

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.

BGL: Blood glucose level.

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.

GTT: Glucose tolerance test.

Home team: The antenatal team to which the woman is initially triaged (based on postcode).

Diabetic Champion: An obstetrician or midwife 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.

Midwives need to have been credentialed (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 responsible for this management and are encouraged to be familiar with this guideline.

4. Guideline

4.1 Introduction

Gestational diabetes has been formally recognized since the 1960s¹ and been suspected since at least the 1950s. Initial experimentation usually involved bilateral intra-venous access via the ante-cubital fossae using one as an "in" channel (for infusion) and one as an "out" channel (usually for BGL measurement). It became quickly apparent that oral administration of glucose resulted in higher BGLs than expected due to progressive insulin resistance throughout gestation. Interestingly these findings were not replicated with intra-venous administration of glucose, however lesser reductions in BGLs were observed with intra-venous administration of insulin in experiments that would be considered ethically inappropriate these days.

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 risk², however the findings of risk reduction with intensive treatment did not yet result in worldwide acceptance of the need for universal screening³. A second well-designed, randomized trial confirmed the risk reduction in intensive treatment⁴, but it was not until the HAPO trial that the BGL level at which risk increased was seriously addressed⁵.

Subsequent analysis of this trial⁶ suggested the diagnostic criteria that are recommended today by the World Health Organisation WHO⁷ and the Australian Diabetes in Pregnancy Society ADIPS⁸.

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.

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4.2 Diagnosis

Gestational diabetes is diagnosed after a fasting 75g GTT at any time in pregnancy (although the validity in the first trimester is uncertain) with one or more of the following blood glucose ranges⁸:

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

Overt diabetes 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 $\geq 6.5\%$ (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 diabetes⁸:

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/m²;

previous macrosomia (birthweight > 4500g or 90th 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 (between 14 and 20 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 $\geq 5.9\%$ (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, an Accredited Practising 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

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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 GDM⁹. 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 or Cosmos Maternity care, and must be referred to the appropriate Team Diabetic Champion. The Shared Maternity Care Coordinator and the Team Care Coordinator are responsible for this for Shared Care and Cosmos respectively.

When women return to their Home Team they should be seen by the Diabetes Champion.

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 their Team CDE since the last visit.

The Team CDE can be consulted if:

- Glycaemic control is sub-optimal (3 or more fasting BGLs \geq 5.0mmol/L or 3 or more 2 hour postprandial BGLs \geq 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

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- 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 or metformin
- Be reviewed by an Endocrinologist (but remain in the Team Clinic)
- Be transferred to the Diabetes Clinic.

Note: A Team Obstetrician can seek a consultation with an endocrinologist for a woman with GDM-related issues; this does not mandate transfer 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. Prior to 36 weeks they should report their BGLs to the Diabetes Educator the week in which they do not see a consultant.

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

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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 > 95th%. 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 > 90th% but < 95th%. 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 IUGR, or hypertension, delivery may be considered from 38 weeks.

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 CPG “Labour and Birth and Early Puerperium – Care during) and for the use of CTG (see CPG “CTG Interpretation And Response”).

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. The following sliding scales should be used.

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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 postprandial 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, the Team 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 CPG Hypoglycaemia-Infant Management.

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.

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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.
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3. U. S. Preventive Services Task Force. Screening for gestational diabetes mellitus: U.S. Preventive Services Task Force recommendation statement. *Ann Intern Med*. 2008;148(10):759-65.
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9. Rowan JA, Hague WM, Gao W, Battling MR, Poore MP. Metformin versus Insulin for the Treatment of Gestation Diabetes. *N Engl J Med*. 2008;358:2003-2015.
10. 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.

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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: [Midwives Caring for Diet Controlled GDM Women](#)

Appendix 4: [Use of Antenatal Corticosteroids](#)

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Criteria for Transfer of GDM to Diabetes Clinic



Table 1 – Criteria for transfer of GDM to Diabetes Clinic

Definite
Diagnosis prior to 18 weeks
HbA1c \geq 6.5% (48 mmol/mol)
Fasting BGL \geq 7.0mmol/; and /or 2-hour \geq 11.1mmol/L on GTT
Women with persistently sub-optimal glycaemic control
Previous adverse outcomes related to GDM (e.g. otherwise unexplained FDIU or intrapartum stillbirth in women with GDM)
Relative
Women requiring high dose of insulin > 40 units total daily dose
Macrosomic baby in current pregnancy (EFW >95 th centile) – consider referral
Clinician concerns: The presence of GDM with any other complicating factor may be discussed with a CDE and referral to the Diabetes Clinic can be considered. Referrals will be triaged by the Head of Diabetes.



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 their 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 their Team CDE is available to receive telephone calls.

The CDE will be available on Team Clinic day to support clinicians and patients in the management of their GDM, including advice to

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

The Team CDE will attend the Team Clinic Meeting, when possible, to facilitate multidisciplinary communication about complex patients.

Dietitian

Women who attend the group education session will also be given an appointment with their Team 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. The Dietitian should have a sound understanding of cultural influences of food choice and thus provide appropriate advice to women who come from a culturally diverse background.

Physiotherapy

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



Midwives Caring for Diet Controlled GDM Women

Midwives who have completed the appropriate training session (and received a certificate of competency) with a Diabetes Educator, Endocrinologist and Dietician are eligible to review women with diet-controlled GDM in the Home Team Clinic.

Referrals to GDM Midwifery care are triaged by Diabetes Educators following their initial GDM education session. It will be documented on the daily GDM TCC report.

The patient's bradma should be placed in the GDM Midwives book so that outcomes of this program can be evaluated.

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

A Diabetes Champion Obstetrician appointment should be made at 36 weeks as per standard care and then booked back to the Midwife. Similarly an appointment should be made at 40 weeks to discuss post-dates care.

Women with GDM who require insulin or for obstetric reasons is too complex for midwife, care should immediately be transferred back to the Diabetes champion obstetrician of that team. This needs to be documented in the "GDM Midwives book". Include date and reason the GDM women was transferred out of Midwifery care.

Note: A GDM trained Midwife can seek a consultation with their team Diabetes Educator for a woman with GDM-related issues; this does not necessitate transfer to the Diabetes champion in the team.

Use of Antenatal Corticosteroids (ACS)



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- 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 CPGs: “Rupture of membranes – Preterm Premature (PPROM)”, and “Preterm Labour – Management”.
- The Team CDE should be notified regarding the use ACS in woman with GDM who are satisfactorily managed with dietary control (both as an inpatient or an outpatient). Temporary treatment with insulin may be required.
- The Obstetric Medicine Fellow should be notified regarding the use of ACS in woman with GDM who are on insulin or metformin therapy. Suitability for outpatient care will be discussed or the possible need for admission and the use of an insulin sliding scale. If the Obstetric Medicine Fellow is unavailable, the on-call Diabetes Endocrinologist should be notified. Both are available via the Switchboard.
- The Women’s supports the Liggins Institute Guidelines for ACS use after 34 weeks and 6 days (refer http://www.ligginsinstitute.org/ANC_CPG/, pages 7, 10 and 11).
- Notably, there is a dearth of evidence for corticosteroid use between 34 weeks and 6 days and 37 weeks but may be considered if caesarean section is deemed likely.
- There is no randomised evidence for the use of ACS in patients with diabetes (pre-existing or gestational) before caesarean section after 37 weeks. Decision making, necessarily, must be individualised and include reference to the following:
 - a probable small decrease in the risk of immediate respiratory morbidity
 - a probable small increase in the risk of neonatal clinical hypoglycaemia
 - an uncertain risk regarding SCN admission given the above two points
 - an uncertain risk regarding future school behavioural and educational outcomes, with most but not all outcomes being reassuring¹⁰