

# QUICK REFERENCE GUIDE TO DIABETES FOR HEALTH CARE PROVIDERS

A special project of the Michigan Diabetes Outreach Network

## Chapter 10

### Insulin Pumps: What, When, Who and How

Continuous subcutaneous insulin infusion (CSII) therapy, also known as insulin pump therapy, has been commercially available for more than 20 years. Recently, insulin pump use has greatly increased. The pumps now available have many important safety, memory, and calculation features that make using a pump much easier than in the past.

#### Indications for Use

- Inability to normalize blood glucose on current insulin regimen. (Elevated A1C)
- Severe hypoglycemia
- Hypoglycemia unawareness
- Client preference/need for normalizing lifestyle
- Recurrent hospitalizations
- Preconception and pregnancy
- Gastroparesis
- Dawn Phenomenon
- Symogji effect.

#### How it works:

The pump is approximately the size of a pager and must be worn 24 hours a day. A reservoir or syringe, holds up to 200-300 units of insulin, which is delivered through an infusion site where the insulin is deposited subcutaneously. Insulin is delivered as either a basal rate or bolus

**Basal rate:** Delivers insulin continuously (every few minutes) in tiny amounts at various rates individual to each patient. Basal rates are determined first and usually require more frequent monitoring when pump therapy is first initiated. Once established basal rates seldom change except in children as they grow and develop, illness, exercise, etc.

**Bolus:** Boluses are delivered by the pump user to correct elevated blood glucose levels or to cover food intake. This is a larger amount of insulin and can be given all at once or over a period of time.

Infusion sets come in many types with different cannula lengths and must be changed by the person with diabetes every 48-72 hours.

## Criteria for screening adults and children with diabetes for possible pump use:

- Willing to monitor and record blood glucose a minimum of 4 times per day
- Responsible
- Willing and able to learn how to count carbohydrates. (Some math skills needed for person with diabetes or their caregiver)
- Willing to commit to medical follow-up.
- Able to or can learn to problem solve.
- Preferably currently using multiple daily injection (MDI) and able to adjust insulin to meet changes in lifestyle.
- Psychologically stable

## Benefits

- Improved glucose control (Lower A1C).
- Delivers insulin in a more physiologic manner.
  - Both the basal and bolus doses can be adjusted in  $\geq 0.05$  increments depending on the brand of pump.
- Normalization of lifestyle.
  - Pump users have more flexibility in eating, sleeping, exercising, etc.
- Less frequent and less severe hypoglycemia.
- Predictable absorption
- Programmable delivery
- Uses only rapid or short acting insulin.
  - Aspart and Glulisine are both approved by the FDA for use in pumps.
  - Lispro, although not FDA approved for use in pumps, has been deemed appropriate for use by the American Diabetes Association (ADA).
- Pump companies have 24/7 customer support lines.

## Risks

- The greatest risk associated with pump therapy is diabetic ketoacidosis (DKA). Because the pumps use only rapid or short acting insulin, delivery must be constant. If the cannula becomes occluded or the pump runs out of insulin, blood glucose and ketones can quickly rise. Testing blood glucose levels 4 or more times per day enables the person to detect possible problems early enough to intervene and prevent severe DKA.
  - Person should always have syringes and vials of insulin available in case of pump malfunction or occlusion.
- Skin infections and reactions to the tape may occur at the insertion site. Changing the site every 2-3 days, and using proper aseptic technique diminishes the occurrence of infection.
- Hypoglycemia is always a risk for anyone who takes insulin. Those on pump therapy have been shown to have a decrease in hypoglycemic events.

**References:** American Diabetes Association (2008). Clinical Practice Recommendations. *Diabetes Care*, Vol 31 (1).