

Management & prevention of type 2 diabetes

NICE guideline on blood glucose management will benefit patients and health professionals



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Work on this guidance began several years ago under the auspices of the RCGP/RCP/RCN and BDA (now Diabetes UK), and has since been subsumed by NICE.

The guidance states that HbA_{1c} should be measured every 2–6 months, depending on stability and change in therapies; and that for those with stable control, checks on HbA_{1c} should be performed every 6 months.

Targets for control should be HbA_{1c} levels of 6.5–7.5%, based on risk of microvascular and macrovascular complications.

The guidance specifies that metformin should be the initial monotherapy for all overweight people (BMI > 25) and should be considered as an option for initial monotherapy in those who are not overweight.

It includes sulphonylureas and short-acting secretagogues in the overall classification of insulin secretagogues, and says little specific

about the role of the newer short-acting agents.

The section on glitazones restates the summary of guidance issued in the NICE technical appraisals of rosiglitazone and pioglitazone.

It states that if insulin treatment is started, metformin therapy should be continued, and that orlistat may be considered as part of a weight-loss strategy.

The treatment options are also presented as an algorithm.

The guideline includes a section entitled 'A guide for adults with type 2 diabetes, and carers: managing blood glucose', which provides helpful advice in non-technical language.

This guidance gives a good overview of the treatment of glycaemia, and while it may be possible to quibble about some of the detail in areas where the level of evidence is graded D (i.e. expert opinion only), overall it is a helpful guide to the management of glycaemia in type 2 diabetes.

NICE sets out national guideline on blood glucose management

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓✓
WOW! factor	✓✓✓✓

1 Type 2 diabetes is becoming more prevalent in the UK. Related complications may have considerable effects both on those people with the condition and on healthcare services.

2 Good management of type 2 diabetes can help to reduce or even prevent the development of such complications.

3 The aim of the Type 2 diabetes guideline series is to provide guidance on the management of type 2 diabetes for the whole range of healthcare professionals working in primary and secondary care.

4 This guideline and evidence review on the management of blood glucose is part of a series providing guidance on other key aspects of type 2 diabetes care, including renal care, early management of diabetic retinopathy, management of blood pressure and various aspects of lipids management.

5 This document contains the clinical practice recommendations and the evidence review carried out to support the guidance. Recommendations are evidence based where evidence is available. Where evidence is lacking, this is made clear and the consensus methods used to derive recommendations are clearly described.

6 These guidelines have brought together the available research on blood glucose management and the considerable experience of healthcare professionals and patient representatives who are proficient in managing type 2 diabetes.

7 The recommendations can be used alone or as a basis for producing local guidelines.

McIntosh A, Hutchinson A, Home PD et al (2002) *Clinical Guidelines and Evidence Review for Type 2 Diabetes: Management of Blood Glucose*. Sheffield: SchARR, University of Sheffield



Exercise training has cardiovascular benefits in diabetes

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓✓✓

1 The coexistence of type 2 diabetes and hypertension are bad for cardiovascular health.

2 Most studies of exercise training in people with type 2 diabetes and hypertension focus on glycaemic control and blood pressure reduction; less is known about the cardiovascular effects of diabetes and hypertension.

3 This article reviews the evidence and plausible mechanisms by which exercise training may improve the cardiovascular health of people with type 2 diabetes and hypertension.

4 Evidence for the benefits of exercise training on cardiovascular health is strongest for improvements in endothelial vasodilator function and left ventricular diastolic function.

5 Exercise training also reduces total and abdominal fat. This leads to improvements in insulin sensitivity and blood pressure and may improve endothelial vasodilator function.

6 The current evidence suggests that exercise training does more than just improve glycaemic control and reduce blood pressure.

Stewart KJ (2002) Exercise training and the cardiovascular consequences of type 2 diabetes and hypertension. Plausible mechanisms for improving cardiovascular health. *Journal of the American Medical Association* **288**: 1622–31

‘Almost two-thirds of the subjects obtained more than 30% of their daily calories from fat and more than 10% from saturated fat.’

‘The total cost of implementing intensive control of blood glucose and blood pressure to all people with diagnosed type 2 diabetes in England was estimated to be a small proportion of the NHS’s spending plans.’



Efforts to promote physical activity and better diet needed

Readability	✓✓✓
Applicability to practice	✓✓✓
WOW! factor	✓✓

- 1 Appropriate use of diet and exercise by adults with type 2 diabetes can improve insulin selectivity and glycaemic control, and reduce the need for oral medications or insulin.
- 2 Past studies suggest that people with diabetes might not follow the recommended guidelines for diet and exercise.
- 3 This study describes dietary intake and physical activity from a nationally representative sample of adults with type 2 diabetes in the US.
- 4 Data from 1480 adults with type 2 diabetes in the Third National Health and Nutrition Examination Survey (NHANES III) were analysed.
- 5 Of the sample, 31% did no regular physical activity and 38% did less than recommended levels; 62% ate fewer than five portions of fruit and vegetables a day; and almost two-thirds obtained >30% of their daily calories from fat and >10% from saturated fat.
- 6 Mexican Americans and people older than 65 ate more fruit and vegetables and obtained less of their calories from fat.
- 7 Lower income and increasing age were found to be associated with a lack of physical activity.
- 8 36% of the sample were overweight and another 46% were obese.
- 9 More needs to be done to promote regular physical activity and improve diet in this population.

Nelson KM, Reiber G, Boyko EJ (2002) Diet and exercise among adults with type 2 diabetes. *Diabetes Care* **25**: 1722–8



Is intensive control of BP and blood glucose affordable?

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓✓✓

- 1 Intensive control of blood glucose concentration reduces complications in patients with type 2 diabetes.
- 2 Similarly, lowering blood pressure in these patients leads to more time free of complications.
- 3 Implementing policies to control blood glucose concentration and reduce blood pressure are therefore

cost-effective ways of increasing health benefits.

- 4 This study set out to estimate the total costs and potential savings of implementing these two interventions in England.
- 5 The annual cost of implementing intensive control of blood glucose and blood pressure to all people with diagnosed type 2 diabetes in England was estimated to be around £100 million, which equates to 1% of the planned increase in annual expenditure on the NHS over the period 2001–5.
- 6 About 720 extra staff would be needed to implement these policies.
- 7 The total cost represents a small proportion of the NHS’s spending plans.

Gray A, Clarke P, Farmer A, Holman R (2002) Implementing intensive control of blood glucose concentration and blood pressure in type 2 diabetes in England: cost analysis (UKPDS 63). *British Medical Journal* **325**: 860–5



Support for GPs improves some areas of diabetes care

Readability	✓✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓✓

- 1 There is considerable potential to improve diabetes care in general practice.
- 2 This study aimed to evaluate the effectiveness of a multifaceted intervention to improve the clinical decision making of GPs for patients with diabetes in The Netherlands.
- 3 A randomised controlled trial was carried out, involving 124 practices and 185 GPs. The intervention group received feedback reports and support from a facilitator, and the control group received no special attention.

- 4 Outcome measures were compliance rates with evidence-based recommendations about discussion of body weight control and problems with medication, blood pressure measurement, foot examination, eye examination, initiating antidiabetic medication or increasing the dosage for uncontrolled blood glucose, and scheduling a follow-up appointment.
- 5 The GPs reported on their clinical decision making in 1410 consultations with type 2 diabetic patients at baseline and 1449 consultations after the study period.
- 6 Intervention resulted in significant improvements for just two measures: foot examination and eye examination. Other means to improve the pursuit of metabolic control by GPs need to be explored.

Frijling BD, Lobo CM, Hulscher MEJL et al (2002) Multifaceted support to improve clinical decision making in diabetes care: a randomized controlled trial in general practice. *Diabetic Medicine* **19**: 836–42

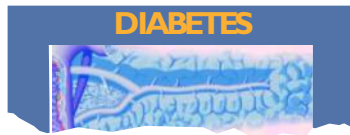


Atherosclerosis may explain excess risk of CAD in diabetes

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓✓

- 1 People with diabetes but without clinical coronary artery disease (CAD) have a similar cardiovascular mortality to non-diabetic people with clinical CAD, but the reason for the excess mortality is not clear.
- 2 This study examined the link between diabetes and coronary atherosclerosis among a defined autopsied population in the US aged 30 years or older at death.
- 3 The prevalence of atherosclerosis in the study population was analysed using a global coronary score and prevalence of high-grade stenoses.
- 4 Almost 75% of those with diabetes but without clinical CAD had high-grade coronary atherosclerosis, and more than 50% had multivessel disease.
- 5 Among those without diabetes, women had less atherosclerosis than men but this female advantage was lost with diabetes.
- 6 Subjects with diabetes but without clinical CAD and non-diabetic subjects with clinical CAD had a similar global coronary disease burden and prevalence of high-grade atherosclerosis.
- 7 These findings show that people with diabetes are at increased risk of clinical CAD, highlighting the need for aggressive prevention of atherosclerosis in all people with diabetes.

Goraya TY, Leibson CL, Palumbo PJ et al (2002) Coronary atherosclerosis in diabetes mellitus: a population-based autopsy study. *Journal of the American College of Cardiology* **40** (5): 946–53



Delayed transcapillary transport of insulin in obese subjects

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓✓✓

- 1 Insulin-resistant subjects have a slow onset of insulin action, but the mechanism is unknown.
- 2 This study investigated whether delayed transcapillary transport is related to peripheral insulin resistance.
- 3 The kinetics of infused insulin and inulin were studied in plasma and muscle interstitial fluid in 10 obese insulin-resistant patients and 10 lean controls.
- 4 Obese subjects had a significantly lower steady-state glucose infusion rate, delayed appearance of insulin, delayed onset of insulin action and inulin in their interstitial fluid.
- 5 These findings suggest that delayed transcapillary transport of insulin in obese subjects contributes to a delayed onset of insulin action.

Sjostrand M, Gudbjornsdottir S, Holmang A et al (2002) Delayed transcapillary transport of insulin to muscle interstitial fluid in obese subjects. *Diabetes* **51**: 2742–8



Troglitazone delays onset of diabetes in high-risk women

Readability	✓✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓✓✓✓

- 1 Type 2 diabetes often results from progressive failure of pancreatic β -cell function in the presence of chronic insulin resistance.
- 2 This study tested whether chronic amelioration of insulin resistance would delay or prevent the onset of type 2 diabetes in high-risk Hispanic women.



Simvastatin shown to have beneficial effect on oxidative stress

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓✓
WOW! factor	✓✓✓✓

- 1 Evidence suggests that postprandial hypertriglyceridaemia and hyperglycaemia may induce endothelial dysfunction through oxidative stress.
- 2 32 diabetic patients and 20 normal subjects ate a high-fat meal, a glucose meal, and a high-fat and glucose meal, and were assayed for glycaemia, triglyceridaemia, nitrotyrosine and endothelial function during the tests.
- 3 Subjects with diabetes then took simvastatin or placebo for 12 weeks.
- 4 All of the meals decreased endothelial function and increased nitrotyrosine in diabetic and normal subjects at baseline.
- 5 Simvastatin had a beneficial effect on oxidative stress and endothelial dysfunction that may be ascribed to a direct effect as well as the lipid-lowering action of the drug.

Ceriello A, Taboga C, Tonutti L et al (2002) Evidence for an independent and cumulative effect of postprandial hypertriglyceridemia and hyperglycemia on endothelial dysfunction and oxidative stress generation: effects of short- and long-term simvastatin treatment. *Circulation* **106**: 1211–18

- 3 236 subjects were given troglitazone or placebo and tested for diabetes over 30 months.
- 4 Protection from diabetes in those who had taken troglitazone was (i) closely related to the reduction in endogenous insulin requirements 3 months after randomisation, (ii) persisted 8 months after medications were stopped, and (iii) was associated with preservation of β -cell compensation for insulin resistance.
- 5 Troglitazone delayed or prevented the onset of type 2 diabetes in high-risk Hispanic women.

Buchanan TA, Xiang AH, Peters RK et al (2002) Preservation of pancreatic β -cell function and prevention of type 2 diabetes by pharmacological treatment of insulin resistance in high-risk Hispanic women. *Diabetes* **51**: 2796–803

‘Almost 75% of those with diabetes but without clinical coronary artery disease had high-grade coronary atherosclerosis.’

‘Troglitazone delayed or prevented the onset of type 2 diabetes in high-risk Hispanic women.’