NICE National Institute for Health and Care Excellence

NICE guideline

Type 2 diabetes in adults: management

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.

All problems (adverse events) related to a medicine or medical device used for treatment or in a procedure should be reported to the Medicines and Healthcare products Regulatory Agency using the Yellow Card Scheme.

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 CG87, TA203, TA248, CG66, ESNM20, ESNM26 and ESNM59.

This guideline is partially replaced by NG136.

This guideline is the basis of QS209.

Overview

This guideline covers care and management for adults (aged 18 and over) with type 2 diabetes. It focuses on patient education, dietary advice, managing cardiovascular risk, managing blood glucose levels, and identifying and managing long-term complications.

In **June 2022**, we reviewed the evidence and made new recommendations on periodontitis.

Who is it for?

- Healthcare professionals, including those working in dental services
- Commissioners and providers
- Adults with type 2 diabetes, and their families and carers

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Recommendations

People have the right to be involved in discussions and make informed decisions about their care, as described in making decisions about 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 prescribing medicines (including off-label use), professional guidelines, standards and laws (including on consent and mental capacity), and safeguarding.

1.1 Individualised care

1.1.1 Adopt an individualised approach to diabetes care that is tailored to the needs and circumstances of adults with type 2 diabetes, taking into account their personal preferences, comorbidities and risks from polypharmacy, and their likelihood of benefiting from long-term interventions. Such an approach is especially important in the context of multimorbidity. **[2015, amended 2022]**

1.1.2 Reassess the person's needs and circumstances at each review and think about whether to stop any medicines that are not effective. **[2015]**

1.1.3 Take into account any disabilities, including visual impairment, when planning and delivering care for adults with type 2 diabetes. **[2015]**

1.2 Education

1.2.1 Offer structured education to adults with type 2 diabetes and their family members or carers (as appropriate) at the time of diagnosis, with annual reinforcement and review. Explain to people that structured education is an integral part of diabetes care. **[2009]**

1.2.2 Ensure that any structured education programme for adults with type 2 diabetes:

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- is evidence-based, and suits the needs of the person
- has specific aims and learning objectives, and supports the person and their family members and carers to develop attitudes, beliefs, knowledge and skills to self-manage diabetes
- has a structured curriculum that is theory driven, evidence-based and resource-effective, has supporting materials and is written down
- is delivered by trained educators who:
  - have an understanding of educational theory appropriate to the age and needs of the person
  - are trained and competent to deliver the principles and content of the programme
- is quality assured, and reviewed by trained, competent, independent assessors who measure it against criteria that ensure consistency
- has outcomes that are audited regularly. **[2015]**

1.2.3 Ensure that education programmes for adults with type 2 diabetes provide the necessary resources to support the educators, and that educators are properly trained and given time to develop and maintain their skills. **[2009]**

1.2.4 Offer adults with type 2 diabetes group education programmes as the preferred option. Provide an alternative of equal standard for people who are unable or prefer not to take part in group education. **[2009]**

1.2.5 Ensure that education programmes for adults with type 2 diabetes meet the cultural, linguistic, cognitive and literacy needs of people in the local area. **[2009]**

1.2.6 Ensure that all members of the diabetes healthcare team are familiar with the education programmes available locally for adults with type 2 diabetes, and that these programmes are integrated with the rest of the care pathway. **[2009]**

1.2.7 Ensure that adults with type 2 diabetes and their family members and

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carers (as appropriate) have the opportunity to contribute to the design and provision of local education programmes for adults with type 2 diabetes. **[2009]**

1.3 Dietary advice and bariatric surgery

1.3.1 Provide individualised and ongoing nutritional advice from a healthcare professional with specific expertise and competencies in nutrition. **[2009]**

1.3.2 Provide dietary advice in a form sensitive to the person's needs, culture and beliefs, being sensitive to their willingness to change and the effects on their quality of life. **[2009]**

1.3.3 Encourage adults with type 2 diabetes to follow the same healthy eating advice as the general population, which includes:

- eating high-fibre, low-glycaemic-index sources of carbohydrate, such as fruit, vegetables, wholegrains and pulses
- choosing low-fat dairy products
- eating oily fish
- controlling their intake of saturated and trans fatty acids. **[2009]**

1.3.4 Integrate dietary advice with a personalised diabetes management plan, including other aspects of lifestyle modification such as increasing physical activity and losing weight. **[2009]**

1.3.5 For adults with type 2 diabetes who are overweight, discuss and agree an initial body weight loss target of 5% to 10%. Remember that a small amount of weight loss may still be beneficial, and a larger amount will have advantageous metabolic impact in the long term. **[2009]**

1.3.6 Individualise recommendations for carbohydrate and alcohol intake, and meal patterns. Make reducing the risk of hypoglycaemia a particular aim for people using insulin or an insulin secretagogue. **[2009]**

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1.3.7 Advise adults with type 2 diabetes that they can substitute a limited amount of sucrose-containing foods for other carbohydrate in the meal plan but should take care to avoid excess energy intake. **[2009]**

1.3.8 Discourage adults with type 2 diabetes from using foods marketed specifically for people with diabetes. **[2009]**

1.3.9 When adults with type 2 diabetes are admitted as inpatients to hospital or any other care setting, implement a meal planning system that provides consistency in the carbohydrate content of meals and snacks. **[2009]**

1.3.10 For recommendations on lifestyle advice, see the NICE guidelines on preventing excess weight gain, weight management, obesity, physical activity and tobacco. **[2015]**

1.3.11 For recommendations on bariatric surgery for people with recent-onset type 2 diabetes, see the section on bariatric surgery for people with recent-onset type 2 diabetes in the NICE guideline on obesity. **[2015]**

1.4 Diagnosing and managing hypertension

The recommendations on diagnosing and managing hypertension have been removed. For recommendations on hypertension in people with type 2 diabetes, see the NICE guideline on hypertension in adults. Diagnosis, treatment and monitoring of hypertension is broadly the same for people with type 2 diabetes as for other people. When a different approach is needed for people with type 2 diabetes, this is specified in the hypertension guideline.

1.5 Antiplatelet therapy

1.5.1 Do not offer antiplatelet therapy (aspirin or clopidogrel) to adults with type 2 diabetes without cardiovascular disease. **[2015]**

1.5.2 For guidance on the primary and secondary prevention of cardiovascular disease in adults with type 2 diabetes, see the NICE guidelines on cardiovascular disease and acute coronary syndromes. **[2015]**

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1.6 Blood glucose management

HbA1c measurement and targets

Measurement

1.6.1 Measure HbA1c levels in adults with type 2 diabetes every:

- 3 to 6 months (tailored to individual needs) until HbA1c is stable on unchanging therapy
- 6 months once the HbA1c level and blood glucose lowering therapy are stable. **[2015]**

1.6.2 Measure HbA1c using methods calibrated according to International Federation of Clinical Chemistry (IFCC) standardisation. **[2015]**

1.6.3 If HbA1c monitoring is invalid because of disturbed erythrocyte turnover or abnormal haemoglobin type, estimate trends in blood glucose control using one of the following:

- quality-controlled plasma glucose profiles
- total glycated haemoglobin estimation (if abnormal haemoglobins)
- fructosamine estimation. **[2015]**

1.6.4 Investigate unexplained discrepancies between HbA1c and other glucose measurements. Seek advice from a team with specialist expertise in diabetes or clinical biochemistry. **[2015]**

Targets

NICE has produced a patient decision aid on agreeing HbA1c targets, which also covers factors to weigh up when discussing HbA1c targets with patients.

1.6.5 Discuss and agree an individual HbA1c target with adults with type 2 diabetes (see recommendations 1.6.6 to 1.6.10). Encourage them to reach their target and maintain it, unless any resulting adverse effects

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(including hypoglycaemia), or their efforts to achieve their target impair their quality of life. Think about using the NICE patient decision aid on weighing up HbA1c targets to support these discussions. **[2015, amended 2022]**

1.6.6 Offer lifestyle advice and drug treatment to support adults with type 2 diabetes to reach and maintain their HbA1c target (see the sections on dietary advice and bariatric surgery and choosing drug treatments). For more information about supporting adherence, see the NICE guideline on medicines adherence. **[2015]**

1.6.7 For adults whose type 2 diabetes is managed either by lifestyle and diet, or lifestyle and diet combined with a single drug not associated with hypoglycaemia, support them to aim for an HbA1c level of 48 mmol/mol (6.5%). For adults on a drug associated with hypoglycaemia, support them to aim for an HbA1c level of 53 mmol/mol (7.0%). **[2015]**

1.6.8 In adults with type 2 diabetes, if HbA1c levels are not adequately controlled by a single drug and rise to 58 mmol/mol (7.5%) or higher:

- reinforce advice about diet, lifestyle and adherence to drug treatment **and**
- support the person to aim for an HbA1c level of 53 mmol/mol (7.0%) **and**
- intensify drug treatment. **[2015]**

1.6.9 Consider relaxing the target HbA1c level (see recommendations 1.6.7 and 1.6.8 and NICE's patient decision aid) on a case-by-case basis and in discussion with adults with type 2 diabetes, with particular consideration for people who are older or frailer, if:

- they are unlikely to achieve longer-term risk-reduction benefits, for example, people with a reduced life expectancy
- tight blood glucose control would put them at high risk if they developed hypoglycaemia, for example, if they are at risk of falling, they have impaired awareness of hypoglycaemia, or they drive or operate machinery as part of their job

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- intensive management would not be appropriate, for example if they have significant comorbidities. **[2015, amended 2022]**

1.6.10 If adults with type 2 diabetes reach an HbA1c level that is lower than their target and they are not experiencing hypoglycaemia, encourage them to maintain it. Be aware that there are other possible reasons for a low HbA1c level, for example deteriorating renal function or sudden weight loss. **[2015]**

1.6.11 For guidance on HbA1c targets for women with type 2 diabetes who are pregnant or planning to become pregnant, see the NICE guideline on diabetes in pregnancy. **[2015]**

Self-monitoring of capillary blood glucose

These recommendations relate to self-monitoring by capillary blood glucose monitoring.

1.6.12 Take the Driver and Vehicle Licensing Agency (DVLA)'s Assessing fitness to drive: a guide for medical professionals into account when offering self-monitoring of capillary blood glucose levels for adults with type 2 diabetes. **[2015, amended 2022]**

1.6.13 Do not routinely offer self-monitoring of capillary blood glucose levels for adults with type 2 diabetes unless:

- the person is on insulin **or**
- there is evidence of hypoglycaemic episodes **or**
- the person is on oral medication that may increase their risk of hypoglycaemia while driving or operating machinery **or**
- the person is pregnant or is planning to become pregnant (see the NICE guideline on diabetes in pregnancy). **[2015, amended 2022]**

1.6.14 Consider short-term self-monitoring of capillary blood glucose levels in adults with type 2 diabetes, reviewing treatment as necessary:

- when starting treatment with oral or intravenous corticosteroids **or**

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- to confirm suspected hypoglycaemia. **[2015, amended 2022]**

1.6.15 Be aware that adults with type 2 diabetes who have acute intercurrent illness are at risk of worsening hyperglycaemia. Review treatment as necessary. **[2015]**

1.6.16 If adults with type 2 diabetes are self-monitoring their capillary blood glucose levels, carry out a structured assessment at least annually. The assessment should include:

- the person's self-monitoring skills
- the quality and frequency of testing
- checking that the person knows how to interpret the blood glucose results and what action to take
- the impact on the person's quality of life
- the continued benefit to the person
- the equipment used. **[2015, amended 2022]**

Continuous glucose monitoring

1.6.17 Offer intermittently scanned continuous glucose monitoring (isCGM, commonly referred to as 'flash') to adults with type 2 diabetes on multiple daily insulin injections if any of the following apply:

- they have recurrent hypoglycaemia or severe hypoglycaemia
- they have impaired hypoglycaemia awareness
- they have a condition or disability (including a learning disability or cognitive impairment) that means they cannot self-monitor their blood glucose by capillary blood glucose monitoring but could use an isCGM device (or have it scanned for them)

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- they would otherwise be advised to self-measure at least 8 times a day.

  For guidance on continuous glucose monitoring (CGM) for pregnant women, see the NICE guideline on diabetes in pregnancy. **[2022]**

1.6.18 Offer isCGM to adults with insulin-treated type 2 diabetes who would otherwise need help from a care worker or healthcare professional to monitor their blood glucose. **[2022]**

1.6.19 Consider real-time continuous glucose monitoring (rtCGM) as an alternative to isCGM for adults with insulin-treated type 2 diabetes if it is available for the same or lower cost. **[2022]**

1.6.20 CGM should be provided by a team with expertise in its use, as part of supporting people to self-manage their diabetes. **[2022]**

1.6.21 Advise adults with type 2 diabetes who are using CGM that they will still need to take capillary blood glucose measurements (although they can do this less often). Explain that is because:

- they will need to use capillary blood glucose measurements to check the accuracy of their CGM device
- they will need capillary blood glucose monitoring as a back-up (for example when their blood glucose levels are changing quickly or if the device stops working).

  Provide them with enough test strips to take capillary blood glucose measurements as needed. **[2022]**

1.6.22 If a person is offered rtCGM or isCGM but cannot or does not want to use any of these devices, offer capillary blood glucose monitoring. **[2022]**

1.6.23 Ensure CGM is part of the education provided to adults with type 2 diabetes who are using it (see the section on education). **[2022]**

1.6.24 Monitor and review the person's use of CGM as part of reviewing their diabetes care plan (see the section on individualised care). **[2022]**

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1.6.25 If there are concerns about the way a person is using the CGM device:

- ask if they are having problems using their device
- look at ways to address any problems and concerns to improve their use of the device, including further education and emotional and psychological support. **[2022]**

1.6.26 Commissioners, providers and healthcare professionals should address inequalities in CGM access and uptake by:

- monitoring who is using CGM
- identifying groups who are eligible but who have a lower uptake
- making plans to engage with these groups to encourage them to consider CGM. **[2022]**

For a short explanation of why the committee made these recommendations see the rationale and impact section on continuous glucose monitoring.

Full details of the evidence and the committee's discussion are in evidence review C: continuous glucose monitoring in adults with type 2 diabetes.

1.7 Drug treatment

Recommendations in this section that cover dipeptidyl peptidase-4 (DPP-4) inhibitors, glucagon-like peptide-1 (GLP-1) mimetics, sulfonylureas and sodium–glucose cotransporter-2 (SGLT2) inhibitors refer to each of these groups of drugs at class level unless otherwise stated.

NICE technology appraisals for SGLT2 inhibitors recommend the use of these medicines only in specific populations and in certain circumstances. The 2022 update of this guideline looked at the clinical- and cost-effectiveness evidence for SGLT2 inhibitors in people with cardiovascular disease or at high risk of developing cardiovascular disease. The guideline recommends SGLT2 inhibitors in a wider population than the technology appraisals that were published before February 2022.

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Choosing drug treatments

We have produced a visual summary to provide an overview of the recommendations and additional information to support medicines choice.

1.7.1 Discuss with adults with type 2 diabetes the benefits and risks of drug treatment and the options available. Base the choice of drug treatments on:

- the person's individual clinical circumstances, for example comorbidities, contraindications, weight, and risks from polypharmacy
- the person's individual preferences and needs
- the effectiveness of the drug treatments in terms of metabolic response and cardiovascular and renal protection
- safety and tolerability of the drug treatment
- monitoring requirements
- the licensed indications or combinations available
- cost (if 2 drugs in the same class are appropriate, choose the option with the lowest acquisition cost). **[2015, amended 2022]**

  See the NICE guideline on shared decision making and the section on safety of medicines for diabetes before and during pregnancy in the NICE guideline on diabetes in pregnancy.

Rescue therapy at any phase of treatment

1.7.2 If an adult with type 2 diabetes is symptomatically hyperglycaemic, consider insulin (see the section on insulin-based treatments) or a sulfonylurea, and review treatment when blood glucose control has been achieved. **[2015]**

First-line drug treatment

Also see the visual summary on first-line drug treatment for an overview of the

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recommendations and additional information to support medicines choice.

For adults with type 2 diabetes and chronic kidney disease, follow recommendations on SGLT2 inhibitors in the section on chronic kidney disease in this guideline.

1.7.3 Offer standard-release metformin as first-line drug treatment to adults with type 2 diabetes. **[2015]**

1.7.4 Assess the person's cardiovascular status and risk to determine whether they have chronic heart failure or established atherosclerotic cardiovascular disease or are at high risk of developing cardiovascular disease.

See the recommendations on using risk scores and QRISK2 to assess cardiovascular disease risk in adults with type 2 diabetes in NICE's guideline on cardiovascular disease: risk assessment and reduction, including lipid modification. **[2022]**

1.7.5 Based on the cardiovascular risk assessment for the person with type 2 diabetes:

- If they have chronic heart failure or established atherosclerotic cardiovascular disease, offer an SGLT2 inhibitor with proven cardiovascular benefit in addition to metformin.
- If they are at high risk of developing cardiovascular disease, consider an SGLT2 inhibitor with proven cardiovascular benefit in addition to metformin. **[2022]**

See the rationale and impact section on first-line drug treatment for an explanation of 'proven cardiovascular benefit'

1.7.6 When starting an adult with type 2 diabetes on dual therapy with metformin and an SGLT2 inhibitor as first-line therapy, introduce the drugs sequentially, starting with metformin and checking tolerability. Start the SGLT2 inhibitor as soon as metformin tolerability is confirmed. **[2022]**

1.7.7 Gradually increase the dose of standard-release metformin over several

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weeks to minimise the risk of gastrointestinal side effects in adults with type 2 diabetes. **[2015]**

1.7.8 If an adult with type 2 diabetes experiences gastrointestinal side effects with standard-release metformin, consider a trial of modified-release metformin. **[2015]**

1.7.9 For first-line drug treatment in adults with type 2 diabetes, if metformin is contraindicated or not tolerated:

- If they have chronic heart failure or established atherosclerotic cardiovascular disease, offer an SGLT2 inhibitor with proven cardiovascular benefit.
- If they are at high risk of developing cardiovascular disease, consider an SGLT2 inhibitor with proven cardiovascular benefit. **[2022]**

1.7.10 For first-line drug treatment in adults with type 2 diabetes, if metformin is contraindicated or not tolerated and if they are not in either of the groups in recommendation 1.7.9, consider:

- a DPP-4 inhibitor **or**
- pioglitazone **or**
- a sulfonylurea **or**
- an SGLT2 inhibitor for people who meet the criteria in NICE's technology appraisal guidance on canagliflozin, dapagliflozin and empagliflozin as monotherapies or ertugliflozin as monotherapy or with metformin for treating type 2 diabetes. **[2015, amended 2022]**

1.7.11 Before starting an SGLT2 inhibitor, check whether the person may be at increased risk of diabetic ketoacidosis (DKA), for example if:

- they have had a previous episode of DKA
- they are unwell with intercurrent illness
- they are following a very low carbohydrate or ketogenic diet. **[2022]**

1.7.12 Address modifiable risks for DKA before starting an SGLT2 inhibitor. For

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example, for people who are following a very low carbohydrate or ketogenic diet, they may need to delay treatment until they have changed their diet. **[2022]**

1.7.13 Advise adults with type 2 diabetes who are taking an SGLT2 inhibitor about the need to minimise their risk of DKA by not starting a very low carbohydrate or ketogenic diet without discussing it with their healthcare professional, because they may need to suspend SGLT2 inhibitor treatment. **[2022]**

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on first-line drug treatment.

Full details of the evidence and the committee's decision are in evidence review B: pharmacological therapies with cardiovascular and other benefits in people with type 2 diabetes.

Reviewing drug treatments

1.7.14 When reviewing or considering changing treatments for adults with type 2 diabetes, think about and discuss the following with the person:

- how to optimise their current treatment regimen before thinking about changing treatments, taking into account factors such as:
  - adverse effects
  - adherence to existing medicines
  - the need to revisit advice about diet and lifestyle
  - prescribed doses and formulations
- stopping medicines that have had no impact on glycaemic control or weight, unless there is an additional clinical benefit, such as cardiovascular or renal protection, from continued treatment (see the note below on off-label use)
- whether switching rather than adding drugs could be effective

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- the considerations about treatment choice in recommendation 1.7.1. **[2022]**

  In February 2022, using ertugliflozin to reduce cardiovascular risk when blood glucose is well controlled was off-label. See NICE's information on prescribing medicines.

  Also see the recommendations on medication review in the NICE guideline on medicines optimisation and on reviewing medicines and supporting adherence in the NICE guideline on medicines adherence.

1.7.15 For adults with type 2 diabetes who start taking an SGLT2 inhibitor before they are 40 because they have an elevated lifetime risk of cardiovascular disease, do not stop the SGLT2 inhibitor when they turn 40 even if their QRISK2 score is below 10%. Only stop the SGLT2 inhibitor if the person's circumstances have changed and the SGLT2 inhibitor is no longer appropriate. **[2022]**

Adding an SGLT2 inhibitor at any stage after first-line treatment has been started

1.7.16 For adults with type 2 diabetes at any stage after they have started first-line treatment:

- If they have or develop chronic heart failure or established atherosclerotic cardiovascular disease, offer an SGLT2 inhibitor with proven cardiovascular benefit in addition to current treatment or replace an existing drug with the SGLT2 inhibitor.

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- If they are or become at high risk of developing cardiovascular disease, consider adding an SGLT2 inhibitor with proven cardiovascular benefit to current treatment or replacing an existing drug with the SGLT2 inhibitor.

  Take into account the person's current treatment regimen and preferences and make a shared decision about switching treatments or adding an SGLT2 inhibitor, as appropriate (also see recommendations 1.7.12 and 1.7.13 on starting an SGLT2 inhibitor). **[2022]**

  In February 2022, using ertugliflozin to reduce cardiovascular risk when blood glucose is well controlled was off-label. See NICE's information on prescribing medicines.

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on reviewing drug treatments.

Full details of the evidence and the committee's discussion are in evidence review B: pharmacological therapies with cardiovascular and other benefits in people with type 2 diabetes.

Treatment options if further interventions are needed

Also see our visual summary on treatment options if further interventions are needed for an overview of the recommendations and additional information to support medicines choice.

1.7.17 Introduce drugs used in combination therapy in a stepwise manner, checking for tolerability and effectiveness of each drug. **[2015]**

1.7.18 For adults with type 2 diabetes, if monotherapy has not continued to control HbA1c to below the person's individually agreed threshold for further intervention, consider adding:

- a DPP-4 inhibitor **or**
- pioglitazone **or**

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- a sulfonylurea **or**
- an SGLT2 inhibitor for people who meet the criteria in NICE's technology appraisal guidance on canagliflozin in combination therapy, ertugliflozin as monotherapy or with metformin, or dapagliflozin or empagliflozin in combination therapy. **[2015, amended 2022]**

1.7.19 For adults with type 2 diabetes, if dual therapy with metformin and another oral drug has not continued to control HbA1c to below the person's individually agreed threshold for further intervention consider either:

- triple therapy by adding a DPP-4 inhibitor, pioglitazone or a sulfonylurea or an SGLT2 inhibitor for people who meet the criteria in NICE's technology appraisal guidance on canagliflozin in combination therapy, dapagliflozin in triple therapy, empagliflozin in combination therapy, or ertugliflozin with metformin and a dipeptidyl peptidase-4 inhibitor **or**
- starting insulin-based treatment (see the section on insulin-based treatments). **[2015, amended 2022]**

1.7.20 In adults with type 2 diabetes, if metformin is contraindicated or not tolerated and dual therapy with 2 oral drugs has not continued to control HbA1c to below the person's individually agreed threshold for intervention, consider insulin-based treatment (see the section on insulin-based treatments). **[2015, amended 2022]**

1.7.21 If triple therapy with metformin and 2 other oral drugs is not effective, not tolerated or contraindicated, consider triple therapy by switching one drug for a GLP-1 mimetic for adults with type 2 diabetes who:

- have a body mass index (BMI) of 35 kg/m^2 or higher (adjust accordingly for people from Black, Asian and other minority ethnic groups) **and** specific psychological or other medical problems associated with obesity **or**

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- have a BMI lower than 35 kg/m^2 **and:**
  - for whom insulin therapy would have significant occupational implications **or**
  - weight loss would benefit other significant obesity-related comorbidities. **[2015, amended 2022]**

1.7.22 Only continue GLP-1 mimetic therapy if the adult with type 2 diabetes has had a beneficial metabolic response (a reduction of at least 11 mmol/mol [1.0%] in HbA1c and weight loss of at least 3% of initial body weight in 6 months). **[2015]**

1.7.23 For adults with type 2 diabetes, only offer combination therapy with a GLP-1 mimetic and insulin along with specialist care advice and ongoing support from a consultant-led multidisciplinary team. **[2015]**

For a short explanation of why the committee did not make any new 2022 recommendations, see the rationale and impact section on treatment options if further interventions are needed.

Full details of the evidence and the committee's discussion are in evidence review B: pharmacological therapies with cardiovascular and other benefits in people with type 2 diabetes.

Insulin-based treatments

1.7.24 For adults with type 2 diabetes starting insulin therapy, provide a structured programme using active insulin dose titration that encompasses:

- injection technique, including rotating injection sites and avoiding repeated injections at the same point within sites
- continuing telephone support
- self-monitoring
- dose titration to target levels

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- dietary advice
- the DVLA's Assessing fitness to drive: a guide for medical professionals
- managing hypoglycaemia
- managing acute changes in plasma glucose control
- support from an appropriately trained and experienced healthcare professional. **[2015]**

1.7.25 For adults with type 2 diabetes starting insulin therapy, continue to offer metformin for people without contraindications or intolerance. Review the continued need for other blood glucose lowering therapies. **[2015]**

1.7.26 Start insulin therapy for adults with type 2 diabetes from a choice of the following insulin types and regimens:

- Offer neutral protamine Hagedorn (NPH) insulin injected once or twice daily according to need.
- Consider starting both NPH and short-acting insulin (particularly if the person's HbA1c is 75 mmol/mol [9.0%] or higher), administered either:
  - separately **or**
  - as a pre-mixed (biphasic) human insulin preparation.
- Consider, as an alternative to NPH insulin, using insulin detemir or insulin glargine if:
  - the person needs help from a carer or healthcare professional to inject insulin, and use of insulin detemir or insulin glargine would reduce the frequency of injections from twice to once daily **or**
  - the person's lifestyle is restricted by recurrent symptomatic hypoglycaemic episodes **or**
  - the person would otherwise need twice-daily NPH insulin injections in combination with oral glucose-lowering drugs.

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- Consider pre-mixed (biphasic) preparations that include short-acting insulin analogues, rather than pre-mixed (biphasic) preparations that include short-acting human insulin preparations, if:
  - the person prefers injecting insulin immediately before a meal **or**
  - hypoglycaemia is a problem **or**
  - blood glucose levels rise markedly after meals. **[2015]**

1.7.27 Consider switching to insulin detemir or insulin glargine from NPH insulin in adults with type 2 diabetes:

- who do not reach their target HbA1c because of significant hypoglycaemia **or**
- who experience significant hypoglycaemia on NPH insulin irrespective of the level of HbA1c reached **or**
- who cannot use the device needed to inject NPH insulin but could administer their own insulin safely and accurately if a switch to one of the long-acting insulin analogues was made **or**
- who need help from a carer or healthcare professional to administer insulin injections and for whom switching to one of the long-acting insulin analogues would reduce the number of daily injections. **[2015]**

1.7.28 Monitor adults with type 2 diabetes who are on a basal insulin regimen (NPH insulin, insulin detemir or insulin glargine) for the need for short-acting insulin before meals (or a pre-mixed [biphasic] insulin preparation). **[2015]**

1.7.29 Monitor adults with type 2 diabetes who are on pre-mixed (biphasic) insulin for the need for a further injection of short-acting insulin before meals or for a change to a basal-bolus regimen with NPH insulin or insulin detemir or insulin glargine, if blood glucose control remains inadequate. **[2015]**

1.7.30 When starting an insulin for which a biosimilar is available, use the product with the lowest acquisition cost. **[2021]**

1.7.31 Ensure the risk of medication errors with insulins is minimised by

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following the Medicines and Healthcare products Regulatory Agency (MHRA) guidance on minimising the risk of medication error with high strength, fixed combination and biosimilar insulin products, which includes advice for healthcare professionals when starting treatment with a biosimilar. **[2021]**

1.7.32 When people are already using an insulin for which a lower cost biosimilar is available, discuss the possibility of switching to the biosimilar. Make a shared decision with the person after discussing their preferences. **[2021]**

For a short explanation of why the committee made the 2021 recommendations on biosimilars and how they might affect practice, see the rationale and impact section on long-acting insulin.

For guidance on using insulin in combination with SGLT2 inhibitors, see:

- the section on drug treatment
- NICE's technology appraisal guidance on canagliflozin, dapagliflozin, and empagliflozin in combination therapy.

Insulin delivery

1.7.33 For guidance on insulin delivery for adults with type 2 diabetes, see the section on insulin delivery in the NICE guideline on type 1 diabetes. **[2015]**

1.8 Managing complications

Periodontitis

1.8.1 Advise adults with type 2 diabetes at their annual review that:

- they are at higher risk of periodontitis

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- if they get periodontitis, managing it can improve their blood glucose control and can reduce their risk of hyperglycaemia. **[2022]**

1.8.2 Advise adults with type 2 diabetes to have regular oral health reviews (their oral healthcare or dental team will tell them how often, in line with the NICE guideline on dental checks: intervals between oral health reviews). **[2022]**

1.8.3 For guidance for oral healthcare and dental teams on how to provide oral health advice, see the NICE guideline on oral health promotion. **[2022]**

1.8.4 For adults with type 2 diabetes who have been diagnosed with periodontitis by an oral healthcare or dental team, offer dental appointments to manage and treat their periodontitis (at a frequency based on their oral health needs). **[2022]**

For a short explanation of why the committee made these recommendations, see the rationale and impact section on periodontitis.

Full details of the evidence and the committee's discussion are in evidence review D: periodontitis.

Gastroparesis

1.8.5 Think about a diagnosis of gastroparesis in adults with type 2 diabetes who have erratic blood glucose control or unexplained gastric bloating or vomiting, taking into account possible alternative diagnoses. **[2009, amended 2015]**

1.8.6 For adults with type 2 diabetes who have vomiting caused by gastroparesis, explain that:

- there is no strong evidence that any available antiemetic therapy is effective
- some people have had benefit with domperidone, erythromycin or metoclopramide

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- the strongest evidence for effectiveness is for domperidone, but prescribers must take into account its safety profile, in particular its cardiac risk and potential interactions with other medicines. **[2015]**

  In December 2015, the use of erythromycin was off-label. See NICE's information on prescribing medicines.

1.8.7 To treat vomiting caused by gastroparesis in adults with type 2 diabetes:

- consider alternating the use of erythromycin and metoclopramide
- consider domperidone only in exceptional circumstances (if domperidone is the only effective treatment) and in accordance with MHRA guidance on domperidone. **[2015]**

  In December 2015, the use of erythromycin was off-label. See NICE's information on prescribing medicines.

1.8.8 If gastroparesis is suspected, consider referring adults with type 2 diabetes to specialist services if:

- the differential diagnosis is in doubt **or**
- the person has persistent or severe vomiting. **[2009]**

Painful diabetic neuropathy

1.8.9 For guidance on managing painful diabetic peripheral neuropathy in adults with type 2 diabetes, see the NICE guideline on neuropathic pain in adults. **[2015]**

Autonomic neuropathy

1.8.10 Think about the possibility of contributory sympathetic nervous system damage in adults with type 2 diabetes who lose the warning signs of hypoglycaemia. **[2009, amended 2015]**

1.8.11 Think about the possibility of autonomic neuropathy affecting the gut in adults with type 2 diabetes who have unexplained diarrhoea that

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happens particularly at night. **[2009, amended 2015]**

1.8.12 For adults with type 2 diabetes and autonomic neuropathy who are taking tricyclic drugs and antihypertensive drug treatments, be aware of the increased likelihood of side effects such as orthostatic hypotension. For guidance on safe prescribing of antidepressants (such as tricyclic drugs) and managing withdrawal, see NICE's guideline on medicines associated with dependence or withdrawal symptoms. **[2009]**

1.8.13 For adults with type 2 diabetes who have unexplained bladder-emptying problems, investigate the possibility of autonomic neuropathy affecting the bladder. **[2009]**

1.8.14 In managing autonomic neuropathy symptoms, include specific interventions indicated by the manifestations (for example, for abnormal sweating or nocturnal diarrhoea). **[2009]**

Diabetic foot problems

1.8.15 For guidance on preventing and managing foot problems in adults with type 2 diabetes, see the NICE guideline on diabetic foot problems. **[2015]**

Chronic kidney disease

1.8.16 For adults with chronic kidney disease (CKD) and type 2 diabetes, offer an angiotensin receptor blocker (ARB) or an angiotensin-converting enzyme (ACE) inhibitor (titrated to the highest licensed dose that the person can tolerate) if albumin-to-creatinine ratio (ACR) is 3 mg/mmol or more, as recommended in the section on pharmacotherapy for CKD in adults, children, and young people with related persistent proteinuria in the NICE guideline on chronic kidney disease. **[2021]**

1.8.17 For adults with type 2 diabetes and CKD who are taking an ARB or an ACE inhibitor (titrated to the highest licensed dose that they can tolerate), offer an SGLT2 inhibitor (in addition to the ARB or ACE inhibitor) if:

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- ACR is over 30 mg/mmol **and**
- they meet the criteria in the marketing authorisation (including relevant estimated glomerular filtration rate [eGFR] thresholds).

  In November 2021, not all SGLT2 inhibitors were licensed for this indication. See NICE's information on prescribing medicines. **[2021]**

1.8.18 For adults with type 2 diabetes and CKD who are taking an ARB or an ACE inhibitor (titrated to the highest licensed dose that they can tolerate), consider an SGLT2 inhibitor (in addition to the ARB or ACE inhibitor) if:

- ACR is between 3 and 30 mg/mmol **and**
- they meet the criteria in the marketing authorisation (including relevant eGFR thresholds).

  In November 2021, not all SGLT2 inhibitors were licensed for this indication. See NICE's information on prescribing medicines. **[2021]**

1.8.19 For guidance on dapagliflozin for adults with CKD, see NICE's technology appraisal guidance on dapagliflozin for treating chronic kidney disease. **[2022]**

1.8.20 For further guidance on managing kidney disease in adults with type 2 diabetes, see the NICE guideline on chronic kidney disease. **[2015]**

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on SGLT2 inhibitors for adults with type 2 diabetes and chronic kidney disease.

Full details of the evidence and the committee's discussion are in evidence review A: SGLT2 inhibitors for people with chronic kidney disease and type 2 diabetes.

Erectile dysfunction

1.8.21 Offer men with type 2 diabetes the opportunity to discuss erectile

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dysfunction as part of their annual review. **[2015]**

1.8.22 Assess, educate and support men with type 2 diabetes who have problematic erectile dysfunction, addressing contributory factors such as cardiovascular disease as well as possible treatment options. **[2015]**

1.8.23 Consider a phosphodiesterase-5 inhibitor to treat problematic erectile dysfunction in men with type 2 diabetes. Initially choose the drug with the lowest acquisition cost and take into account any contraindications. **[2015]**

1.8.24 After discussion, refer men with type 2 diabetes to a service offering other medical, surgical or psychological management of erectile dysfunction if treatment (including a phosphodiesterase-5 inhibitor, as appropriate) has been unsuccessful. **[2015]**

Eye disease

1.8.25 When adults are diagnosed with type 2 diabetes, refer them immediately to the local eye screening service. **[2009, amended 2020]**

1.8.26 Encourage adults to attend eye screening, and explain that it will help them to keep their eyes healthy and help to prevent problems with their vision. Explain that the screening service is effective at identifying problems so that they can be treated early. **[2009]**

1.8.27 Arrange emergency review by an ophthalmologist for:

- sudden loss of vision
- rubeosis iridis
- pre-retinal or vitreous haemorrhage
- retinal detachment. **[2009]**

1.8.28 Refer to an ophthalmologist in accordance with the UK National Screening Committee criteria and timelines for any large sudden unexplained drop in visual acuity. **[2009, amended 2020]**

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Terms used in this guideline

This section defines terms that have been used in a particular way for this guideline. For other definitions, see the NICE glossary and the Think Local, Act Personal Care and Support Jargon Buster.

Atherosclerotic cardiovascular disease

This includes coronary heart disease, acute coronary syndrome, previous myocardial infarction, stable angina, previous coronary or other revascularisation, cerebrovascular disease (ischaemic stroke and transient ischaemic attack) and peripheral arterial disease.

Consultant-led multidisciplinary team

A consultant-led multidisciplinary team may include a wide range of staff based in primary, secondary and community care.

Continuous glucose monitoring

This covers both real-time continuous glucose monitoring (rtCGM) and intermittently scanned continuous glucose monitoring (isCGM, commonly referred to as 'flash').

A continuous glucose monitor is a device that measures blood glucose levels and sends the readings to a display device or smartphone.

High risk of developing cardiovascular disease

Adults with type 2 diabetes who have:

- QRISK2 more than 10% in adults aged 40 and over **or**
- an elevated lifetime risk of cardiovascular disease (defined as the presence of 1 or more cardiovascular risk factors in someone under 40).

Cardiovascular disease risk factors: hypertension, dyslipidaemia, smoking, obesity, and family history (in a first-degree relative) of premature cardiovascular disease.

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Insulin glargine

The recommendations in this guideline also apply to any current or future biosimilar product of insulin glargine that has an appropriate marketing authorisation that allows the use of the biosimilar in the same indication.

Multiple daily injections

Two or more daily insulin injections, which could either be a basal-bolus regimen or more than one daily insulin injection.

Periodontitis

A chronic inflammatory gum disease that destroys the supporting tissues of the teeth (the periodontium).

Gingivitis is a milder form of periodontal disease than periodontitis. However, gingivitis still causes inflammation in the gum, and if not treated it can lead to periodontitis.

Severe hypoglycaemia

Episodes of hypoglycaemia that require assistance from another person to treat.

Recurrent hypoglycaemia

Frequent events of hypoglycaemia that occur each week or month and have an impact on quality of life.

Very low carbohydrate and ketogenic diets

A very low carbohydrate diet has 20 to 50 grams per day of carbohydrate or less than 10% of a 2000 kcal/day diet. A ketogenic diet is a very low carbohydrate, high fat diet that is designed to induce ketosis.

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Recommendations for research

The guideline committee has made the following recommendations for research.

Key recommendations for research

1 The effects of stopping or switching drug treatments to control blood glucose levels

In adults with type 2 diabetes, what are the effects of stopping and/or switching drug treatments to control blood glucose levels, and what criteria should inform the decision? **[2015]**

Why this is important

There is a lack of evidence on the effects of stopping and/or switching drug treatments to control blood glucose levels. The current practice of 'stopping rules' is typically motivated by either inadequate blood glucose control (rising HbA1c levels) or intolerable side effects. There is limited understanding of the short- and long-term effects of stopping a therapy and switching to another in terms of diabetes control (HbA1c levels), hypoglycaemic risk, weight gain, and cardiovascular morbidity and mortality. In addition, there is limited understanding of how quickly consideration should be given to stopping and switching to another drug treatment and, if stopping and switching may be needed, what the optimal sequencing is of drug treatments. Randomised controlled trials examining these different issues would help to improve diabetes care.

2 Non-metformin-based drug treatment combinations to control blood glucose levels

In adults with type 2 diabetes, what treatment combinations (for example, glucagon-like peptide-1 [GLP-1] mimetics and insulin combination therapy with meglitinides) are most effective when initial drug treatment with non-metformin monotherapy fails to adequately control blood glucose levels? **[2015]**

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Why this is important

Although it is recognised that metformin therapy is suitable for most adults with type 2 diabetes, its use is contraindicated or not tolerated in approximately 15% of individuals. To date, research evidence has largely focused on metformin-based treatment combinations. Given the progressive nature of the condition, in which intensification of blood glucose lowering drug therapies are indicated over time, there is little evidence, for some adults, to guide management strategies on treatment combinations that do not include metformin. Randomised controlled trials are therefore needed to better understand the treatment choices that are available which improve blood glucose control and long-term risks of complications associated with diabetes.

3 Drug treatment for when blood glucose levels are inadequately controlled by 3 oral antidiabetic drugs or insulin combinations

When blood glucose levels are inadequately controlled by 3 oral antidiabetic drugs and/or insulin combinations, which blood glucose lowering therapies should be used to control blood glucose levels? **[2015, amended 2021]**

Why this is important

As the incidence of type 2 diabetes increases in the younger population and as blood glucose control declines naturally over time, it is likely that further intensification of therapies would be needed. Currently, there is evidence up to second intensification of drug therapies, that is, when 2 or more non-insulin-based treatment combinations fail to adequately control blood glucose levels. Randomised controlled trials are needed to improve understanding of alternative treatment options for adults at second intensification whose blood glucose is inadequately controlled with insulin and/or triple non-insulin-based drug therapies.

4 Self-monitoring of blood glucose levels

What is the optimal frequency for self-monitoring of blood glucose in adults with type 2 diabetes? **[2015]**

Why this is important

There is limited evidence in relation to the long-term effects (at least 5 years) of blood

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glucose lowering therapies, particularly newer agents in terms of efficacy and adverse events (for example, cardiovascular outcomes). Randomised controlled trials and prospective longitudinal studies are needed to better understand the long-term efficacy and safety issues surrounding these medicines.

Other recommendations for research

1 Effectiveness of SGLT2 inhibitors for different ethnic groups

What is the clinical and cost effectiveness of SGLT2 inhibitors in adults with type 2 diabetes and chronic kidney disease, stratified across different ethnic groups? **[2021]**

For a short explanation of why the committee made the recommendation for research, see the rationale on SGLT2 inhibitors for adults with type 2 diabetes and chronic kidney disease.

Full details of the evidence and the committee's discussion are in evidence review A: SGLT2 inhibitors for people with chronic kidney disease and type 2 diabetes.

2 Effectiveness of SGLT2 inhibitors for adults with a urine albumin-to-creatinine ratio (ACR) below 3 mg/mmol

What is the clinical and cost effectiveness of SGLT2 inhibitors in adults with type 2 diabetes, chronic kidney disease and a urine ACR of less than 3 mg/mmol? **[2021]**

For a short explanation of why the committee made the recommendation for research, see the rationale on SGLT2 inhibitors for adults with type 2 diabetes and chronic kidney disease.

Full details of the evidence and the committee's discussion are in evidence review A: SGLT2 inhibitors for people with chronic kidney disease and type 2 diabetes.

3 Long-term outcomes associated with blood glucose lowering

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agents

In adults with type 2 diabetes, what are the long-term effects of blood glucose lowering therapies such as dipeptidyl peptidase-4 (DPP-4) inhibitors, sodium–glucose cotransporter-2 (SGLT2) inhibitors and meglitinides? **[2015]**

4 Using routinely collected real-world data to assess the effectiveness of continuous glucose monitoring

Based on routinely collected real-world data, what is the effectiveness and cost effectiveness of CGM devices to improve glycaemic control in adults with type 2 diabetes? **[2022]**

For a short explanation of why the committee made this recommendation and how it might affect practice, see the rationale section on continuous glucose monitoring.

Full details of the evidence and the committee's discussion are in evidence review C: continuous glucose monitoring in adults with type 2 diabetes.

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Rationale and impact

These sections briefly explain why the committee made the recommendations and how they might affect practice.

Continuous glucose monitoring

Recommendations 1.6.17 to 1.6.26

Why the committee made the recommendations

The committee discussed how continuous glucose monitoring (CGM) could potentially be useful for many people with type 2 diabetes. They were aware of examples from current practice in which adults who have insulin-treated type 2 diabetes and use intermittently scanned CGM (isCGM) have had good outcomes. Because of the additional cost associated with CGM and the large number of adults with type 2 diabetes, the committee used both the evidence and their clinical experience to decide who would gain the most benefit from using CGM.

There was evidence that intermittently scanned CGM (isCGM) was cost effective for adults with type 2 diabetes using insulin, but no evidence for populations not using insulin, so the committee agreed to restrict their recommendations to that subpopulation.

People who have recurrent or severe hypoglycaemic events were identified as one of the groups likely to benefit most from isCGM, because hypoglycaemic events were considered to be one of the most important and concerning outcomes for adults with type 2 diabetes who are using insulin. The committee decided that the number of hypoglycaemic events was a more effective indicator of someone who would benefit from isCGM than specific HbA1c target values, because target values can vary between people. The evidence also indicated minimal effects of isCGM on HbA1c values.

The committee agreed that people with impaired hypoglycaemic awareness would also benefit from isCGM. However, they did not recommend specific methods for assessing impaired hypoglycaemic awareness. This is because validated methods for assessing impaired hypoglycaemic awareness in people with type 2 diabetes (such as the GOLD or Clarke scores) are not always available in primary care.

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People who use insulin and have a condition or disability that restricts their ability to self-monitor blood glucose levels should also be offered isCGM. This is because having access to isGCM means they will no longer have to rely on others to monitor their diabetes, potentially increasing their independence. For people with learning disabilities, this recommendation is in line with similar guidance for type 1 diabetes set out in the NHS RightCare Pathway, which specifies reasonable adjustments for people with a learning disability who have diabetes.

People who are advised to self-measure using capillary blood glucose monitoring more than 8 times a day should also be offered isCGM. This is in line with the funding requirements for NHS England's flash glucose monitoring: national arrangements for funding of relevant diabetes patients. Although the funding requirements are specifically for people with type 1 diabetes, the committee thought that this criterion was also important for people with type 2 diabetes who have to monitor their blood glucose levels multiple times a day.

People who need help from a care worker or other healthcare professional to administer their insulin injections should also be offered isCGM, even if they only use once-daily insulin injections. isCGM will help care workers to record a person's blood glucose levels quickly. And for people who have multiple home care visits per day, blood glucose levels can be recorded at each visit. This will help them to adjust their insulin levels to reduce the risk of hypoglycaemic events between home visits. It may also reduce the number of hospital admissions for this group.

The committee discussed how short-term use of isCGM may still be useful for some people. It may help people to understand when they have hypoglycaemic episodes, which would help them to develop a more effective treatment plan.

There was no evidence that real-time CGM (rtCGM) was cost effective for people with type 2 diabetes, so the committee agreed it could not be recommended for all adults with type 2 diabetes (whether or not they used insulin). They noted, however, that prices of rtCGM have reduced over the past few years, and if this continues to happen there may come a time when it is no more expensive than isCGM. At this point, rtCGM would be an appropriate alternative for people who meet the criteria for isCGM.

The committee did not make a recommendation on using specific devices because CGM technologies are changing very quickly and this recommendation would soon be out of date. Local healthcare services are better placed to assess which devices are evidence-

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based and suitable for use at any given time.

The committee discussed how self-monitoring of blood glucose should still take place, albeit less frequently, even when a person is using CGM. The ability to self-monitor blood glucose levels allows people to ensure the accuracy of the CGM device. The committee also recommended keeping capillary blood glucose monitoring as a back-up for situations such as when the technology fails.

The committee decided to highlight that CGM should be provided by a team who have expertise in its use. To ensure that CGM is effective, healthcare professionals need to have the skills to interpret and communicate the data effectively. As well as healthcare professionals having a clear understanding of CGM, it is also crucial that people with type 2 diabetes who are using CGM have education about the technology. This will increase the likelihood that people will scan and report the results frequently, allowing people to understand and manage their diabetes effectively.

Although many people will choose CGM if offered, there are some people who either cannot be offered it or do not want to use it. Because it is still important for these people to monitor their blood glucose levels, the committee made a recommendation to reinforce the importance of offering capillary blood glucose monitoring instead.

The committee did not make a recommendation on how long CGM should be used because there was no evidence on this, and they did not want to stop people accessing CGM for short periods if they and their healthcare professional thought they could benefit from this. Using CGM for a short period of time may help some people to understand when they have hypoglycaemic episodes, thereby helping them to develop a more effective treatment plan.

Despite the positive recommendations on CGM, the committee were concerned that existing health inequalities may still lead to lower uptake of CGM in some groups of people. To address this, the committee made a recommendation outlining actions for commissioners, providers and healthcare professionals.

The committee highlighted the importance of routinely reviewing a person's use of CGM. This will establish whether it is providing clinical benefits and whether the monitor is being used correctly. Making people aware that their use of CGM will be continually reviewed is important so they know it is not a guaranteed long-term option.

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The committee also made a recommendation for research on using routinely collected real-world data to assess the effectiveness and cost effectiveness of CGM. They agreed that this has the potential to show the direct effects of the technology used by people with type 2 diabetes instead of interpreting it through the results of clinical trials. Increased monitoring of routine healthcare data including registries and audits would ensure that findings from a broader population are captured.

How the recommendations might affect practice

The recommendations are likely to increase the number of adults with type 2 diabetes who are offered CGM, particularly those who have issues with hypoglycaemia. This will have associated cost implications:

- It may save the NHS time, because healthcare professionals do not have to meet people who are using CGM as often as people who use capillary blood glucose monitoring.
- There should be fewer hypoglycaemic events to manage.

  The committee did not expect a significant resource impact related to education and monitoring for the CGM devices.

Return to recommendations

First-line drug treatment

Recommendations 1.7.3 to 1.7.13

Why the committee made the recommendations

Drug treatment for people without high cardiovascular risk

The evidence from the clinical trials looking at cardiovascular benefits, the network meta-analyses, and the economic modelling, showed that some treatments were effective at improving cardiovascular outcomes and were likely to be cost effective. All of these trials recruited people with established cardiovascular disease, and some also included people with a high risk of developing cardiovascular disease. However, for people without high cardiovascular risk, the committee agreed there was more uncertainty over whether the

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same level of cardiovascular benefits seen in the high-risk groups could be applied to a lower risk population. They decided that they could not justify changing the recommendations for people at lower risk based on this evidence. Therefore, they retained the 2015 recommendations outlining the drug treatment options for people in the lower risk group.

Assessing cardiovascular status

The committee agreed it was important to assess people's cardiovascular status and risk to help determine which treatments are suitable for them. They used a definition for the established cardiovascular disease group (adults with type 2 diabetes and chronic heart failure or established atherosclerotic cardiovascular disease) that reflected the people included in all the clinical trials and modelled as a subgroup in the economic model.

To assess whether people are at high risk of developing cardiovascular disease, the committee recommended using the QRISK2 tool because this is recommended in the NICE guideline on cardiovascular disease: risk assessment and reduction, including lipid modification for adults with type 2 diabetes, and the factors covered by this tool were similar to those used in the trials and economic model to define this population. In addition, this tool is widely used in current practice in the NHS.

Lifetime cardiovascular risk may be underestimated in people aged under 40 using this tool, so the committee also included risk factors to consider for this age group. This definition was broadly aligned to the subgroup of people with high cardiovascular risk without established cardiovascular disease who were included in the model.

Choosing an SGLT2 inhibitor with cardiovascular benefit

The evidence showed that SGLT2 inhibitors as a class of drugs were most likely to be cost effective in combination with metformin, although the incremental cost-effectiveness ratio (ICER) varied between different drugs in the class and in different scenarios in the model. The exception to this was dapagliflozin, which was cost effective at a threshold of £20,000 per quality-adjusted life year in the base-case analysis and across a range of model scenarios. However, the committee agreed there was too much uncertainty in the clinical data, and therefore the economic modelling, for them to be confident that these different ICERs represented true underlying differences in cost effectiveness.

There were also varying levels of certainty in the clinical trials and the network meta-

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analyses about:

- which individual SGLT2 inhibitors were effective at improving cardiovascular outcomes
- whether there were real differences in cardiovascular benefits between the different SGLT2 inhibitors.

  For hospitalisation for heart failure, empagliflozin, canagliflozin and dapagliflozin produced a clinically meaningful reduction compared with placebo in the random effects network meta-analysis model. However, in the sensitivity analyses using a fixed effect model, ertugliflozin also showed a clinically meaningful reduction compared with placebo (which reflects the original clinical trial data). The network meta-analysis could not differentiate between the SGLT2 inhibitors.

For the 3-point MACE outcome (a composite of major adverse cardiovascular events), only canagliflozin and empagliflozin produced a statistically significant reduction compared with placebo. However, the network meta-analyses again could not differentiate between SGLT2 inhibitors.

For all-cause mortality and cardiovascular mortality, empagliflozin showed a clinically meaningful reduction compared with placebo and the other SGLT2 inhibitors. The network meta-analysis could not differentiate between the other SGLT2 inhibitors.

For non-fatal myocardial infarction and non-fatal stroke, the network meta-analysis could not differentiate between empagliflozin, canagliflozin, ertugliflozin or placebo. The data for dapagliflozin was reported differently and could not be included in the network meta-analyses. In the clinical trial data, dapagliflozin could not be differentiated from placebo for myocardial infarction and was not meaningfully different from placebo for stroke.

Finally, only dapagliflozin showed a clinically meaningful reduction in severe hypoglycaemia compared with placebo. However, the remaining SGLT2 inhibitors could not be differentiated from each other or from placebo in the network meta-analysis.

Taking the cost effectiveness and clinical results into account, the committee decided against recommending only dapagliflozin and instead made recommendations for the SGLT2 inhibitors as a class. However, they recognised that there was greater uncertainty around the cardiovascular benefits associated with ertugliflozin than there was for empagliflozin, canagliflozin and dapagliflozin. This was because ertugliflozin did not consistently show a reduction in heart failure compared with placebo in the network meta-

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analyses (it depended on the model used), and it was not statistically significantly better than placebo for the 3-point MACE outcome. The committee therefore decided to refer to 'SGLT2 inhibitors with proven cardiovascular benefit' in the recommendations. This was to enable prescribers to select a particular drug from the class of SGLT2 inhibitors that they thought was clinically appropriate for each person, while allowing the recommendation to remain current even if additional evidence or new SGLT2 inhibitors become available.

The committee agreed there was more certainty of cardiovascular benefits in adults with type 2 diabetes and chronic heart failure or established atherosclerotic cardiovascular disease because they were participants in all the included trials, while people at high risk of developing cardiovascular disease were included in fewer trials. So, they recommended dual therapy with an SGLT2 inhibitor with proven cardiovascular benefit in addition to metformin for both groups, but only as an option to consider for people without established cardiovascular disease, to reflect the lower certainty. For people without a high risk of developing cardiovascular disease who do not have chronic heart failure or established atherosclerotic cardiovascular disease, metformin monotherapy remains the recommended first-line treatment option, based on the 2015 recommendation.

When starting first-line dual therapy, the committee noted the importance of introducing the drugs sequentially. This enables any side effects and intolerances from the first drug to be identified before the second drug is introduced. In line with current practice, the committee recommended starting with metformin and then adding the SGLT2 inhibitor without delay once metformin tolerability is established, to avoid people remaining on metformin alone for prolonged periods.

Some people will have established cardiovascular disease or a high risk of developing cardiovascular disease, but not be able to take an SGLT2 inhibitor. As GLP-1 mimetics were not cost-effective options in this situation (see the rationale and impact section on why GLP-1 mimetics were not recommended as first-line treatment), the committee agreed that these people would be offered metformin alone as a first-line treatment (see recommendation 1.7.3).

If metformin is contraindicated or not tolerated

People who cannot tolerate metformin or for whom it is contraindicated were not included as a separate group in the economic model because the evidence was taken from trials that did not separate results by whether the person was able to take metformin or not. Most people in these trials were expected to be able to take metformin. The committee

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agreed with the assumption that people who cannot tolerate metformin or for whom it is contraindicated would be offered the next most effective and cost-effective treatment options after metformin.

In the economic model scenario, when another drug was used in place of metformin for people with established cardiovascular disease or at high risk of developing cardiovascular disease, SGLT2 inhibitors were the class of drugs that were most likely to be cost effective. The committee therefore prioritised this class of drugs for these people. As before, there was greater certainty in the results for people with established cardiovascular disease compared with those at high risk of developing cardiovascular disease, and the rationale for referring to SGLT2 inhibitors with proven cardiovascular benefit also applies here.

Some people will have established cardiovascular disease or a high risk of developing cardiovascular disease, but not be able to take an SGLT2 inhibitor or metformin. There was no evidence specifically for this group so the committee made the same assumption as above (that these people would take the next most effective and cost-effective treatment). The committee did not recommend a specific drug for these people because GLP-1 mimetics were not cost-effective options in this situation (see the rationale and impact section on why GLP-1 mimetics were not recommended as first-line treatment). They agreed that in practice prescribers would use their clinical judgement to choose an appropriate treatment from the remaining options, based on the individual clinical circumstances and needs of the person with type 2 diabetes (see recommendation 1.7.1).

Safety considerations for SGLT2 inhibitors

The committee noted some particularly important safety considerations to take into account before an adult with type 2 diabetes starts on an SGLT2 inhibitor. The committee highlighted these because the SGLT2 inhibitors are comparatively new drugs and clinical experience with them is low in primary care, but the new recommendations are expected to greatly increase their use in this setting. In the committee's experience there have been multiple instances of avoidable diabetic ketoacidosis (DKA) resulting in hospital admission. The committee highlighted some factors that might put someone at higher risk of DKA, but the list is not intended to be exhaustive. Addressing modifiable risk factors before starting an SGLT2 inhibitor could reduce the risk of DKA and make the drug safer for the person with type 2 diabetes.

The committee were aware that adults with type 2 diabetes who are overweight or obese

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may wish to try a ketogenic diet to reverse or reduce the severity of their diabetes or induce remission. However, the committee agreed, based on their experience, that there may be an increased risk of DKA associated with SGLT2 inhibitors and such diets. It is important to tell people about these risks and to advise them to discuss any planned change to a very low carbohydrate or ketogenic diet with their healthcare professional first.

Why GLP-1 mimetics were not recommended as first-line treatment

The committee did not recommend a GLP-1 mimetic as first-line treatment for the following reasons:

- GLP-1 mimetics were not cost effective as a class at this (or any) stage of treatment for people with a high risk of developing cardiovascular disease or with established cardiovascular disease.
- Although the ICERs for injectable semaglutide for the various modelled scenarios and stages of treatment fell within a similar range to the ICERs for the individual SGLT2 inhibitors, there was more certainty that the SGLT2s were cost effective as a class. In contrast, the ICERs for injectable semaglutide increased significantly in a sensitivity analysis, highlighting the uncertainty surrounding the results.
- There were differences in clinical effectiveness between the injectable and oral forms of semaglutide compared with placebo for some outcomes, such as all-cause mortality, based on the evidence from the trials. However, the committee agreed it was uncertain whether the observed differences in effect were real or might be related to the relatively small size and low event rates in these trials compared with other trials included in the review, which resulted in wide 95% confidence intervals around the effect estimates for some outcomes.
- The committee concluded that the factors above combined to give such a high level of uncertainty around the clinical and cost effectiveness of injectable semaglutide that they could not make a positive recommendation for its use.

How the recommendations might affect practice

The recommendations to offer SGLT2 inhibitors with metformin to adults with type 2 diabetes and chronic heart failure or established atherosclerotic cardiovascular disease at first-line treatment (or if they are already taking metformin monotherapy) are expected to

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lead to a change in practice and increase the number of people taking SGLT2 inhibitors at the beginning of their treatment. This is also expected to be the case for people with a high risk of developing cardiovascular disease, as this category is expected to cover a large proportion of adults with type 2 diabetes. In current practice, these people would not be offered combination therapy with an SGLT2 inhibitor until additional treatment is needed to control their HbA1c to below their individually agreed threshold for intervention, and then only if they met the criteria in the relevant NICE technology appraisals for being prescribed an SGLT2 inhibitor. Overall, this recommendation is expected to greatly increase the number of people taking SGLT2 inhibitors and is likely to have a substantial resource impact.

The number of adults with type 2 diabetes and chronic heart failure or established atherosclerotic cardiovascular disease or a high risk of developing cardiovascular disease who cannot tolerate metformin, or for whom metformin is contraindicated, are expected to be relatively low. The new recommendations are likely to see a change in practice as more people start taking an SGLT2 inhibitor, and this will likely be associated with a resource impact.

The recommendations about how to begin combination therapy, factors to check before a person starts on an SGLT2 inhibitor, and topics to cover in a conversation with the person, are not expected to significantly increase consultation time or be a change in practice because these should already form part of the prescribing process. Checking that the person is not at increased risk of DKA when they are prescribed an SGLT2 inhibitor should help reduce the number of people who experience DKA and thereby reduce unnecessary hospital admissions.

Return to recommendations

Reviewing drug treatments

Recommendations 1.7.14 to 1.7.16

Why the committee made the recommendations

The committee agreed that when changes to treatment are being considered it is important to review existing treatment options first. Stopping medications that have not worked, for example, in controlling blood glucose or weight loss, and optimising current treatments may remove the need to prescribe additional drugs. However, some drugs,

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such as SGLT2 inhibitors, may be continued because they provide additional cardiovascular protective benefits. In particular, there might be reasons, such as problems with adherence or adverse effects, that might make existing treatments less effective or ineffective. Addressing these might mean that adding a new drug is unnecessary.

The list of factors to think about as part of optimisation is not exhaustive but includes those that the committee thought were particularly important. The committee agreed that it is important to revisit advice about diet and lifestyle because part of this discussion is to ensure the person is supported with both non-pharmacological and pharmacological interventions to improve their current health and prognosis.

Reviews should also take into account a person's current clinical circumstances (as detailed in recommendation 1.7.1 on choosing drug treatments). This will help ensure that appropriate treatment options are considered if the person's clinical situation has changed: for example, if it has improved because of weight loss or if they have developed chronic heart failure or atherosclerotic cardiovascular disease.

When people with an elevated lifetime risk of cardiovascular disease turn 40, their cardiovascular risk may appear to drop when it is assessed using QRISK2. However, this is due to switching from assessing lifetime risk to a 10-year risk calculation rather than an actual decrease in cardiovascular risk. SGLT2 inhibitor treatment should not be stopped for this reason alone.

Based on the evidence and the economic model, the benefits of SGLT2 inhibitors were not confined to first-line treatment for people with elevated cardiovascular risk or chronic heart failure or established atherosclerotic cardiovascular disease. To ensure that people who are already on drug therapy (including those people who have started first-line treatment, and those people who are further along the treatment pathway and are taking dual or triple therapy) for type 2 diabetes can have an SGLT2 inhibitor if their level of cardiovascular risk is sufficiently high or they have chronic heart failure or established atherosclerotic cardiovascular disease, the committee included a separate recommendation on SGLT2 inhibitors for these people. As explained in the rationale for recommendations on first-line treatment, the committee specified SGLT2 inhibitors with proven cardiovascular benefits.

This recommendation also takes into account that adults with type 2 diabetes may develop these conditions (or an increase in their risk) over time. If that happens, an SGLT2 inhibitor could then be of benefit to them. The committee agreed that it was very

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important to highlight that it may be more appropriate to replace an existing therapy with an SGLT2 inhibitor than to add to it, depending on the person's circumstances. This is because they were aware that treatment optimisation as detailed in recommendation 1.7.14 is not always carried out in practice.

How the recommendations might affect practice

The recommendation about reviewing drug treatment is not expected to be a change in practice or to need substantial additional resources because these conversations should already take place. However, the wider use of SGLT2 inhibitors in people who are already being treated for type 2 diabetes and who have or develop high cardiovascular risk or chronic heart failure or established atherosclerotic cardiovascular disease is expected to lead to an increase in resource use.

Return to recommendations

Treatment options if further interventions are needed

Recommendations 1.7.17 to 1.7.23

Why the committee did not make any new recommendations in 2022

The committee did not make any new recommendations on further treatment options. They agreed that for later stages of treatment, separate recommendations were not needed for people at high risk of developing cardiovascular disease or with chronic heart failure or established atherosclerotic cardiovascular disease. This was for several reasons.

Firstly, the evidence and the economic model continued to show that an SGLT2 inhibitor was likely to be the most cost-effective option for these people. Secondly, the recommendations they had made on first-line treatment using an SGLT2 inhibitor (either with metformin, or alone if metformin is contraindicated or not tolerated) and for switching or adding this drug at later stages meant that these people would be able to access an SGLT2 inhibitor without adding this consideration to the existing 2015 recommendations.

Finally, the alternative treatment options for people with and without increased

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cardiovascular risk remained the same for later treatment stages. Therefore, the committee agreed to retain the existing 2015 recommendations for treatment options if further interventions are needed, without making any changes based on cardiovascular risk.

To simplify treatment options, the committee merged recommendations for people in whom metformin is contraindicated or not tolerated into the existing 2015 recommendations where possible, and added the NICE technology appraisals as bullet points to the relevant existing recommendations.

The evidence reviewed in this update was limited to the cardiovascular benefits of GLP-1 mimetics and the committee agreed that this was only generalisable to people with a high risk of developing cardiovascular disease or with chronic heart failure or established atherosclerotic cardiovascular disease. As for first-line treatment, GLP-1 mimetics as a class were not cost-effective options for later stages of treatment, and there was too much uncertainty in the clinical and cost effectiveness to support recommending injectable semaglutide (see the rationale and impact section on first-line drug treatment).

The committee did not look at clinical- and cost-effectiveness evidence for the use of GLP-1 mimetics to control blood glucose levels. As a result, the committee were unable to update the 2015 GLP-1 mimetic recommendations in this update. However, the committee were concerned that, as written, the 2015 recommendation on GLP1-mimetics would mean that people taking newer drugs with proven cardiovascular benefit, such as SGLT2 inhibitors, would have to switch to a combination of metformin, a sulfonylurea and a GLP-1 mimetic. They agreed that this might be clinically inappropriate and not in keeping with current clinical practice, so they amended recommendation 1.7.21 to remove the requirement for this specific combination of treatment options. The rest of the recommendation and the other recommendations for GLP-1 mimetics were out of scope for this update, so the criteria for accessing a GLP-1 mimetic remain unchanged. These recommendations set tight limits on who should be offered a GLP-1 mimetic, based on the lack of cost effectiveness of this treatment for most people in the 2015 guideline.

How the recommendations might affect practice

Since no new drug options have been added to later stages of treatment, these recommendations are not expected to lead to an increase in resource impact over that detailed above for starting drug treatment with metformin and an SGLT2 inhibitor, or an SGLT2 inhibitor alone, or for people who are already on drug therapy when an SGLT2

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inhibitor is or becomes appropriate based on their cardiovascular risk.

Removing the previous restriction limiting the use of GLP-1 mimetics to combination therapy with metformin and a sulfonylurea may increase the use of GLP-1 mimetics at later stages of the treatment pathway by making additional combinations of triple therapy that include GLP-1 mimetics available to eligible people. However, these drugs are already widely used in some areas and this change may bring the guideline into line with current practice.

Return to recommendations

Long-acting insulin

Recommendations 1.7.30 to 1.7.32

Why the committee made the recommendations

Biosimilars have the potential to offer the NHS considerable cost savings. To gain approval for use, biosimilar medicines have to be shown to be safe and as effective as the original reference medicine, and have the same quality. Based on this understanding, the committee noted it was appropriate when starting a new prescription of an insulin where a biosimilar is available, to use the one with the lowest cost.

Additionally, people may be using an insulin for which a lower cost biosimilar is available. In such cases, the committee recommended discussing with people the possibility of switching to the biosimilar. This could happen at the person's routine review. They also agreed that switching to the biosimilar should be carefully planned, taking into consideration the dose-switching protocols, monitoring and the person's concerns about switching from their existing regimen, and a shared decision reached. Healthcare professionals should also refer to the summary of product characteristics for further information when considering switching to biosimilars.

Return to recommendations

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SGLT2 inhibitors for adults with type 2 diabetes and chronic kidney disease

Recommendations 1.8.16 to 1.8.20

Why the committee made the recommendations

Strong evidence from well-conducted randomised controlled trials showed that SGLT2 inhibitors reduced the risk of chronic kidney disease (CKD) progression, mortality and cardiovascular events in adults with type 2 diabetes and CKD.

Economic modelling for people with an albumin-to-creatinine ratio (ACR) above 30 mg/mol at baseline showed that SGLT2 inhibitors were likely to be both more effective and cost saving in this group compared with standard treatment.

People with a baseline ACR of 3 mg/mmol to 30 mg/mmol will experience fewer cardiovascular events and events relating to CKD progression than people with a higher ACR. Because of this, SGLT2 inhibitors would prevent fewer events for this group in absolute terms, even if the relative effect was the same. Economic modelling showed that SGLT2 inhibitors were still likely to be both more effective and cost saving in people with a baseline ACR of between 3 mg/mol and 30 mg/mol compared with standard treatment. However, there was more uncertainty around the clinical and cost effectiveness in this group than in people with a baseline ACR over 30 mg/mmol. Because of this, SGLT2 inhibitors may not be suitable for everyone with a baseline ACR of between 3 mg/mmol and 30 mg/mmol, and the committee made a different recommendation for this group.

There was no evidence specifically looking at the effectiveness of SGLT2 inhibitors for people with a baseline ACR of less than 3 mg/mol, so the committee made a recommendation for research for this group.

The committee cautioned that SGLT2 inhibitors are not suitable for everyone and should only be used within their marketing authorisation.

Some ethnic groups have a higher risk of micro- and macrovascular complications and so may benefit more from SGLT2 inhibitors. However, no evidence was found that stratified data by ethnicity. To address this gap, the committee made a recommendation for research.

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For an explanation of why the committee recommended angiotensin receptor blockers (ARBs) and angiotensin-converting enzyme (ACE) inhibitors, see the section on pharmacotherapy in NICE's guideline on chronic kidney disease.

How the recommendations might affect practice

The recommendations will lead to a significant change in practice, since SGLT2 inhibitors will be prescribed more widely. This will result in a substantial cost impact. The committee noted, however, that there was likely to be a long-term cost saving from reduced downstream treatment costs, as SGLT2 inhibitors slow CKD progression and reduce the number of cardiovascular and end-stage renal events.

Return to recommendations

Periodontitis

Recommendations 1.8.1 to 1.8.4

Why the committee made the recommendations

The evidence showed that people with diabetes are at increased risk of periodontitis, and that non-surgical periodontal treatment can improve diabetes control. However, in the committee's experience, people with diabetes are often unaware of this and may not be having regular oral health reviews. To address this, the committee recommended routinely discussing the risk of periodontitis at annual reviews, alongside eye disease and foot problems.

The evidence also showed that periodontal treatment is cost effective for people with type 2 diabetes, assuming improvements in HbA1c are maintained. This was tested with health economic modelling in a range of different scenarios. There were some scenarios where periodontal treatment was not cost effective, but the committee did not think these scenarios reflected real-world practice.

How the recommendations might affect practice

For oral healthcare professionals, the long-term impact of the recommendations is uncertain. The recommendations specify that people should follow existing NICE

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guidelines on oral health. However, the recommendations may also increase awareness of periodontitis, leading to a possible short-term increase in the number of oral health reviews. Any increase in the number of oral health reviews will potentially impact on services, as NHS dental services already have capacity issues.

A short-term increase in the number of oral health reviews will also lead to a short-term increase in costs. However, there is likely to be a larger long-term reduction in costs from the improvement to oral health and diabetes control.

Oral healthcare and dental teams will need clear advice on what they need to do for people with diabetes. They will need clear care pathways to improve quality of care and service delivery, in line with the NHS England commissioning standard on dental care for people with diabetes.

Many people do not have regular oral health reviews, even if they are eligible for free NHS dental care. People are eligible for free dental care if they are:

- pregnant
- mothers with babies under 1 year old
- on low income benefits, or under 20 and dependent on someone who is receiving low income benefits
- having treatment in an NHS hospital by the hospital dentist.

The recommendations may encourage more people with diabetes to have regular oral health reviews. Combined with proactive engagement and enhanced support for people with diabetes, this may broaden access to dental and oral healthcare and help to reduce oral health inequalities.

Return to recommendations

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Context

Type 2 diabetes is a chronic metabolic condition characterised by insulin resistance (that is, the body's inability to effectively use insulin) and insufficient pancreatic insulin production, resulting in high blood glucose levels (hyperglycaemia). Type 2 diabetes is commonly associated with obesity, physical inactivity, raised blood pressure, periodontitis, disturbed blood lipid levels and a tendency to develop thrombosis, and is therefore recognised to have an increased cardiovascular risk. It is associated with long-term microvascular and macrovascular complications, together with reduced quality of life and life expectancy.

In 2019, approximately 3.2 million adults in the UK had diagnosed diabetes. About 90% of these people had type 2 diabetes. Type 2 diabetes is more common in people of African, African-Caribbean and South Asian family background. It can occur in all age groups and is increasingly being diagnosed in adolescents and young adults.

Multiple vascular risk factors and wide-ranging complications make diabetes care complex and time-consuming, and many areas of healthcare services must be involved for optimal management. Necessary lifestyle changes, and the complexities and possible side effects of therapy, make structured education and self-management important aspects of diabetes care. Diabetes care is estimated to account for at least 5% of UK healthcare expenditure, and up to 10% of NHS expenditure.

This guideline contains recommendations for managing type 2 diabetes in adults, and focuses on education, dietary advice, managing cardiovascular risk, managing blood glucose levels, and identifying and managing long-term complications. The guideline does not cover diagnosis, secondary diabetes, type 1 diabetes in adults, diabetes in pregnancy or diabetes in children and young people.

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Finding more information and committee details

To find NICE guidance on related topics, including guidance in development, see the NICE topic page on diabetes.

For full details of the evidence and the guideline committee's discussions, see the evidence reviews. You can also find information about how the guideline was developed, including details of the committee.

NICE has produced tools and resources to help you put this guideline into practice. For general help and advice on putting our guidelines into practice, see resources to help you put NICE guidance into practice.

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Update information

June 2022: We reviewed evidence on periodontitis in people with type 2 diabetes, and made new recommendations. These recommendations are marked **[2022]**.

March 2022: We reviewed the evidence on continuous glucose monitoring for adults with type 2 diabetes. These recommendations are marked **[2022]**.

We also made one change without an evidence review: in the section on self-monitoring of capillary blood glucose, the word 'capillary' has been added to the heading and recommendations, to make it clear that recommendations apply to adults who are using capillary blood glucose monitoring rather than CGM. These recommendations are marked **[2015, amended 2022]**.

Recommendations are marked to show when they last had an evidence review, for example **[2009]** or **[2015]**. In some cases, minor changes have been made to the wording to bring the language and style up to date, without changing the meaning.

We also added a cross-reference to NICE's technology appraisal guidance on dapagliflozin for treating chronic kidney disease in the section on managing complications.

February 2022: We reviewed the evidence and made new recommendations on drug treatment for adults with type 2 diabetes. These recommendations are marked **[2022]**.

We also made some changes without an evidence review:

- We have replaced 'individually agreed threshold for intensification' throughout with 'individually agreed threshold for further intervention' for clarity. (Intensification was also removed from recommendation for research 3.)
- In recommendation 1.1.1 we have removed 'because of reduced life expectancy'.
- Figure 1: Your target HbA1c: weighing it up has been added to the guideline as a tool that people can choose to use to help them discuss their HbA1c target with their healthcare professional.

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- In recommendation 1.7.1 contraindications and weight have been added as examples to the bullet point about individual clinical circumstances. Monitoring requirements has been added as a separate bullet, and cardiovascular and renal protection have been added to bullet point 3 on effectiveness of the drug treatments.
- Recommendation 1.7.10 was amended to make it clear that it applies to people who are not in either of the high cardiovascular risk groups in recommendation 1.7.9. The NICE technology appraisals have been added as a bullet point to show that they may be treatment options at this stage. Information on repaglinide has been removed from the guideline.
- 'Initial drug treatment with metformin' was changed to 'monotherapy' in recommendation 1.7.18 because people may now be taking an SGLT2 inhibitor as monotherapy at this stage. The bullets have been simplified to show which drug could be added (rather than stating combinations) and the NICE technology appraisals have been added as a bullet point.
- The bullets in recommendation 1.7.19 have been simplified to show which drug could be added (rather than stating combinations) and the NICE technology appraisals have been added as a bullet point.
- In recommendation 1.7.21 'consider combination therapy with metformin, a sulfonylurea and a glucagon-like peptide-1 (GLP-1) mimetic' was changed to 'consider triple therapy by switching one drug for a GLP-1 mimetic' to reflect that people might be taking an SGLT2 inhibitor.

These recommendations are marked [**2015, amended 2022**].

November 2021: We reviewed the evidence and made new recommendations on SGLT2 inhibitors for adults with type 2 diabetes and chronic kidney disease. They are marked **[2021]**.

December 2020: We amended recommendations 1.8.25 and 1.8.28 to bring them in line with the diabetic eye screening programme. The evidence for these recommendations has not been reviewed, and they are marked **[2009, amended 2020]**.

August 2019: The recommendations in section 1.4 on diagnosing and managing hypertension have been removed because diagnosis, treatment and monitoring of hypertension is broadly the same for people with type 2 diabetes as for other people (see the NICE guideline on hypertension in adults). When a different approach is needed for

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people with type 2 diabetes, this is specified in the hypertension guideline.

December 2015: We updated and replaced NICE guideline CG87 (published May 2009) and NICE technology appraisal guidance 203 and 248. We made a change without an evidence review. The recommendation on the treatment of gastroparesis was replaced by recommendations from the NICE guideline on type 1 diabetes. This change is labelled **[2015]**.

Minor changes since publication

August 2022: We added a new recommendation to the section on reviewing drug treatments, to clarify what to do for adults who start taking an SGLT2 inhibitor before they are 40. This recommendation is marked **[2022]**.

We also updated the visual summary following stakeholder feedback. See the tables on summary of first-line medicines and on summary of medicines for further treatment.

May 2022: We added a link to NICE's guideline on medicines associated with dependence or withdrawal symptoms in the section on autonomic neuropathy.

December 2019: Relationships to the NICE guideline on hypertension were clarified, and a link was added to the decision aid on choice of medicine to control blood glucose. We added a link to the patient decision aid and user guide about taking a second medicine to control blood glucose.

June 2018: Recommendation 1.3.11 was added to provide a link to NICE's advice on bariatric surgery.

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