



*National Institute for
Health and Clinical Excellence*

Quick reference guide

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Diabetes in pregnancy

Management of diabetes and its complications from
pre-conception to the postnatal period

Introduction

Approximately 650,000 women give birth in England and Wales each year, and 2–5% of pregnancies involve women with diabetes. Diabetes in pregnancy is associated with risks to the woman and to the developing fetus. Pregnancy outcomes for women with diabetes and their babies are poor compared to those for women who do not have diabetes. The prevalence of diabetes is increasing.

Miscarriage, pre-eclampsia and preterm labour are more common in women with pre-existing diabetes, and 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.

The guideline builds on existing clinical guidelines for routine care during the antenatal, intrapartum and postnatal periods, focusing on areas where additional or different care should be offered to women with diabetes and their newborn babies. It also covers pre-conception care for women with diabetes who wish to become pregnant.

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This guidance is written in the following context

NICE clinical guidelines are recommendations about the treatment and care of people with specific diseases and conditions in the NHS in England and Wales.

This guidance represents the view of the Institute, which was arrived at after careful consideration of the evidence available. Healthcare professionals are expected to take it fully into account when exercising their clinical judgement. The guidance does not, however, override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient, in consultation with the patient and/or guardian or carer, and informed by the summary of product characteristics of any drugs they are considering.

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Woman- and baby-centred care

Treatment and care should take into account women's needs and preferences. Women with diabetes should have the opportunity to make informed decisions about their care and treatment, in partnership with their healthcare professionals. If women do not have the capacity to make decisions, healthcare professionals should follow the Department of Health guidelines – 'Reference guide to consent for examination or treatment' (2001) (available from www.dh.gov.uk). Since April 2007 healthcare professionals need to follow a code of practice accompanying the Mental Capacity Act (summary available from www.publicguardian.gov.uk).

Good communication between healthcare professionals and women is essential. It should be supported by evidence-based, written information tailored to the woman's needs. Treatment and care, and the information women are given about it, should be culturally appropriate. It should also be accessible to women with additional needs such as physical, sensory or learning disabilities, and to women who do not speak or read English.

Every opportunity should be taken to provide the woman and her partner or other relevant family members with the information and support they need.

Key priorities for implementation

Pre-conception care

- Women with diabetes who are planning to become pregnant should be informed that establishing good glycaemic 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.
- The importance of avoiding unplanned pregnancy should be an essential component of diabetes education from adolescence for women with diabetes.
- Women with diabetes who are planning to become pregnant should be offered pre-conception care and advice before discontinuing contraception.

Antenatal care

- If it is safely achievable, women with diabetes should aim to keep fasting blood glucose between 3.5 and 5.9 mmol/litre and 1-hour postprandial blood glucose below 7.8 mmol/litre during pregnancy.
- Women with insulin-treated diabetes should be advised of the risks of hypoglycaemia and hypoglycaemia unawareness in pregnancy, particularly in the first trimester.
- During pregnancy, women who are suspected of having diabetic ketoacidosis should be admitted immediately for level 2 critical care¹, where they can receive both medical and obstetric care.
- Women with diabetes should be offered antenatal examination of the four-chamber view of the fetal heart and outflow tracts at 18–20 weeks.

Neonatal care

- Babies of women with diabetes should be kept with their mothers unless there is a clinical complication or there are abnormal clinical signs that warrant admission for intensive or special care.

Postnatal care

- Women who were diagnosed with gestational diabetes should be offered lifestyle advice (including weight control, diet and exercise) and offered a fasting plasma glucose measurement (but not an oral glucose tolerance test) at the 6-week postnatal check and annually thereafter.

¹ 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.

Pre-conception care

Information and advice

- Offer information, care and advice to women with diabetes who are planning to become pregnant before they discontinue contraception.
- Give pre-conception care in a supportive environment. Encourage the woman's partner or a family member to attend.
- This should build on previous care given in routine appointments with healthcare professionals, including the diabetes care team (see box 1).

Box 1 Encouraging women with diabetes to seek pre-conception care

Starting from adolescence:

- healthcare professionals should give information about the benefits of pre-conception glycaemic control at each contact
- the diabetes care team should record the woman's intentions regarding pregnancy and contraceptive use at each contact
- the importance of avoiding unplanned pregnancy should be an essential component of diabetes education.

Give advice and information on:

- the risks of diabetes in pregnancy (see box 2) and how to reduce them with good glycaemic control
- diet, body weight and exercise, including weight loss for women with a body mass index (BMI) over 27 kg/m²
- hypoglycaemia and hypoglycaemia unawareness
- pregnancy-related nausea/vomiting and glycaemic control
- retinal and renal assessment
- when to stop contraception
- taking folic acid supplements (5 mg/day) from pre-conception until 12 weeks of gestation
- review of, and possible changes to, medication, glycaemic targets and self-monitoring routine
- frequency of appointments and local support, including emergency telephone numbers.

Box 2 Risks of diabetes in pregnancy

Risks to women and babies include:

- fetal macrosomia
- birth trauma (to mother and baby)
- induction of labour or caesarean section
- miscarriage
- congenital malformation
- stillbirth
- transient neonatal morbidity
- neonatal death
- obesity and/or diabetes developing later in the baby's life.

Care, assessment and review

Offer:

- folic acid supplements (5 mg/day)
- blood glucose meter for self-monitoring
- ketone testing strips to women with type 1 diabetes and advise on use if hyperglycaemic or unwell
- diabetes structured education programme
- monthly HbA_{1c}
- retinal assessment by digital imaging with mydriasis using tropicamide* (unless carried out in previous 6 months)
- renal assessment (including microalbuminuria) before stopping contraception.

Consider:

- referral to a nephrologist if serum creatinine is 120 micromol/litre or more or the estimated glomerular filtration rate (eGFR) is less than 45 ml/minute/1.73 m².

Review:

- current medications for diabetes and complications of diabetes (see box 3)
- glycaemic targets and glucose monitoring (see box 4).

* Drug names are marked with an asterisk if they do not have UK marketing authorisation specifically for pregnant and breastfeeding women at the time of publication (March 2008). Informed consent should be obtained and documented.

Box 3 Safety of medications before and during pregnancy

- Metformin* may be used before and during pregnancy, as well as or instead of insulin.
- Rapid-acting insulin analogues (aspart and lispro*) are safe to use in pregnancy and have advantages over soluble human insulin* during pregnancy.
- Evidence about the use of long-acting insulin analogues during pregnancy is limited. Isophane (NPH) insulin* is the first-choice long-acting insulin during pregnancy.

Before or as soon as pregnancy is confirmed:

- stop oral hypoglycaemic agents, apart from metformin*, and commence insulin if required
- stop angiotensin-converting enzyme inhibitors and angiotensin-II receptor antagonists and consider alternative antihypertensives
- stop statins.

Box 4 Blood glucose targets and monitoring

- Agree individualised blood glucose targets for self-monitoring.
- Advise women who need intensification of hypoglycaemic therapy to increase the frequency of self-monitoring to include fasting and a mixture of pre- and postprandial levels.
- Offer monthly HbA_{1c}.
- Advise women to aim for an HbA_{1c} below 6.1%, if safe.
- Inform women that any reduction in HbA_{1c} may reduce risks.
- Advise women with HbA_{1c} above 10% to avoid pregnancy.
- Do not offer rapid optimisation of glycaemic control until after retinal assessment and treatment are completed.

* Drug names are marked with an asterisk if they do not have UK marketing authorisation specifically for pregnant and breastfeeding women at the time of publication (March 2008). Informed consent should be obtained and documented.

Gestational diabetes

Box 5 Risk factors for screening

- BMI above 30 kg/m².
- Previous macrosomic baby weighing 4.5 kg or above.
- Previous gestational diabetes.
- First-degree relative with diabetes.
- Family origin with a high prevalence of diabetes (South Asian, black Caribbean and Middle Eastern).

Screening and diagnosis

Offer:

- screening for gestational diabetes using risk factors (see box 5) at the booking appointment
- early self-monitoring of blood glucose or a 2-hour 75 g oral glucose tolerance test (OGTT) at 16–18 weeks to test for gestational diabetes if the woman has had gestational diabetes previously, followed by OGTT at 28 weeks if the first test is normal
- an OGTT to test for gestational diabetes at 24–28 weeks if the woman has any other risk factors.

Do not offer:

- screening for gestational diabetes using fasting plasma glucose, random blood glucose, glucose challenge test or urinalysis for glucose.

Information and advice before screening and testing

Advise that:

- there is a small risk of birth complications if gestational diabetes is not controlled
- gestational diabetes will respond to changes in diet and exercise in most women
- oral hypoglycaemic agents or insulin injections may be needed if diet and exercise do not control blood glucose levels
- extra monitoring and care may be needed during pregnancy and labour.

Information and advice after diagnosis

Give information and advice on:

- the risks of gestational diabetes (see box 6) and how to reduce them with good glycaemic control
- diet, body weight and exercise, including weight loss for women with a BMI over 27 kg/m²
- self-monitoring of blood glucose
- individualised targets for blood glucose.

Box 6 Risks of gestational diabetes

Risks to women and babies include:

- fetal macrosomia
- birth trauma (to mother and baby)
- induction of labour or caesarean section
- transient neonatal morbidity
- neonatal hypoglycaemia
- perinatal death
- obesity and/or diabetes developing later in the baby's life.

Hypoglycaemic therapy

Consider hypoglycaemic therapy for women with gestational diabetes:

- if lifestyle changes do not maintain blood glucose targets over a period of 1–2 weeks
- if ultrasound shows incipient fetal macrosomia (abdominal circumference above the 70th percentile) at diagnosis.

If hypoglycaemic therapy is required:

- tailor hypoglycaemic therapy to the individual woman
- regular insulin*, the rapid acting insulin analogues aspart and lispro*, and/or the oral hypoglycaemic agents metformin* and glibenclamide* may be considered.

* Drug names are marked with an asterisk if they do not have UK marketing authorisation specifically for pregnant and breastfeeding women at the time of publication (March 2008). Informed consent should be obtained and documented.

Key:

- Appointment including specific diabetes care
- Appointment including routine care only
- No routine care appointment

Antenatal care

See also the NICE clinical guideline on antenatal care (www.nice.org.uk/CG062).

Offer:

- immediate referral to a joint diabetes and antenatal clinic
- contact with the diabetes care team every 1–2 weeks to assess glycaemic control
- advice on where to have the birth, which should be in a hospital with advanced neonatal resuscitation skills available 24 hours a day
- information and education at each appointment
- care specifically for women with diabetes, in addition to routine antenatal care, as described below.

Specific antenatal care for women with diabetes

First appointment (joint diabetes and antenatal clinic)

- Offer information, advice and support on glycaemic control (see boxes 7–9).
- Take a clinical history.
- Review medications (see box 3).
- Offer retinal and renal assessment if these have not been performed in the previous 12 months (see boxes 10–11).



7–9 weeks

- Confirm viability of pregnancy and gestational age.



Booking appointment (ideally by 10 weeks)

- Discuss information, education and advice about how diabetes will affect pregnancy, birth and early parenting (such as breastfeeding and initial care of the baby).



16 weeks

- Offer retinal assessment to women with pre-existing diabetes who had signs of diabetic retinopathy at the first antenatal appointment (see box 10).



20 weeks

- Offer four-chamber view of the fetal heart and outflow tracts (see box 12).
- Offer scans that would be offered at 18–20 weeks in routine antenatal care.



25 weeks

- Offer routine care only (appointment for nulliparous women).

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28 weeks

- Offer ultrasound monitoring of fetal growth and amniotic fluid volume (see box 12).
- Offer retinal assessment to women with pre-existing diabetes who did not have diabetic retinopathy at their first antenatal clinic visit.

**31 weeks**

- No appointment (routine care offered to nulliparous women at 32 weeks).

**32 weeks**

- Offer ultrasound monitoring of fetal growth and amniotic fluid volume.
- Offer investigations that would be offered to nulliparous women at 31 weeks in routine antenatal care.

**34 weeks**

- Offer routine care only.

**36 weeks**

- Offer ultrasound monitoring of fetal growth and amniotic fluid volume.
- Offer information and advice about:
 - timing, mode and management of birth
 - analgesia and anaesthesia (including anaesthetic assessment for women with comorbidities, such as obesity or autonomic neuropathy)
 - changes to hypoglycaemic therapy during and after birth
 - initial care of the baby
 - initiation of breastfeeding and the effect of breastfeeding on glycaemic control
 - contraception and follow-up.

**38 weeks**

- Offer induction of labour, or caesarean section if indicated.
- Offer tests of fetal wellbeing for women waiting for spontaneous labour.

**39 weeks**

- Offer tests of fetal wellbeing for women waiting for spontaneous labour.

**40 weeks**

- Offer tests of fetal wellbeing for women waiting for spontaneous labour.

**41 weeks**

- Offer tests of fetal wellbeing for women waiting for spontaneous labour.

Box 7 Blood glucose targets and monitoring

- Advise women to test fasting and 1-hour postprandial blood glucose levels after every meal during pregnancy.
- Agree individualised targets for self-monitoring.
- Advise women to aim for a fasting blood glucose of between 3.5 and 5.9 mmol/litre and 1-hour postprandial blood glucose below 7.8 mmol/litre.
- The presence of diabetic retinopathy should not prevent rapid optimisation of glycaemic control in women with a high HbA_{1c} in early pregnancy.
- Do not use HbA_{1c} routinely in the second and third trimesters.

Box 8 Additional care for women taking insulin**Offer:**

- concentrated oral glucose solution to all women taking insulin
- glucagon to women with type 1 diabetes
- insulin pump therapy if glycaemic control using multiple injections is not adequate and the woman experiences significant disabling hypoglycaemia.

Advise:

- women to test their blood glucose before going to bed at night
- on the risks of hypoglycaemia and hypoglycaemia unawareness, especially in the first trimester
- women and their partners or family members on the use of oral glucose solutions and glucagon for hypoglycaemia.

Box 9 Detecting and managing diabetic ketoacidosis

If diabetic ketoacidosis is suspected during pregnancy, admit women immediately for level 2 critical care¹, where both medical and obstetric care are available.

For women with type 1 diabetes:

- offer ketone testing strips and advise women to test their ketone levels if they are hyperglycaemic or unwell
- exclude diabetic ketoacidosis as a matter of urgency in women who become unwell.

¹ 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.

Box 10 Retinal assessment for women with pre-existing diabetes**Offer retinal assessment:**

- as soon as possible after the first contact in pregnancy if it has not been performed in the past 12 months
- following the first antenatal clinic appointment
- at 28 weeks if the first assessment is normal
- at 16–20 weeks if any diabetic retinopathy is present.

Retinal assessment should be carried out by digital imaging with mydriasis using tropicamide*.

Box 11 Renal assessment for women with pre-existing diabetes**Offer:**

- renal assessment at the first contact in pregnancy if it has not been performed in the past 12 months.

Consider:

- referral to a nephrologist if serum creatinine is abnormal (120 micromol/litre or more) or total protein excretion exceeds 2 g/day
- thromboprophylaxis if proteinuria is above 5 g/day.

Do not offer:

- eGFR during pregnancy.

Box 12 Monitoring and screening fetal development**Offer:**

- antenatal examination of the four-chamber view of the fetal heart and outflow tracts at 18–20 weeks
- ultrasound monitoring of fetal growth and amniotic fluid volume every 4 weeks from 28 to 36 weeks
- individualised monitoring of fetal wellbeing to women at risk of intrauterine growth restriction (those with macrovascular disease or nephropathy).

Do not offer:

- tests of fetal wellbeing before 38 weeks, unless there is a risk of intrauterine growth restriction.

* Drug names are marked with an asterisk if they do not have UK marketing authorisation specifically for pregnant and breastfeeding women at the time of publication (March 2008). Informed consent should be obtained and documented.

Intrapartum care

See also the NICE clinical guideline on intrapartum care (www.nice.org.uk/CG055).

Information and advice

Give information on:

- the risks and benefits of vaginal birth, induction of labour² and caesarean section³ if the baby has macrosomia identified by ultrasound
- the possibility of vaginal birth in women with diabetic retinopathy
- the possibility of vaginal birth after previous caesarean section.

Care for preterm labour

- Consider antenatal steroids for fetal lung maturation in preterm labour or if early elective birth is planned.
- Consider tocolytic medication (but not betamimetic drugs) to suppress labour if indicated.
- Monitor glucose levels of women taking steroids for fetal lung maturation closely and advise on taking supplementary insulin according to an agreed protocol.

Care after 38 weeks

Offer:

- induction of labour, or caesarean section if indicated, after 38 weeks if the baby has grown normally.

Care during labour and birth

Monitor:

- blood glucose hourly and aim to maintain it at between 4 and 7 mmol/litre
- blood glucose every 30 minutes if a general anaesthetic is used.

Consider intravenous dextrose and insulin:

- for women with type 1 diabetes
- for women whose blood glucose is not maintained at between 4 and 7 mmol/litre.

² The NICE guideline on induction of labour is being updated (publication expected June 2008).

³ See the NICE clinical guideline on caesarean section (www.nice.org.uk/CG013).

Neonatal care

- The baby should stay with the mother unless extra neonatal care is required (see box 13).
- Do not transfer babies into community care until they are at least 24 hours old, maintaining their blood glucose levels and feeding well.

Box 13 Admission to a neonatal unit

Admit the baby to a neonatal unit if he or she:

- is hypoglycaemic with abnormal signs
- has respiratory distress or jaundice that requires monitoring or treatment
- has signs of cardiac decompensation, neonatal encephalopathy or polycythaemia
- needs intravenous fluids
- needs tube feeding (unless adequate support is available on the postnatal ward)
- is born before 34 weeks (or between 34 and 36 weeks if dictated clinically by initial assessment).

Test:

- for polycythaemia, hyperbilirubinaemia, hypocalcaemia and hypomagnesaemia if the baby has clinical signs
- for heart abnormalities using an echocardiogram if the baby has clinical signs associated with congenital heart disease or cardiomyopathy.

Preventing, detecting and managing neonatal hypoglycaemia

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

Advise:

- women to feed their babies as soon as possible (within 30 minutes of birth) and then at frequent intervals (2–3 hours) until pre-feeding blood glucose levels are maintained at 2 mmol/litre or more.

Test the baby's blood glucose levels:

- 2–4 hours after birth using a quality-assured method validated for neonatal use (ward-based glucose electrode or laboratory analysis)
- if he or she has signs of hypoglycaemia.

Give:

- intravenous dextrose as soon as possible if the baby has clinical signs of hypoglycaemia
- tube feeding or intravenous dextrose if the baby has blood glucose levels below 2 mmol/litre on two consecutive readings despite maximal feeding support, has abnormal clinical signs or will not feed orally effectively.

Postnatal care

See also the NICE clinical guideline on postnatal care (www.nice.org.uk/CG037).

Information and advice

Advise:

- women with diabetes who are breastfeeding to continue to avoid drugs for complications that were discontinued for safety reasons
- on the importance of contraception and pre-conception care when planning future pregnancies.

Advise women with insulin-treated pre-existing diabetes:

- to reduce insulin immediately after birth and self-monitor blood glucose to establish correct dose
- about the risk of hypoglycaemia, especially while breastfeeding
- to have food available before or during breastfeeding.

Advise women with type 2 diabetes:

- that they can resume or continue taking metformin* and glibenclamide* while breastfeeding
- not to take any other oral hypoglycaemic agents while breastfeeding.

Advise women with gestational diabetes:

- to stop taking hypoglycaemic medication immediately after birth
- on weight control, diet and exercise
- on the symptoms of hyperglycaemia
- on the risks of gestational diabetes in subsequent pregnancies and screening for diabetes when planning pregnancy.

Transfer and follow-up

Offer women with gestational diabetes:

- a blood glucose test before transfer into community care
- a fasting plasma glucose test at the 6-week postnatal appointment, then annually.

Refer women with pre-existing diabetes:

- back to routine diabetes care.

Offer ophthalmological follow-up:

- for women who have preproliferative diabetic retinopathy diagnosed in pregnancy, for at least 6 months after the birth.

* Drug names are marked with an asterisk if they do not have UK marketing authorisation specifically for pregnant and breastfeeding women at the time of publication (March 2008). Informed consent should be obtained and documented.

Implementation tools

NICE has developed tools to help organisations implement this guidance (listed below). These are available on our website (www.nice.org.uk/CG063).

- Slides highlighting key messages for local discussion.
- Implementation advice on how to put the guidance into practice and national initiatives that support this locally.
- Costing tools:
 - costing report to estimate the national savings and costs associated with implementation
 - costing template to estimate the local costs and savings involved.
- Audit support for monitoring local practice.

Further information

Ordering information

You can download the following documents from www.nice.org.uk/CG063

- A quick reference guide (this document) – a summary of the recommendations for healthcare professionals.
- The NICE guideline – all the recommendations.
- ‘Understanding NICE guidance’ – information for patients and carers.
- The full guideline – all the recommendations, details of how they were developed, and reviews of the evidence they were based on.

For printed copies of the quick reference guide or ‘Understanding NICE guidance’, phone NICE publications on 0845 003 7783 or email publications@nice.org.uk and quote:

- N1484 (quick reference guide)
- N1485 (‘Understanding NICE guidance’).

Related NICE guidance

For information about NICE guidance that has been issued or is in development, see the website (www.nice.org.uk).

Published

- Antenatal care. NICE clinical guideline 62 (2008). Available from www.nice.org.uk/CG062
- Intrapartum care. NICE clinical guideline 55 (2007). Available from www.nice.org.uk/CG055
- Postnatal care. NICE clinical guideline 37 (2006). Available from www.nice.org.uk/CG037
- Type 1 diabetes. NICE clinical guideline 15 (2004). Available from www.nice.org.uk/CG015

- Caesarean section. NICE clinical guideline 13 (2004). Available from www.nice.org.uk/CG013
- Diabetes (types 1 and 2) – patient education models. NICE technology appraisal guidance 60 (2003). Available from www.nice.org.uk/TA060
- Diabetes (type 1) – insulin pump therapy. NICE technology appraisal guidance 57 (2003). Available from www.nice.org.uk/TA057
- Diabetes (types 1 and 2) – long-acting insulin analogues. NICE technology appraisal guidance 53 (2002). Available from www.nice.org.uk/TA053
- Improving the nutrition of pregnant and breastfeeding mothers and children in low-income households. NICE public health programme guidance 11 (2008). Available from www.nice.org.uk/PH011

Under development

- Type 2 diabetes. Update of NICE inherited clinical guidelines E, F, G, H and NICE technology appraisals 53, 60, 63 (publication expected April 2008).
- Induction of labour. Update of NICE inherited clinical guideline D (publication expected June 2008).
- Diabetes (type 2): newer agents for blood glucose control. NICE clinical guideline (publication expected February 2009).

Updating the guideline

This guideline will be updated as needed, and information about the progress of any update will be posted on the NICE website (www.nice.org.uk/CG063).

About this booklet

This is a quick reference guide that summarises the recommendations NICE has made to the NHS in 'Diabetes in pregnancy' (NICE clinical guideline 63).

Who should read this booklet?

This quick reference guide is for GPs, nurses and midwives, obstetricians, diabetes physicians, paediatricians and other staff who care for women with diabetes before, during and after pregnancy, and their babies.

Who wrote the guideline?

The guideline was developed by the National Collaborating Centre for Women's and Children's Health, which is linked with the Royal College of Obstetricians and Gynaecologists. The Collaborating Centre worked with a group of healthcare professionals (including consultants, GPs and nurses), patients and carers, and technical staff, who reviewed the evidence and drafted the recommendations. The recommendations were finalised after public consultation.

For more information on how NICE clinical guidelines are developed, go to www.nice.org.uk

Where can I get more information about the guideline?

The NICE website has the recommendations in full, reviews of the evidence they are based on, a summary of the guideline for patients and carers, and tools to support implementation (see pages 17 and 18 for more details).

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