

Management of type 1 diabetes

What is type 1 diabetes?

Type 1 diabetes describes a condition in which the pancreas is no longer able to produce sufficient insulin due to the destruction of the pancreatic beta cells by an autoimmune process. It is a condition which occurs predominantly in younger people, from childhood to young adults, and is increasing in the population, particularly in the under-5 age group. See the separate [Diabetes Mellitus](#) article.

How common is type 1 diabetes?

Type 1 diabetes accounts for over 90% of diabetes in young people aged under 25 years. 12-15% of young people aged under 15 years with diabetes have an affected first-degree relative. Children are three times more likely to develop diabetes if their father has diabetes than if their mother has diabetes.^[1]

Assessment of type 1 diabetes

The successful management of the person with diabetes depends on working in partnership with the person affected and all members of the team responsible for the various elements of their care. Before a management plan can be agreed, an initial assessment of the health and lifestyle of the patient must be undertaken with particular reference to:^[1]

History

- Diabetic history, both recent and historical.
- Symptoms of potential complications - eg, deterioration in eyesight.
- Other medical conditions.
- Drug history, current medications.

- Family history.
- Occupation and social history - eg, level of exercise, type of diet, smoking history, use of alcohol and recreational drugs.
- Prior knowledge of, attitudes to and concerns about the condition.

Examination

- General examination.
- Height/weight/BMI.
- Examination of feet (eg, ulcers, loss of sensation).
- Examination of eyes (eg, cataracts, diabetic retinopathy).
- Blood pressure measurement.
- Examination of peripheral pulses.

Investigations^[2]

Consideration should be given to performing the following investigations, depending on age and previous history of the condition:

- Urine albumin excretion: albumin:creatinine ratio (ACR).
- [Glycated haemoglobin \(HbA1c\)](#).
- U&Es, estimated glomerular filtration rate (eGFR).
- TFTs.
- Full lipid profile (including HDL and LDL cholesterol and triglycerides).
- Consider measurement of C-peptide and/or diabetes-specific autoantibody titres if there is a doubt as to whether a person has type 1 or type 2 diabetes.
- Serological testing for [coeliac disease](#) at diagnosis.^[3]

Management plan for type 1 diabetes^[2]

Referral

When type 1 diabetes has been diagnosed, initial referral to hospital is often required. Urgent referral is essential if the person is unwell or for pregnant women. See the separate [Diabetes in Pregnancy](#) article.

However, if the person is well and sufficient expertise, care and support are available then the initial care and management can be provided at home. At diagnosis (or, if necessary, after managing critically decompensated metabolism), the diabetes professional team should work with people with type 1 diabetes to develop a plan for their early care.

The Scottish Intercollegiate Guidelines Network (SIGN) has recommended that a home-based programme for initial management and education of children with diabetes and their families is an appropriate alternative to a hospital-based programme.^[1]

Consider referring adults with type 1 diabetes, who have recurrent severe hypoglycaemia that has not responded to other treatments, to a centre that assesses people for islet and/or pancreas transplantation. Consider islet or pancreas transplantation for adults with type 1 diabetes with suboptimal diabetes control who have had a renal transplant and are currently on immunosuppressive therapy.

Lifestyle issues

See the separate [Diabetes Education and Self-management Programmes](#) article.

- Discuss diet and give dietary advice taking into account other factors – eg, obesity, hypertension, renal impairment; offer referral to a dietician.
- Advise that regular physical activity can reduce arterial risk in the medium to long term and, where appropriate, discuss adjustments to insulin regime or calorie intake during exercise.
- Give advice and support on smoking cessation where appropriate.
- Ask the patient to consider wearing a medical emergency identification bracelet or similar.
- If appropriate, advise of the need to contact the DVLA to inform them of the diagnosis.^[4]

- Advise the patient to carry insulin in their hand luggage if they are travelling.

Insulin therapy and blood glucose monitoring

NICE recommends continuous glucose monitoring for all adults with type 1 diabetes

The National Institute for Health and Care Excellence (NICE) has updated its guidance on diagnosis and management of type 1 diabetes to recommend that all adult patients with type 1 diabetes should be offered a choice of real-time continuous glucose monitoring (rtCGM) or intermittently scanned continuous glucose monitoring.

The choice should be based on their individual preferences, needs, and characteristics, and the functionality of the devices available. CGM should be provided by a team with expertise in its use, as part of supporting people to self-manage their diabetes.

Factors to consider when choosing a CGM device include:

- The patient's insulin regime or type (including pump integration as appropriate).
- Accuracy and ease of calibration of the device.
- Whether the device has predictive alerts or alarms.
- Whether these alerts/alarms need to be shared with a carer or another person.
- Ease of use, including for those with limited dexterity or other clinical factors.
- Frequency of sensor replacement.
- Compatibility of the device with other technology and data sharing with others including healthcare professionals.
- Unpredictability of glucose levels and activity, and whether erratic blood glucose is affecting the patient's quality of life.
- Whether there are situations where symptoms of hypoglycaemia cannot be communicated or may be confused.

Patients should be advised that they will still need to take capillary blood glucose measurements, albeit less frequently, both to check the accuracy of their CGM device and as a back-up.

CGM should be included in the structured education programme provided to all adults with type 1 diabetes. Use of CGM, and any problems with use, should be addressed as part of their diabetes care plan and opportunistically if there are any concerns about use.

Patients with type 1 diabetes require insulin therapy. See the separate [Insulin Regimens](#) article.

- NICE recommends offering multiple daily injection basal-bolus insulin regimens as the insulin injection regimen of choice for all adults with type 1 diabetes. Do not offer adults newly diagnosed with type 1 diabetes non-basal-bolus insulin regimens (that is, twice-daily mixed, basal only or bolus only).
- Once stabilised, discuss patient preferences for twice-daily or multiple injection regimes.
- Arrive at the regime in partnership with the patient, as patients arriving at informed shared decisions with their practitioner are more likely to be successfully controlled with the chosen regime.
- Offer twice-daily insulin detemir as basal insulin therapy.
- Alternatively, consider one of the following:
 - An insulin regimen that is already being used by the person if it is meeting their agreed treatment goals.
 - Once-daily insulin glargine (100 units/ml) if insulin detemir is not tolerated or the person has a strong preference for once-daily basal injections.
 - Once-daily insulin degludec (100 units/ml) if there is a particular concern about nocturnal hypoglycaemia.
 - Once-daily [ultra-long-acting insulin](#) such as degludec (100 units/ml) for people who need help from a carer or healthcare professional to administer injections.

- Multiple injection regimes using unmodified or 'soluble' insulin or rapid-acting insulin analogues, are suitable for well-motivated individuals with a good understanding of disease control, or those with active or erratic lifestyles.
- Biosimilar insulins (a biological copy) are now available at a cost saving to the NHS. The decision to change to a biosimilar should be made jointly after discussion between patient and prescriber.
- Acquisition cost should be taken into account.
- Ensure that insulin is prescribed by brand name.
- Patients should be given instruction in injection technique using a device best suited to each patient's requirements.
- Advise routine self-monitoring of blood glucose levels for all people with type 1 diabetes and recommend testing at least four times a day, including before each meal and before bed.
- Advise adults with type 1 diabetes to aim for a fasting plasma glucose level of 5-7 mmol/L on waking, and a plasma glucose level of 4-7 mmol/L before meals at other times of the day.
- Give advice on how to change the regime in case of illness. See the separate [Diabetes and Intercurrent Illness](#) article.
- Consider a Dose Adjustment For Normal Eating (DAFNE) programme. [5] See the separate [Diabetes Education and Self-management Programmes](#) article.
- Give advice on how to recognise a hypoglycaemic episode and what action to take.
- Advise patients to carry a source of glucose in case of hypoglycaemic episodes.
- Consider training a partner/parent in the administration of glucagon.
- Patients should be made aware of contact numbers for advice and it may be helpful to provide written information and/or details of how to access further information if required.

Review assessment^[2]

All people with diabetes should be reviewed at least annually and more frequently if there are any factors which may cause concern to the patient or their doctor. The aim of regular review should be to assess and decrease the risk of known complications of diabetes, such as peripheral arterial disease, nephropathy and retinopathy.

A review appointment may involve many healthcare workers, such as the dietician, optometrist, podiatrist or other appropriately trained members of staff. Use of a review protocol will ensure that all areas are covered. A review appointment should include:

- Glycaemic control:
 - Reinforce the need for lifestyle measures. See the separate [Diabetes Diet and Exercise](#) article.
 - HbA1c: agree an individualised HbA1c target with each adult with type 1 diabetes, taking into account factors such as the person's daily activities, aspirations, likelihood of complications, comorbidities, occupation and history of hypoglycaemia.
- BMI.
- Full lipid profile.
- Urinary albumin excretion: ACR.
- Renal function: eGFR.
- Measure blood thyroid-stimulating hormone (TSH) levels in adults with type 1 diabetes at annual review.
- Blood pressure measurement: intervention levels for recommending blood pressure management should be 135/85 mm Hg unless the adult with type 1 diabetes has albuminuria or two or more features of metabolic syndrome, in which case it should be 130/80 mm Hg - maintain below 130/80 mm Hg.

Type 1 diabetes in adults: diagnosis and management^[49534 : NICE NG17 Type 1 diabetes in adults: diagnosis and management remove]

NICE has updated its guidance on blood pressure management to make it more consistent with its blood pressure guidance on [chronic kidney disease](#) and [hypertension](#).

In adults with type 1 diabetes, aim for the below blood pressure targets:

- For adults with a urine albumin:creatinine ratio (ACR) less than 70 mg/mmol, aim for a clinic systolic blood pressure less than 140 mm Hg (target range 120 to 139 mm Hg) and a clinic diastolic blood pressure less than 90 mm Hg.
- For adults with an ACR of 70 mg/mmol or more, aim for a clinic systolic blood pressure less than 130 mm Hg (target range 120 to 129 mm Hg) and a clinic diastolic blood pressure less than 80 mm Hg.
- In adults aged 80 or more, whatever the ACR, aim for a clinic systolic blood pressure less than 150 mm Hg (target range 140 to 149 mm Hg) and a clinic diastolic blood pressure less than 90 mm Hg.

Any assessment of a person with type 1 diabetes should also include:

- Examination of eyes for signs of retinopathy and cataracts.
- Examination of feet for ulceration/sensation/peripheral pulses.
- Examination of injection sites.
- If the patient is male, ask about impotence.
- Females will need pre-conception advice when appropriate.

NICE has updated its guidance on type 1 diabetes to include information on periodontitis: ^[2]

- All patients diagnosed with type 1 diabetes should be advised to get regular dental checks as their risk of periodontitis is high. This could lead to tooth loss.
- Periodontitis is a chronic inflammatory gum disease that destroys the supporting tissues of the teeth (the periodontium). Gingivitis is a milder form of periodontal disease but still causes inflammation in the gum, and if not treated it can lead to periodontitis.

- If they have periodontitis, managing this condition will improve their blood glucose control and subsequently lower their risk of hyperglycaemia.

Children and young adults

Offer children and young people with type 1 diabetes monitoring for:^[6]

- Thyroid disease at diagnosis and then annually until transfer to adult services.
- Diabetic retinopathy annually from age 12 years.
- Microalbuminuria (ACR 3–30 mg/mmol) to detect diabetic kidney disease, annually from age 12 years.
- Hypertension annually from age 12 years.

Acute complications of type 1 diabetes

- See [Diabetic Ketoacidosis](#) and [Hyperosmolar Hyperglycaemic State](#).
- See [Hypoglycaemia \(Emergency Treatment and Management\)](#).

Chronic complications of type 1 diabetes

- Cardiovascular disease: see [Stable Angina](#), [Acute Coronary Syndrome](#), [Cerebrovascular Events \(Stroke\)](#) and [Peripheral Arterial Disease](#).
- See [Diabetic Nephropathy](#).
- See [Diabetic Retinopathy and Diabetic Eye Problems](#).
- See [Diabetic Neuropathy, Autonomic Neuropathy, Neuropathic Pain and its Management](#).
- See [Diabetic Foot, Leg Ulcers, Painful Foot](#).
- Frequent, recurrent and persistent infections.
- Periodontitis.

Prognosis^[7]

- Without insulin replacement, people with type 1 diabetes are likely to die within days or weeks.
- With insulin replacement, people with type 1 diabetes can participate normally in the usual activities of daily life but are at risk of complications.
- The risk of disability associated with complications is greatly reduced by adherence to a healthy lifestyle, good glucose, lipid and blood pressure control and early detection and management of any complications.

Further reading

- [Continuous subcutaneous insulin infusion for the treatment of diabetes mellitus](#); NICE Technology appraisal guidance, July 2008
- [Diabetes UK](#)
- [Integrated sensor-augmented pump therapy systems for managing blood glucose levels in type 1 diabetes \(the MiniMed Paradigm Veo system and the Vibe and G4 PLATINUM CGM system\)](#); NICE Diagnostics Guidance, February 2016
- [Type 1 diabetes in adults](#); NICE Quality standard, March 2023

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