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BACKGROUNDER

INSULIN PUMP THERAPY

What is insulin pump therapy?

For some patients, insulin pumps are a vital alternative to multiple daily injections. The size of a small pager, a pump will deliver a constant supply of insulin that can be adapted to meet a person's round the clock needs. This allows the user to programme precise insulin delivery at mealtimes and to manage meal-related blood sugar fluctuations. Pumps are essential for some patients who are unable to control their diabetes in any other way.

An insulin pump is a small mechanical device that is worn outside the body, often on a belt or in a pocket. The pump delivers insulin directly into the body through a soft, flexible tube under the skin. Patients generally refill their pump with insulin every two to three days.

Pump therapy isn't for everyone. To use a pump, people need a solid understanding of their diabetes and how to maintain a balanced blood glucose level.

What are the benefits of pump therapy?

- Pump therapy allows people with diabetes to adjust insulin intake easily to keep glucose levels within a near-normal range. A pump can help patients avoid hyperglycaemia (high blood sugar), which can cause long-term complications and lead to ketoacidosis (causing coma or death if left untreated), and hypoglycaemia (low blood sugar), an acute condition that can be very dangerous, particularly while sleeping
- An insulin pump more closely mimics a healthy pancreas by delivering insulin continuously. Throughout the day a healthy pancreas delivers insulin automatically every seven to ten minutes, something not practical with multiple injections
- For example, Medtronic MiniMed's pump delivers insulin accurately in 0.1 unit increments every six to seven minutes, matching the natural rhythm of a healthy pancreas, which is nearly impossible for people using traditional injection therapy

- With a pump, people can be more flexible. Patients using longer-acting insulin with injection therapy must follow rigid schedules of insulin injections, meals and snacks, whereas patients using an insulin pump can programme insulin delivery when they eat, and adjust or stop insulin delivery for exercise or other needs. Patients using pump therapy can eat what they want, when they want - something almost unheard of in patients treating their condition with traditional insulin injections

How effective is an insulin pump in treating diabetes?

An insulin pump is an excellent tool for helping people improve glycaemic control. Tight glycaemic control is central to good health, as proven by numerous studies, including the landmark Diabetes Control and Complications Trials (DCCT). In that study, patients who maintained near-normal glycaemic control significantly reduced their risk of long-term complications. The risk of diabetic eye disease decreased by up to 76 per cent, nerve disease was reduced by up to 60 per cent, and kidney complications were reduced by up to 56 per cent.

In addition, a DCCT follow-up study revealed that near-normal control can delay the onset of complications from diabetes by an average of 15 years and prolong life by an average of five years. Pump therapy can improve glycaemic control, which can therefore lead to a reduction in long-term healthcare costs.

How many people currently use insulin pump therapy

An estimated 300,000 people use insulin pumps worldwide. Recent physician survey research has shown that significantly fewer pumps are used in Europe than in other countries: only 1.3 per cent of type 1 diabetics in the UK, compared to 20 per cent in the US. Access to pump therapy is low throughout Europe with pump usage being only 1.2 per cent in Italy and less than 5 per cent in France. This means that an American type 1 patient is up to 15 times more likely to have access to a pump than a patient in Europe.

What is diabetes?

Around 1.4 million people in the UK today have diagnosed diabetes. At least a million more are thought to have diabetes but do not know it yet. The number of people with diabetes is escalating both in the UK and worldwide.

Diabetes mellitus is a condition in which the amount of glucose (sugar) in the blood is too high because the body is unable to use it properly. Normally the pancreas produces insulin, which controls

the levels of glucose in the blood. Diabetes occurs when the body does not produce enough insulin, or produces insulin, but is unable to use it properly.

The main types of diabetes are:

- **Type 1 diabetes** is an auto-immune disease that tends to hit children and young teenagers. Once a patient has type 1 diabetes, they cannot survive without regular doses of insulin for the rest of their lives
- **Type 2 diabetes** tends to affect people after the age of 40. In type 2 diabetes, a patient either doesn't make enough of their own insulin, or they have become insensitive to the effects of insulin. The majority of these patients take tablets to control their diabetes although many would benefit from taking insulin at a later stage

How serious is diabetes?

Diabetes is both progressive and life-threatening. Persistently high levels of blood glucose can damage the nerves and the body's large and small blood vessels, potentially leading to heart disease, stroke, kidney disease, severe pain, blindness and amputation. Complications include:

- *Coronary heart disease*
People with diabetes are at a substantially increased risk of developing coronary heart disease. This is as a result of persistently raised blood glucose exacerbating furring and hardening of the arteries (atherosclerosis and arteriosclerosis)
- *Stroke*
Prolonged high blood glucose in the blood vessels serving the brain means that people with diabetes are significantly more likely to have a stroke
- *Diabetic foot problems*
Foot ulceration is the commonest reason for people with diabetes to be admitted to hospital in the UK. It is a result of nerve damage (neuropathy) and lack of blood supply (ischaemia). Amputation may be necessary if an ulcer becomes infected and gangrenous
- *Blindness*
Diabetic eye disease, caused by damage to the small blood vessels (capillaries) at the back of the eye, is considered to be the leading cause of blindness in people of working age
- *Kidney disease*
Diabetic kidney disease is one of the most serious complications of diabetes and is a major cause of kidney failure and death. It is caused by excess blood glucose damaging the small blood vessels in the kidneys and by raised blood pressure