

# **Pediatric Pearls: Insulin Pumps**

llene Claudius, MD and Ryan Pedigo, MD

- An insulin pump is a pager-size computer with a reservoir of insulin attached to it.
- Insulin is delivered to the patient via tubing to a subcutaneous insertion site.
- The tubing can be disconnected at the subcutaneous insertion site when needed (eg, when patient takes a shower)
- Omnipod<sup>™</sup> is a slightly different version where the pager-sized insulin reservoir attaches directly to the body without any tubing; the "brain" (or computer) is wireless.
- Insulin is usually a rapid-acting form that is delivered as a continuous infusion AKA
   "basal rate". It is usually lispro (Humalog™) or aspart (Novolog™). These are U-100 insulins (which means 100U in 1 mL); it is a very small volume that is typically being delivered. This is the same insulin that is given as a bolus with meals.

# PEARLS •

 Just because the patient comes in and their blood glucose is high or low, there may not necessarily be anything wrong with the pump.

#### PITFALLS ◆

- There is currently no existing pump that totally takes over the work of glycemic control

   the user is still involved with all pumps to varying degrees.
  - Insulin pumps have no innate ability to sense blood glucose levels.



- Some pumps may connect wirelessly to a blood glucose monitoring device that
  may interface with the insulin pump to trigger changes based on levels, but in
  general, the changes are user-initiated, including any change of rate or delivery of
  a bolus.
- Pump malfunction
  - Pump failure, tube disconnect, infusion set leak, insulin "bad", or infusion into a scarred area (pump site problem) are all possible.
    - These malfunctions usually manifest with hyperglycemia or DKA not hypoglycemia
  - If you see **hypoglycemia**, it is either due to:
    - user error (eg, they gave themselves too much insulin)
    - a concomitant problem (eg, acute kidney injury) where their normal amount of insulin (renally cleared) is now too much for them or,
    - another insulin sensitivity issue (higher insulin resistance from cortisol when patient is sick).
- Hypoglycemia management

## PEARLS •

- What if my patient is not eating or hypoglycemic? Should I pull the infusion set out or turn off the infusion?
  - Almost never should you completely remove the device or suspend the pump.
     Since these are short-acting insulins, there is a real risk of DKA.
- Treat patients with hypoglycemia in the same way as you would patients without a pump. Give dextrose.
- If a patient is NPO, they still need a basal rate of insulin.
- DKA/Hyperglycemia management
  - If a patient is hyperglycemic and you are going to try and give a subcutaneous dose of a short acting insulin to treat it, it is recommended that you give it from the pump. This will help you evaluate whether the pump site is an issue or not.
    - If they do respond, the pump system is fine. If they don't respond, maybe the pump site is not working, the insulin might be bad or there could be a tubing issue.

## PEARLS •

If you have a critically ill patient, you may want to disconnect the pump so you take
over. The most reversible way to do this is to disconnect the tubing where it attaches
to the infusion site on the patient's skin.



- Consult an endocrinologist if possible.
- What about "pausing" the pump?
  - Every pump has a little variation in how this is done and it's not a quick or easy thing to do. It is designed not to be too easy because with these short-acting insulins, if it were easy to do, and could accidentally be done, the patient could go into DKA quickly.
  - A patient (or parent) could do this on their own if needed.