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## Executive Summary

## Diabetes and Pregnancy

## KEY MESSAGES

**Pregestational Diabetes**

- All women with pre-existing type 1 or type 2 diabetes should receive preconception care to optimize glycemic control, assess complications, review medications and begin folate supplementation.
- Care by an interdisciplinary diabetes healthcare team composed of diabetes nurse educators, dietitians, obstetricians and diabetologists, both prior to conception and during pregnancy, has been shown to minimize maternal and fetal risks in women with preexisting type 1 or type 2 diabetes.

**Gestational Diabetes Mellitus**

- The diagnostic criteria for gestational diabetes mellitus (GDM) remain controversial; however, the committee has chosen a preferred approach and an alternate approach. The preferred approach is to begin with a 50 g glucose challenge test and, if appropriate, proceed with a 75 g oral glucose tolerance test, making the diagnosis of GDM if  $\geq 1$  value is abnormal (fasting  $\geq 5.3$  mmol/L, 1 hour  $\geq 10.6$  mmol/L, 2 hours  $\geq 9.0$  mmol/L). The alternate approach is a 1-step approach of a 75 g oral glucose tolerance test, making the diagnosis of GDM if  $\geq 1$  value is abnormal (fasting  $\geq 5.1$  mmol/L, 1 hour  $\geq 10.0$  mmol/L, 2 hours  $\geq 8.5$  mmol/L).
- Untreated GDM leads to increased maternal and perinatal morbidity, while treatment is associated with outcomes similar to control populations.

**Highlights of Revisions**

- All recommendations have been updated and reorganized to clarify management considerations for women with pregestational or gestational diabetes in the prepregnancy period, during pregnancy, and in the intrapartum and postpartum periods.
- New criteria have been added for the screening and diagnosis of GDM (Figures 1 and 2).

## RECOMMENDATIONS

**Pregestational Diabetes***Preconception care*

1. All women of reproductive age with type 1 or type 2 diabetes should receive advice on reliable birth control, the importance of glycemic control prior to pregnancy, the impact of BMI on pregnancy outcomes, the need for folic acid and the need to stop potentially embryopathic drugs prior to pregnancy [Grade D, Level 4 (1)].
2. Women with type 2 diabetes and irregular menses/PCOS who are started on metformin or a thiazolidinedione should be advised that fertility may improve and be warned about possible pregnancy [Grade D, Consensus].

3. Before attempting to become pregnant, women with type 1 or type 2 diabetes should:
  - a. Receive preconception counselling that includes optimal diabetes management and nutrition, preferably in consultation with an interdisciplinary pregnancy team to optimize maternal and neonatal outcomes [Grade C, Level 3 (2,3)]
  - b. Strive to attain a preconception A1C  $\leq 7.0\%$  (or A1C as close to normal as can safely be achieved) to decrease the risk of:
    - Spontaneous abortion [Grade C, Level 3 (4)]
    - Congenital anomalies [Grade C, Level 3 (3–6)]
    - Preeclampsia [Grade C, Level 3 (7,8)]
    - Progression of retinopathy in pregnancy [Grade A, Level 1, for type 1 diabetes (9); Grade D, Consensus, for type 2 diabetes]
  - c. Supplement their diet with multivitamins containing 5 mg folic acid at least 3 months preconception and continuing until at least 12 weeks postconception [Grade D, Level 4 (10)]. Supplementation should continue with a multivitamin containing 0.4–1.0 mg folic acid from 12 weeks postconception to 6 weeks postpartum or as long as breastfeeding continues [Grade D, Consensus].
  - d. Discontinue medications that are potentially embryopathic, including any from the following classes:
    - ACE inhibitors and ARBs prior to conception or upon detection of pregnancy [Grade C, Level 3 (11–13)]
    - Statins [Grade D, Level 4 (14)]
4. Women with type 2 diabetes who are planning a pregnancy should switch from noninsulin antihyperglycemic agents to insulin for glycemic control [Grade D, Consensus]. Women with pregestational diabetes who also have PCOS may continue metformin for ovulation induction [Grade D, Consensus].

*Assessment and management of complications*

5. Women should undergo an ophthalmological evaluation by an eye care specialist [Grade A, Level 1, for type 1 (9,15); Grade D, Level 4, for type 2 (16)].
6. Women should be screened for chronic kidney disease prior to pregnancy (see Chronic Kidney Disease chapter, p. S329) [Grade D, Level 4, for type 1 diabetes (17); Grade D, Consensus, for type 2 diabetes]. Women with microalbuminuria or overt nephropathy are at increased risk for development of hypertension and preeclampsia [Grade A, Level 1 (17,18)] and should be followed closely for these conditions [Grade D, Consensus].

*Management in pregnancy*

7. Pregnant women with type 1 or type 2 diabetes should:
  - a. Receive an individualized insulin regimen and glycemic targets typically using intensive insulin therapy [Grade A, Level 1B, for type 1 (19,20); Grade A, Level 1, (20) for type 2]
  - b. Strive for target glucose values:
    - Fasting PG  $\leq 5.3$  mmol/L
    - 1-hour postprandial  $\leq 7.8$  mmol/L
    - 2-hour postprandial  $\leq 6.7$  mmol/L [Grade D, Consensus]

- c. Be prepared to raise these targets if needed because of the increased risk of severe hypoglycemia during pregnancy [Grade D, Consensus]
  - d. Perform SMBG, both pre- and postprandially, to achieve glycemic targets and improve pregnancy outcomes [Grade C, Level 3 (3)]
8. Women with pregestational diabetes may use aspart or lispro in pregnancy instead of regular insulin to improve glycemic control and reduce hypoglycemia [Grade C, Level 2, for aspart (21); Grade C, Level 3, for lispro (22,23)].
9. Detemir [Grade C, Level 2 (24)] or glargine [Grade C, Level 3 (25)] may be used in women with pregestational diabetes as an alternative to NPH.

### Intrapartum glucose management

10. Women should be closely monitored during labour and delivery, and maternal blood glucose levels should be kept between 4.0 and 7.0 mmol/L in order to minimize the risk of neonatal hypoglycemia [Grade D, Consensus].
11. Women should receive adequate glucose during labour in order to meet their high-energy requirements [Grade D, Consensus].

### Postpartum

12. Women with pregestational diabetes should be carefully monitored postpartum as they have a high risk of hypoglycemia [Grade D, Consensus].
13. Metformin and glyburide may be used during breastfeeding [Grade C, Level 3, for metformin (26); Grade D, Level 4, for glyburide (27)].
14. Women with type 1 diabetes in pregnancy should be screened for postpartum thyroiditis with a TSH test at 6–8 weeks postpartum [Grade D, Consensus].
15. All women should be encouraged to breastfeed since this may reduce offspring obesity, especially in the setting of maternal obesity [Grade C, Level 3 (28)].

## Gestational Diabetes

### Diagnosis

16. All pregnant women should be screened for GDM at 24–28 weeks of gestation [Grade C, Level 3 (29)].
17. If there is a high risk of GDM based on multiple clinical factors, screening should be offered at any stage in the pregnancy [Grade D, Consensus]. If the initial screening is performed before 24 weeks of gestation and is negative, rescreen between 24 and 28 weeks of gestation. Risk factors include:
- Previous diagnosis of GDM
  - Prediabetes
  - Member of a high-risk population (Aboriginal, Hispanic, South Asian, Asian, African)
  - Age  $\geq 35$  years
  - BMI  $\geq 30$  kg/m<sup>2</sup>
  - PCOS, acanthosis nigricans
  - Corticosteroid use
  - History of macrosomic infant
  - Current fetal macrosomia or polyhydramnios [Grade D, Consensus]
18. The **preferred** approach for the screening and diagnosis of GDM is the following [Grade D, Consensus]:
- a. Screening for GDM should be conducted using the 50 g GCT administered in the nonfasting state with PG measured 1 hour later [Grade D, Level 4 (30)]. PG  $\geq 7.8$  mmol/L at 1 hour will be considered a positive screen and will be an indication to proceed to the 75 g OGTT [Grade C, Level 2 (31)]. PG  $\geq 11.1$  mmol/L can be considered diagnostic of gestational diabetes and does not require a 75 g OGTT for confirmation [Grade C, Level 3 (32)].

- b. If the GCT screen is positive, a 75 g OGTT should be performed as the diagnostic test for GDM using the following criteria:
- $\geq 1$  of the following values:
    - fasting  $\geq 5.3$  mmol/L
    - 1 hour  $\geq 10.6$  mmol/L
    - 2 hours  $\geq 9.0$  mmol/L [Grade B, Level 1 (33)]
19. An alternative approach that may be used to screen and diagnose GDM is the 1-step approach [Grade D, Consensus]:
- a. A 75 g OGTT should be performed (with no prior screening 50 g GCT) as the diagnostic test for GDM using the following criteria [Grade D, Consensus]:
- $\geq 1$  of the following values:
    - fasting  $\geq 5.1$  mmol/L
    - 1 hour  $\geq 10.0$  mmol/L
    - 2 hours  $\geq 8.5$  mmol/L [Grade B, Level 1 (33)]

### Management during pregnancy

20. Women with GDM should:
- a. Strive for target glucose values:
- i. Fasting PG  $< 5.3$  mmol/L [Grade B, Level 2 (34)]
  - ii. 1-hour postprandial  $< 7.8$  mmol/L [Grade B, Level 2 (35)]
  - iii. 2-hour postprandial  $< 6.7$  mmol/L [Grade B, Level 2 (34)]
- b. Perform SMBG, both fasting and postprandially, to achieve glycemic targets and improve pregnancy outcomes [Grade B, Level 2 (35)].
- c. Avoid ketosis during pregnancy [Grade C, Level 3 (36)].
21. Receive nutrition counselling from a registered dietitian during pregnancy [Grade C, Level 3 (37)] and postpartum [Grade D, Consensus]. Recommendations for weight gain during pregnancy should be based on pre-gravid BMI [Grade D, Consensus].
22. If women with GDM do not achieve glycemic targets within 2 weeks from nutritional therapy alone, insulin therapy should be initiated [Grade D, Consensus].
23. Insulin therapy in the form of multiple injections should be used [Grade A, Level 1 (20)].
24. Rapid-acting bolus analogue insulin may be used over regular insulin for postprandial glucose control, although perinatal outcomes are similar [Grade B, Level 2 (38,39)].
25. For women who are nonadherent to or who refuse insulin, glyburide [Grade B, Level 2 (40–45)] or metformin [Grade B, Level 2 (46)] may be used as alternative agents for glycemic control. Use of oral agents in pregnancy is off-label and should be discussed with the patient [Grade D, Consensus].

### Intrapartum glucose management

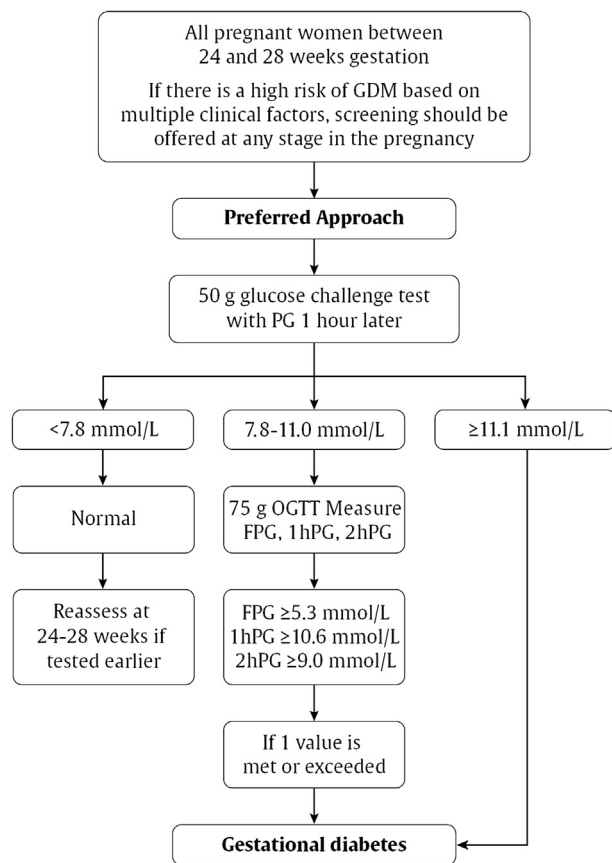
26. Women should be closely monitored during labour and delivery, and maternal blood glucose levels should be kept between 4.0 and 7.0 mmol/L in order to minimize the risk of neonatal hypoglycemia [Grade D, Consensus].
27. Women should receive adequate glucose during labour in order to meet their high-energy requirements [Grade D, Consensus].

### Postpartum

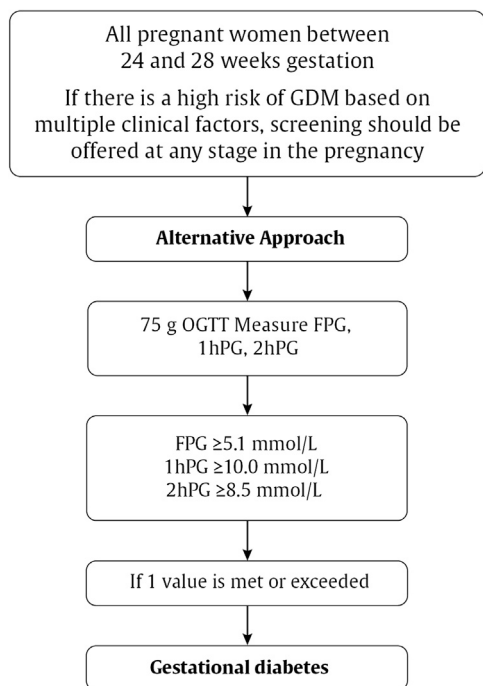
28. Women with GDM should be encouraged to breastfeed immediately after delivery in order to avoid neonatal hypoglycemia [Grade D, Level 4 (47)] and to continue for at least 3 months postpartum in order to prevent childhood obesity [Grade C, Level 3 (48)] and reduce risk of maternal hyperglycemia [Grade C, Level 3 (49)].
29. Women should be screened with a 75 g OGTT between 6 weeks and 6 months postpartum to detect prediabetes and diabetes [Grade D, Consensus].

#### Abbreviations:

A1C, glycated hemoglobin; ACE, angiotension-converting enzyme; ARB, angiotensin II receptor blocker; BMI, body mass index; GCT, glucose challenge test; OGTT, oral glucose tolerance test; PCOS, polycystic ovarian syndrome; PG, plasma glucose; SMBG, self-monitoring of blood glucose; TSH, thyroid-stimulating syndrome.



**Figure 1.** Preferred approach for the screening and diagnosis of gestational diabetes. 1hPG, 1-hour plasma glucose; 2hPG, 2-hour plasma glucose; FPG, fasting plasma glucose; GDM, gestational diabetes mellitus; OGTT, oral glucose tolerance test; PG, plasma glucose.



**Figure 2.** Alternative approach for the screening and diagnosis of gestational diabetes. 1hPG, 1-hour plasma glucose; 2hPG, 2-hour plasma glucose; FPG, fasting plasma glucose; GDM, gestational diabetes mellitus; OGTT, oral glucose tolerance test; PG, plasma glucose.

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