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GUIDELINE FOR MANAGEMENT OF PREGNANT WOMEN WITH DIABETES

This Guideline includes Pre-existing Diabetes (Type 1 and 2 DM) and Gestational Diabetes (GDM).

Introduction

Approximately 5% of pregnant women may have diabetes in pregnancy. About 87.5% of pregnancies complicated by diabetes are due to gestational diabetes, 7.5% due to Type 1 diabetes and the remaining 5% due to Type II diabetes. This guidance has been updated following the recommendations made by NICE clinical guidance NG3 (August 2015).

Pre-conception counselling in pre-existing diabetes

Women should be offered preconception counselling in the joint diabetic/obstetric clinic. The diabetes team will continue preconception care to optimise diabetes control. Advise women to lose weight if BMI above 27kg/m². Check HbA1C every 2-3 months and aim for HbA1C of <48 mmol/L (6.5%), a fasting plasma glucose level of 5-7 mmol/litre on waking and a plasma glucose level of 4-7mmol/litre before meals at other times of the day. Women are advised to report their pregnancy as soon as possible to the diabetes team. Women with Type 1 diabetes are encouraged to undertake local structured educational programme for Type 1 diabetes. Women with Type 2 diabetes are encouraged to attend education session locally through DESMOND or Living with Diabetes if not previously attended. Session is for English and non-English speaking members of the public. Locally used leaflet 'Diabetes and Having a Baby' should be given. Advise women with HbA1C above 86 mmol/litre (10%) not to get pregnant because of the associated risks.

Antenatal care

For women with pre-existing diabetes, they should be referred to the Joint Diabetic Antenatal Clinic (DM/ANC) within 7 days of the confirmed pregnancy. The referral will come from either: The General Practitioner (GP), The Community Midwife (CMW) or self-referral. The multidisciplinary team will include: Obstetrician, Diabetologist, Specialist Diabetes Midwife, Diabetes Specialist Nurse and Dietitian who will provide care as appropriate.

Women should be booked at home by a midwife and seen in the Joint DM/ANC by 10 weeks gestation with the result of a viability scan (usually at 7-9 weeks).

- At first hospital contact (refer to Care Programme – Appendix 1)
 - Ensure that the woman is taking Folic Acid 5mg (continued until 12 weeks)
 - Treatment with ACE inhibitors, ARBs, Statins and Diuretics must be discontinued
 - Alternative antihypertensives (e.g. Labetalol) initiated as required
 - Oral hypoglycaemic agents except Metformin and Glibenclamide should be discontinued
 - Aspirin 75mgs once daily should ideally be commenced from 12 weeks or before and continued throughout the pregnancy unless clinically contra indicated (NICE Guidance CG107)
 - Ensure Diabetes and Midwifery teams are aware of pregnancy
 - Arrange ultrasound scan for viability (7 to 9 weeks)
 - Insulin (type and dosage) to be initiated as advised by Diabetologist

- Advise pregnant women with Type 1 diabetes to test their fasting, pre meal, 1-hour post meal and bedtime blood glucose levels daily
- Advise pregnant women with Type 2 diabetes who are on multiple daily insulin injections regimen to test their fasting, pre meal, 1-hour post meal and bedtime blood glucose levels daily. Offer pregnant women with Type 1 diabetes continuous blood glucose monitoring (CGM) or Flash glucose monitoring (FGM) if women are already on it and decides to continue with FGM. Ensure adequate support from diabetes team.
 - Women who require insulin will be advised about the risks of hypoglycaemia and reduced awareness. The woman should be prescribed a supply of concentrated glucose solution and/or a glucagon pen (for Type 1 diabetics).
 - Offer pregnant women with Type 1 diabetes: education on risk of ketoacidosis, the woman is given a blood ketone testing meter and strips and advised to test for ketonaemia and to seek urgent medical advice if they become hyperglycaemic or feel unwell.
 - Clinical history should be taken to establish the extent of diabetes-related complications.
 - Measure HbA1c at booking and in second and third trimester.
 - Renal assessment with serum creatinine and urine microalbuminuria by albumin: creatinine ratio (ACR) if not done in the previous 3 months. If the serum creatinine is abnormal (120 micromol/litre or more), the urinary albumin creatinine ratio is greater than 30mg/mmol or total protein excretion exceeds 0.5g/day, referral to a nephrologist should be considered (eGFR should not be used during pregnancy). Thromboprophylaxis should be considered for women with nephrotic range proteinuria above 5g/day. (Albumin : creatinine ratio greater than 220 mg/mmol).
 - Retinal Screening using digital imaging should be carried out to exclude retinopathy if this has not been undertaken in the previous 3 months. Referral is made to local retinal screening service for screening in pregnancy. Pregnant women with known retinopathy pre-conception or found to have significant retinopathy during pregnancy screening will be referred to eye clinic according to retinal screening service protocol. Diabetic retinopathy should not be considered a contraindication to rapid optimisation of blood glucose control or vaginal birth.
 - Women will be requested and encouraged to participate in National Pregnancy in Diabetes (NPID) audit. Audit proforma should be completed by the Diabetic Nurses or Specialist Diabetes Midwife after obtaining verbal patient consent.
 - Ensure contact with joint diabetes team every 1-2 weeks throughout pregnancy to review blood glucose levels.

Table I

Aim for capillary blood Glucose of:

Fasting and premeal	3.5 -5.3mmol/L
1hr post meal	<7.8mmol/L
2hr post meal	<6.4mmol/L
Target HbA1c	<48mmol/L (6.5%)

- Advise pregnant women with diabetes who are on insulin or glibenclamide to maintain their capillary plasma glucose level above 4mmol/litre.
- Individual management plans including HbA1c target, will be documented in a letter in the woman's handheld Maternity notes.
- Women with diabetes should also receive routine care according to the schedule of appointments in 'Antenatal care: Routine care for the healthy pregnant woman' (NICE Clinical Guideline 62). Appendix 6a. A Copy of personal plan of care is kept in handheld notes and a copy given to CMW.
- Routine monitoring of fetal by cardiotocograph (CTG) wellbeing is not recommended before 38 weeks unless there is a risk of fetal growth restriction.
- If there are concerns regarding diabetic control (e.g. macrosomia, persistently poor blood sugars) consider weekly tests for fetal wellbeing from 32- 34 weeks onwards.
- Test for fetal well-being could be either umbilical artery Doppler or Oxford CTG.
- Offer women with diabetes and comorbidities such as obesity or autonomic neuropathy an anaesthetic assessment in the third trimester. If general anaesthesia is used for birth in women with diabetes, monitor blood glucose every 30 minutes from induction of anaesthesia until the woman is fully conscious postdelivery.
- All pregnant diabetic women should preferably be first on the elective caesarean section list. (NICE 2015).

Complications

Diabetic Ketoacidosis (DKA): During pregnancy, women who are suspected of having diabetic ketoacidosis should be managed according to hospital guideline on DKA. Women with GDM are unlikely to develop diabetic ketoacidosis.

Hypoglycaemia: Women and those in regular contact with them must be educated about the recognition, management, and treatment of hypoglycaemia, including the use of glucagon. (Refer to Hospital Guideline on Hypoglycaemia) CG165.

Antenatal corticosteroids

Diabetes should not be considered a contraindication to antenatal steroids for fetal lung maturation or to tocolysis except for the betamimetics (Terbutaline). (Refer to "Antenatal corticosteroids (CG182) to prevent respiratory distress syndrome guideline, 2016). Intravenous variable rate insulin infusion in addition to usual subcutaneous insulin and/or Metformin is usually required to control steroid induced hyperglycaemia for a minimum of 12-24 hours after the last dose.

See Appendix 3 - Steroid Administration for All Diabetic/GDM women

For general diabetes care:

See Appendix 4 - Managing Admission of Diabetic Women on Antenatal Ward and Postnatal period.

SPECIFIC ANTENATAL CARE FOR WOMEN WITH PRE-EXISTING DIABETES (NICE 2015)

Table II

Appointment	Care for women with diabetes during pregnancy
First appointment (joint diabetes and antenatal clinic)	Offer information, advice, and support in relation to optimising glycaemic control. Measure HbA1c. Take a clinical history to establish the extent of diabetes-related complications. Review medications for diabetes and its complications. Offer retinal and/or renal assessment if these have not been undertaken in the previous 3 months, refer to local retinal screening protocol for screening in pregnancy protocol schedule.
7–9 weeks	Confirm viability of pregnancy and gestational age.
Booking appointment (ideally by 10 weeks)	Discuss information, education, and advice about how diabetes will affect the pregnancy, birth and parenting (such as breastfeeding and initial care of the baby).
11 -14 weeks	Offer Nuchal scan and screening.
16 weeks	Offer retinal assessment at 16–20 weeks to women with pre-existing diabetes who showed signs of diabetic retinopathy at the first antenatal appointment.
20 weeks	Routine anomaly scan must include four-chamber view of the fetal heart, outflow tracts and 3 vessels view.
23 weeks	Offer additional Fetal Cardiac scan by Fetal Cardiologist or Fetal medicine clinic if 20 weeks scan unsatisfactory
28 weeks	Offer ultrasound monitoring of fetal growth and amniotic fluid volume. Offer retinal assessment to women with pre-existing diabetes who showed no diabetic retinopathy at their first antenatal clinic visit.
32 weeks	Offer ultrasound monitoring of fetal growth and amniotic fluid volume. Offer to nulliparous women all investigations that would be offered at 31 weeks as part of routine antenatal care - such as discussion about fetal movements, breastfeeding, colostrum harvesting and smoking.
	No additional or different care for women with diabetes (follow NICE Antenatal Care modified guideline 2014).
36 weeks	Offer ultrasound monitoring of fetal growth and amniotic fluid volume. Offer information and advice about: <ul style="list-style-type: none"> • timing, mode, and management of birth • analgesia and anaesthesia • changes to hypoglycaemic therapy during and after birth • management of the baby after birth • initiation of breastfeeding and the effect of breastfeeding on glycaemic control • contraception and postnatal follow-up • Complete peripartum management plan – see Appendix 2a/b
37-38+6 weeks	Offer induction of labour (IOL), or caesarean section if indicated. Start regular tests of fetal well-being for women with diabetes who declines IOL and wants to wait for spontaneous labour.
39 weeks	Offer tests of fetal well-being (weekly Oxford CTG) - if undelivered.
40 weeks	Offer tests of fetal well-being (Scan +weekly Oxford CTG) - if undelivered.
41 weeks	Offer tests of fetal well-being (weekly Oxford CTG) - if undelivered.

Breastfeeding and Neonatal care

Advice and management according to local Guidance

- CG 389 Management of Infants at Risk of Hypoglycaemia on the Postnatal Ward.
- 'Diabetes and Breastfeeding' leaflet and information on manual expressing, collecting, freezing and storage of expressed colostrum. This is given and discussed at 32 week antenatal appointment but expressing should not commence till 34 weeks gestation.
- Diabetes management for breast feeding discussed and agreed.

Complications

- Diabetic ketoacidosis (DKA):
May develop without significantly raised blood glucose especially if the woman is nauseous and vomiting. If unwell or vomiting, urine ketones, lab glucose and plasma bicarbonate should be checked. If DKA confirmed, patient should be managed at level 2 critical care jointly by medical and obstetrics teams. Diabetes specialist team should be informed (Refer to Hospital Guideline on DKA). DKA management box on Delivery Suite.
- Hypoglycaemia:
Advice on the recognition, management and treatment of hypoglycaemia should be given. A Hypoglycaemic tray or box and treatment algorithm flowchart should be in place in Antenatal Clinic, Delivery Suite and Maternity Wards. (Refer to Hospital Guideline on Hypoglycaemia).

Peripartum Care

- Peripartum management plan is completed by 36 weeks and gives advice on the postnatal doses of insulin and/or hypoglycaemics. It is filed in the maternity notes.

See Appendix

2a - Peripartum Management of Pregnant Diabetic Patients with Type I / Type II and

2b - Peripartum Management of Pregnant Diabetic Patients: Type I diabetics on 'CSII – continuous Subcutaneous Insulin Infusion Pump'.

4 - Managing admission of Diabetic women on antenatal ward and Postnatal period.

Postnatal care

- Adjust insulin dose – see individualised peripartum plan (Appendix 2a/b).
- Continue blood glucose testing routinely at least 24 hours after birth.
See Appendix 4 - Managing admission of Diabetic women on Antenatal Ward and Postnatal period.
- Women who breastfeed are more prone to develop hypoglycaemia.
- Type 2 diabetics may resume metformin and glibenclamide 24 hours after birth or sooner if not breast feeding. This advice would usually be in the individualised peripartum management plan.
- Offer 6 weeks follow up appointment in Joint Diabetes Postnatal Clinic.

Neonatal care

- Feed within 30 minutes of birth and at 2-3 hourly intervals until baby maintains pre-feed capillary plasma glucose levels at a minimum of 2.0mmol/L.
- For pre-feed blood glucose levels refer to current neonatal hypoglycaemia guidance.
- Carry out blood tests for polycythaemia, hyperbilirubinaemia, hypocalcaemia and hypomagnesaemia for babies with clinical signs.
- Perform echocardiogram (ECHO) for babies born to women with diabetes if they show clinical signs associated with congenital heart disease or cardiomyopathy including heart murmur.
- Admit to neonatal unit if baby less than 34 weeks at birth, develops hypoglycaemia with clinical signs, Respiratory Distress Syndrome (RDS), Cardiac Decompensation, Neonatal Encephalopathy, Polycythaemia, needs IV fluids or NG feed and develops Jaundice requiring intense phototherapy.
- Do not transfer baby to community before 24 hours.

'Management of Infants at Risk of Hypoglycaemia on the Postnatal Ward' version 1 2015
Follow 'Infant Risk pathway' 2019.

GESTATIONAL DIABETES (GDM)

- Gestational diabetes mellitus (GDM) is defined as any degree of glucose intolerance with onset or first recognition in pregnancy.

Diagnosis/ Screening

- The following group of pregnant women should be screened for GDM (NICE Guidance (2015) by a 2-hour 75 g oral glucose tolerance test (OGTT) between 24-28 weeks. For women presenting late in pregnancy, Oral Glucose Tolerance Test (OGTT) can be done up to 36+6 weeks gestation.
- From 37 weeks gestation a fasting/pre and 1- hour postprandial venous blood glucose should be undertaken in the hospital antenatal clinic.

Criteria for Screening

1. South Asian, black Caribbean, black African, Middle Eastern and Oriental (Chinese/Filipino) pregnant women
 2. Body mass index ≥ 30 at booking
 3. First degree relative with diabetes mellitus
 4. Previous macrosomic baby (≥ 4.5 kg)
 5. Confirmed Polycystic Ovary Syndrome on treatment
 6. Chance detection of glycosuria (++ or more) detected on one occasion or + on two occasions
- After OGTT the following criteria should be used to diagnose GDM:
 - Fasting plasma venous glucose \geq to 5.6 mmol / L and /or
 - 2-hour plasma venous glucose \geq 7.8 mmol / L.
 - Women with known non-diabetic hyperglycaemia (NDH) will follow the previous GDM pathway.

GDM in Previous Pregnancy

Women who have had GDM in previous pregnancy should be:

- Referred to the GDM clinic for booking (between 14-16 weeks) and advised to have regular 1 hour post prandial capillary blood glucose monitoring (CBG) and may be offered dietary advice by dietician. HbA1c will be offered.
- These women will be reviewed by the Diabetic Specialist Nurse/Midwife and Dietitian review after 1-2 weeks with their capillary blood glucose (CBG) recordings.
- Dietitian appointment for review of CBG at 22 weeks gestation.
- If CBG's are out of target, these women must be treated as GDM, and will then be referred to the joint GDM clinic.
- At 22 weeks gestation review, if CBG's are within target range these women should be advised to continue with random CBG 1 hour post prandial CBG monitoring and offered OGTT between 24-28 weeks.

Please refer to GDM flow chart in Appendix 5

In addition – consideration should be given to the following women for screening for GDM in conjunction with an Obstetric Consultant opinion:

- Polyhydramnios (single vertical pool of liquor more than 80mm).
- Disproportionately higher fetal abdominal circumference to head circumference (increasing AC >97th centile, HC normal) or EFW >90th centile an on customised GROW chart.

Once an OGTT is reported as abnormal, an ICE alert is sent to the Specialist Diabetes Midwife and Antenatal Screening Co-ordinator (ANSC) who will contact the woman and offer her an appointment in the “Group teaching session” held in Diabetes centre within a week, as well as advice over the phone with regards to diet whilst waiting to attend monitoring clinic. At the group teaching session, women will be provided with a glucose meter, a recording diary, they will be taught how to monitor and record their CBG and provided with dietary and lifestyle advices.

An HbA1c will only be taken in women with GDM in previous pregnancy, or those with OGTT fasting glucose > 6.0mmol or OGTT 2hr glucose >11.0mmol, to identify those who may have pre-existing Type II diabetes (team agreed variation to NICE 2015).

Each woman should be advised to test CBG pre-meal and 1 hour after meal. Women should be reviewed by dietitian after 1 week and a follow up appointment should be arranged at 28 weeks along with a growth scan on the same day.

CBG monitoring schedule in GDM

Previous GDM: Test CBG once per day initially concentrating on 1hr post meals and occasional fasting. No need for pre meal or bedtime CBG. If still on diet only by 24wks, increase to CBG twice per day 1hr post meal and occasional fasting CBG.

Newly diagnosed GDM by OGTT- test CBG 3 times per day 1hr post meal and twice per week fasting CBG.

When started on treatment (Metformin or Insulin) test CBG at least 3 times day, 1hr post meal and occasional (1-2 per week) fasting CBG. Pre-lunch or pre dinner CBG testing should not be routinely needed unless women on insulin and we are worried about hypos pre-lunch or pre dinner.

Consider more frequent testing e.g.- more fasting or more pre-meal CBG, especially if women have raised FBG on OGTT, or on basal insulin and need to see if they need twice basal Insulin. Less frequent testing (no fasting and no premeal BG) to be at discretion of clinician.

Target CBG's must be specified in the CBG record book.

Table III

Aim for CBG levels of:

Before meals	3.5 - 5.3 mmol/L
1 hour after meals	4 - 7.8 mmol/L

(NICE 2015)

Medication

- If diet and physical activity do not provide good blood glucose control within 1-2 weeks, then the mother should be prescribed Metformin and, in some cases Glibenclamide or Insulin. Insulin and Metformin dosage must be decided and managed by the diabetes team of Consultants and specialist nurses/midwife. Women will be counselled on use of Metformin (or Glibenclamide) in pregnancy (NICE 2015).
- Hypoglycaemic therapy should also be considered for women with gestational diabetes if ultrasound investigation suggests incipient fetal macrosomia (abdominal circumference above the 97th percentile/EFW >90th centile on customised growth) at diagnosis.
- Offer immediate treatment with insulin, with or without Metformin, as well as changes to diet and exercise, to women with gestational diabetes who have a fasting plasma of 7.0 mmol/L or above at diagnosis (NICE 2015).
- Consider immediate treatment with insulin, with or without Metformin, as well as changes to diet and exercise, for women with gestational diabetes who have a fasting plasma of between 6.0 and 6.9mmol/L if there are complications such as macrosomia or polyhydramnios.
- Consider Glibenclamide for women with gestational diabetes: in whom blood glucose targets are not achieved with Metformin but who decline insulin or cannot tolerate Metformin (NICE 2015).
- Advise women with GDM to take regular exercises such as walking for 30 minutes after a meal to improve blood glucose control.

Specific antenatal care for women with Gestational diabetes (NICE 2015)

Table IV

Appointment	Care for women with GDM during pregnancy
New diagnosis	See within 1 week of diagnosis, arrange group teaching, and check HbA1C (see criteria), teach self-monitoring, offer dietary advice, education on lifestyle and exercise. Arrange dietician review appointment in 1 week. Arrange growth scan and FU appointments at 28-32-36 weeks.
28 weeks	Review in Joint GDM clinic with ultrasound monitoring of fetal growth and amniotic fluid volume and blood glucose diary.
32 weeks	Review in Joint GDM clinic with ultrasound monitoring of fetal growth and amniotic fluid volume and blood glucose diary. Offer women all investigations/discussions that would be offered at 31 weeks as part of routine antenatal care - such as discussion about fetal movements, breastfeeding, colostrum harvesting and smoking.
34 weeks	No additional or different care for women with diabetes (follow NICE antenatal care modified guideline 2014).
36 weeks	Review in Joint GDM clinic with ultrasound monitoring of fetal growth and amniotic fluid volume and blood glucose diary. <ul style="list-style-type: none"> • Offer information and advice about: <ul style="list-style-type: none"> ○ Timing, mode and management of birth. Advise women with uncomplicated GDM to give birth no later than 40+6 weeks ○ Analgesia and anaesthesia ○ Changes to hypoglycaemic therapy during and after birth ○ Management of the baby after birth ○ Initiation of breastfeeding and the effect of breastfeeding on glycaemic control ○ Contraception and postnatal follow-up with GP ○ Complete Peripartum Management Plan – see Appendix 2c
37-38+6 week	Offer induction of labour, or caesarean section if indicated for women on insulin. Start regular tests for fetal well-being for women with diabetes who are awaiting spontaneous labour. (weekly Oxford CTG)
39-40 weeks	Offer induction of labour, or caesarean section if indicated for women on Metformin. Start regular tests of fetal well-being (weekly Oxford CTG) for women with diabetes who are awaiting spontaneous labour. Growth scan at 40 weeks if pregnancy continues.
40-40+6 weeks	Offer induction of labour, or caesarean section if indicated for women controlled on diet alone. Start regular tests of fetal well-being (weekly Oxford CTG) for women with diabetes who are awaiting spontaneous labour. All women should be offered delivery delivered by 40+6) weeks. Growth scan at 40 weeks and ANC if pregnancy continues.

Antenatal care

Woman with GDM must be offered an appointment in the Joint GDM clinic at 28 weeks, 32 weeks, and 36 weeks after growth scans for assessment of growth and liquor volume. See Appendix – 6b – Management Plan for Gestational Diabetes.

At each visit to the joint GDM clinic- maternal body weight, BP, urine for glucose, ketones and protein must be checked. Capillary blood glucose (CBG) diary and growth scan should be reviewed to check control of GDM.

Any woman with GDM who needs antenatal corticosteroid administration to enhance fetal lung maturity for any obstetric indication must follow the pathway recommended in Appendix 3.

Women with poor glycaemic control should be offered weekly Oxford (Dawes Redman) CTG from 32-34 weeks onwards for increased fetal surveillance.

Delivery plans should be made and documented by 36 weeks. As a general principle, women with GDM who are well controlled with insulin or Glibenclamide should be delivered between 37-38+6 weeks (NICE 2015)

It is recommended that all women with GDM should be delivered in the hospital.

Hypoglycaemia:

Women and those in regular contact with her must be educated about the recognition, management, and treatment of hypoglycaemia, including the use of glucagon. (Refer to Hospital Guideline on Hypoglycaemia CG165).

Delivery

- **Peripartum Plan**

Women on drug therapy for GDM will receive an individualised care plan for Peripartum glycaemic control from the diabetic team at 36 weeks. Diet controlled GDM usually should not require insulin infusion in labour. (see Appendix 2c 'Peripartum Management of Pregnant Gestational Diabetic Women).

- **Intrapartum care**

Monitor CBG hourly during labour for insulin controlled diabetic Women. Ensure that blood glucose is maintained between 4-8 mmol/L. (See Appendix 2c).

Women with well controlled GDM on metformin and or diet should have CBG every 2 hours. Maintain blood glucose level of 4-8 mmol/L. Start variable rate insulin infusion if CBG persistently >8.0 mmol/L.

- **Post-natal management**

Test CBG for at least 24 hours before transfer to the community. In most cases of gestational diabetes, the abnormality of glucose tolerance subsides after delivery. Therefore Metformin /Glibenclamide or insulin used during pregnancy should be stopped.

Approximately 10% – 15% of women who have had GDM may remain Glucose intolerant in the post-partum state. Women will be instructed by diabetes team to have fasting blood glucose test 6 weeks after delivery and result will be notified to women and GP by diabetes team. At discharge, offer advice on lifestyle, diet and exercise choices. GP/ practice nurse should arrange Hba1c check again at 13 weeks post-delivery appointment and recall for annual HbA1c screening for progression to NDH or type 2 diabetes and manage accordingly if diagnosed.

Fasting blood glucose 6 weeks after delivery should be < 5.4 mmol/L. The diabetes team will post reminder and request to the woman to have post delivery diabetes screening.

Even if the blood glucose levels return to normal, women should be encouraged to exercise and lose weight if they are obese, to reduce the likelihood of their developing Type 2 DM in future. Annual fasting blood glucose screening by the GP, or sooner if symptomatic, should take place. Advise risk of recurrence in future pregnancy and offer test (via GP) before planning pregnancy.

- **Neonatal care**

Follow CG389 Management of Infants at Risk of Hypoglycaemia on the Postnatal Ward pathway.

References:

1. Antenatal Corticosteroids to Prevent Respiratory Distress Syndrome RCOG Green-See local guidance No: CG 182 (2019).
2. National Institute for Health and Clinical Excellence. (2015). NG3 Diabetes in pregnancy: Management of diabetes and its complications from pre-conception to the postnatal period. London: NICE. Available at: www.nice.org.uk.
3. National Institute for Health and Clinical Excellence, (2019). CG62 Antenatal care for uncomplicated pregnancies. London: NICE. Available at: www.nice.org.uk.
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5. Trust Guidance
'Prevention and Management of Hypoglycaemia in the Term Neonate' Version 3 September 2012.
6. 'Guideline for the Management of Infant of a Diabetic Mother' Version 3 September 2012.
7. 'Management of infants at risk of hypoglycaemia on the postnatal ward' Version 1 2015.

Auditable criteria

Element to Audited	Lead	Tool	Frequency	Reporting Arrangements	Acting on Recommendations and Lead(s)	Changes in Practice and Lessons to be Shared
<p>Pre-existing diabetes: The percentage of cases where pre-conception counselling was provided.</p> <p>Pre-existing diabetes The percentage of cases where woman taking 5mg Folic Acid prior to conception.</p> <p>Pre-existing diabetes Antenatal ultrasound examination of four-chamber view of fetal heart and outflow chart at 20 weeks.</p>	SDMW Physician Obstetrician	Audit Tool	Yearly	Clinical Governance in Obstetrics and Medicine NPID Annual Report circulated	Diabetes team: Obstetrician, Physician and SDMW	Feedback to the relevant party. Learning outcome incorporated in existing teaching sessions. Any required changes to practice will be identified and actioned within a specific time frame.
<p>All diabetics The percentage of cases where peripartum management plan completed before delivery.</p> <p>Incidence of fetal macrosomia. (>4.5 kg and/ or above 95th centile)</p> <p>Involvement of the multidisciplinary team (Obstetrician, Specialist Diabetes Midwife, Diabetes Physician, Diabetes Specialist Nurse or Dietitian) in the provision of care when appropriate.</p> <p>Documentation of timetable of antenatal appointments in maternity records.</p> <p>Targets for glycaemic control documented in maternity records.</p>	SDMW Physician Obstetricians	Audit Tool	Yearly	Clinical Governance Annual Report circulated	All members of the Diabetes Team: Obstetricians, Physicians, SDMW, DSN, Dietitian	Feedback to the relevant party. Learning outcome incorporated in existing teaching sessions. Any required changes to practice will be identified and actioned within a specific time frame.

Appendix 1

Care programme for the management of pregnant women with diabetes Frequency of antenatal visits need to be assessed individually depending on other complications and level of diabetes control. Patients are advised to have weekly contact with DSN/SDMW team to review blood glucose levels.

7 – 9 wks.	16 wks	20 wks	23-25wk	28 wks	32 wks	34	36 wks
Consultant Obs ANC	CMW	Consultant Obs ANC	CMW	Consultant Obs ANC	Consultant Obs ANC	CMW	Consultant Obs ANC
Booking Visit: viability scan Folic acid 5mg till 12wks Aspirin 75mg od till delivery unless contraindicated Urine PCR Blood HbA1, U&E, TFT Offer Combined test (12 weeks NT+ blood)		Anomaly scan with 4CV Outflow tract	Fetal cardiac scan in Fetal Medicine Clinic, if 20 weeks scan reported as unsatisfactory	Growth and liquor volume scan with JDC follow up 28 weeks bloods and Anti D if Rh negative	Growth and liquor volume scan with JDC follow up DM breastfeeding leaflet		Growth scan and liquor volume with JDC follow up Make delivery plan, and organise IOL at 38 weeks except for diet controlled gestational diabetic women CTG weekly if glucose control poor
Consultant DM	Con DM//SDMW/DSN	Con DM//SDMW/DSN	DSN//SDMW/DSN	Consultant DM/SDMW/DSN	Consultant DM/SDMW/DSN		Consultant DM/SDMW/DSN
Booking Visit: Fundoscopy/retinal assessment HbA1c repeat atleast once every trimester <input type="checkbox"/> Refer to DSN /dietitian to revise hypo's (glucagon for T1), driving, ketones (bl ketones for T1) Complete/Consent NPID Weekly contact with DSN Give 'Diabetes and Having a Baby' leaflet/local leaflets	Fundi/Retinal assessment (if abnormal at booking) HbA1c	<input type="checkbox"/> <input type="checkbox"/> HbA1c	HbA1c/	<input type="checkbox"/> Fundi/ ret screen (Not for GDM) NB this is 1st visit for GDM after OGTT <input type="checkbox"/> <input type="checkbox"/> GDM see * in 1st column GDM Start Rx if fetal AC >70% centile HbA1c	<input type="checkbox"/> <input type="checkbox"/> Review control <input type="checkbox"/> <input type="checkbox"/> HbA1c (Peripartum plan) DM breast feeding leaflet Discuss contraception plans/ pre-conception counselling for next pregnancy		Peri-Partum Management Plan (if not already done, put in 'labour' section in maternity blue notes and DIAMOND Pregnancy ID section) Arrange diabetic and/or joint clinic FU as required Arrange 6 week post-natal fasting and BG for GDM with GP HbA1c- for GDM by 13 weeks For late GDM referrals see separate document for Mx

APPENDIX 2a

Patient Name Hospital Number Date of Birth (Patient name label)
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Peripartum Management of Pregnant Diabetic Patients

Type I **Type II** **Insulin** **Metformin**

Whenever a diabetic woman is admitted in labour, or when induction or elective Caesarean section is planned, please inform the diabetic team by contacting one of the Diabetes Specialist Nurses (on bleeps 053, Mon-Fri between 9am-5pm). Diabetes Consultants can be contacted out of hours via switchboard (for emergencies only)

1a. Induction of Labour/ Labour

- Continue usual subcutaneous insulin after induction while eating and drinking normally

1b. When labour starts,

- commence IV insulin and glucose infusion with hourly blood glucose monitoring as per chart below

1c. For elective Caesarean sections,

- continue usual subcutaneous insulin on day prior to surgery. If on morning list, **Nil by Mouth** from midnight and start IV insulin and glucose infusion as below from 06:00 am on day of surgery. If on afternoon list and early morning breakfast allowed, give **half** morning dose of insulin and start IV insulin and glucose infusion from 12:00 midday.

Monitor capillary blood glucose (CBG) 1hrly, if CBG remain persistently above **8.0mmol** and rising, start IV insulin and glucose infusion:

- Monitor capillary **blood glucose hourly**
- Start IV infusion of **one litre Glucose 5% + 20 mmol KCL** at rate of **60 ml/hour**
- Give IV insulin by syringe driver, **50 units Actrapid insulin in 50ml 0.9% Sodium Chloride. For starting VRII (variable rate insulin infusion) scale (A-D)**, please see instruction below #
- Adjust the insulin infusion rate according to the 'VRII' regimen below

****aim to keep blood glucose levels between 4.0 and 8.0 mmol/L**

Type I diabetic women: If blood glucose 14mmol or above on 2 occasions, please test urine and blood for **ketones**.

Regimen Blood Glucose mmol/L	Insulin infusion rate (unit/hr)					Scale	# Starting scale dependent on total Insulin in 24 hours
	Scale	A	B	C	D		
0 – 3.9		*0/0.5	0.5	0.5	0		
4 – 6.9		1	2	3	0.5		
7 – 8.9		2	4	6	1		
9 - 10.9		3	6	9	2		
11 – 12.9		4	8	12	3		
13+		6	12	18	4		

- Adjustment of 'sliding scale'** may be required every few hours to achieve target blood glucose of 4.0 – 8.0 mmol/l. BG < 3.0 mmol/l at any time or BG persistently > 10 mmol/l are unacceptable. Use scale A-D on VRII found on Emergency Diabetes Chart: print chart from EVOLVE to prescribe and document VRII and capillary blood glucose.
- Advice can be sought from Diabetes team or the duty medic
- If additional fluids are required, use Hartmann's or Normal S

Patient Name Hospital Number Date of Birth (Patient name label)
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After delivery,

- continue with the 5% Glucose + KCl infusion but
- reduce the insulin infusion to **half** the rate required at the end of labour

2. Neonatal hypoglycaemia risk:

Follow local current neonatal guidelines

3. Maternal Post-Delivery Plan

- Continue the 5% Glucose + KCl infusion
- Reduce rate of iv insulin infusion by half until patient able to eat and drink
- Stop iv insulin/glucose **with** first meal (breakfast, lunch or dinner) and ensure treatment below is prescribed on the drug chart:

No need to give insulin/ oral hypoglycaemics **or**

Restart oral hypoglycaemics if not breast feeding*: **or**

Drug _____ dose _____ frequency _____

Drug _____ dose _____ frequency _____

If **breastfeeding/expressing breast milk**, delay restarting Metformin 24 hours to ensure neonatal well being. Should not take any oral hypoglycaemics except **Metformin** if breastfeeding.

Restart subcutaneous insulin at pre-pregnancy doses as recommended below:

1a. Patient is on twice daily insulin injections:

- If first meal is breakfast or evening meal, give insulin **before** meal:
Insulin _____ dose _____ at 8:00am (breakfast)
Insulin _____ dose _____ at 18:00pm (dinner/tea)
- if first meal is lunch, give one stat dose of **short acting** insulin 30 min **before** lunch as below, then resume twice daily doses as above.
Insulin _____ dose _____ at 12:00 midday

1b. Patient is on 4 (or more) times a day insulin injection:

- Give appropriate dose of insulin **before** first meal as below and
- Continue IV insulin infusion until insulin _____ injection at _____ (time and meal):
Insulin _____ dose _____ at 8:00am (BF breakfast- bolus)
Insulin _____ dose _____ at 12:00pm (L lunch- bolus)
Insulin _____ dose _____ at 18:00pm (D dinner/tea- bolus)
Insulin _____ dose _____ at 08:00/18:00/22:00 (basal at BF/ D/bedtime)
Insulin _____ dose _____ at 08:00/18:00/22:00 (basal at BF/ D/bedtime)
- Reduce BG monitoring to 4 times/day (**pre-meals and bedtime**) when IV insulin/glucose discontinued.
- Inform Diabetes Specialist Nurse/Midwife (bleep 053) of delivery.
- Other comments/ instructions: _____

4. Post-Discharge Follow Up Checklist

- Follow-up appt. in Diabetic clinic required? No Yes Date _____
- Follow-up appt. in Joint clinic required? No Yes Date: _____

Doctor/SDMW/DSN

Name:

Signature:

Date:

Peripartum Management of Pregnant Diabetic Patients (Type I/Type II on Insulin)

SCS/RMT 2019

Patient Name
Hospital Number
Date of Birth
(Patient name label)

APPENDIX 2b

Peripartum Management of Pregnant Diabetic Patients Type I Diabetics on 'CSII - Continuous Subcutaneous Insulin Infusion Pump'

Whenever a diabetic woman is admitted in labour, or when induction or elective Caesarean section is planned, please inform the diabetic team by contacting one of the Diabetes Specialist Nurses (on bleeps 053, Mon-Fri between 9am-5pm). Diabetes Consultants can be contacted out of hours via switchboard (for emergencies only)

1. Induction of Labour

- Continue usual CSII insulin pump after induction while eating and drinking normally
- **When labour starts**, Commence I.V. insulin and glucose infusion with hourly blood glucose monitoring as per chart below. Once VRII started, follow step 2 below for insulin pump management.

2. For elective Caesarean sections,

- Continue usual **CSII pump** therapy until starting iv insulin VRII
- Once VRII started, patient removes pump for safekeeping (**Insulin Pump is patients' personal property and should be labelled with their details and kept with their belongings at all times, do not misplace**) Do not try to switch off/rectify pump at any time even if the pump alarms. Insulin loss if disconnected is minimal.
- Start IV infusion of **one litre Glucose 5% + 20 mmol KCL** at rate of **60 ml/hour**
- Give IV insulin by syringe driver, **50 units Actrapid insulin in 50ml 0.9% Sodium Chloride. For starting VRII (variable rate insulin infusion) scale (A-D)**, please see instruction below #
- Monitor capillary **blood glucose hourly**
- Adjust the insulin infusion rate according to the 'VRII' regimen below

****aim to keep blood glucose levels between 4.0 and 8.0 mmol/L**

If blood glucose 14mmol or above on 2 occasions, please test urine and blood for **ketones**.

Regimen Blood Glucose mmol/L	Insulin infusion rate (unit/hr)					Scale	# Starting scale dependent on total Insulin in 24 hours
	Scale	A	B	C	D		
0 – 3.9		*0/0.5	0.5	0.5	0		A Scale A: if total daily sub-cut insulin dose is 31-99 units
4 – 6.9		1	2	3	0.5		
7 – 8.9		2	4	6	1		B Scale B: if total daily sub-cut insulin dose ≥ 100 units
9 - 10.9		3	6	9	2		
11 – 12.9		4	8	12	3		D Scale D: if total daily insulin dose ≤ 30 units, or on diet only, or on Metformin only
13+		6	12	18	4		

- **Adjustment of 'sliding scale'** may be required every few hours to achieve target blood glucose of 4.0 – 8.0 mmol/l. BG < 3.0 mmol/l at any time or BG persistently > 10 mmol/l are unacceptable. Use scale A-D on VRII found on Emergency Diabetes Chart: print chart from EVOLVE to prescribe and document VRII and capillary blood glucose.
- Advice can be sought from Diabetes team or the duty medical registrar.
- If additional fluids are required, use Hartmann's or Normal Saline Solutions

Patient Name Hospital Number Date of Birth (Patient name label)
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3. After delivery

- Continue to monitor CBG hourly regardless of VRII or insulin pump.
- Once patient is ready to eat, reconnect insulin pump (all insulin pump patients are trained to do this). If new infusion set is needed and patient does not have his/her own supply, there is a limited supply on Ward 12 (access via Ward 12 Charge nurse, quoting infusion set type).
- If CBG above target, patient can administer a correction insulin bolus using bolus calculator, in addition to bolus insulin to cover the meal.
- Patient can continue managing diabetes themselves as they would do at home when they are capable to do so.
- Take down VRII 30mins after restarting insulin pump.
- Other comments/ instructions: _____
- Inform Diabetes Specialist Nurse/Midwife (bleep 053) of delivery

4. Neonatal hypoglycaemia risk.

Follow local current neonatal guidelines CG 389 Management of Infants at risk of Hypoglycaemia on the Postnatal Ward adapted from BAMP Guidance

5. Post-Discharge Follow Up Checklist

- Follow-up appt. in Diabetic clinic required? No Yes Date _____
- Follow-up appt. in Joint clinic required? No Yes Date: _____

Doctor/SDMW/DSN

Name _____

Signature _____

Date _____

Patient Name
Hospital Number
Date of Birth
(Patient name label)

APPENDIX 2c

Management of Pregnant Gestational diabetic women

Controlled on: *diet only Metformin only / insulin +/- Metformin (*circle)

If eating in early labour, continue usual diabetes treatment

- When labour starts, monitor capillary blood glucose (CBG) 2hrly, if CBG remain persistently above 8.0mmol and rising, start IV insulin and glucose infusion:
- Monitor capillary **blood glucose hourly**
- Start IV infusion of **one litre Glucose 5% + 20 mmol KCL** at rate of **60 ml/hour**
- Give IV insulin by syringe driver, **50 units Actrapid insulin in 50ml 0.9% Sodium Chloride. For starting VRII (variable rate insulin infusion) scale (A-D)**, please see instruction below #
- Monitor capillary **blood glucose hourly**
- Adjust the insulin infusion rate according to the 'VRII' regimen below
- Once VRII and iv fluid infusion in place for 30 mins, then discontinue CSII insulin pump and give insulin pump to patient for safe keeping

****aim to keep blood glucose levels between 4.0 and 8.0 mmol/L**

Regimen Blood Glucose mmol/L	Insulin infusion rate (unit/hr) Scale					Scale	# Starting scale dependent on total Insulin in 24 hours
	A	B	C	D	E (custom)		
0 – 3.9	*0/0.5	0.5	0.5	0		A	Scale A: if total daily sub-cut insulin dose is 31-99 units
4 – 6.9	1	2	3	0.5		B	Scale B: if total daily sub-cut insulin dose ≥ 100 units
7 – 8.9	2	4	6	1		D	Scale D: if total daily insulin dose ≤ 30 units, or on diet only, or on Metformin only
9 - 10.9	3	6	9	2			
11 – 12.9	4	8	12	3			
13+	6	12	18	4			

- **Adjustment of 'sliding scale'** may be required every few hours to achieve target blood glucose of 4.0 – 8.0 mmol/l. BG < 3.0 mmol/l at any time or BG persistently > 10 mmol/l are unacceptable. Use scale A-D on VRII found on Emergency Diabetes Chart: print chart from EVOLVE to prescribe and document VRII and capillary blood glucose.
- Advice can be sought from Diabetes team or the duty medical registrar.
- If additional fluids are required, use Hartmann's or Normal Saline Solutions
- **After delivery**, discontinue IV insulin VRII and Glucose infusion.

Post-delivery GDM women:

- Stop CBG testing for GDM women
- Stop Metformin/Insulin post-delivery

Neonatal hypoglycaemia risk:

Follow local current neonatal guidelines

Post-Discharge Follow Up Checklist for GDM women

- Remind woman to have a 6week post-partum fasting glucose test. A letter with the request will be posted to the woman to remind her to have this test done.
- Inform woman that their surgery will arrange a repeat HbA1c test at their 13 weeks post-delivery appointment and annual diabetes screening thereafter.

Print

RMT/SCS July 2019

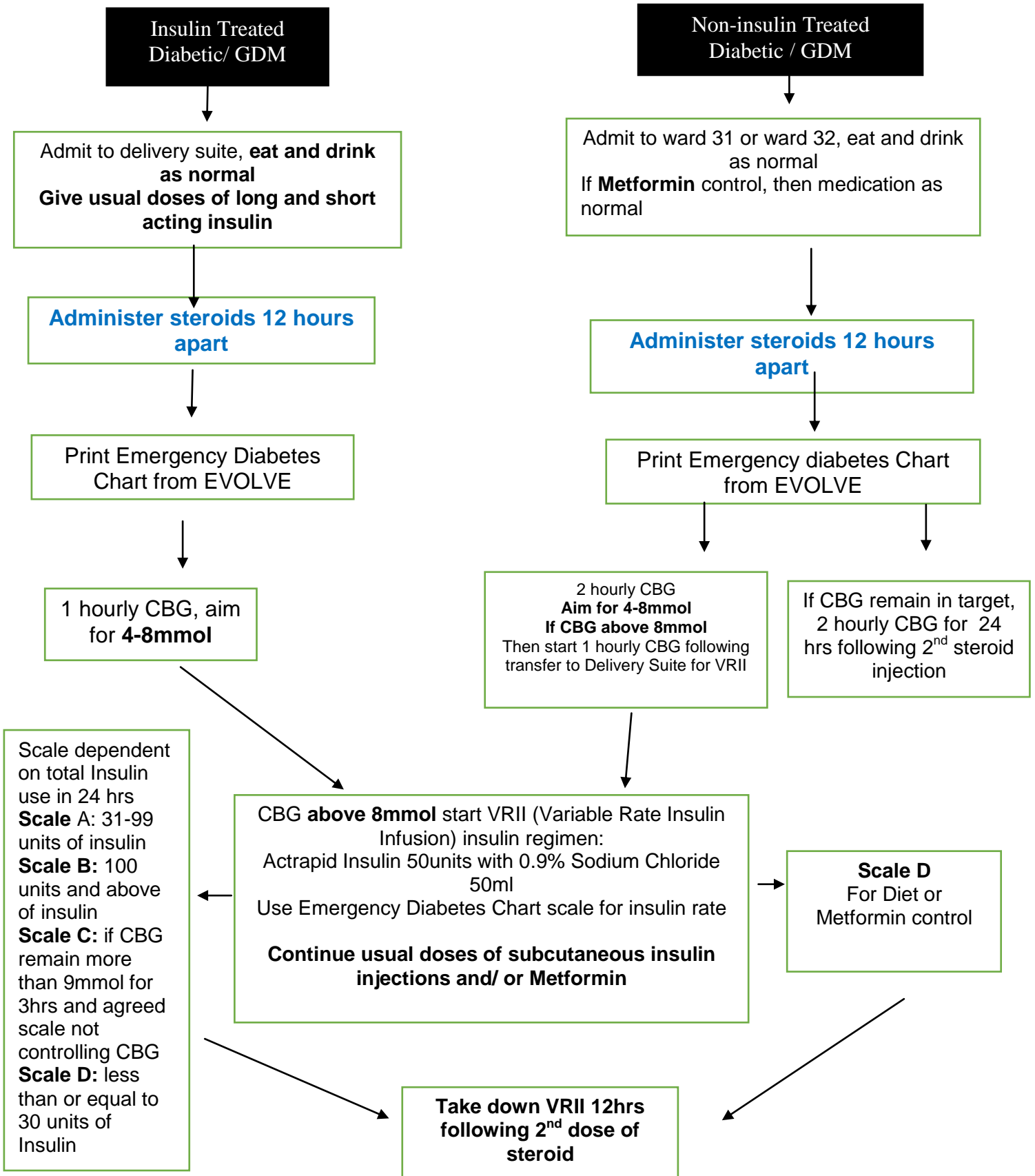
Name:

Signature:

Date:

Appendix 3

Steroid Administration for ALL Diabetic/ GDM Women



RMT/SCS/SW

July 2019 Luton and Dunstable hospital NHS Trust. 2016. Antenatal corticosteroids to prevent neonatal respiratory distress syndrome. (V4). [CG182]. Luton: Luton and Dunstable Hospital NHS Trust.

Appendix 4

Managing admission of Diabetic women on Antenatal ward and Postnatal period

Insulin treated diabetes:

Monitoring:

Each woman will have a blood glucose record book. Follow the pattern of testing in the patient's record book, if no record book: fasting and 1hr post breakfast, pre and 1hr post lunch, pre and 1hr post evening meal, and pre-bed if insulin managed diabetic.

The member of staff (MOS) must use the hospital Roche Accu-chek Inform II meter for all the testing of the woman's capillary blood glucose (CBG).

The **Libre** Flash Glucose Monitoring device is now used by pregnant Type I diabetic women for self-management, but:

- Patient can monitor own glucose using Libre,
- MOS must also use hospital Accu-chek Inform II to monitor CBG on patient at least 4 times/ day (fasting, before meals and bedtime).
- If woman goes to LSCS **Libre** can be left in situ but **not for monitoring** glucose levels whilst VR11 regime in situ. **Must use Accu-chek Inform to monitor CBG** and to titrate VR11.
- MOS to monitor CBG while on VR11 and until delivery.

All CBG should be recorded on the **Green Diabetes Chart** or Emergency diabetic chart (when on VR11) and all **insulin (preparation and units) prescribed on Green Diabetes Chart** and on **ePMA (insulin preparation, device, 1 unit as default dose)**.

Insulin treatment:

Self Administration of Medication and Insulin (SAMI) will be starting in maternity, please follow SAMI policy.

Ensure insulin prescribed on ePMA and on 'Green Diabetes Chart' for all women.

The **peripartum plan** will have the woman's post-delivery diabetes management.

Insulin safety pen needles must be used whilst patient is an in-patient in hospital. MOS to demonstrate the correct insulin safety needle technique.

Provide bedside **sharps bin**, for CBG testing at bedside to maintain 'sharps safety'.

Non-insulin treated diabetes:

Testing varies: See woman's glucose record book and use this for testing regime, if no record book it will generally be fasting and 1hr post breakfast, 1hr post lunch and 1hr post evening meal.

The member of staff (MOS) must use the hospital Accu-chek Inform II meter for all the testing of the woman's capillary blood glucose (CBG).

All CBG should be recorded on the Green Diabetes Chart and Metformin prescribed on ePMA. Metformin must be given with food/ at mealtimes, so prescription should specify with food and which meal.

Peripartum plan will identify post-delivery management of type II diabetic women and GDM women.

Provide bedside **sharps bin**, for CBG testing at bedside to maintain 'sharps safety'.

The Postnatal Period: See back

Postnatal period

Patients with **Libre** must have CBG monitoring with hospital Accu-chek Inform II for the first 24 hours post delivery: minimum of pre-meal and pre-bed (4x/day). This will ensure concordance between Libre and CBG. Once patient eating and drinking normally, and patient self-managing her diabetes she can resume Libre monitoring of her glucose levels.

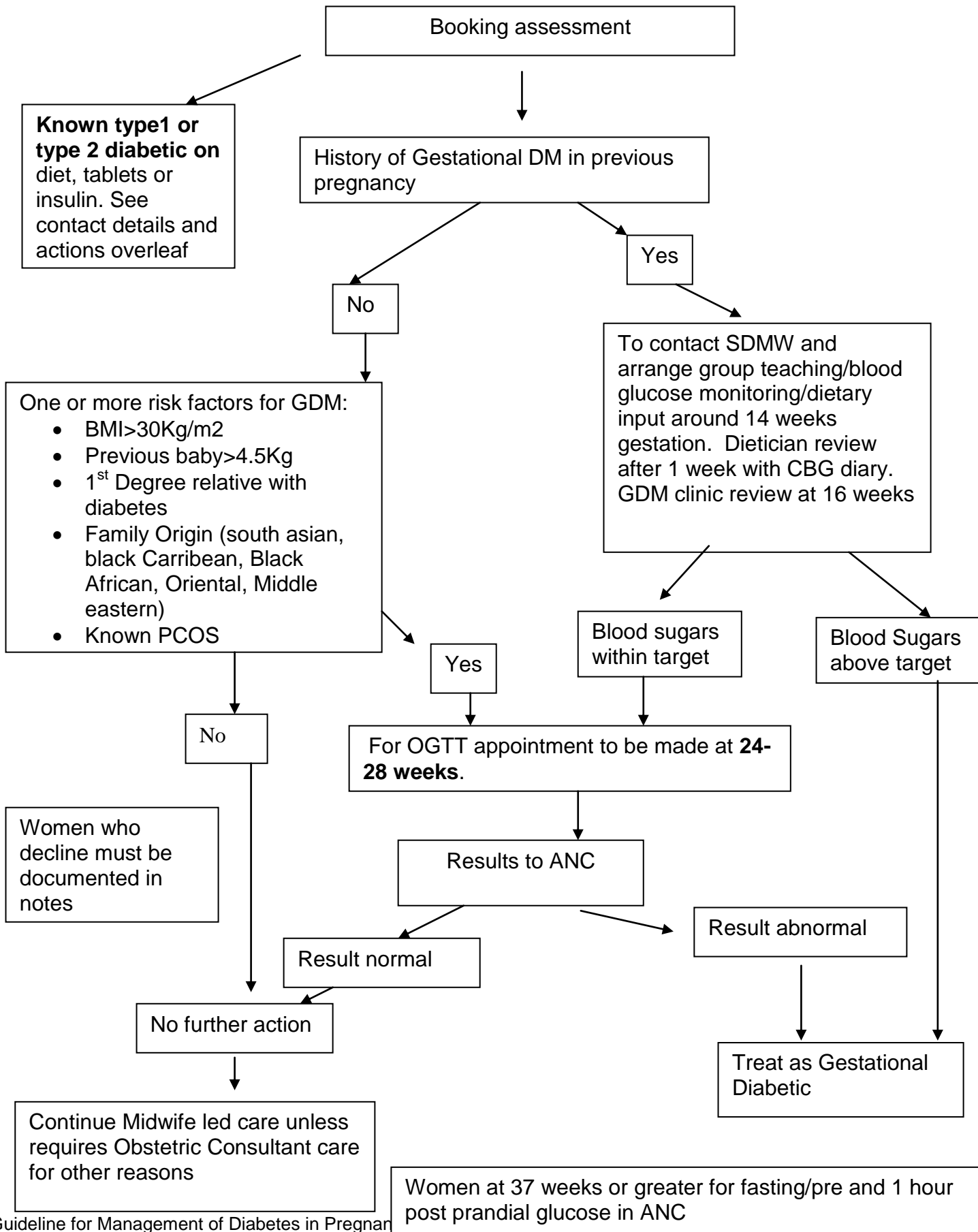
If patient unwell it is the responsibility of the hospital staff to monitor CBG and manage diabetes until patient well.

CBG post-delivery: If breastfeeding aim for the following to reduce risk of hypoglycaemia.

Table V

Timing of CBG	CBG range
Fasting/pre-meal	4-8.5 mmol
1 -hour Post-meal	Up to 15 mmol

Screening for Gestational Diabetes Mellitus (GDM)





**Appendix 6a
Diabetes Type I and II
Management Plan**

CLINICAL EXCELLENCE, QUALITY & SAFETY

Gestation	Location	Date and sign
7-9/40 Viability scan	Joint Diabetes and Obstetric clinic HbA1C, Retinal Assessment	
12/40 Dating or nuchal scan	Joint Diabetes and Obstetric clinic NICE guidelines given	
20/40 Anomaly scan	Joint Diabetes and Obstetric clinic	

23 weeks gestation	Fetal cardiac scan in fetal medicine clinic if 20 weeks scan unsatisfactory	
28 weeks gestation	Joint Diabetes and Obstetric clinic. HbA1C, Retinal Assessment Grp and Rh repeat, Anti D if Rh negative	
32 weeks gestation	Joint Diabetes and Obstetric clinic	
34 weeks gestation	Antenatal visit in community	
36 weeks gestation	Joint Diabetes and Obstetric clinic HbA1C Induction of Labour or el LSCS date organised Peripartum plan completed if not already done so Lifestyle leaflet and contraception 6/52 postnatal visit	
Weekly CTG if diabetes unstable or macrosomia	DAU	
Deliver 37-38+6 weeks	Wd 32 IOL or EI LSCS	
32-34 weeks Peripartum management plan	Filed in front of labour page	
Please contact DSN bleep 053 or SDMw 07811 229750	Delivery suite to contact/notify DSN or SDMw	



CLINICAL EXCELLENCE, QUALITY & SAFETY

Previous Gestational Diabetes

Gestation	Location	Date and sign
14 weeks gestation	Monitoring Clinic, HbA1C	
16 weeks gestation	GDMF clinic	
26-27 weeks gestation	GTT if needed	

Newly Diagnosed Gestational Diabetic

Gestation	Location	Date and sign
On diagnosis	Monitoring Clinic	
28 weeks gestation	Ultrasound and GDMCN Group and Rh repeat and Anti D if Rh negative	
32 weeks gestation	Ultrasound and GDMCF	
34 weeks gestation	Antenatal Visit community	
36/40	Ultrasound and GDMCF Peripartum management plan completed	
Weekly CTG if diabetes unstable or macrosomia	DAU	
Deliver between 38-40+6 weeks. Offer weekly fetal monitoring by CTG if remains undelivered after 38 weeks Scan and ANC review if undelivered	Wd 32 IOL or EI LSCS	
6/52 postnatal FBG. HbA1C by 13 weeks after birth GP to arrange Lifestyle advice leaflet	General Practitioner Given	

Glossary of Abbreviations:

ANSC	Antenatal Screening Co-ordinator
CBG	Capillary Blood Glucose
CMW	Community Midwife
CSII	Continuous Subcutaneous Insulin Infusion pump
CTG	Cardiotocograph
DKA	Diabetic Ketoacidosis
DSN	Diabetes Specialist Nurse \ss
ECHO	Echocardiogram
GDM	Gestational Diabetes Mellitus
GP	General Practitioner
HbA1c	Glycated Haemoglobin
IOL	Induction of Labour
IV	Intravenous
MOS	Member of Staff
NICE	National Institute of Clinical Excellence
OGTT	Oral Glucose Tolerance Test
RDA	Respiratory Distress Syndrome
SDMW	Specialist Diabetes Midwife
VRII	Variable Rate Insulin Infusion