University Hospitals of North Midlands NHS
NHS Trust

Achieving Sustainable Quality in Maternity Services

ASQUAM

Guideline for the Management of Diabetes in Pregnancy

Date of Ratification:	June 2016
Minor change:	June 2018
Date of Next Review:	June 2019
Ratified by:	Labour Ward Forum Sub-Group Obstetric Guideline Group
Reviewed by:	Lead Midwife for Development and Education

VERSION CONTROL SCHEDULE

Version	Date	Author	Comments
1	1993		
2	1995		
3	1997		
4	2000		
5	2001		
6	2002		
7	2005		
8	2008 – Nov		
9	2009 – Feb		
10	2010 – Sept		
11	2010 – Nov		
12	2011 – April		
13	2011 – June		
14	2011 – Dec		
15	2013 – Oct	Miss R Indusekhar Consultant Obstetrician Sarah Taylor Diabetes Specialist Nurse Dr F Hanna Dr A Nayak, Dr L Varadhan Consultants in Diabetes & Endocrinology Diabetes Speciality Team	
16	2015 – October	Miss R Indusekhar Consultant Obstetrician Dr S Usman Consultant Obstetrician and Gynaecologist Sarah Taylor Diabetes Specialist Nurse Dr F Hanna Dr A Nayak Dr L Varadhan Dr R Reddy Dr M Sathiavageeswaran Consultants in Diabetes & Endocrinology Diabetes Speciality Team	Guideline reviewed and updated in line with NICE NG3 – 25/2/15
17	2016 – May	As above	Changes to pathways in relation to women on long term steroids will also need early OGTT and if initial test is normal to be repeated at 28 weeks
18	2016 – October	As above	Changes to page 17 to read: • prescribe regular insulin in regular medications section • prescribe PRN fast acting insulin 2 to 6 units as per steroid guideline • (NovoRapid or Humalog if on regular insulin, otherwise Actrapid).
19	2018 – June	As above	Minor change: updated in line with new antenatal steroids

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1. INTRODUCTION

Diabetes is a disorder of carbohydrate metabolism that requires immediate changes in lifestyle. In its chronic form, diabetes is associated with long-term vascular complications, including retinopathy, nephropathy, neuropathy and vascular disease. Approximately 700,000 women give birth in England and Wales each year, and up to 5% of pregnancies involve women with diabetes[1]. Approximately 87.5% of pregnancies complicated by diabetes are estimated to be due to gestational diabetes, with 7.5% being due to Type 1 diabetes and remaining 5% being due to Type 2 diabetes. The prevalence of Type 2 is increasing in certain ethnic minority groups, i.e. South Asian, African, Black Caribbean, Middle Eastern, Chinese family origin.

2. PRE-EXISTING DIABETES

Pregnancy in a patient with pre-existing Type 1 or Type 2 diabetes is often referred to as 'pre-gestational diabetes'. Type 1 encompasses the cases that are primarily due to pancreatic islet beta- cell destruction and are prone to ketoacidosis. It is characterised by absolute insulin deficiency, abrupt onset of severe symptoms and dependence on exogenous insulin to sustain life. Type 2 diabetes results from defects in insulin secretion, almost always from insulin resistance. It can be asymptomatic and, therefore, can remain undiagnosed.

2.1 Gestational diabetes

Gestational diabetes is defined as carbohydrate intolerance of variable severity with onset or first recognition during pregnancy.

3. RISKS OF DIABETES

Risks to the mother	Risks to the fetus
Miscarriage	Future obesity and diabetes
Hypoglycaemia/Hyperglycaemia	Congenital malformation
Ketoacidosis	Stillbirth/ neonatal death
Hypertension/ pre-eclampsia	Premature delivery
Retinopathy/ nephropathy	Fetal macrosomia
IOL/ Caesarean section	Birth trauma
Future diabetes	Neonatal hypoglycaemia
	Polycythaemia

4. MULTIDISCIPLINARY TEAM INVOLVEMENT

We have a **dedicated multidisciplinary diabetes/ pregnancy clinic** at University Hospitals of North Midlands (UHNM) where a Diabetologist, Obstetrician, Diabetes specialist nurses, Midwife with interest in diabetes and a Dietician work together. They will record their findings from the antenatal visit in the maternal health record.

This guideline contains recommendations for the management of diabetes and its complications in women who wish to conceive and those who are already pregnant.

5. PRE-PREGNANCY CARE

Healthcare professionals should seek to empower women with diabetes to make the experience of pregnancy and childbirth a positive one. This can be achieved by the following

1. Planning pregnancy- The importance of planning pregnancy and the role of contraception.

2. **Glycaemic control-** Women should be informed that establishing good glycaemic control before conception and continuing this throughout pregnancy will reduce the risk of miscarriage, congenital malformation, stillbirth and neonatal death. Optimise diabetic control i.e. HbA1c <48 mmol/mol.[1] May need to switch to insulin to obtain this. Advise women with HbA1c above 86 mmol/mol to avoid pregnancy. Women with type 1 diabetes should be advised of the risk of hypoglycaemia and hypoglycaemia unawareness in pregnancy.

3. Life style measures- Stop smoking and drinking alcohol. Increase level of exercise. Look at diet and having a well distributed carbohydrate intake, good range of low glycaemic index foods especially fruit and vegetables. Ensure a moderate fat intake and awareness of current safe foods during pregnancy is important. Education on formal carbohydrate counting food portion sizes may be provided. Offer referral to a dietician for individualised dietary advice.

4. Achieve ideal body weight. If BMI is >27 offer specific advice on weight loss prior to conception.

5. Screen for complications- Retinal and renal assessment.

6. Drugs. Folic acid supplements 5mgs/day from preconception until 12 weeks gestation. If planning or already pregnant use insulin and Metformin* only (newer agents are not recommended/licensed in pregnancy). **Metformin*** can be considered as an adjunct or alternative to insulin in the pre-conception period and during pregnancy. Stop any Angiotensin converting enzyme inhibitor medication, commencing Labetalol or Methyldopa as an alternative for hypertension. Stop statins.

Women with diabetes or previous gestational diabetes should be referred at the earliest opportunity, well in advance of their planned pregnancy.

***Metformin is not licensed in pregnancy and consent should be obtained.**

6. SCREENING FOR GESTATIONAL DIABETES

The following patients should be screened for gestational diabetes

At 24-28 weeks

- BMI above 30 kg/m2
- Previous macrosomic baby weighing 4.5 kg or above/or >90th centile on customised chart
- Previous gestational diabetes
- First degree relative with Type 1 or Type 2 diabetes
- Family origin with a high prevalence of diabetes- South Asian, Black Caribbean and Middle Eastern
- Previous unexplained stillbirth
- PCOS (see special circumstances on next page)

Early screening

- Previous history of gestational diabetes should have a OGTT arranged at booking or at 16 weeks if booked in second trimester with a repeat at 28 weeks if the first is normal.[1]

Immediate screening (<36 weeks)

- Glycosuria (++) or above on 2 occasions – if positive repeat within 1 week.

Special circumstances

- Polyhydramnios or fetal macrosomia in current pregnancy (>90th centile on customised growth chart). If <36 weeks OGTT and if >36 weeks to be taught blood glucose monitoring.
- Patients on long term steroid treatment should be referred to the joint diabetes/pregnancy clinic once pregnancy is confirmed
- Patients with diagnosis of PCOS should also be tested for GDM with a GTT at 16 weeks and if normal again at 28 weeks; however patients already on Metformin should be referred to joint diabetes/ pregnancy clinic once pregnancy is confirmed

Screening and diagnosis

The 2 hour 75g oral glucose tolerance test (OGTT and HbA1c) should be used to test for gestational diabetes and diagnosis made using the criteria defined by the WHO [2]. Fasting plasma venous glucose concentration greater than or equal to 5.6 mmol/L or 2 hour plasma venous glucose concentrations greater than or equal to 7.8 mmol/L is screen positive or

HbA1c ≥42 mmol/mol. Women with any risk factors for gestational diabetes should be offered an OGTT at 24-28 weeks.

Women should be given information and advice regarding:

- Risks of gestational diabetes - fetal macrosomia, birth trauma, induction of labour or caesarean section, neonatal hypoglycaemia, perinatal death, obesity and/or diabetes developing later in the baby's life.

- Dietary changes should include regular meals based on moderate amounts of low glycaemic carbohydrates, including 5 a day (fruits and vegetables) in line with current 'Eat Well Plate' advice and minimal amounts of simple sugars.

- Gestational diabetes will respond to changes in diet and exercise in most women.

- Metformin and/or insulin injections may be needed if diet and exercise do not control blood glucose levels and if ultrasound shows incipient fetal macrosomia

- Extra monitoring and care is needed during pregnancy and labour

7. BLOOD GLUCOSE TARGETS AND MONITORING

- Advise women to test fasting and 1 hour postprandial blood glucose levels after every meal during pregnancy.

- Aim for a fasting blood glucose of between 3.5 and 5.2 mmol/L and 1-hour postprandial blood glucose below 7.8 mmol/L [1]

- Advise women on the risks of hypoglycaemia and hypoglycaemia unawareness. Offer concentrated oral glucose solution (glucogel) to all women taking insulin and glucagon to women with type 1 diabetes.

- Advise women with pre-existing type 1 diabetes on the risks of diabetic ketoacidosis.

- Ensure all women have blood ketone meter and are aware of management of hyperglycaemia and ketosis.

7.1 Antenatal care

Women with pre-existing diabetes, once pregnancy confirmed, require urgent referral to the joint obstetric/diabetic clinic. Women with diabetes should have contact with the diabetes care team for assessment of glycaemic control every 1-2 weeks throughout pregnancy.

To reduce the risk of hypertensive disorders in pregnancy women with type 1 or type 2 diabetes should be advised to take 75mgs of aspirin daily from 12 weeks until the birth of the baby.

A **comprehensive management plan** should be documented in the medical record and in the WMPI notes that sets out a plan of care through the ante-natal, intrapartum and up to six weeks postnatally.

This plan should be discussed and agreed with the women throughout the different stages of care.

The following tables describe the antenatal care for these women.

Gestational Diabetes Mellitus care pathway

Gestation (weeks)	Purpose of Visit	Location/ Clinician
6-10	Booking history Booking bloods Arrange OGTT and HbA1c if previous GDM [1] or on long term steroids (if negative repeat at 28 weeks)	**CMW**
11-13	Dating scan	**Community scan**
16-18	Antenatal examination If not done in first trimester for OGTT and HbA1c if previous GDM or PCOS (not on Metformin) and refer to Combined Clinic (Obstetrics and Diabetes) if abnormal Offer Quadruple Test	**CMW**
18-20	Anomaly scan	**Community scan**
25 **First pregnancy only**	Antenatal assessment Mat B1	**CMW**
28	Antenatal assessment Repeat bloods Mat B1 (multips)	**CMW**
	Anti D if required	**ANC**
	OGTT if required – refer if abnormal	**CMW**
29	Abnormal OGTT – Combined Clinic for review Growth scan	**Scan/ Consultant/ Diabetic Team**
31-34	Birth plan	**CMW**
32	Growth scan Combined Clinic review	**Scan/ Consultant/ Diabetic Team**
36	Growth scan Combined Clinic review Plan for delivery. If well controlled on diet alone and no fetal or maternal concerns – delivery no later than 40^{+6} weeks. [1] If on Metformin/insulin delivery at 38-39 weeks	**Scan/ Consultant/ Diabetic Team**

If referring to ANC please book growth scan for the same visit.

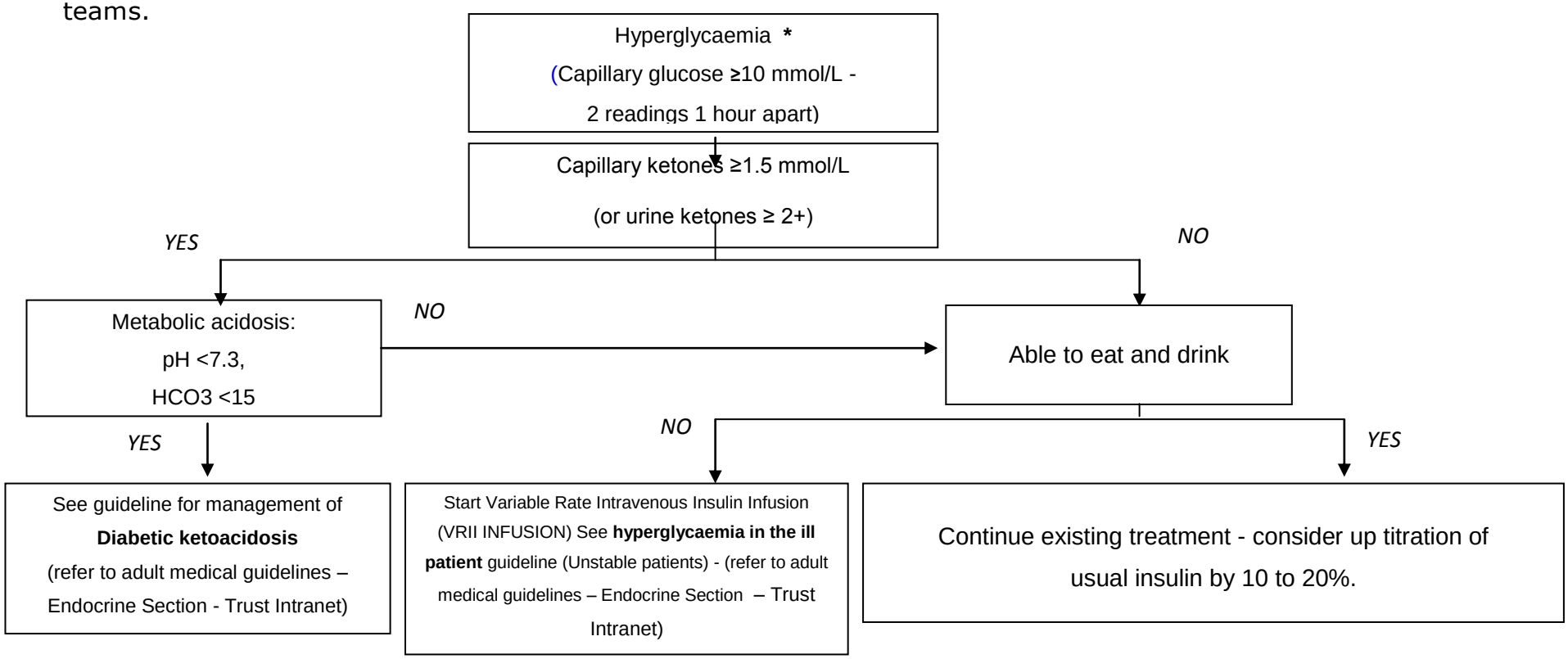
Pre-existing Diabetes Mellitus care pathway

Gestation (weeks)	Purpose of Visit	Location/ Clinician
Pre-conception/ early pregnancy	**Folic acid 5 mg** **Stop ACE inhibitors** **Stop statin** **Take Hb1Ac with booking bloods and arget Hb1Ac as close to <48 mmol/mol** **Use insulin and Metformin only** **If pregnancy confirmed – urgent referral to combined clinic (Obstetrics and Diabetes)**	
6-10 Booking with Midwife	Booking history and urgent referral to combined clinic (as above) Booking bloods (to include HbA1c) Ensure on Folic Acid 5 mgs daily Arrange dating scan (community)	CMW
6-13	Combined Clinic review Viability Scan (if not already done) Retinal assessment Urine ACR Start Aspirin 75 mgs daily at 12 weeks	**Consultant/ Diabetic Team**
11-13	Dating scan	**Community scan**
16-18	Antenatal examination Offer Quadruple Test	CMW
18-20	Anomaly scan Combined clinic review	**Scan/ Consultant & Diabetic Team**
22	Fetal Echocardiography if unclear views at anomaly scan	**Fetal Medicine**
24	Combined clinic review HbA1c	**Consultant & Diabetic Team**
28	Combined clinic review Repeat bloods Growth scan Retinal assessment	**Scan/ Consultant & Diabetic Team**
	Anti D if required	ANC
31-34	Arrange Birth Plan	CMW
32	Combined clinic review Growth Scan HbA1c	**Scan/ Consultant & Diabetic Team**
34	Appointment with CMW	**CMW**
36	Combined clinic review Growth Scan Plan for delivery at 38-38^{+6} weeks gestation [1]	**Scan/ Consultant & Diabetic Team**

CMW can telephone DSN as required. It may be necessary to arrange more appointments particularly if the woman has difficult to control diabetes or there are concerns about the fetus.

8. MANAGEMENT OF HYPERGLYCAEMIA DURING ILLNESS IN WOMEN WITH PRE-EXISTING DIABETES DURING PREGNANCY (See algorithm below)

Women, who are at any time suspected of having diabetic ketoacidosis should be admitted immediately, reviewed by the medical and obstetric teams. Patients will be admitted for high dependency care with input from both the obstetric and medical teams.



***If patient has persistent vomiting, irrespective of blood glucose level, rule out Diabetic Ketoacidosis (DKA) and treat as hyperglycaemia in the ill patient (Unstable patients)**

NB: If patient in Diabetic Ketoacidosis (DKA), prior to contemplating delivery treat the DKA and stabilise first

9. MANAGEMENT IN LABOUR

Points to consider:

- Time and mode of delivery
- Good glycaemic control
- Continuous fetal monitoring
- Prevention of neonatal hypoglycaemia
- Increased risk of shoulder dystocia particularly if baby macrosomic
- Analgesia and anaesthetic considerations

9.1 Spontaneous Labour

Pre-existing diabetes (Type 1)

Once in active labour:

- Commence IV fluids and **Variable Rate Intravenous Insulin Infusion** (VRII Infusion) (formerly known as sliding scale) and check hourly blood glucose levels
- Keep VRII Infusion running for 1 hour after patient has had first subcutaneous insulin dosage.
- Type 1 patients using CSII (Continuous subcutaneous insulin infusion) PUMP therapy, where possible during labour, the PUMP should remain running and the patient will manage any changes to rates, etc. The Diabetes Team will write a detailed plan in the notes regarding each individual patient's target, basal rates, etc.

  The PUMP should only be removed if the patient is unstable and medical review deems intravenous insulin regime, ie. VRII Infusion, more suitable.

Pre-existing diabetes (Type 2)

- 2 hourly capillary glucose level recordings
- Diet and Metformin controlled and if blood glucose levels >7mmols/L on 2 consecutive occasions commence intravenous insulin regime, i.e. VRII Infusion and check hourly blood glucose levels.[1]

Once in active labour:

- Insulin controlled - Dependent on the amount of insulin required. If <24 units/24 hours no VRII Infusion required but if >7mmols/L on 2 consecutive occasions commence intravenous insulin regime, i.e. VRII Infusion. If >24 units/24 hours then a VRII Infusion will be required and check hourly blood glucose levels
- The Diabetes team will write a detailed plan for postnatal management

Gestational Diabetes

- 2 hourly capillary glucose level recordings
- Diet and Metformin controlled and if blood glucose levels >7mmols/L on 2 consecutive occasions commence intravenous insulin regime, i.e. VRII Infusion and check hourly blood glucose levels.

Once in active labour:

- Insulin controlled - dependent on the amount of insulin required but if >7mmols/L on 2 consecutive occasions commence intranvenous insulin regime, i.e. VRII Infusion If <24 units/24 hours no VRII Infusion required. If >24 units/24 hours then a VRII Infusion will be required and check hourly blood glucose levels
- All insulin should be stopped post delivery

9.2 Induction of labour

- Plan for delivery. If well controlled on diet alone and no fetal or maternal concerns – delivery at 40^{+6} weeks. If on Metformin/insulin induction of labour or caesarean section at 38-39 weeks.
- Inductions should be scheduled for mornings rather than evening.
- Once labour is established IV fluids and VRII Infusion should be commenced, if indicated. Prior to this the woman can be on her normal insulin regimen with light diet. Initially check blood glucose 2 hourly and then hourly when on VRII Infusion.

9.3 Elective caesarean section

- Give usual insulin the day before the section.
- Nil by mouth from midnight.
- Commence VRII Infusion and fluid regime as described above from 6am.
- If patient on CSII see section 9.1
- Check hourly blood glucose levels once VRII Infusion regime commenced.
- Following delivery of the placenta, halve insulin dosage on the VRII Infusion and monitor blood sugars every 30 minutes for 2 hours, then thereafter until back on usual subcutaneous regime or oral medication.
- Keep VRII Infusion running for 1 hour after patient has had first subcutaneous insulin dosage

9.4 Pre term labour

- Pulmonary maturation tends to be delayed in fetuses of diabetic women, particularly where control has been poor.

- Antenatal steroids need to be administered to women with established diabetes where premature delivery is anticipated. From April 2018 UHNM have adopted Dexamethasone as the first drug of choice for antenatal steroid administration.

  Administration dosage of Dexamethason is as follows:
  Dexamethasone 9.9mg IM -2 doses given 24hours apart should be administered to between 24 weeks and 34+6 weeks gestation.

  An accelerated course of 2 doses of Dexamethasone 12 hours apart may occasionally be required, however should only be administered following discussion with an Obstetric Consultant.

  In the event of Dexamethasone being unavailable Betamethasone should be considered as an alternative substitute.

  Administration dosage of Betamethasone is as follows:
  Betamethasone 12mg IM -2 doses administered 24 hours apart.
  An accelerated course of 2 doses 12 hours apart may occasionally be required however should only be administered following discussion with an Obstetric Consultant.

- Steroid administration worsens diabetic control and may lead to keto-acidosis in women with pre-existing diabetes. Therefore, an increase in insulin requirement should be anticipated.

- Beta 2 agonists eg Salbutamol / terbutaline should not be used for tocolysis in women with diabetes.

Follow recommendations for steroid use in diabetes as detailed below.

To be initiated as soon as first dose of steroids given.

Recommendations - if on basal/bolus
(4 times daily injections):-

- prescribe regular insulin in regular medications section
- prescribe PRN fast acting insulin 2 to 6 units as per steroid guideline
(NovoRapid or Humalog if on regular insulin, otherwise Actrapid).

Blood Sugar Pre-meal	Fast acting insulin dosage only (see next page)
<6mmol/l	Normal dose insulin
6.1-7mmol/l	add on extra 2 units
7.1-10mmol/l	add on extra 4 units
>10mmol/l	add on extra 6 units

Blood Sugar 1 hour Post-meal	Fast acting insulin dosage
<7.8mmol/l	no extra insulin required
7.8-10mmol/l	give extra 2 units
10.1-13mmol/l	give extra 4 units
>13.1	give extra 6 units
Also check 2am blood sugar	give extra insulin as you would for post-meal

Recommendations - if on twice daily mixed insulin:-

Commence on VRII Infusion (Hyperglycaemia in the Ill Patient – refer to Adult Medical Guidelines – Endocrine Section – Trust intranet.

Recommendations - if on diet only or Metformin

If patients are on diet only or Metformin tablets, continue Metformin, monitor blood sugars pre and 1 hour post meal and at 2 am and give insulin (Actrapid) according to above table if blood sugars are elevated.

10. VRII INFUSION INSULIN AND INTRAVENOUS FLUID MANAGEMENT DURING LABOUR ONLY

- 500mls 10% dextrose with 10mmol potassium chloride to be given at a rate of 50 mls/hour.
- Draw up 50 units of soluble insulin (Actrapid/Humulin S) using a standard U100 or U50 insulin syringe. Add the insulin to 50 mls normal saline and deliver via syringe pump according to blood glucose checked at time of admission and hourly thereafter by glucometer.
- The aim is to keep the mother's blood glucose concentration between 4 and 7 mmol/l.
- Most women will need 2-4 units per hour.
- Avoid large changes in insulin infusion rate and therefore in glucose concentration.
- If the blood sugars are not maintained within the normal range then contact the Diabetic Team

Table 2- VRII Infusion

Blood glucose mmol/l	Insulin (units / hour)
Less than 4	0.5 and increase the glucose infusion rate to 100 mls/hour. (Never stop insulin due to risk of diabetic ketoacidosis)
4.0 - 6.9	1
7.0-9.9	2
10.0 - 12.9	3
13.0 - 15.9	4
Greater than 16	6

11. ELECTIVE CAESAREAN SECTION

- Give usual insulin the day before the section via an insulin pen device or using a standard U100 or U50 insulin syringe.
- Nil by mouth from midnight.
- Commence VRII Infusion and fluid regime as described above from 6am.
- Monitor blood sugars hourly once VRII Infusion regime commenced.
- For GDM stop VRII Infusion immediately after delivery of placenta.
- For pre-existing diabetes, following delivery of the placenta, halve insulin dosage on the VRII Infusion and monitor blood sugars every 30 minutes for 2 hours, then thereafter until back on usual subcutaneous regime or oral medication.
- **Do not stop intravenous insulin regime in type 1 patients until one hour post first sub cut dose of established regime.**

11.1 Emergency caesarean section

- Check blood glucose level and commence VRII Infusion and IV fluids as above.

- For GDM stop VRII Infusion immediately after delivery of placenta.

- For pre-existing diabetes, following delivery of the placenta, halve insulin dosage on the VRII Infusion and monitor blood sugars every 30 minutes for 2 hours, then thereafter until back on usual subcutaneous regime or oral medication.

- **Do not stop intravenous insulin regime in type 1 patients until one hour post first sub cut dose of established regime.**

12. CONTINUOUS FETAL MONITORING

- Maternal hyperglycaemia may cause fetal acidosis so check maternal glucose if there are any CTG abnormalities

- Fetal blood sampling if indicated should be done for as in normal labour

13. ANALGESIA AND ANAESTHESIA

- Women with diabetes and co-morbidities such as obesity or autonomic neuropathy should be offered an obstetric anaesthetic assessment in the third trimester of pregnancy.

- Regular monitoring of blood glucose (every 30 minutes) should be undertaken after the commencement of general anaesthesia in women with diabetes until the woman is fully conscious.

14. POSTNATAL MANAGEMENT

- Women with insulin-treated diabetes should be informed that they are at increased risk of hypoglycaemia in the postnatal period, especially when breastfeeding, and they should be advised to have a meal or snack available before or during feeds.

If Type 1 Diabetic:

- Continue VRII Infusion regime until able to eat and drink normally.
- Revert to pre-pregnancy reduced insulin requirements or as directed by the diabetic team.
- Keep VRII Infusion running for 1 hour after the patient has had first subcutaneous insulin dosage.
- If planning to breast feed may need less insulin.
- Review by diabetes team.
- Arrange 2 to 3 month diabetes outpatient clinic follow up.

If Type 2 Diabetic:

- Metformin is not contraindicated in breast feeding
- Sulphonylureas are not advised during breast feeding
- Revert to pre-pregnancy regime or as directed by diabetes team.
- Review by Diabetes Team.
- Arrange 2 to 3 month diabetes outpatient clinic follow up

If GDM

- Monitor 2 x pre-meal blood glucose levels in 24 hours - contact Diabetic Specialist Nurse if >7 mmol/L
- Arrange 6 week FPG (fasting plasma glucose) and review of results with own GP (give information sheet to patient)

15. NEONATAL CARE

Frequent blood sugar monitoring of baby to reduce risk of neonatal hypoglycaemic attacks.

16. MONITORING AND AUDIT

The need to monitor/audit the standards set out below will be considered alongside other Directorate requirements and prioritised accordingly. The Directorate Clinical Audit programme is drafted by the Directorate Clinical auditor, in liaison with clinical staff, and approved by the Directorate.

Element to be monitored	Lead	Tool	Frequency	Reporting arrangements	Acting on recommendations and lead(s)	Change in practice and lessons to be shared
Guideline content	Guideline Co-ordinator	Guideline Review	Every three years	Labour Ward Forum Subgroup: Guideline Meeting	Required changes to practice will be identified and actioned with the release of the updated guideline.	Required changes to practice will be identified and actioned with the release of the updated guideline.
Clinical standards within guideline	Directorate Clinical Auditor	Clinical Audit	As required in relation to other Directorate priorities	Directorate Business, Performance and Clinical Governance Meeting	Required actions will be identified and completed in a specified timeframe as per the audit action plan.	Required changes to practice will be identified and actioned within a specific timeframe as per the audit action plan and, in addition, lessons will be shared with relevant stakeholders as per audit action plan.

REFERENCES

1. NICE Guideline published 25th February 2015: Diabetes in pregnancy-Management of diabetes and its complications from pre-conception to the postnatal period.NICE.org.uk/guidance/NG3

Appendix 1 – Patient Information Leaflet – Diabetes developed during pregnancy (Gestational Diabetes)- Version 4

University Hospitals of North Midlands NHS NHS Trust	**Patient Details**
Patient Information **Diabetes developed during pregnancy (gestational diabetes)**	

Diabetes that develops during pregnancy

Diabetes that develops during pregnancy is known as **gestational diabetes**. It usually starts in the middle or towards the end of your pregnancy, rarely before 20 weeks of pregnancy. It occurs because your body cannot produce enough **insulin** to meet its extra needs in pregnancy.

If you have been diagnosed with gestational diabetes

Women with gestational diabetes can be at risk of serious health problems for themselves. These can be reduced (but not removed completely) if your blood glucose levels are well controlled. If you have gestational diabetes, you may be at risk of having a large baby, which increases the likelihood of birth problems, having your **labour induced** and **caesarean section**

Your baby may be at risk of:

Health problems following birth that may require hospital care.

This will include:

The risks for you and your baby.

How to check your own blood glucose level and what your ideal blood glucose level should be.

Choosing foods that will help to keep your blood glucose at a healthy and stable level.

You will have the opportunity to see the dietician in the ante natal clinic.

Information will be given about weight control including exercise if you are over weight.

If your blood glucose does not reach a satisfactory level after one to two weeks or if an ultrasound scan shows that your baby is large, you may need to take a tablet called Metformin and/or give yourself insulin injections. The treatment options will be discussed with you.

Developing obesity and/or diabetes in later life

Your healthcare team will give you advice and information about gestational diabetes and how to stay healthy during your pregnancy.

Blood glucose results

You should test your blood glucose level before breakfast and one hour after every meal during pregnancy. Ideally, your blood glucose level should be below 5.3mmols/litre before breakfast and below 7.8 mmol/litre one hour after meals.

Antenatal appointments

Antenatal appointments will be arranged to cover general information about pregnancy and birth and also things that are specific to women with diabetes. You will have contact with your diabetes care team every 1 to 2 weeks during pregnancy (this may be by phone or in person) to discuss your blood glucose levels. You will start receiving extra antenatal care as soon as your diabetes is diagnosed.

Gestational Diabetes Mellitus care pathway

Gestation (weeks)	Purpose of Visit	Location/ Clinician
6-10	Booking history Booking bloods Arrange OGTT and HbA1c if previous GDM [1] or on long term steroids (if negative repeat at 28 weeks)	**CMW**
11-13	Dating scan	**Community scan**
16-18	Antenatal examination If not done in first trimester for OGTT and HbA1c if previous GDM or PCOS (not on Metformin) and refer to Combined Clinic (Obstetrics and Diabetes) if abnormal Offer Quadruple Test	**CMW**
18-20	Anomaly scan	**Community scan**
25 **First pregnancy only**	Antenatal assessment Mat B1	**CMW**
28	Antenatal assessment Repeat bloods Mat B1 (multips)	**CMW**
	Anti D if required	**ANC**
	OGTT if required – refer if abnormal	**CMW**
29	Abnormal OGTT – Combined Clinic for review Growth scan	**Scan/ Consultant/ Diabetic Team**
31-34	Birth plan	**CMW**
32	Growth scan Combined Clinic review	**Scan/ Consultant/ Diabetic Team**
36	Growth scan Combined Clinic review Plan for delivery. If well controlled on diet alone and no fetal or maternal concerns – delivery no later than 40^{+6} weeks. [1] If on Metformin/insulin delivery at 38-39 weeks	**Scan/ Consultant/ Diabetic Team**

If referring to ANC please book growth scan for the same visit.

Your labour and birth

If your ultrasound scans have shown that your baby is large, the risks and benefits of vaginal birth, **induced labour** and **caesarean section** will be discussed. If you have a caesarean section with this baby, it does not necessarily mean that you will not be able to have a vaginal birth if you become pregnant again.

If your labour starts prematurely

If your labour starts prematurely, you may be given medications to delay the birth. You may also be given medications called **steroids** to help your baby's lungs to mature. Steroids can raise your **blood glucose level**, you will need to spend some time in hospital to stabilise the sugar levels if this happens.

If your pregnancy continues beyond 38 weeks

At 36-38 weeks a plan of delivery will be discussed including the timing and mode of delivery.

Your blood glucose levels during labour and birth

It is important that your blood glucose is well controlled during labour and birth to help

Your baby's blood glucose levels

Your baby should have his or her blood glucose level tested (using a special hospital blood test) 24 hours after birth to make sure that it is not too low. **This is not to test for diabetes**. You should start feeding your baby as soon as possible after birth (within 30 minutes), and then every two to three hours to help your baby's blood glucose stay at a safe level. If there are signs of neonatal hypoglycaemia in your baby, this will be treated accordingly.

Your blood glucose levels

As soon as your baby is delivered all diabetes treatment will stop. You will be asked to continue to monitor your glucose levels for a further 24 hours and will be visited on the ward by the diabetes specialist nurse. If you were on other medications before you became pregnant, you will need to discuss resuming them with your team. Some medications are not safe if you are breastfeeding.

Follow-up care

You will be given information about changing your lifestyle, including diet, exercise and weight control. You will be offered an FPG (fasting plasma glucose) test to check for diabetes about 6-12 weeks postnatal. Following this you should make an appointment to see your GP to discuss the results. You should then be checked every year by your GP to check that diabetes

prevent your baby's blood glucose level becoming low following birth (known as **neonatal hypoglycaemia**). Your blood glucose will be monitored every hour during labour to ensure it stays at a satisfactory level. Occasionally a drip of insulin and sugar may be recommended if the sugar control is not adequate during labour.

After your baby is born

Your baby will be given to you to hold and will stay with you unless he or she needs extra care. Your baby may need to be looked after in a neonatal unit if he or she is unwell, needs close monitoring or treatment, needs help with feeding or was born prematurely.

Your team

Diabetes team:

Dr A Nayak (Consultant)
Dr F Hanna (Consultant)
Dr L Varadhan (Consultant)
Dr R Reddy (Consultant)
Dr M Sathiavageeswaran (Consultant)
Diabetes Specialist Nurses
(Tel. 01782 222969)

Obstetric team:

Dr Indusekhar (Consultant)
Dr S Usman (Consultant)
Sara Mountford, Midwife
(Tel. 01782 672111)

has not returned.

Planning a future pregnancy if you have had gestational diabetes before

Talk to your healthcare team if you are planning to become pregnant and have had gestational diabetes before. You are at risk of having diabetes in pregnancy again. If you become pregnant again, you will be offered an **Oral Glucose Tolerance Test** (OGTT) or blood glucose monitoring at booking or when 16 to 18 weeks (plus an OGTT at 28 weeks if the first test is normal) to check for gestational diabetes.

The organisations below can provide more information and support for women with diabetes who are planning to become pregnant or are already pregnant. Please note that NICE is not responsible for the quality or accuracy of any information or advice provided by these organisations.

National Childbirth Trust, 0870 444 8707, www.nct.org.uk

Association for Improvements in the Maternity Services (AIMS), 0870 765 1433, www.aims.org.uk

More information

We are a teaching hospital with students being taught here. We will ask if you mind them observing your consultation. If you do not wish them to be present, your treatment will not be affected in any way.

The Patient Advice and Liaison Service would be pleased to offer confidential advice and support if you have any concerns. PALS can be contacted on 01782 552814 or Email patient.advice@uhns.nhs.uk

Diabetes UK, 0845 120 2960 (careline), www.diabetes.org.uk

South Asian Health Foundation, 0777 193 3939, www.sahf.org.uk

Appendix 2 –Patient Information Leaflet – Type 1 and 2 Diabetes in Pregnancy (Version 4)

University Hospitals of North Midlands NHS NHS Trust	Patient Details
Patient Information **Type 1 and Type 2 Diabetes in Pregnancy**	

About diabetes in pregnancy

Most women who have diabetes have healthy pregnancies and healthy babies. However, there may sometimes be serious problems, so it is important they receive extra care and support to ensure they stay well. Your healthcare team will provide information, advice and support to help you manage your diabetes and reduce the risks to you and your baby. They will discuss the risks with you and explain how they can be reduced (but not removed completely) if your blood glucose levels are well controlled.

You may be at risk of:

Having a large baby increases the likelihood of birth problems, having your labour induced and caesarean section.

Having a miscarriage.

Problems with your eyes (called diabetic_retinopathy) and your kidneys (called diabetic nephropathy), which can become worse during pregnancy.

Your baby may be at risk of:

- Not developing normally.
- Health problems following birth that may require hospital care.
- Developing obesity and/or diabetes in later life.
- Being stillborn or dying shortly after birth.

What needs to be done now:

You will be given advice about your diet by a dietician, and how to lose weight if required.

Folic acid supplements in a higher dose of 5mg daily should be taken when you are planning a pregnancy and for the first 12 weeks of pregnancy. This will help to reduce the risks of having a baby with a serious birth defect such as a neural tube defect (for example, spina bifida).

New guidance recommends that a low dose (75mg) aspirin is offered daily to women who are at high risk of developing hypertension in pregnancy, such as those with diabetes. This is from 12 weeks of pregnancy and continues until delivery.

If you are taking tablets for your diabetes, you may be changed to insulin injections instead. However Metformin may be continued. If you take insulin injections you may need to change the type of insulin this will be discussed with you.

If you take certain tablets for high blood pressure, you may be advised to stop taking them and you may be given different tablets. If you take statins for high cholesterol levels, you should stop taking them before and during pregnancy.

You will need to have your eyes screened during each trimester, especially if you already have problems with your eyes (called diabetic retinopathy). A list of locally trained optometrists will be provided.

People with diabetes are at higher risk of having kidney problems (called diabetic nephropathy). A urine sample and blood sample will be taken to check the kidneys are working properly.

Care during your pregnancy

You should test your blood glucose level before breakfast and one hour after every meal during pregnancy. Ideally, your blood glucose level should be below 5.3 mmol/litre before breakfast and below 7.8 mmol/litre one hour after meals.

You will be offered a blood test called an HbA_{1c} test regularly. This assesses how good your blood glucose levels have been over the past few months. You should aim to have an HbA_{1c} of below 48 mmol/mol.
The lower your HbA_{1c} is the more likely you are to reduce the risks to your baby.

Hypoglycaemia

You might find it more difficult to recognise hypos, especially during the first three months. This will be discussed with you.

You will be prescribed a glucose containing gel (Glucogel) you can swallow if your glucose levels are low.

If you have type 1 diabetes, you should also be given glucagon, which is injected into a muscle to raise your blood glucose level if it gets too low. You and your partner or family members should be shown how to use these in an emergency.

If you have type 1 diabetes, you will be provided with ketone testing strips to test if your blood glucose levels are greater than 10mmols/l on two or more occasions or you are unwell (for example, if you are being sick or have diarrhoea). It is important that you are checked urgently for diabetic ketoacidosis if you become unwell.

Antenatal appointments

Antenatal appointments will be arranged to cover general information about pregnancy and birth and also things that are specific to women with diabetes.

A joint appointment with both your diabetes care team and your antenatal care team will be arranged for you when you first become pregnant.

You will have regular contact with your diabetes care team every one to two weeks or more frequently (this may be by phone or in person) to discuss your blood glucose levels.

Pre-existing Diabetes Mellitus care pathway

Gestation (weeks)	Purpose of Visit	Location/ Clinician
Pre-conception/ early pregnancy	**Folic acid 5 mg** **Stop ACE inhibitors** **Stop statin** **Take Hb1Ac with booking bloods and arget Hb1Ac as close to <48 mmol/mol** **Use insulin and Metformin only** **If pregnancy confirmed – urgent referral to combined clinic (Obstetrics and Diabetes)**	
6-10 Booking with Midwife	Booking history and urgent referral to combined clinic (as above) Booking bloods (to include HbA1c) Ensure on Folic Acid 5 mgs daily Arrange dating scan (community)	CMW
6-13	Combined Clinic review Viability Scan (if not already done) Retinal assessment Urine ACR Start Aspirin 75 mgs daily at 12 weeks	**Consultant/ Diabetic Team**
11-13	Dating scan	**Community scan**
16-18	Antenatal examination Offer Quadruple Test	CMW
18-20	Anomaly scan Combined clinic review	**Scan/ Consultant & Diabetic Team**
22	Fetal Echocardiography if unclear views at anomaly scan	**Fetal Medicine**
24	Combined clinic review HbA1c	**Consultant & Diabetic Team**
28	Combined clinic review Repeat bloods Growth scan Retinal assessment	**Scan/ Consultant & Diabetic Team**
	Anti D if required	ANC
31-34	Arrange Birth Plan	CMW
32	Combined clinic review Growth Scan HbA1c	**Scan/ Consultant & Diabetic Team**
34	Appointment with CMW	**CMW**
36	Combined clinic review Growth Scan Plan for delivery at 38-38^{+6} weeks gestation [1]	**Scan/ Consultant & Diabetic Team**

CMW can telephone DSN as required. It may be necessary to arrange more appointments particularly if the woman has difficult to control diabetes or there are concerns about the fetus.

Labour, birth and after your baby is born

Some women with diabetes have problems during labour and birth because their babies are bigger than normal. If your ultrasound scans have shown that your baby is large, your healthcare team will discuss with you the risks and benefits of vaginal birth, **induced labour** and **caesarean section.**

If your labour starts prematurely, you may be given medications to delay the birth. You may also be given medications called **steroids** to help your baby's lungs to mature. Steroids can raise your **blood glucose level**, so you will need to stay in hospital to monitor your blood glucose closely.

At 36 weeks a plan of delivery will be discussed including the time and mode of delivery.

It is important that your blood glucose is well controlled during labour and birth, to help prevent your baby's blood glucose level becoming low following birth (known as **neonatal hypoglycaemia**).

Your blood glucose will be monitored every hour during labour to ensure it stays at a satisfactory level.

A drip of insulin and glucose will be used to help control your diabetes.

After your baby is born

Your baby will be given to you to hold and will stay with you unless he or she needs extra care.

Your baby may need to be looked after in a neonatal unit if he or she is unwell, needs close monitoring or treatment, needs help with feeding or was born prematurely.

Your baby's blood glucose levels

Your baby will have his or her blood glucose level tested (using a special hospital blood test) for the first 24 hours after birth to make sure that it is not too low. **This is not to check for diabetes in your baby**

You should start feeding your baby as soon as possible after birth (within 30 minutes), and then every two to three hours to help your baby's blood glucose stay at a safe level.

If there are signs that the baby's glucose is too low this will be treated accordingly.

Your blood glucose levels

You will need less insulin to control your blood glucose level after your baby is born. The diabetes team will advise you to reduce the amount of insulin you take and monitor your blood glucose levels carefully until you are taking the correct dose.

Breast feeding increases the risk of **hypoglycaemia.** You will be given advice about how to avoid this.

If you have **type 2 diabetes**, you can start using **Metformin** again after your baby is born and while breastfeeding.

If you were on other medications before you became pregnant you will need to discuss with your team if its safe to restart them as some medications can not be used whilst you are breastfeeding.

Follow-up care if you already had diabetes

After you return home, you will have one follow up appointment with diabetes consultant Dr Hanna and then should go back to having your usual appointments for diabetes care.

Your team

Diabetes team:
Dr A Nayak (Consultant)
Dr F Hanna (Consultant)
Dr L Varadhan (Consultant)
Dr R Reddy (Consultant)
Dr M Sathiavageeswaran (Consultant)
Diabetes Specialist Nurses
Tel. 01782 222969)

Obstetric team:
Dr Indusekhar (Consultant)
Dr S Usman (Consultant)
Sara Mountford, Midwife
(Tel. 01782 672111)

We are a teaching hospital with students being taught here. We will ask if you mind them observing your consultation. If you do not wish them to be present, your treatment will not be affected in any way.

More information

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Insulin Dependent Diabetes Trust, 01604 622 837, www.iddtinternational.org

Association for Improvements in the Maternity Services (AIMS), 0870 765 1433, www.aims.org.uk

Diabetes UK, 0845 120 2960 (careline), www.diabetes.org.uk

South Asian Health Foundation, 0777 193 3939, www.sahf.org.uk

The Patient Advice and Liaison Service would be pleased to offer confidential advice and support if you have any concerns. PALS can be contacted on 01782 552814 or Email patient.advice@uhns.nhs.uk

NHS Direct
www.nhsdirect.nhs.uk
Digital TV
Telephone 0845 4647
Available 24 hours