

SCREENING

Purpose: To encourage the early identification and proper management of gestational diabetes mellitus (GDM). It is estimated that GDM occurs in 2 to 4% of all pregnancies. GDM is usually asymptomatic; therefore, it is necessary to screen for abnormal glucose tolerance. Normal fasting blood glucose in pregnancy does not exclude the diagnosis of GDM. The added metabolic stress of pregnancy will normally lead to some deterioration of glucose tolerance in all pregnancies; particularly, by the third trimester.

Important considerations:

- Test strips and meters at present are not sufficiently precise and accurate for the screening and diagnosis of GDM.¹
- Glycosuria is not a reliable indicator of diabetes mellitus (DM) due to the decreased renal threshold in pregnancy.
- Glycated hemoglobin (A1C) and fructosamine are not useful screening tests for GDM.¹

ASSESSMENT	EDUCATIONAL APPROACH	RATIONALE & CLINICAL MANAGEMENT GUIDELINES
SCREENING GUIDELINES FOR DIABETES MELLITUS IN EARLY PREGNANCY		
<p>PREGNANT WOMEN SUSPECTED OF HAVING PRE-EXISTING DM</p> <ul style="list-style-type: none"> ◆ Perform fasting or casual venous plasma glucose (PG) test or proceed directly to the 50 g oral glucose screen as soon as feasible, depending on the degree of suspicion. 	<ul style="list-style-type: none"> ◆ Explain the reasons for suspecting pre-existing DM and the value of the test <i>early</i> in the pregnancy. ◆ If the test is positive for DM, introduce the team concept and the role the Diabetes Centre (DC)/health care team (HCT) will play throughout the pregnancy. 	<ul style="list-style-type: none"> ◆ The following values on more than one occasion confirm the diagnosis of DM and further screening is not necessary:² <ul style="list-style-type: none"> • Fasting PG ≥ 7.0 mmol/L. OR <ul style="list-style-type: none"> • Casual PG ≥ 11.1 mmol/L. (<i>Casual is defined as any time of day, without regard to the interval since the last meal.</i>) OR <ul style="list-style-type: none"> • 1-hour PG value following the 50 g oral glucose screen ≥ 10.3 mmol/L. ◆ Refer to: <ul style="list-style-type: none"> • The local DC. • An obstetrician. • An endocrinologist or internist with an expertise in DM and pregnancy. ◆ The treatment plan should include a meal plan, exercise/activity, blood glucose monitoring, and, if necessary, insulin.

ASSESSMENT	EDUCATIONAL APPROACH	RATIONALE & CLINICAL MANAGEMENT GUIDELINES
SCREENING GUIDELINES FOR DIABETES MELLITUS IN EARLY PREGNANCY (cont)		
<p>PREGNANT WOMEN SUSPECTED OF HAVING PRE-EXISTING DM (cont)</p>	<ul style="list-style-type: none"> ◆ If the test is negative for DM, consider as high risk in future screening. 	<ul style="list-style-type: none"> ◆ Reassess using 50 g oral glucose screen at 24 to 28 weeks gestation or at any time there are symptoms or signs of hyperglycemia.³
SCREENING GUIDELINES FOR GESTATIONAL DIABETES MELLITUS		
<p>PREGNANT WOMEN CONSIDERED AT HIGH RISK FOR DEVELOPING GDM</p> <ul style="list-style-type: none"> ◆ Assess for the following factors indicative of increased risk:^{2,4} <ul style="list-style-type: none"> • Glycosuria. • A family history of DM in a first degree relative. • A history of unexplained stillbirth. • Previous GDM. • Previous large-for-dates infant. • Obesity. • Maternal age 35 or more.² • Polyhydramnios. • Member of an ethnic group predisposed to DM (e.g., woman of African, Aboriginal, South Asian, Asian, or Hispanic descent). 	<ul style="list-style-type: none"> ◆ Explain: <ul style="list-style-type: none"> • Which factors indicate high risk and warrant this early screen. 	<ul style="list-style-type: none"> ◆ Screen with 50 g oral glucose screen as soon as feasible (within the first trimester)² (taken independently of the time of the last meal or time of day) with 1-hour PG. ◆ Diagnostic Criteria² If the 1-hour pc PG is: <ul style="list-style-type: none"> • < 7.8 mmol/L, it is normal. • ≥ 7.8 mmol/L but ≤ 10.2 mmol/L, a full 2-hour 75 g oral glucose tolerance test (OGTT) is recommended. • ≥ 10.3 mmol/L, GDM is present and the OGTT is unnecessary and contraindicated.

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SCREENING GUIDELINES FOR GESTATIONAL DIABETES MELLITUS (cont)		
<p>PREGNANT WOMEN CONSIDERED AT HIGH RISK FOR DEVELOPING GDM (cont)</p>	<ul style="list-style-type: none"> The need for and timing of a later test if the first test results are within the normal ranges. 	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p>If the 50 g oral glucose screen is normal, repeat the 50 g screen between 24 and 28 weeks, or earlier if clinical evidence indicates.^{2,4,5}</p> </div> <div style="border: 1px solid black; padding: 5px;"> <p>If the 50 g oral glucose screen was abnormal but the 75 g OGTT was normal, repeat the 75 g OGTT between 24 and 28 weeks (closer to 24 weeks). There is no need to repeat the 50 g oral glucose screen.</p> </div> <ul style="list-style-type: none"> See “Preparation and Interpretation of 75 g OGTT” on pages 3 and 4 in this section.
<p>ALL PREGNANT WOMEN</p> <ul style="list-style-type: none"> Screen all pregnant women for abnormal glucose tolerance between 24 and 28 weeks gestation (closer to 24 weeks if possible to allow timely intervention).^{2,3} 	<ul style="list-style-type: none"> Explain: <ul style="list-style-type: none"> This test is done on all pregnant women who are not known to have DM. 	<ul style="list-style-type: none"> Screen with a 50 g oral glucose screen (taken independently of the time of the last meal or time of day) with a 1-hour pc PG. See pages 2 and 3 in this section for diagnostic criteria and procedure to follow for abnormal screen results.
<p>PREPARATION AND INTERPRETATION OF 75 G OGTT</p> <ul style="list-style-type: none"> Ensure proper preparation for the 75 g OGTT. 	<ul style="list-style-type: none"> Explain: <ul style="list-style-type: none"> The need for proper preparation. Discourage any dietary alterations that would reduce intake to less than 1500 to 1800 kcal (6500 to 7500 kJ). Encourage usual activity and fast only the night prior to the test. 	<ul style="list-style-type: none"> Preparation for the 75 g OGTT:³ <ul style="list-style-type: none"> ≥ 150 g of carbohydrate (CHO) is consumed for 3 days prior to the test; 150 g of CHO does not imply any unnecessary loading of CHO as most well-balanced, unrestricted meal plans of 1500 to 1800 kcal (6500 to 7500 kJ) will provide at least 150 g of CHO. Physical activity is not restricted prior to the test. Fasting (water is permitted) for more than 8 hours but not longer than 14 hours (12 hours is recommended).

ASSESSMENT	EDUCATIONAL APPROACH	RATIONALE & CLINICAL MANAGEMENT GUIDELINES
SCREENING GUIDELINES FOR GESTATIONAL DIABETES MELLITUS (cont)		
<p data-bbox="138 329 594 423"><i>PREPARATION AND INTERPRETATION OF 75 G OGTT (cont)</i></p> <ul data-bbox="138 456 594 516" style="list-style-type: none"> ◆ Ensure certain conditions are observed during the test. 	<ul data-bbox="615 456 1077 922" style="list-style-type: none"> ◆ Ensure she understands the conditions of restricted activity and refrains from smoking and eating during the test. ◆ Explain the diagnostic criteria. 	<ul data-bbox="1094 456 1938 1352" style="list-style-type: none"> ◆ Conditions during the test:³ <ul data-bbox="1146 488 1938 711" style="list-style-type: none"> • Remain seated. • Do not smoke. • PG is obtained fasting (to confirm the presence of abnormal glucose). If PG < 7.0 mmol/L, obtain PG at 1 and 2 hours after the 75 g OGTT PG is obtained fasting and 1, 2, and 3 hours after the 100 g OGTT). • Blood samples must be drawn at the exact time. <div data-bbox="1104 743 1938 816" style="border: 1px solid black; padding: 5px;"> <p>If the fasting PG is ≥ 7 mmol/L, the test should not be continued – GDM is present and further testing is unnecessary.</p> </div> <ul data-bbox="1094 894 1938 1352" style="list-style-type: none"> ◆ Diagnostic criteria for the 2-hour 75 g OGTT:² <div data-bbox="1104 959 1938 1130" style="border: 1px solid black; padding: 5px;"> <p>If two or more of the PG values are equal to or exceed the following, a diagnosis of GDM is confirmed:</p> <ul data-bbox="1146 1032 1482 1122" style="list-style-type: none"> • Fasting 5.3 mmol/L • 1-hour 10.6 mmol/L • 2-hour 8.9 mmol/L </div> <ul data-bbox="1094 1166 1938 1352" style="list-style-type: none"> ◆ A single abnormal value indicates glucose intolerance of pregnancy (IGTP). Initiate meal plan, encourage physical activity, and monitor glycemic control. These women are also at risk for adverse pregnancy outcomes.² See <i>Medical Management</i> section. ◆ See <i>Nutrition</i> section for specific guidelines.

ASSESSMENT	EDUCATIONAL APPROACH	RATIONALE & CLINICAL MANAGEMENT GUIDELINES
POSTPARTUM SCREENING OF WOMEN WITH GESTATIONAL DIABETES MELLITUS		
<p><i>IMMEDIATE POSTPARTUM</i></p> <ul style="list-style-type: none"> ◆ Screen all women with insulin-requiring GDM postpartum for DM. ◆ Measure a fasting and/or casual PG prior to discharge. ◆ For diet controlled GDM, screen at the 6 to 8-week assessment.⁵ (<i>See below.</i>) 	<ul style="list-style-type: none"> ◆ Explain: <ul style="list-style-type: none"> • The value of testing blood glucose following delivery to ensure overt DM has not developed. 	<ul style="list-style-type: none"> ◆ Glucose tolerance returns to normal in the majority of women with GDM in the immediate postpartum; however, a small proportion (15%) will continue to have abnormal glucose tolerance.⁶ ◆ If the fasting PG is: <ul style="list-style-type: none"> • ≥ 7.0 mmol/L on two or more occasions, further testing is not required; DM is present.² • ≥ 6.1 mmol/L but ≤ 6.9 mmol/L, impaired fasting glucose (IFG) is present.² Follow-up assessment is indicated at 6 to 8 weeks postpartum. • 5.7 to 6.9 mmol/L should be tested with a 2-hour 75 g OGTT for the presence of IGT or IGT and IFG.² ◆ If a single casual PG value is ≥ 11.1 mmol/L in the presence of DM symptoms, DM is present and further testing is not required.² In the absence of symptoms, a confirmatory test is required.
<p><i>6 TO 8 WEEKS POSTPARTUM</i></p> <ul style="list-style-type: none"> ◆ Obtain a fasting PG or perform a 2-hour 75 g OGTT.^{4,5} 	<ul style="list-style-type: none"> ◆ Explain: <ul style="list-style-type: none"> • The purpose of this test. Review the conditions and proper preparations for the 75 g OGTT test (<i>see pages 3 and 4 in this section</i>). 	<ul style="list-style-type: none"> ◆ For the 75 g OGTT, measure the PG fasting and 2 hours after the glucose challenge. ◆ Interpretation of the 2-hour 75 g OGTT results is based on the non-pregnant adult diagnostic criteria.² <i>See page 6 in this section.</i> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Consideration should be given to additional screening upon termination of breastfeeding in those determined to be at greater risk (e.g., insulin requiring GDM; early diagnosis of GDM).⁷</p> </div>

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POSTPARTUM SCREENING OF WOMEN WITH GESTATIONAL DIABETES MELLITUS (cont)		
6 TO 8 WEEKS POSTPARTUM (cont)	<ul style="list-style-type: none"> • The diagnostic criteria using the 75 g OGTT. 	<ul style="list-style-type: none"> ◆ Interpretation based on the 2-hour 75 g OGTT. <ul style="list-style-type: none"> • Diagnostic for DM <ul style="list-style-type: none"> - Fasting PG ≥ 7.0 mmol/L OR - 2-hour pc PG ≥ 11.1 mmol/L • Diagnostic for Impaired Glucose Tolerance (IGT) (isolated). This can only be diagnosed following a 2-hour 75 g OGTT: <ul style="list-style-type: none"> - Fasting PG < 7.0 mmol/L AND - 2-hour PG 7.8 to 11.0 mmol/L • Diagnostic for Impaired Fasting Glucose (IFG) (isolated). <ul style="list-style-type: none"> - Fasting PG 6.1 to 6.9 mmol/L - 2-hour PC < 7.8 mmol/L • Diagnostic for IFG and IGT. This can only be diagnosed following a 2-hour OGTT: <ul style="list-style-type: none"> - Fasting 6.1 to 6.9 mmol/L AND - 2-hour PG 7.8 to 11.0 mmol/L • Normal <ul style="list-style-type: none"> - Fasting PG ≤ 6.0 mmol/L - 2-hourPG < 7.8 mmol/L

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POSTPARTUM SCREENING OF WOMEN WITH GESTATIONAL DIABETES MELLITUS (cont)		
<p data-bbox="138 402 594 435"><i>LONG-TERM SURVEILLANCE)</i></p> <ul style="list-style-type: none"> <li data-bbox="138 467 594 597">◆ Perform periodic ongoing screening for DM at least annually using fasting or casual PG measurements. <li data-bbox="138 816 594 914">◆ Women with IGT, IFG, or IFG and IGT follow as per the Clinical Practice Guidelines.² 	<ul style="list-style-type: none"> <li data-bbox="615 467 1073 532">◆ Review: <ul style="list-style-type: none"> <li data-bbox="667 500 1073 532">• The value of periodic testing. 	<ul style="list-style-type: none"> <li data-bbox="1094 467 1940 630">◆ The recurrence rate for GDM in a subsequent pregnancy ranges from 30 to 50%.^{8,9,10} It is highest among ethnic groups with high prevalence rates for DM (First Nations, African, Hispanic, and Asian descent). It also increases with age and postpartum weight gain. <li data-bbox="1094 662 1940 792">◆ Thirty to 50% of women with GDM go on to develop DM within 10 years.⁶ This too, is dependent on gestational age at diagnosis, degree of glycemia at diagnosis and at the first postpartum assessment, obesity, and further pregnancy.⁵ <li data-bbox="1094 824 1940 987">◆ Approximately 15% of women who have GDM will remain glucose intolerant or demonstrate overt diabetes mellitus in the postpartum state.¹⁰ Those who were diagnosed early, obese, and required insulin are most likely to demonstrate persistent glucose intolerance.¹⁰ <li data-bbox="1094 1019 1940 1084">◆ The progression to DM or to persistent IGT is greatest in women with increased fasting plasma glucose levels during pregnancy.^{6,10} <li data-bbox="1094 1117 1940 1214">◆ Encourage annual testing for progression to DM, promoting healthy eating, active living (exercise), weight management, and vascular risk factor modifications. <li data-bbox="1094 1247 1940 1344">◆ Assess glucose intolerance prior to conception. To reduce risks and optimize pregnancy outcome, folic acid supplementation and lifestyle modification should be implemented.²

REFERENCES

- 1) Carr SR. Screening for gestational diabetes mellitus: a perspective in 1998. *Diabetes Care*. 1998;21(suppl 2):B14-B18.
- 2) Canadian Diabetes Association 2003 Clinical Practice Guidelines for the Prevention and Management of Diabetes in Canada. *Can J Diabetes*. 2003;27(suppl 2).
- 3) Metzger BE, Coustan DR. Summary and recommendations of the fourth international workshop-conference on gestational diabetes. *Diabetes Care*. 1998;21(2):B161-B167.
- 4) American Diabetes Association. Gestational diabetes mellitus (Position Statement). *Diabetes Care*. 2004;27(suppl 1):S88-S90.
- 5) Setji TL, Brown AJ, Feinglos MN. Gestational diabetes mellitus. *Clinical Diabetes*. 2005;23(1):17-24,
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- 9) MacNeill S, Dodds L, Hamilton DC, Armson, BA, VandenHof M. Rates and risk factors for recurrence of gestational diabetes. *Diabetes Care*. 2001;24(4):659-671.
- 10) Galerneau F, Inzucchi SE. Diabetes mellitus in pregnancy. *Obstetrics and Gynecology Clinics of North America*. 2004;31:907-933.

ADDITIONAL READING

- American Diabetes Association. *Medical Management of Pregnancy a Complicated by Diabetes*. 3rd edition. Alexandria, VA: Author; 2000.
- California Diabetes and Pregnancy Program. *Sweet Success Guidelines for Care*. Sacramento, CA: Maternal and Child Health Branch Department of Health Services; 2002.