

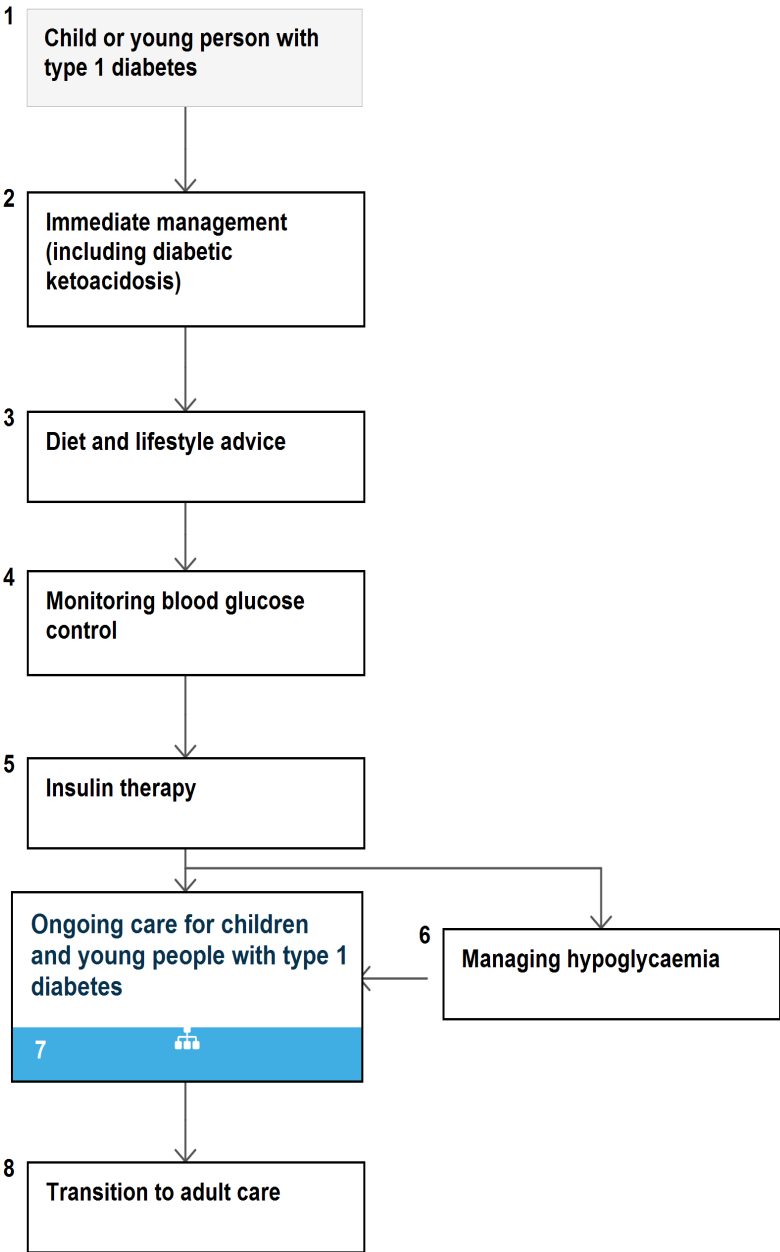
## Managing type 1 diabetes in children and young people

A NICE pathway brings together all NICE guidance, quality standards and materials to support implementation on a specific topic area. The pathways are interactive and designed to be used online. This pdf version gives you a single pathway diagram and uses numbering to link the boxes in the diagram to the associated recommendations.

To view the online version of this pathway visit:

<http://pathways.nice.org.uk/pathways/diabetes>

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**1 Child or young person with type 1 diabetes**

No additional information

**2 Immediate management (including diabetic ketoacidosis)**

Urgent (same-day) referral to multidisciplinary paediatric diabetes care team.

Involve the child/young person and family in making decisions.

Offer home-based initial management with 24-hour access to advice from care team.

Offer inpatient care if child/young person has diabetic ketoacidosis, is less than 2 years old, has social or emotional difficulties, or if family lives a long way from hospital.

Offer MDI (multiple daily injection) regimens to young people (11 years or older). See the section on [insulin therapy](#) in this pathway for recommendations for children under 11 years.

Aim to optimise glycaemic control. See the section on [monitoring blood glucose control](#) in this pathway for more information.

Offer education about: insulin; monitoring glycaemic control; effects of diet, exercise and intercurrent illness on glycaemic control; and avoidance, detection and management of hypoglycaemia.

Screen for coeliac disease (see the NICE pathway on [coeliac disease](#)) and thyroid disease.

**Diabetic ketoacidosis**

Follow [British Society for Paediatric Endocrinology and Diabetes guidelines](#).

Initial management in a high-dependency unit or bed on a children's ward.

Manage in a paediatric intensive care unit if deteriorating consciousness, suspected cerebral oedema, inappropriate response to treatment or age less than 2 years.

Children who are clinically well but with hyperglycaemia, blood pH less than 7.3 and less than 5% dehydrated may respond to oral rehydration, frequent subcutaneous insulin injections and blood glucose monitoring.

### **3 Diet and lifestyle advice**

#### **Education**

Ongoing education with access to information and opportunities for discussion at clinic visits.

Tailor according to maturity, culture, existing knowledge and wishes of child/young person and family.

Explain effects of alcohol, smoking and substance misuse on glycaemic control and vascular complications.

#### **Diet**

Advise on effects of nutritional changes on glycaemic control.

Give support to help optimise weight.

Discuss timing and composition of snacks and problems associated with fasting and feasting.

MDI (multiple daily injection) regimens: adjust insulin to carbohydrate intake.

#### **Exercise**

Encourage exercise and participation in sports.

Advise on effects of exercise on blood glucose.

Prevent exercise-induced hypoglycaemia by monitoring blood glucose levels before and after exercise and making appropriate changes in insulin/food intake.

## 4 Monitoring blood glucose control

### Short-term

Use frequent self-monitoring of blood (not urine) glucose.

Aim for pre-prandial blood glucose 4–8 mmol/litre and post-prandial blood glucose less than 10 mmol/litre.

Adjust insulin dose according to the trend in pre-prandial, bedtime and night-time blood glucose measurements if on 2 injections per day.

Adjust insulin dose after each pre-prandial, bedtime or night-time blood glucose measurement if appropriate when on MDI (multiple daily injection) regimen.

Measure blood glucose more than 4 times/day during intercurrent illness or if trying to optimise glycaemic control.

Offer blood glucose monitor with memory and encourage use of a diary.

### Long-term

Use HbA<sub>1c</sub> (test 2–4 times/year or more frequently if poor glycaemic control).

Aim for HbA<sub>1c</sub> less than 7.5% without frequent disabling hypoglycaemia.

Current HbA<sub>1c</sub> should be available at clinic visits.

Offer additional support if HbA<sub>1c</sub> is consistently more than 9.5%.

Aiming for low HbA<sub>1c</sub> increases risk of hypoglycaemia but high HbA<sub>1c</sub> increases risk of long-term microvascular complications.

## 5 Insulin therapy

### Insulin preparations

Rapid-acting analogues<sup>1</sup> onset 15 minutes, duration 2–5 hours.

<sup>1</sup> Optimally given before eating but can be given just after eating if eating habits are erratic (children under 5 years).

Short-acting: onset 30–60 minutes, duration up to 8 hours.

Intermediate-acting: onset 1–2 hours, duration 16–35 hours.

Long-acting analogues: onset 1–2 hours, duration > 24 hours.

[NICE technology appraisal guidance 53](#) also recommends long-acting insulin analogues (insulin glargine) as a treatment option for people with type 1 diabetes.

Insulin glargine is recommended as a treatment option for people with type 1 diabetes.

NICE has also written information for the public explaining the guidance on [insulin glargine for people with type 1 diabetes](#).

## Insulin regimens

1. 1, 2 or 3 injections per day: rapid- or short-acting insulin premixed or self-mixed with intermediate-acting insulin.
2. MDI regimen: rapid- or short-acting insulin before meals with intermediate- or long-acting insulin.
3. Insulin pump therapy (CSII).

Continuous subcutaneous insulin infusion (CSII or 'insulin pump') therapy is recommended as a treatment option for adults and children 12 years and older with type 1 diabetes mellitus provided that:

- attempts to achieve target haemoglobin A<sub>1c</sub> (HbA<sub>1c</sub>) levels with multiple daily injections (MDIs) result in the person experiencing disabling hypoglycaemia. For the purpose of this guidance, disabling hypoglycaemia is defined as the repeated and unpredictable occurrence of hypoglycaemia that results in persistent anxiety about recurrence and is associated with a significant adverse effect on quality of life

or

- HbA<sub>1c</sub> levels have remained high (that is, at 8.5% or above) on MDI therapy (including, if appropriate, the use of long-acting insulin analogues) despite a high level of care.

CSII therapy is recommended as a treatment option for children younger than 12 years with type 1 diabetes mellitus provided that:

- MDI therapy is considered to be impractical or inappropriate, and
- children on insulin pumps would be expected to undergo a trial of MDI therapy between the ages of 12 and 18 years.

It is recommended that CSII therapy be initiated only by a trained specialist team, which should normally comprise a physician with a specialist interest in insulin pump therapy, a diabetes specialist nurse and a dietitian. Specialist teams should provide structured education programmes and advice on diet, lifestyle and exercise appropriate for people using CSII.

Following initiation in adults and children 12 years and older, CSII therapy should only be continued if it results in a sustained improvement in glycaemic control, evidenced by a fall in HbA<sub>1c</sub> levels, or a sustained decrease in the rate of hypoglycaemic episodes. Appropriate targets for such improvements should be set by the responsible physician, in discussion with the person receiving the treatment or their carer.

The recommendations on [insulin pump therapy](#) are from NICE technology appraisal guidance 151.

NICE has written information for the public explaining the guidance on [insulin pump therapy](#).

### Young people aged 11–17 years

Offer MDI (multiple daily injections) as part of an integrated package of care.

If MDI fails (impossible to maintain HbA<sub>1c</sub> less than 7.5% without disabling hypoglycaemia):

- offer CSII (requires commitment and competence to use it effectively)
- consider 1, 2 or 3 injections per day.

### Children under 11 years

Offer most appropriate regimen to optimise glycaemic control.

## 6 Managing hypoglycaemia

Reduce risk by having rapid access to carbohydrate and blood glucose monitoring equipment.

Wear or carry type 1 diabetes identification.

Offer glucagon and educate carers on emergency use.



**Mild to moderate hypoglycaemia (aware and responds to symptoms)**

Immediately consume rapidly absorbed simple carbohydrate.

As symptoms improve or normoglycaemia is restored consume complex long-acting carbohydrate.

Recheck blood glucose within 15 minutes.

**Severe hypoglycaemia (unable to respond, semi-conscious/unconscious and requires assistance)**

Use 10% intravenous glucose if in a hospital setting.

Use intramuscular glucagon or concentrated oral glucose solution outside hospital or when intravenous access not practical.

As symptoms improve or normoglycaemia is restored consume complex long-acting carbohydrate (if sufficiently awake).

Repeat blood glucose measurements to check if further glucose is needed.

Seek medical assistance if child/young person fails to respond or symptoms persist for more than 10 minutes.

**7 Ongoing care for children and young people with type 1 diabetes**

[See Diabetes / Ongoing care for children and young people with type 1 diabetes](#)

**8 Transition to adult care**

Agree protocols for transfer from paediatric to adult services.

Organise age-banded clinics and joint clinics with adult services.

Encourage attendance 3 or 4 times/year.

Allow time for young people to familiarise themselves with the practicalities of transition.

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Timing depends on physical development, emotional maturity, stability of health, other life changes and local circumstances.

Offer advice on aspects of care that change with transfer to adult services (targets for short-term glycaemic control and screening for complications).

## Sources

Type 1 diabetes. NICE clinical guideline 15 (2004)

Continuous subcutaneous insulin infusion for the treatment of diabetes mellitus. NICE technology appraisal guidance 151 (2008)

Guidance on the use of long-acting insulin analogues for the treatment of diabetes – insulin glargine. NICE technology appraisal guidance 53 (2002)

## Your responsibility

The guidance in this pathway represents the view of NICE, which was arrived at after careful consideration of the evidence available. Those working in the NHS, local authorities, the wider public, voluntary and community sectors and the private sector should take it into account when carrying out their professional, managerial or voluntary duties. Implementation of this guidance is the responsibility of local commissioners and/or providers. Commissioners and providers are reminded that it is their responsibility to implement the guidance, in their local context, in light of their duties to avoid unlawful discrimination and to have regard to promoting equality of opportunity. Nothing in this guidance should be interpreted in a way which would be inconsistent with compliance with those duties.

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