



Gestational diabetes mellitus

An update on screening, diagnosis, and follow-up



Key messages

- 1 During their first trimester, screen for pre-existing diabetes in women at increased risk of it using non-pregnancy glucose thresholds. If results are normal, re-evaluate women for gestational diabetes mellitus (GDM) at 24 to 28 weeks of gestation.
- 2 At 24 to 28 weeks of gestation, screen all women for GDM using 3-point 75 g oral glucose tolerance test (OGTT) unless they have already been diagnosed with diabetes or pre-diabetes.
- 3 At 6 to 12 weeks after delivery, reassess glycaemic status in women with diabetes diagnosed during pregnancy using 2-point 75 g OGTT. If results are normal, screen women with a history of diabetes diagnosed during pregnancy for diabetes every 1 to 3 years (ideally annually) from then on.

Managing GDM to improve outcomes

Women with diabetes during pregnancy (defined as glucose levels higher than normal, including diabetes, GDM, and pre-diabetes) are at increased risk of maternal and neonatal complications (such as pre-eclampsia, macrosomia, and shoulder dystocia) compared to those without diabetes.¹ When diabetes is first identified during pregnancy, this may represent undiagnosed pre-existing diabetes. GDM is diabetes diagnosed in the second or third trimester. The pathophysiology is often underlying β -cell dysfunction or insulin resistance worsened by decreased insulin sensitivity during pregnancy.^{1,2}

The prevalence of GDM in Eastern and Southeast Asian countries is approximately 1 in 10, which is higher than Western and African countries.³ In Singapore, GDM occurs in around 1 in 4 to 5 pregnant women—a higher prevalence than other countries in the Eastern and Southeast Asian region.³⁻⁵ History of GDM is associated with increased lifetime risk of diabetes for both the women and their babies.⁶⁻⁹ Appropriate management of GDM with diet, exercise, or insulin therapy can lower the risk of maternal and neonatal complications by up to 60%.^{10,11}

First trimester Screen for undiagnosed pre-existing diabetes in women at increased risk

Before conception or during the first prenatal visit (first trimester), it is recommended to screen for pre-existing diabetes in women at increased risk of it using non-pregnancy thresholds.¹

Women are considered to be at increased risk of pre-existing diabetes if any risk factor is present, such as:

- Pre-pregnancy body mass index (BMI) ≥ 23 kg/m²
- History of GDM (or delivered a baby ≥ 4 kg)
- History of polycystic ovary syndrome
- History of pre-diabetes
- Age ≥ 40 years
- Family history of diabetes (first degree relative)
- Hypertension

Individual patient circumstances should also be taken into consideration when evaluating the need to test with fasting plasma glucose (FPG)/2-point 75 g OGTT.

If results are normal, re-evaluate women for GDM at 24 to 28 weeks of gestation.

While all women with diabetes diagnosed during pregnancy (including GDM) require timely management (including lifestyle intervention), those with pre-existing diabetes are at higher risk of poor diabetes outcomes than those with GDM. Hence, women with pre-existing diabetes require more stringent measures to reduce their risk of diabetes complications, including tighter glycaemic control and screening for complications (such as eye checks).^{1,7}

24–28 weeks Screen for GDM in all women without diabetes or pre-diabetes

Screening for GDM is recommended at 24 to 28 weeks of gestation because this phase coincides with an increase in gestational insulin resistance.¹² With the higher prevalence of GDM in Asian populations, universal screening is favoured over risk-based screening for GDM.^{3,14}

Apart from detecting more women with GDM, universal screening is associated with improved maternal and neonatal outcomes compared to risk-based screening.¹⁴ **At 24 to 28 weeks of gestation, use 3-point 75 g OGTT to screen all women for GDM—unless they have already been diagnosed with diabetes or pre-diabetes.** This includes re-evaluating women at increased risk of pre-existing diabetes who had normal test results in their first trimester.

The International Association of Diabetes and Pregnancy Study Group (IADPSG) 3-point diagnostic criteria for GDM using 75 g OGTT have been adopted by many organisations, including the World Health Organization and Singapore's College of Obstetricians and Gynaecologists.^{15,16} These criteria are based on findings from the Hyperglycaemia and Adverse Pregnancy Outcomes study, a large observational study which included patients from Singapore.¹⁷

GDM is diagnosed if any of the IADPSG 3-point diagnostic criteria is met (Table 1). Compared to the previously used 2-point criteria,¹⁸ the IADPSG 3-point criteria identify a higher proportion of women at risk of adverse maternal and neonatal outcomes, so more women and their babies can benefit from appropriate GDM management.¹⁹

Table 1. GDM diagnostic criteria

Plasma glucose levels	IADPSG 3-point criteria*
Fasting	≥ 5.1
1-hour post-OGTT	≥ 10.0
2-hour post-OGTT	≥ 8.5

GDM, gestational diabetes mellitus; IADPSG, International Association of Diabetes and Pregnancy Study Group; OGTT, oral glucose tolerance test
*All values in mmol/L.



Avoiding HbA1c for screening and diagnosis of diabetes during pregnancy

Glycated haemoglobin (HbA1c) should not be used to screen for or diagnose diabetes during pregnancy. It is not sensitive in detecting postprandial hyperglycaemia and is generally lower during pregnancy because of increased red blood cell turnover. Screening for diabetes during pregnancy with HbA1c has also not been validated locally.



Post-pregnancy Follow up women with diabetes diagnosed during pregnancy




Usually, plasma glucose reverts to pre-pregnancy levels six weeks after delivery. It is recommended that **women whose diabetes was diagnosed during pregnancy (including diabetes, GDM, and pre-diabetes) be tested with 2-point (fasting and two-hour) 75 g OGTT between 6 to 12 weeks after delivery, to assess glycaemic status using non-pregnancy thresholds.**²⁰

Women with diabetes diagnosed during pregnancy who are found to have normal glycaemic status at 6 to 12 weeks after delivery should be regularly screened for diabetes every 1 to 3 years (ideally annually) from then on.¹

Women with a history of GDM are about 10 times more likely to develop type 2 diabetes mellitus (T2DM) than women who had a normoglycaemic pregnancy.⁷ In Singapore, it is estimated that 4 in 10 women with a history of GDM develop T2DM or pre-diabetes within 4 to 6 years from delivery.^{21,22} Among women with a history of GDM, more frequent follow-up may be required for those who received insulin during pregnancy or those with other risk factors for developing diabetes such as non-pregnancy BMI ≥ 23 kg/m² or a family history of diabetes.^{1,22}

All women with diabetes diagnosed during pregnancy should receive timely management, including adopting a healthy lifestyle. For women with a history of GDM, lifestyle intervention (including healthy diet and increased physical activity) has been shown to reduce the progression from pre-diabetes to T2DM by 35% over 10 years.²³

Figure 1. Screening tests and diagnostic criteria for diabetes during and after pregnancy

	 First trimester	 Second to third trimester at 24–28 weeks	 Post-delivery at 6–12 weeks	Every 1–3 years from then on
Who to screen	Women at increased risk of diabetes	All women without diabetes or pre-diabetes (including women at increased risk of diabetes who were normoglycaemic during their first trimester)	Women with diabetes diagnosed during pregnancy	
Screening tests	FPG/2-point OGTT	3-point OGTT	2-point OGTT	FPG, 2-point OGTT, or HbA1c [†]
Glucose thresholds	<p>Pre-existing diabetes</p> <p>FPG ≥ 7.0 mmol/L or 2-hour post-OGTT ≥ 11.1 mmol/L</p> <ul style="list-style-type: none"> Refer to a specialist for diabetes management Refer for screening for diabetes-related complications <p>Pre-diabetes</p> <p>FPG = 6.1–6.9 mmol/L or 2-hour post-OGTT = 7.8–11.0 mmol/L</p> <p>Start lifestyle intervention and glucose monitoring (refer to the ACG "Managing pre-diabetes – a growing health concern" as appropriate)</p> <p>Normoglycaemia</p> <p>FPG ≤ 6.0 mmol/L and 2-hour post-OGTT < 7.8 mmol/L</p> <p>Re-evaluate for GDM at 24–28 weeks of gestation using 3-point (fasting, 1-hour, and 2-hour) 75 g OGTT criteria</p>	<p>GDM</p> <p>FPG ≥ 5.1 mmol/L or 1-hour post-OGTT ≥ 10.0 mmol/L or 2-hour post-OGTT ≥ 8.5 mmol/L</p> <ul style="list-style-type: none"> Refer to a specialist Start lifestyle intervention and glucose monitoring Consider pharmacotherapy if lifestyle intervention does not consistently achieve glycaemic control. Aim for: <ul style="list-style-type: none"> FPG < 5.3 mmol/L, and 1-hour post-prandial < 7.8 mmol/L, or 2-hour post-prandial < 6.7 mmol/L¹ <p>Normoglycaemia</p> <p>FPG < 5.1 mmol/L and 1-hour post-OGTT < 10.0 mmol/L and 2-hour post-OGTT < 8.5 mmol/L</p> <p>No intervention</p>	<p>Diabetes[‡]</p> <p>FPG ≥ 7.0 mmol/L or 2-hour post-OGTT ≥ 11.1 mmol/L</p> <p>Start diabetes management, including screening for diabetes-related complications</p> <p>Pre-diabetes</p> <p>FPG = 6.1–6.9 mmol/L or 2-hour post-OGTT = 7.8–11.0 mmol/L</p> <p>Start pre-diabetes management (refer to the ACG "Managing pre-diabetes – a growing health concern" as appropriate)</p> <p>Normoglycaemia</p> <p>FPG ≤ 6.0 mmol/L and 2-hour post-OGTT < 7.8 mmol/L</p> <p>Screen every 1–3 years (ideally annually) after initial post-delivery follow-up, and advise on healthy lifestyle.</p>	

FPG, fasting plasma glucose; GDM, gestational diabetes mellitus; HbA1c, glycated haemoglobin; OGTT, oral glucose tolerance test

[†]For more information on HbA1c as a screening test for diabetes mellitus in Singapore, please refer to the [Ministry of Health Circular No. 08/2019](#).

[‡]Results should be confirmed by repeating the test with the result above the diagnostic threshold.

References

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Suggested citation:

Agency for Care Effectiveness (ACE). Gestational diabetes mellitus – an update on screening, diagnosis, and follow-up. Appropriate Care Guide (ACG), Ministry of Health, Singapore. 2022. Available from: go.gov.sg/acg-gestational-diabetes-mellitus-an-update-on-screening-diagnosis-and-follow-up

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