

In this article...

- Medications that are used to treat and manage type 2 diabetes
- How remission can be induced in people with type 2 diabetes
- How we can improve health and wellbeing at an individual level

Type 2 diabetes: how to manage and treat the condition well

Key points

The incidence of diabetes has reached epidemic proportions globally and nationally

Delayed diagnosis is common and 50% of people have complications of diabetes on diagnosis

The treatment of diabetes is changing radically as NHS 'soups and shakes' diets are rolled out across the UK

Only 31% of adults with diabetes achieve target levels of glycated haemoglobin

Glycated haemoglobin levels are different in older people who are frail than they are in healthy adults aged >65 years

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Abstract An estimated 850,000 people with diabetes have not yet been diagnosed and diagnosis delays are common. The treatment of type 2 diabetes is changing radically due to research that indicates that weight loss can induce remission. The NHS is now introducing 'soups and shakes' diets and support programmes to enable people with diabetes to go into remission. This third and final article in our series explores how weight loss can lead to remission in type 2 diabetes, the diabetes care processes, and medication that is used to manage the condition.

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In the UK, >4.3 million people live with a diagnosis of diabetes (Diabetes UK, nd). It is also thought that there are a further 850,000 people living with diabetes who have not yet been diagnosed, most of whom have type 2 diabetes mellitus (T2DM) (Diabetes UK, nd).

Diagnosis delays are common in diabetes and around 50% of people have complications on diagnosis (Bonora et al, 2020; Gopalan et al, 2018; Porta et al, 2014). Research indicates that many people can induce remission of T2DM by losing weight, and this promises to change the way diabetes is managed (Lean et al, 2018). Managing diabetes well reduces the risk of complications and improves quality of life (Adu et al, 2019). This article will enable readers to understand how remission can be induced and how medication is used to manage T2DM.

Inducing remission

In the past, people with T2DM were encouraged to lose weight and increase their activity levels, and most people were prescribed medication. We now know that dietary interventions that lead to weight loss can enable many people with T2DM to

go into remission. A diabetes remission clinical trial (DiRECT) showed that 86% of people with T2DM who had been diagnosed in the previous six years could achieve remission if they lost weight rapidly – a loss of ≥15kg led to 86% remission, and a loss of 10–15kg led to a 57% remission (Lean et al, 2018).

Findings from the DiRECT trial have contributed to NHS England introducing a new programme to enable the remission of T2DM due to weight loss – namely, the NHS Type 2 Diabetes Path to Remission Programme, formerly known as the NHS Low Calorie Diet Programme (NHS England, nd). The programme is gradually being rolled out across England and gives people who have T2DM and meet certain criteria (outlined in Box 1) access to a meal replacement programme – 'soups and shakes' – for three months. The meal replacements provide around 900 calories daily. The programme also provides ongoing support from clinicians and coaches to enable people to maintain healthy lifestyles (NHS England, nd; NHS England, 2022).

There are similar programmes in Scotland and Wales, as highlighted by NHS

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Box 1. NHS Type 2 Diabetes Path to Remission Programme: referral criteria

- **Age:** 18-65 years
- **Length of time since diabetes diagnosis:** within the last six years
- **Body mass index:**
 - >27kg/m² if of White ethnicity
 - >25kg/m² if of Black, Asian and other ethnicities

Source: NHS England (nd)

Lanarkshire (nd) and Counterweight (2022) respectively. Pregnant women are not eligible for the weight-loss programmes.

Treatment

A number of different classes of medication can be used to treat T2DM. These are:

- Biguanides;
- Sodium-glucose cotransporter 2 (SGLT2) inhibitors;
- Dipeptidyl peptidase-4 (DPP-4) inhibitors;
- Glitazones;
- Sulphonylureas.

Biguanides

Metformin, a biguanide class drug, was developed from *Galega officinalis* (goat's rue or French lilac) and was used in herbal medicines for centuries (Bailey and Day, 2004). It is normally used as first-line treatment for T2DM. It reduces the amount of glucose released by the liver and enables cells to take in glucose by reducing insulin resistance. It also helps to reduce the risk of heart disease (Skugor, 2017). There is no risk of hypoglycaemia when metformin is the sole drug used to treat diabetes. It reduces plasma triglycerides by 10-20% and promotes weight loss of around 3-5% (Skugor, 2017).

The most common side-effects of metformin are:

- Diarrhoea;
- Nausea;
- Abdominal discomfort (Skugor, 2017).

These side-effects often resolve with continued use.

Metformin is usually given twice daily, or once daily as a modified-release (MR) formulation. The normal starting dose is 500mg daily. It is titrated gradually to reduce the risk of gastrointestinal side-effects, starting at 500mg with breakfast and increasing by 500mg in weekly intervals until a dose of 1g with breakfast and dinner, or 2g MR once daily with breakfast is reached (National Institute for Health and Care Excellence (NICE), 2023).

Metformin can cause very rare, but life-threatening, lactic acidosis (<1 in 100,000

(NICE, 2003). It should be used with caution in people with renal failure (NICE, 2023). The dose should be reviewed when estimated glomerular filtration rate (eGFR – a measure of renal function) falls to <45mL/min and should not be used when eGFR is ≤30mL/min (NICE, 2023).

SGLT2 inhibitors

There are four SGLT2 inhibitors available in the UK:

- Dapagliflozin;
- Canagliflozin;
- Empagliflozin;
- Ertugliflozin (NICE, 2023).

Normally, the proximal renal tubules in the kidneys reabsorb around 90% of glucose from tubular fluid (Vallon, 2015). SGLT2 inhibitors block this reabsorption of glucose by the kidney and increase the amount of urine excreted by the kidney. This reduces blood glucose levels in people with diabetes who have elevated blood glucose levels. SGLT2 inhibitors reduce major adverse cardiovascular and cerebrovascular events, such as stroke, myocardial infarction and cardiovascular death, as well as the number of hospital admissions for heart failure (Zelniker et al, 2019; Vallon, 2015).

Common side-effects include candida infection, back pain, increased amount of

“When diabetes is diagnosed, the aims of care are to work with the person to manage diabetes well and avoid complications”



urine passed, dizziness and a mild skin rash (NICE, 2023). Serious, life-threatening and fatal cases of diabetic ketoacidosis are rare in people with T2DM. Gangrene (necrotising fasciitis) of the genitalia or perineum is a rare, but serious and potentially life-threatening, infection that has been associated with the use of SGLT2 inhibitors (NICE, 2023). These medications should not be prescribed if the eGFR is <15mL/min as they are dependent on good renal function to act (NICE, 2023). If the eGFR is <45mL/min, additional antidiabetic medication may be needed because SGLT2 medication is less effective as renal function reduces (BNF, nda).

NICE (2022) guidelines recommend that if a person with diabetes who has been prescribed metformin has heart failure, cardiovascular disease or risks of either, an SGLT2 inhibitor should be prescribed in addition to metformin. Metformin should be initiated first and the SGLT2 inhibitor then added when the person is stabilised on metformin.

SGLT2 inhibitors can be combined with insulin in people with T2DM. They improve glycated haemoglobin (HbA1c) levels, reduce body weight and decrease the required dose of insulin without increasing the risk of hypoglycaemia (Yang et al, 2017).

DPP-4 inhibitors

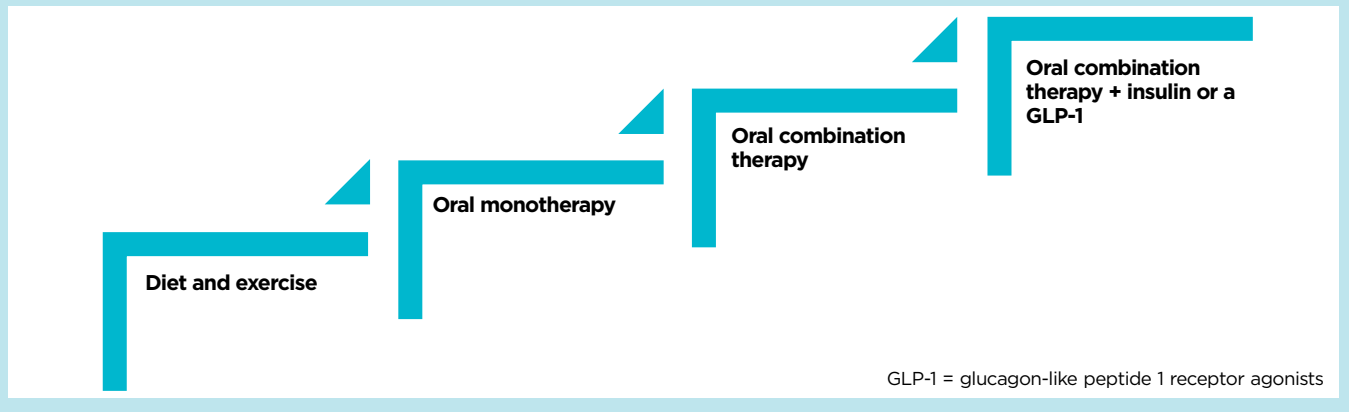
DPP-4 inhibitors – also known as gliptins – work by blocking the DPP-4 enzyme. The DPP-4 enzyme breaks down the hormone incretin. Incretins are a group of hormones that help to control blood glucose. They are released steadily throughout the day and levels rise when a person eats. Incretins help the body to produce more insulin when needed and reduce the amount of glucose being produced by the liver when it is not needed (Kasina and Baradhi, 2023).

The DPP-4 inhibitors (alogliptin, linagliptin, saxagliptin, sitagliptin and vildagliptin) are usually well tolerated, but the patient's hepatic, renal and cardiac function should be checked before they are prescribed. Linagliptin can be used safely in patients with renal failure at a normal dose, but the dose of the other gliptins should be reduced in these patients (NICE, 2023).

DPP-4 inhibitors are associated with acute pancreatitis and should be avoided in people with a past history of pancreatitis (NICE, 2023). Patients should be advised to report severe upper abdominal pain and medication should be stopped if this occurs (BNF, nda). There is an

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Fig 1. Treatment pathways for type 2 diabetes



increased risk of heart failure in all gliptins, other than linagliptin (NICE, 2023; McGuire et al, 2019).

Glitazones

The only glitazone licensed for use in the UK is pioglitazone. It works by treating insulin resistance (Singh et al, 2023). It is contraindicated in heart failure, can cause fluid retention, increase fracture risk in post-menopausal women and increases the risk of bladder cancer (BNF, ndb). NICE (2022) recommends pioglitazone as a second-line medication. A careful assessment of the risks and benefits of this medication should be undertaken before use.

Sulfonylureas

Five sulfonylureas are available in the UK:

- Glibenclamide;
- Gliclazide;
- Glimepiride;
- Glipizide;
- Tolbutamide (NICE, 2023).

Sulfonylureas stimulate the beta cells in the pancreas to produce more insulin and decrease clearance of insulin by the liver. They are only effective if there are functioning pancreatic beta cells (Sola et al, 2015). Sulfonylureas can cause hypoglycaemia and, as hypoglycaemia is damaging to the ageing brain and can contribute to ill health and cognitive decline, they should be used with caution in older people (Mathur et al, 2015; Thorpe et al, 2015). Sulphonylureas lead to weight gain, so long-term use is best avoided in people who are obese.

Glucagon-like peptide 1 (GLP-1) receptor agonists

There are five GLP-1 receptor agonists available in the UK:

- Exenatide;
- Liraglutide;

Fig 2. The nine diabetes care processes

	HbA1C: to measure glycaemic control over time
	Body mass index: to monitor body weight
	Renal function: to check for renal disease
	Albumin-creatinine ratio: to check for protein and screen for renal disease
	Blood pressure: to check risk of cardiovascular disease
	Cholesterol: to check risks of micro- and macrovascular disease
	Diabetes eye screening: to check for retinopathy and eye disease
	Diabetes foot check: to check circulation and for any nerve damage
	Smoking cessation: to provide support and advice to give up smoking

Source: National Institute for Health and Care Excellence (2022)

- Lixisenatide;
- Dulaglutide;
- Semaglutide (NICE, 2023).

GLP-1 receptor agonists work by activating GLP-1 receptors in the pancreas, which leads to an increase in insulin release, reduces glucagon release and slows gastric emptying, thereby aiding a reduction in blood glucose and body weight (Shaefer et al, 2015). GLP-1 agonists generally do not cause hypoglycaemia alone; however, they can contribute to hypoglycaemia if used in combination with sulphonylureas and insulin (Filipatos et al, 2014).

Fig 1 illustrates different treatment pathways for T2DM.

Management

Diabetes can lead to major health problems; the key to enabling people with diabetes to manage well is to improve diagnosis rates and follow national guidance. Diagnosis delays are common (Gopalan et al, 2018; Porta et al, 2014).

Around 50% of people diagnosed with diabetes have complications at the time of diagnosis (Bonora et al, 2020). When diabetes is diagnosed, the aims of care are to work with the person to manage diabetes well and avoid the complications of poorly managed diabetes. NICE (2022) recommends nine care processes for people living with diabetes – these are illustrated in Fig 2.

The National Diabetes Audit of 2020-21, which was published in 2022 and covered the period from 1 January 2020 to 31 March 2021, indicated that diabetes management deteriorated overall during the Covid-19 pandemic. The percentage of people receiving NICE-recommended care processes decreased during this first pandemic year “in all care processes for all diabetes types” (NHS Digital, 2022). NHS

“There is a desperate need for health education to prevent people from developing diabetes, especially when they are young”

Digital (2022) and anecdotal evidence suggests that community diabetes services were less active during this time.

Target HbA1c levels

NICE (2022) recommends that people with diabetes should be supported to achieve an HbA1c level of 48–53mmol/mol. This target may not be suitable for older people as they may carry a risk of hypoglycaemia, which, as discussed, is damaging to an ageing brain. Strain et al (2021) emphasised that HbA1c target setting in older adults should be based on frailty.

The need for health promotion

The UK has the fourth highest obesity rate among adults in Europe (World Health Organization, 2022). Obesity is affecting not only adults, but also children: 14.4% of 4–5 year olds and 25.5% of 10–11 year olds in the UK are obese (NHS Digital, 2021).

T2DM was once a disease that affected overweight, middle-aged adults, but it is now becoming more common in young people (Lascar et al, 2018). Rates of T2DM in those aged <40 years are now increasing faster than in those aged >40 years, with cases up 23% in the past five years (Diabetes.co.uk, 2022). The number of people aged 18–39 years with T2DM rose from around 120,000 in 2016–17 to 148,000 in 2020–21, and Diabetes UK predicts that this could rise to 200,000 by 2027 (Diabetes.co.uk, 2022; Diabetes UK, 2022; Gregory, 2022). There is a desperate need for more health education to prevent people from developing diabetes, especially when they are young.

Prevention on a personal level

As nurses, we can help stem the tide of diabetes on a personal, as well as a professional, level. On the personal front, staff working in healthcare do not always manage to maintain a healthy body weight. A study of English healthcare workers found that two groups of healthcare workers – namely, nurses and unregistered healthcare workers – were most likely to be obese; it found that 25.1% of registered nurses and 31.9% of unregistered healthcare workers were obese (Kyle et al, 2017). Nurses need to look after themselves as well as their patients.

Conclusion

As we have seen in this series, nurses can make a real difference to the health and wellbeing of people who are at risk of, or have, diabetes. Nurses can screen people for diabetes risk, discuss this with the person at risk and advise self-referral, or refer the person to a diabetes prevention programme. Nurses can also ask whether a person who is at risk of diabetes has any symptoms that suggest diabetes, which can enable earlier diagnosis.

People who have been diagnosed with T2DM can be referred to the NHS Type 2 Diabetes Path to Remission Programme to try to induce remission due to weight loss. People who require medication can be supported to manage their diabetes well. **NT**

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