



# Basic Insulin Pump Overview-Camp Leo Staff:

Jennifer Okemah MS RD BCADM CDE



## Overview:

- Terminology
- Non-pumper therapy and how it relates to pumpers
- Insulin pump basic theory
- Camp implications for both
- Pump parts and features
- What do you need to know about campers on pumps?
- Hands On practice

# Terminology

## ► Basal Insulin

- Insulin delivered or dissipated over 24 hours to account for liver production of glucose (extra fuel tank controlled by hormones)
- Basal insulin delivered via a pump is actually RAI trickled through at an hourly rate
- “flat line insulin”
- “background insulin”

## ► Temporary basal – pumps only

- Setting a period of time in which basal rate is decreased or increased to account for factors the pump is not programmed for: exercise, illness. This can be done by % of current basal rate or u/hr.
- Example: current basal rate is 0.50 units/hr. Camper is going to exercise more than normal. We may reduce the basal rate by 50% for X amount of time. Usually done for duration of exercise x 2.
- Can release temp basal anytime.
- Automatically goes back into regular basal pattern when time has ended

## ► Bolus insulin

- ICR – Insulin to Carb ratio – one unit of RAI covers \_\_\_\_ grams of carbohydrate. This numbers is unique to each individual and may change throughout the day and throughout life. There is no “Factory Setting” or “One size fits all”
- ISF or Correction Insulin – Insulin Sensitivity Factor or Correction Insulin – one unit of RAI not assigned to carbs, is estimated to drop a blood sugar by \_\_\_\_ points (mg/dL). Same as ICR, there is no factory setting and this can change throughout the day, with body weight changes and body composition.
- IOB – Insulin on Board – uses BOLUS insulin amount and “action time” to determine how much of that bolus is still “active”.

# Non-pumper therapy

- ▶ Definition of non-pumper: Insulin is injected approx. 3-5x per day at specific times and with specific doses.
- ▶ Multiple Daily Injections (MDI)–using pen and/or vial with syringe. AKA *Basal + Bolus* (see ‘Terminology’)
  - ▶ 1- 2 Injections of long acting insulin (LAI)– usually at night (before bed) and/or in the morning when wake up \*Most commonly 1x per day, same time every day.
    - ▶ NOT related to food. LAI dose is designed to keep up with normal liver production of glucose
    - ▶ Common names: Lantus, Levemir, Toujeo, Tresiba, Basaglar
    - ▶ Duration of action 12-24 hours
  - ▶ Meal time insulin – rapid acting insulin (RAI)
    - ▶ With meals – measured insulin to match carbohydrate intake – **OR** to correct existing high blood sugar **OR** quantities added together to account for both
    - ▶ Common names: Novolog, Humalog, Apidra, Afrezza (inhaled insulin-not indicated)
    - ▶ Duration of action of RAI is between 3-5 hours.



# Insulin pump basic theory

- ▶ Pump uses one type of rapid acting insulin in 3 ways:
  - ▶ Basal delivery per hour
  - ▶ Bolus calculation for entered amount of carbs
  - ▶ Bolus calculation to correct a high blood sugar to a defined target

# Camp implications for non pumpers and pumpers

## ► Non pumpers:

- Cannot retroactively adjust LAI for increased activity (decrease dose) or illness (increase dose)
- Cannot suspend delivery since injection is already on board
- “background insulin” can be protective against DKA
- Cannot determine IOB (easily)
- Can bolus RAI before or after meals and reduce bolus before exercise or increased activity

## ► Pumpers:

- Can suspend or apply temporary basal if hypoglycemic or prevent hypoglycemia
- No protective background insulin if there is disconnection from pump or infusion site is altered. HIGH RISK FOR DKA!!!
- Can determine IOB/active insulin



# Pump parts and features –Show and Tell

- ▶ Pump (brains)
- ▶ Reservoir or cartridge – holds insulin
- ▶ Infusion set or Pod
  - ▶ Tubing
    - ▶ Insertion set/cannula – must change location at least every 3 days
    - ▶ Pod/cannula – times out in 72 hours or when all insulin has been delivered. Must change every 3 days.
- ▶ CGM combined or separate communication from pump. DOES NOT deliver insulin. Does not affect auto adjustments of basal insulin except for Medtronic 530g with Enlite sensor (not Dexcom sensor) or Medtronic 670g with Guardian sensor (not Dexcom sensor)

# What do you need to know about campers on pumps?

- ▶ AKA – What could *possibly* go wrong?
- ▶ EVERYTHING!!! Camp is camp. BG targets and management is DIFFERENT from real life. Do not apply “real life” to camp. ADAPT to camp.
- ▶ Pump batteries die
- ▶ Reservoirs or cartridges empty
- ▶ Tubing gets kinked or occluded
- ▶ Infusion sets get bent, jostled, bumped
- ▶ Pods “fall off”
- ▶ Kids get sick
- ▶ Suspended pump does not get restarted
- ▶ Increased activity from home life = plummeting blood sugars
  - ▶ Consider adjust home basal rates -20% from home rates; dec LAI in non-pumpers



A dark grey arrow points to the right from the left edge of the slide. Several thin, curved lines in shades of blue and grey originate from the left side and sweep across the page towards the text.

## Hands On practice- Identify these 4 features in each pump

- Current basal rate
- Temporary basal rate
- IOB
- Last bolus given



# Tandem-

- ▶ Activate pump by touching sequences 1,2,3
- ▶ Current basal rate – OPTIONS, My pump, Personal Profiles, Edit to view but don't edit.
- ▶ Temporary basal rate – Options, Temp Rate, set % and duration, hit “start”.
- ▶ IOB – main screen
- ▶ Last bolus given – units and time remaining is on main screen



## Omnipod – (PDM)

- ▶ Current basal rate – Status screen – activate by pressing any button, then confirm identity of camper by name.
- ▶ Temporary basal rate – if active, will be on Status screen. To activate:
  - ▶ Press “home” button once PDM is in Status Screen. Scroll down to Temp Basal. Select “Increase” or “Decrease” per instruction. Select “next”. Enter duration of time by scrolling up. ‘Confirm’
- ▶ IOB – Status screen
- ▶ Last bolus given – Status screen

# Medtronic Paradigm or 530g series

- Current basal rate – Press ‘ESC’ key for current basal rate
- Temporary basal rate – open circle on main screen indicates a unique situation is occurring such as ‘temp basal’. Press ‘ESC’ key for status of temp basal.
  - To set temp basal – Press ‘ACT’ ->scroll down to ‘Basal’. Press ‘ACT’ ->press ‘set/edit temp basal’ – set duration of time –press ‘ACT’ – set % or u/hr change as instructed -> press ‘ACT’ - you should now see an open circle in upper left corner of home screen, right next to the “syringe” indicating reservoir volume.
- IOB – main menu, Bolus, Bolus History
- Last bolus given – Press ‘ESC’ key for last bolus given

# Medtronic 630g or 670g

- Current basal rate – highlight ‘Basal’ on home screen ->press center ‘confirm’ button. Current basal rate will show
- Temporary basal rate – highlight ‘Basal’ on home screen ->press center ‘confirm’ button. Scroll down to Temp Basal. Set duration of time ->‘confirm’. Change percent of basal per instruction. Hit ‘Begin’.
- IOB – called “active insulin” – on Home screen, bottom right or under “bolus” on home screen
- Last bolus given – Home screen. Bolus will be highlighted. ‘Confirm’. Last bolus will show. Also can access it by Home screen, highlight top bar using up key. Hit ‘confirm’. Scroll down to ‘quick status’. Last bolus, current basal is on there.



# Animas Vibe

- ▶ Current basal rate – main screen
- ▶ Temporary basal rate – Menu -> Basal -> Temp
  - ▶ Same as PING
- ▶ IOB
  - ▶ Home screen
- ▶ Last bolus given
  - ▶ Main screen -> History -> bolus



# CGM

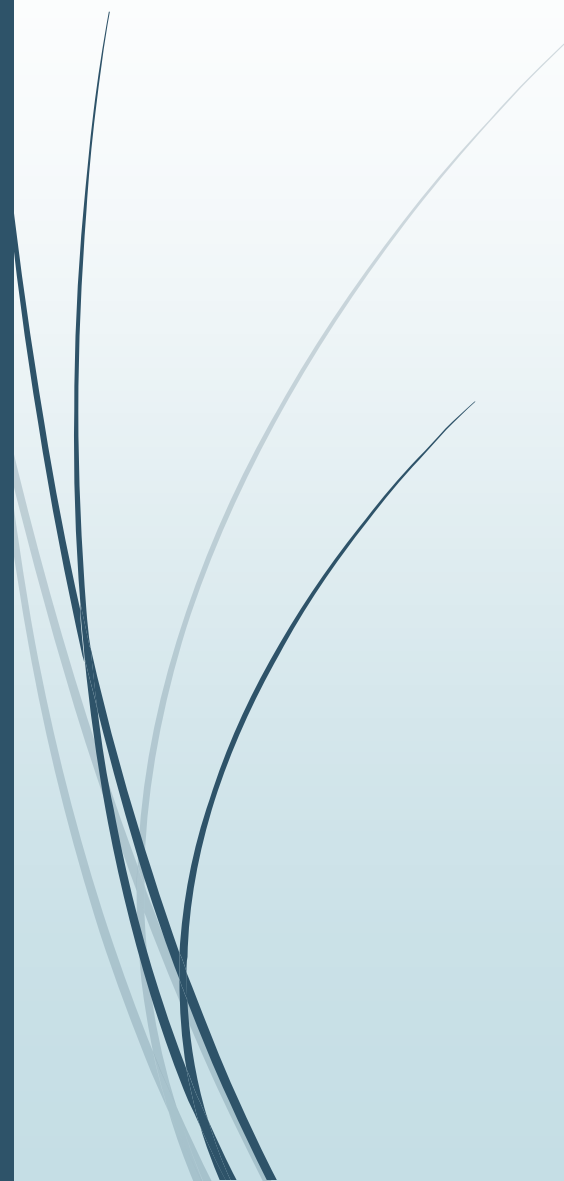
- ▶ Dexcom
  - ▶ Stand alone or with pump
  - ▶ Does not affect insulin delivery
  - ▶ Provides alerts and alarms for highs and lows
  - ▶ 1 sensor plus transmitter per week- may be on abdomen, arm, backside
- ▶ Libre
  - ▶ Stand alone
  - ▶ Does not communicate with any pump
  - ▶ Does not provide alerts or alarms
  - ▶ 1 sensor for 10 days –usually on arm
- ▶ Medtronic
  - ▶ Only in combination with Medtronic pumps
  - ▶ Can affect basal insulin delivery or microbolus
  - ▶ Provides alerts and alarms
  - ▶ 1 sensor plus transmitter per 6 days – usually on abdomen



# CGM cont:

- ▶ BG vs SG
- ▶ Benefits and limitations
- ▶ Trend arrows and decision making
  - ▶ Double up/down
  - ▶ Slightly up/down
  - ▶ Lateral or flat





**Questions?**