Diabetes in pregnancy

Case Definition

Diabetes in pregnancy can be: (1) Pre-existing diabetes mellitus (diagnosed prior to pregnancy or in the first trimester of pregnancy) (2) Gestational Diabetes Mellitus (GDM) or (3) Diabetes Mellitus commencing in pregnancy which is differentiated from GDM by positive postnatal diabetes testing.

Table 1: Criteria for diagnosis of GDM and Diabetes Mellitus in Pregnancy with a 2-hour Pregnancy Oral GTT (from 1st January 2015)

Diagnosis	Fasting BSL (mmol / L)	Following 75g oral glucose load	
		1-hour BSL (mmol/l)	2-hour BSL (mmol/l)
Normal	<5.1	< 10.0	< 8.5
GDM	5.1 – 6.9	≥10.0	8.5 – 11.0
DM in Pregnancy	≥7.0		≥11.1

Any BSL ≥ 11.1mmol/L with diabetes symptoms at any stage

Diabetes diagnosed within the first 12 weeks of pregnancy is considered preexisting – diagnosis Hba1c -≥ 48mmol/mol (6.5 %)

At Risk of Diabetes in Pregnancy -

Anyone with values outside of normal reference ranges eg. Fasting BSL 5.1-6.9 mmol, HbA1c 39-48mmol/mol (5.7-6.5%) – in first trimester reference ranges can be considered to be increased risk of GDM and should have early GTT.

Screening

Pre-existing Diabetes Mellitus

All women BSL at booking visit – as per KEMH shared care

HbA1c for Aboriginal and Torres Strait Islander (ATSI) people - annually as per diabetes protocol

Gestational Diabetes

Diabetes screening by 75g OGTT is indicated for ALL women without an existing diagnosis of diabetes and:

- As early in pregnancy as practical for women with:
  - ≥1 high risk factor/s for GDM
  - ≥ 2 moderate risk factors for GDM
- At any time, where there is clinical suspicion of GDM (e.g. glycosuria, (2+ or above) polyhydramnios and fetal macrosomia).
- At 24 – 28 weeks for all women without a diagnosis of DM in pregnancy or GDM. This includes women who have had a normal OGTT earlier in pregnancy for risk factors or symptoms.
- At any time during pregnancy after 18 weeks if BSL > 5.1 mmol/L FASTING or > 7.0 mmol/L RANDOM
- Anyone with values outside of normal reference ranges eg. venous fasting BSL 5.1-6.9, HbA1c 39-48mmol/mol (5.7-6.5%) – in first trimester reference ranges can be considered to be at increased risk of GDM and should have an early OGTT.

Role of HbA1c

HbA1c reflect BSL levels over 3-4 months, hence does not correlate well with the more rapid changes seen in GDM. HbA1c should NOT be routinely used for diagnosis of GDM. The main utility is in diagnosing frank diabetes ≥48mmol/mol (6.5%) in the first trimester.

Box 1: Risk factors for gestational diabetes/diabetes in pregnancy

High risk factors:

- Previous GDM
- Previously elevated BSL > 5.1 mmol/L FASTING or > 7.0 mmol/L RANDOM
- Maternal age ≥ 40 years
- Family history of DM (i.e. 1st degree relative with diabetes or sister with GDM)
- BMI > 35 kg/m²
- Previous macrosomic baby (birth weight > 4500g or > 90th centile)
- Polycystic ovary syndrome
- Medication with corticosteroids or antipsychotics
- Multiple pregnancy

Moderate risk factors:

- Ethnicity (Asian, Indian subcontinent, Aboriginal, Torres Strait Islanders, Pacific Islander, Maori, Middle Eastern, non-white African)
- BMI 25-35 kg/m²

GENERAL PRINCIPLES OF MANAGEMENT

Treatment of pregnant women reduces serious perinatal morbidity and may also improve maternal quality of life.

REFERRAL

Register women with the National Diabetes Services Scheme (NDSS) https://www.ndss.com.au/registration

- Involve multi-disciplinary team including Obstetrician and/or Obstetric DMO and possibly Physician
- Women should be referred to a dietitian and diabetes educator as soon as possible where available or otherwise consider a Telehealth consult if necessary with Diabetes WA or KEMH Diabetes Service

https://diabeteswa.com.au/professionals/supporting-self-care/services-on-offer/

MONITORING

- Glycaemia profiling – fasting and 2 hours after meals (e.g. if the woman starts a meal at 1300 hours, the test should be taken at 1500 hours).
- HbA1c monitoring in pregnancy is not covered by the medicare benefit scheme so in the Kimberley should only be done under obstetric advice in certain situations

LIFESTYLE

Dietary advice:

Women with gestational diabetes should be referred to a dietitian for individualized dietary advice and are encouraged to:

- Dietary modification and education - (see Nutrition, weight and exercise in pregnancy protocol) http://kams.org.au/resources/clinical-protocols-guidelines/
- Eat 3 small meals and 2-3 snacks each day, focusing on nutrient rich, whole foods from the 5 food groups (see resources in background document)
- NOT cut out all carbohydrates foods, but instead choose low GI carbohydrate foods in small portions spread throughout the day (see resources)
- Use the ¼, ¼, ½ plate guide for main meals, keeping carbohydrate containing foods to ¼ of the meal (see resources)
- Maintain a healthy weight (see Nutrition, weight and exercise in pregnancy protocol)

Exercise

- For women with gestational diabetes, moderate intensity physical activity for 30 minutes a day, can help to manage blood glucose levels. See Nutrition, weight and exercise in pregnancy protocol for guidance on exercising safely in pregnancy.

THERAPEUTIC PROTOCOLS

MANAGEMENT OF GDM

Indications for medical treatment

Most women who achieve good glycaemic control do so within two weeks. As a general principle all patients should be offered 1-2 weeks for diet and exercise before initiation of metformin – if however the clinical practitioner believes that this will be ineffective due to high baseline BSL

eg. > 10 mmol/L then metformin can be initiated earlier.

Treatment will be considered if:

- Fasting values are ≥ 5.1 mmol / L once or more a week
- Two hour post prandial values ≥ 6.7 mmol / L twice or more a week are recorded

Diabetes in pregnancy

Pharmacological treatment

Metformin

- Can be short acting or XR (once daily dosing)
- Increasing weekly as tolerated according to BSL
  - Maximum dose 2000mg
  - Gastrointestinal effects, usually nausea, vomiting and or diarrhea are common in women taking metformin in pregnancy and can be minimised by taking each dose with food. Such effects usually settle over a few days and / or with reduction of the dose and a slow increasing dose.
  - Insulin may be added to metformin treatment where control is not achieved with metformin

Insulin treatment

Consult with obstetric medical care provider to initiate insulin. Suggest Glargine use as first line.

In the normal diabetic pregnancy it is expected that insulin requirements will increase with gestation therefore frequent review of BSL – ideally twice weekly, is recommended.

Table 2: Suggested Insulin regimes in pregnancy by pattern of hyperglycaemia

Abnormality	Suggested insulin type
Elevated fasting glucose	Single bedtime injection of GLARGINE
Postprandial hyperglycaemia	Meal time rapid acting NOVORAPID
Fasting and postprandial hyperglycaemia	Basal-bolus insulin regimen: Mealtime rapid acting insulin and bedtime intermediate acting i.e. NOVORAPID AND GLARGINE

**** very occasionally with Obstetric specialist input may consider twice daily mixtard*

Clinical monitoring:

Antenatal checks:

- If well controlled: review every 2-4 weeks until 36 weeks, then weekly.
- If uncontrolled diabetes, at least every week until well controlled or transferred. Discussion with the team where the patient will birth is important. In the Kimberley this will generally be Broome, but occasionally KEMH

Obstetric ultrasound:

In addition to usual scans during pregnancy, women with diabetes in pregnancy requiring medication may benefit from serial scans for growth and well-being – particularly if very unstable BGL's, suspicion of macrosomia or polyhydramnios, evidence of IUGR/PET especially in cases with pre-existing diabetes with vascular disease. We would generally perform them at 28/32/ and 36 weeks.

Cardiotocography

In cases of complicated diabetes (poorly controlled, co-existing hypertension, large baby), cardiotocography (CTG) may be recommended from 34 weeks onwards. Each case should be discussed with the birthing hospital medical obstetric team as to if CTG monitoring is needed and when it should be commenced.

Obese Women

See Nutrition, weight and exercise in pregnancy protocol for additional details on clinical monitoring in women who are overweight or obese.

MANAGEMENT OF DIABETES MELLITUS IN PREGNANCY

Antenatal care

First antenatal appointment

Routine booking bloods, SOLVS and urine and additionally:

- HbA1c, random glucose
- TFT (for women with type 1 diabetes mellitus)
- Urea and electrolytes, liver function tests, urate
- Spot urine for protein/creatinine ratio
- Aim for specialist review at 28/40 and 34/40

Review every 2-4 weeks.

Pharmacological treatment

Metformin

- Can be short acting or XR (once daily dosing)
- If patient not already on metformin suggested start at 500mg daily (immediate release or XR) ideally with food
- Increasing weekly as tolerated according to BSL
  - Maximum dose 2000mg
  - Gastrointestinal effects, usually nausea, vomiting and or diarrhea are common in women taking metformin in pregnancy and can be minimised by taking each dose with food. Such effects usually settle over a few days and / or with reduction of the dose and a slow increasing dose.
  - Insulin may be added to metformin treatment where control is not achieved with metformin

Insulin treatment

Consult immediately with obstetric medical care provider to discuss insulin requirements if already on insulin or to initiate insulin. Suggest Glargine use as first line.

In the normal diabetic pregnancy it is expected that insulin requirements will increase with gestation therefore frequent review of BSL – ideally twice weekly, is recommended.

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Other Medications

- Oral hypoglycaemics: thiazolidinediones (glitazones) and repaglinide are contraindicated at present
- Cease any ACE inhibitors and statins
- Continue with metformin.
- Aspirin 100mg commenced as early as possible as evidence of significant reductions in pre-eclampsia and fetal growth restriction if started <16 weeks gestation in the pre-existing diabetic woman

Clinical monitoring

- Every visit: Review BP, UA (proteinuria)
- At 12 weeks: Offer nuchal translucency and serum screening +/- Non-Invasive Prenatal Testing (NIPT)
- At 19-20 week: if BGL's very unstable or initial HbA1c high consider tertiary scan – although if local scan service is good it is not mandatory as films can be viewed on PACS by tertiary centre
- Document on the referral that the women has pre-existing diabetes in pregnancy
- At 22 – 24 weeks: If HbA1c ≥86 mmol/mol (≥10%) a foetal echocardiogram is recommended.
- Regular growth scans/ liquor volume in the third trimester, 28, 32, 36 weeks.

Blood glucose monitoring

- Four times a day, before breakfast (fasting) and two hours from the start of each meal
- Aim for BGL <5.0mmol/L fasting, <6.7mmoll/ post prandial
- The target blood glucose should remain above 3.5mmol/L
- Consider continuous electronic glucose monitoring (CEGM) if appropriate

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In addition to usual scans during pregnancy, women with diabetes in pregnancy requiring medication may benefit from serial scans for growth and well-being – particularly if very unstable BGL's, suspicion of macrosomia or polyhydramnios, evidence of IUGR/PET especially in cases with pre-existing diabetes with vascular disease. We would generally perform them at 28/32/ and 36 weeks.

Cardiotocography

Cardiotocography (CTG) recommended after 34 weeks in discussion with birthing hospital medical obstetric team. The initiation of CTG monitoring may be delayed at the discretion of the hospital medical obstetric team under certain circumstances.

Obese Women

See Nutrition, weight and exercise in pregnancy protocol for additional details on clinical monitoring in women who are overweight or obese. http://kams.org.au/resources/clinical-protocols-guidelines/

ADDITIONAL CONSIDERATIONS FOR PRE-EXISTING DIABETES

Preconception counselling

Aim for a review by the woman's physician, endocrinologist, and / or diabetes educator prior to conception.

Explain the reasons for and benefits of optimal glucose targets in pregnancy.

- Pre pregnancy glycaemic control should be maintained as close to the non-diabetic range as possible. Hypergylcemia is associated with an increased risk of congenital abnormalities (neural tube defects, cardiovascular and vertebral defects). An HbA1c of ≥86 mmol/mol (≥10%) is associated with a 23% rate of major congenital abnormalities.
- Increased risk of complication such as shoulder dystocia, macrosomia, polyhydramnios, instrumental delivery, Caesarean section and fetal death.
- Possible contraindications to pregnancy include: ischemic heart disease, severe renal disease, advanced retinopathy, gastropathy and uncontrolled hypertension
- Assess for the presence and severity of micro and macrovascular complications. There is an increased risk of worsening renal disease, heart disease, retinopathy and peripheral neuropathy if already present.

Preconception plan

- Aim for HbA1c ≤53 mmol/mol (≤7%)
- Test HbA1c every 3 months to assess risk of birth defects and to guide glucose control
- Refer for retinopathy screening, renal review, podiatrist
- Commence 5mg (high dose) folate and iodine supplementation.

MODE AND TIMING OF DELIVERY

It is essential to discuss best location for birth with a specialist obstetric/ paediatric and anesthetic team.

Early induction aims to prevent stillbirth without increasing the risk of neonatal morbidity. Decision regarding timing and mode of birth should be made on an individual basis, considering: gestational age, estimated foetal weight, degree of glycaemic control, obstetric history and cervical status *(Bishops' score)*.

Women with diabetes but on no medications and no evidence of macrosomia /polyhydramnios or IUGR, treat pregnancy as normally as possible. No indication for preterm induction.

Women with diabetes on insulin or oral hypoglycaemic agents: Arrange an elective birth at 38-40 weeks. The better controlled the diabetes the less the indication to birth early.

Decisions for caesareans must be individualised. Consider elective Caesarean Section if concerned about shoulder dystocia, however this is very hard to predict in advance and ultrasound estimations of fetal weight can be very inaccurate.

POSTNATAL CARE

Pre Existing Diabetes

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

Gestational Diabetes

Women without significant hyperglycaemia post pregnancy should be screened by HbA1c as per the screening method for adults in the non-pregnant state. Testing at four months postpartum with HbA1c is cheaper and less resource intensive than OGTT. If HbA1c is taken at the 6 week routine postnatal review the result could be artificially low and not represent a non-pregnancy state. The result of the test should be evaluated according to standard WHO criteria for the non-pregnant state (see T2DM protocol for interpretation of HbA1c results). This screening should be negative for women with GDM.

Women who do not have diabetes mellitus at this time should still be regarded as at risk of developing diabetes mellitus later in life. All women who have had GDM should be screened for diabetes ANNUALLY with HbA1c.

Diabetes Mellitus commencing in pregnancy

Women diagnosed with diabetes during pregnancy may well continue to be diabetic post birth. This is often not recognized until postnatal testing.

In this case screening of HbA1c at four months postpartum will be positive for women who have developed diabetes mellitus during pregnancy. See T2DM protocol (insert link) for interpretation of HbA1c results.

Follow up care as per T2DM protocol.