DIABETES MELLITUS – MANAGEMENT IN PREGNANCY

This LOP is developed to guide clinical practice at the Royal Hospital for Women. Individual patient circumstances may mean that practice diverges from this LOP.

1. AIM
   • To provide appropriate services to woman at risk of the maternal and fetal/neonatal complications of diabetes mellitus (DM) in pregnancy.
   • To provide a structured program of education which includes diet, exercise, medication, self care and blood glucose level (BGL) monitoring to woman with diabetes in pregnancy.
   • To optimise glycaemic control for all woman with diabetes in pregnancy.
   • To detect and treat appropriately any maternal or fetal complication of diabetes manifesting during the course of pregnancy.
   • To prevent or shorten hospitalisation by providing stabilisation through outpatient services.
   • To liaise with obstetricians, midwives, neonatologists and general practitioners to help them provide an appropriate level of care to woman with diabetes in pregnancy.
   • To identify woman with persistent diabetes or carbohydrate intolerance following pregnancy and to ensure appropriate follow up with their general practitioner and/or local Diabetes Centre.

2. PATIENT
   • Pregnant woman with known pre-existing diabetes mellitus (pre-gestational DM)
   • Pregnant woman with known pre-existing carbohydrate intolerance
   • Pregnant woman with gestational diabetes mellitus (GDM) diagnosed in pregnancy

3. STAFF
   • Medical staff
   • Registered Midwives
   • Registered nurses
   • Diabetes Consultant
   • Dietitian

4. EQUIPMENT
   • Blood Glucose Level (BGL) monitor

5. CLINICAL PRACTICE
   ANTENATAL
   • Assess diabetic woman following diagnosis or at the booking visit, by an obstetrician. Decide whether their care is with an obstetrician, midwife or shared care GP (see Table 1)
   • Arrange review with diabetic team: this includes diabetic educator, dietitian and physician/endocrinologist. See educational notes for more information.
   • Give woman with gestational diabetes (GDM) a home blood glucose meter with memory facility.
   • Recommend that woman performs 4 times daily capillary BGLs or as doctor requests:
     o Before breakfast
     o 2 hours after breakfast
     o 2 hours after lunch
     o 2 hours after the evening meal
   • Aim for fasting glucose level <5.0 and postprandial 4-7 mmol/l.
DIABETES MELLITUS – MANAGEMENT IN PREGNANCY  cont’d

- Request fructosamine and an HbA1C level at the first visit and subsequently (every 4-6 weeks) at the discretion of the physician.
- Request first trimester dating ultrasound in women with pre-gestational diabetes
- Recommend first trimester screening with ultrasound at 11-13+ weeks for aneuploidy and or structural anomalies, especially in women with pre-gestational diabetes
- Request ultrasound at 18-20 weeks gestation to look for major structural abnormalities. In women with pre-gestational DM, recommend this is performed at a centre with expertise in fetal imaging
- Consider fetal echocardiography at 20-24 weeks for woman with pre-gestational diabetes, particularly in women with poor peri-conceptual or subsequent BGL control.
- Arrange fetal surveillance with ultrasound in women with pre-gestational DM or GDM on insulin (see educational notes below)
- Arrange ongoing care:
  - Diabetic Educator: Telephone/email consultations (with written consent) or outpatient visits as necessary.
  - Physician: Regular visits – 1-4 weekly depending on diabetic control. All insulin/oral hypoglycaemic requiring patients will be seen 1-2 weekly until 34/40 then weekly. They will also require close telephone/e-mail contact with the educator for adjustment of insulin dosage.
  - Antenatal care: Regular antenatal review with an obstetrician, midwife or shared care GP. Women requiring insulin or oral hypoglycaemics or women with poor diabetic control will need to see an obstetrician regularly. Women with GDM with good diabetic control with diet only (and no other obstetric risk factors) may be managed by their low risk model of care
  - Timing of delivery: Women with suboptimal control evidenced by elevated BGL or fetal complications may require delivery prior to 40 weeks gestation. This will be determined by the patient’s obstetrician. Insulin/Oral hypoglycaemic requiring patients will also require assessment regarding timing of delivery (see educational notes below)
- Inform neonatologists when delivery is planned for woman with fetal macrosomia (estimated fetal weight >90th centile) or congenital malformations or woman with poorly controlled diabetes

ADMINISTRATION OF STEROIDS TO WOMEN WITH DIABETES
- Administration of steroids for fetal lung maturation to women with diabetes is associated with an increase in blood glucose levels.

For women receiving insulin
- Consult obstetric physician/endocrinologist
- Continue qid BGL
- Increase basal insulin by 50% at time of first dose and review dose after 24 hours. Continue for 48 hours after first dose. No change to meal time insulin
- After 48 hours return to usual dose

For women on diet or those receiving oral hypoglycaemic drugs e.g. metformin:
- Consider temporary treatment with insulin e.g. long acting insulin 12-16 units bd for 48 hours, especially if the woman demonstrates hyperglycaemia after the first dose of steroids.
INTRAPARTUM/PRE-CAESAREAN PLAN FOR WOMAN WITH DIABETES

1. Diet Controlled Diabetic Patients:
   - Continue 6-hourly BGL testing and a diabetic diet. Insulin will rarely be required at this stage of pregnancy.
   - No 5% dextrose is required.

2. Insulin or oral hypoglycaemic medication (e.g. metformin) requiring diabetic patients during labour
   - Continue their current doses of self-administered insulin and/or oral hypoglycaemics until they are fasting or in established labour.
   - Commence second hourly BGL on the morning of planned delivery or when fasting commences.
   - Base further doses of insulin on these results given as ultra short acting insulin. This may be administered as either a sliding scale or insulin infusion (see Appendix B).
   - If labour cannot be induced, the patient may require further doses of long-acting insulin. This should be discussed with the endocrinologist/physician.
   - Suspend regular doses of insulin once in established labour, (exception Type 1 DM)
   - Perform BGL’s 1-2 hourly unless otherwise specified.
   - Commence 5% Dextrose 84ml/hour (see Appendix B), if BGL <3.5mmol/l or symptomatic hypoglycaemia, or give a carbohydrate meal if appropriate.
   - Check urinalysis for ketones at each void or 4 hourly for Type 1 Diabetics only

3. Insulin or oral hypoglycaemic medication (e.g. metformin) requiring diabetic patients prior to elective LSCS:
   - Plan LSCS for a morning list.
   - Administer the usual dose of insulin the evening prior to LSCS
   - Commence hourly capillary BGL s at 0600.
   - Perform urinalysis for ketones (type 1 Diabetics) at each void or 4 hourly
   - These babies are at increased risk of neonatal complications including hypoglycaemia and need appropriate assessment (see Hypoglycaemia in a neonate - monitoring and management LOP)

4. Patients with subcutaneous insulin pump
   - Arrange detailed management plan/consent for Type 1 diabetics receiving insulin by continuous subcutaneous pump in advance.
   - Contact the physician/endocrinologist on call if these women present unexpectedly in labour or for delivery;
   - Reduce basal insulin by 30% and perform hourly capillary BGL monitoring in the interim
   - Complete the following documentation:
     - SESIAHS assessment of patient entering hospital with subcutaneous insulin pump 031213. Prior to or on admission, all women using subcutaneous insulin pumps will need to sign the appropriate consent (SESIAHS inpatient continuous subcutaneous insulin infusion pump therapy patient agreement_041213)
     - An insulin chart completed indicating the woman is using an insulin pump (adult subcutaneous insulin prescribing chart 240713)
     - Insulin dosage should then be prescribed on the appropriate chart (SESIAHS continuous subcutaneous insulin infusion record 041212.)
DIABETES MELLITUS – MANAGEMENT IN PREGNANCY  cont’d

B. Postpartum
- Recommend breastfeeding
- Arrange monitoring and management for neonatal hypoglycaemia as per the Hypoglycaemia in a neonate- monitoring and management LOP

Women with pre-gestational diabetes postpartum
- Continue 4/24-qid capillary BGL monitoring until the woman is eating a full diet or more frequently if indicated.
- Recomence insulin at pre-pregnancy doses for pre-gestational diabetics, or approximately 1/3 of pregnancy dose
- Continue diabetic diet
- Inform women with pre-pregnancy diabetes about the importance of pre-conceptional folate (5 mg) and the importance of good peri-conceptual diabetic control.
- Ensure contraception has been addressed and a plan has been made to have LOW FAILURE RATE contraception in place by 6 weeks postpartum. Women with pre-gestational diabetes should be encouraged to NEVER have an unplanned pregnancy

Women with GDM postpartum
- Cease insulin/ oral hypoglycaemics
- Continue qid BGL’s for 48 hours after recommencement of a normal diet.
- Determine further monitoring following review by the doctor or diabetes educator.
- Advise women regarding need for follow up for Glucose tolerance test prior to discharge:
  - At 1 year for diet controlled women – written recommendation to be sent to the GP
  - All others at 6 weeks; to be arranged by postnatal ward

6. DOCUMENTATION
- Integrated clinical notes
- Diabetes care plan
- For GDM women record BGLs on the NSW Health Maternity Observation chart.
- For women on subcutaneous insulin or pre-existing diabetes record BGLs on the Adult Subcutaneous Insulin prescribing chart.
- For women on Subcutaneous Insulin pumps the Assessment of Patient Entering Hospital with Subcutaneous Insulin Pump and Inpatient continuous Subcutaneous Insulin infusion Pump Patient agreement forms are completed and filed in the medical notes. The Continuous Subcutaneous Insulin Infusion Record form is completed by the staff or the patient to maintain a record of management.
- For women on IV Insulin use the Adult IV Insulin Infusion medication and record form.

7. EDUCATIONAL NOTES
- Self-testing of capillary blood using reagent test strips and a home blood glucose meter is the standard method for monitoring BGL in pregnant woman with diabetes
- Fructosamine or HbA1C levels which are the upper end of the normal range, may underestimate the severity of the hyperglycaemia. Fructosamine and HbA1C monitor the adequacy of blood glucose homeostasis over the preceding 3 and 6 weeks respectively. There is no Medicare rebate for this for women with gestational diabetes
Although diabetes is a known risk factor for unexplained stillbirth, there is no evidence that standard fetal monitoring identifies these at risk babies (unless associated with IUGR). This complication is extremely rare in woman with controlled diabetes in pregnancy.

Insulin requirements during labour are generally quite low. Insulin can be given by S/C or intravenous route (see Appendix A).

All infants of a diabetic mother require early establishment of feeds and screening of BGL with a cot side (portable) device. Cot side devices may under-read and a low cot side BGL should be confirmed with a formal BGL.


The role of the Diabetes Educator is to:
- Provide general education about the nature of diabetes in pregnancy
- Enrol women in National Diabetes Services Scheme (NDSS)
- Instruct the patient in the techniques of blood sugar monitoring four times a day (qid) i.e. fasting and 2 hour postprandial
- In some cases, the patient will require insulin therapy which will be prescribed by the physician and the patient will be given instruction on self administration of insulin
- Educate insulin treated patients about hypoglycaemia
- Educate women about the benefits of breastfeeding for women with diabetes and encourage breastfeeding

The role of the Dietitian is to:
- Educate patients about the appropriate diabetic diet
- Encourage obese patients to maintain their present weight or minimise subsequent weight gain

The role of the Physician/Endocrinologist is to
- Explain the results of the diabetes testing
- Explain the potential maternal and fetal/neonatal complications of diabetes
- Advise about the potential long term implications of gestational diabetes
- Describe the management regimen
- Perform an appropriate history and examination
- Identify and manage any maternal complications e.g. hypertension, renal impairment, eye disease
- Ensure liaison with obstetrician/midwife/GP performing antenatal care
- Refer to obstetrician if insulin or oral hypoglycaemic agents are commenced or diabetic control is considered suboptimal.

Obstetric management of diabetic patients
- Insulin/Oral hypoglycaemic requiring patients will be seen regularly by an obstetrician.
- Insulin/Oral hypoglycaemic requiring patients will require assessment regarding timing of delivery
- Patients with suboptimal control evidenced by elevated HBGM or fetal complications may require delivery prior to 40 weeks gestation. This will be determined by the patient’s obstetrician

Timing of delivery (to prevent stillbirth and complications associated with macrosomia/ IUGR)
DIABETES MELLITUS – MANAGEMENT IN PREGNANCY  cont’d

- Review obstetric risk factors for stillbirth: including maternal age >40, obesity (BMI>30), ethnicity, fetal growth restriction, hypertension and smoking
  - Well controlled diet controlled GDM: allow to deliver at standard post-dates i.e. >40+7-12
  - Well controlled low dose(< 0.5 units/kg) Insulin/oral hypoglycaemics requiring GDM with no other risk obstetric risk factors: aim to deliver around 40-41 weeks
  - Poorly controlled insulin/oral hypoglycaemics requiring GDM, high dose (>0.5 units/kg) insulin/oral hypoglycaemic requiring GDM, or insulin/oral hypoglycaemic requiring GDM with other obstetric risk factors aim to deliver by 40 weeks
  - Well controlled pre-gestational DM: review at 38 weeks for fetal and maternal stability (blood sugars, HbA1c, insulin requirement, fetal growth). Deliver from 38-40 weeks depending on control
  - Poorly controlled pre-gestational DM: consider delivery around 38 weeks gestation

- Fetal surveillance

  - Review maternal/obstetric risk factors for growth restriction or other indications for ultrasound such as obesity (BMI>30), previous fetal growth restriction, maternal hypertension and smoking
    - Diet controlled GDM: no additional scans
    - Insulin/oral hypoglycaemics requiring GDM: ultrasound scan once on insulin/oral hypoglycaemics and then every 4 weeks from 28 weeks
    - Pre-existing DM: ultrasound scans every 4 weeks from 28 weeks.
    - Indication for more frequent ultrasounds may include: fetal macrosomia, polyhydramnios, poor diabetic control, significant decrease in insulin/ hypoglycaemic medication, microvascular (e.g. nephrology or proliferative retinopathy) or macrovascular disease, hypertension (pre-existing or pregnancy-induced), intrauterine growth restriction, smokers

8. RELATED POLICIES/ PROCEDURES

- Gestational diabetes - screening
- Hypoglycaemia in a neonate- monitoring and management
- Obesity management in pregnancy
- Fetal Monitoring
- Corticosteroids for women at risk of preterm birth
- Fetal movements – Identification and Management of Reduced Patterns
- Induction of labour policy and procedure
- Insulin infusion protocol
- Cardiotocography (ctg) - antenatal
9. REFERENCES

1. ADIPS Consensus Guidelines for the Testing and Diagnosis of Gestational Diabetes Mellitus in Australia 2005


REVISION & APPROVAL HISTORY
Amended to bring into line with new SESLHD forms Feb 2014
Reviewed Maternity Services LOPs group 15/7/13
Replaced : Diabetes in Pregnancy Service
Approved Quality Council 16/10/06
Reviewed and endorsed Maternity Services Clinical Committee 10/10/06
Revised October 2006
Revised March 2003, Approved Quality Council 14/4/03
Amended October 2000
Approved RHW Council 26/7/99

FOR REVIEW : JULY 2018

..../Appendices
Diabetes Care Plan for Management of Diabetic Patients in Labour or prior to LSCS

Date ............

To the Midwife / Registrar

RE: ................................................

This patient has gestational diabetes / pre-existing NIDDM / pre-existing IDDM
She is being treated with diet alone / diet and insulin / diet and metformin.

On the evening prior to induction or LSCS she should receive the following:
Usual dose of insulin or oral hypoglycaemics until in labour or fasting
Or
The following : ......................

Her diabetic condition places this baby at LOW/HIGH risk of neonatal complications

She will / will not require 5% dextrose 84 ml/hr, from 0600 hours

During labour / LSCS she should have her capillary blood glucose checked .......... hourly /qid

If the BGL is <3.5 mmol/l or >8.0 mmol/l, please follow Appendix B of the Diabetes protocol.
1. sliding scale of insulin and dextrose
2. insulin infusion and dextrose

OR: Institute the following treatment:
Contact .................................................................................

After delivery she should continue BGL testing ............... hourly / qid for ................. days with
............................................. diet.
She should commence the following dose of insulin when able to eat:

This patient will / will not require a repeat 2 hour GTT post partum.
This patient will / will not require an appointment for the Diabetes Clinic in 7 weeks.

Yours sincerely

.......................................................

.......................................................

......................................................
Insulin therapy in labour or during LSCS can be given by

1. Sliding scale subcutaneous route or
2. Intravenous Infusion

The patient may require a concurrent dextrose infusion. This is particularly important for Type I diabetics who are unable to eat for any reason.

Example of sliding scale:
Check BGL 1-2 hourly depending on the patient’s condition or the directions of the Physician/Endocrinologist.

<table>
<thead>
<tr>
<th>BGL mmol/l</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 3.5</td>
<td>No insulin, give Carbohydrate meal or commence 5% dextrose 84ml/hr and continue until the patient is eating.</td>
</tr>
<tr>
<td>3.6 - 8</td>
<td>No insulin, no 5% dextrose</td>
</tr>
<tr>
<td>8.1 - 10</td>
<td>6 units ultra short acting insulin s/c</td>
</tr>
<tr>
<td>10.1 - 12</td>
<td>8 units ultra short acting insulin s/c</td>
</tr>
<tr>
<td>&gt;12</td>
<td>10-20 units ultra short acting insulin Rpt 2/24 as necessary</td>
</tr>
<tr>
<td>&gt;14 or urinary ketones in a Type I diabetic</td>
<td>ultra short acting insulin 10-20 units s/c plus IV Plasmolyte 120 ml/hr</td>
</tr>
</tbody>
</table>

Insulin infusion: See Insulin Infusion LOP :

Note:
Short acting insulin: Actrapid
Ultra short acting insulin: Novorapid, Humalog R
Long acting insulin: Lantus, Levemir, Protaphane, Humalog NPH
<table>
<thead>
<tr>
<th>Type of Diabetes</th>
<th>Pre-gestational Diabetes (Type 1 or 2)</th>
<th>Gestational diabetes requiring oral hypoglycaemins or insulin</th>
<th>Gestational diabetes, not well controlled on diet</th>
<th>Gestational diabetes on diet, well controlled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review by obstetrician</td>
<td>At Booking</td>
<td>At commencement of pharmacotherapy</td>
<td>At recognition of poor control</td>
<td>Stay with low risk model of care</td>
</tr>
<tr>
<td>Obstetric Model of Care</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physician/ diabetes team and Obstetrician in Diabetes clinic</td>
<td>Diabetes team and Obstetrician</td>
<td>Diabetes team and Obstetrician</td>
<td>Diabetes team and low risk model of care (MGP, GPSC, or other)</td>
<td></td>
</tr>
<tr>
<td>Morphology ultrasound</td>
<td>At Tertiary centre</td>
<td>Usual care</td>
<td>Usual care</td>
<td>Usual care</td>
</tr>
<tr>
<td>Fetal Echo</td>
<td>Consider if poor control</td>
<td>Not required</td>
<td>Not required</td>
<td>Not required</td>
</tr>
<tr>
<td>Ultrasound surveillance</td>
<td>Every 4 weeks from 28 weeks, or more often as required</td>
<td>Once on treatment every 4 weeks</td>
<td>Consider every 4 weeks</td>
<td>No additional scans</td>
</tr>
<tr>
<td>Timing of delivery</td>
<td>Review at 38 weeks for fetal and maternal stability (blood sugars, HbA1c, insulin requirement, fetal growth). Deliver from 38-40 weeks depending on control. Poorly controlled pre-gestational DM: consider delivery around 38 weeks gestation</td>
<td>Well controlled low dose Insulin/oral hypoglycaemins requiring GDM with no other risk obstetric risk factors: aim to deliver around 40-41 weeks Poorly controlled insulin/oral hypoglycaemins requiring GDM, high dose insulin/oral hypoglycaemic requiring GDM, or insulin/oral hypoglycaemic requiring GDM with other obstetric risk factors aim to deliver by 40 weeks</td>
<td>Aim to deliver by 40 weeks</td>
<td>Consult with low risk model of care obstetrician (MGP/ GPSC/other) at 40 weeks Usual postdates &gt;40+7-12 if no other obstetric risk factors</td>
</tr>
<tr>
<td>Neonatal risk of hypoglycaemia</td>
<td>High risk of hypoglycaemia</td>
<td>High risk of hypoglycaemia</td>
<td>High risk of hypoglycaemia</td>
<td>Low risk</td>
</tr>
</tbody>
</table>