Gloucestershire Hospitals NHS Foundation Trust

Patient Information

Continuous Subcutaneous Insulin Infusion (CSII) pump therapy

Contents

Reference No.
GHPI1267_07_25
Department
Diabetes
Review due
July 2028

Patient Information

Introduction

This booklet has been written by the Insulin Pump Therapy Team to standardise the information given to patients about Continuous Subcutaneous Insulin Infusion (CSII) pump therapy in Gloucestershire. We advise that you and/or your family read this booklet and keep it in a safe place for reference when needed.

What is CSII Pump Therapy

Insulin pump therapy is used to help patients with type 1 diabetes to reach target blood glucose (HbA1c) levels without multiple daily injections.

Insulin pump therapy only uses rapid-acting insulin. If there is a problem with the delivery of insulin via the pump, blood glucose will rise rapidly to dangerous levels. Therefore, it is important for you to monitor your blood glucose levels regularly; either via finger prick or continuous glucose monitoring (CGM).

Diabetes Ketoacidosis (DKA) may develop if your blood glucose level rises to 15mmols/l or above, and is not treated appropriately.

DKA is a serious medical condition caused by very little, or no insulin in the body. A lack of insulin in the body means glucose remains in the bloodstream and cannot enter the body's cells to provide energy. The body responds by producing more glucose and eventually breaking down body fat to produce energy.

DKA requires urgent hospital treatment and, if not treated properly, can be life threatening.

Clinic appointments

After starting insulin pump therapy, you will have close follow up and support with members of the nursing and dietetic team. Your diabetes consultant will discuss whether have pump therapy has been successful and whether you have benefitted from using an insulin pump at your next routine appointment. If your diabetes management shows no improvement, pump therapy may be discontinued. This will be discussed with you and reviewed at each clinic visit.

Patient Information

During your appointment, your sensor glucose and insulin pump data will be reviewed.

Please make sure that you have linked your pump to the appropriate online account, such as Glooko or Carelink. This is so that we can review your data. If you need to download your pump, please try to do this before you attend appointments.

If you are unsure which account to link to, or you do not know if your pump is currently linked to an account, please contact the diabetes team.

You will be invited to attend the joint pump clinic with the Diabetes Specialist Nurse and Dietitian if you need further support.

Using an insulin pump

The aim of pump therapy is to keep fasting blood glucose levels between 4 to 7 mmol/L. However, this depends on -your individual personal targets, which can be discussed with your diabetes team. If you have no hypoglycaemia awareness, you may be given a different blood glucose target range.

We advise, as a minimum, you monitor your glucose levels on waking, before food, at bedtime, before and after exercise and before driving.

For ongoing care, you must:

- Change your metal cannula every 48 hours.
- Change your Teflon cannula every 2 to 3 days, unless otherwise stated.
- Monitor your glucose levels 2 hours after inserting a new cannula. Try not to perform cannula changes before bed.
- Do not remove your old cannula until the new cannula is in place and secure.
- Change the cartridge/reservoir and tubing every 3 to 6 days (depending on the pump manufacturer instructions).
- Change your insulin Pod (Omnipod) every 3 days.
- Always keep a supply of backup insulin via pens in case of an emergency; if blood glucose levels are high or blood ketones are present, or in case of a pump or cannula failure and you need to revert back to insulin pen injections.

Patient Information

You must check the expiry dates of your insulin pens regularly. You must keep a record of your pump daily basal amount, basal insulin profile, insulin to carbohydrate ratios and correction ratios (insulin sensitivity) in case of pump failure resulting in a need to revert back to pen therapy. All of this information is available on the online platform you use to download your pump or review your data, such as Glooko or CareLink for Medtronic.

Potential causes of hypoglycaemia

- An increase in physical activity
- Drinking alcohol
- Priming a new infusion set whilst it is still attached to the body
- Infusing insulin through damaged sites, for example areas of lipohypertrophy (the over use of injection/cannula sites which affects insulin absorption)
- Basal rates are set too high (relevant if using open loop pump ort:slim)
- Failure to cancel or reduce a temporary basal rate
- Errors in handling the pump/PDM
- Miscalculation of a bolus
- Over correction of a high blood glucose
- Slow digestion of food
- Stress
- Menstrual cycle
- Incorrect carbohydrate or correction ratio

For more information, please refer to the ABCD DTN Guidance document on managing hypos and high blood glucose levels.

Patient Information

Potential causes of hyperglycaemia

- Not adjusting settings for increased insulin requirements
- Illness or infection
- Reduced physical activity
- Stress
- Hormonal changes such as menstrual cycle
- Medication, such as steroids
- Inflammation at infusion site
- Insufficient insulin delivery
- Miscalculation or forgetting to administer bolus insulin
- Too much hypoglycaemia treatment
- Basal rates set too low (only relevant if using an open loop pump ort:slim)
- Too much time disconnected from the pump/Pod
- Pump not functioning/pump in stop mode/incorrect operation of the pump/battery is low or expired
- Insulin is not effective e.g. insulin has expired, near the end of the vial, crystallised, cloudy or been exposed to extreme temperatures

Issues with infusion sets

- Infusion set blocked/kinked/dislodged cannula
- Infusion set/Pod empty or not primed
- Infusion set leaking
- Air or blood in the tubing/pod
- Infusing insulin through an area of lipohypertrophy
- Empty cartridge/reservoir/Pod
- Cannula has bent or has slipped out of your skin

For more information, please refer to the ABCD DTN Guidance document on managing hypos and high blood glucose levels.

Patient Information

Converting back to insulin pen injections

In certain circumstances, it may be necessary for you to go back to your previous regime of 4 pen injections a day (basal bolus).

To make the change back to basal bolus therapy, you should take your pump's total basal insulin dose plus 10%, or your average basal insulin use per 24 hours over the last 5 days if you are using HCL, plus 10%. Be mindful that this is a starting point and if you are using pens for some time, it may need increasing further. It is advisable to take the basal insulin in the morning.

You can use your usual insulin to carbohydrate ratio and correction ratio (insulin sensitivity) with a basal bolus regime.

Converting back to insulin pump therapy

When restarting insulin pump therapy, there will be active basal insulin present from your last basal insulin injection, therefore you will need to test your glucose levels or review your CGM 2 hourly, to start with.

A temporary basal reduction may be needed in the first 24 hours. If you are using a HCL system you may need to wait 48 hours before activating HCL auto mode. Alternatively, you can use the activity mode/ease off **or** raise your personal glucose target for the first 48 hours. This may vary depending on the system you are using, please check with your diabetes team if you are unsure.

Insulin pumps and hospitals

For any hospital admission, it is essential that the medical and nursing staff are aware that you are using an insulin pump.

It is therefore important that you always carry some form of identification with you. For example, a medical alert disc or a pump identification card stating that you have diabetes and are using an insulin pump.

- You may be able to continue using your pump during your hospital stay if this is agreed with the medical team.

- Remember to take with you all the necessary equipment for your insulin pump as this will not be available on a hospital ward.
- If you are unable to manage your pump independently then your diabetes will need to be managed with conventional therapy, such as subcutaneous injections or IV insulin and dextrose infusion.
- Do not remove the pump/Pod until either intravenous insulin and - fluids, or insulin administered by pen or syringe is established.
- You can be referred to the diabetes team whilst in hospital. If you would like to be reviewed, please ask the nurse looking after you to complete a referral.

Investigations

Certain examinations can interfere with the operation of the insulin pump/Pod. For example, MRI scans (Magnetic Resonance Imaging), X-rays and CT scans (Computed Tomography).

You must remove the insulin pump or Pod, glucose sensor (and transmitter if applicable) and store safely outside the room. If you do not remove the pump, it may affect the warranty.

If your procedure lasts longer than 1 hour, you will need to have either sliding scale insulin commenced or a bolus dose of rapid insulin.

Traveling by air with your insulin pump

Requirements:

- Type 1 identification
- Pump travel letter
- A copy of your latest prescription
- This pump booklet - we can provide you with an electronic copy if you prefer
- Contact details for your pump company, listed at the end of this booklet
- Pump equipment and consumables. Some pump companies will be able to loan you a spare pump for your holiday. Please check with your company
- Insulin vials for your pump

Patient Information

- Back up insulin pens, needles, basal and rapid insulin
- Blood ketone meter and strips
- Hypo treatment
- Blood glucose meter and strips
- You may want to consider investing in a small cool bag to keep your insulin cool in warmer climates, please ask your diabetes team for recommendations.

Pack your insulin and pump supplies in your hand luggage. The temperature in the luggage hold could freeze your insulin and cause it to become inactive.

Take double your insulin consumables to cover the holiday. Remember to take both your insulin for your pump AND your long acting and rapid acting insulin in pens.

You may have to store your diabetes equipment in a secure area of the aircraft depending on the flight company regulations.

Metal detectors will not harm your pump, Pod or PDM and will not normally activate security alarms. It is advisable to notify the airport security that you are wearing an insulin pump. **Insulin pumps and blood glucose meters that are active must not go through X-ray unless the batteries are removed.**

If you have to have a body scan, disconnect the pump from your body; it cannot go through the body scanner unless the batteries are removed.

If your pump is operated by Bluetooth, the Bluetooth function may have to be switched off - please check with the airline before you fly.

If you use an insulin pump with a glucose sensor, please follow the guidance from the manufacturer of the sensor with regards to travel and airport regulations.

Check the tubing and insulin cartridge for air bubbles frequently. Atmospheric pressure from altitude may affect insulin delivery from the pump and cause air bubbles. If this happens then you will need to prime the infusion line.

Omnipod insulin pumps can be operated during the flight.

Patient Information

Other travel information

You may wish to return to pen therapy for your holiday. Please speak with a member of the diabetes team if this is something you would like to do.

If you are travelling to a country with high temperatures:

- You may be more susceptible to hypos, due to the increased absorption of the insulin.
- Consider making adjustments to your basal rates depending on your blood glucose levels.
- Direct exposure from the heat to the pump/Pod may affect the efficiency of the insulin and require the cartridge/Pod and tubing to be changed more frequently.
- Dehydration and hyperglycaemia can lead to ketoacidosis.
- On arrival at your destination, change the pump/PDM time to local time, your pump settings schedule will automatically change.
- Never change the battery or insulin cartridge on the beach, sand may enter the cartridge chamber and affect the movement of the piston rod.

Testing basal rates

One of the key advantages of insulin pump therapy is the ability to tailor basal rates in ways not possible with insulin injections.

You should test your basal rates by fasting with every season change, or every 3 months and before your hospital appointment if you would find it useful.

You should test the basal rate first, during the night. Once you have the correct overnight basal rate set, you can move on to testing the basal rates in the first part of the day. Test basal rates in sections of the day rather than fasting for the whole day.

If you are using a HCL system, you may not need to test your basal rates as the insulin pump will adjust these for you, based on its algorithm. However, it is important that you regularly review your basal rate settings within the manual mode on your pump. This is to make sure that you are on the correct amount of insulin if you need to revert to manual mode.

Patient Information

You can do this by regularly reviewing your total basal rate in the closed loop and comparing it with the total basal rate you have saved in your manual settings. Please ask your Diabetes Specialist Nurse or Dietitian if you would like support adjusting this.

Remember, optimising your basal rates is key to optimising your pump.

To know if your basal rates are correct:

- The aim is to keep all glucose levels between 5-7mmol/L before breakfast and between 4-7mmol/L before meals and other times of day.
- Test your glucose levels 2 hourly during a fast. This can be either via sensor glucose or finger-prick.
- Choose a time when your blood glucose is within target before testing fasting basal rates, but not at the expense of a correction dose. Should you need to give a correction dose, check your blood glucose after 1 hour, if it is within target, start fasting.
- Try not to eat a meal high in fat before fasting as this will have an extended effect on your blood glucose.
- No alcohol should be consumed in the previous 24 hours.
- Avoid if you are premenstrual.
- If your basal rates need changing, increase or decrease the basal rate 2 hours before the out of target blood glucose by 0.1.

Once you have your basal rates are correct, then you need to check if your carbohydrate ratio is correct. Test your glucose levels before and 2 hours after your meal. If your glucose levels rise more than 2.8 mmol 2 hours after your meal, you should consider reducing your carbohydrate ratio with that meal so that it offers you more insulin, i.e. changing from a 1:10 to a 1:8 ratio.

We recommend that you always keep a record of your current pump settings, carbohydrate ratios and correction ratios (insulin sensitivity), so that in the event of a pump failure or the unexpected requirement for a new pump, you can use these settings.

Patient Information

Contact Information

The Diabetes Pump Therapy Team
Gloucestershire Royal Hospital
Tel: 0300 422 8613
Monday to Friday, 8:00am to 4:00pm

Cheltenham General Hospital
Tel: 0300 422 4266
Monday to Friday, 8:00am to 4:00pm

E-mail: ghn-tr.diet.diabetes@nhs.net
E-mail: ghn-tr.diabetesnurses@nhs.net

For technical advice, please call the pump company helpline:

Medtronic
Tel: 01923 205 167

Insulet (Omnipod)
Tel: 0800 011 6132

Air Liquide (Tandem TSLIM)
Tel: 08000121560

Ypsomed
Tel: 0344 856 7820

Advanced Therapeutics (DANA)
Orders and technical queries
Tel: 01926 833 273
Monday to Sunday, 9:30am to 5:30pm

Technical support emergencies
Tel: 07775 642239

Content reviewed: July 2025

Gloucestershire Hospitals
NHS Foundation Trust

Patient Information

Making a choice

Shared Decision Making

If you are asked to make a choice, you may have lots of questions that you want to ask. You may also want to talk over your options with your family or friends. It can help to write a list of the questions you want answered and take it to your appointment.

Ask 3 Questions

To begin with, try to make sure you get the answers to three key questions if you are asked to make a choice about your healthcare.

1. What are my options?
2. What are the pros and cons of each option for me?
3. How do I get support to help me make a decision that is right for me?

https://aqua.nhs.uk/resources/shared-decision-making-case-studies/