

# Insulin Pump Therapy



## What is insulin pump therapy?

An insulin pump is a small computerised device powered by batteries. It delivers rapid-acting insulin continuously in small amounts into the subcutaneous tissue. The pump is about the size of a deck of cards and is worn by clipping it onto a piece of clothing or worn in a pocket. Insulin is delivered through a thin plastic tubing attached to a syringe in the pump. At the end of the tubing there is a small needle which is used to insert the infusion set under the skin into the fatty tissue and is secured by a waterproof dressing. The needle is then removed leaving a small, hollow, flexible plastic tube, called a cannula. These infusion sets are changed every 2-3 days. The pump can be removed for up to 1.5 hours, to enable you to have a shower, go swimming or participate in contact sport.

Insulin pumps are not automatic and not an 'artificial pancreas'. It must be interacted with to give insulin when needed. Blood glucose levels must be checked 6-8 times a day for pump therapy to be safe and effective. **The pump does not monitor blood glucose levels!** You can purchase continuous glucose monitoring (CGM) separately to work with your insulin pump.

## How does it work?

An insulin pump tries to replicate what normally happens in the body. It can deliver insulin in exact amounts as small as 0.025 units per hour. Insulin is delivered in two ways:

- **Basal:** insulin that is delivered continuously 24hrs a day in the background. The job of the basal insulin is to keep blood glucose levels stable when you aren't eating food. Basal rates can be programmed to change over the day based on individual needs.
- **Bolus:** Insulin needs to be given in a larger amount when you are eating or when your BGL is above target. These boluses cannot be pre-programmed into the pump. A pre-meal bolus is given based on the amount of carbohydrates about to be consumed. A correction bolus is given when blood glucose levels are above target to try and bring them back down. The pump is able to calculate the amount of insulin required based on BGL and/or carbohydrate grams being entered by the user. **It cannot work independently. It requires the user to enter BGL's and amount of carbohydrate to be consumed.**

All rates and ratios are set by the diabetes team at the commencement of pump therapy based on individual needs. With assistance, families are then taught to adjust their own pump settings when required.

## What are the advantages to pump therapy?

- Insulin delivery is precise and calculated according to each person's individual needs. Because of the accuracy of insulin administration, it may be possible to keep blood glucose levels in target range, most of the time.
- There is a greater flexibility in timing and the type of meals and snacks that can be eaten
- With accurate settings, quality of life can be improved with greater flexibility in being able to accommodate unpredictable events/activity
- Allows for more frequent adjustments in insulin dose, enabling a rapid response to changing BGL
- Diminishes variable absorption rates that occurs with long acting insulin
- May reduce incidence of hypoglycaemia during the night, post exercise and severe recurrent hypoglycaemia
- When used properly, pump therapy can be responsible for better diabetes control

### **What are the disadvantages to pump therapy?**

- There is a higher risk for DKA as the pump only uses rapid acting insulin. If there is an interruption to insulin delivery, blood sugars will immediately begin to rise and ketones will start developing within a few hours without insulin. Rapid acting insulin pens must be available at all times to inject insulin if required and ketones must be checked if BGLs are higher than 15mmol.
- Potential for skin infection and irritation around the insertion site is much higher. Infusion sets must be changed every 2-3 days and site rotation is just as important and when you are injecting.
- Intensive BGL testing is required. Pump users need to do 6-8 BGLs per day to ensure basal and bolus doses are accurate
- The device needs to be attached all the time with only certain exceptions for showers, swimming and contact sport.
- Learning how to manage pump therapy successfully can be a steep learning curve. Commencing on a pump requires several education sessions and is a lengthy process to learn all the features to the pump.

### **Who would be considered for CSII?**

CSII is not for everyone. Discuss pump therapy with your Endocrinologist at your next appointment and clarify with them if insulin pump therapy is suitable for you.

The following need to be considered before commencing on a pump:

- The young person needs to be able to show evidence of more than 4 BGLs per day
- Ability to self adjust insulin appropriately
- Ability to self administer injections
- No injection bother
- Family members must be supportive and motivated to help with management, and must be included in the all education sessions
- The young person needs to be motivated to improve control and maintain it
- An interest in learning about carbohydrate counting

### **What are the financial cost involved?**

The CSII devices are approx \$9,500. Private health insurance should cover this cost. This should be confirmed with your health fund before considering insulin pump therapy. Confirmation in writing is preferred. If you intend to join a private health insurance company, the qualifying/waiting period to be eligible for a pump is 12 months.

The other costs involved in CSII are the consumables; the line, cannula and insulin reservoir/cartridge. Most consumables are covered by NDSS. The costs of consumables are approximately \$30.00 per month.

## Who are the insulin pump manufacturers?

AMSL Diabetes (Animas): <http://amsldiabetes.com.au/>

Medtronic: <https://www.medtronic-diabetes.com.au/>



Animas Vibe



Medtronic VEO

There are two insulin pumps that we recommend for children and young people. Both are comparable in their features and functions.

For more information refer to the Medtronic and Animas web sites.

### **I would like my child to commence on pump therapy, what is the next step?**

The first step is to speak with your Endocrinologist at your next appointment. If you meet the criteria for pump therapy, your doctor will write you a referral to the Diabetes Allied Health team for a pump information session. This appointment will take place with a diabetes nurse educator and one other family. This will help answer all your questions regarding pump therapy. You will get the opportunity to insert an infusion set, see the pumps and gain an understanding of what is involved in commencing on a pump.

If you decide that pump therapy will suit your family you will be allocated a series of appointments for your 'pump start'. The current waitlist **from** the time of your information session is 6-9 months. The appointments following your information session include:

1. Choosing your pump (approx. 3hrs)
2. Receiving your pump and learning how it works (approx. 3hrs)
3. Pump start (two full days)
4. Pump start review (approx. 2hrs)
5. Pump start follow up (6 weeks from pump start)

These clinics are run on set days and may be with one or two other families

### **Where should I direct any additional questions?**

If you have any further questions please speak with your Endocrinologist at your next appointment or contact the Diabetes office on 9345 6661