

Diabetes in pregnancy: management from preconception to the postnatal period

NICE guideline

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Your responsibility

The recommendations in this guideline represent the view of NICE, arrived at after careful consideration of the evidence available. When exercising their judgement, professionals and practitioners are expected to take this guideline fully into account, alongside the individual needs, preferences and values of their patients or the people using their service. It is not mandatory to apply the recommendations, and the guideline does not override the responsibility to make decisions appropriate to the circumstances of the individual, in consultation with them and their families and carers or guardian.

Local commissioners and providers of healthcare have a responsibility to enable the guideline to be applied when individual professionals and people using services wish to use it. They should do so in the context of local and national priorities for funding and developing services, and in light of their duties to have due regard to the need to eliminate unlawful discrimination, to advance equality of opportunity and to reduce health inequalities. Nothing in this guideline should be interpreted in a way that would be inconsistent with complying with those duties.

Commissioners and providers have a responsibility to promote an environmentally sustainable health and care system and should assess and reduce the environmental impact of implementing NICE recommendations wherever possible.

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This guideline replaces CG63.

This guideline is the basis of QS109.

Overview

This guideline covers managing diabetes and its complications in women who are planning pregnancy or are already pregnant. It aims to improve the diagnosis of gestational diabetes and help women with diabetes to self-manage their blood glucose levels before and during pregnancy.

In August 2015, changes were made to recommendations 1.1.17, 1.1.29, 1.1.34 and 1.3.28 for consistency with other NICE guidelines.

Who is it for?

- Healthcare professionals
- Commissioners and providers
- Women with diabetes who are planning a pregnancy or are pregnant and women at risk of, or diagnosed with, gestational diabetes

Introduction

This guideline updates and replaces 'Diabetes in pregnancy' (NICE guideline CG63). The recommendations are labelled according to when they were originally published (see [about this guideline](#) for details).

Approximately 700,000 women give birth in England and Wales each year, and up to 5% of these women have either pre-existing diabetes or gestational diabetes. Of women who have diabetes during pregnancy, it is estimated that approximately 87.5% have gestational diabetes (which may or may not resolve after pregnancy), 7.5% have type 1 diabetes and the remaining 5% have type 2 diabetes. The prevalence of type 1 diabetes, and especially type 2 diabetes, has increased in recent years. The incidence of gestational diabetes is also increasing as a result of higher rates of obesity in the general population and more pregnancies in older women.

Diabetes in pregnancy is associated with risks to the woman and to the developing fetus. Miscarriage, pre-eclampsia and preterm labour are more common in women with pre-existing diabetes. In addition, diabetic retinopathy can worsen rapidly during pregnancy. Stillbirth, congenital malformations, macrosomia, birth injury, perinatal mortality and postnatal adaptation problems (such as hypoglycaemia) are more common in babies born to women with pre-existing diabetes.

This guideline contains recommendations for managing diabetes and its complications in women who are planning pregnancy and those who are already pregnant. The guideline focuses on areas where additional or different care should be offered to women with diabetes and their newborn babies. Where the evidence supports it, the guideline makes separate recommendations for women with pre-existing diabetes and women with gestational diabetes. The term 'women' is used in the guideline to refer to all females of childbearing age, including young women who have not yet transferred from paediatric to adult services.

Reasons for this update

Several developments have occurred since publication of the original Diabetes in pregnancy guideline in 2008 that have prompted this update.

New studies on diagnosing and treating gestational diabetes have been published. The landmark [HAPO \(Hyperglycemia and Adverse Pregnancy Outcomes\)](#) study resulted in consensus guidance on the definition of gestational diabetes that has been adopted by the World Health Organization and which would result in many more women being diagnosed with gestational diabetes. This has

been the subject of wide debate, and a cost–benefit analysis of the new guidance was a priority for this guideline update.

Other topics that have been reviewed include using newer technologies for monitoring blood glucose (for example, continuous glucose monitoring) and blood ketones, the role of HbA1c (glycated haemoglobin) levels in diagnosing diabetes in pregnant women and managing their diabetes, the role of specialist (multidisciplinary) teams, blood glucose targets before and during pregnancy, and the timing and best test for diagnosing continuing glucose intolerance in women after the birth.

Medicines

The guideline will assume that prescribers will use a medicine's summary of product characteristics to inform decisions made with individual patients.

This guideline recommends some medicines for indications for which they do not have a UK marketing authorisation at the date of publication, if there is good evidence to support that use. The prescriber should follow relevant professional guidance, taking full responsibility for the decision. The patient (or those with authority to give consent on their behalf) should provide informed consent, which should be documented. See the General Medical Council's [Good practice in prescribing and managing medicines and devices](#) for further information. Where recommendations have been made for the use of medicines outside their licensed indications ('off-label use'), these medicines are marked with a footnote in the recommendations.

Key priorities for implementation

The following recommendations have been identified as priorities for implementation. The full list of recommendations is in [section 1](#).

Preconception planning and care

- Advise women with diabetes who are planning to become pregnant to aim for the same capillary plasma glucose target ranges as recommended for all people with type 1 diabetes:
 - a fasting plasma glucose level of 5–7 mmol/litre on waking and
 - a plasma glucose level of 4–7 mmol/litre before meals at other times of the day.

For more information, see the section on [blood glucose targets](#) in the NICE guideline on type 1 diabetes. [new 2015]

Gestational diabetes

- Diagnose gestational diabetes if the woman has either:
 - a fasting plasma glucose level of 5.6 mmol/litre or above or
 - a 2-hour plasma glucose level of 7.8 mmol/litre or above. [new 2015]

Antenatal care for women with diabetes

- Advise pregnant women with any form of diabetes to maintain their capillary plasma glucose below the following target levels, if these are achievable without causing problematic hypoglycaemia:
 - fasting: 5.3 mmol/litre
 - and
 - 1 hour after meals: 7.8 mmol/litre or
 - 2 hours after meals: 6.4 mmol/litre. [new 2015]
- Test urgently for ketonaemia if a pregnant woman with any form of diabetes presents with hyperglycaemia or is unwell, to exclude diabetic ketoacidosis. [new 2015]

- At antenatal appointments, provide care specifically for women with diabetes, in addition to the care provided routinely for healthy pregnant women (see the NICE guideline on [antenatal care](#)). Table 1 describes how care for women with diabetes differs from routine antenatal care. At each appointment, offer the woman ongoing opportunities for information and education. [2008, amended 2015]

Table 1 Timetable of antenatal appointments

Appointment	Care for women with diabetes during pregnancy*
<p>Booking appointment (joint diabetes and antenatal care) – ideally by 10 weeks</p>	<p>Discuss information, education and advice about how diabetes will affect the pregnancy, birth and early parenting (such as breastfeeding and initial care of the baby).</p> <p>If the woman has been attending for preconception care and advice, continue to provide information, education and advice in relation to achieving optimal blood glucose control (including dietary advice).</p> <p>If the woman has not attended for preconception care and advice, give information, education and advice for the first time, take a clinical history to establish the extent of diabetes-related complications (including neuropathy and vascular disease), and review medicines for diabetes and its complications.</p> <p>Offer retinal assessment for women with pre-existing diabetes unless the woman has been assessed in the last 3 months.</p> <p>Offer renal assessment for women with pre-existing diabetes if this has not been performed in the last 3 months.</p> <p>Arrange contact with the joint diabetes and antenatal clinic every 1–2 weeks throughout pregnancy for all women with diabetes.</p> <p>Measure HbA1c levels for women with pre-existing diabetes to determine the level of risk for the pregnancy.</p> <p>Offer self-monitoring of blood glucose or a 75 g 2-hour OGTT as soon as possible for women with a history of gestational diabetes who book in the first trimester.</p> <p>Confirm viability of pregnancy and gestational age at 7–9 weeks.</p>

16 weeks	<p>Offer retinal assessment at 16–20 weeks to women with pre-existing diabetes if diabetic retinopathy was present at their first antenatal clinic visit.</p> <p>Offer self-monitoring of blood glucose or a 75 g 2-hour OGTT as soon as possible for women with a history of gestational diabetes who book in the second trimester.</p>
20 weeks	<p>Offer an ultrasound scan for detecting fetal structural abnormalities, including examination of the fetal heart (4 chambers, outflow tracts and 3 vessels).</p>
28 weeks	<p>Offer ultrasound monitoring of fetal growth and amniotic fluid volume.</p> <p>Offer retinal assessment to all women with pre-existing diabetes.</p> <p>Women diagnosed with gestational diabetes as a result of routine antenatal testing at 24–28 weeks enter the care pathway.</p>
32 weeks	<p>Offer ultrasound monitoring of fetal growth and amniotic fluid volume.</p> <p>Offer nulliparous women all routine investigations normally scheduled for 31 weeks in routine antenatal care.</p>
34 weeks	<p>No additional or different care for women with diabetes.</p>
36 weeks	<p>Offer ultrasound monitoring of fetal growth and amniotic fluid volume.</p> <p>Provide information and advice about:</p> <ul style="list-style-type: none"> • timing, mode and management of birth • analgesia and anaesthesia • changes to blood glucose-lowering therapy during and after birth • care of the baby after birth • initiation of breastfeeding and the effect of breastfeeding on blood glucose control • contraception and follow-up.
37 ⁺⁰ weeks to 38 ⁺⁶ weeks	<p>Offer induction of labour, or caesarean section if indicated, to women with type 1 or type 2 diabetes; otherwise await spontaneous labour.</p>
38 weeks	<p>Offer tests of fetal wellbeing.</p>

39 weeks	<p>Offer tests of fetal wellbeing.</p> <p>Advise women with uncomplicated gestational diabetes to give birth no later than 40⁺⁶ weeks.</p>
<p>* Women with diabetes should also receive routine care according to the schedule of appointments in the NICE guideline on antenatal care, including appointments at 25 weeks (for nulliparous women) and 34 weeks, but with the exception of the appointment for nulliparous women at 31 weeks.</p> <p>OGTT = oral glucose tolerance test.</p>	

Intrapartum care

- Advise pregnant women with type 1 or type 2 diabetes and no other complications to have an elective birth by induction of labour, or by elective caesarean section if indicated, between 37⁺⁰ weeks and 38⁺⁶ weeks of pregnancy. [new 2015]
- Advise women with gestational diabetes to give birth no later than 40⁺⁶ weeks, and offer elective birth (by induction of labour, or by caesarean section if indicated) to women who have not given birth by this time. [new 2015]

Postnatal care

- For women who were diagnosed with gestational diabetes and whose blood glucose levels returned to normal after the birth:
 - Offer lifestyle advice (including weight control, diet and exercise).
 - Offer a fasting plasma glucose test 6–13 weeks after the birth to exclude diabetes (for practical reasons this might take place at the 6-week postnatal check).
 - If a fasting plasma glucose test has not been performed by 13 weeks, offer a fasting plasma glucose test, or an HbA1c test if a fasting plasma glucose test is not possible, after 13 weeks.
 - Do not routinely offer a 75 g 2-hour OGTT. [new 2015]
- Offer an annual HbA1c test to women who were diagnosed with gestational diabetes who have a negative postnatal test for diabetes. [new 2015]

1 Recommendations

The following guidance is based on the best available evidence. The [full guideline](#) gives details of the methods and the evidence used to develop the guidance.

People have the right to be involved in discussions and make informed decisions about their care, as described in [your care](#).

[Making decisions using NICE guidelines](#) explains how we use words to show the strength (or certainty) of our recommendations, and has information about professional guidelines, standards and laws (including on consent and mental capacity), and safeguarding.

Blood glucose and plasma glucose

This guideline refers frequently to circulating glucose concentrations as 'blood glucose'. A lot of the evidence linking specific circulating glucose concentrations with particular outcomes uses 'plasma' rather than 'blood' glucose. In addition, patient-held glucose meters (which use capillary blood samples) and monitoring systems are all calibrated to plasma glucose equivalents. However, the term 'blood glucose monitoring' is in very common use, so in this guideline we use the term 'blood glucose', except when referring to concentration values.

1.1 *Preconception planning and care*

Information about outcomes and risks for mother and baby

- 1.1.1 Aim to empower women with diabetes to have a positive experience of pregnancy and childbirth by providing information, advice and support that will help to reduce the risks of adverse pregnancy outcomes for mother and baby. [2008]
- 1.1.2 Explain to women with diabetes who are planning to become pregnant that establishing good blood glucose control before conception and continuing this throughout pregnancy will reduce the risk of miscarriage, congenital malformation, stillbirth and neonatal death. It is important to explain that risks can be reduced but not eliminated. [2008]
- 1.1.3 Give women with diabetes who are planning to become pregnant, and their family members, information about how diabetes affects pregnancy and how pregnancy affects diabetes. The information should cover:

- the role of diet, body weight and exercise
- the risks of hypoglycaemia and impaired awareness of hypoglycaemia during pregnancy
- how nausea and vomiting in pregnancy can affect blood glucose control
- the increased risk of having a baby who is large for gestational age, which increases the likelihood of birth trauma, induction of labour and caesarean section
- the need for assessment of diabetic retinopathy before and during pregnancy
- the need for assessment of diabetic nephropathy before pregnancy
- the importance of maternal blood glucose control during labour and birth and early feeding of the baby, in order to reduce the risk of neonatal hypoglycaemia
- the possibility of temporary health problems in the baby during the neonatal period, which may require admission to the neonatal unit
- the risk of the baby developing obesity and/or diabetes in later life. [2008]

The importance of planning pregnancy and the role of contraception

- 1.1.4 Ensure that the importance of avoiding an unplanned pregnancy is an essential component of diabetes education from adolescence for women with diabetes. [2008, amended 2015]
- 1.1.5 Explain to women with diabetes that their choice of contraception should be based on their own preferences and any risk factors (as indicated by [UK medical eligibility criteria for contraceptive use \[UKMEC\] 2009 \[revised 2010\]](#)). [new 2015]
- 1.1.6 Advise women with diabetes that they can use oral contraceptives (if there are no standard contraindications to their use). [new 2015]
- 1.1.7 Advise women with diabetes who are planning to become pregnant:
- that the risks associated with pregnancy in women with diabetes increase with how long the woman has had diabetes

- to use contraception until good blood glucose control (assessed by HbA1c level^[1] – see [recommendation 1.1.18](#)) has been established
- that blood glucose targets, glucose monitoring, medicines for treating diabetes (including insulin regimens for insulin-treated diabetes) and medicines for complications of diabetes will need to be reviewed before and during pregnancy
- that extra time and effort is needed to manage diabetes during pregnancy and that she will have frequent contact with healthcare professionals. [2015]

1.1.8 Give women with diabetes who are planning to become pregnant information about the local arrangements for support during pregnancy, including emergency contact numbers. [2015]

Diet, dietary supplements and body weight

1.1.9 Offer women with diabetes who are planning to become pregnant individualised dietary advice. [2008]

1.1.10 Offer women with diabetes who are planning to become pregnant and who have a BMI above 27 kg/m² advice on how to lose weight, in line with the NICE guideline on [obesity: identification, assessment and management of overweight and obesity in children, young people and adults](#)^[2]. [2008]

1.1.11 Advise women with diabetes who are planning to become pregnant to take folic acid (5 mg/day) until 12 weeks of gestation to reduce the risk of having a baby with a neural tube defect. [2008]

Monitoring blood glucose and ketones in the preconception period

1.1.12 Offer women with diabetes who are planning to become pregnant monthly measurement of their HbA1c level^[1]. [2008]

1.1.13 Offer women with diabetes who are planning to become pregnant a meter for self-monitoring of blood glucose. [2008]

1.1.14 If a woman with diabetes who is planning to become pregnant needs intensification of blood glucose-lowering therapy, advise her to increase the frequency of self-monitoring of blood glucose to include fasting levels and a mixture of pre-meal and post-meal levels. [2008]

- 1.1.15 Offer women with type 1 diabetes who are planning to become pregnant blood ketone testing strips and a meter, and advise them to test for ketonaemia if they become hyperglycaemic or unwell. [new 2015]

Target blood glucose and HbA1c levels in the preconception period

- 1.1.16 Agree individualised targets for self-monitoring of blood glucose with women who have diabetes and are planning to become pregnant, taking into account the risk of hypoglycaemia. [2008]
- 1.1.17 Advise women with diabetes who are planning to become pregnant to aim for the same capillary plasma glucose target ranges as recommended for all people with type 1 diabetes:
- a fasting plasma glucose level of 5–7 mmol/litre on waking and
 - a plasma glucose level of 4–7 mmol/litre before meals at other times of the day.

For more information, see the section on [blood glucose targets](#) in the NICE guideline on type 1 diabetes. [new 2015]

- 1.1.18 Advise women with diabetes who are planning to become pregnant to aim to keep their HbA1c level^[3] below 48 mmol/mol (6.5%), if this is achievable without causing problematic hypoglycaemia. [new 2015]
- 1.1.19 Reassure women that any reduction in HbA1c level towards the target of 48 mmol/mol (6.5%) is likely to reduce the risk of congenital malformations in the baby. [new 2015]
- 1.1.20 Strongly advise women with diabetes whose HbA1c level is above 86 mmol/mol (10%) not to get pregnant because of the associated risks (see [recommendation 1.1.2](#)). [2015]

Safety of medicines for diabetes before and during pregnancy

- 1.1.21 Women with diabetes may be advised to use metformin^[3] as an adjunct or alternative to insulin in the preconception period and during pregnancy, when the likely benefits from improved blood glucose control outweigh the potential

for harm. All other oral blood glucose-lowering agents should be discontinued before pregnancy and insulin substituted. [2008]

1.1.22 Be aware that data from clinical trials and other sources do not suggest that the rapid-acting insulin analogues (aspart and lispro) adversely affect the pregnancy or the health of the fetus or newborn baby. [2008]

1.1.23 Use isophane insulin (also known as NPH insulin) as the first choice for long-acting insulin during pregnancy. Consider continuing treatment with long-acting insulin analogues (insulin detemir or insulin glargine) in women with diabetes who have established good blood glucose control before pregnancy^[4]. [2008, amended 2015]

Safety of medicines for complications of diabetes before and during pregnancy

1.1.24 Angiotensin-converting enzyme inhibitors and angiotensin-II receptor antagonists should be discontinued before conception or as soon as pregnancy is confirmed. Alternative antihypertensive agents suitable for use during pregnancy should be substituted. [2008]

1.1.25 Statins should be discontinued before pregnancy or as soon as pregnancy is confirmed. [2008]

Removing barriers to the uptake of preconception care and when to offer information

1.1.26 Explain to women with diabetes about the benefits of preconception blood glucose control at each contact with healthcare professionals, including their diabetes care team, from adolescence. [2008]

1.1.27 Document the intentions of women with diabetes regarding pregnancy and contraceptive use at each contact with their diabetes care team from adolescence. [2008]

1.1.28 Ensure that preconception care for women with diabetes is given in a supportive environment, and encourage the woman's partner or other family member to attend. [2008, amended 2015]

Education and advice

- 1.1.29 Offer women with diabetes who are planning to become pregnant a structured education programme as soon as possible if they have not already attended one (see the [education and information](#) section in the NICE guideline on type 1 diabetes in adults, and the [patient education](#) section in the NICE guideline on type 2 diabetes in adults). [2008]
- 1.1.30 Offer women with diabetes who are planning to become pregnant preconception care and advice before discontinuing contraception. [2008]

Retinal assessment in the preconception period

- 1.1.31 Offer retinal assessment (see recommendation 1.1.32) to women with diabetes seeking preconception care at their first appointment (unless they have had an annual retinal assessment in the last 6 months) and then annually if no diabetic retinopathy is found. [2008]
- 1.1.32 Carry out retinal assessment by digital imaging with mydriasis using tropicamide, in line with the UK National Screening Committee's recommendations for annual mydriatic 2-field digital photographic screening as part of a systematic screening programme. [2008]
- 1.1.33 Advise women with diabetes who are planning to become pregnant to defer rapid optimisation of blood glucose control until after retinal assessment and treatment have been completed. [2008]

Renal assessment in the preconception period

- 1.1.34 Offer women with diabetes a renal assessment, including a measure of albuminuria, before discontinuing contraception. If serum creatinine is abnormal (120 micromol/litre or more), the urinary albumin:creatinine ratio is greater than 30 mg/mmol or the estimated glomerular filtration rate (eGFR) is less than 45 ml/minute/1.73 m², referral to a nephrologist should be considered before discontinuing contraception. [2008, amended 2015]

1.2 Gestational diabetes

Risk assessment, testing and diagnosis

Risk assessment

1.2.1 So that women can make an informed decision about risk assessment and testing for gestational diabetes, explain that:

- in some women, gestational diabetes will respond to changes in diet and exercise
- the majority of women will need oral blood glucose-lowering agents or insulin therapy if changes in diet and exercise do not control gestational diabetes effectively
- if gestational diabetes is not detected and controlled, there is a small increased risk of serious adverse birth complications such as shoulder dystocia
- a diagnosis of gestational diabetes will lead to increased monitoring, and may lead to increased interventions, during both pregnancy and labour. [new 2015]

1.2.2 Assess risk of gestational diabetes using risk factors in a healthy population. At the booking appointment, determine the following risk factors for gestational diabetes:

- BMI above 30 kg/m²
- previous macrosomic baby weighing 4.5 kg or above
- previous gestational diabetes
- family history of diabetes (first-degree relative with diabetes)
- minority ethnic family origin with a high prevalence of diabetes.

Offer women with any one of these risk factors testing for gestational diabetes (see recommendations 1.2.5–1.2.7). [2008, amended 2015]

1.2.3 Do not use fasting plasma glucose, random blood glucose, HbA1c, glucose challenge test or urinalysis for glucose to assess risk of developing gestational diabetes. [2015]

Glycosuria detected by routine antenatal testing

- 1.2.4 Be aware that glycosuria of 2+ or above on 1 occasion or of 1+ or above on 2 or more occasions detected by reagent strip testing during routine antenatal care may indicate undiagnosed gestational diabetes. If this is observed, consider further testing to exclude gestational diabetes. [new 2015]

Testing

- 1.2.5 Use the 2-hour 75 g oral glucose tolerance test (OGTT) to test for gestational diabetes in women with risk factors (see recommendation 1.2.2). [2015]
- 1.2.6 Offer women who have had gestational diabetes in a previous pregnancy:
- early self-monitoring of blood glucose or
 - a 75 g 2-hour OGTT as soon as possible after booking (whether in the first or second trimester), and a further 75 g 2-hour OGTT at 24–28 weeks if the results of the first OGTT are normal. [new 2015]
- 1.2.7 Offer women with any of the other risk factors for gestational diabetes (see recommendation 1.2.2) a 75 g 2-hour OGTT at 24–28 weeks. [2015]

Diagnosis

- 1.2.8 Diagnose gestational diabetes if the woman has either:
- a fasting plasma glucose level of 5.6 mmol/litre or above or
 - a 2-hour plasma glucose level of 7.8 mmol/litre or above. [new 2015]
- 1.2.9 Offer women with a diagnosis of gestational diabetes a review with the joint diabetes and antenatal clinic within 1 week. [new 2015]
- 1.2.10 Inform the primary healthcare team when a woman is diagnosed with gestational diabetes (see also the NICE guideline on [patient experience in adult NHS services](#) in relation to continuity of care). [new 2015]

Interventions

1.2.11 Explain to women with gestational diabetes:

- about the implications (both short and long term) of the diagnosis for her and her baby^[5]
- that good blood glucose control throughout pregnancy will reduce the risk of fetal macrosomia, trauma during birth (for her and her baby), induction of labour and/or caesarean section, neonatal hypoglycaemia and perinatal death
- that treatment includes changes in diet and exercise, and could involve medicines. [new 2015]

1.2.12 Teach women with gestational diabetes about self-monitoring of blood glucose. [2015]

1.2.13 Use the same capillary plasma glucose target levels for women with gestational diabetes as for women with pre-existing diabetes (see [recommendations 1.3.5 and 1.3.6](#)). [2015]

1.2.14 Tailor blood glucose-lowering therapy to the blood glucose profile and personal preferences of the woman with gestational diabetes. [new 2015]

1.2.15 Offer women advice about changes in diet and exercise at the time of diagnosis of gestational diabetes. [new 2015]

1.2.16 Advise women with gestational diabetes to eat a healthy diet during pregnancy, and emphasise that foods with a low glycaemic index should replace those with a high glycaemic index. [new 2015]

1.2.17 Refer all women with gestational diabetes to a dietitian. [new 2015]

1.2.18 Advise women with gestational diabetes to take regular exercise (such as walking for 30 minutes after a meal) to improve blood glucose control. [new 2015]

- 1.2.19 Offer a trial of changes in diet and exercise to women with gestational diabetes who have a fasting plasma glucose level below 7 mmol/litre at diagnosis. [new 2015]
- 1.2.20 Offer metformin^[2] to women with gestational diabetes if blood glucose targets are not met using changes in diet and exercise within 1–2 weeks. [new 2015]
- 1.2.21 Offer insulin instead of metformin to women with gestational diabetes if metformin is contraindicated or unacceptable to the woman. [new 2015]
- 1.2.22 Offer addition of insulin to the treatments of changes in diet, exercise and metformin^[2] for women with gestational diabetes if blood glucose targets are not met. [new 2015]
- 1.2.23 Offer immediate treatment with insulin, with or without metformin^[2], as well as changes in diet and exercise, to women with gestational diabetes who have a fasting plasma glucose level of 7.0 mmol/litre or above at diagnosis. [new 2015]
- 1.2.24 Consider immediate treatment with insulin, with or without metformin^[2], as well as changes in diet and exercise, for women with gestational diabetes who have a fasting plasma glucose level of between 6.0 and 6.9 mmol/litre if there are complications such as macrosomia or hydramnios. [new 2015].
- 1.2.25 Consider glibenclamide^[6] for women with gestational diabetes:
- in whom blood glucose targets are not achieved with metformin but who decline insulin therapy or
 - who cannot tolerate metformin. [new 2015]

1.3 *Antenatal care for women with diabetes*

This section should be read in conjunction with the NICE guideline on [antenatal care for the healthy pregnant woman](#).

Monitoring blood glucose

- 1.3.1 Advise pregnant women with type 1 diabetes to test their fasting, pre-meal, 1-hour post-meal and bedtime blood glucose levels daily during pregnancy. [new 2015]
- 1.3.2 Advise pregnant women with type 2 diabetes or gestational diabetes who are on a multiple daily insulin injection regimen to test their fasting, pre-meal, 1-hour post-meal and bedtime blood glucose levels daily during pregnancy. [new 2015]
- 1.3.3 Advise pregnant women with type 2 diabetes or gestational diabetes to test their fasting and 1-hour post-meal blood glucose levels daily during pregnancy if they are:
- on diet and exercise therapy or
 - taking oral therapy (with or without diet and exercise therapy) or single-dose intermediate-acting or long-acting insulin. [new 2015]

Target blood glucose levels

- 1.3.4 Agree individualised targets for self-monitoring of blood glucose with women with diabetes in pregnancy, taking into account the risk of hypoglycaemia. [2008]
- 1.3.5 Advise pregnant women with any form of diabetes to maintain their capillary plasma glucose below the following target levels, if these are achievable without causing problematic hypoglycaemia:
- fasting: 5.3 mmol/litre
- and
- 1 hour after meals: 7.8 mmol/litre or
 - 2 hours after meals: 6.4 mmol/litre. [new 2015]
- 1.3.6 Advise pregnant women with diabetes who are on insulin or glibenclamide to maintain their capillary plasma glucose level above 4 mmol/litre. [new 2015]

Monitoring HbA1c

- 1.3.7 Measure HbA1c levels in all pregnant women with pre-existing diabetes at the booking appointment to determine the level of risk for the pregnancy. [new 2015]
- 1.3.8 Consider measuring HbA1c levels in the second and third trimesters of pregnancy for women with pre-existing diabetes to assess the level of risk for the pregnancy. [new 2015]
- 1.3.9 Be aware that level of risk for the pregnancy for women with pre-existing diabetes increases with an HbA1c level above 48 mmol/mol (6.5%). [new 2015]
- 1.3.10 Measure HbA1c levels in all women with gestational diabetes at the time of diagnosis to identify those who may have pre-existing type 2 diabetes. [new 2015]
- 1.3.11 Do not use HbA1c levels routinely to assess a woman's blood glucose control in the second and third trimesters of pregnancy. [2008]

Managing diabetes during pregnancy

Insulin treatment and risks of hypoglycaemia

- 1.3.12 Be aware that the rapid-acting insulin analogues (aspart and lispro) have advantages over soluble human insulin during pregnancy and consider their use. [2008]
- 1.3.13 Advise women with insulin-treated diabetes of the risks of hypoglycaemia and impaired awareness of hypoglycaemia in pregnancy, particularly in the first trimester. [2008]
- 1.3.14 Advise pregnant women with insulin-treated diabetes to always have available a fast-acting form of glucose (for example, dextrose tablets or glucose-containing drinks). [2008, amended 2015]
- 1.3.15 Provide glucagon to pregnant women with type 1 diabetes for use if needed. Instruct the woman and her partner or other family members in its use. [2008, amended 2015]

- 1.3.16 Offer women with insulin-treated diabetes continuous subcutaneous insulin infusion (CSII; also known as insulin pump therapy) during pregnancy if adequate blood glucose control is not obtained by multiple daily injections of insulin without significant disabling hypoglycaemia^[7]. [2008]

Continuous glucose monitoring

- 1.3.17 Do not offer continuous glucose monitoring routinely to pregnant women with diabetes. [new 2015]
- 1.3.18 Consider continuous glucose monitoring for pregnant women on insulin therapy:
- who have problematic severe hypoglycaemia (with or without impaired awareness of hypoglycaemia) or
 - who have unstable blood glucose levels (to minimise variability) or
 - to gain information about variability in blood glucose levels. [new 2015]
- 1.3.19 Ensure that support is available for pregnant women who are using continuous glucose monitoring from a member of the joint diabetes and antenatal care team with expertise in its use. [new 2015]

Ketone testing and diabetic ketoacidosis

- 1.3.20 Offer pregnant women with type 1 diabetes blood ketone testing strips and a meter, and advise them to test for ketonaemia and to seek urgent medical advice if they become hyperglycaemic or unwell. [new 2015]
- 1.3.21 Advise pregnant women with type 2 diabetes or gestational diabetes to seek urgent medical advice if they become hyperglycaemic or unwell. [new 2015]
- 1.3.22 Test urgently for ketonaemia if a pregnant woman with any form of diabetes presents with hyperglycaemia or is unwell, to exclude diabetic ketoacidosis. [new 2015]
- 1.3.23 During pregnancy, admit immediately women who are suspected of having diabetic ketoacidosis for level 2 critical care^[8], where they can receive both medical and obstetric care. [2008]

Retinal assessment during pregnancy

- 1.3.24 Offer pregnant women with pre-existing diabetes retinal assessment by digital imaging with mydriasis using tropicamide following their first antenatal clinic appointment (unless they have had a retinal assessment in the last 3 months), and again at 28 weeks. If any diabetic retinopathy is present at booking, perform an additional retinal assessment at 16–20 weeks. [2008, amended 2015]
- 1.3.25 Diabetic retinopathy should not be considered a contraindication to rapid optimisation of blood glucose control in women who present with a high HbA1c in early pregnancy. [2008]
- 1.3.26 Ensure that women who have preproliferative diabetic retinopathy or any form of referable retinopathy diagnosed during pregnancy have ophthalmological follow-up for at least 6 months after the birth of the baby. [2008, amended 2015]
- 1.3.27 Diabetic retinopathy should not be considered a contraindication to vaginal birth. [2008]

Renal assessment during pregnancy

- 1.3.28 If renal assessment has not been undertaken in the preceding 3 months in women with pre-existing diabetes, arrange it at the first contact in pregnancy. If the serum creatinine is abnormal (120 micromol/litre or more), the urinary albumin:creatinine ratio is greater than 30 mg/mmol or total protein excretion exceeds 0.5 g/day, referral to a nephrologist should be considered (eGFR should not be used during pregnancy). Thromboprophylaxis should be considered for women with nephrotic range proteinuria above 5 g/day (albumin:creatinine ratio greater than 220 mg/mmol). [2008, amended 2015]

Preventing pre-eclampsia

- 1.3.29 For guidance on using antiplatelet agents to reduce the risk of pre-eclampsia in pregnant women with diabetes, see recommendation 1.1.2.1 in the NICE guideline on [hypertension in pregnancy](#). [new 2015]

Detecting congenital malformations

- 1.3.30 Offer women with diabetes an ultrasound scan for detecting fetal structural abnormalities, including examination of the fetal heart (4 chambers, outflow tracts and 3 vessels), at 20 weeks. [2008, amended 2015]

Monitoring fetal growth and wellbeing

- 1.3.31 Offer pregnant women with diabetes ultrasound monitoring of fetal growth and amniotic fluid volume every 4 weeks from 28 to 36 weeks. [2008]
- 1.3.32 Routine monitoring of fetal wellbeing (using methods such as fetal umbilical artery Doppler recording, fetal heart rate recording and biophysical profile testing) before 38 weeks is not recommended in pregnant women with diabetes, unless there is a risk of fetal growth restriction. [2008, amended 2015]
- 1.3.33 Provide an individualised approach to monitoring fetal growth and wellbeing for women with diabetes and a risk of fetal growth restriction (macrovascular disease and/or nephropathy). [2008, amended 2015]

Organisation of antenatal care

- 1.3.34 Offer immediate contact with a joint diabetes and antenatal clinic to women with diabetes who are pregnant. [2008]
- 1.3.35 Ensure that women with diabetes have contact with the joint diabetes and antenatal clinic for assessment of blood glucose control every 1–2 weeks throughout pregnancy. [2008, amended 2015]
- 1.3.36 At antenatal appointments, provide care specifically for women with diabetes, in addition to the care provided routinely for healthy pregnant women (see the NICE guideline on [antenatal care](#)). Table 1 describes how care for women with diabetes differs from routine antenatal care. At each appointment, offer the woman ongoing opportunities for information and education. [2008, amended 2015]

Table 1 Timetable of antenatal appointments

Appointment	Care for women with diabetes during pregnancy*
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<p>Booking appointment (joint diabetes and antenatal care) – ideally by 10 weeks</p>	<p>Discuss information, education and advice about how diabetes will affect the pregnancy, birth and early parenting (such as breastfeeding and initial care of the baby).</p> <p>If the woman has been attending for preconception care and advice, continue to provide information, education and advice in relation to achieving optimal blood glucose control (including dietary advice).</p> <p>If the woman has not attended for preconception care and advice, give information, education and advice for the first time, take a clinical history to establish the extent of diabetes-related complications (including neuropathy and vascular disease), and review medicines for diabetes and its complications.</p> <p>Offer retinal assessment for women with pre-existing diabetes unless the woman has been assessed in the last 3 months.</p> <p>Offer renal assessment for women with pre-existing diabetes if this has not been performed in the last 3 months.</p> <p>Arrange contact with the joint diabetes and antenatal clinic every 1–2 weeks throughout pregnancy for all women with diabetes.</p> <p>Measure HbA1c levels for women with pre-existing diabetes to determine the level of risk for the pregnancy.</p> <p>Offer self-monitoring of blood glucose or a 75 g 2-hour OGTT as soon as possible for women with a history of gestational diabetes who book in the first trimester.</p> <p>Confirm viability of pregnancy and gestational age at 7–9 weeks.</p>
<p>16 weeks</p>	<p>Offer retinal assessment at 16–20 weeks to women with pre-existing diabetes if diabetic retinopathy was present at their first antenatal clinic visit.</p> <p>Offer self-monitoring of blood glucose or a 75 g 2-hour OGTT as soon as possible for women with a history of gestational diabetes who book in the second trimester.</p>
<p>20 weeks</p>	<p>Offer an ultrasound scan for detecting fetal structural abnormalities, including examination of the fetal heart (4 chambers, outflow tracts and 3 vessels).</p>

28 weeks	<p>Offer ultrasound monitoring of fetal growth and amniotic fluid volume.</p> <p>Offer retinal assessment to all women with pre-existing diabetes.</p> <p>Women diagnosed with gestational diabetes as a result of routine antenatal testing at 24–28 weeks enter the care pathway.</p>
32 weeks	<p>Offer ultrasound monitoring of fetal growth and amniotic fluid volume.</p> <p>Offer nulliparous women all routine investigations normally scheduled for 31 weeks in routine antenatal care.</p>
34 weeks	No additional or different care for women with diabetes.
36 weeks	<p>Offer ultrasound monitoring of fetal growth and amniotic fluid volume.</p> <p>Provide information and advice about:</p> <ul style="list-style-type: none"> • timing, mode and management of birth • analgesia and anaesthesia • changes to blood glucose-lowering therapy during and after birth • care of the baby after birth • initiation of breastfeeding and the effect of breastfeeding on blood glucose control • contraception and follow-up.
37 ⁺⁰ weeks to 38 ⁺⁶ weeks	Offer induction of labour, or caesarean section if indicated, to women with type 1 or type 2 diabetes; otherwise await spontaneous labour.
38 weeks	Offer tests of fetal wellbeing.
39 weeks	<p>Offer tests of fetal wellbeing.</p> <p>Advise women with uncomplicated gestational diabetes to give birth no later than 40⁺⁶ weeks.</p>
<p>* Women with diabetes should also receive routine care according to the schedule of appointments in the NICE guideline on antenatal care, including appointments at 25 weeks (for nulliparous women) and 34 weeks, but with the exception of the appointment for nulliparous women at 31 weeks.</p> <p>OGTT = oral glucose tolerance test.</p>	

Preterm labour in women with diabetes

- 1.3.37 Diabetes should not be considered a contraindication to antenatal steroids for fetal lung maturation or to tocolysis. [2008]
- 1.3.38 In women with insulin-treated diabetes who are receiving steroids for fetal lung maturation, give additional insulin according to an agreed protocol and monitor them closely. [2008, amended 2015]
- 1.3.39 Do not use betamimetic medicines for tocolysis in women with diabetes. [2008]

1.4 *Intrapartum care*

Timing and mode of birth

- 1.4.1 Discuss the timing and mode of birth with pregnant women with diabetes during antenatal appointments, especially during the third trimester. [new 2015]
- 1.4.2 Advise pregnant women with type 1 or type 2 diabetes and no other complications to have an elective birth by induction of labour, or by elective caesarean section if indicated, between 37⁺⁰ weeks and 38⁺⁶ weeks of pregnancy. [new 2015]
- 1.4.3 Consider elective birth before 37⁺⁰ weeks for women with type 1 or type 2 diabetes if there are metabolic or any other maternal or fetal complications. [new 2015]
- 1.4.4 Advise women with gestational diabetes to give birth no later than 40⁺⁶ weeks, and offer elective birth (by induction of labour, or by caesarean section if indicated) to women who have not given birth by this time. [new 2015]
- 1.4.5 Consider elective birth before 40⁺⁶ weeks for women with gestational diabetes if there are maternal or fetal complications. [new 2015]
- 1.4.6 Diabetes should not in itself be considered a contraindication to attempting vaginal birth after a previous caesarean section. [2008]

- 1.4.7 Explain to pregnant women with diabetes who have an ultrasound-diagnosed macrosomic fetus about the risks and benefits of vaginal birth, induction of labour and caesarean section. [2008]

Anaesthesia

- 1.4.8 Offer women with diabetes and comorbidities such as obesity or autonomic neuropathy an anaesthetic assessment in the third trimester of pregnancy. [2008]
- 1.4.9 If general anaesthesia is used for the birth in women with diabetes, monitor blood glucose every 30 minutes from induction of general anaesthesia until after the baby is born and the woman is fully conscious. [2008]

Blood glucose control during labour and birth

- 1.4.10 Monitor capillary plasma glucose every hour during labour and birth in women with diabetes, and ensure that it is maintained between 4 and 7 mmol/litre. [2008, amended 2015]
- 1.4.11 Intravenous dextrose and insulin infusion should be considered for women with type 1 diabetes from the onset of established labour. [2008]
- 1.4.12 Use intravenous dextrose and insulin infusion during labour and birth for women with diabetes whose capillary plasma glucose is not maintained between 4 and 7 mmol/litre. [2008, amended 2015]

1.5 Neonatal care

Initial assessment and criteria for admission to intensive or special care

- 1.5.1 Advise women with diabetes to give birth in hospitals where advanced neonatal resuscitation skills are available 24 hours a day. [2008]
- 1.5.2 Babies of women with diabetes should stay with their mothers unless there is a clinical complication or there are abnormal clinical signs that warrant admission for intensive or special care. [2008]

- 1.5.3 Carry out blood glucose testing routinely in babies of women with diabetes at 2–4 hours after birth. Carry out blood tests for polycythaemia, hyperbilirubinaemia, hypocalcaemia and hypomagnesaemia for babies with clinical signs. [2008]
- 1.5.4 Perform an echocardiogram for babies of women with diabetes if they show clinical signs associated with congenital heart disease or cardiomyopathy, including heart murmur. The timing of the examination will depend on the clinical circumstances. [2008]
- 1.5.5 Admit babies of women with diabetes to the neonatal unit if they have:
- hypoglycaemia associated with abnormal clinical signs
 - respiratory distress
 - signs of cardiac decompensation from congenital heart disease or cardiomyopathy
 - signs of neonatal encephalopathy
 - signs of polycythaemia and are likely to need partial exchange transfusion
 - need for intravenous fluids
 - need for tube feeding (unless adequate support is available on the postnatal ward)
 - jaundice requiring intense phototherapy and frequent monitoring of bilirubinaemia
 - been born before 34 weeks (or between 34 and 36 weeks if dictated clinically by the initial assessment of the baby and feeding on the labour ward). [2008]
- 1.5.6 Do not transfer babies of women with diabetes to community care until they are at least 24 hours old, and not before you are satisfied that the baby is maintaining blood glucose levels and is feeding well. [2008]

Preventing and assessing neonatal hypoglycaemia

- 1.5.7 All maternity units should have a written policy for the prevention, detection and management of hypoglycaemia in babies of women with diabetes. [2008]

- 1.5.8 Test the blood glucose of babies of women with diabetes using a quality-assured method validated for neonatal use (ward-based glucose electrode or laboratory analysis). [2008]
- 1.5.9 Women with diabetes should feed their babies as soon as possible after birth (within 30 minutes) and then at frequent intervals (every 2–3 hours) until feeding maintains pre-feed capillary plasma glucose levels at a minimum of 2.0 mmol/litre. [2008, amended 2015]
- 1.5.10 If capillary plasma glucose values are below 2.0 mmol/litre on 2 consecutive readings despite maximal support for feeding, if there are abnormal clinical signs or if the baby will not feed orally effectively, use additional measures such as tube feeding or intravenous dextrose. Only implement additional measures if one or more of these criteria are met. [2008, amended 2015]
- 1.5.11 Test blood glucose levels in babies of women with diabetes who present with clinical signs of hypoglycaemia, and treat those who are hypoglycaemic with intravenous dextrose as soon as possible. [2008, amended 2015]

1.6 *Postnatal care*

Blood glucose control, medicines and breastfeeding

- 1.6.1 Women with insulin-treated pre-existing diabetes should reduce their insulin immediately after birth and monitor their blood glucose levels carefully to establish the appropriate dose. [2008]
- 1.6.2 Explain to women with insulin-treated pre-existing diabetes that they are at increased risk of hypoglycaemia in the postnatal period, especially when breastfeeding, and advise them to have a meal or snack available before or during feeds. [2008]
- 1.6.3 Women who have been diagnosed with gestational diabetes should discontinue blood glucose-lowering therapy immediately after birth. [2008]
- 1.6.4 Women with pre-existing type 2 diabetes who are breastfeeding can resume or continue to take metformin^[2] and glibenclamide^[6] immediately after birth, but

should avoid other oral blood glucose-lowering agents while breastfeeding. [2008]

- 1.6.5 Women with diabetes who are breastfeeding should continue to avoid any medicines for the treatment of diabetes complications that were discontinued for safety reasons in the preconception period. [2008]

Information and follow-up after birth

Women with pre-existing diabetes

- 1.6.6 Refer women with pre-existing diabetes back to their routine diabetes care arrangements. [2008]
- 1.6.7 Remind women with diabetes of the importance of contraception and the need for preconception care when planning future pregnancies. [2008]

Women diagnosed with gestational diabetes

- 1.6.8 Test blood glucose in women who were diagnosed with gestational diabetes to exclude persisting hyperglycaemia before they are transferred to community care. [2008]
- 1.6.9 Remind women who were diagnosed with gestational diabetes of the symptoms of hyperglycaemia. [2008]
- 1.6.10 Explain to women who were diagnosed with gestational diabetes about the risks of gestational diabetes in future pregnancies, and offer them testing for diabetes^[9] when planning future pregnancies. [2008, amended 2015]
- 1.6.11 For women who were diagnosed with gestational diabetes and whose blood glucose levels returned to normal after the birth:
- Offer lifestyle advice (including weight control, diet and exercise).
 - Offer a fasting plasma glucose test 6–13 weeks after the birth to exclude diabetes (for practical reasons this might take place at the 6-week postnatal check).

- If a fasting plasma glucose test has not been performed by 13 weeks, offer a fasting plasma glucose test, or an HbA1c test if a fasting plasma glucose test is not possible, after 13 weeks.
- Do not routinely offer a 75 g 2-hour OGTT. [new 2015]

1.6.12 For women having a fasting plasma glucose test as the postnatal test:

- Advise women with a fasting plasma glucose level below 6.0 mmol/litre that:
 - they have a low probability of having diabetes at present
 - they should continue to follow the lifestyle advice (including weight control, diet and exercise) given after the birth
 - they will need an annual test to check that their blood glucose levels are normal
 - they have a moderate risk of developing type 2 diabetes, and offer them advice and guidance in line with the NICE guideline on [preventing type 2 diabetes](#)^[10].
- Advise women with a fasting plasma glucose level between 6.0 and 6.9 mmol/litre that they are at high risk of developing type 2 diabetes, and offer them advice, guidance and interventions in line with the NICE guideline on [preventing type 2 diabetes](#)^[10].
- Advise women with a fasting plasma glucose level of 7.0 mmol/litre or above that they are likely to have type 2 diabetes, and offer them a diagnostic test to confirm diabetes. [new 2015]

1.6.13 For women having an HbA1c test as the postnatal test:

- Advise women with an HbA1c level below 39 mmol/mol (5.7%) that:
 - they have a low probability of having diabetes at present
 - they should continue to follow the lifestyle advice (including weight control, diet and exercise) given after the birth
 - they will need an annual test to check that their blood glucose levels are normal
 - they have a moderate risk of developing type 2 diabetes, and offer them advice and guidance in line with the NICE guideline on [preventing type 2 diabetes](#)^[10].

- Advise women with an HbA_{1c} level between 39 and 47 mmol/mol (5.7% and 6.4%) that they are at high risk of developing type 2 diabetes, and offer them advice, guidance and interventions in line with the NICE guideline on [preventing type 2 diabetes](#)^[10].
- Advise women with an HbA_{1c} level of 48 mmol/mol (6.5%) or above that they have type 2 diabetes and refer them for further care. [new 2015]

1.6.14 Offer an annual HbA_{1c} test to women who were diagnosed with gestational diabetes who have a negative postnatal test for diabetes. [new 2015]

1.6.15 Offer women who were diagnosed with gestational diabetes early self-monitoring of blood glucose or an OGTT in future pregnancies. Offer a subsequent OGTT if the first OGTT results in early pregnancy are normal (see [recommendation 1.2.6](#)). [2008, amended 2015]

^[1] HbA_{1c} values are reported in mmol/mol, using the [International Federation of Clinical Chemistry and Laboratory Medicine \(IFCC\) standardised HbA_{1c} test](#). The equivalent values in %, using the Diabetes Control and Complications Trial (DCCT)-aligned HbA_{1c} test, are reported in parentheses.

^[2] The BMI cut-off should consider the variation in risk for different ethnic groups. See the NICE guideline on [BMI](#).

^[3] Although metformin is commonly used in UK clinical practice in the management of diabetes in pregnancy and lactation, and there is strong evidence for its effectiveness and safety (presented in the full version of the guideline), at the time of publication (February 2015) metformin did not have a UK marketing authorisation for this indication. The summary of product characteristics advises that when a patient plans to become pregnant and during pregnancy, diabetes should not be treated with metformin but insulin should be used to maintain blood glucose levels. The prescriber should follow relevant professional guidance, taking full responsibility for the decision. Informed consent should be obtained and documented. See the [General Medical Council's Good practice in prescribing and managing medicines and devices](#) for further information.

^[4] At the time of publication (February 2015), long-acting insulin analogues did not have UK marketing authorisation for use during pregnancy in women with diabetes. However, the summaries of product characteristics (SPCs) for insulin detemir and insulin glargine state that their use may be considered during pregnancy; see the SPCs of the individual products for details. The prescriber should follow relevant professional guidance, taking full responsibility for the decision.

Informed consent should be obtained and documented. See the [General Medical Council's Good practice in prescribing and managing medicines and devices](#) for further information.

^[5] Advice for women on driving with diabetes is available from the [DVLA website](#).

^[6] At the time of surveillance review (April 2018) the UK marketing authorisation for glibenclamide varied between different brands with regards to use in pregnancy. The prescriber should follow relevant professional guidance, taking full responsibility for the decision. Informed consent should be obtained and documented. See the [General Medical Council's Good practice in prescribing and managing medicines and devices](#) for further information.

^[7] For the purpose of this guidance, 'disabling hypoglycaemia' means the repeated and unpredicted occurrence of hypoglycaemia requiring third-party assistance that results in continuing anxiety about recurrence and is associated with significant adverse effect on quality of life.

^[8] Level 2 critical care is defined as care for patients requiring detailed observation or intervention, including support for a single failing organ system or postoperative care and those 'stepping down' from higher levels of care.

^[9] See [Use of glycated haemoglobin \(HbA1c\) in the diagnosis of diabetes mellitus: abbreviated report of a WHO consultation \(2011\)](#).

^[10] Note that the threshold for defining a moderate and high risk of developing type 2 diabetes postnatally for women who have had gestational diabetes is different from that given in the NICE guideline on [preventing type 2 diabetes](#), because of the different populations.

2 Research recommendations

The Guideline Development Group has made the following recommendations for research, based on its review of evidence, to improve NICE guidance and patient care in the future. The Guideline Development Group's full set of research recommendations is detailed in the [full guideline](#).

2.1 *Preconception care for women with diabetes: insulin pump therapy and continuous glucose monitoring*

What are the roles of insulin pump therapy (continuous subcutaneous insulin infusion) and continuous glucose monitoring in helping women with diabetes to achieve blood glucose targets before pregnancy?

Why this is important

Babies born to women with diabetes have a high risk of having congenital malformations and this risk is greater if blood glucose control is poor around the time of conception. However, lowering the risk to that of women without diabetes would require normalisation of blood glucose levels, and this is difficult to achieve without increasing the risk of serious hypoglycaemia. Insulin pump therapy and continuous glucose monitoring have been shown to reduce both blood glucose levels and rates of hypoglycaemia in the non-pregnant population, but it is uncertain if this holds true before conception and in early pregnancy. There is therefore an urgent need to test the effectiveness and acceptability of these technologies in women with diabetes who are planning pregnancy. This would be best undertaken in a randomised controlled trial of women with diabetes who are trying to conceive. Women would be allocated to receive either conventional care (self-monitoring of blood glucose and insulin adjustment) or insulin pump therapy and continuous glucose monitoring.

2.2 *Testing for gestational diabetes*

When should testing for gestational diabetes take place – in the first or second trimester?

Why this is important

Conventionally, testing for gestational diabetes takes place in the second trimester. Intervention has been shown to improve outcomes for women diagnosed with gestational diabetes. However, maternal age and obesity are increasing, and some women (especially those from populations with a high incidence of type 2 diabetes) enter pregnancy with undiagnosed type 2 diabetes, but may not

be tested for diabetes until the second trimester. This exposes the woman and the fetus to risks resulting from early and prolonged maternal hyperglycaemia. It is presumed that this is associated with increased morbidity. UK population studies are needed to establish the incidence of glucose intolerance in women in the first trimester. Well-designed randomised controlled trials are needed to establish if testing, diagnosis and intervention in the first rather than the second trimester improves maternal, fetal and neonatal outcomes, including fetal hyperinsulinaemia.

2.3 *Barriers to achieving blood glucose targets before and during pregnancy*

What are the barriers that women experience to achieving blood glucose targets?

Why this is important

It is vital for normal fetal development in the first trimester that women with pre-existing diabetes achieve good blood glucose control both before and during pregnancy. Good control also helps to prevent macrosomia and other complications in the third trimester in women with pre-existing or gestational diabetes. Whereas many women manage to achieve blood glucose targets, a proportion of women continue to find it difficult to do so. A number of factors could be involved, such as health beliefs, a poor understanding of the importance of good blood glucose control, an inability to be able to comply with a demanding regimen of blood glucose testing up to 7 times a day, and the need to adjust insulin dosage. A better understanding of the barriers in this cohort of women is needed so that healthcare professionals can work to overcome them. Robust qualitative studies are needed to explore these barriers, with the aim of improving blood glucose control and fetal outcomes in pregnancy for women with pre-existing diabetes and women with gestational diabetes.

2.4 *Risk of fetal death for women with diabetes*

How can fetuses at risk of intrauterine death be identified in women with diabetes?

Why this is important

Unexpected intrauterine death remains a significant contributor to perinatal mortality in pregnant women with diabetes. Conventional tests of fetal wellbeing (umbilical artery Doppler ultrasound, cardiotocography and other biophysical tests) have been shown to have poor sensitivity for predicting such events. Alternative approaches that include measurements of erythropoietin in the amniotic fluid and MRI spectroscopy may be effective, but there is currently insufficient clinical evidence to evaluate them. Well-designed randomised controlled trials that are sufficiently powered are needed to determine whether these approaches are clinically and cost effective.

2.5 *Postnatal treatment for women diagnosed with gestational diabetes*

Are there effective long-term pharmacological interventions to prevent the onset of type 2 diabetes that can be recommended postnatally for women who have been diagnosed with gestational diabetes?

Why this is important

Gestational diabetes is one of the strongest risk factors for the subsequent development of type 2 diabetes: up to 50% of women diagnosed with gestational diabetes develop type 2 diabetes within 5 years of the birth. There are some data suggesting that changes in diet and exercise, with or without metformin, can prevent type 2 diabetes developing in non-pregnant middle-aged people with glucose intolerance, but there are no studies specifically in women with a past history of gestational diabetes. There is thus an urgent need to investigate what interventions may delay or prevent type 2 diabetes developing in this high-risk population of women. Undertaking a formal randomised controlled trial involving long-term outcomes is often not feasible in practice. However, it would be possible to have a quasi-randomised study comparing 2 populations of women with similar demographic profiles who had gestational diabetes. One population would be encouraged at their annual check to follow a specific diet and exercise regime and those in the other population would not. The incidence of the development of type 2 diabetes in the 2 groups at 5, 10 and 20 years would be compared.

Finding more information and resources

To find out what NICE has said on topics related to this guideline, see our web page on [fertility, pregnancy and childbirth](#) and [diabetes](#).

Update information

December 2015: Recommendation 1.1.29 and related NICE guidance section amended to refer to updated NICE guideline on [type 2 diabetes in adults](#). Footnote numbering corrected.

October 2015: Title changed from 'Diabetes in pregnancy: management of diabetes and its complications from preconception to the postnatal period' to 'Diabetes in pregnancy: management from preconception to the postnatal period' for clarity and consistency with other guidance on this topic.

August 2015: Changes have been made for consistency with other NICE guidelines. Recommendation 1.1.17 now includes plasma glucose target levels taken from the NICE guideline on [type 1 diabetes in adults](#). Recommendation 1.1.29 cross-refers to recommendations about education in the NICE guidelines on type 1 diabetes in adults and type 2 diabetes in adults. Recommendations 1.1.34 and 1.3.28 have been amended to ensure consistency with the terminology used in the NICE guideline on [chronic kidney disease](#).

Minor changes since publication

August 2018:Footnotes were added to recommendation 1.1.10 to clarify BMI in different ethnic groups, and to recommendation 1.2.11 to provide a link to the DVLA. The footnotes on glibenclamide and on thresholds for defining risk of developing type 2 diabetes were updated.

About this guideline

This guideline updates and replaces NICE guideline CG63 (published March 2008).

It has not been possible to update all recommendations in this update of the guideline. Areas for review and update were identified and prioritised through the scoping process and stakeholder feedback. Areas that have not been reviewed in this update may be addressed in 2 years' time when NICE next considers updating this guideline. NICE is currently considering setting up a standing update committee for diabetes, which would enable more rapid update of discrete areas of the diabetes guidelines, as and when new and relevant evidence is published.

Recommendations are marked as [new 2015], [2015], [2008] or [2008, amended 2015]:

- [new 2015] indicates that the evidence has been reviewed and the recommendation has been added or updated
- [2015] indicates that the evidence has been reviewed but no change has been made to the recommended action
- [2008] indicates that the evidence has not been reviewed since 2008
- [2008, amended 2015] indicates that the evidence has not been reviewed since 2008, but either changes have been made to the recommendation wording that change the meaning or NICE has made editorial changes to the original wording to clarify the action to be taken (see below).

Recommendations from NICE guideline CG63 (2008) that have been amended

Recommendations are labelled [2008, amended 2015] if the evidence has not been reviewed but either:

- changes have been made to the recommendation wording that change the meaning or
- NICE has made editorial changes to the original wording to clarify the action to be taken.

Recommendation(s) in 2008 guideline	Recommendation(s) in current guideline	Reason for change
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<p>Women with insulin-treated diabetes who are planning to become pregnant should be informed that there is insufficient evidence about the use of long-acting insulin analogues during pregnancy. Therefore isophane insulin (also known as NPH insulin) remains the first choice for long-acting insulin during pregnancy. (1.1.6.3)</p>	<p>Use isophane insulin (also known as NPH insulin) as the first choice for long-acting insulin during pregnancy. Consider continuing treatment with long-acting insulin analogues (insulin detemir or insulin glargine) in women with diabetes who have established good blood glucose control before pregnancy^[a]. [2008, amended 2015] (1.1.23)</p>	<p>The summaries of product characteristics for insulin detemir and insulin glargine now state that use during pregnancy may be considered. Some consultation comments raised concerns that women with good blood glucose control on long-acting insulin analogues may have their glucose levels disrupted if they switch to isophane insulin.</p>
<p>Women with diabetes should be offered a renal assessment, including a measure of microalbuminuria, before discontinuing contraception. If serum creatinine is abnormal (120 micromol/litre or more) or the estimated glomerular filtration rate (eGFR) is less than 45 ml/minute/1.73 m², referral to a nephrologist should be considered before discontinuing contraception. (1.1.11.1)</p>	<p>Offer women with diabetes a renal assessment, including a measure of albuminuria, before discontinuing contraception. If serum creatinine is abnormal (120 micromol/litre or more), the urinary albumin:creatinine ratio is greater than 30 mg/mmol or the estimated glomerular filtration rate (eGFR) is less than 45 ml/minute/1.73 m², referral to a nephrologist should be considered before discontinuing contraception. [2008, amended 2015] (1.1.34)</p>	<p>The text 'the urinary albumin:creatinine ratio is greater than 30 mg/mmol' has been added because this is the threshold used to define severe <u>chronic kidney disease</u> (NICE guideline CG182). The terminology has been amended for consistency with the NICE guideline on <u>chronic kidney disease</u>. Minor editing changes to reflect current NICE style.</p>

<p>Screening for gestational diabetes using risk factors is recommended in a healthy population. At the booking appointment, the following risk factors for gestational diabetes should be determined:</p> <ul style="list-style-type: none"> • body mass index above 30 kg/m² • previous macrosomic baby weighing 4.5 kg or above • previous gestational diabetes • family history of diabetes (first-degree relative with diabetes) • family origin with a high prevalence of diabetes: <ul style="list-style-type: none"> - South Asian (specifically women whose country of family origin is India, Pakistan or Bangladesh) - black Caribbean - Middle Eastern (specifically women whose country of family 	<p>Assess risk of gestational diabetes using risk factors in a healthy population. At the booking appointment, determine the following risk factors for gestational diabetes:</p> <ul style="list-style-type: none"> • BMI above 30 kg/m² • previous macrosomic baby weighing 4.5 kg or above • previous gestational diabetes • family history of diabetes (first-degree relative with diabetes) • minority ethnic family origin with a high prevalence of diabetes. <p>Offer women with any one of these risk factors testing for gestational diabetes (see recommendations 1.2.5–1.2.7). [2008, amended 2015] (1.2.2)</p>	<p>The verb has been changed because 'screen' and 'screening' are now used in NICE guidelines only in relation to national screening programmes.</p> <p>The GDG advised that the sub-bullets listing different family origin in the original recommendation did not cover all minority ethnic groups that have a high prevalence of diabetes. It is important that women in groups other than those that were listed are not overlooked for screening.</p> <p>Minor editing changes to reflect current NICE style, and the verb has been changed (no change to meaning).</p>
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<p>origin is Saudi Arabia, United Arab Emirates, Iraq, Jordan, Syria, Oman, Qatar, Kuwait, Lebanon or Egypt).</p> <p>Women with any one of these risk factors should be offered testing for gestational diabetes (see recommendation 1.2.2.4). (4.3.1.1)</p>		
<p>During pregnancy, women with insulin-treated diabetes should be provided with a concentrated glucose solution and women with type 1 diabetes should also be given glucagon; women and their partners or other family members should be instructed in their use. (1.3.3.3)</p>	<p>Advise pregnant women with insulin-treated diabetes to always have available a fast-acting form of glucose (for example, dextrose tablets or glucose-containing drinks). [2008, amended 2015] (1.3.14)</p> <p>Provide glucagon to pregnant women with type 1 diabetes for use if needed. Instruct the woman and her partner or other family members in its use. [2008, amended 2015] (1.3.15)</p>	<p>The GDG advised that the original recommendation no longer reflects usual clinical practice, and the changes take this into account. It was also felt that the information is clearer if it is divided into 2 recommendations because the actions are different in each.</p> <p>Minor editing changes to reflect current NICE style.</p>

<p>Pregnant women with pre-existing diabetes should be offered retinal assessment by digital imaging with mydriasis using tropicamide following their first antenatal clinic appointment and again at 28 weeks if the first assessment is normal. If any diabetic retinopathy is present, an additional retinal assessment should be performed at 16–20 weeks. (1.3.4.1)</p>	<p>Offer pregnant women with pre-existing diabetes retinal assessment by digital imaging with mydriasis using tropicamide following their first antenatal clinic appointment (unless they have had a retinal assessment in the last 3 months), and again at 28 weeks. If any diabetic retinopathy is present at booking, perform an additional retinal assessment at 16–20 weeks. [2008, amended 2015] (1.3.24)</p>	<p>All women with pre-existing diabetes should have retinal assessment at booking (first antenatal appointment) and at 28 weeks, in accordance with the NHS Diabetic Eye Screening Programme. Thus 'if the first assessment is normal' has been removed because it implies that if the first reading is not normal the woman does not need to be tested at 28 weeks.</p> <p>However, if a woman has had retinal assessment in the 3 months before her booking appointment, another one isn't needed at that time.</p> <p>If retinopathy is present at booking, the woman should have an additional screen at 16–20 weeks (that is, as well as at 28 weeks).</p> <p>Minor editing changes to reflect current NICE style.</p>
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<p>Women who have preproliferative diabetic retinopathy diagnosed during pregnancy should have ophthalmological follow-up for at least 6 months following the birth of the baby. (1.3.4.4)</p>	<p>Ensure that women who have preproliferative diabetic retinopathy or any form of referable retinopathy diagnosed during pregnancy have ophthalmological follow-up for at least 6 months after the birth of the baby. [2008, amended 2015] (1.3.26)</p>	<p>The text 'or any form of referable retinopathy' was added as advised by the National Screening Programme. Retinopathy can worsen during pregnancy because of the acute effects of improved blood glucose control. The potential continues after the birth. Minor editing changes to reflect current NICE style.</p>
<p>If renal assessment has not been undertaken in the preceding 12 months in women with pre-existing diabetes, it should be arranged at the first contact in pregnancy. If serum creatinine is abnormal (120 micromol/litre or more) or if total protein excretion exceeds 2 g/day, referral to a nephrologist should be considered (eGFR should not be used during pregnancy). Thromboprophylaxis should be considered for women with proteinuria above 5 g/day (macroalbuminuria). (1.3.5.1)</p>	<p>If renal assessment has not been undertaken in the preceding 3 months in women with pre-existing diabetes, arrange it at the first contact in pregnancy. If the serum creatinine is abnormal (120 micromol/litre or more), the urinary albumin:creatinine ratio is greater than 30 mg/mmol or total protein excretion exceeds 0.5 g/day, referral to a nephrologist should be considered (eGFR should not be used during pregnancy). Thromboprophylaxis should be considered for women with nephrotic range proteinuria above 5 g/day (albumin:creatinine ratio greater than 220 mg/mmol). [2008, amended 2015] (1.3.28)</p>	<p>The time from the previous renal assessment has been changed from 12 months to 3 months because of the increased risk of pre-eclampsia in women with moderately increased albuminuria ('microalbuminuria'). The text 'the urinary albumin:creatinine ratio is greater than 30 mg/mmol' has been added because this is the threshold used to define severe disease in the NICE guideline on chronic kidney disease. Minor editing changes to reflect current NICE style.</p>

<p>Women with diabetes should be offered antenatal examination of the four-chamber view of the fetal heart and outflow tracts at 18–20 weeks. (1.3.6.1)</p>	<p>Offer women with diabetes an ultrasound scan for detecting fetal structural abnormalities, including examination of the fetal heart (4 chambers, outflow tracts and 3 vessels), at 20 weeks. [2008, amended 2015] (1.3.30)</p>	<p>When reviewing and updating the Table of antenatal appointments in recommendation 1.3.35, the GDG became aware of some inconsistencies between the recommendations about the use of ultrasound to detect structural abnormalities in the 2008 guideline. The relevant 2008 recommendations were recommendation 1.3.6.1 (listed) and the following wording in Table 1 (recommendation 1.3.8.3): 'Offer four-chamber view of the fetal heart and outflow tracts plus scans that would be offered at 18–20 weeks as part of routine antenatal care'. However, the 2008 full guideline states that the ultrasound scan for detecting structural anomalies and anatomical examination of the four-chamber view of the fetal heart plus outflow tracts should take place at 20 weeks. This was because visualisation of fetal cardiac anatomy, including the four-chamber</p>
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		<p>view, was better at 20 weeks than at 18 weeks.</p> <p>In view of this duplication of recommendations and inconsistency in gestational age, the GDG felt that it would be better to bring together the separate recommendations about screening for congenital abnormalities (scanning for structural abnormalities in general, scanning the four-chamber view of the fetal heart and performing the ultrasound scan at 20 weeks [rather than the usual 18 weeks in a non-diabetic pregnancy]) into 1 recommendation for greater clarity.</p> <p>The recommendation was further amended from 'Offer an ultrasound scan for detecting structural anomalies and examination of the four chamber view of the fetal heart and outflow tracts' to 'Offer women with diabetes an ultrasound scan for detecting fetal structural abnormalities including examination of the fetal heart (four chambers, outflow tracts and three</p>
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		vessels) at 20 weeks' as these views are recommended as part of the Fetal Anomaly Screening Programme. Minor editing changes to reflect current NICE style.
Routine monitoring of fetal wellbeing before 38 weeks is not recommended in pregnant women with diabetes, unless there is a risk of intrauterine growth restriction.	Routine monitoring of fetal wellbeing (using methods such as fetal umbilical artery Doppler recording, fetal heart rate recording and biophysical profile testing) before 38 weeks is not recommended in pregnant women with diabetes, unless there is a risk of fetal growth restriction. [2008, amended 2015] (1.3.32)	Details have been added to the recommendation to make it clear which types of monitoring are being referred to – this recommendation does not refer to standard checks carried out by midwives. The term 'intrauterine growth restriction' is outdated and has been replaced by 'fetal growth restriction'.
1.3.8.2 Women with diabetes should have contact with the diabetes care team for assessment of glycaemic control every 1–2 weeks throughout pregnancy.	Ensure that women with diabetes have contact with the joint diabetes and antenatal clinic for assessment of blood glucose control every 1–2 weeks throughout pregnancy. (1.3.35) [2008, amended 2015]	The term 'joint diabetes and antenatal clinic' has been used for consistency and clarity.
1.3.8.3	1.3.36	Details in table 1 (Timetable of antenatal appointments) have been amended to match changes to recommendations elsewhere in the guideline. Minor editing changes to reflect current NICE style.

<p>Babies of women with diabetes who present with clinical signs of hypoglycaemia should have their blood glucose tested and be treated with intravenous dextrose as soon as possible. (1.5.2.5)</p>	<p>Test blood glucose levels in babies of women with diabetes who present with clinical signs of hypoglycaemia, and treat those who are hypoglycaemic with intravenous dextrose as soon as possible. [2008, amended 2015] (1.5.11)</p>	<p>The GDG recommended adding the text 'those who are hypoglycaemic' for clarity.</p> <p>Minor editing changes to reflect current NICE style.</p>
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<p>Women who were diagnosed with gestational diabetes (including those with ongoing impaired glucose regulation) should be informed about the risks of gestational diabetes in future pregnancies and they should be offered screening (OGTT or fasting plasma glucose) for diabetes when planning future pregnancies. (1.6.2.5)</p>	<p>Explain to women who were diagnosed with gestational diabetes about the risks of gestational diabetes in future pregnancies, and offer them testing for diabetes^[6] when planning future pregnancies. [2008, amended 2015] (1.6.10)</p>	<p>The text '(including those with ongoing impaired glucose regulation)' has been removed because it did not make sense: women with 'ongoing impaired glucose regulation' need ongoing surveillance and care from the diabetes care team. This recommendation was intended for women who have no evidence of glucose intolerance after birth.</p> <p>A verb has been changed because 'screen' and 'screening' are now used in NICE guidelines only in relation to national screening programmes.</p> <p>The text '(OGTT or fasting plasma glucose)' has been removed and a footnote giving a link to WHO criteria for diagnosing diabetes has been added. This is for consistency with current practice for diagnosing diabetes.</p> <p>Minor editing changes to reflect current NICE style.</p>
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<p>Women who were diagnosed with gestational diabetes (including those with ongoing impaired glucose regulation) should be offered early self-monitoring of blood glucose or an OGTT in future pregnancies. A subsequent OGTT should be offered if the test results in early pregnancy are normal (see recommendation 1.2.2.4). (1.6.2.6)</p>	<p>Offer women who were diagnosed with gestational diabetes early self-monitoring of blood glucose or an OGTT in future pregnancies. Offer a subsequent OGTT if the first OGTT results in early pregnancy are normal (see recommendation 1.2.6). [2008, amended 2015] (1.6.15)</p>	<p>The text '(including those with ongoing impaired glucose regulation)' has been removed because it did not make sense: anyone with 'ongoing impaired glucose regulation' needs ongoing surveillance and care from the diabetes care team. This recommendation was intended for women who have no evidence of any glucose intolerance after birth.</p> <p>The text 'the test results in early pregnancy' has been changed to 'the first OGTT results in early pregnancy' to clarify which test is meant. A subsequent OGTT is not needed if the woman is self-monitoring.</p>
<p>1.1.2.1, 1.1.8.3, 1.3.4.4, 1.3.7.3, 1.3.9.2, 1.4.3.1, 1.4.3.3, 1.5.2.3, 1.5.2.4</p>	<p>1.1.4, 1.1.28, 1.3.33, 1.3.38, 1.4.10, 1.4.12, 1.5.9, 1.5.10</p>	<p>NICE has made editorial changes to the original wording to clarify the action to be taken (no change to meaning): a verb has been added, or the verb used has been changed.</p>

^[a] At the time of publication (February 2015), long-acting insulin analogues did not have UK marketing authorisation for use during pregnancy in women with diabetes. However, the summaries of product characteristics (SPCs) for insulin detemir and insulin glargine state that their use may be considered during pregnancy; see the SPCs of the individual products for details. The prescriber should follow relevant professional guidance, taking full responsibility for the decision. Informed consent should be obtained and documented. See the [General Medical Council's Good practice in prescribing and managing medicines and devices](#) for further information.

^[b] See [Use of glycated haemoglobin \(HbA1c\) in the diagnosis of diabetes mellitus: abbreviated report of a WHO consultation \(2011\)](#).

Strength of recommendations

Some recommendations can be made with more certainty than others. The Guideline Development Group makes a recommendation based on the trade-off between the benefits and harms of an intervention, taking into account the quality of the underpinning evidence. For some interventions, the Guideline Development Group is confident that, given the information it has looked at, most patients would choose the intervention. The wording used in the recommendations in this guideline denotes the certainty with which the recommendation is made (the strength of the recommendation).

For all recommendations, NICE expects that there is discussion with the patient about the risks and benefits of the interventions, and their values and preferences. This discussion aims to help them to reach a fully informed decision.

Interventions that must (or must not) be used

We usually use 'must' or 'must not' only if there is a legal duty to apply the recommendation. Occasionally we use 'must' (or 'must not') if the consequences of not following the recommendation could be extremely serious or potentially life threatening.

Interventions that should (or should not) be used – a 'strong' recommendation

We use 'offer' (and similar words such as 'refer' or 'advise') when we are confident that, for the vast majority of patients, an intervention will do more good than harm, and be cost effective. We use similar forms of words (for example, 'Do not offer...') when we are confident that an intervention will not be of benefit for most patients.

Interventions that could be used

We use 'consider' when we are confident that an intervention will do more good than harm for most patients, and be cost effective, but other options may be similarly cost effective. The choice of intervention, and whether or not to have the intervention at all, is more likely to depend on the patient's values and preferences than for a strong recommendation, and so the healthcare professional should spend more time considering and discussing the options with the patient.

Recommendation wording in guideline updates

NICE began using this approach to denote the strength of recommendations in guidelines that started development after publication of the 2009 version of 'The guidelines manual' (January 2009). This does not apply to any recommendations ending [2008] (see 'Update information' above for details about how recommendations are labelled). In particular, for recommendations labelled [2008] the word 'consider' may not necessarily be used to denote the strength of the recommendation.

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