SECTION 13

Pregnancy and Diabetes

5.5 % of all pregnancies in South Australia will be complicated by diabetes mellitus. (0.6% in women with pre-existing diabetes – type 1 or type 2 and 4.9% gestational diabetes).[1] Diabetes which occurs during pregnancy is known as gestational diabetes. Gestational diabetes usually disappears after the baby is born but women have an increased lifetime risk of developing type 2 diabetes.

Regardless of the type of maternal diabetes, babies of women with diabetes are at an increased risk of intrauterine death, macrosomia (causing difficulties with delivery), neonatal respiratory distress syndrome, neonatal hypoglycaemia, jaundice and others.[2] [3]

We recommend that health care professionals who work with women who are pregnant and have diabetes become familiar with two key documents:

- The Australasian Diabetes in Pregnancy Society (2005) 'Consensus guidelines for the management of type 1 and type 2 diabetes in relation to pregnancy'.[4]
- The Australasian Diabetes in Pregnancy Society (1998) 'Gestational diabetes mellitus management guidelines'.[5]

This section has been spilt into two sections:

1. Pre-existing diabetes and pregnancy

2. Gestational diabetes.

Pre-existing diabetes and pregnancy

Risks to the mother and baby

Diabetes in pregnancy is associated with risks to the woman and the developing foetus. Miscarriage, pre-eclampsia and preterm labour are more common in women who have pre-existing diabetes. Diabetic retinopathy can worsen rapidly during pregnancy. Stillbirth, congenital malformation, birth injury, peri natal mortality and hypoglycaemia are more common in babies who are born to women with pre-existing diabetes.[6] However these complications can be greatly reduced if women receive pre-pregnancy counselling and are able to achieve tight glucose control before conception and then maintained as close to normal throughout the pregnancy.[4]

Before pregnancy

All women with type 1 and type 2 diabetes should receive counselling and information about potential problems of diabetes in pregnancy, the potential dangers of an unplanned pregnancy, and the benefits of pre-pregnancy counselling.[4]

Women with pre-existing diabetes should plan their pregnancy. They should have their HbA1c monitored and obtain tight control prior to and during early conception, noting that careful management should aim to prevent severe maternal hypoglycaemia. The ideal HbA1c preconception is less than 6.1%. Less than 7.0% is satisfactory and 7.0% to 8.0% is borderline. An HbA1c greater than 8.0% is not satisfactory and should be tightened before conception, and those with HbA1c greater than 10.0% should be advised of their extreme risk should they get pregnant.[7]

Folic acid 5mg daily should be commenced to minimise the risk of folate deficiency induced birth defects.

Management of diabetes in the preconception phase aims to ensure the best outcome for both mother and baby. Questions that might arise include fertility, spontaneous abortion, incidence of diabetes mellitus in offspring, effects of pregnancy on existing diabetes complications and expected outcomes. These questions should be addressed in a supportive manner to reduce anxiety.

Diabetes complication screening is essential and should occur preconception or as early in the pregnancy as possible. Some pre-existing complications are contraindications to pregnancy.[4] The complication screening involves a check for retinopathy, nephropathy, macrovascular disease and autonomic neuropathy.

Pregnancy

Women with pre-existing diabetes should be managed by a specialised multidisciplinary team. This is more difficult in rural areas but the use of virtual teams and distance communication technologies (eg videoconferencing) can be an option.

Healthy nutrition is important for all pregnant women (see *Healthy eating* – Section 8). Energy and nutrient requirements must be individualised. However, it is recommended that all women with diabetes be assessed by a dietitian and advice given on appropriate meal planning.

It is important to monitor insulin requirements as these can change frequently during pregnancy. For women with pre-existing diabetes insulin requirements may initially fall during the first three months. Hypoglycaemia, particularly overnight, is more frequent from the 6th to 14th week of gestation but should be assessed at all times throughout the pregnancy. By about 24-28 weeks, insulin-counteracting hormones will have significantly increased, and by the third trimester insulin requirements may be more than twice those needed pre-pregnancy.

The Australian Diabetes In Pregnancy Society (ADIPS) 2005 consensus guidelines state that there is insufficient evidence about the safety of long acting analogue insulin and so caution must be used[4]. Women need to be informed about their choices. Women with pre-existing type 2 diabetes who are planning pregnancy are advised that insulin therapy carries the least established risk for the baby and is the gold standard[4]. Oral hypoglycaemic agents are not first line treatment because there is limited information regarding their safety in pregnancy[4 6]. Although there are some short term data about the safety and efficacy of metformin in women with gestational diabetes, long term follow-up data for offspring of mothers is still lacking[4 8 9 10]. Consequently most clinicians are cautious and continue to limit the use of metformin to those women who have extreme insulin resistance or needle phobia.

Women with type 2 diabetes may also be taking antihypertensive or lipid lowering medications. Consideration needs to be given to ceasing angiotensin converting enzyme inhibitors and angiotensin receptor blockers prior to pregnancy, because of their potential for teratogenesis. This may need to be balanced with the need to preserve maternal renal function until pregnancy is established[11]. Lipid lowering medication is contraindicated in early pregnancy[4]. In neither case, the risks to the fetus are not sufficient to warrant termination of pregnancy.

Women on oral hypoglycaemic drugs are generally advised to switch to insulin therapy before they conceive[4 6]. If a woman on oral hypoglycaemic agents becomes pregnant whilst taking oral hypoglycaemic drugs, then insulin can be commenced with a slow withdrawal of oral treatment so that diabetes control can still be maintained during this transition period. An abrupt stopping of oral therapy can lead to poor diabetes control which can have adverse effects during pregnancy[4].

Close monitoring of women throughout the pregnancy is required. It is important that these women have their medication reviewed and adjusted frequently to maintain optimal glucose control. Such review may be required as frequently as twice a week. Some diabetes services offer phone stabilisation services which decrease the need for face to face visits.

Management is monitored by blood glucose levels (BGL) and glycosylated haemoglobin concentrations (HbA1c). Blood glucose levels are monitored by the woman at home, usually a minimum of four tests daily (fasting and 3 post prandial measures) or as recommended by the physician or obstetrician. The frequency of home testing will increase or decrease depending on the woman's BGL control.

Targets are Less than 5.5mmol/L fasting
Less than 7.0mmol/L 2 hours post prandial

If diabetes control becomes unstable, consider the possibility of urinary or vaginal infections. Micro cultures for infection should be checked. The presence of ketones needs to be addressed as it suggests inadequate dietary intake or progressing ketoacidosis in those with pre-existing type 1 diabetes. Pregnant women with type 1 diabetes are at a higher risk of ketoacidosis[4].

Women are at an increased risk of pre-eclampsia and should be regularly assessed. If the woman has poor diabetes control there is an increased risk of foetal cardiac defects and so a foetal echocardiograph is recommended at 24 weeks.

The pregnancy is monitored the same as other pregnancies with an extra scan at around 32-34 weeks to check foetal growth should be considered.

Labour

Obstetric assessment is essential in determining the mode of delivery. Encourage women to discuss their delivery plans with the obstetrician early in the pregnancy. Delivery should be at term unless obstetric or medical factors dictate otherwise[4].

Often women are advised to continue taking their usual insulin until the start of labour or until they commence fasting for a caesarean. At this point the woman would commence an insulin/glucose infusion protocol. Each hospital should have its own protocol for management during and post labour. The goal during labour is to provide adequate carbohydrate intake to meet maternal energy requirements and to maintain euglycaemia.

After delivery

Mother

Following delivery, insulin requirements of women with pre-existing diabetes decrease before returning to around pre-pregnancy requirements (this time is variable and can take days). If fasting the woman will require a glucose infusion and the hospital protocol needs to account for the unpredictability of the blood glucose levels. The woman has an increase in insulin sensitivity (ie reduced insulin requirements) and consequently hypoglycaemia risk is increased during this period.

If there is no reduction in insulin requirement consider the possibility of an underlying infection. Women who decide to breast feed will have decreased insulin requirements and increased energy requirements. Continuing diet assessment and support is recommended. Women need to be aware of the increased risk of hypoglycaemia particularly nocturnal and that breastfeeding may accentuate this risk. Discharge from hospital should be delayed until the blood glucose levels have stabilised (may take 4 or 5 days).

Baby

The baby must be monitored for hypoglycaemia during the first 24 hours. Each hospital should have an agreed protocol to guide the care of the baby. The paediatrician or medical officer (MO) will assess and manage post delivery complications.

Gestational diabetes

Risks

In well treated gestational diabetes the risk of perinatal mortality is not increased but if untreated the risk is increased. Perinatal morbidity is increased eg macrosomia, shoulder dystocia, birth injuries, respiratory distress syndrome, hyperbilirubinaemia and neonatal hypoglycaemia. Long term health outcomes among infants born to mothers with gestational diabetes include obesity and/or diabetes. The increased risk of obesity and/or diabetes relates to the intrauterine environmental factors as well as the increased genetic risk from the mother. [3] As with pre-existing diabetes the risk of complications is decreased if blood glucose targets are met. Women who have had gestational diabetes carry a lifelong risk of developing type 2 diabetes.

Screening for gestational diabetes

All pregnant women should be screened for gestational diabetes. Gestational diabetes is defined as glucose intolerance with onset during pregnancy.[5]

Consider early screening (OGTT at 13 weeks):

- If woman is obese with BMI greater than 35.
- History of gestational diabetes.
- Known glucose intolerance (impaired glucose tolerance or impaired fasting glucose).

If the OGTT is negative repeat 75gm OGTT at 24-28 weeks. If a woman vomits during the OGTT an option is to do 2 weeks of home blood glucose monitoring instead of repeating the OGTT. The woman can be asked to test fasting and 2 hour post prandial at breakfast, lunch and tea. If the fasting BGL is above 5.5mol/L or the 2 hour post prandial is above 7.8mmol/L then they can be classified as having gestational diabetes[12].

Screen all pregnant women for gestational diabetes at 26 – 28 weeks

Screening Tests: Oral Glucose Challenge Test (OGCT)
50g load, abnormal ≥7.8mmol/L at 1 hour

If high, proceed to diagnostic 75g **Oral Glucose Test (OGTT)**

Diagnosis of GDM
(26-30wks)
75 g OGTT
FBG ≥5.5mmol/L
or
2 hour BG ≥7.8mmol/L*

Management

Nutritional advice & exercise
Self blood glucose monitoring
Refer to dietitian and/or diabetes educator

Aim for normoglycaemia
FBG < 5.5mmol/l
AND
2 hour postprandial <7.0mmol/L
Continue dietary management

Persistent hyperglycaemia
FBG ≥ 5.5mmol/L OR
2 hour postprandial ≥7.0mmol/L
Seek specialist advice;
Insulin or oral hypoglycaemics (see page 2); Ultrasound at 32-34 weeks;
Foetal monitoring

Clinically uncomplicated. Usual pregnancy care with close blood **glucose** and clinical monitoring.

Clinically complicated eg pre-eclampsia, hypertension, macrosomia, polyhydramnios. Seek specialist advice. Foetal monitoring. Consider delivery ≥38 weeks.

Good control and no macrosomia or complications. Consider delivery at full term.

Poor BGL control. Notify obstetrician Consider delivery ≥38 weeks.

Close monitoring of baby for hypoglycaemia and respiratory distress syndrome.
Encourage breast feeding.

* Although the ADIPS consensus refers to ≥8.0mmol/L for diagnosis of gestational diabetes, the Perinatal Practice Guidelines are recommending 7.8mmol/L based on more recent level 1 evidence (accessed online at http://www.health.sa.gov.au/ppg/Default.aspx?PageContentID=743&tabid=35).

Education

Once gestational diabetes is detected, referral for diabetes education and management advice as soon as possible (ideally within 1 week).

All women should receive individual education, counselling and specific dietary advice from a diabetes educator, a dietitian and a medical consultant.

Women are taught self blood glucose monitoring and in some services are loaned a blood glucose meter. The diabetes educator should make arrangements for the woman to make contact with them on a one to two weekly basis (either by phone or face to face). Women should have access to a dietitian as needed. Technique and accuracy of blood glucose testing should be regularly checked.

Regular activity is encouraged as tolerated.

Aim of treatment

Management of the pregnancy is as for pre-existing diabetes. The mainstay of treatment is a healthy diet with regular intake of carbohydrates. If diet alone does not control blood glucose levels, then insulin is commenced.

The overall aim of treatment is to maintain fasting blood glucose values less than 5.5mmol/L and less than 7.0mmol/L 2 hours post prandial. Insulin therapy is started if fasting blood glucose values exceed this more than twice in a one to two week interval.

Insulin therapy is often commenced as an outpatient unless contra-indicated by either medical or social circumstances.

The women should have access to 24 hour phone support for any problems from the diabetes and obstetric services or obstetric registrar.

Labour

Spontaneous labour at term should be considered for those whose blood glucose levels have been optimal throughout and whose pregnancy is clinically uncomplicated (eg no pre-eclampsia, hypertension, poor glycaemic control, foetal growth, amniotic fluid abnormalities on ultrasound, urinary infections or other infections). However, a woman should not go beyond full term. The obstetrician will arrange for an interventional delivery at 38 weeks if required.

After delivery the need for insulin therapy usually ceases. It is recommended that each hospital adheres to an agreed protocol for the assessment of blood glucose levels.

Post delivery Recommended blood glucose monitoring protocol		
Timing	**Frequency**	**Rationale**
First 3-4 hours post partum[5]	Hourly blood glucose levels if glucose/insulin infusion	To monitor hypoglycaemia in patients who have ceased insulin therapy
Post natally up to day 4 or before discharge[5]	Monitor blood glucose up to QID (fasting and pre-meal) during the first 24 - 48 hours.	To exclude ongoing diabetes
6 – 8 weeks	Offer testing for diabetes using a 75g OGTT	Exclude permanent diabetes
1 – 2 yearly[5]	Repeat testing NB: OGTT is the gold standard but yearly venous fasting is acceptable[6]	Diabetes high risk screening

Post delivery and long term follow up

Risks to the mother

At least 50% of women with gestational diabetes will develop type 2 diabetes over the next 30 years.[13] Maintaining healthy body weight, healthy eating, regular exercise and a healthy lifestyle will reduce the risk.

Women are encouraged to breastfeed as this assists blood glucose and weight control in addition to all the normal benefits of breastfeeding.

All women who have had gestational diabetes should be counselled about the life long risk of developing type 2 diabetes and the need for yearly follow up.

Risks to the baby

There is evidence that exposure to high glucose in utero places the child at risk of the metabolic syndrome later in life. The infant also has the family inherited risk from its mother.

Monitoring

There is no need for ongoing self-monitoring if the women's blood glucose level is normal after delivery. Women should know that the symptoms of polyuria, polydipsia, polyphagia, thrush and blurred vision may indicate the development of type 2 diabetes. Women who have had gestational diabetes should have 1 yearly blood tests done to assess for diabetes.[5]

Subsequent pregnancies

Women should be counselled as to the risk of GDM in subsequent pregnancies and/or development of type 2 diabetes prior to any subsequent pregnancy. Pre-conception screening and earlier screening in pregnancy (13-14 weeks) is advised. A healthy lifestyle is to be encouraged between pregnancies.

Contraception

It is very important to discuss contraception with all women postnatally. Women should discuss the most appropriate option with their GP or specialist physician.

Women who have gestational diabetes need to be informed that they should visit their GP for preconception diabetes screening prior to stopping contraception. Women with pre existing diabetes should plan any subsequent pregnancies with their GP or specialist physician prior to stopping contraception.

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