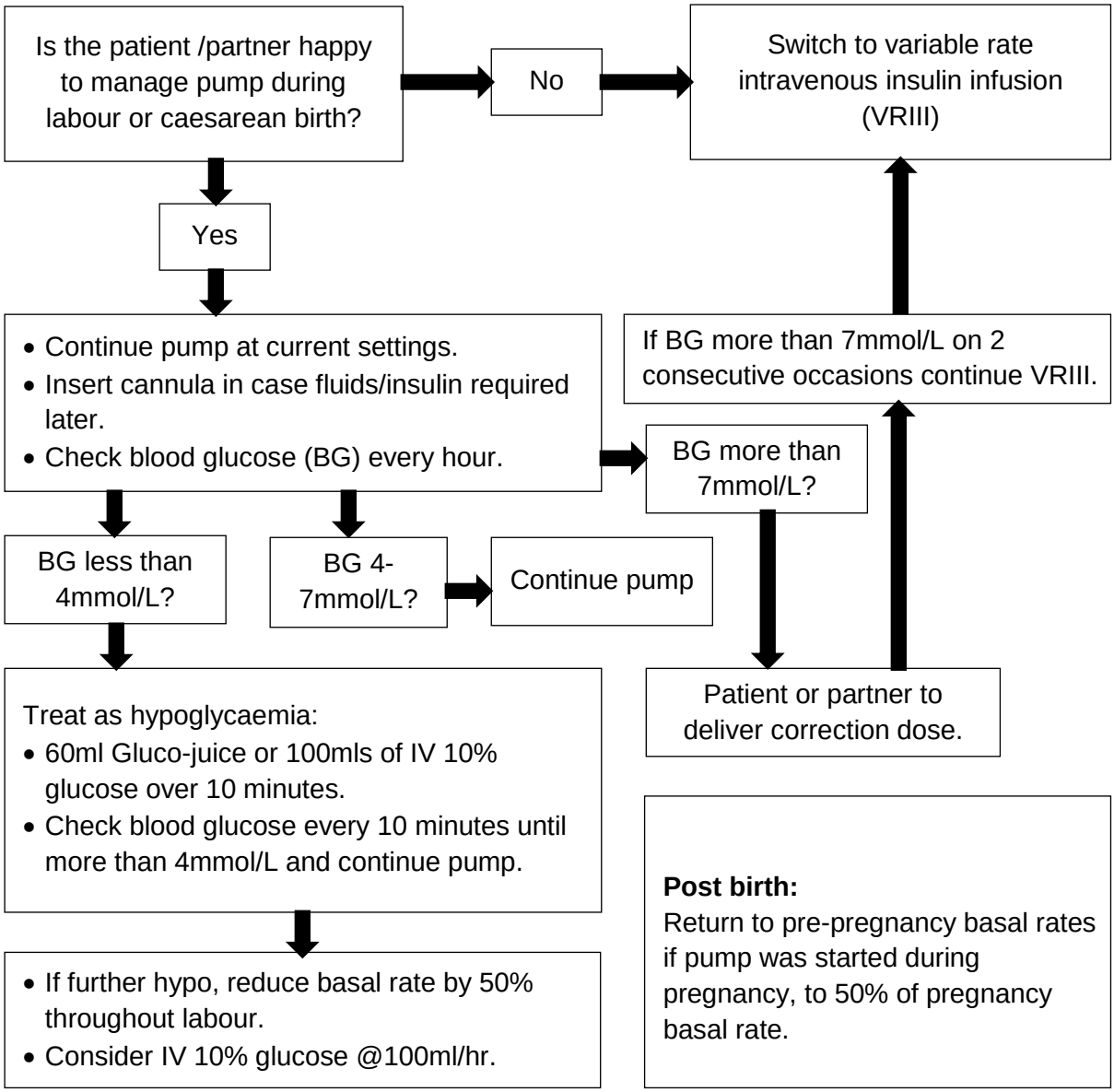
Algorithm 1 – Most women will start here.
Algorithm 2 – Use this algorithm for women who are likely to require more insulin (on more than 80 units of insulin or those not achieving target on algorithm 1).
Algorithm 3 – For those pregnant women/people not achieving target on algorithm 2 – only start in 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.**

Postnatally:

- **GDM – STOP VRIII 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 4: Management of Insulin pumps during labour or caesarean birth



For caesarean birth requiring general anaesthetic, follow instruction for major surgery (above)

Contact numbers:

- Diabetes nurse specialists (Worthing): 01903 285044 / mobile 07799868506 (working hours only).
- Diabetes nurse specialists (Chichester): 01243 788122 ext 3750 / mobile 07880 645514 or 07825 450268 (working hours only).
- Endocrinology Consultant or Registrar via switchboard.

Appendix 5: GP Letter – Gestational Diabetes test strip prescription request & covid-19 vaccination

DIAGNOSIS- GESTATIONAL DIABETES

I saw in the Diabetes Specialist Midwife clinic today, she had been referred from the Midwife on the …….. and is now …… week's gestation with a history of gestational diabetes or a raised GTT of mmols/L.

I have provided your patient with an AgaMatrix WaveSense JAZZ Blood Glucose Monitoring System. I would be pleased if you could prescribe for her WaveSense JAZZ test strips, pack size 50 Pip code 340-1619. **Following the NICE Guidelines, patients are required to monitor their blood sugars frequently in pregnancy (usually four times per day); therefore please can you prescribe 4 boxes on repeat***. Please also prescribe some AgaMatrix Ultra-Thin 33g lancets, a box of 200 Pip-Code 342-0601.

I have advised her that we would aim to have her blood sugars between 4 – 5.3mmols/L, before meals and 4 - 7.8mmols/L, one hour after her meals. She will test her blood sugars four times daily and will liaise with the results.

I have advised that she is at risk of developing Type 2 Diabetes in later life and to reduce or postpone that risk, I have given her some lifestyle advice, to eat a healthy diet, take regular exercise, to maintain a normal weight and to have an annual fasting blood sugar arranged at your Surgery. In a future pregnancy we would like her to be referred here EARLY to advise about diet and initiate blood glucose monitoring.

Yours sincerely

Sharon Howard	Natasha Bailey	Soraya Mole
Diabetes Specialist Midwife	Diabetes Specialist Midwife	Diabetes Specialist Midwife

URGENT- FOR ATTENTION OF THE GP:

All adults with underlying health conditions that put them at higher risk of serious disease and mortality (group 6), as set out in Joint Committee on Vaccination and Immunisation (JCVI) guidance, are being offered the COVID-19 vaccine. Conditions for eligibility have been specified in chapter 14a of Public Health England's Green Book (Table 3). **Pregnant women/people** will be among these groups and should be offered a discussion around the risks and benefits of vaccination with a clinician, so they can make an informed choice about whether to receive it. **Pregnant women/people with Gestational Diabetes** are at increased risk and should be offered a vaccination as soon as possible.

Appendix 6: Antenatal Corticosteroids to reduce neonatal morbidity and mortality