Guideline

# Diabetes Mellitus: Management of Gestational Diabetes

## 1. Purpose

The Women's is committed to the provision of best practice multidisciplinary care for women with gestational diabetes based on the best available evidence.
This guideline outlines the recommended management of women with gestational diabetes (GDM) at the Women's.

## 2. Definitions

**GDM:** a defined degree of glucose intolerance with the onset or first recognition during pregnancy.
**GTT:** Glucose tolerance test.
**BGL:** Blood glucose level.
**Diabetes in pregnancy:** A more severe glucose intolerance with glucose levels on a GTT that would be diagnostic of diabetes mellitus outside of pregnancy
**ACS:** antenatal corticosteroids.
**CDE:** credentialed diabetes educator.
**HbA1c:** Haemoglobin A1c, values expressed in both NGSP units (as a percentage) and newer IFCC units (mmol/mol). The newer units are bracketed.
**Home team:** The antenatal team to which the woman is initially triaged (based on postcode).
**Diabetes Champion:** An obstetrician who is a member of a home team, regularly attends antenatal clinic and has been proposed by the Medical Team Leader to review patients with gestational diabetes.
**Accredited Diabetes Midwife**: Midwives who have attended a GDM education session and successfully completed an online Catalys questionnaire (see Appendix 3: Midwives caring for diet controlled GDM women)

## 3. Responsibilities

The management of gestational diabetes requires multi-disciplinary input. This may be within the home team or within the specialised Diabetes Clinic.

All staff are likely to encounter women with GDM and are encouraged to be familiar with this guideline.

## 4. Guideline

### *4.1 Introduction*

Gestational diabetes has been formally recognized since the 1960s[1] and been suspected since at least the 1950s. Controversy about the degree of risk associated with the condition and the diagnostic criteria which should be applied was prominent over ensuing decades. The ACHOIS trial was the first well designed, randomized trial to address risk[2], however the findings of risk reduction with intensive treatment did not yet result in worldwide acceptance of the need for universal screening[3]. A second well-designed, randomized trial confirmed a risk reduction with intensive treatment[4], but it was not until the HAPO trial that the BGL level at which risk increased was seriously addressed[5]. Subsequent analysis of this trial[6] suggested the diagnostic criteria that are recommended today by the World Health Organisation WHO[7] and the Australian Diabetes in Pregnancy Society ADIPS[8].

It is important to note that these criteria were introduced at the Women's in mid 2015 and represent a change from previous guidelines. It is also important to note that, while widely accepted within Australia, these guidelines have not necessarily been accepted worldwide. The Women's recommends that the following document, based on current ADIPS recommendations, is used in diagnosing and managing gestational diabetes and that international guidelines may not necessarily be the same.

## 4.2 Diagnosis

**Gestational diabetes** is diagnosed after a fasting 75g GTT after the first timester with one or more of the following blood glucose ranges[8]:

- Fasting: 5.1-6.9 mmol/L
- 1 hour: ≥ 10.0 mmol/L
- 2 hours: 8.5 – 11.0 mmol/L

**Diabetes in pregnancy** is diagnosed by the following levels

- Fasting: ≥ 7.0 mmol/L
- 2 hours: ≥ 11.1 mmol/L
- Random BGL ≥ 11.1 mmol/L in the presence of diabetes symptoms.
- HbA1c ≥ 6.5% (48 mmol/mol)

## 4.3 Timing of diagnosis

The Women's recommends routine screening of all pregnant women at 26-28 weeks (unless they have pre-existing diabetes). If a GTT has been done after 24 weeks, this need not be repeated at 26-28 weeks.
The following are known risk factors for gestational diabetes[8]:
*previous hyperglycemia/GDM in pregnancy; previous elevated BGL;*
*maternal age > 40 years;*
*Asian, Indian subcontinental, Aboriginal, Torres Strait Islander, Pacific Islander, Maori, Middle Eastern, non-white African ethnicities;*
*first-degree relative with diabetes; pre-pregnancy BMI > 30 kg/m$^2$;*
*previous macrosomia (birthweight > 4500g or 90$^{th}$ centile for gestation);*
*polycystic ovarian syndrome;*
*corticosteroid or antipsychotic medication.*
Patients with one or more of these risk factors should be considered for an early GTT (at around 18 weeks, no earlier than 16 weeks). Note: a GTT in the first trimester (before 14 weeks) can be difficult to interpret and there is a recognized dearth of evidence in this area. After 20 weeks it is generally acceptable to wait until 26 weeks to avoid two tests within a short period of time.
A repeat GTT in the third trimester (after 28 weeks) should be performed only sparingly, if there is a very strong suspicion of diabetes and the patient is not close to likely delivery.
Various strategies have been proposed if a GTT is not tolerated (e.g. vomiting after a glucose load). We support adding an HbA1c to the fasting BGL. If the HbA1c is ≥ 5.9% (41 mmol/mol), a repeat GTT should be strongly considered. An alternative is to consider a trial of blood glucose monitoring after discussion with a CDE.

## 4.4 GDM Education

All women with a new diagnosis of gestational diabetes will initially be provided with education preferably in a group multidisciplinary session. Individual education will be provided according to need.
The education covers:

- The importance of GDM, its implications, need for management
- Education in self-blood glucose monitoring
- Initial dietary and exercise advice
- Longer-term health implications.

All women with GDM will be provided with a glucose meter, a diary in which to record their blood glucose levels (BGLs), written information about GDM and dietary information. They will register with the NDSS (National Diabetes Services Scheme) in order to purchase glucose strips and lancets at a discounted price.
GDM Group Education for English speaking women (and their partners) is in small groups of 5-9 women. This involves a CDE, a dietician and a physiotherapist. Non-English speaking women may be seen in smaller

classes of up to 2-3 women or may be seen individually. Women with special needs or women who are unable to attend the group session may be referred for individual education with a CDE and dietician. Women are seen for further dietetic support, as required, throughout the remainder of the pregnancy.
For further information see Appendix 2: Procedure following confirmation of GDM on a 75g GTT.

## *4.5 Glycaemic Control*

BGLs should be measured four times a day using standard procedures and equipment. Fasting BGLs should be measured on waking in the morning. Postprandial BGLs should be measured 2 hours after the start of the meal.
The glycaemic targets are:

- Fasting BG: < 5.0mmol/L
- BGL 2 hours after a main meal: < 6.7mmol/L
- (BGL 1 hour after a main meal < 7.4 mmol/L. Only measured if the woman is unable to complete a measurement at 2 hours)
- HbA1c: < 6% (42 mmol/mol)

## *4.6 Initiation of Therapy*

*Insulin in GDM*
Insulin is generally first line therapy in GDM inadequately controlled with lifestyle modification. A modified multidose insulin regimen is effective and flexible. Insulin doses target the specific pattern of hyperglycaemia. A quick-acting insulin is used before meals, as needed, and a longer acting insulin is used at bedtime to control fasting glucose levels. Insulin is delivered using disposable pen injectors.
Usual starting doses are

NovoRapid® (insulin aspart) or Humalog® (insulin lispro) 4-6 Units before meals;
Protaphane® (insulin isophane) 4-8 Units at bedtime

The Team Diabetes Educator should be consulted when starting insulin.

*Metformin Use in GDM*
Although insulin is generally the treatment of choice in GDM inadequately controlled with lifestyle modification, metformin is considered safe to use for women with GDM[9]. It is indicated as first line therapy in women not able or refusing to use insulin. It is useful as an insulin-sparing agent in women with marked insulin resistance or high BMI.
Refer to Diabetes Clinic for consultation regarding metformin commencement.

## *4.7 Antenatal Care in Team Clinics*

Women with GDM will remain under the care of their Team unless they meet any of the high risk criteria (see Appendix 1: Table 1 – Criteria for transfer of GDM to Diabetes Clinic)
**Note**: women with GDM are ineligible for routine Shared Maternity Care and must be referred to the appropriate Team Diabetic Champion or Accredited Diabetes Midwife. The Shared Maternity Care Coordinator is responsible for this. Women may stay in Cosmos care if their midwife is an Accredited Diabetes Midwife (see Appendix 3).

At each antenatal visit, a routine antenatal check should be performed. The woman's blood glucose diary should be examined to assess glycaemic control.
The range of BGLs pre-breakfast and two hours after each meal should be recorded in the antenatal notes at each visit. In addition, the number of BGLs outside the target range should be recorded. Women should also be asked whether they have had any contact with a CDE since the last visit.
A CDE can be consulted if:

- Glycaemic control is sub-optimal (3 or more fasting BGLs ≥ 5.0mmol/L or 3 or more 2 hour postprandial BGLs ≥ 6.7 mmol/L in the preceding week)

- There is poor compliance with blood glucose testing (multiple levels not being recorded)
- The patient has questions about GDM that cannot be answered by the clinician
- The clinician has any other concerns about the patient's diabetes management
- HbA1c exceeds 6.0% (42 mmol/mol)

After consultation with the patient, the CDE will advise whether the patient should:

- Continue their current management
- Be reviewed by the Team Dietitian
- Commence insulin
- Be reviewed by an Endocrinologist (but remain in the Team Clinic)
- Be transferred to the Diabetes Clinic.

Refer to Appendix 4: Use of Antenatal Corticosteroids (ACS) if corticosteroid therapy is required.

## *4.8 Frequency of Team Clinic Visits*

Women with GDM who do not require insulin will be seen **every 2-3 weeks** from initial diagnosis of GDM until 38 weeks, then weekly until birthing. Contact should be made with the Diabetes Educator on their non-attendance week, and more frequently if clinically indicated.
Women with GDM who require insulin should be seen more frequently depending on degree of control, and should not be less than 2-weekly before 36 weeks and usually weekly after. Consider increasing the frequency of visits if there are other complications or risk factors, such as:

- Hypertension: pre-existing or gestational
- Fetal macrosomia
- Intrauterine growth restriction
- Poor glycaemic control
- Smokers.

## *4.9 Maternal Investigations*

An HbA1c will be ordered as part of the initial education session.
Further investigations should then be ordered according to clinical need. It is important to remember that those who no longer require a 26-28 week GTT should still have the routine FBE and (if Rhesus negative) a Group and Antibody screen.

## *4.10 Fetal surveillance*

*Ultrasound for screening*

- All patients diagnosed with gestational diabetes before 20 weeks and with an HbA1c > 6.5% (48 mmol/mol) are eligible for a 20-week morphology ultrasound at The Women's (as are patients with pre-existing Type 1 or Type 2 diabetes).
- These patients are also eligible for fetal echocardiography at 23-24 weeks. This is done via an internal referral form directed to the FMU co-ordinator. A valid Medicare provider number is required.

*Ultrasound for macrosomia*

- All patients with gestational diabetes and who require insulin or metformin are eligible for a growth scan at 34 weeks at The Women's.
- Patients who are managed with dietary measures alone are not eligible for a growth scan at The Women's

without another complicating factor. There is good evidence that this group of patients are not at increased risk of fetal macrosomia when compared to a matched control population. Any patient may choose to seek a growth scan in the community.

- Fetal macrosomia should be strongly suspected if at 34 weeks either the EFW or the AC is > 95$^{th}$%. A further scan is not required. Management may include early induction of labour or discussion of elective caesarean section. A senior obstetrician should be involved in decision making.
- Fetal macrosomia may be suspected if at 34 weeks either the EFW or the AC is > 90$^{th}$% but < 95$^{th}$%. Decision making should be individualised and involve a senior obstetrician.

Growth scans after 36 weeks may be difficult to perform and interpret. Suspicion of macrosomia after this time should be based on clinical assessment which may include symphyseal-fundal height measurement, clinical palpation, poor BGL control or bedside ultrasound including measurement of AFI. An ultrasound may be performed if management is likely to be altered and must be counter-signed by the relevant Head of Unit.

*Ultrasound/monitoring for fetal well-being*

- Concerns must be individualised and may include, but are not limited to, suspicion of intra-uterine growth restriction, rapidly decreasing insulin requirements, poor obstetric history, and fetal anomalies. A senior obstetrician should be involved in decision making, and may utilise such modalities as growth ultrasound, Doppler indices, CTG or bio-physical profile.
- There is little evidence that routine CTG improves outcome.

## *4.11 Timing and Mode of delivery*

*Timing*

- In patients with gestational diabetes and good BGL control on dietary measures alone, it is appropriate for routine post-dates care.
- If small doses of insulin are required but BGL control is optimal, delivery should be considered from 40 weeks depending on other clinical factors.
- If there are other concerns such as suboptimal BGL control, unexplained reduced insulin needs, suspicion of macrosomia or FGR, or hypertension, delivery may be considered from 38 weeks or earlier as deemed clinically necessary.

*Mode of Delivery*

An attempt at labour is generally preferable.
If macrosomia is suspected (as outlined in “Ultrasound” above) the pros and cons of elective caesarean section may be discussed. It should be mentioned that shoulder dystocia, although still rare, is increased in women with diabetes and macrosomia and may be unpredictable. It should be mentioned that no screening test for macrosomia (including ultrasound) is perfect and a seemingly macrosomic baby may be of normal size. A senior obstetrician should be involved in the decision making.

## *4.12 Care during Labour and Delivery*

Existing hospital guidelines should be used for general care during labour (see “Labour and Birth and Early Puerperium – Care during guideline) and for the use of CTG (see “CTG Interpretation And Response” guideline).

*Insulin therapy*

Normal insulin should be given the night before planned induction or caesarean section and ceased on the planned day of delivery. Women having a caesarean section should follow the routine fasting instructions issued by the hospital and measure their fasting BGL before coming to hospital.

*BGL Management and Insulin Sliding Scale*

The Diabetes Record and Insulin Medicines Chart (MR/2000) must be used.
BGLs should be measured 4-hourly for women with diet controlled GDM and 2-hourly for women with insulin or metformin controlled GDM. Diet-controlled women should not have a sliding scale: any BGL > 8mmol/L should

be reported to the medical team on birth suite and/or the obstetric medicine fellow or endocrinologist. Women receiving insulin should use the following sliding scale.

Daily insulin dose <40 units

| Blood glucose mmol/L | NovoRapid® subcut |
|---|---|
| 0 - 5.5 | nil |
| 5.6 - 7.0 | 2 units |
| 7.1 - 10.0 | 4 units |
| 10.1 - 13.0 | 6 units |
| >13.0 | 8 units and call RMO |

Daily insulin dose >40 units

| Blood glucose mmol/L | NovoRapid® subcut |
|---|---|
| 0- 5.5 | Nil |
| 5.6 - 7.0 | 4 units |
| 7.1 - 10.0 | 6 units |
| 10.1-13.0 | 8 units |
| >13.0 | 10 units and call RMO |

## *4.13 Postnatal Care*

Cease all insulin immediately following birth.
Blood glucose monitoring should continue twice daily (either fasting or 2-hour post-prandial measurements) for 48 hours if previously on insulin or 24 hours if previously on dietary control.
If the fasting blood glucose is <6mmol/L or 2hr post prandial blood glucose is < 8mmol/L, cease monitoring. If blood glucose levels exceed these targets, a CDE should be contacted.
A woman who is diet controlled is eligible for the routine 24-hour discharge.
The baby of a woman with GDM should be managed according to the Hypoglycaemia-Infant Management guideline. Note: babies of women with GDM that is diet controlled are also eligible for the 24-hour discharge and do not need to stay in hospital longer without a further complicating factor.

## *4.14 Follow-up*

A woman's GP should be notified as part of her discharge summary about the diagnosis of her GDM and should organise a follow-up GTT at 6 weeks. It is prudent to recognise that a fasting test that requires several hours of attendance can be difficult for a new mother and may not be immediately feasible at 6 weeks. Nonetheless, the woman should be encouraged to have the test done at the most convenient time. There is good evidence that the early recognition and management of impaired glucose tolerance reduces future risk.
Medicare eligible patients are automatically registered on the National Gestational Diabetes Register via the

National Diabetes Services Scheme (NDSS) and they and their GP are sent a 6 week and subsequent annual reminder. Woman can opt out via the website: http://gd.ndss.com.au.
Long-term follow-up includes optimisation of lifestyle, annual HbA1c and early testing for GDM in subsequent pregnancies.

## 5. Evaluation, monitoring and reporting of compliance to this guideline

Compliance with this guideline will be monitored, evaluated and reported through the Team leader's management meeting. Outcomes will be measured by review of incidents, and / periodically auditing the compliance with the guideline. Comprehensive data will be maintained for all GDM pregnancies

## 6. References

1. O'Sullivan JB, Mahan CM. Criteria for the oral glucose tolerance test in pregnancy. Diabetes. 1964;13:278-85.
2. Crowther CA, Hiller JE, Moss JR, McPhee AJ, Jeffries WS, Robinson JS, et al. Effect of treatment of gestational diabetes mellitus on pregnancy outcomes. N Engl J Med. 2005;352(24):2477-86.
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4. Landon MB, Spong CY, Thom E, Carpenter MW, Ramin SM, Casey B, et al. A multicenter, randomized trial of treatment for mild gestational diabetes. N Engl J Med. 2009;361(14):1339-48
5. HAPO Study Cooperative Research Group MB, Lowe LP, Dyer AR, Trimble ER, Chaovarindr U, Coustan DR, Hadden DR, McCance DR, Hod M, McIntyre HD, Oats JJ, Persson B, Rogers MS, Sacks DA. Hyperglycemia and adverse outcomes. N Engl J Med. 2008;358(19):1991-2002.
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7. Diagnostic criteria and classification of hyperglycemia first detected in pregnancy: a World Health Organization Guideline. Diabetes Res Clin Pract. 2014;103:341-63.
8. ADIPS Consensus Guidelines for the Testing and Diagnosis of Hyperglycaemia in Pregnancy in Australia and New Zealand. wwwadipsorgau (accessed June 2014). 2014
9. Rowan JA, Hague WM, Gao W, Batting MR, Poore MP. Metformin versus Insulin for the Treatment of Gestation Diabetes. N Engl J Med. 2008:358;2003-2015.

Stuchfield RR, Whitaker R, Giddon AE, Hobson L, Kotecha S, Doull IJ. Behavioural, educational and respiratory outcomes of antenatal betamethasone for term caesarean section (ASTECS trial). Arch Dis Child Fetal Neonatal Ed. 2013: 98;195-200.

## 7. Legislation/ Regulations related to this guideline

Not applicable.

## 8. Appendices

Appendix 1: Criteria for transfer of women with GDM to Diabetes Clinic
Appendix 2: Procedure following confirmation of GDM on a 75g GTT
Appendix 3: Accredited Diabetes Midwives
Appendix 4: Use of Antenatal Corticosteroids

**Appendix 1**

# Criteria for Transfer of GDM to Diabetes Clinic

Transfer to Diabetes Clinic requires a written referral addressed to the Head of Unit. Table 1 shows conditions that are suitable for consideration for transfer. If transfer is not accepted, a written reason will be given.

Table 1 – Criteria for transfer of GDM to Diabetes Clinic

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|---|
| Diagnosis prior to 20 weeks |
| HbA1c ≥ 6.5% (48 mmol/mol) |
| Fasting BGL ≥7.0mmol/; and /or 2-hour ≥11.1mmol/L on GTT |
| Women with persistently sub-optimal glycaemic control |
| |
| |
| Women requiring high doses of insulin (> 40 units total daily dose) before 36 weeks |
| |
| Other clinician concerns may be put in a written referral and will be assessed on their merits by the Head of Unit |

**Appendix 2**

# Procedure Following Confirmation of GDM on a 75g GTT

- RWH Pathology will forward all positive GTT results to the Diabetes Educators electronically. Shared Care results will be directed to CDEs by the Shared Care Coordinators.
- The CDE will phone the women and:
    - Advise the women of the positive GTT result
    - Make an appointment for a group or individual education session as specified in Section 4.4
    - Review the patient's future clinic appointments and ensure that the patient's next appointment is within two weeks and that the appointment is with a Diabetes Champion
- A report of all the new GDM seen each day will be made to the Team Clinic Coordinators.

At the initial education session, all women will be provided with the contact details and best contact time for a CDE and asked to ring her/him within one week to discuss their self-blood glucose testing results. A CDE will be available to take calls from women with GDM at any time during business hours but women are encouraged to ring on the day that a CDE is available to receive telephone calls.

**Dietitian**
Women who attend the group education session will also be given an appointment with a dietitian for individualised dietary counselling within 2 weeks of their initial education session. Additional appointments with the dietitian can be scheduled if required. The role of a dietitian is in dietary assessment and provision of advice to women with GDM regarding their dietary management. Nutritional requirements for pregnancy are accounted for when assessing and advising patients, in addition to advice on meal planning to assist with glycaemic control. Strategies to encourage optimal gestational weight gain are also addressed.

**Physiotherapy**
Women will generally have a group physiotherapy session booked within 1-2 weeks from their initial education session.

**Appendix 3**

# Accredited Diabetes Midwives

Midwives who have completed the appropriate training session and online Catalys questionnaire are eligible to review women with diet-controlled GDM.
Following their initial GDM education session, women may be seen by either Accredited Diabetes Midwives or the team Diabetes Champion.
If a woman is not meeting the recommended BGL targets an Accredited Diabetes Midwife may consult a CDE or consult the team Diabetes Champion. Women who require insulin must be transferred to the team Diabetes Champion and are no longer eligible for midwifery-led care.

Antenatal care should be identical to that described in Sections 4.5-4.10.

An appointment should be made with an obstetrician between 40 and 41 weeks to discuss post-dates care for women with GDM that is diet-controlled.

This program is new and will be the subject of future research within the hospital.

**Appendix 4**

# Use of Antenatal Corticosteroids (ACS)

• Existing guidelines regarding the use of ACS for the prevention of prematurity up to 34 weeks and 6 days gestation should be used. Refer to guidelines: Antenatal Rupture of the Membranes - Preterm Premature (PPROM), and Preterm Labour – Management.

• The Obstetric Medicine Fellow (in hours) or the on-call endocrinologist (outside business hours) should be notified regarding the use of ACS in all woman with GDM. Suitability for outpatient care will be discussed or the possible need for admission and the use of an insulin sliding scale.

• If delivery is unlikely to be imminent, it is preferable to administer ACS to women with diabetes in the morning of a normal working day. This facilitates review for hyperglycaemia by the Obstetric Medicine Fellow. If ACS need to be given immediately appropriate provisions for hyperglycaemia must be made (usually a sliding scale as directed by the on-call endocrinologist).
Refer to Antenatal Corticosteroids for the Prevention of Neonatal Morbidity & Mortality guideline

• There is no randomised evidence for the use of ACS in patients with diabetes (pre-existing or gestational) having a caesarean section after 37 weeks. Currently the Women's does not support corticosteroid use in women with diabetes (of any kind) after 37 weeks pending future, high-quality evidence.