Barking, Havering and Redbridge NHS
University Hospitals
NHS Trust

GUIDELINE FOR THE MANAGEMENT OF PRE-EXISTING AND GESTATIONAL DIABETES IN PREGNANCY

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Approved by:	Guidelines Development Group - 19 05 2014
Ratified by:	Maternity Quality and Safety Committee - 09 06 2014
Issue no:	Version 7
File name:	http://aglovale/assets/pdfs/medical_info/guidelinesmat24.pdf
Supercedes:	Merger of: Pre-existing Diabetes in Pregnancy Gestational Diabetes in Pregnancy
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Next Review Due:	May 2017

Barking Havering & Redbridge Hospitals NHS Trust aims to design and implement services, policies and measures that meet the diverse needs of our service, population and workforce, ensuring that none are placed at a disadvantage over others.

MANAGEMENT OF WOMEN WITH PRE EXISTING DIABETES IN PREGNANCY

PRE-CONCEPTION CARE

Women with the following types of diabetes should receive pre-conception advice:

- Pre-existing diabetes mellitus controlled by diet alone
- Pre-existing diabetes mellitus controlled by oral hypoglycaemic drugs
- Pre-existing diabetes mellitus controlled with insulin
- Women with previous gestational diabetes

Pre-conception clinic should involve the multidisciplinary team including the consultant obstetrician with a special interest in diabetes, diabetes physician, diabetes specialist midwife, public health midwife, diabetes specialist nurse and dietician.

A referral for the pre-conception clinic should be made to diabetes specialist midwife (DSM)) or any member of the antenatal diabetic team.

Women with diabetes who are planning to become pregnant should be offered information about how diabetes affects pregnancy and how pregnancy affects diabetes. This information should cover the following:

- Increased risk of adverse pregnancy outcomes including miscarriage, fetal congenital anomaly, stillbirth, and perinatal death.

- Increase risk of pre-eclampsia, pre-term labour, macosomia which increases the likelihood of birth injury, induction of labour and caesarean section.

- Risk of the baby developing obesity and/or diabetes in later life (2-3% if the mother is diabetic).

- How nausea and vomiting in pregnancy can affect glycaemic control and increase risk of diabetic ketoacidosis (DKA).

- Risk of hypoglycaemia and hypoglycaemia unawareness during pregnancy.

- Risk of development of new retinopathy or deterioration of pre-existing retinopathy.

- Increased risk of pre-eclampsia if has existing nephropathy.

To help reduce the risks of congenital anomalies and improve pregnancy outcome women with diabetes who are planning to become pregnant should be informed of the following:

- That establishing good glycaemic control when trying to conceive and in the first trimester will decrease their risk of fetal congenital anomalies and improve pregnancy outcome.

- If safely achievable women should aim to achieve a glycosated haemoglobin (HbA1C) of <6.1%.

- The use of contraception should be advised if HBA1C is greater than 10%.

- Should have baseline bloods of FBC, U&E's, LFT's, TFT's, TSH, Free T4, HBA1C, a full virology screening and HBO screening. If not immune to rubella should be offered vaccine.

- To help achieve good glycaemic control should be given a meter for self-monitoring of blood glucose and advised to test blood sugars 4 times per day pre and post-prandial. A letter should be sent to GP to support the lady with this.

- Women with type 1diabetes should be offered blood ketone testing meter and advised to test for blood ketonaemia if they become hyperglycaemic or unwell.

- Should be advised and referred to have an assessment for retinopathy using digital imaging before pregnancy. If retinopathy needing treatment should be advised to have treatment before considering rapid improvement in glycaemic control.

- Should have an assessment for nephropathy by sending a mid-stream urine for mid-culture and sensitivity and a specimen for microalbuminuria and creatinine clearance before pregnancy. If serum creatinine is abnormal (120micromol/litre or more) consider referral to a nephrologist.

- Advised to take folic acid 5mg/day and until 12 weeks of gestation to reduce the risk of neural tube defects.

- Advised to take Vitamin D supplements 10mcg daily.

- If the body mass index is above 27kg/m2 should be offered advice on how to lose weight.

- Should have advice on a low fat, low sugar, high fibre diet and offered referral to a dietician.

- If smokes should be informed on the effects of smoking can have on the fetus/baby and referred to smoking cessation service.

- Should have medications for the complications of diabetes (statins, anti-hypertensives) reviewed/discontinued and alternatives agents suitable for use during pregnancy should be used.

- Should have the option to try oral hypoglycaemic agents as an alternative to insulin to try and achieve good glycaemic control.

- Women on insulin should be informed that there is insufficient evidence about the use of long-acting insulin analogues during pregnancy and the use of isophane insulin remains the first choice for long-acting insulin during pregnancy.

Women with diabetes who are planning to become pregnant should be invited to attend the pre-conception clinic every 1-2 months. Appendix 1 should be used to guide/assist with the pre-conception consultation.

ANTENATAL MANAGEMENT OF WOMEN WITH PRE-EXISTING DIABETES IN PREGNANCY

Management of the pregnancy occurs in the multidisciplinary joint diabetic/obstetric clinics in King George Hospital and Queen's Hospital. Both these clinics are run by experienced consultants in obstetrics and diabetic medicine as well as diabetes specialist midwife (DSM), Public Health Midwife and diabetes specialist nurses (DSN).

- Referrals for bookings should be made to Diabetes Specialist Midwife or Public Health Midwife for early booking and joint diabetic/obstetric care.

- Antenatal care will be in the joint antenatal diabetic clinic where an individualized care plan will be made.

- Women will be seen every 1-2 weeks throughout pregnancy. Women have a timetable outlining schedule of care attached to the inside of the back cover of their notes (Appendix 2). Antenatal appointments should provide routine care for the healthy pregnant woman as according to NICE Antenatal care: www.nice.org.uk/CG062 and in addition the following care should be provided.

- Education given on the effects of pregnancy on diabetes and effects of diabetes on pregnancy. See type 1 and type 2 diabetic women checklist which is attached to each woman's notes between page 10 and 11(Appendix 3).

- Education on risks of hypoglycaemia and hypoglycaemia unawareness in pregnancy, particular in the first trimester.

- Bloods for FBC, U&E's, TFT's, LFT's, TSH, Free T4 and HBA1C. HBA1C should be performed at least once in each trimester.

- MSU for MC&S and for Microalbuninuria and Creatinine clearance. If serum creatinine is abnormal (120micromol/litre or more) or if total protein excretion exceeds 2g/day consider referral to nephrologist.

- Targets of blood glucose set for fasting/pre-meals 4.0-5.5mmols, 1.5 hours post-prandial 5.0-7.5mmols.

- Advised to monitor blood sugars at least 4 times per day or more pre and post meals and to test before going to bed and during the night.

- Women with type 1 diabetes should be given blood ketone testing meter and advised to test if hyperglycaemic (blood sugar >14.0mmols) or unwell.

- Women with type 1 diabetes should be advised if ketocic to present to A&E at Queen's hospital if under 20 weeks gestation and to labour ward if above 20 weeks gestation immediately.

- Women with type1 diabetes should be prescribed with glucagon injection and another member of the family shown how to administer.

- Advised on diet of low sugar, low fat, high fibre and carbohydrates from low glycaemic index sources. This should be ongoing throughout the pregnancy at antenatal visits.

- The woman should be referred to have retinal screening by digital imaging at least twice during pregnancy in the first trimester and again in the third trimester. If retinopathy is detected then additional retinal assessment should be performed in second trimester and/or referral to an ophthalmologist.

- Medications for complications of diabetes (statins, ace-inhibitors) should if not already be stopped. Other medications should be reviewed by the DSM contacting the consultant obstetrician at booking.

- Offered a dating scan to confirm viability and dates.

- The use of oral hypoglycaemic agents (metformin) should be reviewed on an individual basis by the diabetes physician and offered to be continued during pregnancy. The woman should also be informed insulin may also be necessary to achieve good glycaemic control. Other oral hypoglycaemic agents should be stopped.

- Women are carefully assessed with regard to insulin requirements. A mixture of insulin regimens are used depending on requirements. A four time's daily basal bolus regimen is often required. Women can be prescribed the newer rapid acting insulins (eg Novorapid) if indicated.

- Offered first trimester combined screening at 12 weeks along with BHRUT NHS Trust routine booking bloods.

- Offered a detailed fetal anomaly and cardiac scan (four chamber view) with uterine artery dopplers at 20 weeks.

- Offered 4 weekly scans to monitor fetal growth and amniotic fluid from 28 to 36 weeks. The 32 week scan should be performed with the fetal medicine unit.

- At 36-37 weeks gestation timing, mode and management of birth should be discussed by the consultant obstetrician. Delivery should be planned at 38-39 weeks gestation.

- An individual diabetic birth plan placed in the birth section of notes (Appendix 4) is drawn up outlining the changes to hypoglycaemic agents/insulin doses during and after birth.

- Women are referred back to their diabetologist/GP for follow-up care with a letter from the DSM with the option to re-refer back if further advice is needed.

- Women are to be reviewed on the postnatal ward by the DSM before discharge. Contraception should be discussed and the importance of pre-conception care for the next pregnancy.

MANAGEMENT OF SPONTANEOUS LABOUR IN WOMEN WITH PRE-EXISTING DIABETES

- When confirmed in established labour, assess baseline blood glucose; then hourly blood glucose measurements for all women on metformin or insulin and 2 hourly if on diet using hospital based blood glucose meter not patients own meter.

- Inform Duty Registrar. Take blood for U&Es, Hb and G+S.

- Start sliding scale. Aim to maintain the blood glucose level between 4.0 – 8.0mmols.If blood sugars while on a sliding scale are greater than 8.0mmols for two consecutive hours please call a member of the antenatal diabetic team for further adjusting of the sliding scale. Maternal hyperglycaemia will cause neonatal hypoglycaemia.

- All women with Type 1 diabetes will require a sliding scale (50units Actrapid in 50mls N.Saline & IV fluids of 5% Dextrose/Saline with 20mmols Potassium running over 8-12hrs) when in established labour. Insulin should run in a separate cannula to all other infusions.

- Most women with Type 2 diabetes will require a sliding scale when in labour however there may be some women who are on small amounts of insulin/metformin and will not require a sliding scale. See individual diabetic birth plan in woman's notes for further guidance or if blood sugars greater than 8.0mmols start sliding scale as above.

- If the woman's blood glucose level drops below 4.0mmols then refer to the hypoglycaemia flowchart, appendix 5. All areas in maternity have a hypo box with this flowchart and the necessary treatments.

- Encourage epidural (because pain causes catecholamine release and increases the blood glucose).

- Commence continuous FHR monitoring for all women with pre-existing diabetes when in labour.

- Administer syntocinon in normal saline only.

- If labour is not progressing satisfactorily after 8 hours in the active phase or delivery not anticipated consider caesarean section and discuss with consultant on call.

- Anticipate shoulder dystocia if macrosomia.

- After delivery continue sliding scale until eating and drinking. If delivery takes place during the night then the sliding scale must be continued until breakfast time when the lady will start her pre-pregnancy insulin regime/oral medication.

- Postnatally women with pre-existing diabetes should have routine postnatal care of women and their babies. In addition the following should be considered:

- If Type 1 diabetic or Type 2 on insulin pre-pregnancy restart pre-pregnancy dose of insulin (see individualized diabetic birth plan in birth section of notes) just before meal and stop sliding scale 20 minutes after a meal.
  Note: insulin requirements will be significantly less than before delivery.

- If wishes to breastfeed should be informed of increased risk of hypoglycaemia and that insulin requirements will need to be reduced approx by a further 10%.

- If women with Type 2 diabetes wishes to breast feed oral hypoglycaemic agents of metformin and glibenclamide can be restarted when eating and drinking. All others should be avoided.

- See individualized diabetic birth plan or contact Diabetes Specialist Midwife, Public Health Midwife, Diabetes Specialist Nurse, on-call diabetalogist for advice.

- Women with pre-existing diabetes must have regular monitoring of blood sugars pre and 1.5 hours post meals over the next 24 hours or until normal glycaemic control is achieved.

- All women with pre-existing diabetes should be referred back to their routine diabetes care arrangements of the GP or a diabetalogist. A standard letter should be sent to them indicating this with the option to re-refer to the diabetalogist if further management is needed. Notes should be sent back to ANC for the diabetes specialist midwife to do this.

MANAGEMENT OF INDUCTION OF LABOUR FOR WOMEN WITH PRE-EXISTING DIABETES

- Admission to antenatal ward or labour ward. Consultant to decide where induction to take place antenatally.

- Some women on small doses of insulin/Metformin may be induced on the antenatal ward. Please see the individualized diabetic birthplan or consultant on ward round for clarity.

- During the induction process woman should be allowed to eat, drink and take own insulin/Metformin and encouraged to test own blood sugars.

- When in established labour, or on starting of Syntocinon infusion women with Type 1 diabetes should be advised not to take own insulin and started on sliding scale (50 units Actrapid in 50mls Normal Saline & IV fluids 5% Dextrose/Saline with 20mmols Potassium running over 8-12 hours) and monitor as above for spontaneous labour.

- Women with Type 2 diabetes should be commenced on sliding scale if blood sugars greater than 8.0mmols or see individualized diabetic birth plan and monitor as above for spontaneous labour.

- If the woman's blood glucose level drops below 4.0mmols then refer to the hypoglycaemia flowchart, appendix 5. All areas in maternity have a hypo box with this flowchart and the necessary treatments.

- Postnatally women with pre-existing diabetes should have routine postnatal care of women and their babies. In addition the following should be considered:

- If Type 1 diabetic or Type 2 requiring insulin pre-pregnancy restart pre-pregnancy dose of insulin (see individualized diabetic birth plan) before meal and stop sliding scale 20 minutes after a meal.
  Note: insulin requirements will be significantly less than before delivery.

- If wishes to breastfeed should be informed of increased risk of hypoglycaemia and that insulin requirements will need to be reduced approx by a further 10%.

- If women with Type 2 diabetes wish to breast feed oral hypoglycaemic agents of metformin and glibenclamide can be continued or restarted when eating and drinking. All others should be avoided.

- All women with pre-existing diabetes should be referred back to their routine diabetes care arrangements of the GP or a diabetalogist. A standard letter should be sent to them indicating this with the option to re-refer to the diabetalogist if further management is needed. Notes should be sent back to ANC for the diabetes specialist midwife to do.

MANAGEMENT OF CAESAREAN SECTION FOR WOMEN WITH PRE-EXISTING DIABETES

- If caesarean performed before 39 weeks gestation admit for steroids 2 days before and refer to management of women with diabetes admitted for steroids.

- Admit night before or on morning of operation at discretion of consultant.

- Woman should have normal or reduced night time insulin dose. Follow woman's individualized diabetic birth plan in notes.

- Give ranitidine 150mg at midnight and 06.00hrs.

- Admit to labour ward at 07.00-08.00hrs.

- See individual diabetic birth plan in notes. Insulin should run in a separate cannula to all other infusions.

- All women with Type 1 diabetes will require a sliding scale (50units Actrapid in 50mls N.Saline & IV fluids of 5% Dextrose/Saline with 20mmols Potassium running over 8-12hrs) prior to theatre. Insulin should run in a separate cannula to all other infusions.

- Women with Type 2 diabetes should be commenced on sliding scale if blood sugars greater than 8.0mmols or see individualized diabetic birth plan.

- Aim to perform Caesarean section at 09.00hrs.

- During the caesarean section operation the blood glucose must be checked.

- If the woman's blood glucose level drops below 4.0mmols then refer to the hypoglycaemia flowchart, appendix 5. All areas in maternity have a hypo box with this flowchart and the necessary treatments.

- Following delivery maintain sliding scale until eating and drinking.

- Postnatally women with pre-existing diabetes should have routine postnatal care of women and their babies. In addition the following should be considered:

- If Type 1 diabetic or Type 2 requiring insulin pre-pregnancy restart pre-pregnancy dose of insulin (see individualized diabetic birth plan) before meal and stop sliding scale 20 minutes after a meal.
  Note: insulin requirements will be significantly less than before delivery.

- If wishes to breastfeed should be informed of increased risk of hypoglycaemia and that insulin requirements will need to be reduced approx by a further 10%.

- If women with Type 2 diabetes wish to breast feed oral hypoglycaemic agents of metformin and glibenclamide can be continued or restarted when eating and drinking. All others should be avoided.

- All women with pre-existing diabetes should be referred back to their routine diabetes care arrangements of the GP or a diabetalogist. A standard letter should be sent to them indicating this with the option to re-refer to the diabetalogist if further management is needed. Notes should be sent back to ANC for the diabetes specialist midwife to do.

The paediatricians must be called to review all babies born to women with diabetes either normally or at caesarean section.

SCREENING FOR GESTATIONAL DIABETES

All women booking at BHRUT should have a random blood sugar (RBS) measurement at booking as an initial screening for gestational diabetes. Women with pre-existing diabetes should **not** have an oral glucose tolerance test (OGTT).

- A RBS under 8.0mmols is normal
- A RBS of 8.0mmols to 10.9mmols woman to have OGTT straight away, if normal repeat at 24 weeks gestation
- A RBS of 11.0mmols or greater woman to be treated as a pre-existing diabetic

Interpretation of OGTT in pregnancy is

	Normal (mmol/L)	IGT (impaired glucose tolerance) (mmol/L)	Diabetes (mmol/L)
Fasting	3.5-6.0	6.1 – 6.9	7.0 or greater
At 120 minutes	< 7.8	7.8 – 11.0	11.1 or greater

The following are indications for OGTT during pregnancy.

- Previous GDM pregnancy-GTT at 16-18 weeks and 28 weeks

The following are indication for OGTT during pregnancy at 24 weeks

- Family history i.e. 1st degree relative or family history of GDM
- BMI of greater than 30
- Previous baby of 4.5kgs or more in Caucasian or African women
- Previous baby of 4.0kgs or more in all other ethnic groups
- Previous unexplained stillbirth
- Women on Olanzapine medication

The following are additional indications for OGTT during pregnancy before 37 weeks gestation. From 37 weeks gestation a fasting blood glucose should be carried out.

- Polyhydraminos
- Macrosomia
- Glycosuria (2 ++'s or more on 2 occasions or 3 +'s or more on one occasion)

Instructions for OGTT are on the intranet under Women's, Information leaflets.

MANAGEMENT OF WOMEN WITH GESTATIONAL DIABETES

- All women with high OGTT's should be referred to the Diabetes Specialist Midwife (DSM) or Public Health Midwife/DSN for education as outlined in Appendix 6. This performa is placed at the end of the woman's notes.

- Women should be reviewed 1-2 weeks later and receive routine care for the healthy pregnant woman as according to NICE Antenatal care:www.nice.org.uk/CG062 and in addition the following care should be provided 2-3 weekly or as according to the needs of the patient.

- Antenatal care should be provided for women on Metformin/Insulin's in the Multidisciplinary clinic at KGH on Friday's and Queens on Mondays.

- Women with GDM on diet alone can have antenatal care by diabetes specialist midwife/public health midwife in KGH Tuesday clinic until 36 weeks when they will be then be seen in the multidisciplinary clinic for consultant to decide date and mode of delivery.

- Women with GDM diagnosed before 20 gestation will have serial growth scans at 28, 32 and 36 weeks, diagnosed after 20 weeks gestation growth scans at 32 and 36 weeks gestation or as indicated.

- Women controlled on diet showing no evidence of macrosomia and no other concerns then delivery should be at 40 weeks gestation.

- Women controlled on metformin, insulin's or evidence of macrosomia delivery should be between 39-40 weeks gestation.

MANAGEMENT OF GESTATIONAL DIABETIC WOMEN IN SPONTANEOUS LABOUR/INDUCTION OF LABOUR/CAESAREAN SECTION

- Admit to antenatal ward or labour ward on day of induction or caesarean section.

- Women for caesarean section should be prepared as for all women going for caesarean section and advised antenatally by antenatal diabetic team on normal or reduced insulin doses night before the caesarean section.

- During induction of labour women to eat, drink monitor own blood glucose levels and administer own metformin, insulin's until in established labour.

- When in established labour metformin, insulin's to be stopped and midwife to take over monitoring of blood sugars with hospital based meters. 2 hourly blood sugars for women on diet and hourly for women on metformin or/and insulin's.

- Only if blood sugars go above 8.0mmols a sliding scale should be commenced in established labour as protocol (50 units Actrapid in 50mls N. Saline & 5% Dextrose/Saline with 20mmols Potassium running over 8-12 hours). Maternal hyperglycemia will cause neonatal hypoglycaemia.

- Aim to maintain the woman's blood glucose level between 4.0-8.0mmols. If blood sugars are greater than 8.0mmols for 2 consecutive hours while on sliding scale call a member of antenatal diabetic team for further adjusting of the sliding scale.

- If blood glucose level drop below 4.0mmols refer to hypoglycaemia flowchart appendix 5. All areas in maternity have a hypo box with this flowchart and the necessary treatments.

- Continuous fetal monitoring for women on metformin or/and insulin's, intermittent fetal monitoring and water births for women with diet controlled diabetes if all else normal.

- After delivery stop sliding scale, metformin and all insulin's. Check blood glucose level. If greater than 8.0mmols, ask woman to continue monitor own blood glucose levels over next 12-24 hours. If persistently greater than 8.0mmols then call member of antenatal diabetic team to review.

- On discharge all women with gestational diabetes should be asked to return for a fasting blood glucose measurement at 6 weeks postnatally. Instructions leaflet for postnatal fasting blood glucose can be found on intranet under Women's then Information leaflets.

- Abnormal results will be forwarded to the DSM/Public Health Midwife to forward to the GP and woman.

MANAGEMENT OF ALL DIABETIC WOMEN WHEN ADMITTED FOR STERIODS

Maternal diabetes mellitus is a recognised risk factor for neonatal respiratory distress syndrome (RDS). The use of antenatal corticosteroids in pregnancies complicated by maternal diabetes mellitus is recommended. Steroid therapy can have an adverse effect on glucose tolerance causing significant worsening in blood glucose control. Supplementary insulin is used to prevent the development of maternal ketoacidosis (DKA) and fetal acidaemia (DOH 2001).Betamethasone is the steroid of choice to enhance lung maturation. Recommended therapy involves two doses of Betamethasone 12mg, given intramuscularly 24 hours apart.

IF EATING AND DRINKING THE WOMAN SHOULD BE ALLOWED TO TAKE OWN METFORMIN AND OWN INSULINS. IN ADDITION SLIDING SCALE INSULIN (ACTRAPID 50 UNITS + 50MLS NORMAL SALINE) SHOULD BE COMMENCED WHEN BLOOD SUGAR IS GREATER THAN 8.0MMOLS. IV FLUIDS OF 5% DEXTROSE/SALLINE WITH 20MMOLS OF POTASSIUM ARE NOT REQUIRED IF EATING AND DRINKING. IF OR WHEN NBM THEN IV FLUIDS OF 5% DEXTROSE/SALINE WITH 20MMOLS OF POTASSIUM OVER 8-12 HOURS SHOULD BE COMMENCED ALONGSIDE INSULIN INFUSION. U&E'S SHOULD BE CHECKED.

- Women with Type 1 or Type 2 diabetes admit to labour ward. Women with GDM controlled on metformin and or insulin's should be admitted to antenatal ward. Women with GDM controlled on diet should have steroid in ODU/Triage.

- Women with GDM on metformin and or insulin should monitor own blood sugars pre and post all meals (3 hourly in night) on antenatal ward and when greater than 8.0mmols to be transferred to labour ward for sliding scale insulin. Women should remain in hospital for up to 24 hours after the second steriod injection.

- Women with GDM on diet should be advised to monitor blood sugars at home pre and post all meals for 24 hours after the second steriod injection and if greater than 8.0mmols then present to labour ward for sliding scale insulin.

- Site IV cannula. Take bloods for U&E's, FBC, G&S.

- Give first dose of Bethamethasone 12mg IM.

- If patient eating and drinking ensure she continues with her own insulin/metformin regime or individualized plan by antenatal diabetic team.

- Women with Type 1 or Type 2 diabetes monitor own blood sugar hourly after 1st steroid injection and when blood sugar greater than 8.0mmols then start sliding scale insulin infusion. (Actrapid 50 units + 50mls N.Saline). When on sliding scale insulin blood sugars must be taken using hospital based meter.

- If emergency delivery is being considered or woman to be nil by mouth, start insulin/glucose infusion (Actrapid 50 units + 50mls N.Saline and IV fluids of 5% Dextrose/Saline with 20mmols potassium over 8-12hours).

- CTG monitoring to be performed 3 times daily, all urine samples to be tested for ketones.

- The initial peak in blood glucose is likely to occur 9-15 hours after the first Betamethasone injection. The second peak 8-15 hours after the second dose.

- While on sliding scale if blood sugars greater than 10.0mmols for 2 consecutive hours then inform registrar for advice on a tailored sliding scale. The tailored sliding scale should consist of increasing the standard dose by 1-2 units more per hour when blood sugar 10mmols or more. When blood sugar under 10.00mmols revert to the normal sliding scale dose. Blood sugars should be done hourly. Call the antenatal diabetic team or on-call diabetalogist for advice.

- Give 2nd dose Bethamethasone 24 hours later.

- Sliding scale and blood sugar monitoring will need to be continued for 12 to 24 hours after 2nd dose of steroid. When blood sugar less than 8.0mmols for 2 consecutive hours stop sliding scale. If hyperglycemia continues after 24 of having 2nd steroid call team to review woman's daily insulin/metformin doses.

MANAGEMENT OF WOMEN ADMITTED WITH DIABETIC KETOACIDOSIS

Women with Type 1 diabetes in pregnancy are warned of the risks of diabetic ketoacidosis (DKA). Women are provided with a blood ketone meter at booking and advised that if they become unwell (high blood sugar with ketonuria with or without evidence of infection) they should seek medical advice immediately. All women have telephone number for the diabetes specialist midwife. If the diabetes midwife is not available women are advised to attend casualty department at Queen's Hospital if under 20 weeks or labour ward (triage) at Queen's Hospital if over 20 weeks pregnant.

Diabetic ketoacidosis in pregnancy is an emergency and the woman should be managed by a multi-professional team.

- The obstetric consultant should be informed.
- The on-call medical team should be informed
- The anesthetic team should be informed

The woman will be managed in the labour ward HDU at Queen's Hospital where there is access to high dependency care. While waiting for the on-call medical team the following can assist in the care given to women with DKA.

Diabetic Ketacidosis (DKA) in Adults

CONFIRM DIAGNOSIS, Note: If patient is pregnant call diabetic team immediately
• Glucose, Na, K, Urea, Chloride • Venous bicarbonate (arterial blood gases (ABG) if there are any other indications i.e., shortness of breath, upper respiratory tract infection or chronic chest disease) • Urine/plasma ketones
ESTABLISH CAUSE
• FBC: Differential Count • LFT'S, U&E'S • Blood & Urine Cultures • ECG • CXR (Latter 2 mandatory if age >40 years) •
NIL BY MOUTH INITIALLY AND CONSIDER NG TUBE (SEVERE CASE)
SET UP IVI. Caution if potential contraindications (e.g. fluid overload IHD/heart failure/dialysis)
• 1st litre 0.9% sodium chloride or colloid over 1 hour (if patient in shock) (add KCL as appropriate, keep K+ between 4.0-5.0mmol/L • 2nd litre over 2 hours (+20-40 mmols KCL) • 3rd & 4th litres over 4 hours each (measure electrolyte every 2-4 hours initially then 4-6 hourly) • Further infusions – each litre over 6 to 8 hours (Change Normal Saline to Dextrose 5% or Dextrose/Saline if blood glucose less than 12 mmol/L)
IF PATIENT IS IN SHOCK OR HYPOTENSIVE – ASSESS FOR PLASMA EXPANDERS
GIVE INSULIN AS INFUSION AND BASAL INSULIN **e.g. Levemir or Lantus 10 units stat sc**
50 units soluble insulin in 50 mls 0.9% sodium chloride infusion Administer as per sliding scale via syringe driver
Use same cannula for insulin infusion Y connector only if all fluids/insulin given via drip Control device (IVAC) or syringe driver Aim to stop insulin infusion sliding scale if patient is well, eating and drinking Recommence normal medications or commence oral hypoglycaemic agents & insulin's as required. **NOTE: Any concerns please contact Senior Medical Doctor or Diabetes Team**

Reference:

Cathy Nelson-Piercy. Handbook of Obstetric medicine. Pgs 91-108 (2006)

Confidential Enquiry into Maternal and Child Health (CEMACH) Pregnancy in Women with Type 1 and Type 2 diabetes in 2002-2003, England, Wales and Northern Ireland. London: CEMACH. 2005

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

National Institute for Health and Clinical Excellence (NICE) Diabetes in pregnancy: management of diabetes and its complications from pre-conception to the postnatal period. March (2008)

National Institute for Health and Clinical Excellence (NICE) Antenatal care: routine care for the healthy pregnant women. NICE: 2008

Guideline compiled by Liz Phillips, Edel Casey and Richard Howard

Appendix 1
Pre-conception checklist

Name: DOB: Age: Hospital Number:	Date of 1st visit: Type 1 / Type 2 Date of diagnosis: BMI: Smoker Yes / No BP:

Current Medications:

Previous Pregnancies:

Microvascular complications:
Other medical problems:

Screening Test	Date of last investigation	Result	Signature/ Designation/ Date
HbA1C			
TFTs			
U&Es, Creatinine			
MSU / PCR			
Retinal Screening			
Neuropathy Screening			
Rubella			
Last cervical smear			
Other (HBO, virology)			

Issues for discussion	Discussed Y / N	Plan	Signature/ Designation/ Date
Individualised target HbA1C			
Target blood glucose (individualised)			
Increased monitoring in pregnancy/frequent hospital appointments			
Hypo warning signs/Glucagon/ Driving/DVLA			
Ketoacidosis in pregnancy			
Retinal screening			
Contraception			
Diet, Exercise, Weight loss			
Alcohol, Smoking			
Recreational drugs			

Counselled re:	Y / N	Plan	Signature/ Designation/ Date
Congenital abnormalities			
Macrosomia/Birth trauma/IUGR			
Late stillbirth/IOL			
Antenatal screening tests/USS			
Neonatal complications/SCBU/ tests			
Information leaflets			

Recommended treatments	Medications stopped and why

Appendix 2

Barking, Havering and Redbridge University Hospitals NHS Trust

Timetable of Antenatal Appointments for Type 1 and Type 2 Diabetic Women

Every appointment should provide the opportunity to discuss pregnancy and diabetes. Antenatal care will consist of shared care between the obstetrician and the midwife

Booking appointment by 10 weeks	Medical and pregnancy history taken, lifestyle and health issues discussed Information on how diabetes affects pregnancy and how pregnancy affects diabetes according to antenatal checklist for type 1 and type 2 diabetes Blood tests and investigations for diabetes and pregnancy Review medications and prescribe Aspirin 75mg, Folic Acid 5mg Antenatal care planned CO_2 monitoring
One week later	Appointment with multidisciplinary team (see sticker on page) Dating scan Review and discuss blood tests results Plan of care for pregnancy
11-13 weeks	Ultrasound scan and screening for chromosomal abnormalities Joint antenatal diabetic clinic to discuss pregnancy and diabetes
15-16 weeks	Joint antenatal diabetic clinic to discuss pregnancy and diabetes Review, discuss and record results of screening tests Plan care accordingly
18 weeks	Joint antenatal diabetic clinic to discuss pregnancy and diabetes
18-20 weeks	Fetal anomaly and cardiac scan (4 chamber view) including dopplers (Queen's) Joint antenatal diabetic clinic to discuss pregnancy and diabetes Blood test HBA1C Retinal screening if 1st trimester screening showed retinopathy
22-24 weeks	Joint antenatal diabetic clinic to discuss pregnancy and diabetes Review fetal anomaly scan results and book serial growth scans
25 weeks	Joint antenatal diabetic clinic to discuss pregnancy and diabetes
28 weeks	Joint antenatal diabetic clinic to discuss pregnancy and diabetes Blood test for anaemia and red cell antibodies and HBA1C Anti-D injection if rhesus negative blood group Scan for growth and amniotic fluid Retinal screening
30-32 weeks	Joint antenatal diabetic clinic to discuss pregnancy and diabetes Scan for growth and amniotic fluid with Fetal Medicine Unit Results of blood tests taken at 28 weeks Discuss breastfeeding
34 weeks	Joint antenatal diabetic clinic to discuss pregnancy and diabetes Anaesthetic review if BMI > 40 or other co-morbidities HBA1C
36 weeks	Joint antenatal diabetic clinic to discuss pregnancy and diabetes with Consultant Scan for growth and amniotic fluid Mode of delivery and timing of delivery discussed and booked Birthplan
37-38 weeks	Joint antenatal diabetic clinic to discuss pregnancy and diabetes
39-40 weeks	Joint antenatal diabetic clinic to discuss pregnancy and diabetes

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APPENDIX 3

TYPE 1 AND TYPE 2 DIABETES – ANTENATAL CHECKLIST
The following topics should be discussed with all pregnant women with existing diabetes

Pre-conception Care **Yes/No**

Name: **Hospital No.**	**Plan**	**Signature & Date**
How diabetes affects your pregnancy: • Increased risk of miscarriage, stillbirth, congenital abnormalities • Increased risk of having a large baby, admission to SCBU • Increased risk of polyhydraminos (extra fluid around baby) • Increased monitoring and interventions during labour • Increased risk of your labour being induced, caesarean section • Early delivery		
How pregnancy affects your diabetes: • Increased risk of hypoglycaemia/hyperglycaemia • Increased risk of retinopathy • Increased risk of nephropathy • Increased hypo-unawareness		
To help reduce (but not remove completely) the above risks we recommend the following: **Blood Tests/Investigations in addition to pregnancy bloods** • HBAIC (in each trimester) • U&E's, LFT's, TFT's, (liver and thyroid function) • MSU – MC&S, ACR/PCR (urine tests) • Retinal Screening twice during pregnancy (1st and 3rd trimester) **Medications of:** • Aspirin 75mg until 34 weeks • Folic acid 5mg until 13 weeks • Vitamin D 10mcg (Pregnacare) until delivery • Insulin +/- Metformin • Glucagon		

Glycaemic Control: • Diet & Exercise (BHR Diet Sheet given) • Test blood sugars 4 times daily • Target blood sugars: Pre-meals 4.0-5.5mmols 1½ hrs Post meals 5.0-7.5mmols • Hypo – unawareness/signs of hypo's/treatment of hypo's • Ketoacidosis – blood ketone meter and advised to get GP to prescribe ketone strips (Type 1 only) • Injection sites/size of needles checked **Scans:** • Dating, Nuchal, Anomaly+Cardiac (4 chamber view) • Growth @ 28, 32, 36 weeks **Delivery:** • Queen's • Timing of delivery 38 – 40 weeks • Consultant to discuss delivery 36 weeks • Diabetic birth plan (time, mode and management of birth, contraception and follow-up) **Baby:** • Breastfeeding • Monitoring of baby's blood sugars **Postnatally:** • Referred back to GP, Diabetic Physician • Contraception and pre-conception care for next pregnancy		

Appendix 4

Management of Diabetes during IOL, Labour, LSCS and Post delivery
(To be completed at 36-38 weeks gestation)

Patient details:

Type of Diabetes: Type 1 Type 2 GDM

Present insulin's doses: **Metformin dose:**

Mode of Planned Delivery: IOL / Spontaneous Labour / LSCS/ Steroids

Insulin Dose Night Before:

During labour/LSCS

Type 1 diabetics - Sliding Scale (5% Dextrose/Saline + 20mmols KCL over 8-12 hours and Actrapid 50units + 50msl N.Saline with hourly blood sugars)

Type 2 diabetics/GDM – Sliding Scale as above when blood sugar greater than 8.0mmols

Steriods - If woman eating and drinking allow own insulin/metformin + start Actrapid 50 units + 50mls N.Saline when blood sugar 10.0mmols or more. If NBM start Sliding Scale (5% Dextrose/Saline + 20mmols KCL over 8-12 hours and Actrapid 50units + 50msl N.Saline with hourly blood sugars)

Post natal

Insulin Doses Post Delivery:

Oral hypoglycaemic medication:

Discharge: GP ☐ Diabetalogist ☐ 6 week retest ☐

Contraception and Pre-conception advice for next pregnancy

Signed:

HYPO BOX: For Treatment of Hypoglycaemia in Patients with Diabetes (Adult inpatient care)

Hypoglycaemia = blood glucose (BG)of less than 4 mmol/l. Confirm with a lab sample but DO NOT WAIT for results before acting
Blood Glucose <3mmol/l needs URGENT attention. Treat and verify. Take Blood for URGENT laboratory glucose

4mmol/L	3mmol/L	2mmol/L	1mmol/L
MILD **Patient conscious and able to swallow** Trembling, sweating, hungry, tingling, headache, anxiety, palpitations, nausea, forgetfulness	**MODERATE** **Patient conscious and able to swallow, but in need of assistance** Difficulty concentrating, confusion, weakness, giddiness, drowsiness, unsteady, headache, dizziness, difficulty focusing and speaking	**SEVERE** **Patient unconscious, fitting and unable to swallow** **AIRWAY** **BREATHING** **CIRCULATION**	**NIL BY MOUTH** **Call for Emergency Assistance** Give IV Glucose 150-160ml 20% Glucose Or Glucagon 1mg IM
STEP 1		**Call for Emergency Assistance**	
Administer 10g – 20g fast acting glucose 4 - 5x GlucoTabs (4g glucose per tablet) or 1 x bottle of GlucoJuice	**Administer 1-2 tubes of GlucoGel** (10g glucose per tube) Ensure gag reflex is present.	**Administer:** IV Glucose 150-160ml 20% glucose over 10-15 minutes or Glucagon 1mg IM (located in fridge)	**NG/Gastrostomy/Jejunal Feed:** 5 level teaspoons of sugar dissolved in 50ml of warm water followed by 30ml bolus water
STEP 2			
Wait 15 minutes and recheck glucose levels, and record. If reading is still below 4 mmol/L, or if no physical improvement, repeat STEP 1. (cycle x 4) If sample is less than 3 mmol/L check venous sample IF NO RECOVERY, BG<3mmol/l – call doctor		**Once patient is conscious and not NBM give frequent sips of GlucoJuice or Lucozade** Recheck glucose level every 15 minutes to ensure increase to at least 4 mmol/L **If No recovery after 15mins IV 20% glucose infusion**	

ALWAYS FOLLOW UP WITH A SLOWLY DIGESTED/ STARCHY CARBOHYDRATE
Check glucose level. Once it is at 4 mmol/L or over and patient is recovered, eat a minimum of 15g slowly digested/starchy carbohydrate. Eg: cereal, sandwich or a glass of milk or normal meal if due (or restart NG feed)
Recheck glucose levels after 15 minutes.
NOTE: Insulin should NOT be omitted following an episode of hypoglycaemia and patients should be assessed for dose adjustment.

Appendix 6

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GESTATIONAL DIABETES – ANTENATAL CHECKLIST

The following topics should be discussed with all newly diagnosed gestational diabetics

Name: **Hospital No:**	**Date**	**Signature**
What is gestational diabetes? (GDM) (leaflet provided)		
Why you were tested		
Result of glucose tolerance test (GTT)		
Reasons why you may have developed GDM		
Risks of GDM to mother: (these risks are reduced if your blood glucose levels are controlled) • Increased risk of infections (thrush, urinary tract infections) • Increased risk of polyhydraminos (extra fluid around baby) • Increased monitoring and interventions during labour • Increased risk of induction of labour and caesarean section		
Risks of GDM to baby: (these risks are reduced if your blood glucose levels are controlled) • Macrosomia (large baby) • Birth trauma • Neonatal hypoglycaemia (low blood sugars in baby) • Stillbirth		

• Obesity in later life		
Treatment of GDM: • Diet (BHR diet sheet given) • Exercise • Monitoring of blood sugars • Target blood sugars: Pre-meals 4.0-5.5mmols 1½ hours Post meals 5.0-7.5mmols • Metformin tablets/insulin • Scans		
Delivery: • Queen's • Timing of delivery		
Baby: • Breastfeeding • Monitoring of baby's blood sugars		
Postnatally: • 6 weeks' retesting • Annual follow-up with GP • The next pregnancy		