

Insulin pump therapy – aiming for better blood glucose control in people with diabetes

Your doctor has suggested that you may benefit from using an insulin pump to improve your blood glucose (sugar) control. This leaflet has been given to you to help answer some of the questions you may have about insulin pump therapy. If you have any questions or concerns, please do not hesitate to speak with your doctor or diabetes specialist nurse.

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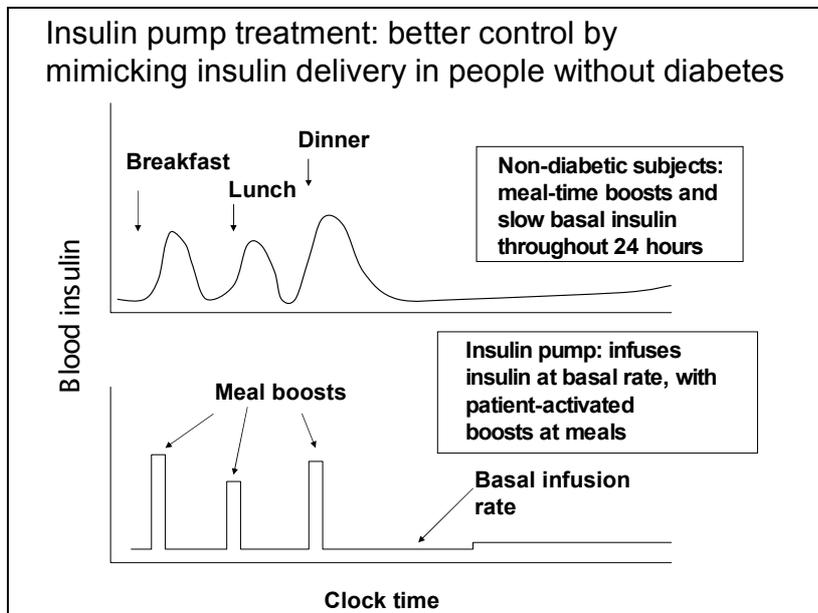
What is insulin pump therapy?

Insulin pump therapy is more properly called Continuous Subcutaneous Insulin Infusion (CSII). The aim is to get better blood glucose control by mimicking how insulin is released in the body of people without diabetes.

In a person without diabetes, the pancreas continually releases a low level of insulin throughout the day and night (called the 'basal insulin'), with boosts of insulin released at meal times.

With insulin pump therapy, a small, battery-operated pump continually gives insulin through a fine tube, which ends under the skin (subcutaneous) – the basal insulin. You can then press controls or buttons on the pump to give the meal-time boosts of insulin (or 'bolus' insulin).

The graph below shows the blood insulin levels in a person without diabetes (top) and in a person with diabetes having insulin pump therapy (below).



How well established are insulin pumps?

Insulin pumps were invented at Guy's Hospital in the 1970s and the treatment has been developed and improved over the years. It is now used by hundreds of thousands of people with diabetes throughout the world. Interestingly, the number of people using the pumps in the UK is still quite small. This is partly because the treatment was not approved for NHS funding until 2003. However, in the USA, more than 20% of people with type 1 diabetes use an insulin pump.

What does an insulin pump look like?

There are a number of different pump makes and models. They all work in similar ways and most are about the size of a pager. We can show you an example of what one looks like at your next appointment.

Why is insulin pump therapy needed?

Insulin pumps are only needed in selected people with type 1 diabetes who are having continued problems with maintaining good, blood glucose control on 'best insulin injection treatments'.

'Best insulin injection treatment' is always tried before a trial of insulin pump therapy is considered and can include:

- using new, long-acting insulin's – glargine [Lantus] or detemir [Levemir];
- altering the injection of short-acting insulin at meals according to meal size;
- frequent blood glucose testing at home and insulin dosage adjustment; and
- diabetes education.

What are the benefits and possible disadvantages of having insulin pump therapy?

Insulin pump therapy is not painful and most people find that wearing the pump 24-hours a day is not uncomfortable or inconvenient. Insulin pump therapy is likely to lower the number of severe hypoglycaemic episodes you have, though it may not completely stop them. Severe hypoglycaemia is when the blood glucose drops so low that a person is incapacitated and needs help from others.

In many people, pump therapy will also:

- lower the swings in blood glucose throughout the day;
- improve the predictability in blood glucose levels from day-to-day; and
- lower the 'dawn phenomenon' – this is a marked rise in the blood glucose in the few hours before breakfast. The pump can help can be programmed to automatically increase the basal insulin infusion rate during the night and therefore achieve better blood glucose control at this time.

Many people also find their general well-being and quality of life improves during insulin pump therapy.

Some people might feel that wearing a pump (though it is small and easily concealed) is more of an 'advert of their diabetes' than is treatment by injections.

You need to be aware that pump treatment requires a commitment and willingness to:

- do regular and frequent blood glucose testing;
- use the facilities that the pump has to adjust the insulin as needed; and
- attend the Insulin Pump Clinic.

We will speak with you in more detail about the pros and cons of insulin pump therapy. Please feel free to ask us questions if you are uncertain.

Insulin pump therapy is not an artificial pancreas (not yet, anyway):

It is important to realise that the insulin pump needs to be programmed by you with help from the doctor and nurse. The rates of insulin infusion used are guided by your needs (changing with food and exercise), and by the blood glucose tests that you perform. You would need to test your blood glucose at least four times a day to get the most out of pump therapy.

In the future, it may be possible to have an artificial pancreas where the insulin rates are automatically changed according to continuously measured glucose levels, thereby keeping the blood glucose at normal levels throughout the entire day. Research is being done to develop such devices at Guy's Hospital and other centres, but it is not yet available for patient use and is likely to be several years before it can be used routinely.

What will happen once I am referred to the insulin pump clinic?

You will usually be referred to the clinic by your hospital consultant or general practitioner if he/she is concerned that your diabetes is not well controlled and feels you may benefit from a trial of insulin pump therapy. Alternatively, you might have been started on insulin pump therapy at another hospital and need to have care and supervision at a centre with expertise in this treatment.

During your visits to the clinic you will meet members of our team, including:

- **Consultants:** Professor John Pickup, Dr Anna Brackenridge, Dr Stephen Thomas;
- **Diabetes Specialist Nurses:** Julia Kidd, Siobhan Pender, Anna Reid (Nurse Consultant);
- **Dietitians:** Nardos Yemane, Penny Jackson;
- **Specialist registrars**
- **Administrator:** Barbara Dryden
- **Secretary:** Elaine Venner

For new patients, your assessment takes place in stages:

First clinic visit

You will be sent an appointment letter in the post to see one of the consultants in the clinic. These are senior doctors who are experienced in both general diabetes care and specifically in insulin pump therapy. The consultant will ask you about the problems you have been having with your diabetes, how you are currently being treated on injections and generally about the state of your diabetes and your medical history.

The consultant will explain the insulin pump programme at the hospital, the pros and cons of insulin pump therapy, and give you a chance to ask questions and discuss what the treatment involves. Occasionally, either you or the doctor may feel, even at this early stage, that you are unlikely to benefit from insulin pump therapy, and you can discuss this. However, pump therapy will usually be an option and the only decision you have to make is whether you wish to enter the pre-pump assessment programme.

Pre-pump assessment programme

The programme typically last a few months. You will have an appointment with a diabetes specialist nurse and a dietitian who specialise in intensive insulin therapy, including using insulin pumps.

The aim of the programme is to:

- try and improve your diabetes control by using best injection treatment – this will include reviewing your injection technique, changing to new insulin types if needed, and teaching you how to adjust insulin according to your blood glucose results. You will also be shown how to estimate the carbohydrate content of meals ('carbohydrate counting') so you can adjust your insulin appropriately;
- speak with you about insulin pump therapy, show you the equipment used and give you the opportunity to ask questions about the therapy; and
- give you time to speak with family and friends about pump therapy and to think about whether it is right for you.

Second visit with the doctor

At this visit, the doctor will:

- examine your blood glucose results with the best injection treatment;
- ask you about any changes in hypoglycaemia and your well-being.

You will be offered a trial of insulin pump therapy if:

- there has been no improvement with the best injection treatment; and
- you and the diabetes specialist nurse think you would benefit from starting the pump therapy.

You may decide that insulin pump therapy is not for you. It is important to realise that some patients have improved control on their new insulin injection treatment and do not need to use a pump. Patients who do not need a pump or decide not to use a pump will be seen again in the general diabetes clinic, either

at their usual hospital or at Guy's and St Thomas' NHS Foundation Trust.

Starting on insulin pump therapy

An appointment will be made for you to see the diabetes specialist nurse and dietitian to start insulin pump therapy. At this visit, you will be taught the pump controls and procedures, including:

- setting and altering the basal and bolus rates;
- how to put in and change the infusion cannula under your skin;
- putting insulin in the pump;
- how to use the pump during exercise, bathing and illness; and
- recording blood glucose tests.

The dietitian will talk with you about carbohydrate counting methods and other food-related issues.

You will not put insulin in the pump at this visit. Saline (salt solution) will be used instead so that you can go home for a week and safely practice the pump controls while still using insulin injections.

The specialist nurse will see you in the clinic one week later to put insulin in the pump, answer any questions you may have and give further instructions, if needed. The nurse will keep telephone contact with you over the next few days and weeks, so you can report blood glucose levels and make adjustments with his/her advice.

Follow-up

The specialist nurse will be available by telephone during the day and will be your first point of contact for concerns, advice and help. The pump manufacturers also have a helpline, in the event of problems with the pump. Your nurse will give you these numbers. You will also be given the contact details for the on-call doctor who you can call if you have an urgent problem during the night or at the weekend.

Guy's and St Thomas' NHS Foundation Trust

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Switchboard: 020 7188 7188 www.guysandstthomas.nhs.uk

The doctor will also see you in the Insulin Pump Clinic a few months after starting pump therapy, and then at about 6-monthly intervals, to check:

- your diabetes control;
- whether there have been any problems; and
- that your general diabetes care is satisfactory.

This involves measurements of body weight and blood pressure, various blood and urine tests (e.g. for HbA1c and kidney function) and annual photographs of the back of the eyes (the retina) with a special digital camera. You may also see the diabetes specialist nurse and dietitian at the same time.

Will my blood glucose always be well controlled if I am using the insulin pump?

Starting on insulin pump therapy is a trial. Because we have a strict selection procedure, most people who are chosen for an insulin pump trial have much better glucose control, manage the pump procedures very well and will be completely satisfied. However, improved control is not guaranteed. Some people who use the pump may have no improvement in their blood glucose control after a few months or find it difficult to cope with the demands of the pump programme. A switch back to injections may be the most appropriate option. We find that less than 10% of people who start insulin pump therapy switch back to using insulin injections.

Research studies

The medical school (King's College London), based at Guy's and St Thomas' NHS Foundation Trust, is a distinguished and active research centre. It not only invented insulin pump therapy but continues to investigate new ways of improving care for people with diabetes. Many research studies occur each year,

which are important for developing treatment in the future.

You may be asked to take part in a research study. More information about this can be found in the leaflet, **Your outpatient visit**. Please ask us for a copy if you do not have one.

We are always interested in your views about what are the important problems in diabetes and delighted to discuss progress in research. Please feel free to speak with your doctor or nurse.

To help us make sure you are getting the maximum benefit from the insulin pump programme, please:

- make every effort to attend your clinic appointments - if this is not possible, phone us as soon as possible so we can rearrange your appointment and give your original appointment to someone else.
**Tel: 020 7188 1915 or
020 7188 1912**
- commit to the treatment plan set out by the team;
- tell us of any changes in your personal and treatment details; and
- tell us your views about our services – this might be something that went well or a concern about the care given. Speak to your doctor or nurse or contact the Patient Advice and Liaison Service (PALS) – details are at the end of this leaflet.

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Further information

For more information about insulin pump therapy, please speak to your doctor or diabetes specialist nurse.

You may find the **Diabetes UK** position statement on insulin pump therapy interesting: **www.diabetes.org.uk**

INPUT is a patient-led support group for people using insulin pumps. Tel: **01590 677911**. Its website has useful links to other websites about diabetes and insulin pump therapy: **www.input.me.uk**

PALS. To make comments or raise concerns about the Trust's services, please contact our Patient Advice and Liaison Service (PALS). Ask a member of staff to direct you to PALS or call **020 7188 8801** at St Thomas' or **020 7188 8803** at Guy's. Email **pals@gstt.nhs.uk**

Language Support Services. If you need an interpreter or information about the care you are receiving in the language or format of your choice, please call **020 7188 8815**, fax **020 7188 5953** or email **languagesupport@gstt.nhs.uk**

Knowledge & Information Centre (KIC): For more information about health conditions, support groups and local services, or to search the internet and send emails, please visit the KIC on the Ground Floor, North Wing, St Thomas' Hospital. Call **020 7188 3416**, email **kic@gstt.nhs.uk** or visit **www.kic.gstt.nhs.uk**

NHS Direct offers health information and advice from a specially trained nurse over the phone 24 hours a day. Call **0845 4647** or visit **www.nhsdirect.nhs.uk**

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