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1. INTRODUCTION

This guideline applies to the management of Type 1 and Type 2 diabetes and its complications from pre-conception to the postnatal period. This applies to obstetric, midwifery, neonatology and diabetology staff.

Gestational diabetes is diagnosed during pregnancy. Please refer to the [Gestational Diabetes Mellitus \(GDM\) UHL Obstetric Guideline](#) for detailed information about screening, diagnosis and management.

Diabetes Care Team

The Diabetes Care Team consists of Consultant Obstetricians, Consultant Diabetologists, Diabetes Specialist Midwives (DSM), Diabetes Specialist Nurses (DSN) and Diabetes Specialist Dieticians (DSD).

What's new?

The following are key areas of practice change that require additional education for midwifery, obstetric and diabetes teams.

- Referral to a nephrologist if the urinary albumin:creatinine ratio is greater than 30 mg/mmol (previously included serum creatinine) or the estimated glomerular filtration rate (eGFR) is less than 60 ml/minute/1.73 m² (previously less than 45 ml/minute/1.73 m²).
- Changed terminology of Flash glucose monitoring to Continuous glucose monitoring.
- Before or as soon as pregnancy is confirmed: Stop other hypoglycaemic agents including sulphonylureas, DPP4 inhibitors (gliptins), SGLT2 inhibitors (flozins) and GLP-1 agents (eg Semaglutide)
- Offer all pregnant women with Type 1 diabetes continuous glucose monitoring technology
- Offer pregnant women with Type 2 diabetes using multiple daily insulin injections continuous glucose monitoring technology
- Consider hybrid-closed loop therapy.
- At booking appointment, if recent HbA1c is raised (≥8.5%) (previously ≥10%) a discussion is required about the increased risk of congenital anomaly and the limitations of ultrasound to detect all anomalies. All pregnant women with pre-pregnancy diabetes should have repeat HbA1c in the early third trimester. This result needs to be reviewed and appropriate actions taken.
- Women with CKD 2 with significant proteinuria i.e. PCR>30; or CKD 3 or more should be referred to the East Midlands Maternal Medicine Network for MDT discussion.
- A/N contacts; Blood glucose levels will be reviewed every 2 weeks either by face to face appointment in the MDT Diabetes antenatal clinic or by telephone appointment. At a minimum, combined obstetric and diabetic reviews will occur at booking, 12-14 weeks, 20 weeks, 28 weeks, 32 weeks and 36 weeks in the setting of an antenatal clinic for women with Type 1 & 2 diabetes.
- Neonatal monitoring updated in line with NEWTT2

Key points:

- Identify which type of diabetes the woman is presenting with.
- Maintain background long acting insulin throughout out all regimens.
- If the pregnant woman is unwell during variable rate intravenous insulin infusion administration, use capillary blood glucose monitoring.
- Following dexamethasone administration, Type 2 pregnant women with diabetes can return home but to increase blood glucose monitoring and admit for VRIII if blood glucose reading ≥ 12 mmol.
- All Type 1 pregnant women should be admitted for monitoring when receiving dexamethasone.
- Steroids should not be given to women with diabetes after 35+6 weeks even if they are undergoing Caesarean Section

Note Keeping

Information regarding blood glucose levels and insulin requirements, as well as obstetric information, is recorded on specific green clinical sheets and filed in the hospital notes. This information is also written in the handheld maternity notes. An individualised management plan for labour, postnatal period and neonatal care is recorded on designated forms in the hospital notes. Pregnant women with Type 2 diabetes who use the GDM App have additional documentation within the App. This includes treatment changes and records of text messages and notes.

Related Guidelines

- [Diabetic Ketoacidosis \(DKA\) in Adults UHL Guideline UHL B66/2011](#)
- [Enhanced Maternity Care UHL Obstetric Guideline UHL B47/2011](#)
- [Gestational Diabetes Mellitus \(GDM\) UHL Obstetric Guideline UHL C14/2022](#)
- [Hypoglycaemia - Neonatal UHL Neonatal Guideline UHL C22/2008](#)
- [Hypoglycaemia in Adults with Diabetes UHL Guideline UHL B41/2011](#)
- [Diabetes Patients Undergoing Surgery UHL Guideline.pdf \(sharepoint.com\) UHLB3/2013](#)

Abbreviations:

GDM	Gestational Diabetes Mellitus
T1DM	Type 1 Diabetes Mellitus
T2DM	Type 2 Diabetes Mellitus
DKA	Diabetic Keto Acidosis
BG	Blood Glucose
CBG	Capillary Blood Glucose
CGM	Continuous Glucose Monitoring
VRIII	Variable Rate Intravenous Insulin Infusion
BMI	Body Mass Index
MDT	Multi-Disciplinary Team
LGH	Leicester General Hospital
MAU	Maternity Assessment Unit

2. PRE-CONCEPTION CARE FOR WOMEN WITH TYPE 1 OR 2 DIABETES

Give pre-conception care in a supportive environment with the emphasis on how improving glycaemic control makes pregnancy safer and reduces the risk of complications to both mother and baby. Encourage the woman's partner or a family member to attend. This should build on previous care given in routine appointments with healthcare professionals, including the diabetes care team:

Starting from adolescence:

- Healthcare professionals should give information about the benefits of pre-conception glycaemic control at each contact with women of child-bearing potential and with all types of diabetes.
- The diabetes care team should record the woman's intentions regarding pregnancy and contraceptive use.
- For most women, all contraceptive options are available to them.
- A small number of women with specific medical conditions e.g. venous thromboembolism or hypertension require specialist advice. This is available from Family Planning Services. <https://leicestersexualhealth.nhs.uk/>
- The importance of avoiding unplanned pregnancy should be an essential component of diabetes education.
- Women who are planning pregnancy, should be seen by healthcare professionals with appropriate competence to give advice.
- Inform that when planning pregnancy, the target HbA1c is 6.5% if this can be achieved without significant hypoglycaemia.
- Any additional medical or obstetric problems which further increase risk in pregnancy should be referred to LGH for specialist pre-pregnancy counselling.

Give advice and information on:

- The risks of diabetes in pregnancy (see box 1) and how to reduce them with good glycaemic control, diet and exercise, including weight loss for women with a body mass index (BMI) over 27 kg/m².
- Hypoglycaemia and hyperglycaemia awareness
- Pregnancy-related nausea/vomiting and glycaemic control.
- Retinal and renal assessment.
- When to stop contraception.
- Taking folic acid supplements (5 mg/day) from pre-conception until 12 weeks of gestation.
- Review of, and possible changes to, medication, glycaemic targets and self-monitoring routine.
- Frequency of appointments and local support, including emergency telephone numbers.

- The use of continuous glucose monitoring in pregnancy for women and people with Type 1 diabetes

Box 1: Risks of diabetes in pregnancy

Risks to pregnant women and babies include:

- Fetal macrosomia
- Birth trauma (to mother and baby)
- Induction of labour or caesarean section
- Miscarriage
- Congenital malformation
- Stillbirth
- Transient neonatal morbidity
- Neonatal death
- Obesity and/or diabetes developing later in the baby's life.
- Pre-eclampsia

2.1 Care, assessment and review:

Offer:

- Folic acid supplements (5 mg/day).
- Blood glucose meter for self-monitoring for pregnant women with Type 2 diabetes managed by diet and/or metformin.
- Continuous glucose monitoring for pregnant women with Type 1 diabetes
- Ketone testing strips and meter to pregnant women with type 1 diabetes and advise to use if hyperglycaemic or unwell.
- Continuous glucose monitoring for pregnant women with Type 2 diabetes using multiple daily injections of insulin
- Diabetes structured education programme.
- 3 monthly HbA1c assessment
- Retinal assessment by digital imaging (unless carried out in previous 6 months).
- Renal assessment (including microalbuminuria) before stopping contraception.
- Referral to a nephrologist if the urinary albumin:creatinine ratio is greater than 30 mg/mmol or the estimated glomerular filtration rate (eGFR) is less than 60 ml/minute/1.73 m².
- Consider offering hybrid-closed loop therapy to women with Type 1 diabetes

Review:

- Current medications for diabetes and its complications. (Box 2)
- Glycaemic targets and glucose monitoring (see Box 3).

Advice to make contact with positive pregnancy test results

Box 2: Safety of medications before and during pregnancy

Metformin may be used before and during pregnancy, as well as or instead of insulin. Rapid acting insulin analogues (NovoRapid® insulin aspart, Fiasp, Lyumjev and Humalog® insulin lispro) are safe to use in pregnancy and have advantages over soluble human insulin during pregnancy.

Evidence about the use of long-acting insulin analogues during pregnancy is limited. Use Isophane (NPH) insulin as the first choice for long acting insulin in pregnancy. Consider continuing treatment with long acting insulin Detemir or Glargine in women who have established good blood glucose control before pregnancy.

Before or as soon as pregnancy is confirmed:

Continue metformin and commence insulin if required

Stop other hypoglycaemic agents including sulphonylureas, DPP4 inhibitors (gliptins), SGLT2 inhibitors (flozins) and GLP-1 agents (e.g. Semaglutide)

Stop angiotensin-converting enzyme inhibitors and angiotensin-II receptor antagonists and consider alternative antihypertensives.

Stop statins

Box 3: Blood glucose targets and monitoring

Agree individualised blood glucose targets for self-monitoring, taking into account the risk of hypoglycaemia.

Offer all women with Type 1 diabetes continuous glucose monitoring technology

Offer women with Type 2 diabetes using multiple daily insulin injections continuous glucose monitoring technology

Consider hybrid-closed loop therapy. Offer 3 monthly HbA1c.

Advise women to aim for an HbA1c < 48 mmol/mol (6.5%) if this is achievable without causing problematic hypoglycaemia.

Inform women that any reduction in HbA1c may reduce risks, even if this target is not achievable.

Advise women with HbA1c above 86 mmol/mol (10%) to avoid pregnancy because of the associated risks and refer to preconception service.

Useful resources for women with diabetes planning a pregnancy;

<https://www.tommys.org/pregnancy-information/pregnancy-complications/type-1-or-type-2-diabetes/how-type-1-or-2-diabetes-might-affect-your-pregnancy>

<https://www.diabetes.org.uk/guide-to-diabetes/life-with-diabetes/pregnancy>

<https://jdrf.org.uk/information-support/living-with-type-1-diabetes/health-and-wellness/pregnancy/>

Woman can request a pregnancy toolkit to be downloaded.

3. ANTENATAL CARE FOR PREGNANT WOMEN WITH PRE-EXISTING DIABETES: TYPE 1 OR TYPE 2.

Offer:

- Immediate referral to a joint diabetes and antenatal clinic at LGH (Tuesday pm) or LRI (Wednesday pm), by telephone to the Diabetic Specialist Midwife.
- Information and education at each appointment.
- Care specifically for pregnant women with diabetes, in addition to routine antenatal care, [see page 23](#).

Diabetes Antenatal Clinic:

All pregnant women will be cared for in a one-stop multidisciplinary clinic consisting of;

Consultant in Diabetes

Consultant in Obstetrics

Diabetes Specialist Nurse

Diabetes Specialist Midwife

Dietitian who specialises in diabetes

Collaborative care with other specialist services and clinics will be assessed and accessed on an individual basis. E.g. asylum support, psychology and perinatal mental health.

Care will be co-ordinated via the diabetes clinic with shared documentation in hand-held notes and on the patient electronic records.

3.1 Booking appointment

At the booking appointment, the following should be performed:

- Review recent HbA1c
- If HbA1c is raised ($\geq 8.5\%$) a discussion is required about the increased risk of congenital anomaly and the limitations of ultrasound to detect all anomalies
- Review all medications and stop any contraindicated medication e.g. statins, ACE inhibitors
- If ongoing treatment is required e.g. antihypertensive, anticoagulation, change medication to preparations that are safe for pregnancy
- Review any existing complications of diabetes
- Discuss hypoglycaemia and hypoglycaemic awareness
- Discuss DVLA rules
- Outline the plan of antenatal care for pregnant women with diabetes
- Discuss the change in hypoglycaemic awareness, insulin sensitivity and insulin requirements in pregnancy
- Discuss delivery is usually advised at approximately 38 weeks gestation but many factors influence the exact timing.

3.2 Aspirin

Advise pregnant women with pre-existing diabetes to take 150 mg Aspirin daily from 12 weeks gestation until 36 weeks to reduce the risk of pre-eclampsia ([NICE guideline NG133 Hypertension in Pregnancy](#))

3.3 Vitamin D

Advise pregnant women with pre-existing diabetes to take Colecalciferol 20 micrograms/800 units daily. (see [Vitamin D in Pregnancy UHL Obstetric Guideline C4/2017](#))

3.4 Blood glucose targets and monitoring

Time	Blood glucose mmols/L
Fasting and pre-meal	4.0-5.3
1 hour post meal	4.0-7.8
2 hours post meal (if 1 hour target is unachievable or hypoglycaemia occurs between meals)	4.0-6.4

Treatment	Frequency of blood glucose check/sensor scan
T2DM on diet and/or metformin	Fasting and 1 hour post-meals (minimum 4 checks per day) (NICE 2020)
T2DM on single dose of intermediate or long acting insulin +/- metformin	Fasting and 1 hour post meals (minimum 4 checks per day) (NICE 2020)
T1DM OR T2DM on multiple daily injections (MDI) including background insulin +/- metformin	Fasting, pre-meals, 1 hour post-meals and pre-bed. (minimum 7 checks per day) (NICE 2020)

Women with type 1 and 2 diabetes will measure their blood glucose levels either by:

- Continuous glucose monitoring (CGM): Dexcom, Freestyle Libre, Guardian Sensor
- Capillary blood glucose monitoring.

Most will record the results in an App. Very few will write down the results in a book.

Pregnant women with Type 2 diabetes who are using capillary blood glucose monitoring are offered use of the GDM App to allow the team to review their blood glucose levels frequently.

- A record of blood glucose values will be recorded in the base hospital folder at every face to face antenatal visit.
- For virtual reviews, a record of blood glucose values will be recorded in the GDM App or on SystemOne. There may be an additional record in the base folder.

3.5 Continuous Glucose Monitoring (DEXCOM, Freestyle Libre, Guardian Sensor)

- Offer continuous glucose monitoring to pregnant women with type 1 diabetes at booking.
- This will continue for 1 year.
- Ensure that support is available for pregnant women who are using continuous glucose monitoring from a member of the joint diabetes and antenatal care team with expertise in its use.

Continuous glucose monitoring measures glucose levels in the interstitial fluid underneath the skin which is different from finger prick testing which measure glucose in blood.

CGM provides a reading of glucose level and also a series of arrows. The arrows show where the glucose has been over the last 20 minutes and where it will go in the next 20-30 minutes. The number of arrows indicates the rate of change.

The interstitial glucose lags behind blood glucose by about 5-10 minutes.

If the readings are different, act on the finger prick test result.

Women using CGM are required to check finger prick testing in several circumstances:

- To confirm hypoglycaemia
- If symptoms do not match sensor reading
- If the sensor reading seems unlikely in the circumstances
- During and after exercise
- If the sensor does not provide a reading
- When following sick day rules or managing unexplained hyperglycaemia
- As an inpatient using variable rate insulin infusion

Offer pregnant women with type 1 diabetes blood ketone testing strips and meter and advise to test their ketone levels if they are hyperglycaemic (blood glucose ≥ 12 mmol/l) or unwell.

Advise pregnant women with type 2 diabetes to seek urgent medical advice if they become hyperglycaemic or unwell.

3.6 Monitoring HbA1c

Measure HbA1c levels in all pregnant women with pre-existing diabetes at the booking appointment to determine the level of risk for the pregnancy.

All women with pre-pregnancy diabetes should have repeat HbA1c in the early third trimester.

This result needs to be reviewed and appropriate actions taken.

Green	HbA1c 43 mmol/mol or less	Continue current care
Amber	HbA1c 44-48 mmol/mol	Consider additional input to improve glucose management
Red	HbA1c more than 48 mmol/mol	MDT discussion required. Offer additional input to improve glucose management including alternative methods of monitoring treatment. Offer increased fetal surveillance, and re-discuss increased risk of stillbirth, birth and neonatal complications.

3.7 Hypoglycaemia Advice

Provide glucagon to pregnant women with type 1 diabetes for use if needed. Instruct the woman and their partner or other family members in its use.

Advise pregnant women on the risks of hypoglycaemia and hypoglycaemia unawareness, especially in the first trimester with particular reference to driving (see box A).

Advise pregnant women with insulin-treated diabetes to always have available a fast-acting form of glucose (for example, dextrose tablets or glucose-containing drinks).

Box 4: Safe driving when taking insulin

- **Keep glucose treatments and meter in the car within easy reach at all times.**
- **Check CBG level immediately before driving and every 2 hours while driving.**
- **DO NOT DRIVE if CBG level is less than 5 mmols/l.**
- **Follow Instructions as per insulin and driving.**

<https://www.diabetes.org.uk/guide-to-diabetes/life-with-diabetes/driving>

3.8 Retinal assessment for pregnant women with pre-existing diabetes

Offer pregnant women with pre-existing diabetes retinal assessment by digital imaging following their first antenatal clinic appointment (unless they have had a retinal assessment in the last 3 months), and again at 28 weeks.

If any diabetic retinopathy is present at booking, perform an additional retinal assessment at 16–20 weeks.

Ensure that pregnant women who have preproliferative diabetic retinopathy or any form of referable retinopathy diagnosed during pregnancy are given ophthalmological follow-up for at least 6 months after the birth of the baby.

If pregnant women with retinopathy require treatment during pregnancy, they should be referred to the East Midlands Maternal Medicine Network for MDT discussion.

<https://east-midlands-maternal-medicine-network.nhs.uk/>

3.9 Renal assessment for pregnant women with pre-existing diabetes

Offer renal assessment at the first contact in pregnancy if it has not been performed in the past 3 months. Consider referral to a nephrologist if serum creatinine is 120 micromol/litre or more or the urinary albumin:creatinine ratio is greater than 30 mg/mmol.

Start thromboprophylaxis if proteinuria is above 2 g/day or PCR>200.

Pregnant women with CKD 2 with significant proteinuria i.e. PCR>30; or CKD 3 or more should be referred to the East Midlands Maternal Medicine Network for MDT discussion.

<https://east-midlands-maternal-medicine-network.nhs.uk/>

3.10 Monitoring fetal growth and wellbeing

Ultrasound monitoring of fetal growth/ dopplers and amniotic fluid volume every 4 weeks from 28 weeks till delivery (as per [NICE NG3 guideline](#) 2015 – updated 2020).

There may be occasions when the USS interval is reduced due to individualised factors such as; accelerated or reduced fetal growth velocity, reduction in insulin requirements >20%, development of hypertension and/or proteinuria. The complexity of such cases requires Consultant Obstetrician and Diabetologist MDT discussion, followed by individualised risk assessment regarding fetal growth monitoring.

3.11 Frequency of antenatal contacts

Blood glucose levels will be reviewed every 2 weeks either by face to face appointment in the MDT Diabetes antenatal clinic or by telephone appointment.

At a minimum, combined obstetric and diabetic reviews will occur at booking, 12-14 weeks, 20 weeks, 28 weeks, 32 weeks and 36 weeks in the setting of an antenatal clinic for pregnant women and people with Type 1 & 2 diabetes.

4. MATERNITY ASSESSMENT UNIT AND INPATIENT CARE

In the event of a new admission to MAU, it is essential to have a recent blood glucose reading. If a patient can provide this using Dexcom or Libre, please ask them to perform a scan.

If the pregnant woman is:

- Unwell
- Vomiting
- In pain
- Has a blood glucose reading ≤ 4.0 mmol/l or ≥ 12.0 mmol/l

a finger prick blood glucose reading and a blood ketone measurement is required in addition to the Dexcom or Libre reading.

4.1 Hyperglycaemia and ketones

Due to the physiological changes to carbohydrate metabolism and insulin resistance in the mother combined with fetal energy requirements, ketones can develop more easily in pregnancy. Pregnant women with type 1 diabetes are at the highest risk of forming ketones, but pregnant women with type 2 diabetes and GDM also are at risk, particularly in the third trimester.

Ketones are formed when there is not enough glucose to supply energy for the body. The body starts breaking down fat to supply essential energy and ketones are produced as a by-product.

There can be multiple reasons why ketones develop:

- A period of fasting
- A very low carbohydrate intake
- Missed doses of insulin
- Vomiting
- Dehydration

A low level of ketones is relatively common in the morning before eating and drinking, and this is not harmful.

An accumulation of ketones is associated with the development of metabolic acidosis. This is called Diabetic Ketoacidosis (DKA) and is a life-threatening condition to the mother and baby. It is essential that DKA is diagnosed at the earliest opportunity and prompt MDT management is initiated in a level 2 setting.

4.2 When to measure blood ketones?

If the blood glucose level is ≥ 12.0 mmol/L, always measure blood ketones and refer to decision tool [Appendix 3 red hyperglycaemia/ketone chart if ketones \$\geq 1.5\$ mmol/L](#), [Appendix 2 green hyperglycaemia chart if ketones \$< 1.5\$ mmol/L](#).

Community teams haven't the resources to monitor ketones; if the woman does not carry their own ketone monitor they will need referral to MAU for testing and review.

If the woman or is unwell, vomiting, in pain and/or signs of infection, measure blood ketones, even if the blood glucose reading is in normal range

If the pregnant woman has known diabetes and significant ketonuria ($\geq 3+$ on dipstick)

Management of diabetic ketoacidosis in pregnancy

Due to the physiological changes of pregnancy, DKA in pregnancy can occur with only very modest elevation of glucose levels, i.e. < 13.9 mmol/l.

Symptoms include nausea and/or vomiting, abdominal pain, polyuria and polydipsia, and leg cramps.

Later signs/symptoms include dehydration (manifesting as dry skin and mouth), blurred eyesight, tachypnoea, rapid pulse, a distinct smell on the breath (sometimes described as 'pear drops') and coma.

Ketoacidosis should always be considered when a pregnant woman with diabetes feels unwell. These patients must be assessed by a medical or diabetes team.

DKA in pregnancy is associated with a high rate of fetal death (160 per 1000 births)

Pregnant women with DKA need urgent initiation of treatment as per trust policy and an urgent review by a senior obstetrician (ST6 or above), senior diabetes/medical physician and obstetric anaesthetist.

A consultant led MDT is required to decide best place of care considering the severity of DKA and gestation of pregnancy.

If gestation is above 26 weeks, admission to obstetric HDU setting is appropriate to facilitate fetal monitoring.

4.3 Hypoglycaemia

Initiate immediate treatment if blood glucose is <4.0mmol/L as per Hypoglycaemia algorithm ([Appendix 6](#))

+Refer to UHL Diabetic Ketoacidosis (DKA) guideline.

*Refer to Enhanced Maternity Care UHL Obstetric guideline.

4.4 Insulin Pump Use during Pregnancy.

Pregnant women using an insulin pump will be educated to manage their background rates and calculate bolus doses based on the carbohydrate content of each meal. This will be under supervision of the diabetes team.

Midwifery, obstetric and anaesthetic teams are not expected to have expertise in this area.

In the event of an acute admission with poor control of blood glucose and/or ketoacidosis, support from the diabetes team should be sought urgently.

To safely control blood glucose levels and reduce ketones, it may be necessary to stop the pump and initiate variable rate insulin infusion.

Technical pump failure is a medical emergency

This shows as **warning** on the pump screen.

Refer all enquiries to the Pump Manufacturer Technical Helpline immediately as they may be able to get pump back up and running. If not, they will try and arrange for replacement to be sent to as soon as possible.

Pump technical support lines:

- Medtronic insulin pump: 01923212213
Email: customer.services.uk@medtronic.com
Website: www.medtronic-diabetes.co.uk
- Omnipod insulin pump: 08000116132
- T-slim insulin pump: 0800 012 1560

If the pump fails, the patient needs to be swapped to MDI regime with pens until a new pump is received.

4.5 In-Patient Care and Blood Glucose Testing.

There are two ways that women with type 1 and 2 diabetes will measure their blood glucose levels:

- Continuous glucose monitoring (CGM): Dexcom, Freestyle Libre, Guardian Sensor
- Capillary blood glucose (CBG) monitoring.

Most will record the results in an App. Very few women will write down the results in a book.

It is essential that all women with diabetes have blood glucose levels recorded on the appropriate chart so that glucose levels are available to all staff.

At a minimum, blood glucose levels should be documented 4 times a day (see monitoring following dexamethasone for additional information):

- Before breakfast
- One hour after breakfast, lunch and evening meal.

It is appropriate to ask women to show you the blood glucose levels on their phone or monitor and these to be recorded in NerveCentre.

Members of the diabetic antenatal team can access all the electronic platforms to gain a full view of the blood glucose levels.

All medications including insulin to be locked away as per medicine management policy. ([Leicestershire Medicines Code](#))

Pregnant women are advised to administer fast acting insulin e.g. NovoRapid, Fiasp at least 15 mins before a meal. As pregnancy progresses this time period may increase. Staff should facilitate administration of insulin before meals.

If a patient with diabetes is:

- Unwell
- Vomiting
- Has a blood glucose reading ≤ 4.0 mmol/L or ≥ 12.0 mmol/L

They require a finger prick blood glucose reading in addition to the Dexcom or Libre, and a blood ketone measurement.

If the blood glucose level is ≥ 12.0 mmol/l, always measure blood ketones and refer to decision tool [Appendix 3 red hyperglycaemia/ketone chart if ketones \$\geq 1.5\$ mmol/L](#), [Appendix 2 green hyperglycaemia chart if ketones \$< 1.5\$ mmol/L](#)

5. PROTOCOL FOR THE ADMINISTRATION OF STEROIDS

5.1 ADMINISTRATION OF STEROIDS FOR PREGNANT WOMEN WITH TYPE 1 DIABETES

Diabetes is not a contraindication to steroid treatment. However, steroids increase blood glucose (BG) significantly in pregnant women with diabetes. It is important that the decision to give steroids is carefully considered, discussed with a consultant and that the expected hyperglycaemia is managed appropriately. Steroids should only be given if the delivery is thought to be imminent or planned within the next 48 hours. Steroids should not be given to pregnant women with diabetes after 35+6 weeks even if they are undergoing Caesarean Section.

When steroids are given, ***all diabetes medication should be continued*** including diet, metformin, meal-time insulin (e.g. Humulin S, Humalog, Novorapid, Fiasp, Lyumjev and long acting insulin (e.g. Humulin I, Insulatard, Detemir (Levemir) and Glargine (Lantus)).

After the first dose of steroids, capillary BG (CBG) should be checked hourly.

Start Variable Rate Intravenous Insulin Infusion (VRIII) **WITHOUT** IV glucose if eating and drinking. Use algorithm 1 on the [VRIII chart](#) (page 27).

This is in ADDITION to usual diabetes medication, which should continue.

This is called a dry variable rate insulin infusion and the aim is that additional insulin via the VRIII will control the hyperglycaemic effect of steroids above the normal background insulin requirements.

Patients should eat and drink as normal.

If a patient is not eating and drinking e.g. being prepared for delivery by caesarean section or vomiting, IV fluids will be required:

Once a patient is nil by mouth 0.18% NaCl with 4% glucose with 0.3% KCl with 20 or 40 mmol/L at 125 ml/hr must be started to manage the VRIII.

If nil by mouth and no 0.18% NaCl with 4% glucose with 0.3% KCl with 20 or 40 mmol/L at 125 ml/hr is given, there will be a rapid fall in blood glucose and hypoglycaemia.

If additional IV fluids are required for example, hydration purposes, Hartman's can be given alongside the **0.18% NaCl with 4% glucose with 0.3% KCl with 20 or 40 mmol/L at 125 ml/hr.**

5.2 ADMINISTRATION OF STEROIDS FOR PREGNANT WOMEN WITH TYPE 2 DIABETES

Diabetes is not a contraindication to steroid treatment. However, steroids increase blood glucose (BG) significantly in pregnant women with diabetes. It is important that the decision to give steroids is carefully considered, discussed with a consultant and that the expected hyperglycaemia is managed appropriately. Steroids should only be given if the delivery is thought to be imminent or planned within the next 48 hours. Steroids should not be given to pregnant women with diabetes after 35+6 weeks even if they are undergoing Caesarean Section.

For pregnant women on metformin:

Continue metformin

Monitor capillary blood glucose pre-meal, 1 hour after meal and at midnight and 04.00 hrs.

If capillary blood glucose is ≥ 12 mmol/L, measure blood ketones, transfer to delivery suite and commence VRIII.

Patients should eat and drink as normal.

If a patient is not eating and drinking e.g. being prepared for delivery by caesarean section or vomiting, IV fluids will be required:

Give **0.18% NaCl with 4% glucose with 0.3% KCl with 20 or 40 mmol/L at 125 ml/hr** to manage the VRIII.

If additional IV fluids are required, Hartman's can be given.

For pregnant women on insulin:

Increase all insulin doses by 40% from the time of 1st steroid injection.

If taking metformin, continue.

Monitor capillary blood glucose pre-meal, 1 hour after meal and at midnight and 04.00 hrs.

After steroid administration, capillary blood glucose levels remain elevated for 12-24 hours after the last steroid dose. Patients require daily reviews and the insulin doses need to return to baseline 12-24 hours after last steroid dose. This is important to avoid hyperglycaemia.

If capillary blood glucose is ≥ 12 mmol/L, measure blood ketones transfer to delivery suite and commence VRIII.

Continue basal and fast acting insulin at the dose the woman was using **PRIOR** to steroids. ie before the 40% increase. The aim of the VRIII is to control the hyperglycaemia caused by the steroids.

Patients should eat and drink as normal.

If a patient is not eating and drinking e.g. being prepared for delivery by caesarean section or vomiting, IV fluids will be required:

Once a patient is nil by mouth 0.18% NaCl with 4% glucose with 0.3% KCl with 20 or 40 mmol/L at 125 ml/hr must be started to manage the VRIII.

If nil by mouth and no 0.18% NaCl with 4% glucose with 0.3% KCl with 20 or 40 mmol/L at 125 ml/hr is given, there will be a rapid fall in blood glucose and hypoglycaemia.

If additional IV fluids are required for example, hydration purposes, Hartman's can be given alongside the **0.18% NaCl with 4% glucose with 0.3% KCl with 20 or 40 mmol/L at 125 ml/hr**.

6. INTRAPARTUM CARE

Every pregnant woman with diabetes will have an intrapartum care plan for delivery which is filed in the hospital notes. This is developed jointly by the Obstetricians and Diabetologists in discussion with the woman, usually from 36 weeks.

6.1 Information and advice:

Discuss the timing and mode of birth with pregnant women with diabetes during antenatal appointments, especially during the third trimester including:

- The risks and benefits of vaginal birth, induction of labour and caesarean section if the baby has macrosomia identified by ultrasound.
- The possibility of vaginal birth after previous caesarean section.

6.2 Timing of delivery

Advise pregnant women with type 1 or type 2 diabetes and no other complications to have an elective birth by induction of labour, or by elective caesarean section if indicated, between 37+0 weeks and 38+6 weeks of pregnancy.

Consider elective birth before 37+0 weeks for pregnant women with type 1 or type 2 diabetes if there are metabolic or any other maternal or fetal complications.

Type 1 or type 2 diabetes newly diagnosed in pregnancy and/or DKA in pregnancy should be considered as 'Red Flags' for a poor obstetric outcome and should be taken into consideration when planning delivery.

Timing of delivery should include individualised risk assessments of each patient, including:

- Pre-existing complications of diabetes e.g. retinopathy, nephropathy,
- Pregnancy complications e.g. hypertension, proteinuria
- Recent ultrasound scans including growth velocity and liquor volume.

6.3 Care during labour and birth:

Measure HbA1c on admission in labour, for induction of labour or planned caesarean section.

Monitor:

Blood glucose levels hourly for pregnant women on insulin, aiming to maintain blood glucose levels between 4 and 8 mmol/l.

6.4 Insulin Pump Therapy during labour and birth

Some women may choose to continue use of their insulin pumps during labour. They should have programmes pre-set to reduce basal rate. This should be done in discussion with the diabetes specialist team. The pregnant women and their partners need to have the ability to change the pump settings. If blood glucose is not controlled between 4 and 8 mmol/l, or has urinary ketones ++ or more or high capillary blood ketones (>1.5 mmol/L) a VRII should be started and the pump discontinued

6.5 For pregnant women with type 1 diabetes on multiple daily injections:

Commence variable rate insulin infusion and **0.18% NaCl with 4% glucose with 0.3% KCl with 20 or 40 mmol/L at 125 ml/hr** for women with Type 1 DM from the **onset of established labour**

6.6 For pregnant women with type 2 diabetes on multiple daily injections:

Perform hourly blood glucose measurements.

Commence variable rate insulin infusion and **0.18% NaCl with 4% glucose with 0.3% KCl with 20 or 40 mmol/L at 125 ml/hr** for women with Type 2 DM whose **blood glucose is not maintained between 4 and 8 mmol/l**.

6.7 Variable Rate Insulin Infusion (VRII) in labour – A Quick Guide

WHEN to start a VRII:

Pre-existing Diabetes (Type 1 & 2)

If planning a Vaginal Birth;

COMMENCE VRII in:

- Women with Type 1 DM from the onset of established labour
- Women with Type 2 DM whose BG is not maintained between 4 - 8mmol/l

If planning delivery by Caesarean Section (CS);

COMMENCE VRII for:

- Women with poorly controlled Type 1 or 2 DM
- Women on Insulin whose BG is not maintained within 4 - 8mmol/l

How to Start a VRII:

- Always use an **Insulin syringe** to draw up Insulin
- **If Nil By Mouth (NBM);**
 - ⊖ **Use 0.18% NaCl with 4% glucose with 0.3% KCl with 20 or 40 mmol/L at 125 ml/hr**
- Follow VRII Algorithm ([See page 27](#));
 - Most women will start on Algorithm 1
 - Move to higher Algorithm if BG >9 for 2 hours or not dropping
 - Move to lower Algorithm if BG <4mmol/l or dropping too fast (>5mmol in 1 hour)

How to STOP a VRII:

In pregnant women with pre-existing diabetes (Type 1 & 2);

- Reduce the rate of VRII by HALF as soon as the placenta is delivered
- Encourage to eat a meal
- Administer prescribed postnatal fast-acting Insulin dosage (as per Diabetic Team Care Plan)
- After 30 minutes discontinue the VRII
- Check BG as recommended as per the Diabetic Team Care Plan
- Continue prescribed postnatal long-acting Insulin dosage (as per Diabetic Team Care Plan)

Top Tips on VRII:

- ✓ Always use an Insulin syringe to draw up Insulin
- ✓ Whilst on VRII; **STOP** all **fast-acting Insulin** (*Novorapid, Apidra, Humalog*)
- ✓ Whilst on VRII; **CONTINUE** any **long-acting Insulin** (*Humulin I, Insuman Basal, Lantus/Glargine, Levemir, Toujeo, Tresiba/Degludec*)
- ✓ Check U&E's every 12h if on VRII in labour
- ✓ Treat HYPO's as per UHL Guideline and repeat BG after 10 minutes

*VRII to be used with caution in pregnant women at risk of hyponatraemia (low sodium levels) e.g. on Labetalol, Oxytocin, Magnesium Sulphate; consider restriction of IV Glucose.

6.8 Care prior to elective caesarean section for pregnant women with Type 1 and Type 2 diabetes:

Consider antenatal steroids if elective caesarean section is planned prior to 36/40.

Adjust insulin dosage to account for pre-operative fasting.

Monitor blood glucose level hourly prior to going to theatre from 7am.

For pregnant women whose blood glucose is not maintained within 4 and 8 mmol/l, commence a variable rate insulin infusion **and 0.18% NaCl with 4% glucose with 0.3% KCl with 20 or 40 mmol/L at 125 ml/hr.**

If general anaesthesia is used for the birth in women with pre-existing diabetes, monitor blood glucose every 30 minutes from induction of general anaesthesia until after the baby is born and the woman is fully conscious.

7. POSTNATAL CARE

7.1 Insulin treated Type 1 or 2 diabetes

Once the baby and placenta are delivered insulin requirements will drop very quickly. If a variable rate insulin infusion is in progress, reduce the rate of insulin infusion by 50% at delivery.

Continue IV 0.18% NaCl + 4% glucose with 0.3% KCl with 20 or 40 mmol/L KCl at 125mls/hour until eating and drinking normally.

When stopping VRII refer to: [6.7 Variable Rate Insulin Infusion \(VRII\) In labour](#) (page 17)

Refer to the individual green diabetic care plan for guidance on postnatal treatment regimens and ensure the treatment is appropriately prescribed on NerveCentre.

As a guide: –

Women with pre-existing diabetes (type 1 and 2) should return to their pre-pregnancy medication regimen immediately after delivery.

Episodes of hypoglycaemia are common in the early postnatal period and women who are breastfeeding are at particular risk.

A further reduction of pre-pregnancy insulin may be required

7.2 Blood glucose targets

After delivery, women should be advised to run with a higher CBG level to avoid the risk of hypoglycaemia.

Time	Blood glucose mmols/L
Fasting and pre-meal	5.5-8.0
1 hour post meal	8.0-11.0
Pre-bed	6.5-8.0

7.3 Oral hypoglycaemics

Women and people with type 2 diabetes can resume or continue taking metformin while breastfeeding. They should not to take any other oral hypoglycaemic agents while breastfeeding.

7.4 Postnatal diabetic care on discharge:

Women with pre-existing diabetes should be referred back to routine diabetes care.

Please email a Specialist midwife in diabetes to inform them of the discharge.

Remind women with diabetes of the importance of contraception and the need for preconception care when planning future pregnancies.

Offer additional advice regarding the risk of hypoglycaemia with breast feeding and the importance of always testing blood glucose levels before driving.

8. NEONATAL CARE

Babies of women with diabetes should be kept with their mothers unless there is a clinical complication or there are abnormal clinical signs that warrant admission for intensive or special care.

Babies must have **2** consecutive normal pre-feed CBG levels (≥ 2.6 mmols) before being allowed home.

Observations in line with NEWTT2 must be commenced. The baby should stay with the mother unless extra neonatal care is required.

Do not transfer babies into community care until they are at least 24 hours old, maintaining their blood glucose levels and feeding well.

8.1 Preventing, detecting and managing neonatal hypoglycaemia

UHL has a written policy for the prevention and management of symptomatic or significant hypoglycaemia in neonates. [Hypoglycaemia - Neonatal UHL Neonatal Guideline](#)

Feeding

Babies should be fed as soon as possible, aim for within 60 minutes after birth and then at frequent intervals (2–3 hours) until pre-feed blood glucose levels are maintained at **2** consecutive blood glucose readings of 2.6 mmol/l or more.

Test the baby's blood glucose levels before **the 2nd and 3rd** feed using a quality-assured method validated for neonatal use (ward-based glucose electrode or laboratory analysis)

If the baby has signs of hypoglycaemia, refer urgently to the Neonatal Team.

Symptoms of hypoglycaemia:

- Altered level of consciousness: Coma, lethargy, hypotonia, stupor, irritability
- Hypothermia
- Apnoea,
- High pitched cry
- Cyanosis, pallor
- Abnormal feeding behaviour after previously feeding well
- Seizures, tremor and jitteriness (jitteriness - excessive repetitive movements of one or more limbs, which is unprovoked and not in response to a stimulus)

Abnormal feeding behaviour (not waking for feeds, not sucking effectively, appearing unsettled and demanding very frequent feeds), especially after a period of feeding well may be indicative of hypoglycaemia. It should prompt a full clinical assessment and consideration of BG measurement.

9. NATIONAL DIABETES IN PREGNANCY AUDIT

The National Diabetes in Pregnancy audit measures the quality of care given to pregnant women with pre-existing diabetes during pregnancy. The audit is managed by the Health and Social Care Information Centre (HSCIC), in collaboration with Diabetes UK and Diabetes Health Intelligence and is part of the National Diabetes Audit. It is expected that all Trusts with joint obstetric and diabetes services will participate.

Reliable annual reports benchmarked against all participating delivery units in England and Wales will be produced. These can be used for service assurance, prioritisation of areas for improvement and measurement of the effectiveness of improvements initiatives.

The Diabetes Care Team actively encourages women and people to consent to their data being collected and submitted securely to the HSCIC. Guidance.

10. EDUCATION AND TRAINING

All Midwives must complete insulin safety training every 2 years.

11. MONITORING COMPLIANCE

What will be measured to monitor compliance	How will compliance be monitored	Monitoring Lead	Frequency	Reporting arrangements
Incidents, trends associated with management of care of diabetic women in pregnancy.	Review of reports via datix	Quality and Safety Manager	As per occurrence	Maternity Service or Neonatal Governance Group
Completion of insulin safety training every 2 years.	Mandatory training records	Core Training lead	Data available on monthly dashboard	Women's Quality & Safety Board

12. SUPPORTING REFERENCES

NICE – Diabetes in Pregnancy 2015 – updated Dec 2020 ng3

NHS England. Saving Babies' Lives Car Bundle 2. March 2019 <https://www.england.nhs.uk/wp-content/uploads/2019/03/Saving-Babies-Lives-Care-Bundle-Version-Two-Updated-Final-Version.pdf>

NHS England. Saving Babies' Lives Car Bundle 3. 2023

<https://www.england.nhs.uk/publication/saving-babies-lives-version-three/>

Diabetic Ketoacidosis (DKA) in Adults UHL Guideline UHL B66/2011

Enhanced Maternity Care UHL Obstetric Guideline UHL B47/2011

Gestational diabetes UHL C14/2022

Hypoglycaemia - Neonatal UHL Neonatal Guideline UHL C22/2008

Hypoglycaemia in Adults with Diabetes UHL Guideline UHL B41/2011

13. KEY WORDS

Blood glucose monitoring, Diabetic Ketoacidosis, Hyperglycaemia, Hypoglycaemia, Insulin, Variable Rate Intravenous Insulin Infusion

The Trust recognises the diversity of the local community it serves. Our aim therefore is to provide a safe environment free from discrimination and treat all individuals fairly with dignity and appropriately according to their needs. As part of its development, this policy and its impact on equality have been reviewed and no detriment was identified.

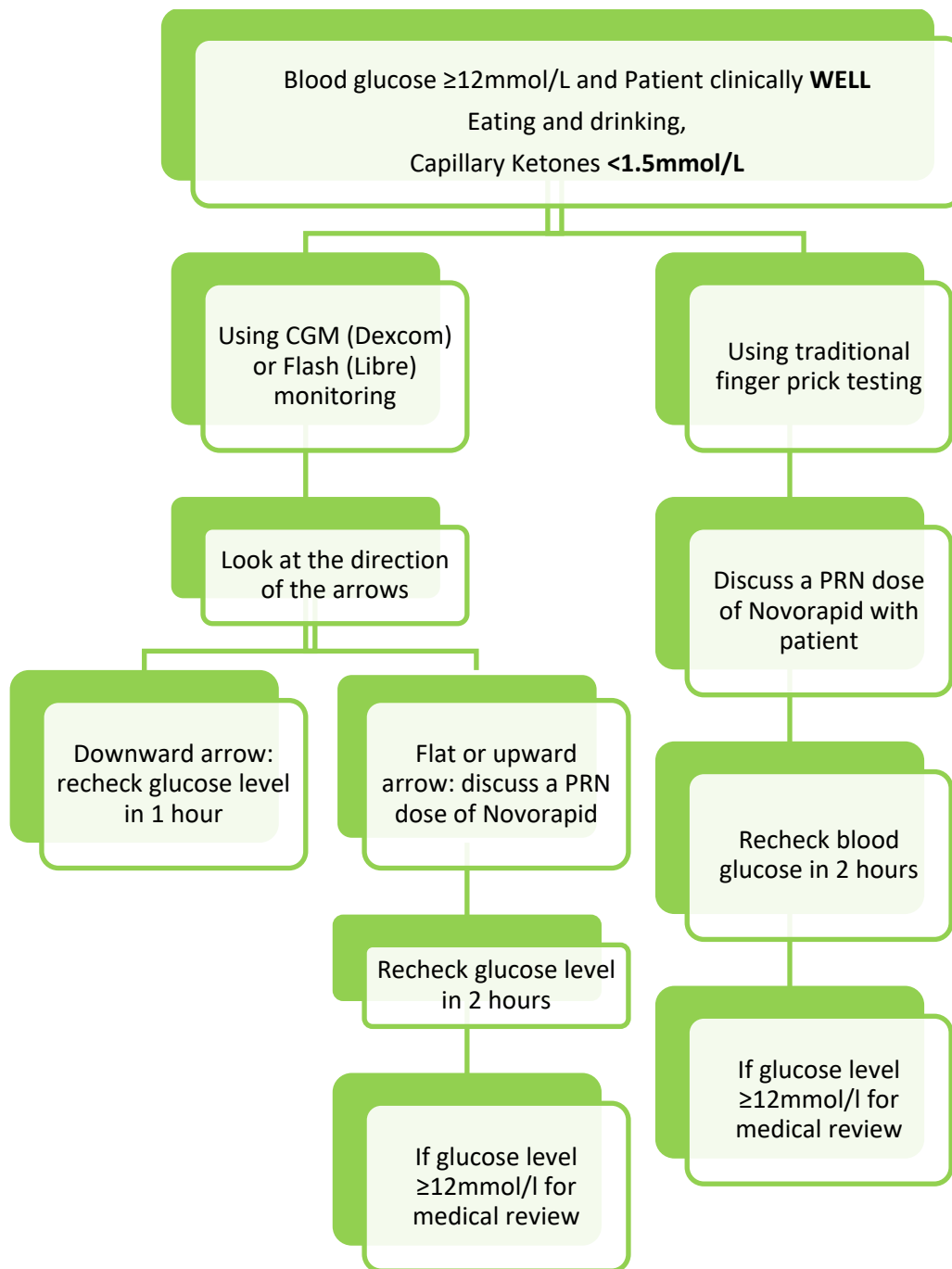
Contact and review details	
<p>Guideline Lead (Name and Title) Written by: Reviewed by: H Maybury Consultant Obstetrician , K Moores Consultant Obstetrician</p>	<p>Executive Lead Chief Medical Officer</p>
<p>Details of Changes made during review: Referral to a nephrologist if the urinary albumin:creatinine ratio is greater than 30 mg/mmol (previously included serum creatinine) or the estimated glomerular filtration rate (eGFR) is less than 60 ml/minute/1.73 m² (previously less than 45 ml/minute/1.73 m²). Changed terminology of Flash glucose monitoring to Continuous glucose monitoring. Before or as soon as pregnancy is confirmed: Stop other hypoglycaemic agents including sulphonylureas, DPP4 inhibitors (gliptins), SGLT2 inhibitors (flozins) and GLP-1 agents (eg Semaglutide) Offer all women with Type 1 diabetes continuous glucose monitoring technology Offer women with Type 2 diabetes using multiple daily insulin injections continuous glucose monitoring technology Consider hybrid-closed loop therapy At booking appointment, if recent HbA1c is raised (≥8.5%) (previously ≥10%) a discussion is required about the increased risk of congenital anomaly and the limitations of ultrasound to detect all anomalies All women with pre-pregnancy diabetes should have repeat HbA1c in the early third trimester. This result needs to be reviewed and appropriate actions taken. Women with CKD 2 with significant proteinuria i.e. PCR>30; or CKD 3 or more should be referred to the East Midlands Maternal Medicine Network for MDT discussion. A/N contacts; Blood glucose levels will be reviewed every 2 weeks either by face to face appointment in the MDT Diabetes antenatal clinic or by telephone appointment. At a minimum, combined obstetric and diabetic reviews will occur at booking, 12-14 weeks, 20 weeks, 28 weeks, 32 weeks and 36 weeks in the setting of an antenatal clinic for women with Type 1 & 2 diabetes Added HbA1c levels and risk table Added DKA in pregnancy section August 2024 Neonatal care updated in line with NEWTT2 implementation</p>	

Appendix 1: ANTE NATAL MANAGEMENT OF TYPE 1 AND TYPE 2 DIABETES

WEEKS OF PREGNANCY	ANTENATAL CLINIC	Retinal screening	HbA1c	SCANS	BLOODS	INFORMATION
4 – 11 weeks	See DSM, Diabetologist, Obstetrician, DSN & Dietitian	✓	✓	Viability scan	U&E, HbA1c, TFT, urine ACR,	Diabetes and pregnancy. Book with Community Midwife ¹ Advise Folic Acid 5mg od Commence Cocalciferol 20 micrograms/ 800units od.
11 ⁺² - 15 weeks	See above as necessary			Dating Scan/ Nuchal Translucency Scan (NT 11 ⁺² – 14 ⁺¹ weeks)]	Further tests at discretion of diabetes/obstetric teams	Start Aspirin 150mg od. Documentation of booking bloods
16 - 17 weeks	See above as necessary		✓			Give results of NT scan
18 - 22 weeks	See above as necessary	✓ (if needed)		Anomaly Scan including 4 chamber, 3 vessels and outflow tract cardiac scan.		
23 - 28 weeks	See above as necessary			Growth scan from 28/40		

29 - 32 weeks	See above as necessary	✓		Growth Scan at 32/40	FBC & antibody screen (Empath bloods) if not already taken	Anti-D if required
32 - 36 weeks	See above as necessary		✓	Growth Scan at 36/40		Documentation of FBC and Empath bloods
36 - 37 weeks	See above as necessary				FBC	Discuss and document birth plan. Arrange IOL/ELCS for 37-38+6/40. Consider <37/40 if maternal/fetal complications Discuss postnatal care and follow-up including PN insulin doses.

Appendix 2: Management of hyperglycaemia in a well patient with T1 diabetes



Guidance for PRN Novorapid doses:

Do not give within 2 hours of novorapid bolus.

Insulin sensitivity changes as pregnancy progresses.

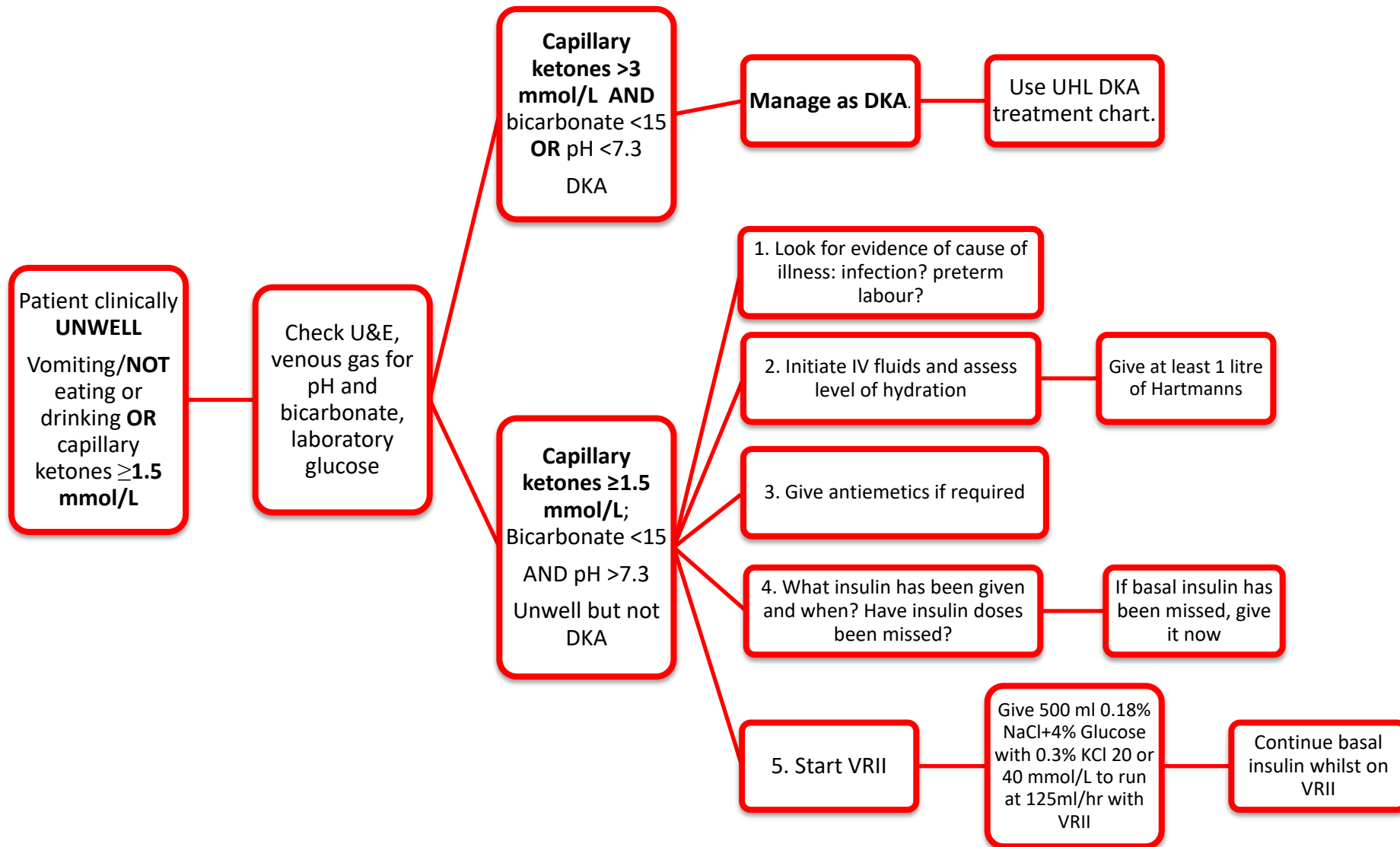
At the beginning of pregnancy 1 unit of novorapid may decrease glucose levels by 3mmol/L.

In the third trimester, 1 unit of novorapid may decrease glucose levels by 1-2mmol/L.

Patients will have experience of giving PRN or “corrective” doses, discuss it with them.

Do not repeat PRN dosing within 2 hours.

Appendix 3: Unwell patient management



Appendix 4: Intravenous Insulin and Fluid Prescription

For use during pregnancy and labour for ALL patients receiving Variable Rate Intravenous Insulin Infusion (VRIII) NEVER use an IV syringe to draw up insulin ALWAYS draw up insulin using an insulin syringe ALWAYS continue subcutaneous intermediate* or basal insulin** *Intermediate: Insulatard, Humulin I, Insuman basal **Basal: Lantus (Glargine), Levemir (Detemir), Tresiba (Degludec), Toujeo Doctor: All prescriptions for insulin and fluids must be signed Nurse/Midwife: All entries must be signed				Ward	Consultant	Admission Date:	
						Discharge Date:	
				Surname		First Name	
				Hospital Number		Date of Birth/Age	
				NHS Number:			
Address							

DOSING ALGORITHM (please see guide below)				ALGORITHM GUIDE			
Algorithm	1	2	3	<ul style="list-style-type: none"> All women with diabetes should have Capillary Blood Glucose (CBG) testing hourly in established labour or at least once on admission for induction of labour or elective C-Section Start VRIII and fluids if two consecutive CBG's >target (see below) or at the start of established labour if the woman has type 1 diabetes. <p>Algorithm 1 Most women will start here</p> <p>Algorithm 2 Use this algorithm for women who are likely to require more insulin (on steroids; on >80 units of insulin during pregnancy; or those not achieving target on algorithm 1)</p> <p>Algorithm 3 Use this for women who are not achieving target on algorithm 2 (No patient starts here without diabetes or medical review)</p> <p>If the woman is not achieving targets with these algorithms, contact the diabetes team (out of hours: Medical SpR on call)</p> <p>Target CBG level=4-8mmol/L</p> <p>Check CBG every hour whilst on VRIII and every half an hour if under anaesthesia</p> <p>Move to the higher algorithm if the CBG is >target and is not dropping - D/W Obstetric team</p> <p>Move to the lower algorithm if CBG falls below 4 mmol/L or is dropping too fast - D/W Obstetric team</p>			
	For most women	For women not controlled on algorithm 1 or needing >80 units/day of insulin	For women not controlled on algorithm 2 (after specialist advice)				
CBG Levels (mmol/L)	Infusion rate (units/hr=ml/hr)						
<4	STOP INSULIN FOR 20 MINUTES Treat hypo as per guideline (re-check CBG in 10 minutes)						
4.0-5.5	0.2	0.5	1.0				
5.6-7.0	0.5	1.0	2.0				
7.1-8.5	1.0	1.5	3.0				
8.6-11.0	1.5	2.0	4.0				
11.1-14.0	2.0	2.5	5.0				
14.1-17.0	2.5	3.0	6.0				
17.1-20.0	3.0	4.0	7.0				
>20.1	4.0	6.0	8.0				
Signed							
Print name							
Date							

Drug (approved name) Please tick	Dose	Volume	Route	Prescribers signature	Prescriber Print name	Date	SYRINGE PREPARATION			
Human Actrapid	50	Made up to 50mls with NaCl 0.9% (1 UNIT per ml)	IV				Prepared and administered by:	Date	Time started	Time stopped

INTRAVENOUS SUBSTRATE FLUID PRESCRIPTION				
Date	Intravenous Fluid and Rate	Alternative Rate	Prescriber's Signature	Nurse's Signature
	0.18% NaCl with 4% glucose with 0.3% KCl with 20 or 40 mmol/L at 125 ml/hr			
	0.18% NaCl with 4% glucose with 0.3% KCl with 20 or 40 mmol/L at 125 ml/hr			

PRESCRIPTION OF INTRAVENOUS MANAGEMENT OF HYPOGLYCAEMIA									
Date	Time	Preparation	Volume	Route	Duration	Prescriber's Signature	Print Name	Given by	Time given
		20% Dextrose	100 mls	IV	15 mins				

CAPILLARY BLOOD GLUCOSE MONITORING												
Date	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00
CBG												
Insulin rate												
Blood Ketones												
Initials												
Date	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	24:00
CBG												
Insulin rate												
Blood Ketones												
Initials												

Patients with type 1 DM on insulin pumps should be referred to the Diabetes Specialist Team

Maintain IV insulin infusion for 30 minutes after re-starting original insulin regimen – IV insulin has a 5 minute half-life

GESTATIONAL DIABETES:
STOP VRIII and IV substrate Fluid regimen once placenta is delivered

TYPE 1 DM and INSULIN TREATED TYPE 2 DM
Reduce the rate of VRIII by HALF once placenta is delivered.
Contact diabetes team to review on-going insulin requirements

Appendix 5: Common insulins prescribed during pregnancy

Rapid-acting insulins



NovoRapid FlexPen
(aspart)



Humalog KwikPen
(lispro)



Apidra SoloStar
(glulisine)



Fiasp FlexTouch
(ultra-fast aspart)

Intermediate-acting insulins



Insultard InnoLet
(NPH, isophane)



Humulin I
KwikPen (NPH,
isophane)

Long Acting Insulins



Lantus SoloStar
(glargine)



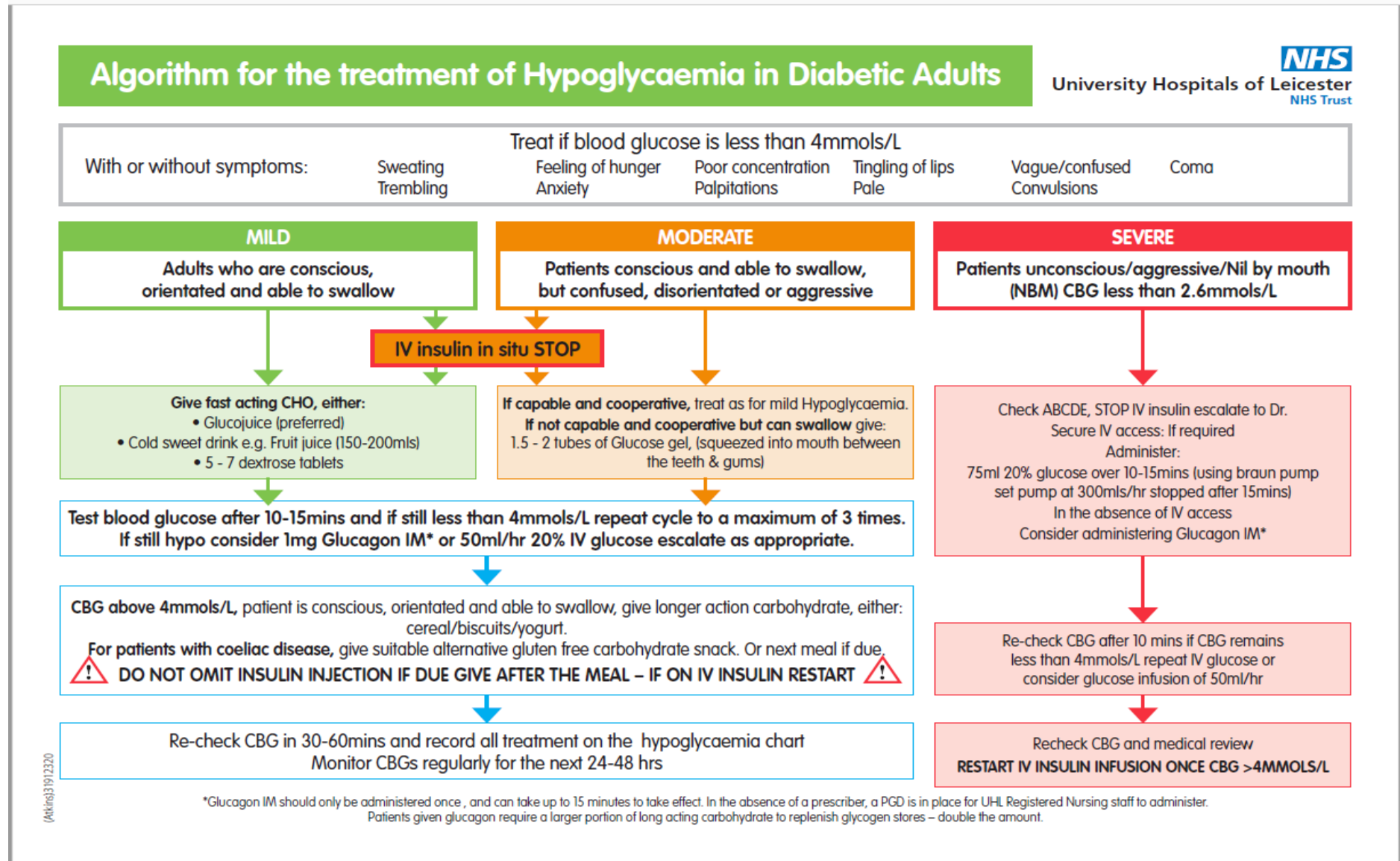
Levemir FlexPen
(detemir)



Tresiba
FlexTouch
(degludec)

*NB: Actrapid and Humilin S are short-acting insulins which can be used for variable rate insulin infusions, but not for routine diabetes management in pregnancy. Mixed insulins (e.g., Mixtard, NovoMix, Humalog Mix 50) are not routinely used in pregnancy.

Appendix 6: Algorithm for the treatment of hypoglycaemia in diabetic adults



*Glucagon IM should only be administered once, and can take up to 15 minutes to take effect. In the absence of a prescriber, a PGD is in place for UHL Registered Nursing staff to administer. Patients given glucagon require a larger portion of long acting carbohydrate to replenish glycogen stores – double the amount.