Diabetes in the School

What do I need to know?

School Nurse Workshop 2023

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Diabetes Management

- Blood Glucose Monitoring
  - Before all meals and with signs and symptoms
  - Finger sticks vs CGM

Insulin

- Long acting
  - Lantus, Tresiba, Basaglar, Semglee, Toujeo
  - Onset
  - Peak
  - Duration
  - Typically given once daily at same time
  - Set dose by provider

Insulin

- Rapid Acting
  - Novolog, Humalog, Lyumjev, Apidra
  - Onset
  - Peak
  - Duration of Action
  - Typically dosed immediately BEFORE eating
  - If dosing AFTER, dose must be given within 30 minutes of first bite
  - Dosing Frequency

Measuring and Administering Insulin

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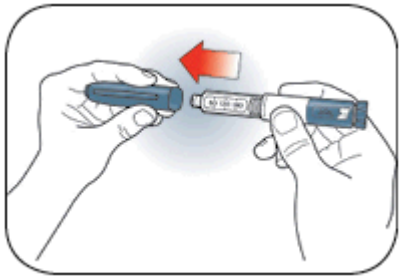
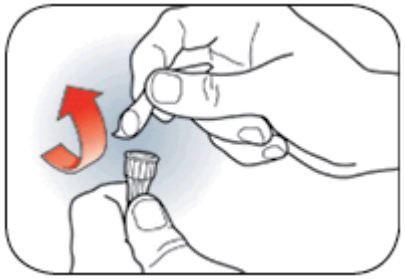
How to Use a Pen-Preparation

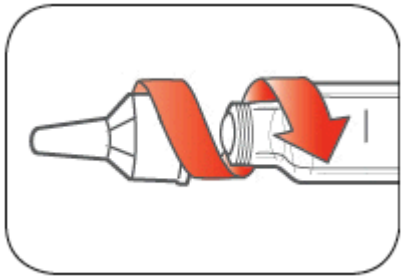
1. Check to ensure you have the correct insulin
2. Wash hands with soap and water
3. Check the expiration date
4. Use a new needle with each injection



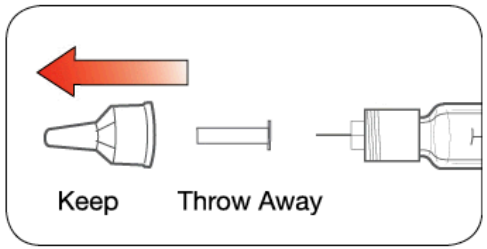
•Pull cap straight off
•Wipe rubber seal with alcohol
•Insulin should be clear and colorless



•Remove paper from outer needle shield



•Place the needle onto the pen until it is tight.



•Pull outer needle shield and put aside… **DO NOT THROW AWAY**
•Remove inner needle shield and throw away.

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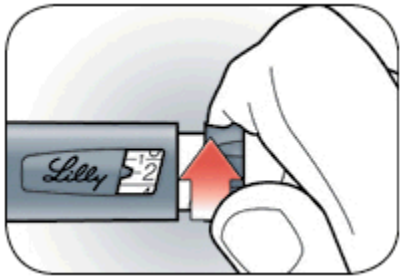
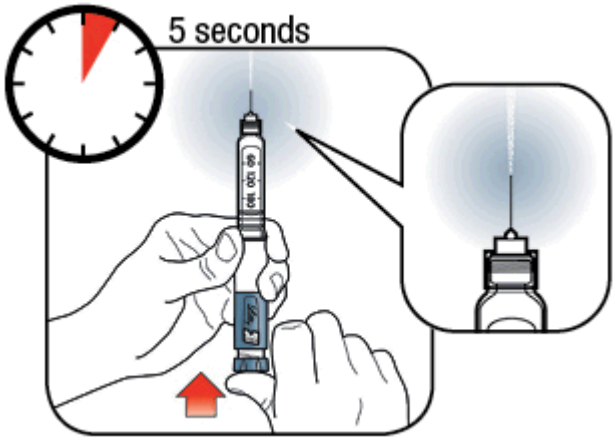
Priming



•Turn dose selector to 2 units to perform an air shot.

•Hold the pen with the needle pointing up.
•Tap cartridge gently a few times to collect air bubbles at the top.



•Keep needle pointing up.
•Press the push button all the way in.
•Hold the dose knob in and count to 5 slowly.
•You should see a drop of insulin and “0” will appear in the Dose window.

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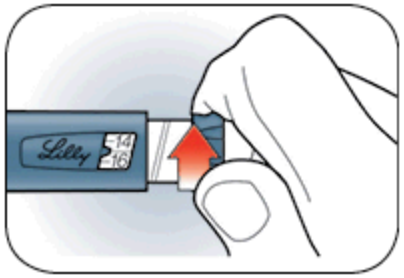
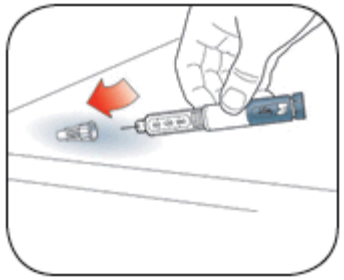
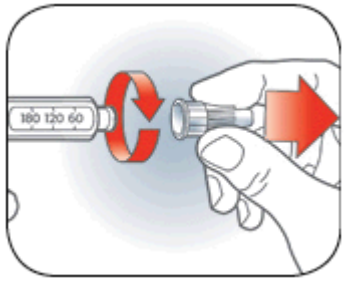
Dose Selection



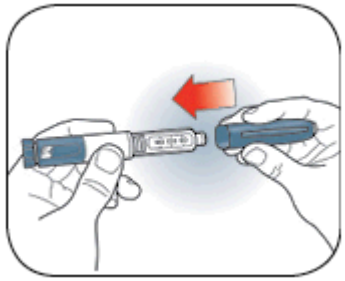
1. Turn dose knob to selected number needed for injection.
2. You can turn the knob in either direction until the correct dose is visible.
3. The dose indicator should line up with your dose.
4. You can not dial more than the amount of insulin left in the pen.
5. Inject the insulin.
6. **Count slowly to 10 after injecting insulin**
7. You should see “0” in dose window after injecting. If you do not see “0” you did not give the full dose.



•Replace outer needle shield only.



•Unscrew and discard.
•DO NOT store pen with needle



•Replace pen cap and store

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After Injection

- Count to 10 before removing the needle
- If you see blood after removing the needle, press the injection site lightly. **Do not** rub the area
- Remove needle from pen after each injection
- Place used needles in sharp container
- **Do not share insulin pens or needles.**
- Store unused pens in refrigerator
- The pen you are currently using can be stored out of the refrigerator
- Dose knob should be at “0”

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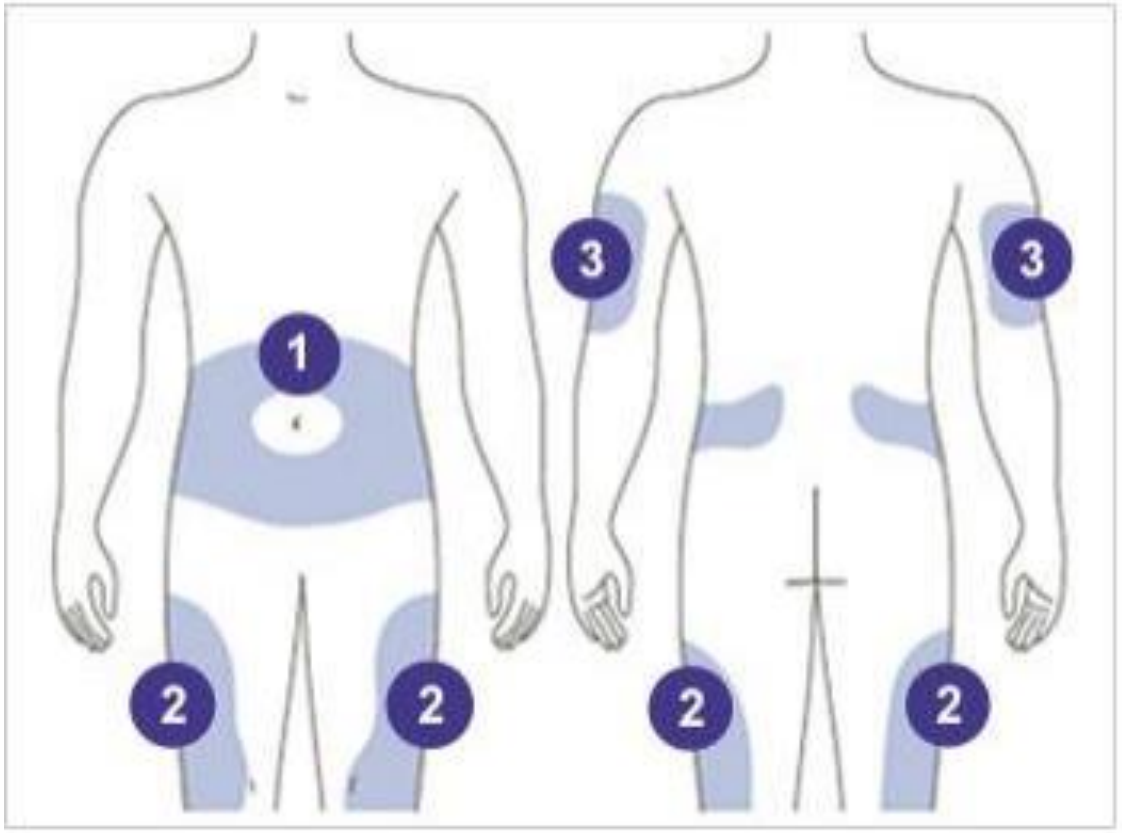
Where Should My Insulin be Given?

The best places to give insulin are the stomach, arms, thighs, and hips. Give insulin in different spots within each site.



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Meal/Snack Dosing

- Dosed regardless of blood sugar level
- Insulin to Carbohydrate Ratio (Carb Ratio)
  - Carb counting required
  - Dosed based on carbs consumed
- Fixed Dose
  - Set amount for meals
  - Similar portion sizes for carbs

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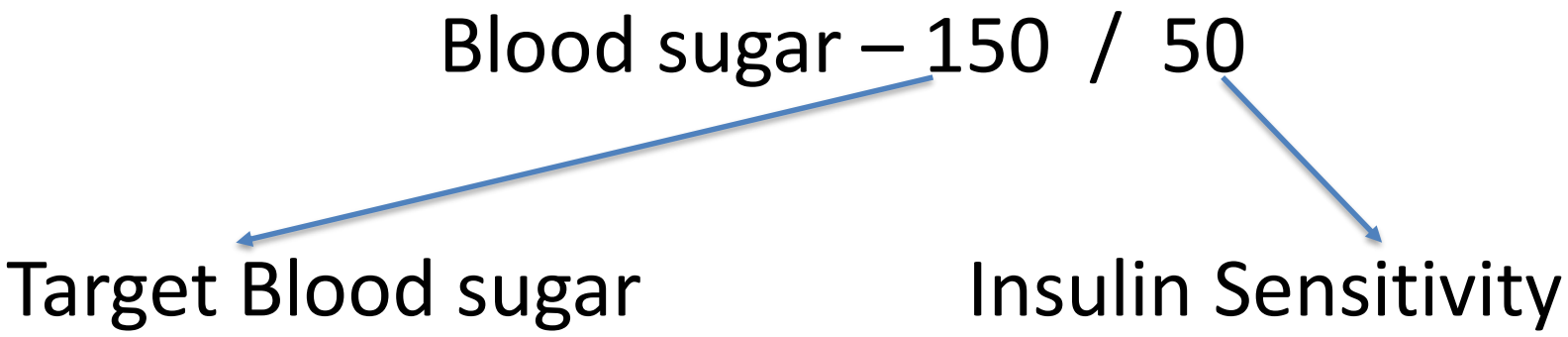
Insulin Dosing

- Correction Factor



- MUST wait 3 hours in between correction factor dosing

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Insulin Dosing

- Sliding Scale

  1 units if blood glucose is 150 to 200 mg/dl

  2 units if blood glucose is 201 to 250 mg/dl

  3 units if blood glucose is 251 to 300 mg/dl

  4 units if blood glucose is 301 to 350 mg/dl

  5 units if blood glucose is 351 to 400 mg/dl

  6 units if blood glucose is greater than 400 mg/dl

- MUST wait 3 hours between sliding scale doses

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Rounding

ALWAYS do each math problem separately but wait to round until the very end!

Round to the nearest half unit	Round down to the nearest half unit	Round up to the nearest half unit
0.1 – 0.4 = Round down to the whole unit 0.5 = Keep dose as is 0.6 – 0.9 = Round up to the whole unit	0.1 – 0.4 = Round down to the whole unit 0.5 = Keep dose as is 0.6 – 0.9 = Round down to the half unit	0.1 – 0.4 = Round up to the half unit 0.5 = Keep dose as is 0.6 – 0.9 = Round up to the whole unit
Round to the nearest whole unit	**Round down to the nearest whole unit**	**Round up to the nearest whole unit**
0.1 – 0.4 = Round down to the whole unit 0.5 – 0.9 = Round up to the whole unit	0.1 – 0.4 = Round down to the whole unit 0.5 – 0.9 = Round down to the whole unit	0.1 – 0.4 = Round up to the whole unit 0.5 – 0.9 = Round up to the whole unit

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Dosing Example

Johnny comes to your office before lunch. His orders read Novolog 1 unit per 12 grams of carbs before lunch. Correction Factor is Blood sugar – 150 / 80. Round down to the nearest whole unit. You check his blood sugar, and it is 258. He tells you what all he plans to get from cafeteria, and you add it up to be a total of 89 carbs. How much Novolog does Johnny get?

Dosing Example Cont.

Blood sugar = 258

Carbs = 89

Blood sugar-150/80

1 unit per 12 grams of carbs

Correction factor:

258-150 = 108

108/80 = 1.35(Do NOT round here. Keep first decimal place only)

1.3 units needed for blood sugar

Carb ratio:

89/12 = 7.41 (Do NOT round here. Keep first decimal place only)

7.4 units needed for carbs

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Dosing Example Cont.

1.3 (from BG) + 7.4 (from Carbs)=

8.7 units

Order states to round down to the nearest whole unit, therefore you would give

8 units of Novolog

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Example #2

Susie is coming to you before lunch with a blood sugar of 323 and her lunch sent by mom totals 45 grams of carbs. Her orders read:

Humalog

1 unit per 10 grams of carbs

Blood sugar – 120/80

Round to the nearest whole unit

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Example #2 Cont.

Blood sugar 323

Carbs = 45 grams

Round to the nearest whole unit

Blood sugar – 120/80

1 unit per 10 grams of carbs

Correction Factor:

323 – 120 = 203

203/80 = 2.53

2.5 units for correction

Carbs

45/10 = 4.5

4.5 units for carbs

2.5+4.5 = 7 units Humalog needed

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Example #3

Zach comes to you before lunch with a blood sugar of 65 (LOW). He says he plans to eat 97 grams of carbs at lunch. His orders read:

Novolog

Blood sugar – 120/20

1 unit per 5 grams of carbs

Round to the nearest whole unit

Do you still need to give him Novolog?

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Example # 3 Cont.

YES!!!!!!!!!!

No correction factor needed due to low blood sugar. But still need carb ratio for food.

Therefore:

97/5 = 19.4

give 19 units

*Follow Medical Management Plan regarding Treatment of Lows

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Example #4

- Mary had lunch at 12pm. She received her carb ratio and correction factor doses at that time. At 2pm she comes to you complaining of a headache. You check her blood sugar and it is 303. How should you proceed? How much Novolog is needed?

Example #4 Cont.

- You can NOT give more Novolog at this time. It has only been 2 hours since last correction factor given.
- Follow medical management plan, check for ketones, give sugar free fluids. Notify parents if ketones are present

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Example #5

- It’s 1:30pm. Marcus’ class is having cupcakes for a classmate’s birthday today. He has a snack order for Novolog 1 unit per 12 grams of carbs. His blood sugar is 253 on the Dexcom. Marcus had lunch at 11:35 am. What do you do?

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Example #5 cont.

- Give Marcus Novolog for cupcake (carbs) only. No need to check blood sugar unless ordered on Treatment and Intervention Order page

InPen

FIRST FDA-CLEARED SMART INSULIN PEN

DATA-DRIVEN MDI THERAPY WITH INPEN™ SMART INSULIN PEN

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Further, Together

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DIABETES TECHNOLOGY FOR ALL MDI USERS

INPEN™

First FDA-cleared smart insulin pen*

Launched in US (Dec 2017)

Smart Insulin Pen

- 12-month battery life and warranty
- Delivers 0.5-unit doses
- Compatible with:
  - Novolog®
  - Humalog®
  - Fiasp®
- Available in Pharmacy for type 1 & type 2 diabetes

Take the right amount of insulin at the right time

- Tracks active insulin
- Reminds to dose
- Calculates personalized doses
- Automatically logs doses
- Creates shareable reports
- Syncs with CGMs and glucose meters

*Smart insulin pens connect wirelessly to the user's smartphone device and provide dosing calculations and reminders while integrating with advanced CGM systems.

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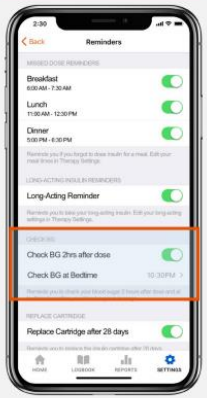
TYPES OF REMINDERS

Missed Meal Dose

Missed Long-Acting

Check BG Reminder



Replace Cartridge

Reminders may help adherence to a diabetes treatment plan

DOSE CALCULATOR

INPEN™ AUTOMATICALLY TRACKS INSULIN DOSES IN THE APP

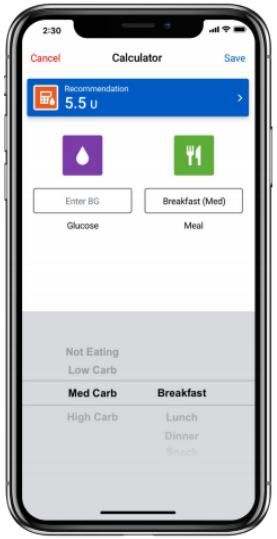
The use of a bolus calculator is associated with a 0.7-1.0% reduction in A1C.[1-3]

MDI patients using a bolus calculator report:

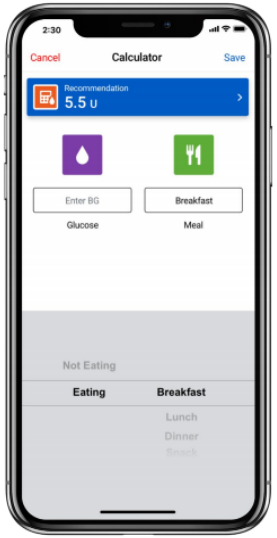
- Reduced fear of hypoglycemia[4-6]
- Improved confidence in the accuracy of their insulin bolus dose[4-6]
- Increased treatment satisfaction[4-6]

Carb Counting

Meal Estimation



Fixed Dose



1. Ziegler R, Cavan DA, Cranston I, et al. Use of an insulin bolus advisor improves glycemic control in multiple daily insulin injection (MDI) therapy patients with suboptimal glycemic control: first results from the ABACUS trial. Diabetes Care. 2013; 36(11):3613-3619.
2. Kaufman FR, Halvorson M, Carpenter S. Use of a plastic insulin dosage guide to correct blood glucose levels out of the target range and for carbohydrate counting in subjects with type 1 diabetes. Diabetes Care. 1999; 22(8):1252-1257.
3. Anderson DG. Multiple daily injections in young patients using the ezy-BICC bolus insulin calculation card, compared to mixed insulin and CSII. Pediatric Diabetes. 2009; 10(5):304-309
4. Barnard KD, Parkin CG, Young A, et al. Use of an automated bolus calculator reduces fear of hypoglycemia and improves confidence in dosage accuracy in patients with type 1 diabetes mellitus treated with multiple daily insulin injections. J Diab Sci Tech. 2012;6:144–149.
5. Schmidt S, Mahlgaard M, Ser Fioshi N, et al. Use of an automated bolus calculator in MDI-treated type 1 diabetes: the bolusCal study, a randomized controlled pilot study. Diabetes Care. 2012;35:984–990
6. Vallejo-Mora M, Carreira M, Anarte MT, Linares F, et al. Bolus Calculator Reduces Hypoglycemia in the Short Term and Fear of Hypoglycemia in the Long Term in Subjects with Type 1 Diabetes (CBMDI Study). Diabetes Technol Ther. 2017 19(7):402-409

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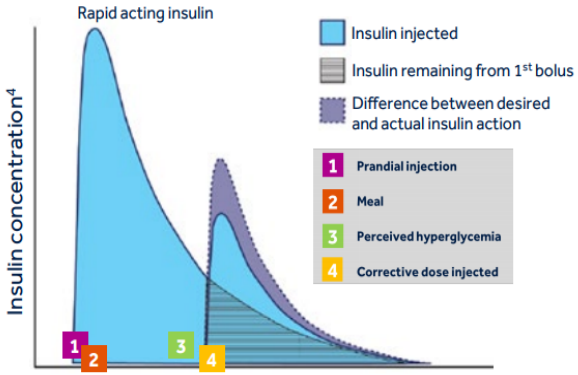
ACTIVE INSULIN AUTOMATICALLY TRACKED WITH INPEN™

60% of insulin doses are taken with some insulin-on-board.[1-3]



Available features to account for insulin-on-board

1. Ziegler R, Cavan DA, Cranston I, et al. Use of an insulin bolus advisor improves glycemic control in multiple daily insulin injection (MDI) therapy patients with suboptimal glycemic control: first results from the ABACUS trial. Diabetes Care. 2013; 36(11):3613-3619. 2. Kaufman FR, Halvorson M, Carpenter S. Use of a plastic insulin dosage guide to correct blood glucose levels out of the target range and for carbohydrate counting in subjects with type 1 diabetes. Diabetes Care. 1999; 22(8):1252-1257. 3. Anderson DG. Multiple daily injections in young patients using the ezy-BICC bolus insulin calculation card, compared to mixed insulin and CSII. Pediatric Diabetes. 2009; 10(5):304-309 4. Heise T, Meneghini LF. Endocrine Practice. 2014;20(1):75-83.

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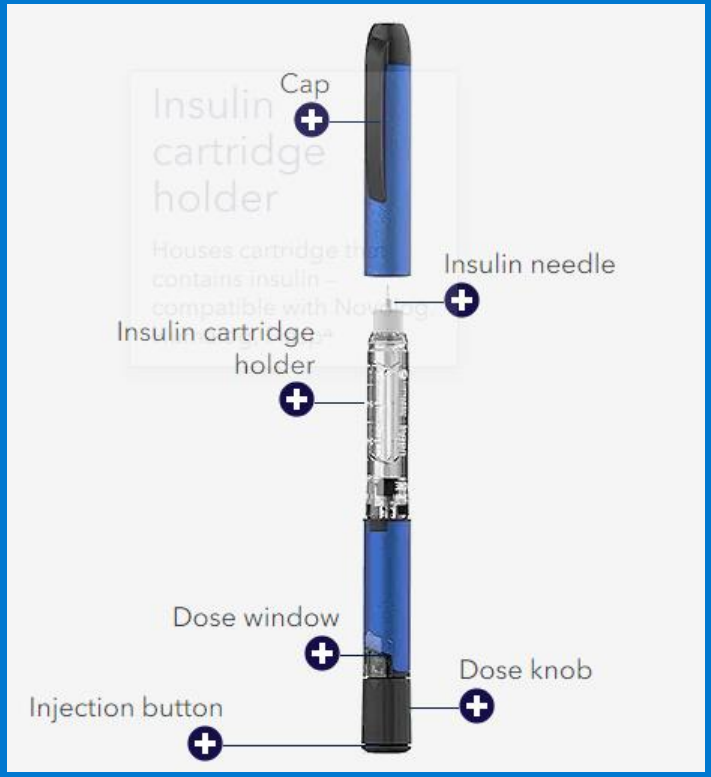
InPen Insulin Delivery Device



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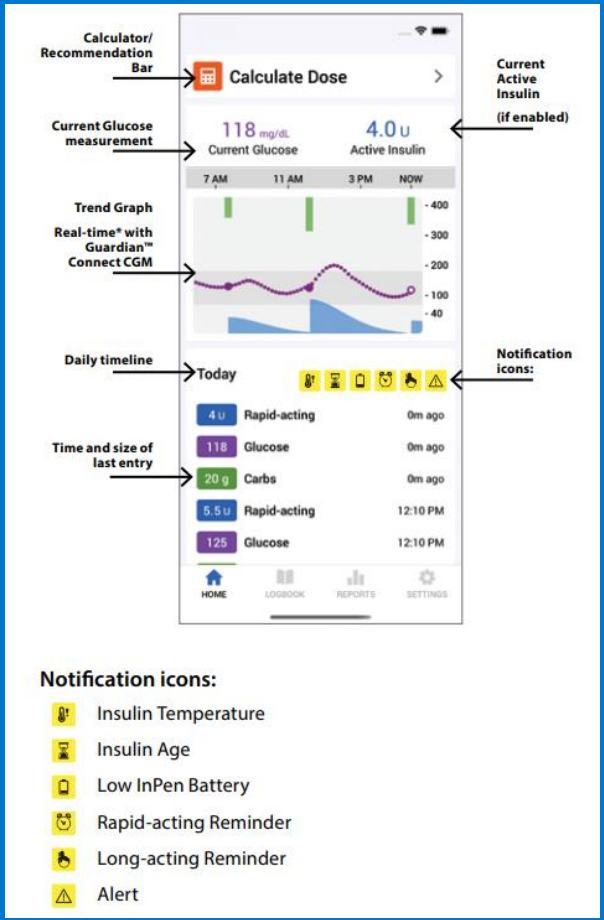
InPen App Home Screen



Trend Graph

- Green Line = Carbohydrates
- Purple Dot/Wave = Blood Glucose or CGM data
- Blue Wave = Rapid acting Insulin on Board

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Dose Calculator

- Enter Blood Glucose, total Carbohydrates for meal/snack, OR Both
- Select save
- Recommended rapid acting insulin dose is in blue bar at top of screen
- Do NOT prime your pen before you have saved this dose calculation
- If you do not wish to dose, select cancel and no data will be saved

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InPen- Lows

If a low blood Glucose is entered into calculator, it will prompt you to eat fast-acting carbs, regardless of the amount of carbs to be consumed with the meal/snack.

Remember we like to treat the low first!

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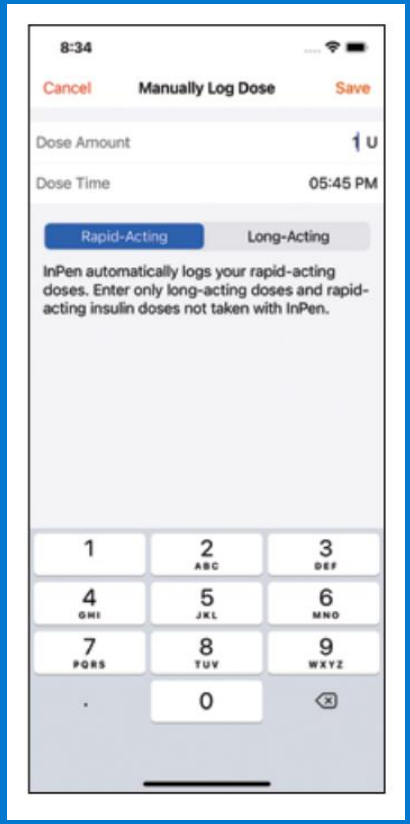
InPen- Manually Log Dose

- Accurate Insulin on Board is KEY for InPen success
- If you don't have the InPen device and are using the app only, in the logbook page, select "**LOG DOSE**"
- Enter rapid vs. long acting
- Enter total dose delivered and time administered
- Save!



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InPen support, Instructional Videos, and User Guides

https://www.medtronicdiabetes.com/products/inpen-smart-insulin-pen-system

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School Packet for InPen

□ **InPen Device** (See Treatment for Hyperglycemia/Hypoglycemia on pages 7 & 9)

***The dose the Inpen App recommends is calculating the insulin on board so it may or may not match the same dose if you calculate it out.

Mealtime Dose – See medication prescriber/parent authorization form, labeled "**meal dose**" for dosage and route. This is always given for food. Verify the doses on the medication Prescriber form is the same doses that are in the dose setting in the app. Enter the amount of carbohydrates and the current blood sugar in the Inpen app. This will calculate the recommended dosing for that meal.

Correction Dose – Use medication authorization form labeled "**correction dose**", for blood glucose above the target number. Verify that the doses match the correct doses on the medication authorization form and the dose settings in the app.

CORRECTION FACTOR DOSE SHOULD NOT BE GIVEN ANY CLOSER THAN 2 HOURS APART IF USING THE DOSING SUGGESTION FROM THE INPEN APP THAT INCLUDES SUBTRACTING INSULIN ON BOARD

- If **NO** correction factor is needed at meal/snack time, **NO** correction factor can be given for high blood sugar, until it has been a minimum of 2 hours after the meal/snack dose.

***The dose the Inpen App recommends is calculating the insulin on board so it may or may not match the same dose if you calculate it out.

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