

DiabetesEd Training Conference | San Diego *
Day Two | October 12, 2023 (Pacific Time)



Insulin Fundamentals to Pattern Management, Physical Assessment & Diabetes Technologies

Time	Topic	Speakers
7:00am – 8:00am	Breakfast & Vendor Stations	
8:00 – 9:30	Insulin - the Ultimate Hormone Replacement Therapy	Diana Isaacs, PharmD, BCPS, BCACP, CDCES, BC-ADM, FADCES, FCCP
9:30 – 9:50	Break	
9:50 – 10:45	Insulin Pattern Management and Dosing Strategies	and Beverly Dyck Thomassian, RN, BC-ADM, MPH, CDCES
10:45– 12:00	Diabetes Interview – From Head to Toe Microvascular Risk Reduction	
12:00 – 1:00	Lunch & Vendor Stations	Scan QR Code below for Day Two Survey
1:00 - 2:15	Diabetes Technology-Monitors, Pumps and Data Interpretation	
2:15– 2:30	Break	
2:30 – 3:15	Diabetes Technology-Monitors, Pumps and Data Interpretation	
3:15 – 4:45	Integrating Mental Health with Body Health. Delivering Extraordinary Diabetes Care	 

**Topics and Timing Subject to Change*



**DiabetesEd Specialist
Training Conference – Day 2**

Beverly Thomassian, RN, MPH, BC-ADM, CDCES
President, Diabetes Education Services
Oct 12, 2023

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**Course Schedule –
Day 2,
October 12,
2023**

Insulin – Ultimate Hormone Replacement Therapy



**Diana Isaacs, PharmD,
BCPS, BCACP, CDCES, BC-ADM, FADCES, FCCP**
Endocrine Clinical Pharmacy Specialist
Co-Director Endocrine Disorders in Pregnancy
Cleveland Clinic Diabetes Center

Disclosures for Dr. Isaacs

- ▶ Diana Isaacs, PharmD, BCPS, BCACP, CDCES, BC-ADM, FADCES, FCCP declares the following disclosures:
- ▶ Speaker: Abbott, Dexcom, Novo Nordisk, Insulet, Medtronic
- ▶ Consultant: Lilly, CeQur, Undermyfork
- ▶ CBDCES Credentialing Committee
- ▶ ADA Professional Practice Committee
- ▶ ADCES Board Member

Objectives – Insulin –The Ultimate Hormone Replacement Therapy

Objectives:

- Discuss the actions of different insulins
- Describe how to use the ADA algorithm for insulin management
- Counsel a person with diabetes on safe and effective insulin use
- Discuss strategies to determine and fine-tune basal and bolus insulin settings based on glucose pattern management
- Describe how insulin settings are used to program insulin pumps and connected insulin pens

History of insulin

- ▶ Insulin is produced by beta cells in the pancreas
- ▶ Discovered in 1921 by Frederick Banting and his assistant Charles Best from a dog's pancreas
- ▶ First used in a dog with diabetes and kept him alive for 70 days until they ran out of extract
- ▶ With the help of JB Collip and John Macleod, insulin was derived from the pancreas of cattle and in January 1922, given to a 14-year-old dying from diabetes in a Toronto hospital
- ▶ In 1923, Banting and Macleod received the Nobel Prize in Medicine which they shared with Best and Collip
- ▶ Soon after, Eli Lilly started large-scale production of insulin

ADA. The history of a wonderful thing we call insulin [accessed 2020 Aug 20]

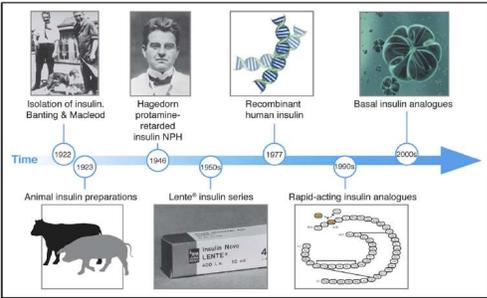
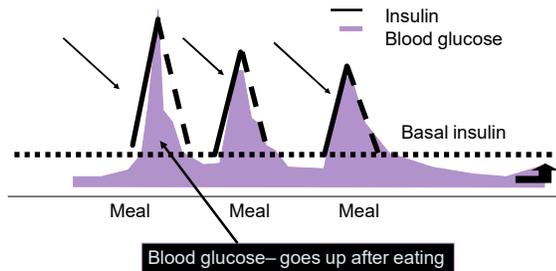


Figure 1 Milestones in the evolution of insulin therapy. NPH = neutral protamine Hagedorn.

Evolution of Insulin: From Human to Analog. Joseph M. Tibaldi, MD
 American Journal of Medicine, 2014

Physiologic Insulin Release: Individuals without diabetes



Physiologic Insulin at Meals

- ▶ **1st phase:** peak 1-2 minutes, duration 10 minutes, suppresses hepatic glucose production
- ▶ **2nd phase:** duration 1-2 hours

The perfect insulin would be fast enough to match the absorption of carbohydrates

Freeman JS. J Am Osteopath Assoc. 2009;109:26-36.

Insulin Overview

- ▶ None of the commercially available insulins are as fast as true physiologic insulin
- ▶ Almost all insulin is injected (SC or IV) with 1 inhaled option
- ▶ All people with T1D require basal + bolus insulin or insulin pump therapy
- ▶ Many people with T2D require insulin due to the progressive nature of the condition

Basal aka “Background” Insulin

- ▶ The liver plays a major role in maintaining glucose levels by regulating the process of gluconeogenesis and glycogenolysis in the liver
- ▶ Excessive hepatic glucose leads to hyperglycemia
- ▶ In a person without diabetes, there is a low level of insulin to keep glucose homeostasis from glucose produced by the liver (**basal insulin**)
- ▶ People with type 1 diabetes lack the ability to produce insulin to counteract the liver’s effects
- ▶ In people with type 2 diabetes, there may not be enough insulin due to insulin resistance
- ▶ Long-acting insulins or intermediate-acting insulins serve as a basal or “background insulin”
- ▶ In an insulin pump, a regular or rapid-acting insulin can be given continuously to serve as the basal

Everyone with T1D need basal insulin and many with T2D may need it

Shawabi K et al. Med Aspects Med. 2015; 46:21-22.

Bolus Insulin

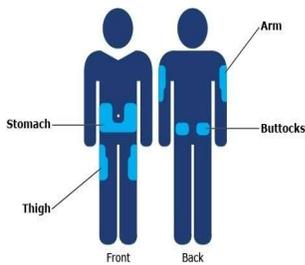
- ▶ Glucose rises in response to carbohydrates
- ▶ A regular or rapid-acting insulin is given as a bolus to prevent the glucose from rising too much
- ▶ A regular or rapid-acting insulin can also be given to “correct” a high glucose

Everyone with T1D needs bolus insulin, some people with T2D may need it to achieve glycemic targets

Which Insulin is Interchangeable with Lantus (Insulin glargine U100)?

- A. Toujeo (Insulin glargine U300)
- B. Basaglar (Insulin glargine U100)
- C. Semglee (Insulin glargine U100)
- D. Insulin degludec U100
- E. All of the above

Insulin Injection Sites



Insulin Key Counseling Points

- ▶ Do not shake insulin
- ▶ Cloudy insulin (NPH or pre-mixed) should be rolled before use so suspension is uniform
- ▶ Skin thickness is usually 2mm regardless of person's size, so shortest needles (4mm) work well for most
- ▶ Take outer and inner covering off for pen needles
- ▶ Leave the needle/syringe in the body for 5-10 seconds
- ▶ Change needle or syringe with each injection
- ▶ Dispose of needles/syringes in a sharps container or per local regulations



Dang DK. Taking medication. In: Cornell S et al, eds. The art and science of diabetes self-management education desk reference. 5th ed.

Priming insulin

- ▶ Pens should be primed before every use to get air bubbles out
- ▶ Hold vertically with needle at the top
- ▶ Turn dial to 2 units
- ▶ Push plunger
- ▶ Repeat until insulin comes out of the top
- ▶ May have to do multiple times for a new pen
- ▶ This will ensure all air is out and that pen needle works
- ▶ Do this every time an insulin pen injection is given



Storage Options



Insulin Storage and Expiration Cheat Sheet Available

Insulin Storage and Dispensing Info



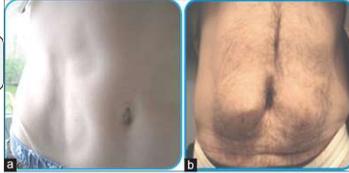
Product Name/Type	Expiration when opened, stored at room temp up to 86 F	Pens per Box Or Vial	Units per Pen/Vial	Max Dose / Notes
Rapid Acting Insulins				
Aspart (Fiasp)				
-Vial	28 Days	1 Vial	1000 units	
-Pen	28 Days	5 Pens per Box	300 units in 3 ml	80 Units
-Pump	6 Days			
Aspart (Novolog)				
-Vial	28 Days	1 Vial	1000 units	
-Cartridge	28 Days	5 cartridges	300 units in 3 ml	60 Units
-Flexpen	28 Days	5 Pens per Box	300 units in 3 ml	
-Pump	6 Days			
Glisulins (Apidra)				
-Vial	28 Days	1 Vial	1000 units	
-SoloStar Pen	28 Days	5 Pens per Box	300 units in 3 ml	80 Units
-Pump	2 Days			
Lispro (Humalog/Admelog)				
-Vial	28 Days	1 Vial	1000 units	80 Units (Admelog)
-Cartridge	28 Days	5 cartridges	300 units in 3ml	60 Units (Humalog)
-Pen	28 days	5 Pens per Box	300 units in 3ml	
-Pump	Up to 7 Days			
Lispro-aabc (Lyumjev)				
-Vial	28 Days	1 Vial	1000 units	
-Cartridge	28 Days	5 cartridges	300 units in 3ml	
-KwikPen	28 days	5 Pens per box	300 units in 3ml	60 units

Side Effects of Insulin

Weight Gain

Lipodystrophy/
Lipohypertrophy

Hypoglycemia



Dang DK. Taking medications. In: Cornwell S et al, eds. The art and science of diabetes self-management education desk reference, 4th ed.

Sharps Disposal: Product and Info



- ▶ Search for household hazardous waste listing for your city or county.
- ▶ Call 1-800-CLEANUP (1-800-253-2687)

Polling Question 1

- ▶ After how many days should an open vial of insulin degludec be discarded?
 - 28 days
 - 30 days
 - 42 days
 - 56 days

How to Dose Insulin

Type 1 Diabetes (T1D)

- ▶ Absolute deficiency in endogenous insulin
- ▶ Exogenous insulin is required
- ▶ The regimen should include:

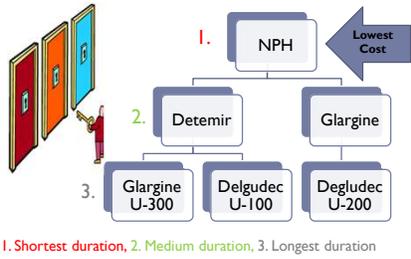
Basal Insulin + Bolus Insulin

How to Dose Insulin? T1D

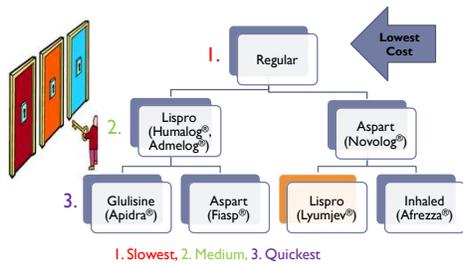
- ▶ Newly diagnosed T1D
 - ▶ Total insulin dose: 0.5-1.0 units/kg/day
 - ▶ 50% basal
 - ▶ 50% bolus
- ▶ Bolus can initially start with set doses or calculations can be used to determine initial carbohydrate ratio and correction factor

Permpapapetri LG et al. In: Corwell T et al. Pharmacotherapy for Glucose Management. The art and science of diabetes self-management education desk reference. 5th ed.

Choice of Basal Insulin



Choice of Bolus Insulin

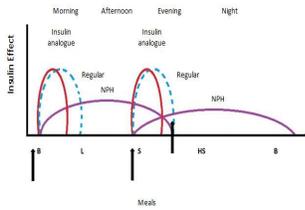


T1D: Insulin Dosing Regimens

Time of Insulin Administration	Before breakfast	Before lunch	Before dinner	Bedtime
Method 1	Intermediate: Regular (2/3 TDD) 2:1 ratio		Intermediate: Regular (1/3 TDD) 2:1 ratio	
Method 2	Regular/ analog (1/2 TDD ÷ by 3)	Regular/ analog (1/2 TDD ÷ by 3)	Regular/ analog (1/2 TDD ÷ by 3)	Long-acting (1/2 TDD)

***These are starting regimens and are adjusted based on ability to carbohydrate count and glycemic management as determined by A1C, BGM and/or CGM

Intermediate-acting Insulin + Regular Insulin or Insulin Analog

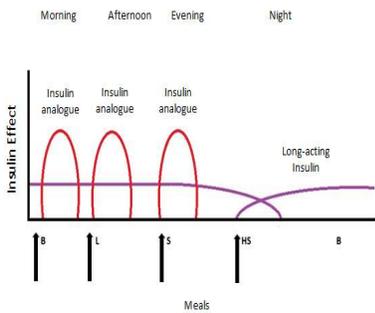


Intermediate insulin serves as basal while regular or insulin analog serves as bolus

Regular insulin: Novolin R, Humulin R
 Intermediate insulin: Novolin N, Humulin N
 Insulin analogue: aspart, lispro, glulisine

Dipiro JT et al, eds. Pharmacotherapy: a pathophysiologic approach. 11th ed. 2020.

Long-acting Insulin with Insulin analog



Long-acting serves as basal insulin analog serves as bolus

Carbohydrate Ratio

- ▶ Insulin to carbohydrate ratio (ICR)
 - ▶ 1 unit of insulin is expected to cover X grams of carbohydrates
- ▶ Rule of 450 (regular insulin) or 500 (rapid acting insulin) can be used
 - ▶ $500/TDD = \text{estimated carbohydrate ratio}$

Traglia J et al. Diabetes mellitus. In: Dipiro JT et al, eds. Pharmacotherapy: a pathophysiologic approach. 11th ed.

Correction Factor

- ▶ Insulin correction factor (ICF)
 - ▶ Often referred to as insulin sensitivity
 - ▶ 1 unit of insulin is expected to lower glucose by Y points
- ▶ Rule of 1700 or 1800 can be used
 - ▶ $1700/\text{TDD} = \text{estimated ICF}$
- ▶ For regular insulin, the rule of 1500 is typically used

Trujillo et al. Diabetes mellitus. In: DiGiro J et al., eds. Pharmacotherapy: a pathophysiologic approach. 12th ed.

An Example: Meet Larry

- ▶ Larry is a 12-year-old newly diagnosed with T1D, he weighs 40kg
- ▶ He is started on 0.5 units/kg/day of total insulin
 - ▶ $40 \times 0.5 = 20$ units
 - ▶ 50% basal = 10 units
 - ▶ 50% bolus = 10 units
- ▶ Larry is prescribed 10 units of long-acting insulin and 3 units of rapid-acting insulin at meals
- ▶ The insulin doses will be adjusted based on glucose data

Larry Calculation cont'd

- ▶ Larry is ready for carbohydrate counting
- ▶ Based on the rule of 500 and rule of 1700, what should his ICR and ICF be?



Poll Question 2

- ▶ Based on the rule of 500 and rule of 1700, what should Larry's ICR and ICF be? (TDD=20 units/day)
- A. ICR=25, ISF=85
 - B. ICR=20, ISF=60
 - C. ICR=15, ISF=50
 - D. ICR=30, ISF=75
 - E. I am not sure

Answer and Explanation

- ▶ $ICR = 500 / 20 = 25$
- ▶ This means that 1 unit of insulin covers 25 grams of carbohydrate
 - ▶ If Larry eats 50 grams of carbohydrate, he should inject 2 units
- ▶ $ISF = 1700 / 20 = 85$
- ▶ This means that 1 unit of insulin is expected to lower glucose by 85 mg/dL
 - ▶ Larry's glucose target is 100
 - ▶ If his current glucose is 185, he should take 1 extra unit of insulin

Correction Bolus (Common Scale)

Rapid/Fast Acting Insulin (1 unit:50 mg/dl>150)

Less than 70	Subtract 1 unit
70-150 mg/dl	0 units
151-200 mg/dl	1 unit
201-250 mg/dl	2 units
251-300 mg/dl	3 units
301-350 mg/dl	4 units
351-400 mg/dl	5 units

Correction Bolus (Common Scale)

Rapid/Fast Acting Insulin (2 units:50 mg/dl>150)

Less than 70	Subtract 1 unit
70-150 mg/dl	0 units
151-200 mg/dl	2 unit
201-250 mg/dl	4 units
251-300 mg/dl	6 units
301-350 mg/dl	8 units
351-400 mg/dl	10 units

Poll Question 3

- How much insulin does a person with type 1 diabetes need a day?
- About 1 unit per pound per day
 - No more than 0.5 units/kg per day
 - Approximately 5 units/kg per day
 - About 0.5 to 1.0 units/kg per day



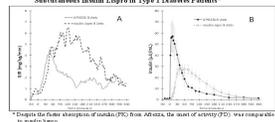
Afrezza – Inhaled Insulin



Injected Meal Time Dose	Inhaled Insulin Dose
Up to 4 units	4 units
5-8 units	8 units
9-12 units	12 units
12-16 units	16 units
17-20 units	20 units
21-24 units	24 units

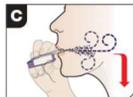
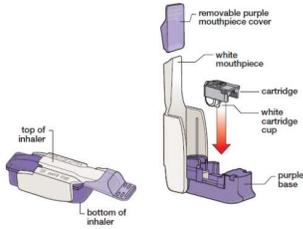
- **FDA approved for adults over 18yo**
- **Not indicated for pregnancy, while breastfeeding**

Figure 3. Baseline-Corrected Glucose Infusion Rate (A) and Baseline-Corrected Serum Insulin Concentrations (B) after Administration of AFREZZA as Subcutaneous Baseline Insulin in Type 1 Diabetic Patients*



Afrezza Inhaler

Know your AFREZZA® inhaler:



Inhale Deeply and Hold Breath

With your mouth closed around the mouthpiece, inhale deeply through the inhaler.

Hold your breath for as long as comfortable and at the same time remove the inhaler from your mouth. After holding your breath, exhale and continue to breathe normally.

Afrezza Storage

IN USE:
ROOM TEMPERATURE STORAGE
Reference the chart below for instructions on taking care of your inhaler and opened foil packages.

OPENED AFREZZA INHALERS	Room Temperature
	Use for up to 15 days from the date of first use. After 15 days, inhaler must be discarded and replaced.

SEALED BLISTER CARDS + STRIPS	Room Temperature
	Must be used within 10 days

OPENED STRIPS	Room Temperature
	Must be used within 3 days

NOT IN USE:
REFRIGERATED STORAGE
Store unopened drug in a refrigerator 36°F-48°F (2°C-8°C).

SEALED FOIL PACKAGES	Refrigerated
	May be used until the expiration date*

SEALED BLISTER CARDS + STRIPS	Refrigerated
	Must be used within 1 month*

*If a foil package, blister card, or strip is not refrigerated, the contents must be used within 10 days.

BEFORE USING YOUR AFREZZA INHALER

Before use, cartridges and inhaler should be at room temperature for 10 minutes.

Do not put a blister card or strip back into the refrigerator.
<https://afrezza.com/wp-content/uploads/2020/01/Afrezza-Storage-and-Handling-Guide.pdf>

Afrezza Dosing and Considerations

- ▶ Bolus regular insulin – inhaled before meals
- ▶ Dosing: 4, 8 and 12 unit cartridges
- ▶ Lung function test before start (FEV1)
 - ▶ Not for pts w/ chronic lung issues
 - ▶ Asthma, COPD, history of lung cancer, smokers
 - ▶ Can cause acute bronchospasm – Black box warning
- ▶ Side effects:
 - ▶ Sore throat, cough
 - ▶ Less hypoglycemia than injected insulin



Bolus Insulin Timing

▶ How is the effectiveness of bolus insulin determined?

- ▶ 1-2 hours post meal
- ▶ Before next meal blood glucose



▶ Glucose goals may be modified by HCP/pt

- ▶ 1-2 hours peak post meal <180 (ADA)
- ▶ 2 hour post meal <140 (AACE)
- ▶ Before next meal 80 - 130

Poll Question 5

▶ Mary takes 4 units lispro (Humalog) before breakfast. Which BG result reflects that the dose was the right dose?



1. Before breakfast BG of 97
2. 1 hour post breakfast BG of 190
3. Before lunch BG of 69
4. 2-hour post breakfast BG of 154

U500 Insulin

More than 200 units a day?



DRUG NAME	AVAILABILITY	PEN UNITS	EXPIRATION	ONSET	PEAK EFFECT	DURATION OF ACTION	CLINICAL PEARLS
INSULIN HUMAN REGULAR (HUMULIN R U500)	Pen, Vial	5 unit	Vial: 40 days Pen: 28 days	0.25-0.5 hours	4-8 hr	13-24 hr	This insulin is 5 times as concentrate d. If using a vial, use the special U500 syringe.

DailyMed: <https://dailymed.nlm.nih.gov/dailymed/index.cfm>
 Statinke AM et al. ADCEs in Practice. March, 2020. <https://doi.org/10.1177/2633559X20896414>

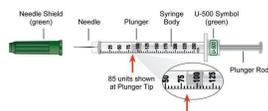
Switching to u500 insulin

- ▶ Typically reserved for people requiring insulin >200 units/day
- ▶ U500 acts like an intermediate acting insulin but replaces both the basal and bolus doses
 - ▶ If A1C < 8%, recommend to reduce TDD by 10-20%
 - ▶ If A1C ≥ 8%, consider 1:1 conversion
- ▶ Typically dosed 2-3 times daily
- ▶ It should be taken 30 minutes prior to meals
- ▶ Often initiated as a 60/40 or 40/30/30 split

Reid TS, et al. Postgrad Med. 2017;129(5):554-562.

U500 example

- ▶ A woman with obesity, T2D, and insulin resistance takes insulin detemir 120 units BID and insulin aspart 60 units TID a.c. Her most recent A1C=9%. How would she switch to U500?
 - ▶ 1:1 conversion since A1C ≥ 8%
 - ▶ TDD=180+240=420 units split as 40/30/30
- ▶ New Dose:
 - ▶ U500 165 units QAM, 125 units at lunch, 125 units at dinner
 - ▶ Must round to nearest 5 unit increment
 - ▶ Inject 30 minutes before each meal
 - ▶ Use U500 syringe or U500 pen
 - ▶ Do not use U100 syringes!



Reid TS, et al. Postgrad Med. 2017;129(5):554-562.

Barriers to Insulin Use

Poll Question 6

▶ AJ tells you she doesn't want to start on insulin. What is your best response?

- a. The needles are so small, you won't even feel it.
- b. Lots of people are afraid of insulin.
- c. It sounds like you are refusing to take insulin?
- d. I'm sorry, but there is a doctors' order to start insulin.
- e. What concerns do you have about taking insulin?



Psychological Insulin Resistance (PIR)

- ▶ 50% of providers in study threatened pts "with the needle".
- ▶ Less than 50% of providers realized insulins' positive effect on type 2 DM
- ▶ Most pts don't believe that insulin would "better help them manage their diabetes".
- ▶ Solutions: Find the root of PIR and address it



Diabetes Attitudes, Wishes, Needs Study - Rubin

Needle Size often a Barrier: Size Matters

- ▶ Use shortest needles – 4 mm
- ▶ Effective for almost ALL patients
- ▶ Keeps it subq
- ▶ If thin, inject at angle
- ▶ To avoid leakage, count to 10 before withdrawing needle
- ▶ ½ the patients who could benefit from insulin are not using it due to needle phobias
- ▶ Also consider insulin pumps, patches, iport, and inhaled insulin



How To's of Adding Insulin in Type 2 DM

Injectable Therapy for Type 2 DM

- ▶ Consider GLP-1 RA first
- ▶ Start basal insulin 10 units or 0.1 to 0.2 units/kg day
- ▶ Titrate up 2 units every 3 days, until FBG at goal
- ▶ If hypo, decrease insulin 20% or 4 units
- ▶ If basal insulin is >0.5 unit/kg day, add bolus insulin (avoid overbasalization)
- ▶ Adding bolus
 - ▶ Start with 4 units bolus at largest meal or
 - ▶ Start 1-2 injections with 10% of basal or
 - ▶ Switch to 70/30 twice or three times daily.



Intensifying Injectable Footnotes 9.2

- ▶ Consider insulin as the first injectable if evidence of ongoing catabolism A1C levels (>10%) or BG levels ≥ 300 mg/dL or a diagnosis of type 1 diabetes is a possibility.
- ▶ For those on GLP-1RA and basal insulin combination, consider using a fixed-ratio combination product (iDegLira or iGlarLixi).
- ▶ Consider switching from evening NPH to a basal analog if there is hypoglycemia and/or the individual frequently forgets to administer NPH in the evening. In this case, an AM dose of a long-acting basal insulin could be a better choice.
- ▶ If adding prandial insulin to NPH, consider initiation of a self-mixed or premixed insulin regimen to decrease number of injections.

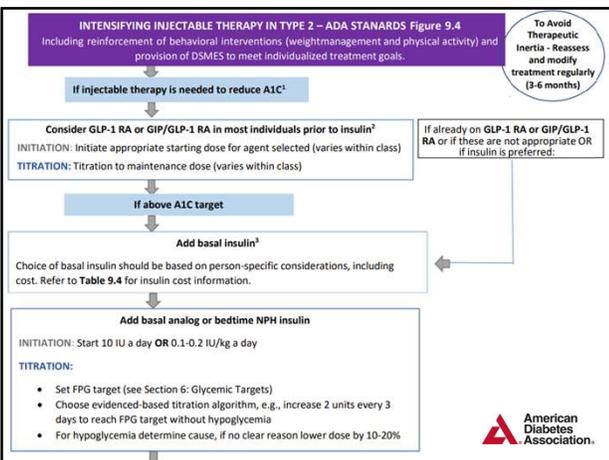


Insulin/Injectable Combos

PocketCards updated annually. Download FREE CDEES Coach App for latest updates and notifications.

Name	Combines	Considerations
iDegLira* Xultophy 100/3.6	Insulin degludec (IDeg or Tresiba) Ultra long insulin + Liraglutide (Victoza) GLP-1 Receptor Agonist (GLP-1 RA)	Xultophy 100/3.6 pre-filled pen = 100 units IDeg / 3.6 mg liraglutide per mL Once daily injection – Dose range 10 to 50 = 10 – 50 units IDeg + 0.36 -1.8 mg liraglutide Recommended starting dose: • 16 iDegLira (= 16 units IDeg + 0.58 mg liraglutide) Titrate dose up or down by 2 units every 3-4 days to reach target. Supplied in package of five single-use 3mL pens. Once opened, good for 21 days.
iGlarLixi* Soliqua 100/33	Insulin glargine (Lantus) Basal Insulin + Lixisenatide (Alyxin) GLP-1 Receptor Agonist	Soliqua 100/33 Solostar Pen = 100 units glargine / 33 μ g lixisenatide per mL Once daily injection an hour prior to first meal of day. Dose range 15 – 60 = 15-60 units glargine + 5 – 20 μ g lixisenatide Recommended starting dose: • 15 units if not meeting glucose target on 30 units basal insulin or GLP-1 RA • 30 units if not meeting glucose target on 30-60 units basal insulin or GLP-1 RA Titrate dose up or down by 2-4 units every week to reach target. Supplied in package of five single-use 3mL pens. Once opened, good for 14 days.

*Discontinue basal insulin /GLP-1 RA therapy before starting. If dose missed, resume with next usual scheduled dose.



INTENSIFYING INJECTABLE THERAPY IN TYPE 2 – ADA STANDARDS Figure 9.4
Including reinforcement of behavioral interventions (weightmanagement and physical activity) and provision of DSMES to meet individualized treatment goals.

Assess adequacy of basal insulin dose
Consider clinical signals to evaluate for overbasalization and need to consider adjunctive therapies (e.g., basal dose >0.5 IU/kg, elevated bedtime-morning and/or post-preprandial differential, hypoglycemia [aware or unaware], high variability)

If above A1C target and not on GLP-1/GIP, consider adding to treatment plan. If A1C still elevated:

Add prandial insulin⁵
Usually, one dose with the largest meal or meal with the greatest PPG excursion; prandial insulin can be dosed individually or mixed with NPH as appropriate

INITIATION:

- 4 IU a day or 10% of basal insulin dose
- If A1C <8% (64 mmol/mol) consider lowering the basal dose by 4 IU a day

TITRATION:

- Increase dose by 1-2 IU or 10-15% twice weekly
- For hypoglycemia determine cause, if no clear reason lower corresponding dose by 10-20%



INTENSIFYING INJECTABLE THERAPY IN TYPE 2 – ADA STANDARDS Figure 9.5
Including reinforcement of behavioral interventions (weightmanagement and physical activity) and provision of DSMES to meet individualized treatment goals.

If on bedtime NPH, consider converting to twice-daily NPH regimen
Conversion based on individual needs, glycemic control. The following is one possible approach:

INITIATION:

- Total dose= 80% of current NPH dose
- 2/3 given in the morning
- 1/3 given at bedtime

TITRATION: Titrate based on individualized needs

If above A1C target

Stepwise additional injections of prandial insulin
(i.e., two then three additional injections)

Proceed to full basal-bolus regimen
(i.e., basal insulin and prandial insulin with each)

Consider self-mixed/split insulin regimen
Can adjust NPH and short/rapid-acting insulins separately

INITIATION:

- Total NPH dose = 80% of current NPH dose
- 2/3 given before breakfast
- 1/3 given before dinner
- Add 4 IU of short/rapid-acting insulin to each injection or 10% of reduced NPH dose

TITRATION:

- Titrate each component of the regimen based on individualized needs

Consider twice daily premix insulin regimen

INITIATION:

- Usually unit per unit at the same total insulin dose, but may require adjustment to individual needs

TITRATION:

- Titrate based on individualized needs



Case Study: Jenny

Jenny is a 50-year-old woman that takes insulin glargine 100 units daily, glipizide 10mg BID, metformin 1000mg BID, and linagliptin 5mg daily. A1C is 9.3%. She weighs 110kg. She checks glucose in the AM only and reports it's 90-130mg/dL. Her eGFR is 70. She previously had UTI's with empagliflozin.

What is the best recommendation to adjust this regimen?

Thinking about the choices

- ▶ Continue glargine?
- ▶ Continue glipizide?
- ▶ Continue linagliptin?
- ▶ Switch to combination GLP1 receptor agonist /insulin injectable?
- ▶ Add GLP-1 agonist?
- ▶ Add prandial insulin?
- ▶ Add SGLT-2 inhibitor?



Piecing it Together

- ▶ New Regimen:
 - ▶ Insulin glargine 80 units once daily (20% reduction)
- ▶ Semaglutide 0.25mg weekly, titrated up to 1.0mg weekly
- ▶ Stop linagliptin
- ▶ Continue glipizide (for now)
- ▶ Next step could be to retry SGLT2i with counseling on how to avoid UTIs
- ▶ Or replacing glipizide with prandial insulin with largest meal

Switching Insulin

How to Switch Basal Insulin

- ▶ When going from twice daily basal insulin to once daily, reduce dose by 20%
- ▶ Examples:
 - ▶ Insulin NPH BID to insulin glargine daily
 - ▶ Insulin detemir BID to insulin degludec daily
- ▶ When switching between once daily, a unit per unit conversion is okay
- ▶ Long-acting to glargine U300 often requires higher doses (10 to 18%) but start with a unit to unit conversion
- ▶ When switching from glargine U300 to another long-acting insulin, reduce dose by 20%
- ▶ Need to use clinical judgement
 - ▶ For example, if A1C, FBG, and pre-meal BG are all above target, then may not be necessary to reduce basal insulin dose

Clinical Resource: Pharmacist's Letter/Prescriber's Letter, August 2019.

Poll 7 - Making the switch: Meet Joan

Joan is taking insulin glargine 30 units twice daily. Her insurance formulary wants her to switch to insulin degludec. Her current A1C is 6.9%. What is the best dose recommendation?



- A. Insulin degludec 30 units twice daily
- B. Insulin degludec 60 units once daily
- C. Do not switch since her A1C is well-controlled and get a prior authorization to continue with insulin glargine
- D. Insulin degludec 48 units once daily

Switching Meal time Insulin

- ▶ This is a 1:1 conversion when switching between regular insulin, aspart, lispro, and glulisine including Fiasp® and Lyumjev™
- ▶ The exception is when switching to Afrezza

Injected Meal Time Dose	Inhaled Insulin Dose
Up to 4 units	4 units
5-8 units	8 units
9-12 units	12 units
12-16 units	16 units
17-20 units	20 units
21-24 units	24 units

Clinical Resource: Pharmacist's Letter/Prescriber's Letter, August 2019. Afrezza package insert 2019.

Poll 8. Patient Case: Lumy

- ▶ Lumy's insurance formulary changed from insulin lispro to insulin aspart.
- ▶ She was following an insulin to carbohydrate ratio of 1:12 and a correction factor of 1:50.
- ▶ How should she dose insulin aspart when she switches?
 - Reduce all doses by 10%
 - Increase all doses by 10%
 - Same dosing
 - Submit prior authorization so she doesn't change insulin

Insulin Pattern Management

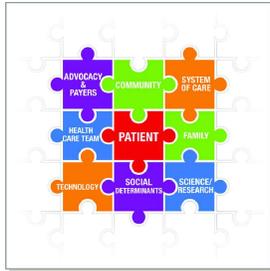
Pattern Management –AKA

How to think like a pancreas

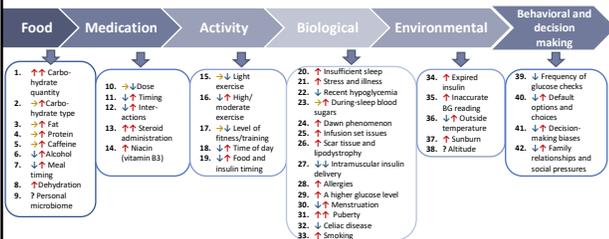


What do the numbers mean?

It's like a BIG puzzle!



At Least 42 Factors Affect Glucose!



Adapted from: Brown A. Diabetes Learn: Making sense of diabetes... diabetes.org/42factors

Poll Question 9

▶ When looking at glucose patterns, which problem do you fix first?

- a. Hyperglycemia
- b. Hypoglycemia
- c. Non-compliance
- d. Legible writing



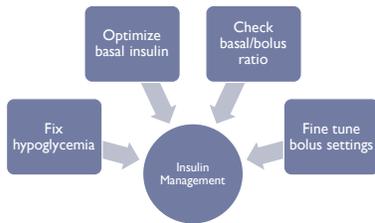
Pattern Management

- ▶ Safety 1st!! - Evaluate 3 day patterns
- ▶ **Hypo:** eval 1st and fix:
 - ▶ If possible, decrease medication dose
 - ▶ Timing of meals, exercise, medications
- ▶ **Hyperglycemia:** evaluate 2nd
 - ▶ Identify patterns
 - ▶ Before increase insulin, make sure not missing something (carbs, exercise, omission)



General Rules in T1DM

- ▶ Optimize basal dose (stay within 30mg/dL when not eating)

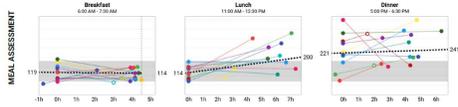


Adjusting Insulin doses in a Basal/Bolus regimen (T1DM & T2DM)

Out of Range Glucose	Insulin to Adjust
Fasting	Long acting insulin or evening NPH
Post-breakfast/pre-lunch	Pre-breakfast rapid/regular insulin
Post lunch/pre-dinner	Pre-lunch rapid/regular insulin or morning NPH
Post-dinner/before bedtime	Pre-dinner rapid/regular insulin

Meal Time Data Review

- ▶ Glucose data before and after breakfast, lunch and dinner
- ▶ Ideally, 2 hour post-meal should not rise above 180mg/dL or 50mg/dL from the pre-meal start
- ▶ By 4-5 hours, glucose should return to pre-meal level

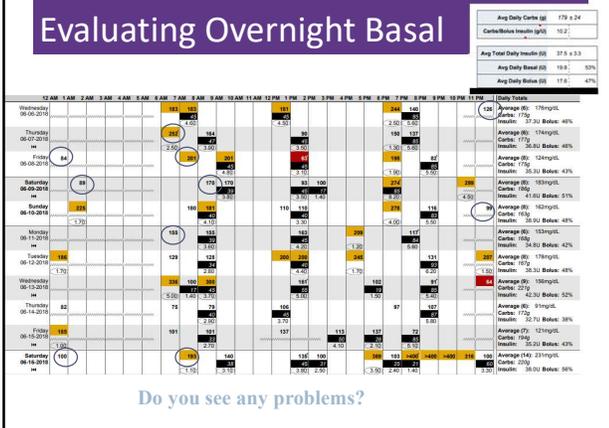


Bolus Pattern Management

- ▶ Does glucose go low after a correction dose?
 - ▶ May need a higher sensitivity
 - ▶ Ex. 1:60 instead of 1:50
- ▶ Does glucose remain high after a correction dose?
 - ▶ May need a lower sensitivity
 - ▶ Ex. 1:40 instead of 1:50
- ▶ Often people are more sensitive overnight (less insulin needed)
- ▶ Does the person spike high after eating?
 - ▶ Is the person bolusing BEFORE the meal
 - ▶ Counting carbs correctly?
 - ▶ May need a more intensive carb ratio
 - ▶ Ex. 1:6 instead of 1:8
- ▶ Does the person go low after eating?
 - ▶ Counting carbs correctly?
 - ▶ May need a less intensive carb ratio
 - ▶ Ex. 1:10 instead of 1:8

Adjustments typically made 10-20% at a time

Evaluating Overnight Basal



Checking the Sensitivity

▶ TDD=49 units

▶ Rule of 1700

▶ $1700/49=35$

▶ Current sensitivity is 40

Total daily dose (per day)		49 units
Bolus amount (per day)		21U (43%)
Auto Basal / Basal amount (per day)		28U (57%)

Carbohydrate Ratio (g/U)		Insulin Sensitivity (mg/dL per U)	
Time	Ratio	Time	Sensitivity
0:00	15.0	0:00	40

The calculation is slightly different from the current sensitivity. Look at the glucose data to determine if the sensitivity should be decreased.

Checking the Carb Ratio

▶ TDD=49 units

▶ Rule of 450

▶ $450/49=12.9$

▶ Current carb ratio is 15

Total daily dose (per day)		49 units
Bolus amount (per day)		21U (43%)
Auto Basal / Basal amount (per day)		28U (57%)

Carbohydrate Ratio (g/U)		Insulin Sensitivity (mg/dL per U)	
Time	Ratio	Time	Sensitivity
0:00	15.0	0:00	40

The calculation is different from the current carb ratio. Look at the glucose data to determine if the carb ratio should be decreased.

Case Study: Larry Poll Question 12

Larry takes metformin 1000mg BID, insulin glargine 50 units once daily, empagliflozin 10mg daily. His A1C is 7.8%. He weighs 90kg. FBG averages 100mg/dL. PP breakfast=190mg/dL, PP lunch=210mg/dL, and PP dinner is 240mg/dL. What is the best recommendation for an agent to add to the regimen to achieve A1C target?

- Initiate insulin aspart 5 units at dinner, decrease insulin glargine to 45 units daily
- Initiate insulin aspart 5 units with all meals, decrease insulin glargine to 35 units daily
- Initiate insulin aspart 5 units at dinner, continue insulin glargine 50 units daily
- Initiate dulaglutide 0.75mg weekly, decrease insulin glargine to 45 units daily

Summary

- ▶ Many different types of insulin
- ▶ Basal + bolus needed for T1DM
- ▶ Weight based dosing and rules of 1700/1800 and 500/450 can be used to calculate correction factor and carb ratio
- ▶ GLP1 agonist preferred 1st injectable in T2DM
- ▶ Avoid overbasalization, if taking more than 0.5unit/kg/day, think about GLP1 agonist +/- prandial insulin
- ▶ Counsel patients on injection site technique, administration and storage
- ▶ Fine tune insulin settings based on BGM and CGM data



Diabetes Interview – From Head to Toe & Microvascular Risk

www.DiabetesEd.net

Beverly Thomassian, RN, MPH, BC-ADM, CDCES
President, Diabetes Education Services

Honing Detective Skills



During interviews, outline strategies to identify previously undiscovered diabetes co-conditions, identify clinical inertia and move to best health.

4. Comprehensive Medical Evaluation and Assessment of Comorbidities: *Standards of Medical Care in Diabetes—2022* [FREE](#)
American Diabetes Association Professional Practice Committee

[Check for updates](#)
Diabetes Care 2022;45(Supplement_1):S46–S59
<https://doi.org/10.2337/oc22-0004>

Objectives

1. Identify common yet often under diagnosed co-conditions associated with type 1 and type 2 diabetes.
2. Describe the interrelationship between glucose, inflammation and diabetes complications.
3. List the elements of a head-to-toe assessment including lower extremity assessment.
4. Discuss barriers to sexual health and communication strategies.



4. Comprehensive Medical Evaluation and Assessment of Comorbidities

- ▶ Person centered communication, strength-based language, active listening, literacy, quality of life
- ▶ It is necessary to take into account all aspects of a person's life circumstance
- ▶ It is important to integrate medical eval, engagement and lifestyle changes.
- ▶ Interdisciplinary teams provide best care



EV Arrives and Requests Help

- ▶ 58 yr old complains of 4 lb wt gain for past month. BMI 31, wt 90 kg. B/P 142/96. A1C 8.3%
- ▶ Meds include:
 - ▶ Sitagliptin, Metformin
 - ▶ Actos 15mg ac breakfast
 - ▶ Basaglar 58 units
 - ▶ Semaglutide 0.5mg weekly
 - ▶ Levothyroxine (ran out)
 - ▶ Lisinopril 10mg
 - ▶ Gabapentin 100 mg TID

What story do these meds tell?
Any med(s) missing?
Any med needs to be stopped?



EV Arrives and Requests Help

- ▶ 58 yr old complains of 4 lb wt gain for past month. BMI 31, wt 90 kg. B/P 142/96. Checks BG in morning; 150ish. A1C 8.3%
- ▶ Meds include:
 - ▶ Sitagliptin (DPP-IV), Metformin
 - ▶ Basaglar 58 units (Basal)
 - ▶ Semaglutide 0.5mg wk (GLP-1)
 - ▶ Levothyroxine (ran out)
 - ▶ Lisinopril 10mg (ACE)
 - ▶ Lovastatin 20mg (Statin)
 - ▶ Gabapentin 100 mg TID (leg pain)

What does this tell us about EV?

- Struggling with weight
- B/P & A1C above target
- Overbasalized (max dose 0.5 units/kg a day)
- Why not taking thyroid med?
- Lower extremity pain contributing to distress?
- Elevated CV risk?

EV is Gaining Weight and is Tired

- ▶ 58 yr old complains of 4 lb wt gain for past month. BMI 31, wt 90 kg. B/P 142/96. Checks BG in morning; 150ish. A1C 8.3%
- ▶ Meds include:
 - ▶ Sitagliptin, Metformin
 - ▶ Actos 15mg ac breakfast
 - ▶ Basaglar 58 units
 - ▶ Semaglutide 0.5mg weekly
 - ▶ Levothyroxine – ran out
 - ▶ Lisinopril 10mg
 - ▶ Gabapentin 100 mg TID



Labs

A1C – 8.3%
 UACR 26 GFR >60
 TSH 10.6
 LDL 98 mg/dl, Trig 158
 ALT 85 IU/L, AST 90 IU/L
 (normal range 25-50)

Life situation

Takes care of dad with dementia
 Gums inflamed
 No eye doctor for year
 Both feet hurt at night

ABCs of Diabetes

- ▶ A1c less than 7%
 - ▶ Pre-meal BG 80-130
 - ▶ Post meal BG <180
- ▶ Blood Pressure < 140/90
 - ▶ BP target <130/80
 - ▶ If CVD or 10-year CVD Risk > 15%
- ▶ Cholesterol
 - ▶ Statin therapy indicated if 40+



Advocating for Best Health for people with Diabetes

- ▶ Modifiable
 - ▶ Sleep
 - ▶ Activity
 - ▶ Smoking
 - ▶ Dietary Habits
 - ▶ Glucose
 - ▶ Blood Pressure
 - ▶ Lipids
 - ▶ Oral Care
 - ▶ Immunizations
 - ▶ Psychosocial care



▶ Make small, achievable goals. We are in this for the long run.

Diabetes is a long path



Get at least 7 hours of sleep a night – Check for sleep apnea

Obstructive Sleep Apnea - OSA

- ▶ OSA affects ~25% of people with type 2
 - ▶ Up to 60% of those with type 2 have disordered sleep
- ▶ Associated with increased CVD risk
- ▶ 4-10 increased risk if BMI 30+ with visceral adiposity
- ▶ Treatment:
 - ▶ Lifestyle modification
 - ▶ Continuous positive oral airway pressure and devices
 - ▶ Surgery



Where are we on this continuum?



Only about 50% of us are meeting activity goals



Benefits of Exercise and Diabetes

- ▶ Increase muscle glucose uptake 5-fold
- ▶ Glucose uptake remains elevated for 24 - 48 hours (depending on exercise duration)
- ▶ Increases insulin sensitivity in muscle, fat, liver.
- ▶ Reduce CV Risk factors (BP, cholesterol, A1c)
- ▶ Maintain wt loss
- ▶ Contribute to well being
- ▶ Muscle strength
- ▶ Better physical mobility



Exercise decreases:

- ▶ Sleep apnea
- ▶ Diabetic kidney disease, retinopathy
- ▶ Depression
- ▶ Sexual dysfunction
- ▶ Urinary incontinence
- ▶ Knee pain
- ▶ Need for medications
- ▶ Health care costs



Best Medicine

- ▶ **Exercise is the best medicine.** Structured exercise of 8 weeks duration, has been shown to lower A1c by an average of 0.66% in people with type 2, even without a significant change in BMI.



Smoking and Diabetes

Smoking increases risk of diabetes 30%



- Ask at every visit
- Assess
- Advise
- Assist with stop smoking
- Arrange for referrals
- Organize your clinic

USDA www.myplate.gov

Balancing Calories

- ▶ Enjoy your food, but eat less.
- ▶ Avoid oversized portions.

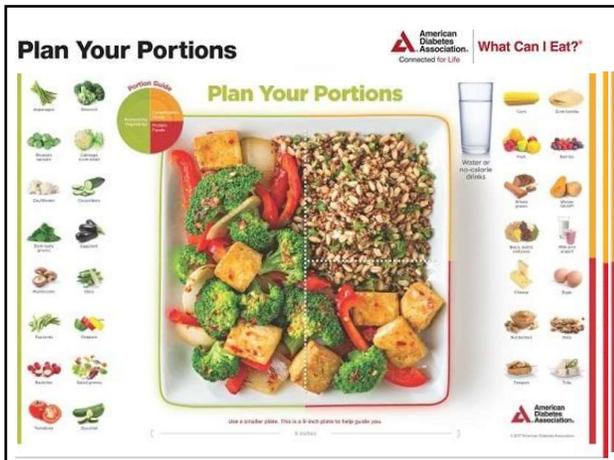
Foods to Increase

- ▶ Make half your plate fruits and vegetables.
- ▶ Make at least half your grains whole grains.
- ▶ Switch to fat-free or low-fat (1%) milk.

Foods to Reduce

- ▶ Compare sodium in foods like soup, bread, and frozen meals — and choose the foods with lower numbers.
- Drink water instead of sugary drinks.





Diabetes Toolkit

- Meter**
 - ▶ Diabetes ID
 - ▶ Strips that aren't expired?
 - ▶ Phone, medic alert, on person
- Medication supply**
 - ▶ Carbohydrate source
- Pump Supplies**
 - ▶ Granola bar, glucose tabs, GU, gummy bears
- CGM Supplies**
 - ▶ Rescue Meds
- Power back-up**

EV asks why the weight gain?



- ▶ Fluid retention - diabetes doubles risk for Congestive Heart Failure (CHF). Check lower extremities.
- ▶ Inaccurate nutrition knowledge
- ▶ Actos and Avandia, (TZD's) associated with edema
- ▶ Blood sugars improving
- ▶ Thyroid disease under treated
- ▶ Novel Antipsychotics
- ▶ Depression / Increased intake

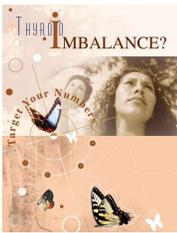
Thyroid Disease and Diabetes

- ▶ 15 to 30% of people w/ diabetes & their siblings or parents are likely to develop thyroid disease
- ▶ Up to 60 percent of those with thyroid disease are unaware of their condition.
- ▶ Women are 5-8x's more likely than men to have thyroid problems.
- ▶ Check TSH on Type 1 & 2 annually or if indicated.
- ▶ Hashimoto's thyroiditis – autoimmune thyroid
 - ▶ most common cause of hypothyroidism w/ dm
 - ▶ Associated with:
 - ▶ Elevated cholesterol levels
 - ▶ Increased risk of CV disease
 - ▶ Weight gain



AACE Website

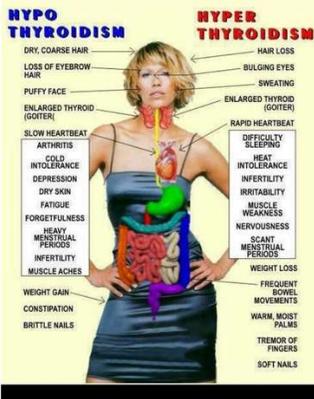
Thyroid & TSH* Levels



- ▶ *Thyroid Stimulating Hormone - secreted by pituitary gland
- ▶ controls thyroid hormone thyroxine production
- ▶ first and best test
- ▶ TSH Norm = up to 4.5 mIU/mL
- ▶ Treatment based on TSH plus symptoms.
 - ▶ 4.5 – 10 based on risk, s/s
 - ▶ 10 or more = treat
- ▶ Lower = hyperthyroidism
- ▶ Higher = hypothyroidism-

AACE Guidelines

Thyroid Dysfunction



A TSH above 10 mIU/L, in combination with a subnormal free T4 characterizes overt hypothyroidism.

If TSH in range, but person is symptomatic, Check for thyroid peroxidase atb or TPO antibodies

A low TSH indicates hyperthyroidism (0.1 ish)

Poll question 13

- ▶ Which of the following is a true statement?
 - Atypical antipsychotics are contraindicated for people with diabetes.
 - Hyperthyroidism is more common than hypothyroidism.
 - Depression can be associated with weight gain or weight loss.
 - Hypothyroidism causes LDLs to decrease.



Novel / Atypical Antipsychotics Linked to Hyperglycemia

- ▶ Severe cases of hyperglycemia – even death reported
- ▶ Monitor BG regularly for DM individuals started on this class of med
- ▶ If at risk for DM, determine fasting glucose before initiating therapy and monitor closely during treatment
- ▶ Weight gain may require increased dosing of diabetes therapies.

Summary of FDA warning statement for atypical antipsychotics

Novel/ Atypical Antipsychotics Linked to Hyperglycemia

- ▶ Zyprexa – olanzapine
- ▶ Geodon - ziprasidone
- ▶ Seroquel – quetiapine
- ▶ Risperdal - risperidone
- ▶ Clozaril - clozapine
- ▶ Abilify – aripiprazole
- ▶ Latuda - lurasidone



Consensus Development Conference on Antipsychotic Drugs and

Collaborative Action Plan

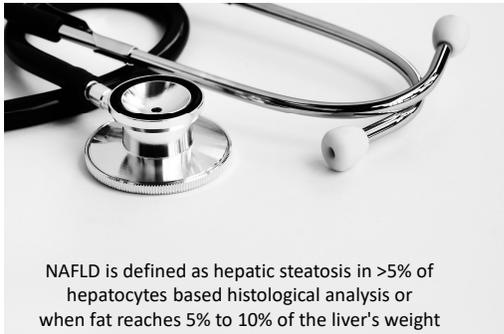
- ▶ Increase semaglutide to 1.0mg
- ▶ Decrease basaglar by 10 units
- ▶ Stop sitagliptin, pioglitazone (Actos)
- ▶ Walk after lunch during work week
- ▶ Restart levothyroxine, Re-Check TSH - Re-evaluate in 4 weeks.
- ▶ Eat one serving of veggie a day and decrease meat intake to 4 nights a week.
- ▶ Meet with RD/RDN
- ▶ Check BG a few times a week before bed (in addition to am)



What about alcohol intake?

Are these goals realistic?

EV has the beginning of NAFLD



NAFLD is defined as hepatic steatosis in >5% of hepatocytes based histological analysis or when fat reaches 5% to 10% of the liver's weight

Non-Alcoholic Fatty Liver Disease

NAFLD is when fat reaches 5% to 10% of the liver's weight

Without consumption of significant amounts of alcohol defined as:

- Ingestion of less than 21 standard drinks per week in men and
- Less than 14 standard drinks per week in women

over a 2-year period preceding evaluation) or the presence of other secondary causes of fatty liver disease.



Non-Alcoholic Fatty Liver Disease (NAFLD)

4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2023

Fatty Liver Disease & Steatohepatitis

Adults with type 2 diabetes.

- ▶ NAFLD is prevalent in >70%
 - ▶ Of those 50% have NASH*
 - ▶ 12-20% have fibrosis
- ▶ Need evaluation for nonalcoholic steatohepatitis and liver fibrosis for those:
 - ▶ At high risk: type 2 or prediabetes with cardiometabolic risk factors plus
 - ▶ elevated liver enzymes (ALT) or
 - ▶ fatty liver on imaging or ultrasound

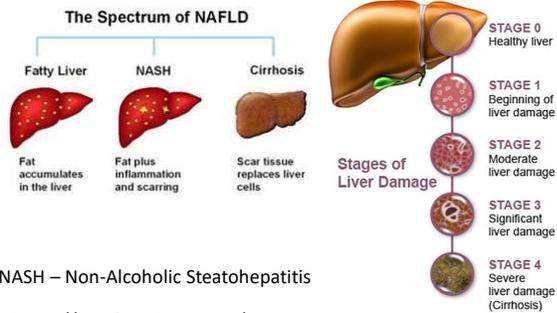


- Associated with :**
- Increased BMI (30+)
 - Cardiometabolic risk factors
 - Over 50 yrs
 - ALT & AST 30 units/L +

*Non-Alcoholic Steatohepatitis (NASH)

4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2023

Natural History of NAFLD to NASH



NASH – Non-Alcoholic Steatohepatitis

<https://liverfoundation.org/wp-content/uploads/2020/11/StagesFibrosis.jpg>

Stages of Liver Failure

- ▶ NAFLD – nonalcoholic fatty liver disease
 - ▶ NAFL – simple fatty liver, doesn't usually progress to cause liver damage
 - ▶ NASH – nonalcoholic steatohepatitis
 - ▶ Liver inflammation and cell damage.
 - ▶ Can cause fibrosis, scarring
 - ▶ Leading cause of hepatocellular carcinoma and liver transplants (ADA)
- ▶ Cirrhosis – degeneration of cells, inflammation, fibrous thickening
- ▶ End-stage liver disease & Liver Cancer

<https://liverfoundation.org/for-patients/about-the-liver/the-progression-of-liver-disease/#fibrosis-scarring>

Symptoms of Fatty Liver

If symptoms do appear, they may include:

- ▶ A feeling of fullness in the middle or upper right side of the abdomen
- ▶ Abdominal pain, nausea
- ▶ Loss of appetite or weight loss
- ▶ Weakness
- ▶ Jaundice
- ▶ Swelling of the abdomen and legs
- ▶ Mental confusion
- ▶ Extreme fatigue or tiredness
- ▶ Signs of advanced disease include:
 - ▶ Portal hypertension, spider angiomas, reddening of palms, declining platelet counts



Mayo Clinic

<https://dermcollective.com/palmar-erythema/>

Screening for NASH – FIB-4

Fibrosis-4 (FIB-4) Index for Liver Fibrosis

Noninvasive measure of liver scarring in HCV and HIV patients, to assess need for biopsy

When to Use	Peaks/Plateaus	Why Use
Age	59	years
AST Aspartate aminotransferase	34	U/L
ALT Alanine aminotransferase	28	U/L
Platelet count	217	$\times 10^9/L$

1.75 points
Further investigation needed
Approximate fibrosis stage: Metak 2-3 (Steering et al 2006)

FIB-4 screening is quick and simple, tracks changes over time

mdcalc.com/calc/2200/fibrosis-4-fib-4-index-liver-fibrosis

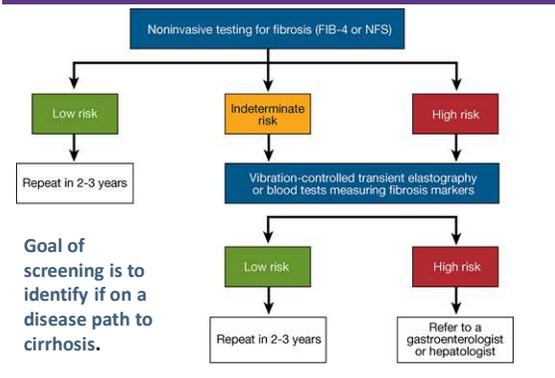
4. Comprehensive Medical Evaluation and Assessment of Comorbidities. Standards of Care in Diabetes—2023

FIB-4 estimates risk of hepatic cirrhosis (age 35+):

- ▶ Calculated by imputing:
 - ▶ Age
 - ▶ plasma aminotransferases (AST and ALT)
 - ▶ and platelet count
- ▶ FIB-4 Risk Levels
 - ▶ Lower risk is <1.3
 - ▶ Intermediate 1.3 to 2.67
 - ▶ High risk >2.67
 - ▶ considered as having a high probability of advanced fibrosis (F3–F4).

Diabetes Education Services www.DiabetesEd.net

Screening for Fibrosis Risk



Finding Liver Disease

- ▶ Imaging procedures used to diagnose NAFLD include:
- ▶ **Abdominal ultrasound**, which is often the initial test when liver disease is suspected.
- ▶ **Transient elastography**, an enhanced form of ultrasound that measures the stiffness of liver. Liver stiffness indicates fibrosis or scarring.
- ▶ **Magnetic resonance elastography**, works by combining MRI imaging with sound waves to create a visual map (elastogram) showing the stiffness of body tissues
- ▶ **Biopsy** by liver specialist confirms definitive diagnosis



Referral to Hepatologist or GI specialist may be needed

Mayo Clinic

Fatty Liver Interventions

- ▶ **Nutrition**
 - ▶ Weight loss goal of 5-10% or more
 - ▶ Mediterranean Diet
 - ▶ Avoid alcohol
 - ▶ Decrease processed foods, meats and sugary foods.
 - ▶ Increase vegetables and other high fiber foods.
- ▶ Move more – including aerobic activity and strength training.
- ▶ Close follow-up and ongoing monitoring
- ▶ Can be associated with worsening renal function

4. Comprehensive Medical Evaluation and Assessment of Comorbidities: Standards of Care in Diabetes—2023

Other Treatments for NAFLD and NASH

- ▶ Meds that lower glucose, cholesterol and weight
- ▶ Bariatric surgery
- ▶ Pioglitazone (Actos)
 - ▶ Improves lipid and glucose metabolism
 - ▶ Reverses steatohepatitis in prediabetes/diabetes
 - ▶ Causes 1-2% wt gain at 15 mg
 - ▶ 3-5% wt gain at 45 mg
- ▶ GLP-1 Receptor Agonists



Support lifestyle changes

EV Dental, Eye, Kidney and Nerve Care

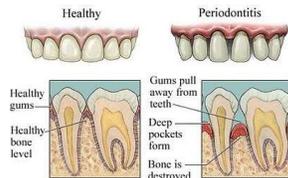


Poll Question 14

- ▶ Diabetes is associated with an increased risk of oral disease. Which of the following statements is true?
 - a. Diabetes is associated with decreased saliva production.
 - b. People with diabetes benefit from vinegar gargles to decrease bacterial load
 - c. People with diabetes are at greater risk for tongue cancer.
 - d. Diabetes is associated with increased tonsillitis.

Periodontal Disease

- ▶ More severe and prevalent with diabetes and elevated A1c levels.
 - ▶ periodontal treatment associated with better glycemic control (A1C 8.3% vs. 7.8%)
 - ▶ Benefits lasted for 12 mo's
- ▶ People with periodontal disease have higher rates of diabetes.
- ▶ Bidirectional



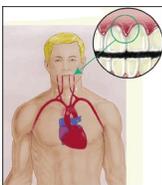
Gingivitis



Mild to Severe Periodontitis



Periodontal disease and Heart Disease



- Heart disease link:
 - oral bacteria enter the blood stream, attach to fatty plaques in coronary arteries increasing clot formation
 - inflammation increases plaque build up, which may contribute to arterial inflammation
- Hyperglycemia = Gingivitis = Heart Disease

Salivary Dysfunction and Xerostomia (dry mouth) in DM

- ▶ Less saliva uptake and excretion = less protection against bacteria
- ▶ Hyperglycemia increases glucose levels in saliva, providing medium for bacterial growth-also promotes dry mouth
- ▶ Dry mouth increases risk of infection and can alter nutritional intake (due to chewing, swallowing difficulties)



Keeping Oral Healthy

- ▶ Oral disease linked with heart disease
- ▶ Dental exams (every 6 mo's)
- ▶ Metabolic control critical
- ▶ Quit smoking
- ▶ Brush twice daily and floss daily.
- ▶ Help access affordable dental care.
- ▶ Treat infections with ATB's, can lower A1c by 1-2%. Lowering BG shortens infection.



Retinopathy Changes How We See



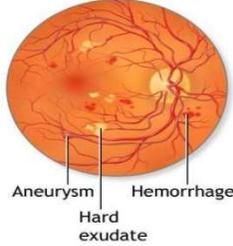
View of boys by person with normal vision



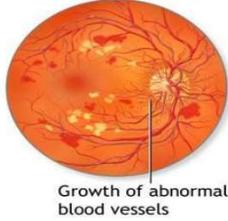
View of boys by person with diabetic retinopathy.

Non - Proliferative to Proliferative Diabetic Retinopathy

Non-proliferative diabetic retinopathy



Proliferative diabetic retinopathy



ADAM.

Quick Question 15

- ▶ Which of the following is correct regarding eye screening for people with diabetes?
 - A. All people with diabetes must get a complete eye exam every year
 - B. All people diagnosed with type 1 and 2 should receive an immediate eye exam.
 - C. All people diagnosed with type 2 should receive an immediate eye exam.
 - D. People with diabetes over age of 60 should receive an eye exam every 6 months.



Eye Screening Recommendations

Screen with initial dilated and comprehensive eye exam by ophthalmologist or optometrist

- ▶ Type 2 at diagnosis, then every one to 2 years
- ▶ Type 1 within 5 years of dx, then every 1-2 years
- ▶ Programs that use validated retinal photography with remote reading can be used for screening with in-person follow-up as needed.
- ▶ Promptly refer those with macular edema, severe non-proliferative disease to trained specialist



Keep Eyes and Kidneys Healthy

To reduce the risk or slow the progression of nephropathy

- ▶ Optimize glucose control (A)
- ▶ Optimize blood pressure control (A)



Kidney Screening Guidelines

- ▶ Screen Urine Albumin Creatinine Ratio (UACR) and GFR
 - ▶ Type 2 at diagnosis then yearly
 - ▶ Type 1 with diabetes for 5 years, then yearly
 - Twice annually if:
 - UACR > 300mg/g or GFR 30-60 mL/min



Optimize glucose and B/P to protect kidneys

- ▶ If UACR > 30 mg/g treat hypertension with ACE or ARB
- ▶ Monitor serum creat and K+ if on ACE, ARB or diuretics
- ▶ If Chronic Kidney Disease (CKD), consider SGLT2 to slow progression and decrease CV Risk
- ▶ If CKD consider using GLP-1 to reduce CV Risk

Urine Albumin Creatinine Ratio - UACR

- ▶ UACR | Urine albumin – creatinine ratio (spot collection)

Category	mg/g creatinine
▶ normal	<30 mg/g
▶ Moderately increased	30+ mg/g
▶ Severely increased	300 + mg/g

- ▶ 2 of 3 tests w/in 3-6 mo abnormal to confirm
- ▶ Exercise within 24 h, infection, fever, CHF, marked hyperglycemia, and marked hypertension may elevate urinary excretion over baseline values.

Collaborative Action Plan and F/U

- ▶ Make appointment with dentist and eye doctor.
- ▶ Brush twice daily and floss daily.
- ▶ Need some relief from nerve pain.
- ▶ Experiencing vaginal dryness.



Moving on to the Lower Half



Diabetes and Amputations

- ▶ Rate declined 43% - 2000 – 2009
- ▶ Increased 50% from 2009-2015
 - ▶ 2.1 per 1000 then up to 4.2 per 1000
 - ▶ Driven by a 62% increase in minor amputations
 - ▶ Highest rates in young and middle age adults (18- 64 years).
- ▶ 50% of amputations can be avoided through self-care skill education and early intervention

Resurgence of Diabetes-Related Nontraumatic Lower Extremity Amputation in the Young and Middle-Aged Adult U.S. Population
www.ncbi.nlm.nih.gov/pmc/articles/PMC5722428/

Diabetes Care 2018



Poll Question 16

► Which of the following is true about diabetes and lower extremities?

- a. Excess hair on the toes indicates compromised circulation.
- b. People with diabetes need to inspect lower extremities weekly.
- c. People over 65, with high-risk feet, qualify for a pair of custom shoes annually
- d. Once a person with diabetes has an amputation, they are not likely to have another.



Lower Extremities

► Lift the Sheets and Look at the Feet



No
DeFEET

Feet Deserve Special Care



Medicare Pays for Therapeutic Shoes

Under the Therapeutic Shoe Bill, Medicare patients with diabetes are entitled to one pair of shoes and three pairs of orthotic inserts. This is available to the benefit of your Medicare plan. We will assist you and take care of the paperwork for you. Our Certified Therapists come to your home to measure and provide fit, all state regulated and comply with Medicare rules. Call today to get your shoes. Deductible or copayments may apply. Sorry, no HMO's.

Ohio, Pennsylvania, Western New York, Florida and More.

- Daily inspection
- With order from MD and Loss of Protective Sensation (LOPS), Medicare Covers:
 - Annual custom shoes
 - 3 pairs of orthotic inserts

Medicare and Custom Shoes

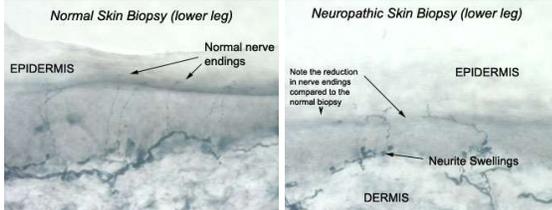
- ▶ The doctor who treats your diabetes must certify your need for therapeutic shoes or inserts and be a Medicare provider.
- ▶ A podiatrist (foot doctor) or other qualified doctor must prescribe the shoes or inserts, and you must get the shoes or inserts from one of these:
 - A podiatrist A prosthetist
 - A pedorthist An orthotist
 - Another qualified individual

Nerve disease Screening

- ▶ Screen all people with diabetes for nerve disease using simple tests, such as a monofilament
 - ▶ Type 2 at diagnosis, then annually
 - ▶ Type 1 diabetes at 5 years, then annually
- ▶ Glycemic management is the main strategy to prevent or delay the development and progression of neuropathy.
- ▶ Assess and treat to reduce pain and symptoms to improve quality of life.



Skin Biopsy to Assess Neuropathy

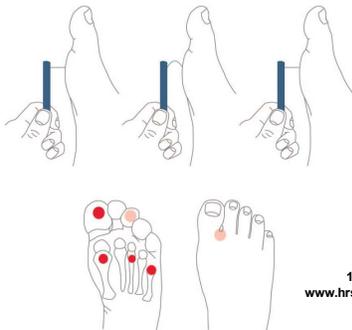


Testing for Small and Large Nerve Fiber Loss

- ▶ Test for nerve fiber function and loss of protective sensation:
 1. Small-fiber function: pinprick and temperature sensation.
 2. Large-fiber function: vibration perception and 10-g monofilament.
 3. Protective sensation: 10-g monofilament.



5.07 monofilament delivers 10gms linear pressure



10 Free Monofilaments
www.hrsa.gov/hansensdisease/leap

Treating Neuropathy

- ▶ Improve glycemic control
- ▶ Control pain
- ▶ Relief from depression from chronic pain
 - ▶ Massage, stretching,
 - ▶ Pain control clinic,
 - ▶ Transcutaneous Electrical Nerve Stimulation (TENS)
 - ▶ Avoid alcohol
 - ▶ Relaxation exercises....



Meds for Neuropathy – Cheat Sheet

Neuropathy Medication for Diabetes

Prevention – Maintain glycemic control; quit smoking, alcohol reduction, exercise.

Pathogenetically Oriented Therapy

- Alpha lipoic acid 600 – 1,800 mg a day

Prescription Therapy:

1st line – Tricyclic Antidepressants (Amitriptyline, Nortriptyline, Desipramine)

- Calcium Channel Modulators (Gabapentin, Pregabalin)
- Serotonin Norepinephrine Reuptake Inhibitors (SNRI – Venlafaxine, Duloxetine)

2nd Line - Topical Capsaicin Cream for localized pain – Apply 2-4 x daily for up to 8 wks

- Opioids (Tramadol, Oxycodone)

Reasons for Treatment Failure

- Dose too low
- Inadequate trial – requires 2-8 weeks of treatment to observe symptom reduction
- Pt expecting elimination of symptoms – only reduces symptoms by about 50%
- Incorrect diagnosis: If in doubt, refer to neurologist
- If patient does not respond or has adverse effects, change medication class
- In patient has some but inadequate relief, raise the dose and consider adding or changing meds.

References: Ziegler, D. Painful diabetic neuropathy. Diabetes Care 2009; 32 (Supp 2): S414-S419

Meds for Neuropathy – Cheat Sheet

Class	Generic / Trade Name	Usual Daily Dose Range	Comments	Side Effects/ Caution
1st Line Agents Tricyclic Antidepressants TCA Improves neuropathy and depression	Amitriptyline / Elavil	25 – 100 mg* Avg dose 75mg	Usually 1 st choice	Take 1 hour before sleep. Side effects: dry mouth, tiredness, orthostatic hypotension. Caution: not for pts w/ unstable angina (<6 mo), MI, heart failure, conduction system disorder.
	Nortriptyline / Pamelor	25 – 150 mg* (for burning mouth)	Less sedating and anticholinergic	
	Desipramine / Norpramine	25 – 150 mg* *Increase by 25mg weekly till pain relieved		
Calcium Channel Modulators	Gabapentin/ Neurontin	100 - 1,200mg TID	Improves insomnia, fewer drug interactions	Sedation, dizziness, peripheral edema, wt gain Caution: CHF, suicide risk, seizure disorder.
	Pregabalin / Lyrica *FDA approved for neuropathy treatment	50 - 200mg TID		
Serotonin Norepinephrine Reuptake Inhibitor SNRI	Duloxetine / Cymbalta *FDA approved for neuropathy treatment	60 mg daily Start at 30 mg	Improves depression, insomnia	Nausea, sedation, HTN, constipation, dizziness, dry mouth, blurred vision. Caution: adjust dose for renal insufficiency, do not stop abruptly, taper dose.
	Venlafaxine/ Effexor	75 - 225 mg daily		
2nd Line Agents Opioids	Weak opioids Tramadol / Ultram Strong opioids Oxycodone	50 – 400 mg 10 – 100 mg	Sedation, nausea, constipation (always prescribe stool softener) Caution: abuse, suicide risk, short acting opioids not recommended for long term tx, can develop tolerance	
Local Treatment	Capiscin Cream (0.025%)	Apply 2-4 x daily for up to 8 wks		
Other choices	If above medications not effective, contraindicated or intolerable consider: Bupropion/Welbutrin Paroxetine / Paxil Clonazepam / Celexa Topiramate / Topamax Topical Lidocaine (for localized pain).			



Other strategies to help ease the pain

- ▶ Music
 - ▶ Podcasts
 - ▶ Movies
 - ▶ Pet's
 - ▶ Massage
 - ▶ Touch
 - ▶ Topical creams
 - ▶ Lidocaine patches
 - ▶ Mineral salts baths
 - ▶ Neurostimulators
- 
- ▶ Tylenol / Ibuprofen
 - ▶ Earthing
 - ▶ Sleep
 - ▶ Hobbies
 - ▶ Aromatherapy
 - ▶ Time with special people
 - ▶ Work / volunteering

Fancy Creams and Stuff



We Can Make A Difference

- ▶ Assess
 - ▶ Nail condition, nail care, in between the toes
 - ▶ Who trims your nails
 - ▶ Have you ever cut your self?
 - ▶ Shoes – type and how often
 - ▶ Socks
 - ▶ Skin/skin care and vascular health
 - ▶ Ability to inspect
 - ▶ Loss of protective sensation
 - ▶ Nerve pain treatment



Lower Extremities

- ▶ **"Every time you see your provider, take off your shoes and socks and show your feet!"**
- ▶ For those at high risk for foot complications
 - ▶ with loss of protective sensation, foot deformities, or a history of foot ulcers
- ▶ Everyone else needs a thorough, annual inspection



“DAN” Diabetic Autonomic Neuropathy

- ▶ 50% of ind’s with peripheral neuropathy also have DAN
- ▶ DAN associated with higher M/M Rates
 - ▶ hypoglycemia unawareness
 - ▶ resting tachycardia, orthostatic hypotension
 - ▶ gastroparesis, constipation, diarrhea, fecal incontinence
 - ▶ neurogenic bladder
 - ▶ sudomotor dysfunction with either increased or decreased sweating
 - ▶ erectile dysfunction

Who is DAN?



Sexual Functions as We Age

- ▶ 20-30 years trice daily
- ▶ 30-40 years tri weekly
- ▶ 40-50 years try weekly
- ▶ 50-60 years try weakly
- ▶ 60-70 years try oysters
- ▶ 70-80 years try anything
- ▶ 80-90 years try to remember



A touch of humor from AADE-New Perspectives on Erectile Dysfunction, 1999

Asking about sexual health

- ▶ “ I’m going to ask you a few questions *about your sexual health*. Since sexual health is very important to overall health, I ask each person these same questions.
- ▶ Before I begin, do you have any questions or sexual concerns you’d like to discuss?”
- ▶ Have you noticed any changes in your sex life over the past year?
 - ▶ Trouble with erection, lowered libido, decreased sensation, painful intercourse or something else?



Improving Sex Life

People with diabetes get more vaginal and bladder infections

- ▶ Difficulty achieving orgasm due to neuropathy
- ▶ Painful intercourse due to lack of vaginal lubrication



Many people with diabetes have issues with sexual desire, arousal, or orgasm. How about you?"

Treatment

- ▶ Lower blood glucose / blood pressure
- ▶ Treat vaginal infections and UTI's
- ▶ Water based lubricants for vaginal dryness
- ▶ Hormone replacement therapy
- ▶ Eat to prevent lows during intimacy
- ▶ Allow time, touching and romance

Erectile Dysfunction

- ▶ Affects about 50% of men with diabetes
- ▶ Loss of erections sufficient for intercourse
- ▶ Due to combo of vascular and nerve damage
- ▶ Tests: penile tumescence to eval if organic or psychogenic
- ▶ Treatment:
 - ▶ Sildenafil (Viagra), Vardenafil (Levitra), Tadalafil (Cialis)
 - ▶ Use caution if taking nitrate drugs. Check w/ MD first
 - ▶ Other meds, vacuum devices, prosthetics
 - ▶ HRT- testosterone gel, patches, injections, pills



Low Testosterone

- ▶ Hypogonadism: loss of sex drive or activity
- ▶ Screening: morning serum levels
- ▶ Mean testosterone levels lower in men with diabetes – also associated with elevated BMI
- ▶ Testosterone replacement therapy can improve:
 - ▶ Sexual function, strength, bone density, mood
 - ▶ Repeat am testosterone level after treatment to eval response



EV is feeling Empowered

- ▶ Her A1c has dropped, she feels better about herself with healthier eating and increased activity.
- ▶ She is back on her thyroid medication and has more energy.
- ▶ The pain in her feet is better and she is more hopeful overall!



Important Themes

- ▶ Start with the individual
- ▶ Careful listening
- ▶ Be curious
- ▶ Think outside the box
- ▶ Review labs for clues
- ▶ Encourage preventive screenings
- ▶ Collaborate with other members of the health care team



Thank You



- ▶ Questions?
- ▶ Info@diabetesed.net
- ▶ 530-893-8635
- ▶ www.DiabetesEd.net



Integrating Technology: CGM Connected Pens and Insulin Pumps DiabetesEd Training Conference – Day 2

Diana Isaacs, PharmD, BCPS, BC-ADM, BCACP
CDCES, FADCES, FCCP
Director, Education & Training in Diabetes
Technology

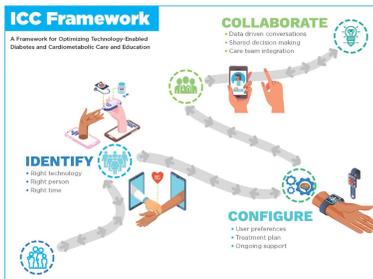


Learning Objectives

- Discuss continuous glucose monitoring (CGM) and the clinical benefits for managing diabetes
- Describe critical teaching content for insulin pump and CGM use
- Compare and contrast the CGM, connected pen and insulin pump devices
- Describe appropriate candidates for insulin pump therapy
- List inpatient considerations for insulin pump therapy and CGMs

ICC Framework – Identify-Configure-Collaborate

A framework to overcome barriers to technology use and therapeutic inertia



Greenwood DA, Howell F, Scher L, et al. A Framework for Optimizing Technology-Enabled Diabetes and Cardiovascular Care and Education: The Role of the Diabetes Care and Education Specialist. *The Diabetes Educator*. 2020;46(4):315-322. doi:10.1177/0145721720935125

Technology is Here



CONTINUOUS
GLUCOSE
MONITORS (CGM)



INSULIN PUMPS



CONNECTED
PENS AND CAPS



MOBILE APPS

Identify: PWD Identify the "Right" Technology

DiabetesWise.org

Check Up Sensors Device Finder Wisdom Resources

Helping You Find The Right Diabetes Devices For Your Life.



DEVICE COMBOS

FINDING WHAT'S RIGHT FOR YOU.

Get to know how different devices work together.

Devices



GLUCOSE CONTROL
Sensor & Pump



INSULIN PUMP,
METER & PUMP



SMART SYSTEM
Sensor & Smart Pump



CONNECTED
Sensor & Transitions



ARTIFICIAL PANCREAS
System Meter & Insulin

Diabeteswise.org, providers.diabeteswise.org/#/

The Importance of Education & Training

"No device used in diabetes management works optimally without education, training, and follow-up."

ADA, Diabetes Care, 2023;45-51.

Continuous Glucose Monitors



Continuous Glucose Monitors (CGM)



- Measures glucose (sugar) every 1-5 mins and records it every 5-15 mins (up to 288 readings/day)
- Includes 3 components: transmitter, sensor, receiver/reader

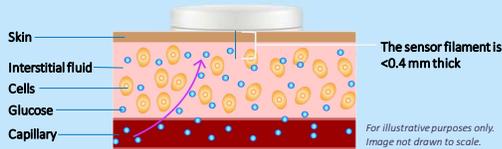


Illustration adapted from: Association of Diabetes Care & Education Specialists. ADCES Practice Paper. Accessed 11/9/21. <https://www.diabeteseducator.org/docs/default-source/practice/practice-documents/practice-papers/the-diabetes-educator-role-in-continuous-glucose-monitoring.pdf?sfvrsn=4>

CGM: Real-Time Data



Types of CGM

Professional	Personal
Owned by the clinic	Owned by the person with diabetes
Blinded and unblinded (real-time feedback) options	Real-time feedback or scan for feedback (flash device)
Short-term use (3-14 days)	Long-term use
Insurance coverage for most people with type 1 or type 2 diabetes	Insurance coverage more focused on type 1 diabetes or those on intensive insulin regimens
Not compatible with insulin pumps or connected pens	Compatible with smartphones, connected pens and insulin pumps with select devices

Wright LA, Hirsch IB. Diabetes Technol Ther. 2017;19(suppl 2):S16-S26; Kruger DF, et al. Diab Educ. 2019;45(suppl 1):S3-S20.

Professional CGM Comparison



	Dexcom G6 Pro	LibrePro
Blinded vs unblinded	Both	Blinded
Maximum wear time of sensor	10 days	14 days
Calibration	None	None
Downloading reports	Clarity	LibreView
Care between transmitter use	Disposable-1 time use, must attached transmitter	Disposable 1-time use, combined sensors/transmitter
Alarms for high/low glucose alerts	Yes	No
Interfering substances	Hydroxyurea	Salicylic acid and high-dose vitamin C

ADCEES Practice Paper: The diabetes care and education specialist role in CGM.

Personal CGM Options



Dexcom G6

- 10 day wear
- 2 hour warm-up
- No calibrations required-optional
- 1 press inserter, must attach transmitter
- Reusable transmitter-3 months
- Choice of receiver or smart phone
- High, low, predictive low alert
- Hydroxyurea drug interference
- Dexcom G6, Clarity, and Dexcom follow apps (up to 10 followers)



<https://www.dexcom.com/g6-sgm-system>

Dexcom G7

- 10.5 day wear
- 30 minute warm-up
- FDA approved over 2 yrs
- No calibrations required-optional
- Fully disposable
- No more separate transmitter
- Choice of receiver or smart phone
- More customization with alerts
- Hydroxyurea drug interference
- Dexcom G7, Clarity, and Dexcom follow apps (up to 10 followers)



<https://www.dexcom.com/g6-sgm-system>

Guardian Connect, G3, G4

- 7 day wear
- Up to 2 hour warm-up
- Guardian 3 or 4 sensor –compatible with 770G and 780G insulin pumps
- Guardian Connect- compatible with smart phone (no separate receiver)
- Calibrations required 2-4 times/day – Guardian Connect, G3
- Calibration to enter auto mode in 780G pump – G4
- Acetaminophen and Hydroxyurea interference
- Reusable transmitter
 - Charge every 7 days, transmitter lasts for 1+ year
- MiniMed, Guardian Connect, and Carelink mobile apps
- 60 minute predictive high or low for guardian connect



<https://www.medtronicdiabetes.com/products/guardian-connect-continuous-glucose-monitoring-system>

Freestyle Libre 2

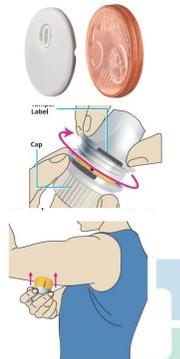
- 14 day wear (soon to be 15 days)
- 1 hour warm-up
- Real time alerts - must scan for actual number
- Confirm glucose in the first 12 hours of use
- Must scan every 8 hours to avoid data gaps
- Vitamin C interference (>500mg)
- 1 press inserter, disposable transmitter included with sensor
- Libre2 mobile app
- LibreLinkUp allows up to 20 followers



<https://www.freestylelibre.us/safety-information.html>

Freestyle Libre 3

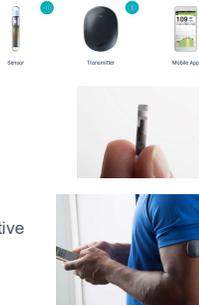
- 14 day wear (soon to be 15 days)
- 1 hour warm-up
- Scan to start sensor then real-time
- Confirm glucose in the first 12 hours of use
- 1 press inserter, disposable transmitter included with sensor
- Libre 3 and LibreLinkUp mobile apps
- Smaller size
- Reduced steps for insertion vs. Libre 2



<https://www.freestylelibre.com/products/freestyle-libre-3.html>

Eversense

- Implantable CGM sensor – lasts 180 days
 - Sensor is MRI safe (not the transmitter)
- Removable, rechargeable transmitter
 - Taped above sensor
 - Communicates to smartphone (no separate receiver)
 - On-body vibrate high and low glucose alerts
- 24-hour warm-up (dressing for 2 days after insert)
- Requires calibrations every 12 hours x 3 weeks
- Then 1 calibration/day
- Eversense CGM Mobile app with customized predictive alerts (10-30 min in advance of high or low)
- Eversense Now app allows 5 followers



<https://www.eversensediagnostics.com/>

CGM Comparison

	G6	G7	Libre 2	Libre 3	Guardian	Eversense
Integration	T: Slim X2, Omnipod, InPen	T: Slim X2 (soon)	Bigfoot Unity, T: Slim X2 (Soon)	Not yet	770G, 780G, InPen	No
Type	rtCGM	rtCGM	isCGM	rtCGM	rtCGM	rtCGM
Maximum wear time	10 days	10.5 days	14 days (Soon to be 15 days)		7 days	180 days
Warm-up time	2 hours	30 min	1 hour		Up to 2 hours	24 hours
Calibrations required	0	0	0		At least 2/day	2/day for 21 days, then 1/day
Water depth	8 feet, 24h	8 feet, 24h	3 feet, 30 min		8 feet, 30 min	3.28 feet, 30 min

Product user guides: Dexcom G6, Dexcom G7, Libre 2, Libre 3, Medtronic Guardian Connect, Guardian 3, Eversense

CGM Comparison (Continued)

	G6	G7	Libre 2	Libre 3	Guardian	Eversense
FDA approved sites	Abdomen (ages 2+) Upper buttocks (ages 2-17)	Upper arm (ages 7+) Upper buttocks (ages 2-6)	Upper arm		Upper arm, abdomen Upper buttocks (ages 2-13)	Upper arm
Approved in pregnancy	No	Yes	Yes		No	No
Transmitter	3 months	Disposable	Disposable		Charge weekly	Charge daily
FDA approved ages (years)	≥2	≥2	≥4 (soon to be 2)		≥2 Guardian 3 ≥2 Guardian 4 ≥14 Guardian Connect	≥18
Drug interactions	Hydroxyurea	Hydroxyurea	Vitamin C		Acetaminophen, Hydroxyurea	Tetracycline antibiotics, mannitol

Product user guides: Dexcom G6, Dexcom G7, Libre 2, Libre 3, Medtronic Guardian Connect, Guardian 3, Eversense

Integrated CGM

- Dexcom G6, G7 and Libre 2, Libre 3 are integrated CGM (iCGM)

- Integration with digitally connected devices (eg, pumps, pens, automated insulin dosing [AID] systems)



Goal: Greater Interchangeability 



- More efficient regulatory pathways
- Faster innovation
- A more vibrant device ecosystem

Poll Question 12

Which of the following drugs interact with the Libre systems?

- A. Aspirin
- B. Vitamin C
- C. Hydroxyurea
- D. Acetaminophen



CGM Counseling Points

- Important to check glucose when indicated
 - Symptoms do not match sensor value
 - During warm-up period
 - When making dosing decisions for select devices
- Sensors are waterproof
 - Showering, bathing, swimming OK
- Avoid with MRI, CT, diathermy
 - Exception: Eversense implantable, transmitter should be removed
- Not FDA approved
 - Dialysis, critically ill
 - Pregnancy-Guardian, eversense, G6
 - If people choose to use, it is important they know it is off-label



Troubleshooting Site Adhesiveness



Lag Time

- Refers to a delay in CGM sensor readings compared to finger stick blood glucose readings
 - Estimated CGM sensor reading ~5 minutes behind
- Most apparent when glucose is changing rapidly

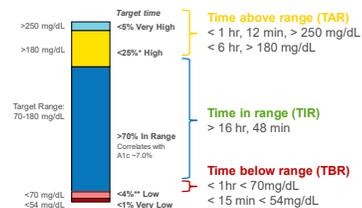


Downloading CGM Data



CGM Key Metrics

Recommended Time in Range for most people with T1D & T2D



15 MINUTES = 1% OF THE DAY

Time above range (TAR) < 1 hr, 12 min, > 250 mg/dL < 6 hr, > 180 mg/dL
Time in range (TIR) > 16 hr, 48 min
Time below range (TBR) < 1 hr < 70mg/dL < 15 min < 54mg/dL
Number of days CGM is worn 14 days is recommended
Percentage of time CGM is active 70% of data from 14 days is recommended
Mean glucose
Glucose management indicator (GMI) Estimated A1C
Coefficient of variation (CV) This is a measure of glycemic variability. A CV >36% is considered unstable.

15. What is the goal time in range for most adults with type 1 or 2 diabetes?

- A. ≥50%
- B. ≥70%
- C. ≥80%
- D. ≥90%

Review of CGM - DATAA



At each step, express that this is information, not good or bad

Basics D, Cox C, Schwab K, et al. Technology Integration: The Role of the Diabetes Care and Education Specialist in Practice. The Diabetes Educator. 2020;46(4):323-334. doi:10.1177/0145721720985123

Tips for DATA Interpretation

- Start by asking the person what they've experienced and noticed with their glucose patterns
- Avoid judgment
- Learn from 1 time episodes, but make changes based on patterns
- Fix lows first but some amount is expected (<1-4%) and if you remove all lows, you may end up with too many highs
- If it's not making sense, dig deeper (ex. missed doses, rationing, injection technique, food insecurity, etc)



Case Studies & 2 min Stretch



Case

Terrance is a 60-year-old man with T2D x 12 years

Current DM2 meds:

- Metformin 1000 mg twice daily
- Glimepiride 8mg daily

Other conditions

- CKD
- Hyperlipidemia
- Hypertension

Checks BGM once daily

Pertinent Labs

- SCr = 1.38 mg/dL, eGFR = 55
- A1C = 8.2%, BMI = 34 kg/m²

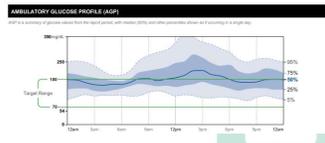
- Works in project management
- Eats 3 meals/day, snacks at night, no regular exercise
- Glucose log

Day	FBG, mg/dL
1	125
2	123
3	110
4	108
5	99
6	81
7	134

Starts CGM

D Download Data

A Assess Safety



- Which CGM key metrics are at goal?
- Which are not?
- Overall patterns?

Assessment Question

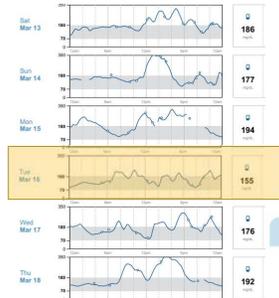
Which CGM key metrics are at goal?

- A. Time in range
- B. Time above range
- C. Time below range
- D. Glucose management indicator

Time in Range



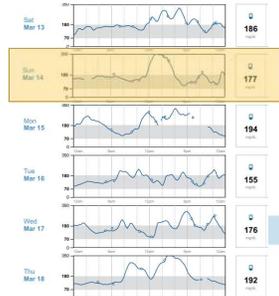
- Focus on the positive: what's worked well on Tue 3/16?
- Time in range is high this day
- Ate a granola bar for breakfast, grilled chicken salad at lunch, steak, greens, potato at dinner
- No missed medication doses
- Good night's sleep, low stress

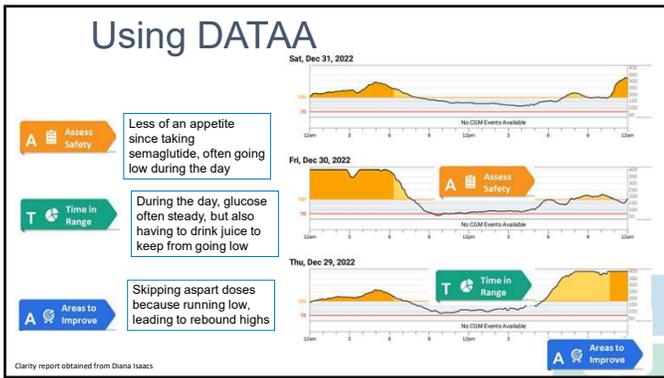


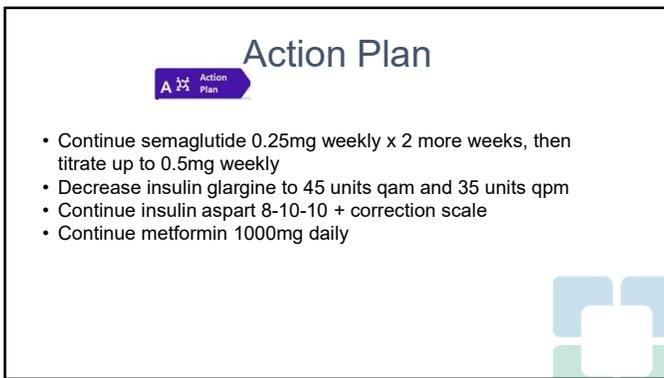
Areas for Improvement

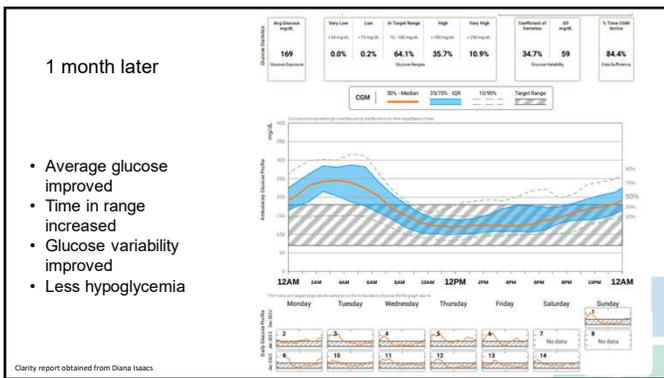


- Sun 3/14 glucose went high 12 pm
- Reports eating rice bowl and coke
- Silver lining
 - Walked around 3 pm (helped to lower glucose)
 - Avoided afternoon snacking
 - Ate low-carb dinner (salmon, salad, small potato)
 - Denies missed doses







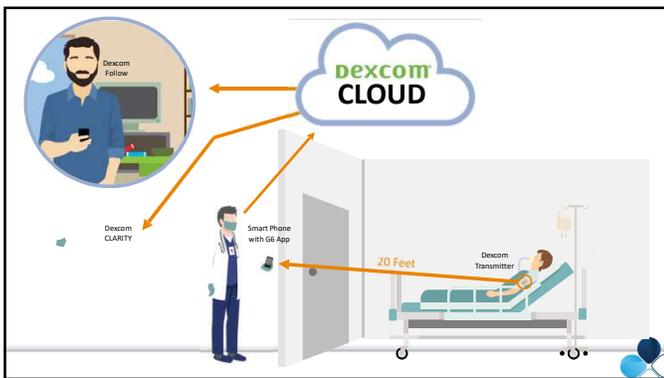


CGM in the Hospital

- Dexcom G6 and Freestyle Libre available for inpatient remote monitoring
 - FDA temporarily approved due to the public health crisis of COVID-19 and the need to preserve PPE and reduce hospital staff exposure to coronavirus
- March 1, 2022
 - FDA grants breakthrough device designation for Dexcom hospital CGM system
 - Designed to expedite the development and regulatory review

<https://www.dexcom.com/news/dexcom-cgm-hospital-covid19>
<https://abbott.mediaroom.com/2020-04-08-Abbotts-Freestyle-R-Libre-14-Day-System-Now-Available-in-US-for-Hospitalized-Patients-with-Diabetes-During-COVID-19-Pandemic>





Insulin Pumps



Common Insulin Pump Features

- Bolus calculator
- Temporary basal or temporary target
- Insulin-on-board/active insulin feature to prevent stacking
- Multiple basal patterns
- Small dose increments
- Integration with CGM
- Designed to work with U100 insulin
- Most have a 4-5 year warranty/contract

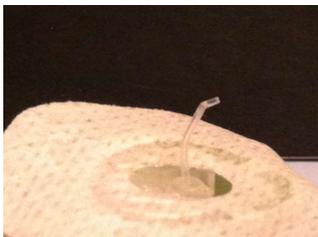


Infusion Sets

- Infusion sets are usually Teflon
 - Available in different sizes (ex. 9mm vs 6mm)
 - Silhouette (angled) may be better for kids/thinner/very active people
 - Steel infusion sets a good option for people with frequent site occlusions
- Insert at least 1 inch from CGM site
 - Auto-injectors vs. manually injecting
- Site selection/rotation
- Longer tubing options
 - Good if connected on leg, arm or wearing pump further from site
- Caution with kids/babies/pets-pouches available to hide pump
- When changing out infusion set, check glucose or CGM 1-2 hours after
 - Don't change right before bed



What Happens with a Bent Cannula?



- A. Hyperglycemia
- B. Hypoglycemia
- C. No effect



Filling the Pump



- Only fill with how much insulin you expect to use in 3 days + ~30 units
- Pumps hold 200-300 units
- Caution with air bubbles
- Fill cannula amount
 - Steel needle (0 units)
 - 6mm cannula (0.3 units)
 - 9mm cannula (0.5 units)
- If cannula overfilled, can lead to lows
- If cannula under-filled or air bubbles, can lead to highs



Where to Wear?



Ideal Pump Candidates

- Wearing CGM or frequently checking BGM
- Carbohydrate counting or good with estimates
- Ability to learn pump programming
- Willing to follow up regularly with health care team
- Can afford the pump/supplies
- Following hyperglycemia treatment instructions
- Problem solving skills (ex. high or low glucose)





Patch Pumps



CeQur Simplicity

- Bolus pump patch only
- Approved for adults with T1DM or T2DM
- Holds up to 200 units of rapid acting insulin
- On-demand bolus doses in 2 unit increments
- Doses administered via clicks directly on the device
- Must be changed every 3 days

<https://myceqursimplicity.com/>
<https://www.go-go.com/>

V-Go

- 24 hr. basal/bolus patch pump
- Approved for adults with T2DM
- Allows 20, 30, 40 unit basal rate options
- On-demand bolus doses in 2 unit increments
 - Up to 36 units/24 hrs
- Doses administered via clicks directly on the device
- Must be changed daily

Automated Insulin Delivery Systems



Omnipod 5
(Insulet)



T:slim X2 (Tandem)
Control IQ



780G
(Medtronic)



iLet
(Beta Bionics)



Mobi (Tandem)
Control IQ



Tidepool Loop

Hybrid-Closed Loop



- Automated insulin delivery (AID)
- Auto adjust background insulin
- Some systems give auto corrections
- Maximize time 70-180mg/dL

Omnipod® 5

- No tubing
- Holds 200 units
- Uses last 4-5 pods for adjustments, based on TDD
- Control system from a compatible smartphone or controller
- Requires Dexcom G6® use from a compatible smart device
- SmartBolus calculator informed by CGM value and trend
- Glucose targets from 110-150 mg/dL adjustable in 10 mg/dL increments
- HypoProtect mode to reduce risk of lows
- Bluetooth connectivity with glooko, automatic data download
- Requires charging cable



Omnipod® 5 Automated Insulin Delivery System. User Guide.

Medtronic 780G

- Holds 300 units
- Compatible with Guardian Sensor 3 or 4
- Meal detection (auto correction + basal)
- Adjustable target (100, 110, 120)
- Bluetooth connectivity, remote software upgrades
- Suspend before/on low options (in manual mode)
- Bluetooth connectivity
- MiniMed and Carelink apps for data sharing/viewing
- 7 day infusion set
- Uses AA battery



Beta Bionics iLet

- Holds 160 units of insulin
- Works with Dexcom G6
- Future compatibility with pre-filled insulin cartridges
- Programmed by entering body weight
 - No other insulin pump settings
- Enter in meal estimates (usual, less, more)
- Provides calculated back up settings
- Requires charger



Cleveland Clinic • <https://www.betabionics.com/>

Tandem T: Slim X2 with Control-IQ

- Holds 300 units
- Compatible with Dexcom G6 and future (G7, Libre)
- Algorithm adjusts insulin delivery from programed "manual" settings
- Automatic correction doses
 - Up to 1 every hour based on projected glucose >180mg/dL
 - Calculated at 60% of programmed correction factor (target of 110)
- T:Connect app to bolus and for remote downloads (changing to Source soon)
- Requires charging cable
- Bolus from T:connect app from phone



Control IQ Targets

	Control IQ	Sleep Activity	Exercise Activity	
Delivers	Delivers an automatic correction bolus if sensor glucose is predicted to be above ____ mg/dL.	180	---	180
Increases	Increases basal insulin delivery if sensor glucose is predicted to be above ____ mg/dL.	160	120	160
Maintains	Maintains active Personal Profile settings when sensor glucose is between ____ - ____ mg/dL.	112.5 - 160	112.5 - 120	140 - 160
Decreases	Decreases basal insulin delivery if sensor glucose is predicted to be below ____ mg/dL.	112.5	112.5	140
Stops	Stops basal insulin delivery if sensor glucose is predicted to be below ____ mg/dL.	70	70	80

Tandem Mobi

- FDA approved 6 + years
- 200 unit cartridge
- Half the size of T: Slim X2
- 5 inches of tubing
- Everything controlled from mobile app
- New syringe-driven pump fill
- Wireless charging
- IP28 water resistant rating (8 feet for 2 hours)



Pump Comparison

	Omnipod 5	Control IQ	780G	iLet
Min age	2 years	6 years	7 years	6 years
Min daily insulin	5 units	10 units, 55lbs	8 units	8 units
Max fill	200 units	300 units	300 units	160 units
Basal increment	0.05 units	0.001 units	0.025 units	NA
Bolus increment	0.05 units	0.01 units	0.025 units	NA
Site change frequency	3 days	3 days	7 days (extended infusion set)	3 days
CGM compatibility	G6	G6	Guardian 3, 4	G6
Calibration	No	No	3-4/day	No
CGM trend in calculator	Increase up to 30% Decrease down to 100%	No	No	NA

Cleveland Clinic

Pump Comparison

	Omnipod 5	Control IQ	iLet	780G
Algorithm target	110, 120, 130, 140, 150mg/dL	112.5 – 160 mg/dL	110, 120, 130mg/dL	100, 110, 120mg/dL
Basal automation	Calculated from total daily insulin, updated each pod change, 60 min prediction	Increases or decreases from programmed basal rates, 30 min prediction	Initiated based on user weight and adapts with glucose profile	Calculated based on total daily insulin from past 2-6 days
Automated Corrections	No	Max 1/hour if glucose predicted >180 mg/dL, 60% of calculated dose	No	If glucose > 120 mg/dL and at max "auto basal" delivery, up to every 5min
Extended bolus	No, manual mode only	Yes, up to 2 hours	No	No, manual mode only
Insulin action time (IAT)	2-6 hours	5 hours (automated mode)	NA	2-8 hours
Temporary targets	Activity 150 mg/dL	Exercise 140 -160 mg/dL Sleep 112.5 – 120 mg/dL	NA	150 mg/dL
Bolus adjustments	ISF, IAT, ICR, max bolus, reverse correction	ISF, ICR, max bolus, reverse correction	Usual, more, Less meal announcements	ICR, IAT, max bolus
Ability to override bolus	Yes	Yes	No	No

Patient Case

- 47 years old
- T2D x 20+ years
- A1C=8.1%
- BMI=39kg/m²
- Works as a bank teller
- No diabetes complications
- Meds:
 - Insulin glargine 100 units qpm
 - Insulin aspart 45 units TID a.c.
 - Dapagliflozin 10mg daily
 - Dulaglutide 1.5 mg weekly

Is this a good candidate for an insulin pump?

Guidelines: ADA

- **CGM should be offered** for diabetes management in adults with diabetes on multiple daily injections (MDI) or CSII who are capable of using the devices safely (either by themselves or with a caregiver).
- **AID systems should be offered** for diabetes management to youth and adults with T1D (A) and other forms of insulin deficient diabetes (E) who are capable of using the device safely.
- The choice of device should be made based on the individual's circumstances, preferences and needs.



Diabetes Care 2023;46(Supplement_1):S111-S127

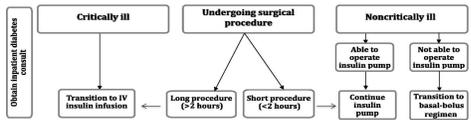
Patient Case

47yo T2DM, A1C=8.1%, BMI=39kg/m²



**TDD decreased by 30%
Follow-Up
A1C=6.7%**

Patient With Insulin Pump Admitted to Hospital



Changes to Pump Therapy With Imaging Studies	
X-ray/CT	Pump should be covered by lead apron
MRI	Pump and metal infusion set should be removed
Ultrasound	No need to remove pump but transducer should not be pointed directly at the pump
Cardiac catheterization	Pump should be covered by lead apron
Pacemaker/automatic implantable cardioverter defibrillator (AICD)	Pump should be covered by lead apron
Colonoscopy/EGD	Pump can remain in place
Laser surgery	Pump can remain in place

Umperrez G et al. Diabetes Care 2018 Aug; 41(8): 1579-1589.

Contraindications to Insulin Pumps in the Hospital

Impaired level of consciousness (except during short-term anesthesia)
Patient's inability to correctly demonstrate appropriate pump settings
Critical illness requiring intensive care
Psychiatric illness that interferes with a patient's ability to self-manage diabetes
Diabetic ketoacidosis and hyperosmolar hyperglycemic state
Refusal or unwillingness to participate in self-care
Lack of pump supplies
Lack of trained health care providers, diabetes educators, or diabetes specialist
Patient at risk for suicide

Umgierez G et al. Diabetes Care 2018 Aug; 41(8): 1579-1589.

Insulin Pump Data Management Tools

System	Website	Integration
Glooko	glooko.com	Insulin pumps (Omnipod, Tandem), Dexcom, Eversense, many glucose meters
Carelink	carelink.medtronic.com	Medtronic insulin pumps and Medtronic CGM
Tidepool	tidepool.org	Insulin pumps (Medtronic, Tandem, Omnipod), FreeStyle Libre, Dexcom, Guardian Connect, many glucose meters
T:Connect	tconnect.tandemdiabetes.com	Insulin pump (Tandem), Dexcom

Connected Insulin Pens





InPen

- Delivers up to 30 units of insulin per dose
- Delivers in ½-unit increments
- Disposable needles (not included)
- 1 year life span
- Does not require charging
- Comes in blue, gray, and pink
- Integrates with Apple Health and Glooko
- Requires a prescription, uses cartridges
- Compatible with: Humalog, NovoLog, and Fiasp U100 3.0 mL prefilled cartridges
- Multiple pens can be paired to the InPen app.

<https://www.companionmedical.com/inPen>

Bigfoot Unity Diabetes Management System

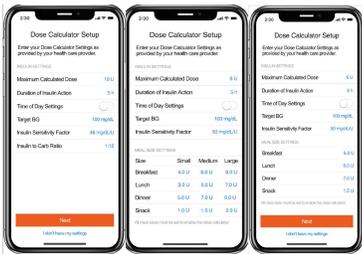
- Cleared by the FDA for ages over 12 years
- Smart insulin pen caps fits onto most commercially available insulin pens
- 2 versions of the pen cap:
 - Black for basal and white for bolus
- Uses glucose data from Freestyle Libre 2 CGM
 - Scan the sensor with the pen cap
- Recommended dose displayed by pen cap
 - 3 options based on small, medium large or carb counts
- Will not recommend insulin within 3 hours of last dose
- Records when a dose was taken (pen cap off for >4 seconds)
- Pen caps are rechargeable

Lilly Tempo Smart Button

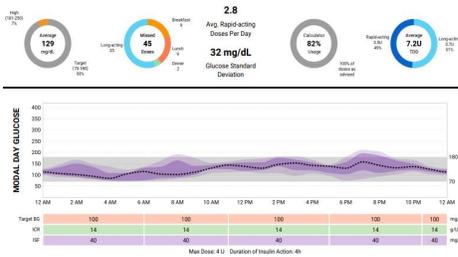


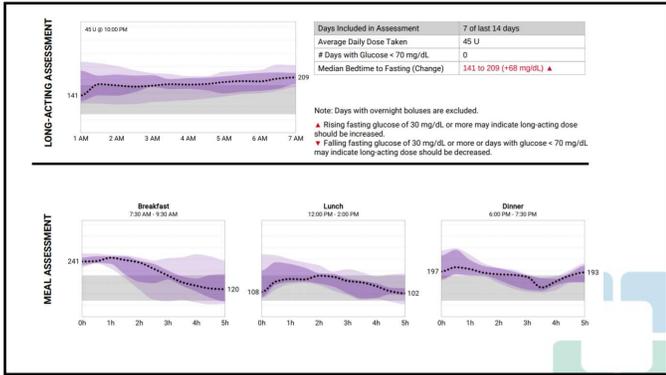
- Tempo pen available with Lyumjev, Basaglar, Humalog
- Button uses Bluetooth to transfer insulin dose to mobile app
- TempoSmart App integrates insulin dosing data with glucose, food, exercise, and sleep data
- Set personalized reminders and alerts

Therapy Settings



Connected Pen + CGM Data





In Summary

- There are several CGM, connected pen and insulin pump options, and the DCES can help PWD select the best device for their individual needs
- New era of hybrid closed loops
- No artificial pancreas yet, but we are getting closer to closing the loop
- Connected data can be used to discussion diabetes self-management with the person with diabetes and help to make meaningful changes-think DATAA

Resources



**From Dis-Ease to Well-Being
Assessment Tools & Coping**
DiabetesEd Training Conference – Day 2

Beverly Dyck Thomassian, RN, MPH, BC-ADM, CDCES
President, Diabetes Education Services
2023

**From Dis-Ease to Well-Being.
Assessment Tools & Coping**

- ▶ State strategies to assess and address social determinants of health
- ▶ Discuss health care delivery systems using a person-centered approach
- ▶ List screening tools that can help detect depression, trauma and cognitive decline
- ▶ Describe psycho-social and emotional barriers to diabetes self-management
- ▶ Provide strategies for healthcare professionals to identify and overcome barriers to self-care.



Psychosocial Care

- ▶ Inspired by
- ▶ Psychosocial Care for People with Diabetes: A Position Statement of the American Diabetes Association
- ▶ New Language for Diabetes



Psychosocial Care for People With Diabetes: A Position Statement of the American Diabetes Association

Deborah Young-Hyman¹, Mary de Groot², Felicia Hill-Briggs³, Jeffrey S. Gonzalez⁴, Korey Hood⁵ and Mark Peyrot⁶

¹ Author Affiliations

Corresponding author: Deborah Young-Hyman, youngyh@ed.sri.hg.uic.edu

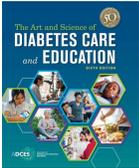
Diabetes Care 2016; Dec; 39(12): 2126-2140.
<https://doi.org/10.2337/16.16.2053>



Resources



- ▶ ADA Standard 1 and 5
- ▶ ADCES Art and Science of Diabetes Care, 6th Ed
- ▶ Others as listed



Ch1 Diabetes Care and Education: Rich Past, Challenging Present, Promising Future
Ch2 The Diabetes Self-Management Process
Ch3 Theoretical and Behavioral Approaches to Self-Management of Health
Ch4 Healthy Coping
Ch5 Healthy Eating
Ch6 Being Active
Ch7 Taking Medication
Ch8 Monitoring
Ch9 Reducing Risks
Ch10 Problem Solving
Ch11 Diabetes Education Program Management

Well-Being Key Goal of Care

- ▶ Clinical outcomes, health status, and well-being are key goals of diabetes self-management education and support
- ▶ Address as part of routine care
- ▶ Psychological and social barriers can impair the ability for self-care and lead to poor health outcomes.



Warm-Up Poll Question

- ▶ TR is a health care professional getting ready to take their certification exam. They are interested in providing more person-centered care. Which of the following statements verifies they are on the right track?



1. Adherence to the diabetes self-care plan takes time.
2. Motivating individuals to engage in their self-management is the first step.
3. Adult learners do best when provided a step-by-step demonstration.
4. Creating mutual agreement on the plan for next steps.

Providing Successful Diabetes Care

- ▶ Set up delivery systems using chronic care model of pro-active instead of re-active.
- ▶ Assess the unique needs of each individual
- ▶ Encourage and support diabetes self-management
- ▶ All treatment decisions are made in conjunction with the person's preferences, needs & values.
- ▶ Person centered care.



Poll Question 1

- ▶ RT often skips breakfast in the morning so he can sleep as long a possible before going to work. Since he takes morning insulin, this often results in hypoglycemia at work. After meeting with RT, a plan is made to have a granola bar in the car to eat on the way to work. What does this exemplify?
- ▶ A. Problem solving
- ▶ B. Adult learning theory
- ▶ C. Transtheoretical model
- ▶ D. DASH Approach



Problem Solving Strategies

- ▶ Reassess treatment regimen and barriers
 - ▶ Competing demands including those related to family responsibilities and dynamics
 - ▶ Literacy
 - ▶ Diabetes related distress or depression
 - ▶ Poverty
 - ▶ Culturally appropriate education?
 - ▶ Referral to social worker for assistance with insurance coverage
 - ▶ Medication taking behavior and regimen
 - ▶ Other?



How do Diabetes Specialists Help?

How Do Diabetes Educators Help?

• AADE7™ Self-Care Behaviors:



From Dis-Ease to Well-Being

Four critical times to provide and modify DSMES



- 1) At diagnosis.
- 2) Annually and/or when not meeting treatment targets.
- 3) When complicating factors develop.
- 4) When transitions in life and care occur.

Powers MA, Burdick JK, et al. DSMES Consensus Report. The Diabetes Educator. 2020
AADE7™ Self-Care Behaviors. The Diabetes Educator. 2020



(cdc.gov/diabetes/professional-info/training.html)

Diabetes Self Management Ed Benefits

- ▶ Improved knowledge
- ▶ Lower weight
- ▶ Improved quality of life
- ▶ Reduced mortality
- ▶ Positive coping
- ▶ Reduced cost
- ▶ Only 5-7% of Medicare/insured receive DSME)
- ▶ Increased primary care, preventive services
- ▶ Less frequent use of acute care and inpatient admissions
- ▶ More likely to follow best practice recommendations (esp those with Medicare)



Diabetes Self-Management Education and Support (DSMES)

- ▶ All people with prediabetes and diabetes should participate in DSMES to facilitate the knowledge, skills and ability necessary to self-manage their diabetes.
- ▶ DSMES provides support to implement and sustain skills and behaviors needed for ongoing self-management.



DSMES is underutilized



Of **MEDICARE** beneficiaries with newly diagnosed diabetes used DSMT services¹



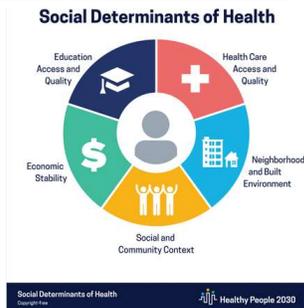
Of individuals with newly diagnosed T2D with **PRIVATE HEALTH** insurance received DSMES within 12 months of diagnosis²

LI R, et al. Morbidity Mortality Weekly Report, 2014
Strawbridge LM, et al. Health Educator, 2015

Diabetes Education SERVICES

Social Determinants of Health and Equity

- ▶ Recognize the need to provide person-centered services that embrace each individual and acknowledge their SDOH.
- ▶ Goal is to increase health equity through access to this critical service while focusing *more* on person-centered care and decreasing administrative complexities.



Poll Question 2

- ▶ LS has type 1 diabetes and reports to clinic with unusual hyperglycemia and some weight loss. Tells you they barely have enough money to pay for rent and food. What are you considering?
- ▶ A. Disordered eating
- ▶ B. Food insecurity
- ▶ C. Insulin rationing
- ▶ D. Diabetes distress



Tailor Treatment for Social Context

- ▶ Consider individualized care and provide resources
- ▶ These factors impair ability to self-manage diabetes.
 - ▶ 20% of people with food insecurity have diabetes
 - ▶ Financial barriers can lead to less healthy food choices and inability to access medications.
 - ▶ Lack of housing – 8% of people without homes have diabetes.



Tailor Treatment for Social Context

- ▶ Consider individualized care and provide resources
- ▶ Migrant and seasonal workers at higher risk of diabetes due to stress, food insecurity, lack of med care
- ▶ Health literacy limits ability to navigate HC systems
- ▶ Social capital/ Community Support
 - ▶ Health inequities related to Social Determinants of Health
- ▶ Need to make more community connections through Community Health Workers



Members of the lesbian, gay, bisexual, transgender and queer (LGBTQ) community have unique health disparities and worse health outcomes than their heterosexual counterparts, which has clinical relevance in the delivery of diabetes care and education.¹ Diabetes care and education specialists are in a pivotal position to help this medically underserved and vulnerable population get the best possible care.

Definitions²

Gender Identity: One's internal sense of being male or female, neither of these, both, or another – female/woman/girl, male/man/boy, other gender(s) (e.g. 58 gender options for Facebook users).

Gender Expression: The physical expression of one's gender identity through clothing, hairstyle, voice, body shape, etc. - feminine, masculine, other.

Sex Assigned at Birth: The assignment and classification of people as male, female, intersex or another sex based on a combination of anatomy, hormones and chromosomes – female, male, other/intersex.

Sexual Orientation: Sexually attracted to men, women, other gender(s).

Romantic/Emotional Orientation: Romantically attracted to men, women, other gender(s).

Transgender: An umbrella term for people whose gender identity and/or gender expression differs from what is typically associated with the sex they were assigned at birth.

Cisgender: A term used to describe people who are not transgender, i.e., who identify with the gender assigned at birth. "Cis-" is a Latin prefix meaning "on the same side as," and is therefore an antonym of "trans-."

AADE American Association of Diabetes Educators

Content provided by Theresa Gamero, APRN, BC-ADM, MSN, CDE
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Other factors - Assess Literacy

- ▶ Numeral
 - ▶ 130 could look same as 310, 013
- ▶ Health
 - ▶ Not sure how to use the health system
 - ▶ Prescriptions, appointments, insurance coverage
- ▶ Functional
 - ▶ Ability to use reading, writing and computation at levels adequate to everyday situations (checkbooks, signs, apps)



Poll question 3

▶ Which of the following strategies are best used when someone has low literacy skills?

- A. speak slowly and clearly
- B. underline key points on educational materials
- C. direct the teaching to the support person and encourage reinforcement.
- D. be concrete and focus on problem solving



Assess: Learning Style:

- ▶ Method: read, listen, discuss
 - ▶ Sensors: problem solving: demo.
 - ▶ Feelers: listening, discussion
 - ▶ Thinkers: Facts...lecture



Look Beyond – What impacts DSM

- ▶ Improving diabetes treatment outcomes requires looking at multiple factors:
 - ▶ Living situation
 - ▶ Adequacy of medical management
 - ▶ Duration of diabetes
 - ▶ Weight gain / weight loss
 - ▶ Other health related problems
 - ▶ Social structural factors
 - ▶ Childhood trauma – Adverse Childhood Experiences



Question - What is ACE?

- ▶ ACE =
 - ▶ Adverse
 - ▶ Childhood
 - ▶ Experiences
 - ▶ (before 18 yrs)
- ▶ What is the relationship between childhood trauma, diabetes and health?



www.AcesAware.org

10 Assessment Areas for ACE – Use 10 Question Screening Tool to Assess

ABUSE	NEGLECT	HOUSEHOLD DYSFUNCTION	
Physical	Physical	Mental Illness	Incarcerated Relative
Emotional	Emotional	Mother treated violently	Substance Abuse
Sexual		Divorce	

<https://www.npr.org/sections/health-shots/2015/03/02/387007941/take-the-ace-quiz-and-learn-what-it-does-and-doesnt-mean>

ACE increases risk for 9 out of 10 leading causes of death in US

Leading Cause of Death	Odds Ratio with ≥ 4 ACEs
▶ Heart Disease	▶ 2.1
▶ Stroke	▶ 2.0
▶ Diabetes	▶ 1.4
▶ Kidney Disease	▶ 1.7
▶ Cancer	▶ 2.3
▶ Alzheimer's	▶ 4.2
▶ Suicide(attempts)	▶ 37.5

<https://www.cdc.gov/vitalsigns/aces/index.html>

3 Realms of ACEs

Adverse childhood and community experiences (ACEs) can occur in the household, the community, or in the environment and cause toxic stress. Left unaddressed, toxic stress from ACEs harms children and families, organizations, systems and communities, and reduces the ability of individuals and entities to respond to stressful events with resiliency. Research has shown that there are many ways to reduce and heal from toxic stress and build healthy, caring communities.

1 HOUSEHOLD

- incarcerated family member
- divorce
- homelessness
- parental mental illness
- alcoholism and drug abuse
- physical and emotional neglect
- bullying
- maternal depression
- domestic violence

2 COMMUNITY

- discrimination
- historical trauma
- violence
- lack of social capital and mobility
- substandard schools
- lack of jobs
- structural racism
- poor water and air quality
- food insecurity
- poor housing quality and affordability
- poverty

3 ENVIRONMENT

- CLIMATE CRISIS
 - record heat & droughts
 - wildfires & smoke
 - record storms, flooding & mudslides
 - sea level rise
- NATURAL DISASTERS
 - tornadoes & hurricanes
 - volcano eruptions & tsunamis
 - earthquakes
 - pandemic

PAICES Connection thanks Building Community Resilience Collaborative and Networks and the International Transformational Resilience Coalition for inspiration and guidance. Please visit PAICESConnection.com to learn more about the science of ACEs and join the movement to prevent ACEs, heal trauma and build resilience.

The Act of Recognition is Healing



When we provide trauma informed care, we give voice to the unheard.

There is hope for healing.

We are part of breaking the cycle.

The Impact of Adverse Childhood Experiences on Health: A Personal Story of Resilience & Hope with Coach Beverly

Link to The Impact of Adverse Childhood Experiences on Health: A Personal Story of Resilience & Hope with Coach Beverly

~ Coach Beverly

Quick Self-Assessment

- ▶ LS arrives late for appointment and says they forgot their log book. LS has only been taking their metformin a couple times a week and has gone back to getting fast food each morning for breakfast.
- ▶ What feelings would this evoke?
 - ▶ LS doesn't care
 - ▶ Non-compliant
 - ▶ Lazy
 - ▶ Better scare them
 - ▶ Exasperation

curiosity

Expectancy Theory and Language

- ▶ When we label people, we form biases.
- ▶ We act out behaviors based on this label.
 - ▶ Providers also modify behavior in response to label
- ▶ The person labeled may take on attributes of that label.
- ▶ Do our language choices lead to clinical inertia?



Poll Question 4

Which phrase represents the principles for communicating with and about people living with diabetes?

- A. Your BMI indicates you are in the obese category
- B. Your fasting blood sugar is above normal
- C. You should try and exercise 150 minutes a week.
- D. You are checking your blood sugar daily.



Guiding Language Principles

Strength Based

- ▶ Emphasize what people know, what they *can* do.
- ▶ Focus on strengths that empower people

Person-first

- ▶ Words that indicate awareness
- ▶ Sense of dignity
- ▶ Positive attitude toward person with diabetes



What We Say Matters: Language that Respects the Individual and Imparts Hope | FREE Webinar & Resources

SPEAKING THE LANGUAGE OF DIABETES:
Language Guidance for Diabetes-Related Research, Education, and Publications

How we talk to and about people with diabetes plays an important role in engagement, conceptualization of diabetes and its management, treatment outcomes, and psychosocial well-being. For people with diabetes, language has an impact on motivation, behaviors, and outcomes.

Four principles guided this work and served as a core set of beliefs for the paper:

- ▶ Diabetes is a complex and challenging disease involving many factors and variables
- ▶ Every member of the health care team can serve people with diabetes more effectively through a respectful, inclusive, and person-centered approach
- ▶ Stigma that has historically been attached to a diagnosis of diabetes can contribute to stress and feelings of shame and judgment
- ▶ Person-first, strengths-based, empowering language can improve communication and enhance motivation, health and well-being of people with diabetes

<https://diabetesed.net/language-and-diabetes/>

Take a Strength Based Approach

- ▶ Individuals asked to take active role in directing the day-to-day planning, monitoring, evaluation and problem-solving.
- ▶ Need to eval perceptions about their own ability and self-efficacy to manage diabetes
- ▶ Explore past situations where they have had past success
- ▶ Use strength-based language



“Mindfulness-based Interventions”

- ▶ Avoid compliance model
- ▶ Focus on empowerment and acceptance
- ▶ Mindfulness
 - ▶ “Pay attention-on purpose “
 - ▶ Non-judgmental
 - ▶ In-the-present
 - ▶ Better chance to be present to life and become less reactive to the tides of distraction.
 - ▶ Really HEAR your clients!



Psychosocial Assessment

- ▶ Integrate psychosocial care using a collaborative, person centered approach for all people with diabetes, to optimize health outcomes and health-related quality of life
- ▶ Assess for:
 - ▶ Anxiety
 - ▶ Cognitive capacities
 - ▶ Depression
 - ▶ Distress
 - ▶ Disordered eating
- ▶ Use validated tools
- ▶ Initial visit & periodically
- ▶ If over 65, screen for depression & cognitive impairment



Anxiety – Exaggerated response to normal fears

- ▶ Anxiety
- ▶ Symptoms - (must have 5 for over 6mo's)
 - ▶ restlessness,
 - ▶ keyed-up or on-edge
 - ▶ easily fatigued
 - ▶ difficulty concentrating or mind going blank
 - ▶ irritability
 - ▶ muscle tension
 - ▶ sleep disturbances
- ▶ Diabetes causes fear –
 - ▶ Hypoglycemia
 - ▶ Complications
 - ▶ Living with chronic condition
- ▶ Impact of Anxiety
 - ▶ 1. Counterreg hormones
 - ▶ 2. Self-care behavior diminishes

Keeps forgetting insulin

- ▶ Cheerful and fun loving
- ▶ At diabetes support group, isn't feeling well
- ▶ BG 493
- ▶ Ran out of insulin "a while ago"



Cognition, Alzheimer's and Dementia

- ▶ Diabetes increases risk of cognitive impairment
 - ▶ 73% increased risk of dementia,
 - ▶ 56% increased risk of Alzheimer's
 - ▶ 127% increased risk of vasculature dementia
 - ▶ Cognitive impairment influences treatment goals
 - ▶ Less intensive, realistic, get support
- ▶ People with Alzheimer's and dementia are more likely to get diabetes
 - ▶ Rates increase over time



Cognitive Impairment Treatment

▶ Treatment:

- ▶ Refer to specialist for assessment
- ▶ Achieve optimal BG control
- ▶ Pharmacist to evaluate drug safety and potential drug interactions
- ▶ Keep physically active
- ▶ Nutrition and gut health
- ▶ Community engagement and support



Poll Question 6

▶ A 47 year old enters your office and says, “the doctor made me come here. I don’t know why, I just have borderline diabetes”. A1c is 8.7%. What is the most appropriate response?

- A. Based on your A1c level, it looks like you have diabetes.
- B. We don’t use the term “borderline diabetes anymore
- C. Let’s just start with carb counting.
- D. It sounds like you aren’t sure why you are here.



Adaptation to the Emotional Stress of Chronic Disease

(Kubler-Ross, Rubin RR, WHPolonsky)

Denial	Don’t agree, but listen Acknowledge Survival Skills only!
Anger	Indicates: Awareness, Learning Begins Be clear, concise instructs No long WHY answers
Bargaining	ID’s w/ others Group classes good Ed: “what” pt. wants to know
Depression & Frustration	Realize permanency of DSC Tx Psycho-social support referral Emphasize + change made
Accept & Adapt	Sense of responsibility for Self-care;

Depression

- ▶ Characterized by depressed mood
- ▶ Loss of interest in activities usually found pleasurable
- ▶ Difficulty concentrating, sleeping, changes in appetite
- ▶ Difficulty in following through with self care behaviors
- ▶ Person may actually be experiencing diabetes distress.



My spouse doesn't want to hear

- ▶ Living with type 1
- ▶ Afraid to exercise due to risk of hypoglycemia
- ▶ Afraid to go to sleep for fear of going low even though has CGM and pump
- ▶ Spouse does not want them to share about day-to-day diabetes issues.



Diabetes Related Emotional Distress=DRED

- ▶ DRED - unique emotional issues directly related to the burdens and worries of living with a chronic disease. (embarrassed, guilty)
- ▶ More than worry: can overlap with depression, anxiety and stress.
- ▶ Normal-to some extent
- ▶ Associated with stress of living with diabetes
- ▶ Express high levels stress and depressive symptoms; but not clinical depression
- ▶ Not rare: linked to poor health outcomes



DDS 17: Diabetes Distress Scale

► Yields a total Diabetes Distress Scale score plus 4 sub scores:

- Emotional burden
- Physician related Distress
- Regimen related Distress
- Interpersonal Distress



Begin a conversation with any item rated 3 or more – See Distress Scale in your resources page

- 44.5% of reported diabetes distress
- Only 24% of providers asked pts how diabetes affected their life (DAWN Study)

Diabetes Distress Scale

1. Feeling that diabetes is taking up too much of my mental and physical energy every day.
2. Feeling that my doctor doesn't know enough about diabetes and diabetes care/ doesn't give me clear enough directions.
3. Feeling angry, scared, and/or depressed ... think about living with diabetes
4. Feeling that I am not testing my blood sugars frequently enough.

	Not a Problem	A Slight Problem	A Moderate Problem	Somewhat Serious Problem	A Serious Problem	A Very Serious Problem
1. Feeling overwhelmed by the demands of living with diabetes.	1	2	3	4	5	6
2. Feeling that I am often failing with my diabetes routine.	1	2	3	4	5	6

Poll question 7

- You assess that a person with new LADA is struggling with diabetes distress. What is an appropriate intervention?
- A. Encourage them to ask their provider about starting antidepressants.
- B. Set a SMART goal that is very challenging to help move them forward.
- C. Support them in making a realistic goal
- D. Remind them that alcohol is actually a depressant



Diabetes Distress Reframes

12 Reframes to Help with Diabetes Burnout or Distress

- It's not your fault you have diabetes. It's not your fault your pancreas doesn't work right.
- You can't control your blood sugars all the time, but you can take actions to manage your diabetes to the best of your ability.
- Blood sugars are not good or bad, they are just numbers that inform us of what action is needed next.
- Listen to your self-talk. It is tempting to be overly self-critical and blame ourselves. Try to imagine you are coaching a friend with diabetes. What advice or coaching would you provide?
- Diabetes isn't about perfect or getting it right all the time. It's about taking baby steps to make small improvements and keep safe.
- Take short mental breaks from your diabetes – walk outside, enjoy a hobby, listen to music, volunteer, join a group.
- Talk about your feelings to friends and family. Let them know how to help you succeed and things that don't help.
- Keep active, nourish your body, try meditation, enjoy oxygen cocktails, get out in nature.
- Remind yourself of all the work you ARE doing to manage your diabetes.
- Join diabetes camps, social media groups, find your people, your community.
- Consider connecting with a mental health professional.
- Remember, you are not alone. You are resilient. You are not your blood sugars. You got this. Baby Steps.



[Download PDF List of 12 Reframes to Share](#)

<https://diabetesed.net/dealing-with-diabetes-burnout-or-distress-12-attitude-shifts-that-can-help/>

[Download List of 12 Reframes to Share](#)

ReVive 5 – Diabetes Distress and More

Mental health – Build a Foundation

- ▶ Although the educator might not feel qualified to treat psychological problems, optimizing the individual / educator relationship as a foundation to increase likelihood of acceptance.
- ▶ Determine if help is needed
- ▶ Have a list of mental health providers
- ▶ Resource list of phone helplines
- ▶ Help individual problem solve to get access
- ▶ If individual cannot act on behalf of themselves, help identify a support person



Psychosocial Assessment

Informal check in or can utilize more formal assessments

- ▶ [Adverse Childhood Experiences](#) – ACE – early childhood experience can affect health outcomes for life. Read more about ACE [here](#).
- ▶ [Psychosocial Care for People with Diabetes](#): A Position Statement of the American Diabetes Association 2016. (See chart below excerpted from Position Statement)
- ▶ [Diabetes Distress Scale](#)
- ▶ [PHQ-9 Depression Screening Scale](#)
- ▶ [PAID – Problem Areas in Diabetes Survey](#) – Pediatric Version Youth perceived burden of type 1 diabetes.
- ▶ [General Health Numeracy Test](#) – A 6 question assessment on numeral literacy
- ▶ [The Mini-Mental State Examination \(MMSE\)](#) or Folstein test is a 30-point questionnaire that is used extensively in clinical and research settings to measure cognitive impairment. It is commonly used in medicine and allied health to screen for dementia.

Consider Referral to Mental Health Provider for Eval and Treatment

- ▶ Diabetes distress even after tailored education
- ▶ Screens positive for depression, anxiety, FoH*
- ▶ Disordered eating or disrupted eating patterns
- ▶ Not taking insulin/meds to lose weight
- ▶ Serious mental illness is suspected
- ▶ Youth with repeated hospitalizations, distress
- ▶ Cognitive impairment or impairment of DSME
- ▶ Before bariatric/metabolic surgery

*FoH – Fear of Hypoglycemia

Empowering and Promoting Health for Individuals and Populations



Our Actions Make a Difference

Move away from term “Non-Compliance”

- ▶ People with diabetes are asked to take active role in directing the day-to-day planning, monitoring, evaluation and problem-solving.
- ▶ Non-compliance denotes a passive, obedient role or “following doctor’s orders” without any input
- ▶ Need to eval perceptions about their own ability and self-efficacy to manage diabetes

Empowerment Defined

- ▶ “Helping people discover and develop their inherent capacity to be responsible for their own lives and gain mastery over their diabetes”.
- ▶ Posits:
 - ▶ Choices made by individuals (not HCPs) have greatest impact.
 - ▶ Individuals are in control of their self-management
 - ▶ The consequences of self-management decisions affect the individual most. It is their right and responsibility to be the primary decision makers.



Traditional vs Empowerment Based

Traditional vs Empowerment Based

Table 3.5 Comparison of Traditional and Empowerment-Based DSME and DSMS

Traditional DSME and DSMS	Empowerment-Based DSME and DSMS
Diabetes is a physical illness.	Diabetes is a biopsychosocial illness.
Professional is viewed as teacher and problem solver, and responsible for outcomes.	Patient is viewed as problem solver and self-manager; professional acts as a resource and shares responsibility for outcomes.
Learning needs are usually identified by professional	Problems and learning needs are identified by patient.
Education is curriculum-driven.	Education is patient-centered and consistent with adult learning principals.
Education is primarily didactic.	Patient experiences are used as learning opportunities for problem solving and serve as the core for the curriculum.
Emotional issues are a separate component of the curriculum.	Emotional issues are integrated with clinical content.
Behavioral strategies are used to increase compliance with recommended treatment.	Behavioral strategies are integrated with clinical content and taught to patients to help them change behaviors of their choosing.
Goal of education is compliance/adherence with recommendations.	Goal is to enable patients to make informed choices.
A lack of goal attainment is viewed as a failure by both the patient and the educator.	A lack of goal attainment is viewed as feedback and used to modify goals and action plans.
Behavior changes are externally motivated.	Behavior changes are internally motivated.
Patients is relatively powerless, professional is powerful.	Patient and professional are equally powerful.

Source: Adapted from MM Funnell, RM Anderson, “Patient empowerment: from revolution to evolution,” *Treat Strategies Diabetes 3* (2011): 98-105.

This philosophy is important to know for the exam

How to Succeed with Person-Centered Coaching

- ▶ A diagnosis of diabetes often carries a significant emotional response. A person with diabetes might report shame, fear, and guilt as they come to terms with their diagnosis and anticipate their future. As diabetes healthcare providers, we can learn to address these feelings while helping people move forward!
- ▶ Using a person-centered approach, we can identify the individual's strengths and expertise and then leverage this information to open a door of possibilities.
- ▶ Our choice of communication techniques can spark behavior change in people living with diabetes.



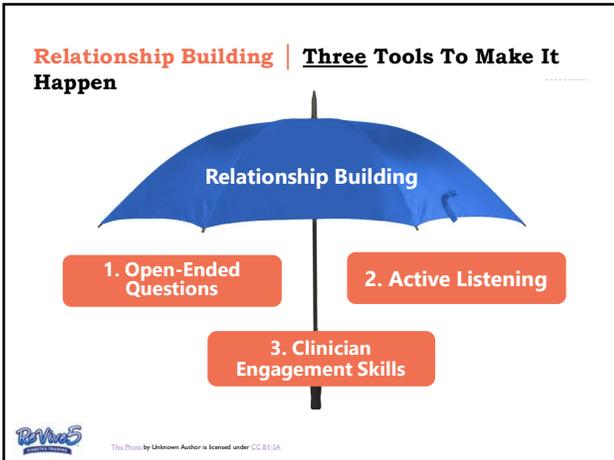
Motivational Interviewing

- ▶ The primary goal is to evoke intrinsic motivation and commitment to change by creating a collaborative and non-judgmental atmosphere.
- ▶ The approach recognizes that individuals often have mixed feelings about changing their behaviors, and it aims to guide them towards resolving this ambivalence in a positive and constructive manner.



Motivational Person-Centered Coaching

- ▶ **Express Empathy:**
 - ▶ Active listening and empathy
 - ▶ Open ended questions
 - ▶ Understand the individual's perspective without judgment
 - ▶ Individual feels heard and understood.
- ▶ **Develop Discrepancy:** recognize discrepancy between their current behavior and their broader goals, values, or aspirations.
- ▶ **Roll with Resistance:** Rather than confronting or challenging resistance, "roll with it." Acknowledging and respecting resistance while gently exploring its roots and potential effects.
- ▶ **Support Self-Efficacy:** enhance belief capacity to change. Identify and reflect on their past successes, skills, and resources to achieve their goals.
- ▶ **Develop a Plan:** If ready to change, help them create a concrete plan for moving forward. This plan is collaboratively developed, with the client taking an active role in defining the steps they're willing to take.
- ▶ **Avoid Arguing and Confrontation:** since can lead to resistance and defensiveness. Instead, seek to understand the client's perspective and work from there.



Mindfully Listen to the individuals' problems and fears.

- Listening and then reflecting back the struggles of the individual is the first phase of energizing the visit.
 - ▶ "It's hard to eat more vegetables because you are a long-haul truck driver."
- Focus on curiosity before exploring possible changes in behavior can provide comfort and open the door to insights.
 - ▶ "As a truck driver, I am curious to learn more about your food choices when driving."
- With a person-centered approach, spend more time in the "curiosity" phase before moving to the "action" phase."
 - ▶ "I could buy a veggie tray before heading out in my truck,"
- Listen for insights and ideas, "what are your ideas about how you can improve this situation?"
 - ▶ "So, you think you could buy a vegetable tray before heading out?"
- Ask questions and collaborate

SMART Goals

The graphic shows a chalkboard with the title "GOAL SETTING" at the top. Below it, the acronym "SMART" is written vertically, with each letter on a colored sticky note: S (yellow), M (pink), A (green), R (blue), and T (purple). To the right of each letter is its corresponding word: SPECIFIC, MEASURABLE, ATTAINABLE, RELEVANT, and TIME-BOUND. A blue star is drawn at the bottom right of the chalkboard.

Avoid and Lean Into

- ▶ **AVOID: Pressure, fix, or control.**
- ▶ We are careful to avoid forced solutions or controlling language. Our job is to help the person with diabetes find their own answers and solutions.
- ▶ **Let's stop "Shoulding" on people.**
- ▶ It's time to let go of terms like "You must, you should, you have to, it's better, it's important, do it for me" since they fall under the category of "controlling motivation"—which can be hurtful and lead to the individual becoming defensive or shutting down.
- ▶ **Ditch the scare tactics too!**

▶ **Lean into - A person-centered approach energizes individuals to take the lead in managing their condition, in step with their providers and supporters.**



Support Self-Confidence

- ▶ **Support positive expectations for change...**
- ▶ emphasize personal responsibility,
- ▶ instill confidence and hope,
- ▶ increase sense of ability to cope.



"From what you've told me about your past successes...it really seems like you can do this!"

Celebrate and Recognize

In conclusion: Celebrate and Recognize Each Person's Efforts.

- ▶ Making behavior changes, like losing weight or adjusting lifelong eating habits, can be extremely difficult.
- ▶ **Find a way to recognize and affirm their efforts even if there is no or little change in clinical measures.**



Our belief in people makes a difference!

FREE Webinar | Behavior Change Theories Made Easy



Behavior Change Theories Made Easy

DigitalStudio Live Webinar

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For all health care professionals who are coaching individuals to support healthier self-management or taking the Diabetes Certification Exams.

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Diabetes Education 25

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Behavior Change Theories Made Easy Handout

Providing Extraordinary Diabetes Care and Education

- ▶ Begins with the ordinary. Then moves toward gaining skills, knowledge, succeeding and failing, moving past our fear and then *owning our extraordinary.*
- ▶ **Extraordinary** goes above and beyond what is expected.



Step 1

Consider Your Emotional And Scientific Relationship With Diabetes



Consider

- How do you perceive diabetes?
- How has diabetes affected your life?
- What are your scientific beliefs around the cause and treatment of diabetes?
- Explore any biases you may be holding about people with diabetes and their communities.

Diabetes Education SERVICES

Step 2

Become A Diabetes Scholar & Advocate



- Study and refer to recognized Standards and research
- Share your findings with colleagues
- Pursue diabetes specialty certification
- Keep up-to-date with blogs, articles, conferences and online learning
- Stand up for best care.

Diabetes Education SERVICES

Step 3

Discover Colleagues' Gifts

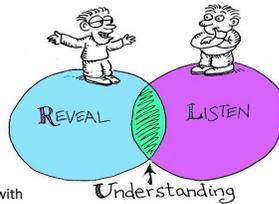
- View diabetes care from another lens
- Make a list of who you would like to shadow and seek them out
- Identify approaches that match your values and that resonate with people with diabetes
- Incorporate observed wisdom into your own practice



Diabetes Education SERVICES

Step 4

Fine Tune Empathy



- Practice mindfulness with a sincere intention to understand the persons with prediabetes or diabetes story.
- Pay attention to body language – yours and the person with diabetes. What is it saying?
- Call upon empathy and non-judgement with the belief that this person is doing their best at this moment.
- Meet them where they are at.
- Try to hear what is not said.

Diabetes Education SERVICES

Step 5

Highlight What The Person Is Doing Right

- Our belief in people's ability to change is powerful.
- We can transmit our belief in others through body language, affirmation and encouragement.
- When we use a strength-based approach, confidence in success increases – for both parties.
- Use phrases like, "You've overcome this in the past and I believe in your ability to figure out what will work best for you now."



Diabetes Education SERVICES

Step 6

Limit Advice Giving, Expand Curiosity

- As the person with diabetes is sharing their "story", we might be thinking of a whole range of solutions that will fix the situation.
- The truth is, the person sitting across from us knows what will fix the situation. Our goal is to help them in the process of self-discovery.
- By being curious and asking questions, we can help them explore different strategies and determine the best fit.
- "What would you like to work on today?"



"Our goal is to help in the process of self-discovery"

Diabetes Education SERVICES

Step 7

Believe In You

- We may not always know the answer, it's okay.
- Allow room for self-grace.
- Sometimes listening and connecting is more important than providing a solution.
- Seek resources to fill in knowledge gaps.
- If you receive resistance from others, try to seek understanding and consider a different approach.



Diabetes Education SERVICES

Step 8

Take Care of Yourself

- Get enough sleep
- Keep active
- Remind yourself that you are not responsible for the decisions of others. Love and release.
- Connect with friends and family
- Investigate unhealthy behaviors
- Nourish your body
- Consider a hobby



Diabetes Education SERVICES

Your Turn

- ▶ What extraordinary qualities do you bring to your work?
- ▶ What improvements have you noticed as a result?



Summary

Thank you for providing **extraordinary** diabetes care, and education and advocacy



GREAT DREAM

Ten keys to happier living

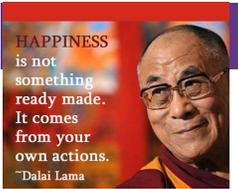
Action for Happiness has developed the 10 Keys to Happier Living based on a review of the latest scientific research relating to happiness.

Everyone's path to happiness is different, but the research suggests these ten things consistently tend to have a positive impact on people's overall happiness and well-being.

The first five relate to how we interact with the outside world in our daily activities. The second five come more from inside us and depend on our attitude to life.

- GIVING** Do things for others
- RELATING** Connect with people
- EXERCISING** Take care of your body
- APPRECIATING** Notice the world around
- TRYING OUT** Keep learning new things
- DIRECTION** Have goals to look forward to
- RESILIENCE** Find ways to bounce back
- EMOTION** Take a positive approach
- ACCEPTANCE** Be comfortable with who you are
- MEANING** Be part of something bigger

ACTION FOR HAPPINESS Actionforhappiness.org



“ People will forget what you said, people will forget what you did, but people will never forget how you made them feel ” — Maya Angelou

See you Tomorrow at 0800

Ashley LaBrier, RD, MS, CDCES presents on Medical Nutrition Therapy.

Thank You

- ▶ Questions?
- ▶ Email info@diabetesed.net
- ▶ Web www.diabetesed.net
- ▶ Phone: 530/ 893-8635



25
years

DiabetesEd Specialist Training Conference – Day 2

Beverly Thomassian, RN, MPH, BC-ADM, CDCES
President, Diabetes Education Services

Oct 12, 2023

Insulin – Ultimate Hormone Replacement Therapy



Diana Isaacs, PharmD,
BCPS, BCACP, CDCES, BC-
ADM, FADCES, FCCP

Endocrine Clinical
Pharmacy Specialist

Co-Director Endocrine
Disorders in Pregnancy

Cleveland Clinic Diabetes
Center

Disclosures for Dr. Isaacs

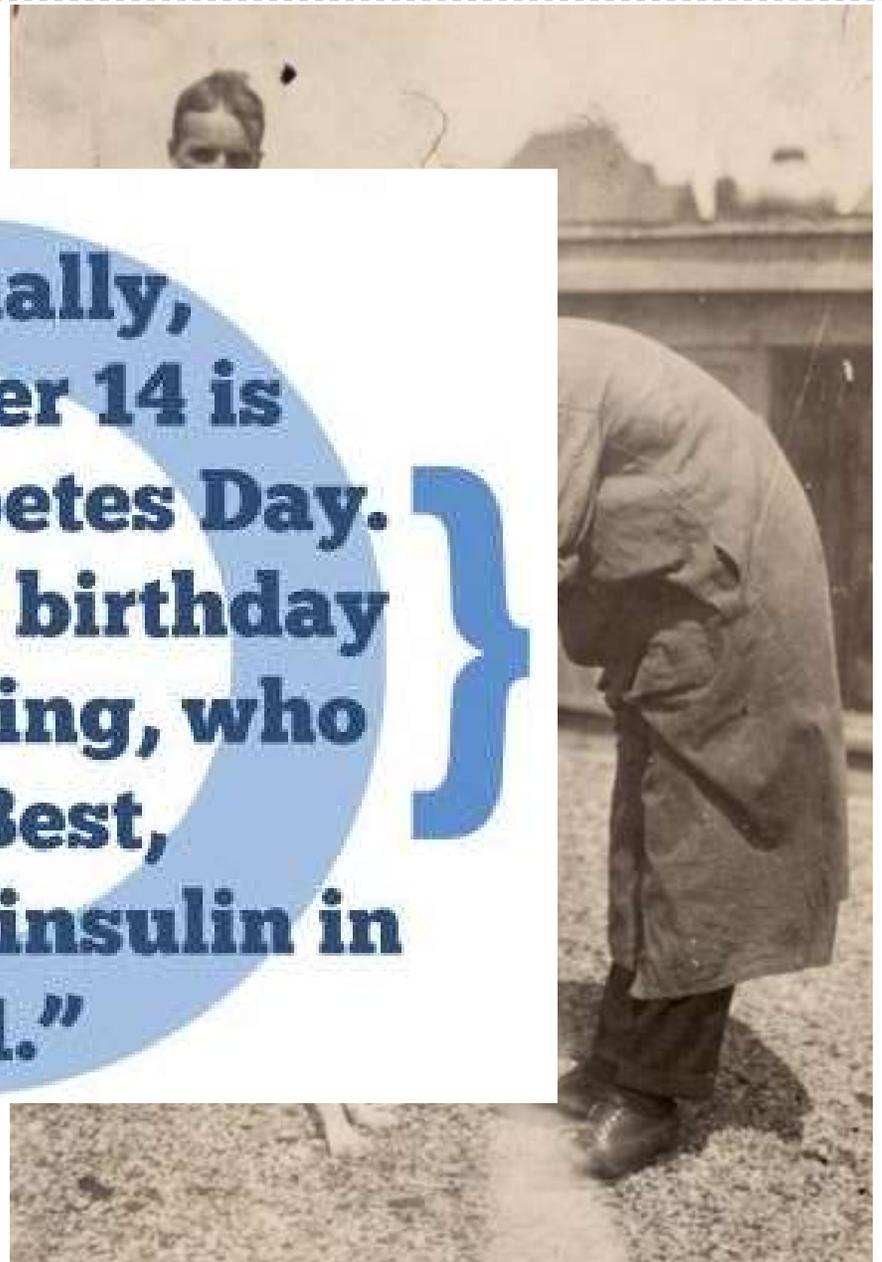
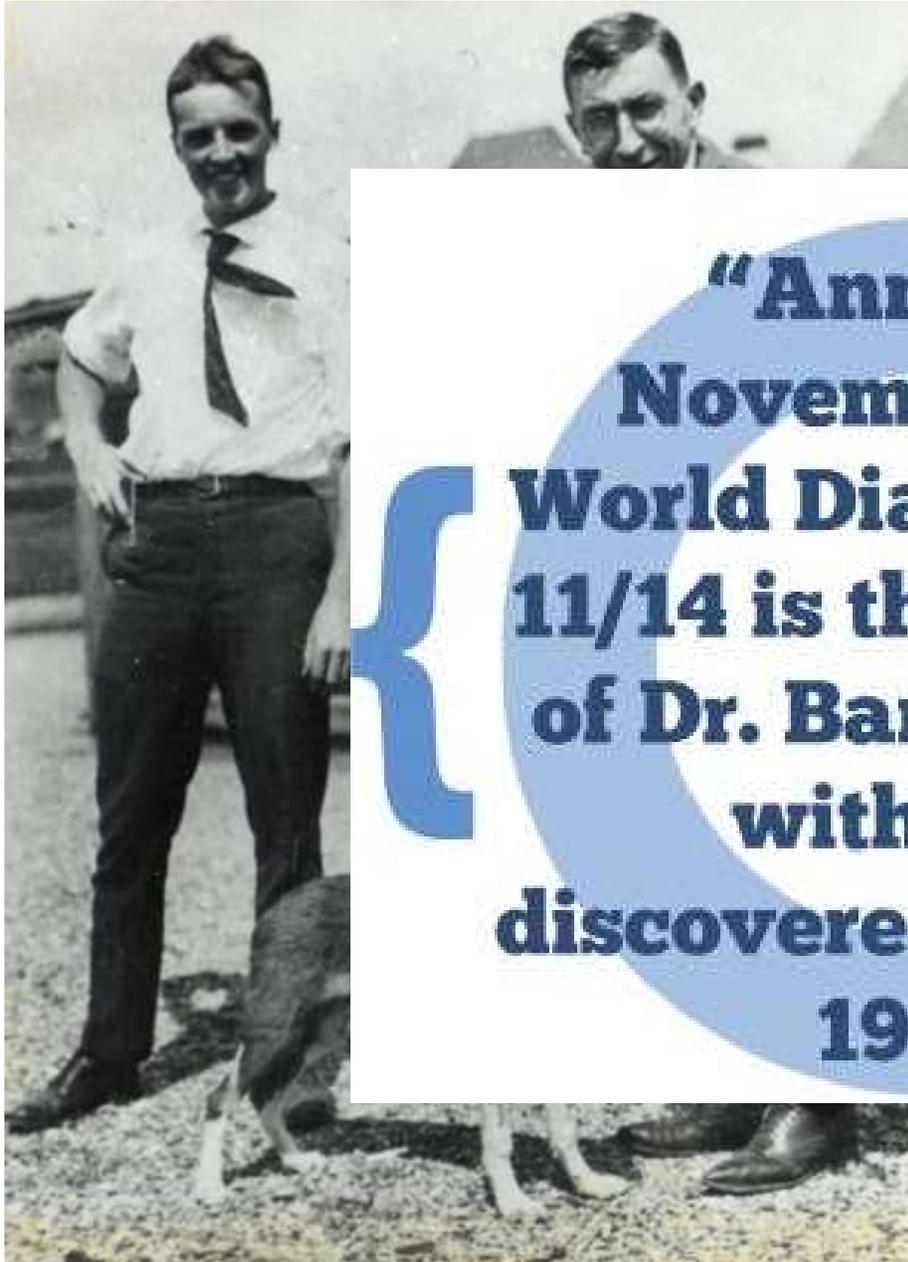
- ▶ Diana Isaacs, PharmD, BCPS, BCACP, CDCES, BC-ADM, FADCES, FCCP declares the following disclosures:
- ▶ Speaker: Abbott, Dexcom, Novo Nordisk, Insulet, Medtronic
- ▶ Consultant: Lilly, CeQur, Undermyfork
- ▶ CBDCES Credentialing Committee
- ▶ ADA Professional Practice Committee
- ▶ ADCES Board Member

Objectives – Insulin –The Ultimate Hormone Replacement Therapy

Objectives:

- Discuss the actions of different insulins
- Describe how to use the ADA algorithm for insulin management
- Counsel a person with diabetes on safe and effective insulin use
- Discuss strategies to determine and fine-tune basal and bolus insulin settings based on glucose pattern management
- Describe how insulin settings are used to program insulin pumps and connected insulin pens

Best and Banting – U of Toronto 1921



**“Annually,
November 14 is
World Diabetes Day.
11/14 is the birthday
of Dr. Banting, who
with Best,
discovered insulin in
1921.”**

History of insulin

- ▶ Insulin is produced by beta cells in the pancreas
- ▶ Discovered in 1921 by Frederick Banting and his assistant Charles Best from a dog's pancreas
- ▶ First used in a dog with diabetes and kept him alive for 70 days until they ran out of extract
- ▶ With the help of JB Collip and John Macleod, insulin was derived from the pancreas of cattle and in January 1922, given to a 14-year-old dying from diabetes in a Toronto hospital
- ▶ In 1923, Banting and Macleod received the Nobel Prize in Medicine which they shared with Best and Collip
- ▶ Soon after, Eli Lilly started large-scale production of insulin

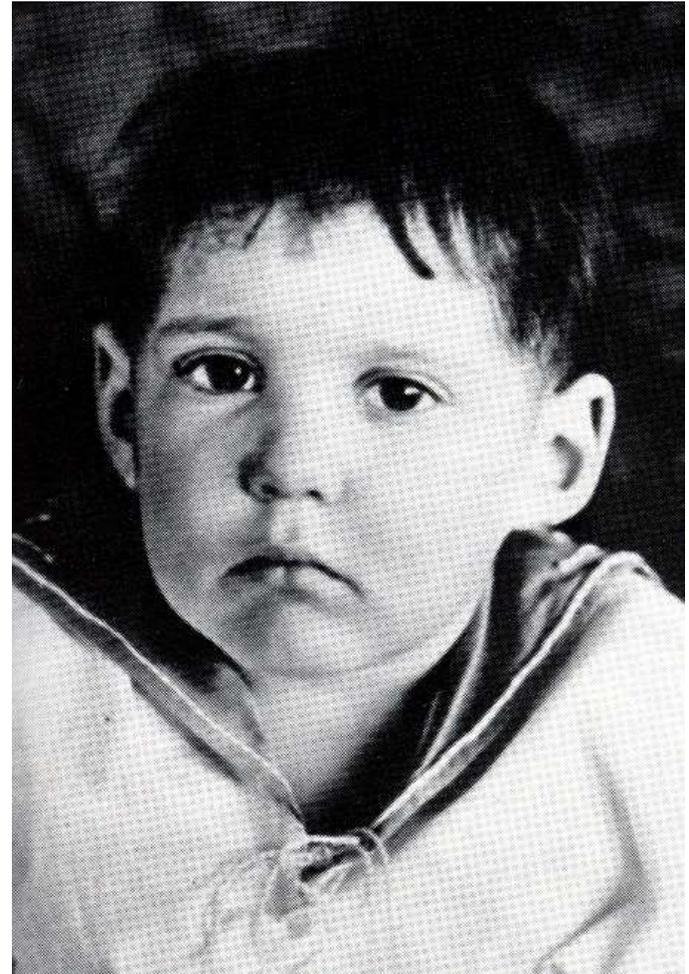
1st Insulin Available - 1922



Miracle of Insulin



Patient J.L., December 15, 1922



February 15, 1923

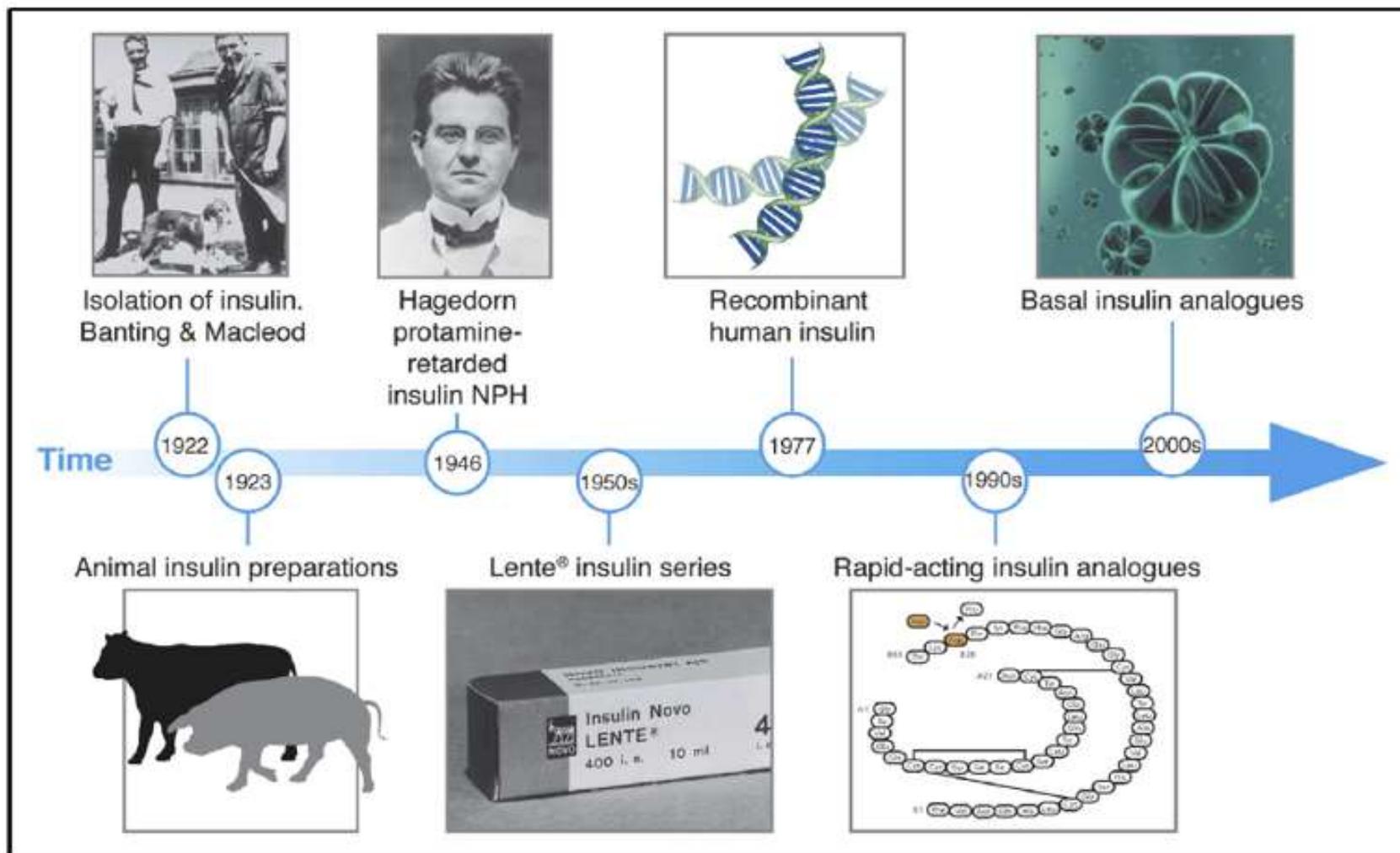
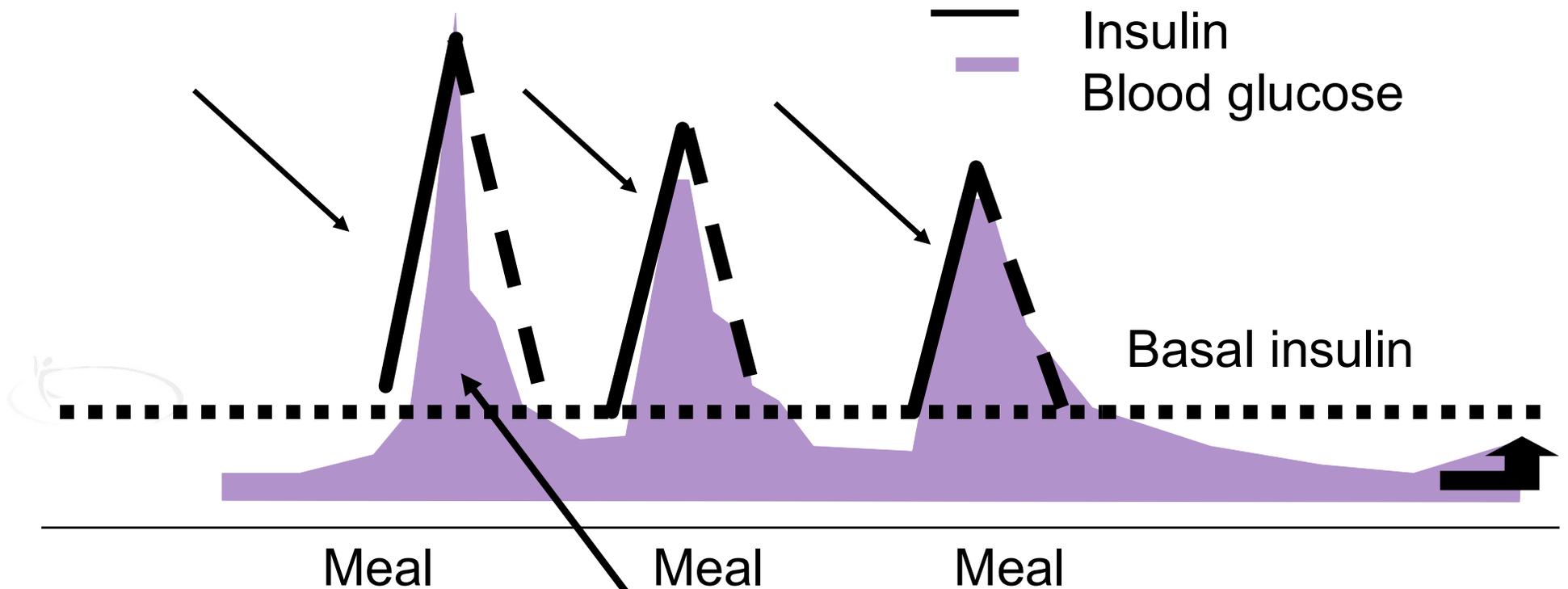


Figure 1 Milestones in the evolution of insulin therapy. NPH = neutral protamine Hagedorn.

Evolution of Insulin: From Human to Analog. Joseph M. Tibaldi, MD
 American Journal of Medicine, 2014

Physiologic Insulin Release:

Individuals without diabetes



Blood glucose— goes up after eating

Physiologic Insulin at Meals

- ▶ **1st phase:** peak 1-2 minutes, duration 10 minutes, suppresses hepatic glucose production
- ▶ **2nd phase:** duration 1-2 hours

The perfect insulin would be fast enough to match the absorption of carbohydrates

Insulin Overview

- ▶ None of the commercially available insulins are as fast as true physiologic insulin
- ▶ Almost all insulin is injected (SC or IV) with 1 inhaled option
- ▶ All people with T1D require basal + bolus insulin or insulin pump therapy
- ▶ Many people with T2D require insulin due to the progressive nature of the condition

Basal aka “Background” Insulin

- ▶ The liver plays a major role in maintaining glucose levels by regulating the process of gluconeogenesis and glycogenolysis in the liver
- ▶ Excessive hepatic glucose leads to hyperglycemia
- ▶ In a person without diabetes, there is a low level of insulin to keep glucose homeostasis from glucose produced by the liver (**basal insulin**)
- ▶ People with type 1 diabetes lack the ability to produce insulin to counteract the liver’s effects
- ▶ In people with type 2 diabetes, there may not be enough insulin due to insulin resistance
- ▶ Long-acting insulins or intermediate-acting insulins serve as a basal or “background insulin”
- ▶ In an insulin pump, a regular or rapid-acting insulin can be given continuously to serve as the basal

Everyone with T1D need basal insulin and many with T2D may need it

Bolus Insulin

- ▶ Glucose rises in response to carbohydrates
- ▶ A regular or rapid-acting insulin is given as a bolus to prevent the glucose from rising too much
- ▶ A regular or rapid-acting insulin can also be given to “correct” a high glucose

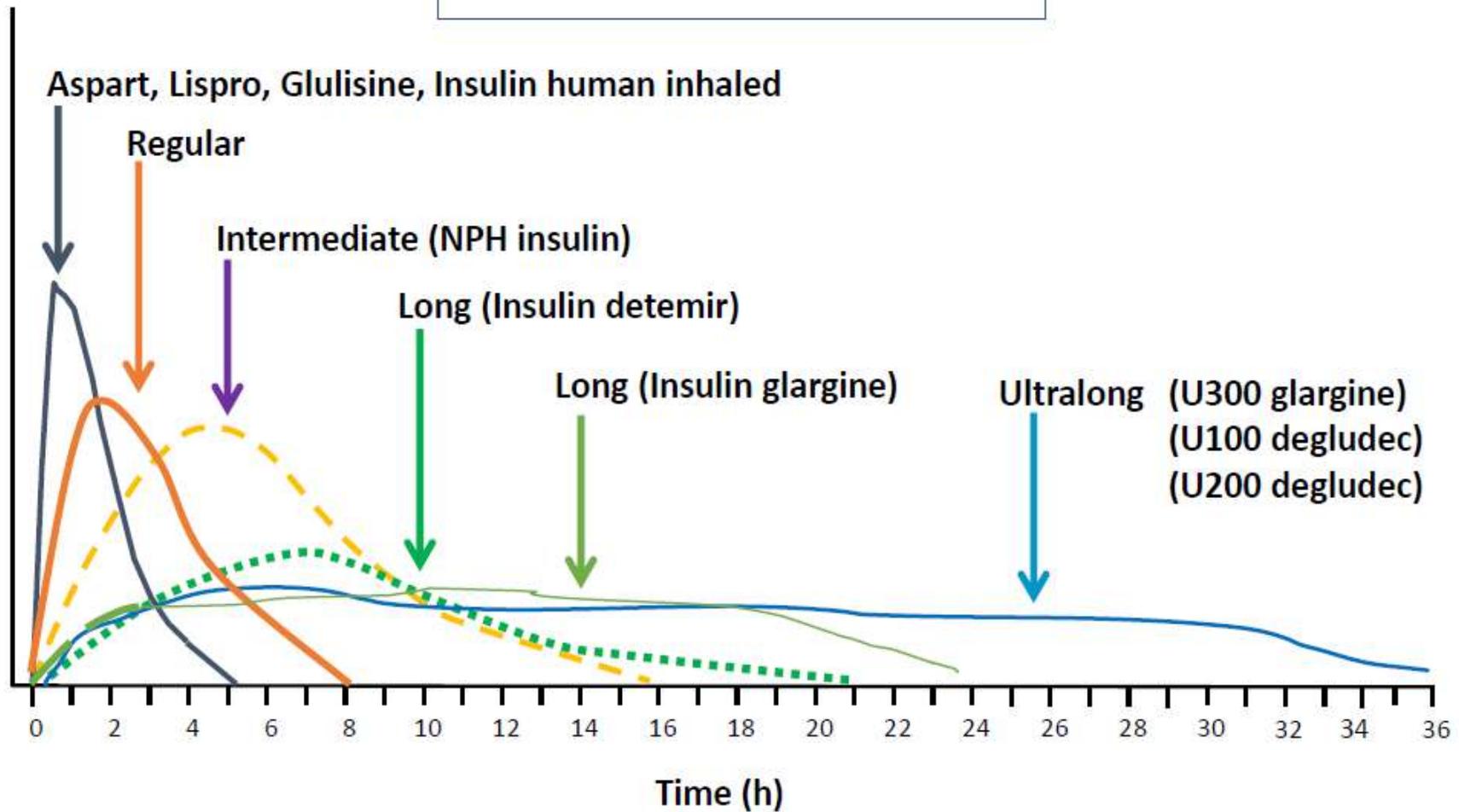
Everyone with T1D needs bolus insulin, some people with T2D may need it to achieve glycemic targets

Effective						
Action		Insulin Name	Onset	Peak	Duration	Considerations
Bolus	Very Rapid Acting Analogs	Aspart (Fiasp)	16 - 20 min	1 - 3 hrs	5 - 7 hrs	Bolus insulin lowers after-meal glucose. Post meal BG reflects efficacy. Basal insulin controls BG between meals and nighttime. Fasting BG reflects efficacy. Side effects: hypoglycemia, weight gain. Typical dosing range: 0.5-1.0 units/kg body wt/day.
		Lispro-aabc (Lyumjev)	15 - 17 min	2 - 3 hrs	5 - 7 hrs	
	Rapid Acting Analogs	Aspart (Novolog)	20 - 30 min	1 - 3 hrs	3 - 7 hrs	
		Lispro (Humalog*/ Admelog)	30 min	2 - 3 hrs	5 - 7 hrs	
		Glulisine (Apidra)	15 - 30 min	1 - 3 hrs	3 - 4 hrs	
Short Acting	Regular*	30 - 60 min	2 - 4 hrs	5 - 8 hrs		
Basal	Intermediate	NPH	2 - 4 hrs	4 - 10 hrs	10 - 16 hrs	Side effects: hypoglycemia, weight gain. Typical dosing range: 0.5-1.0 units/kg body wt/day.
	Long Acting	Detemir (Levemir)	3 - 8 hrs	No peak	6 - 24 hrs	
		Glargine (Lantus*/Basaglar/Semglee/Rezvoglar)	2 - 4 hrs		20 - 24 hrs	
		Degludec (Tresiba)*	~ 1 hr		< 42 hrs	
Basal + Bolus	Intermediate + short	Combo of NPH + Reg 70/30 = 70% NPH + 30% Reg 50/50 = 50% NPH + 50% Reg	30 - 60 min	Dual peaks	10 - 16 hrs	Discard most open vials after 28 days. For pen storage guidelines, see package insert.
	Intermediate + rapid	Novolog® Mix - 70/30 Humalog® Mix - 75/25 or 50/50	5 - 15 min		24 hrs	

*Concentrated insulins available - see Concentrated Insulin Card for details. Insulin action times vary; time periods are general guidelines only. All PocketCard content is for educational purposes only. Please consult prescribing information for detailed guidelines. © 2023

Insulin Profiles

Plasma Insulin Levels



Hirsch IB. NEJM 2005;352:174-183.

Lexicomp Online, Lexi-Drugs Online, Hudson, Ohio: UpToDate, Inc; 2020; August 21, 2020.

Insulin Concentration

- ▶ Most insulin is U100: 100 units/mL
- ▶ There is also concentrated insulin
 - ▶ U500 insulin, 500 units/mL, U300, 300 units/mL, and U200, 200 units/mL
- ▶ Insulin is available in a vial, pen, or cartridge
- ▶ U100 insulin:
 - ▶ 1 vial = 10mL = 1000 units
 - ▶ 1 pen = 3 mL = 300 units
 - ▶ 1 cartridge = 3 mL = 300 units
 - ▶ 1 box of pens = 5 pens = 1500 units
- ▶ Inhaled insulin
 - ▶ 4, 8, 12 units cartridges



Afrezza, Novolog, Humalog, Lantus, Levmir (package inserts) 2022

Image: :Blausen.com staff (2014). Medical gallery of Blausen Medical 2014. WikiJournal of Medicine 1 (2).

Concentrated and Inhaled Insulin

Concentrated & Inhaled Insulins

Name/Concentration	Insulin/Action	Considerations
Humulin Regular U-500 <ul style="list-style-type: none"> 500 units insulin/mL KwikPen or Vial 	Regular Bolus / Basal	Indicated for those taking 200+ units daily. 3 mL pen holds 1,500 units. Max dose 300 units. Once opened, good for 28 days. 20 mL vial holds 10,000 units. Max dose 250 units using U-500 syringe. Once opened, good for 40 days.
Humalog KwikPen U-200 200 units insulin/mL.	Lispro (Humalog) Bolus	3 mL pen holds 600 units. Max dose 60 units. Once opened good for 28 days.
Lyumjev KwikPen U-200 200 units insulin/mL.	Lispro (Lyumjev) Bolus	3 mL pen holds 600 units. Max dose 60 units. Once opened good for 28 days.
Toujeo Solostar U-300 Pen 300 units insulin/mL.	Glargine (Lantus) Basal	1.5 mL pen holds 450 units. Max dose 80 units. 3 mL Max Solostar pen holds 900 units. Max dose 160 units. Once opened good for 56 days.
Tresiba FlexTouch U-200 Pen 200 units insulin/mL.	Degludec (Tresiba) Ultra basal	3 mL pen holds 600 units. Max dose 160 units. Once opened good for 56 days.

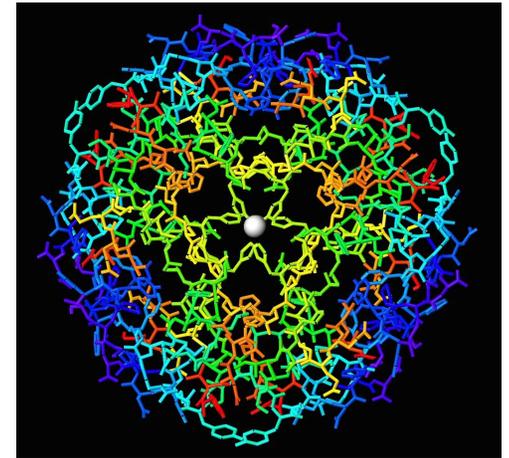
All concentrated insulin pens and the U-500 syringe automatically deliver correct dose (in less volume). No conversion, calculation or adjustments required. For example, if order reads 30 units, dial the concentrated pen to 30 units or draw up 30 units on the U-500 syringe. Important – never withdraw concentrated insulin from the pen using a syringe.

Inhaled Insulins

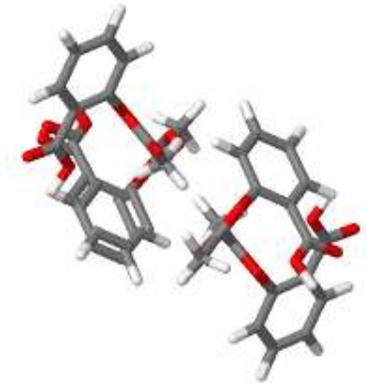
Action	Insulin Name	Dose Range	Onset	Peak	Duration	Considerations
Bolus – Rapid-acting	Afrezza Inhaled regular human insulin	4, 8, and 12 unit cartridges before meals	~ 12 min	35 - 45 mins	1.5 - 3 hrs	Assess lung function. Avoid in lung disease — bronchospasm risk. Side effects: hypo, cough, throat irritation.

Follow-On Insulin

- ▶ Follow-on insulin products may require a separate prescription (not directly interchangeable)
- ▶ Examples:
 - ▶ Insulin glargine (Lantus), follow-on products (Semglee, Basaglar),
 - ▶ Insulin lispro (Humalog), follow-on product (Ademlog)
- ▶ Semglee and Rezvoglar can be interchangeable with Lantus (insulin glargine)



Insulin – Large Molecule



Aspirin – Small Molecule



Generic Insulins

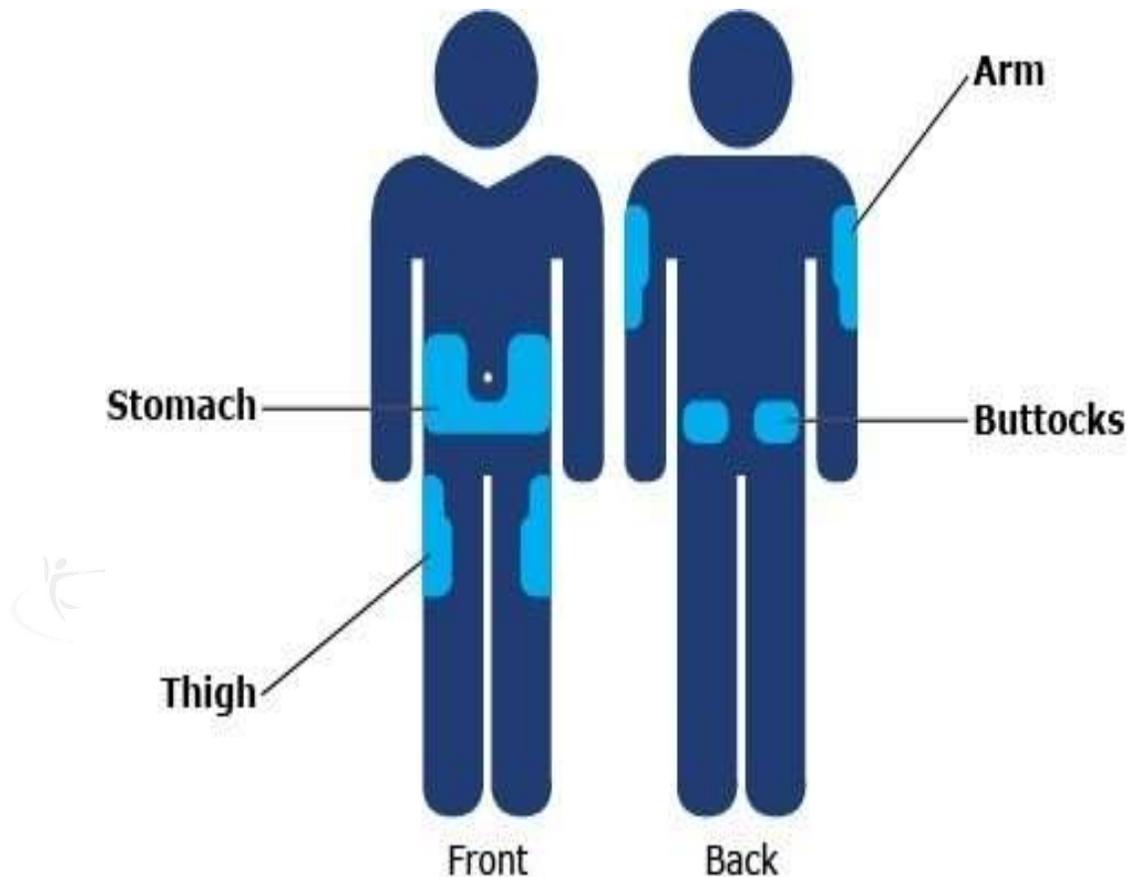
- ▶ Insulin aspart
- ▶ Insulin lispro
- ▶ Insulin glargine
- ▶ About half the cost of the brand name
- ▶ Exact same formulation, produced by same manufacturer, interchangeable at pharmacy



Which Insulin is Interchangeable with Lantus (Insulin glargine U100)?

- A. Toujeo (Insulin glargine U300)
- B. Basaglar (Insulin glargine U100)
- C. Semglee (Insulin glargine U100)
- D. Insulin degludec U100
- E. All of the above

Insulin Injection Sites



Sites should be rotated

Insulin Key Counseling Points

- ▶ Do not shake insulin
- ▶ Cloudy insulin (NPH or pre-mixed) should be rolled before use so suspension is uniform
- ▶ Skin thickness is usually 2mm regardless of person's size, so shortest needles (4mm) work well for most
- ▶ Take outer and inner covering off for pen needles
- ▶ Leave the needle/syringe in the body for 5-10 seconds
- ▶ Change needle or syringe with each injection
- ▶ Dispose of needles/syringes in a sharps container or per local regulations



Priming insulin

- ▶ Pens should be primed before every use to get air bubbles out
- ▶ Hold vertically with needle at the top
- ▶ Turn dial to 2 units
- ▶ Push plunger
- ▶ Repeat until insulin comes out of the top
- ▶ May have to do multiple times for a new pen
- ▶ This will ensure all air is out and that pen needle works
- ▶ Do this every time an insulin pen injection is given



Storage Options



Insulin Storage and Expiration Cheat Sheet Available

Insulin Storage and Dispensing Info



Product Name/Type	Expiration when opened, stored at room temp up to 86 F	Pens per Box Or Vial	Units per Pen/Vial	Max Dose / Notes
Rapid Acting Insulins				
Aspart (Fiasp) -Vial -Pen -Pump	28 Days 28 Days 6 Days	1 Vial 5 Pens per Box	1000 units 300 units in 3 mL	80 Units
Aspart (Novolog) -Vial -Cartridge -Flexpen - Pump	28 Days 28 Days 28 Days 6 Days	1 Vial 5 cartridges 5 Pens per Box	1000 units 300 units in 3 mL 300 units in 3 mL	60 Units
Glulisine (Apidra) -Vial -SoloStar Pen -Pump	28 Days 28 Days 2 Days	1 Vial 5 Pens per Box	1000 units 300 units in 3 mL	80 Units
Lispro (Humalog/Admelog) -Vial -Cartridge -Pen -Pump	28 Days 28 Days 28 days Up to 7 Days	1 Vial 5 cartridges 5 Pens per Box	1000 units 300 units in 3mL 300 units in 3mL	80 Units (Admelog) 60 Units (Humalog)
Lispro -aabc (Lyumjev) - Vial -Cartridge -KwikPen	28 Days 28 Days 28 days	1 Vial 5 cartridges 5 Pens per box	1000 units 300 units in 3mL 300 units in 3mL	60 units

Side Effects of Insulin

Weight Gain

Lipodystrophy/
Lipohypertrophy

Hypoglycemia



Sharps Disposal: Product and Info



- ▶ Search for household hazardous waste listing for your city or county.
- ▶ Call 1-800-CLEANUP (1-800-253-2687)



Polling Question 1

▶ After how many days should an open vial of insulin degludec be discarded?

A. 28 days

B. 30 days

C. 42 days

D. 56 days

Diabetes Bingo “DiaBingo”

Shout out Right Answer



DiaBingo - I

| Inhaled insulin

| Glargine, Detemir, NPH are types of

| Breakdown of glycogen into glucose

| Anabolic hormone made by pancreatic beta cells

| Insulin is released when glucose levels are low

| In which injection site is insulin most rapidly absorbed?

| Elevated post-prandial glucose indicate need for pre-meal

| Epinephrine increases insulin resistance

| Creation of glucose from amino acids and lactate

| Decreasing renal function for people on insulin can cause

| Bolus insulins

| A hormone that increases blood glucose

Question Time

Break for Questions





How to Dose Insulin

Type 1 Diabetes (T1D)

- ▶ Absolute deficiency in endogenous insulin
- ▶ Exogenous insulin is required
- ▶ The regimen should include:



Basal
Insulin

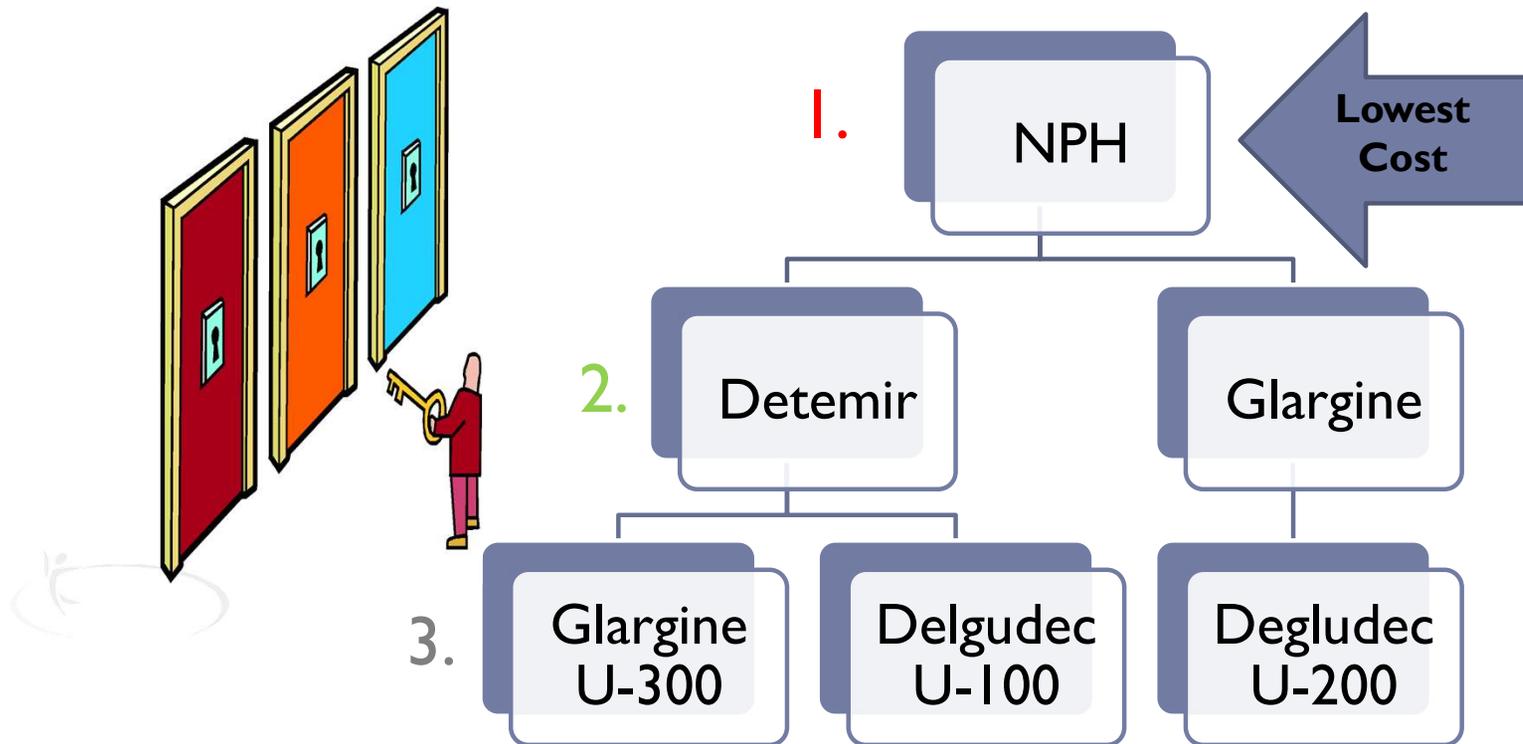
+

Bolus
Insulin

How to Dose Insulin? T1D

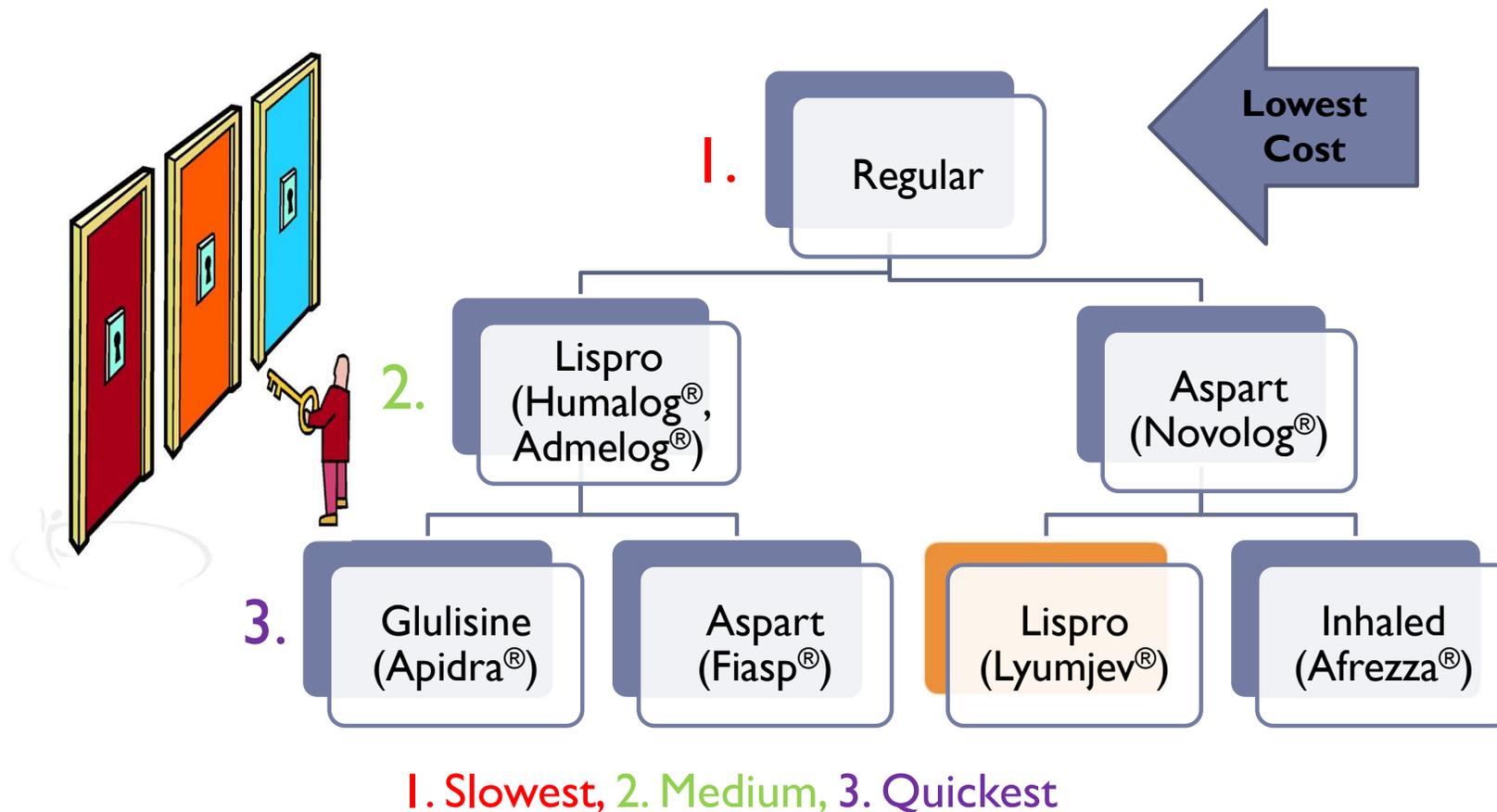
- ▶ Newly diagnosed T1D
 - ▶ Total insulin dose: 0.5-1.0 units/kg/day
 - ▶ 50% basal
 - ▶ 50% bolus
- ▶ Bolus can initially start with set doses or calculations can be used to determine initial carbohydrate ratio and correction factor

Choice of Basal Insulin



1. Shortest duration, 2. Medium duration, 3. Longest duration

Choice of Bolus Insulin

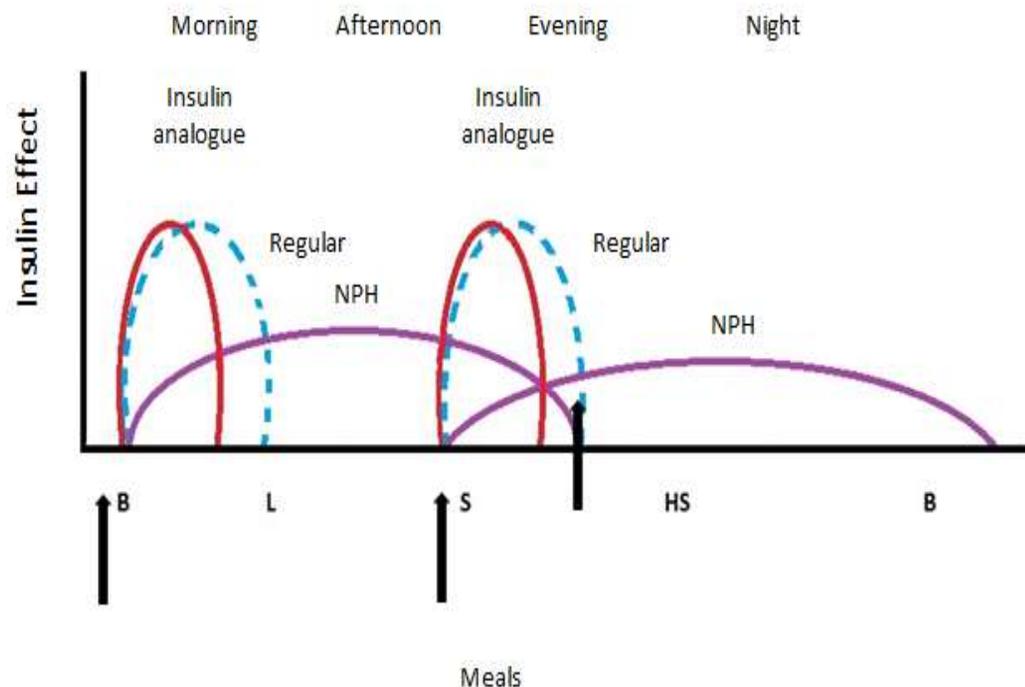


T1D: Insulin Dosing Regimens

Time of Insulin Administration	Before breakfast	Before lunch	Before dinner	Bedtime
Method 1	Intermediate: Regular (2/3 TDD) 2:1 ratio		Intermediate: Regular (1/3 TDD) 2:1 ratio	
Method 2	Regular/ analog (1/2 TDD ÷ by 3)	Regular/ analog (1/2 TDD ÷ by 3)	Regular/ analog (1/2 TDD ÷ by 3)	Long-acting (1/2 TDD)

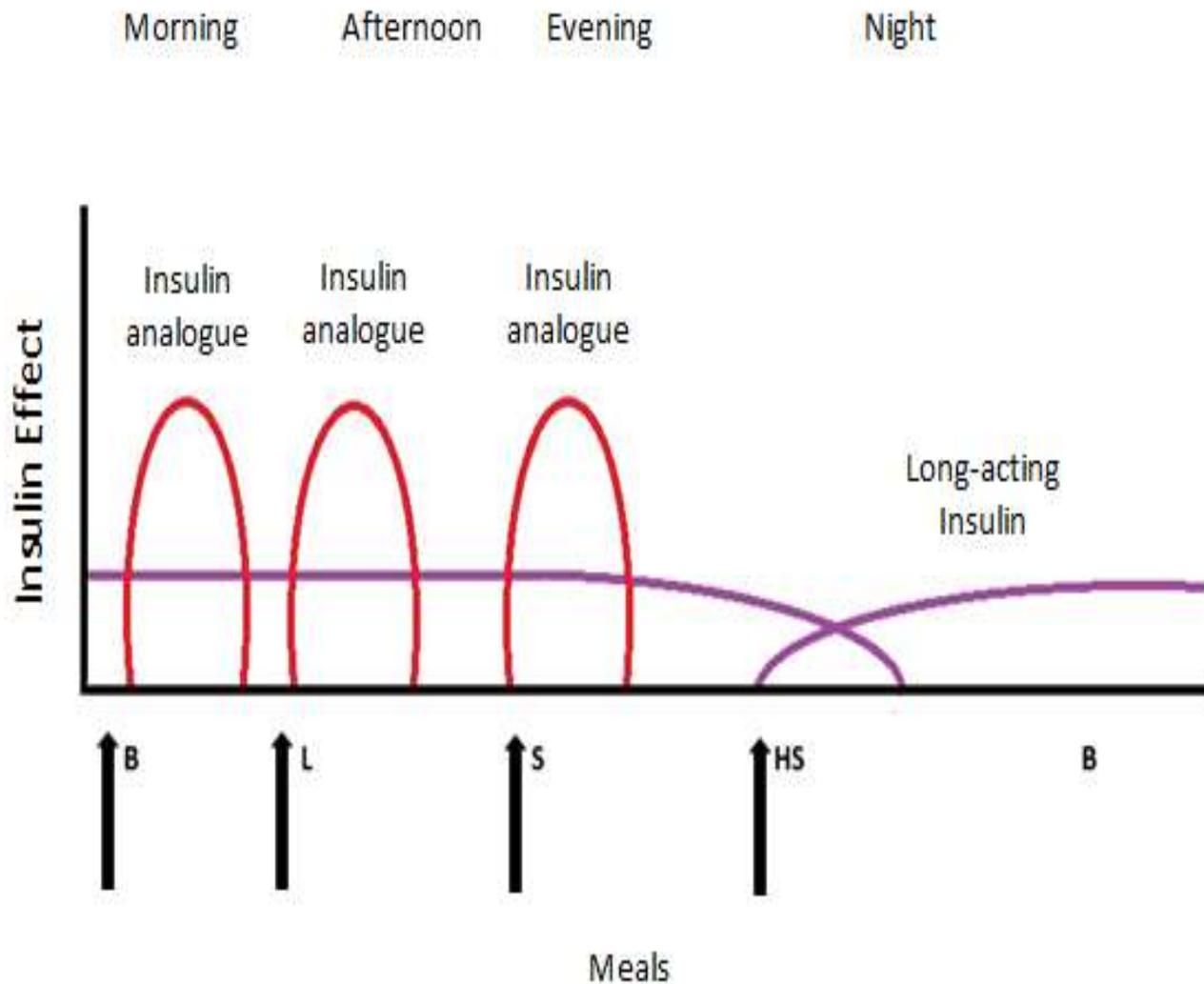
***These are starting regimens and are adjusted based on ability to carbohydrate count and glycemic management as determined by A1C, BGM and/or CGM

Intermediate-acting Insulin + Regular Insulin or Insulin Analogue



Regular insulin: Novolin R, Humulin R
Intermediate insulin: Novolin N, Humulin N
Insulin analogue: aspart, lispro, glulisine

Long-acting Insulin with Insulin analog



Long-acting
serves as
basal
insulin
analog
serves as
bolus

Carbohydrate Ratio

- ▶ Insulin to carbohydrate ratio (ICR)
 - ▶ 1 unit of insulin is expected to cover X grams of carbohydrates
- ▶ Rule of 450 (regular insulin) or 500 (rapid acting insulin) can be used
 - ▶ $500/\text{TDD} = \text{estimated carbohydrate ratio}$

Correction Factor

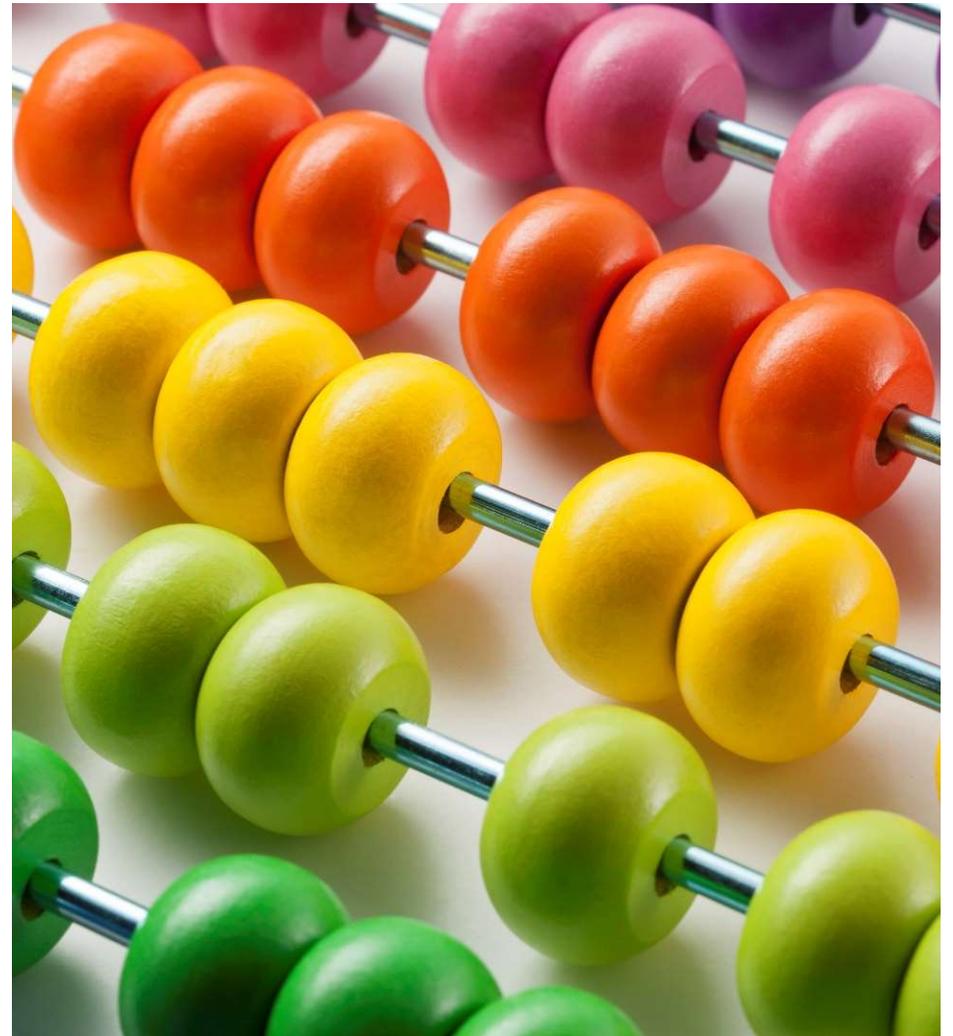
- ▶ Insulin correction factor (ICF)
 - ▶ Often returned to as insulin sensitivity
 - ▶ 1 unit of insulin is expected to lower glucose by Y points
- ▶ Rule of 1700 or 1800 can be used
 - ▶ $1700/\text{TDD} = \text{estimated ICF}$
- ▶ For regular insulin, the rule of 1500 is typically used

An Example: Meet Larry

- ▶ Larry is a 12-year-old newly diagnosed with T1D, he weighs 40kg
- ▶ He is started on 0.5 units/kg/day of total insulin
 - ▶ $40 \times 0.5 = 20$ units
 - ▶ 50% basal = 10 units
 - ▶ 50% bolus = 10 units
- ▶ Larry is prescribed 10 units of long-acting insulin and 3 units of rapid-acting insulin at meals
- ▶ The insulin doses will be adjusted based on glucose data

Larry Calculation cont'd

- ▶ Larry is ready for carbohydrate counting
- ▶ Based on the rule of 500 and rule of 1700, what should his ICR and ICF be?



Poll Question 2

▶ Based on the rule of 500 and rule of 1700, what should Larry's ICR and ISF be? (TDD=20 units/day)

A. ICR=25, ISF=85

B. ICR=20, ISF=60

C. ICR=15, ISF=50

D. ICR=30, ISF=75

E. I am not sure

Answer and Explanation

▶ $ICR=500/20=25$

- ▶ This means that 1 unit of insulin covers 25 grams of carbohydrate
- ▶ If Larry eats 50 grams of carbohydrate, he should inject 2 units

▶ $ISF=1700/20=85$

- ▶ This means that 1 unit of insulin is expected to lower glucose by 85 mg/dL
- ▶ Larry's glucose target is 100
- ▶ If his current glucose is 185, he should take 1 extra unit of insulin

Correction Bolus (Common Scale)

Rapid/Fast Acting Insulin (1 unit:50 mg/dl>150)

Less than 70	Subtract 1 unit
70-150 mg/dl	0 units
151-200 mg/dl	1 unit
201-250 mg/dl	2 units
251-300 mg/dl	3 units
301-350 mg/dl	4 units
351-400 mg/dl	5 units

Correction Bolus (Common Scale)

Rapid/Fast Acting Insulin (2 units:50 mg/dl>150)

Less than 70	Subtract 1 unit
70-150 mg/dl	0 units
151-200 mg/dl	2 unit
201-250 mg/dl	4 units
251-300 mg/dl	6 units
301-350 mg/dl	8 units
351-400 mg/dl	10 units

Poll Question 3

- ▶ How much insulin does a person with type 1 diabetes need a day?
 - a. About 1 unit per pound per day
 - b. No more than 0.5 units/kg per day
 - c. Approximately 5 units/kg per day
 - d. About 0.5 to 1.0 units/kg per day



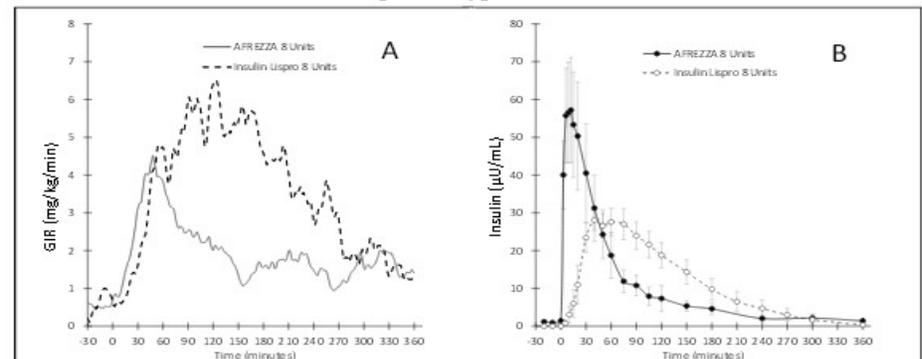
Afrezza – Inhaled Insulin



- **FDA approved for adults over 18yo**
- **Not indicated for pregnancy, while breastfeeding**

Injected Meal Time Dose	Inhaled Insulin Dose
Up to 4 units	4 units
5-8 units	8 units
9-12 units	12 units
12-16 units	16 units
17-20 units	20 units
21-24 units	24 units

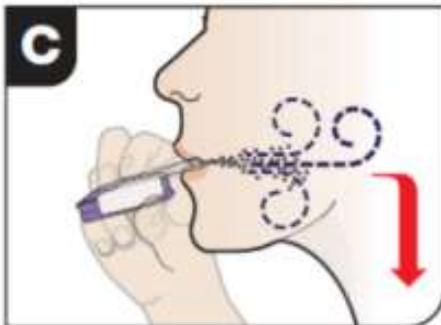
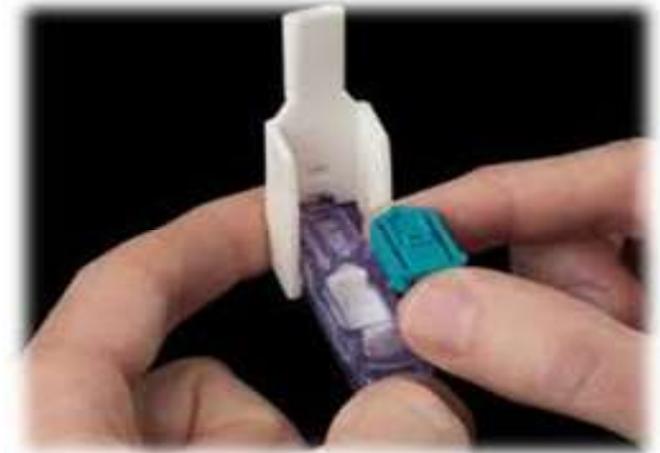
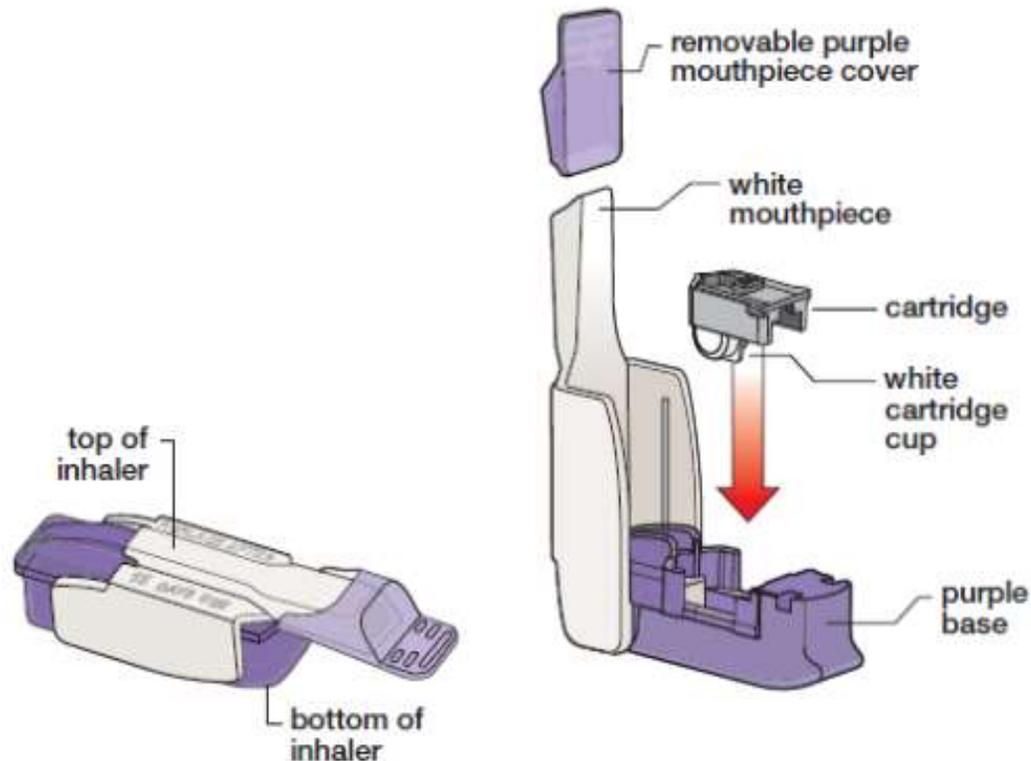
Figure 3. Baseline-Corrected Glucose Infusion Rate (A) and Baseline-Corrected Serum Insulin Concentrations (B) after Administration of AFREZZA or Subcutaneous Insulin Lispro in Type 1 Diabetes Patients*



* Despite the faster absorption of insulin (PK) from Afrezza, the onset of activity (PD) was comparable to insulin lispro.

Afrezza Inhaler

Know your AFREZZA[®] inhaler:



Inhale Deeply and Hold Breath

With your mouth closed around the mouthpiece, **inhale deeply through the inhaler.**

Hold your breath for as long as comfortable and at the same time remove the inhaler from your mouth. After holding your breath, exhale and continue to breathe normally.

Afrezza Storage

IN USE: ROOM TEMPERATURE STORAGE

Reference the chart below for instructions on taking care of your inhaler and opened foil packages.

OPENED AFREZZA INHALERS	Room Temperature
	Use for up to 15 days from the date of first use. After 15 days, inhaler must be discarded and replaced.
SEALED BLISTER CARDS + STRIPS	Room Temperature
	Must be used within 10 days
OPENED STRIPS	Room Temperature
	Must be used within 3 days

Do not put a blister card or strip back into the refrigerator after being stored at room temperature.

NOT IN USE: REFRIGERATED STORAGE

Store unopened drug in a refrigerator 36°F-46°F (2°C-8°C).

SEALED FOIL PACKAGES	Refrigerated
	May be used until the expiration date*
SEALED BLISTER CARDS + STRIPS	Refrigerated
	Must be used within 1 month*

*If a foil package, blister card, or strip is not refrigerated, the contents must be used within 10 days.

BEFORE USING YOUR AFREZZA INHALER



Before use, cartridges and inhaler should be at room temperature for 10 minutes.



ROOM TEMPERATURE



10 mins.

Afrezza Dosing and Considerations

- ▶ Bolus regular insulin – inhaled before meals
- ▶ Dosing: 4, 8 and 12 unit cartridges
- ▶ Lung function test before start (FEV1)
 - ▶ Not for pts w/ chronic lung issues
 - ▶ Asthma, COPD, history of lung cancer, smokers
 - ▶ Can cause acute bronchospasm – Black box warning
- ▶ Side effects:
 - ▶ Sore throat, cough
 - ▶ Less hypoglycemia than injected insulin



Bolus Insulin Timing



- ▶ How is the effectiveness of bolus insulin determined?
 - ▶ 1-2 hours post meal
 - ▶ Before next meal blood glucose
- ▶ Glucose goals may be modified by HCP/pt
 - ▶ 1-2 hours peak post meal <180 (ADA)
 - ▶ 2 hour post meal <140 (AACE)
 - ▶ Before next meal 80 - 130

Poll Question 5

▶ Mary takes 4 units lispro (Humalog) before breakfast. Which BG result reflects that the dose was the right dose?



1. Before breakfast BG of 97
2. 1 hour post breakfast BG of 190
3. Before lunch BG of 69
4. 2-hour post breakfast BG of 154

Stretch Break and Questions: -)





U500 Insulin

More than 200 units a day?

Medscape



Source: Am J Health-Syst Pharm © 2010 American Society of Health-System Pharmacists

DRUG NAME	AVAILABILITY	PEN UNITS	EXPIRATION	ONSET	PEAK EFFECT	DURATION OF ACTION	CLINICAL PEARLS
INSULIN HUMAN REGULAR (HUMULIN R U500)	Pen, Vial	5 unit	Vial: 40 days Pen: 28 days	0.25-0.5 hours	4-8 hr	13-24 hr	This insulin is 5 times as concentrated. If using a vial, use the special U500 syringe.

DailyMed: <https://dailymed.nlm.nih.gov/dailymed/index.cfm>

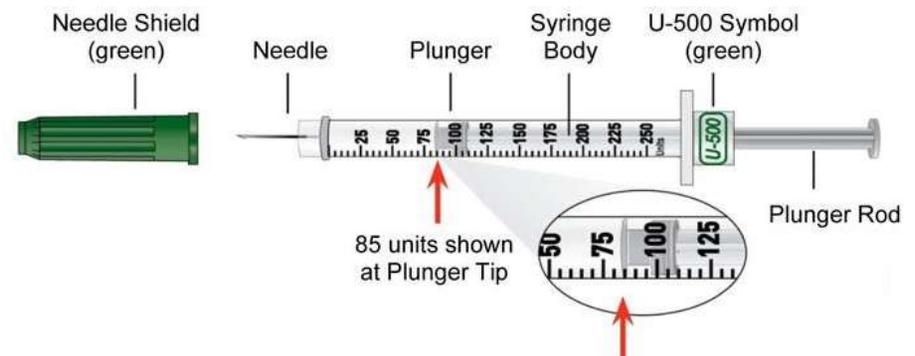
Stahnke AM et al. ADCES in Practice. March, 2020. <https://doi.org/10.1177/2633559X20896414>

Switching to u500 insulin

- ▶ Typically reserved for people requiring insulin >200 units/day
- ▶ U500 acts like an intermediate acting insulin but replaces both the basal and bolus doses
 - ▶ If A1C < 8%, recommend to reduce TDD by 10-20%
 - ▶ If A1C ≥ 8%, consider 1:1 conversion
- ▶ Typically dosed 2-3 times daily
- ▶ It should be taken 30 minutes prior to meals
- ▶ Often initiated as a 60/40 or 40/30/30 split

U500 example

- ▶ A woman with obesity, T2D, and insulin resistance takes insulin detemir 120 units BID and insulin aspart 60 units TID a.c. Her most recent A1C=9%. How would she switch to U500?
 - ▶ 1:1 conversion since A1C \geq 8%
 - ▶ TDD=180+240=420 units split as 40/30/30
- ▶ New Dose:
 - ▶ U500 165 units QAM, 125 units at lunch, 125 units at dinner
 - ▶ Must round to nearest 5 unit increment
 - ▶ Inject 30 minutes before each meal
 - ▶ Use U500 syringe or U500 pen
 - ▶ Do not use U100 syringes!





Barriers to Insulin Use

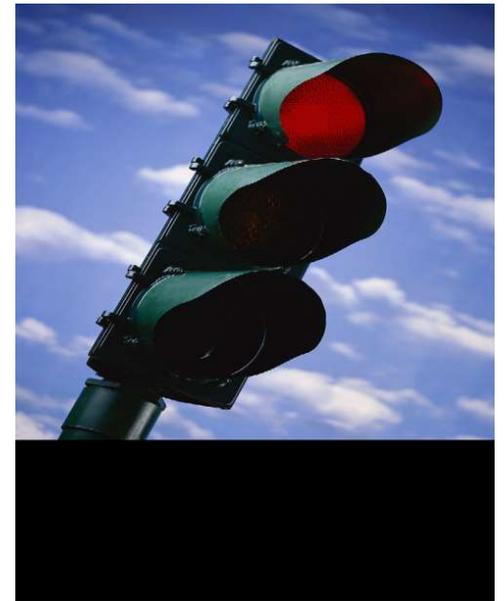
Poll Question 6

- ▶ AJ tells you she doesn't want to start on insulin. What is your best response?
 - a. The needles are so small, you won't even feel it.
 - b. Lots of people are afraid of insulin.
 - c. It sounds like you are refusing to take insulin?
 - d. I'm sorry, but there is a doctors' order to start insulin.
 - e. What concerns do you have about taking insulin?



Psychological Insulin Resistance (PIR)

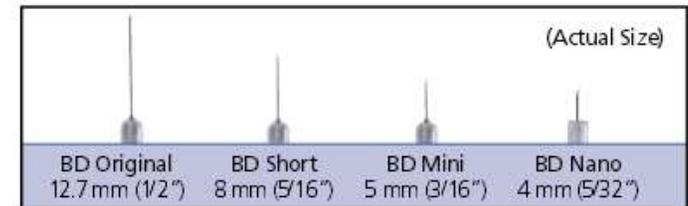
- ▶ 50% of providers in study threatened pts “with the needle”.
- ▶ Less than 50% of providers realized insulins’ positive effect on type 2 DM
- ▶ Most pts don’t believe that insulin would “better help them manage their diabetes”.
- ▶ Solutions: Find the root of PIR and address it



Diabetes Attitudes, Wishes, Needs Study - Rubin

Needle Size often a Barrier: Size Matters

- ▶ Use shortest needles – 4 mm
- ▶ Effective for almost ALL patients
- ▶ Keeps it subq
- ▶ If thin, inject at angle
- ▶ To avoid leakage, count to 10 before withdrawing needle
- ▶ ½ the patients who could benefit from insulin are not using it due to needle phobias
- ▶ Also consider insulin pumps, patches, iport, and inhaled insulin



BD Nano 4mm and BD Mini 5mm only available in pen needles



How To's of Adding Insulin in Type 2 DM

Injectable Therapy for Type 2 DM

- ▶ Consider GLP-1 RA first
- ▶ Start basal insulin 10 units or 0.1 to 0.2 units/kg day
- ▶ Titrate up 2 units every 3 days, until FBG at goal
- ▶ If hypo, decrease insulin 20% or 4 units
- ▶ If basal insulin is >0.5 unit/kg day, add bolus insulin (avoid overbasalization)
- ▶ Adding bolus
 - ▶ Start with 4 units bolus at largest meal or
 - ▶ Start 1-2 injections with 10% of basal or
 - ▶ Switch to 70/30 twice or three times daily.



Intensifying Injectable Footnotes 9.2

- ▶ Consider insulin as the first injectable if evidence of ongoing catabolism A1C levels ($>10\%$) or BG levels $\geq 300\text{mg/dL}$ or a diagnosis of type 1 diabetes is a possibility.
- ▶ For those on GLP-1RA and basal insulin combination, consider using a fixed-ratio combination product (iDegLira or iGlarLixi).
- ▶ Consider switching from evening NPH to a basal analog if there is hypoglycemia and/or the individual frequently forgets to administer NPH in the evening. In this case, an AM dose of a long-acting basal insulin could be a better choice.
- ▶ If adding prandial insulin to NPH, consider initiation of a self-mixed or premixed insulin regimen to decrease number of injections.



Insulin/Injectable Combos

PocketCards updated annually. Download FREE
CDCES Coach App for latest updates and notifications.



Name	Combines	Considerations
IDegLira* Xultophy 100/3.6	Insulin degludec (IDeg or Tresiba) Ultra long insulin + Liraglutide (Victoza) GLP-1 Receptor Agonist (GLP-1 RA)	<p>Xultophy 100/3.6 pre-filled pen = 100 units IDeg / 3.6 mg liraglutide per mL Once daily injection – Dose range 10 to 50 = 10 – 50 units IDeg + 0.36 -1.8 mg liraglutide</p> <p>Recommended starting dose:</p> <ul style="list-style-type: none"> • 16 IDegLira (= 16 units IDeg + 0.58 mg liraglutide) Titrate dose up or down by 2 units every 3-4 days to reach target. Supplied in package of five single-use 3mL pens. Once opened, good for 21 days.
iGlarLixi* Soliqua 100/33	Insulin glargine (Lantus) Basal Insulin + Lixisenatide (Adlyxin) GLP-1 Receptor Agonist	<p>Soliqua 100/33 Solostar Pen = 100 units glargine / 33 µg lixisenatide per mL Once daily injection an hour prior to first meal of day. Dose range 15 – 60 = 15-60 units glargine + 5 – 20µg lixisenatide</p> <p>Recommended starting dose:</p> <ul style="list-style-type: none"> • 15 units if not meeting glucose target on 30 units basal insulin or GLP-1 RA • 30 units if not meeting glucose target on 30-60 units basal insulin or GLP-1 RA Titrate dose up or down by 2-4 units every week to reach target. Supplied in package of five single-use 3mL pens. Once opened, good for 14 days.

*Discontinue basal insulin /GLP-1 RA therapy before starting. If dose missed, resume with next usual scheduled dose.

INTENSIFYING INJECTABLE THERAPY IN TYPE 2 – ADA STANDARDS Figure 9.4

Including reinforcement of behavioral interventions (weightmanagement and physical activity) and provision of DSMES to meet individualized treatment goals.

To Avoid
Therapeutic
Inertia - Reassess
and modify
treatment regularly
(3-6 months)

If injectable therapy is needed to reduce A1C¹

Consider GLP-1 RA or GIP/GLP-1 RA in most individuals prior to insulin²

INITIATION: Initiate appropriate starting dose for agent selected (varies within class)

TITRATION: Titration to maintenance dose (varies within class)

If already on GLP-1 RA or GIP/GLP-1 RA or if these are not appropriate OR if insulin is preferred:

If above A1C target

Add basal insulin³

Choice of basal insulin should be based on person-specific considerations, including cost. Refer to **Table 9.4** for insulin cost information.

Add basal analog or bedtime NPH insulin

INITIATION: Start 10 IU a day OR 0.1-0.2 IU/kg a day

TITRATION:

- Set FPG target (see Section 6: Glycemic Targets)
- Choose evidenced-based titration algorithm, e.g., increase 2 units every 3 days to reach FPG target without hypoglycemia
- For hypoglycemia determine cause, if no clear reason lower dose by 10-20%

INTENSIFYING INJECTABLE THERAPY IN TYPE 2 – ADA STANDARDS Figure 9.4

Including reinforcement of behavioral interventions (weightmanagement and physical activity) and provision of DSMES to meet individualized treatment goals.

Assess adequacy of basal insulin dose

Consider clinical signals to evaluate for overbasalization and need to consider adjunctive therapies (e.g., basal dose >0.5 IU/kg, elevated bedtime-morning and/or post-preprandial differential, hypoglycemia [aware or unaware], high variability)

If above A1C target and not on GLP-1/GIP, consider adding to treatment plan. If A1C still elevated:

Add prandial insulin⁵

Usually, one dose with the largest meal or meal with the greatest PPG excursion; prandial insulin can be dosed individually or mixed with NPH as appropriate

INITIATION:

- 4 IU a day or 10% of basal insulin dose
- If A1C <8% (64 mmol/mol) consider lowering the basal dose by 4 IU a day

TITRATION:

- Increase dose by 1-2 IU or 10-15% twice weekly
- For hypoglycemia determine cause, if no clear reason lower corresponding dose by 10-20%

If on bedtime NPH, consider converting to twice-daily NPH regimen

Conversion based on individual needs, glycemic control. The following is one possible approach:

INITIATION:

- Total dose= 80% of current NPH dose
- 2/3 given in the morning
- 1/3 given at bedtime

TITRATION: Titrate based on individualized needs

INTENSIFYING INJECTABLE THERAPY IN TYPE 2 – ADA STANDARDS Figure 9.4
Including reinforcement of behavioral interventions (weightmanagement and physical activity) and provision of DSMES to meet individualized treatment goals.



If above A1C target

Stepwise additional injections of prandial insulin

(i.e., two then three additional injections)

Proceed to full basal-bolus regimen

(i.e., basal insulin and prandial insulin with each)

Consider self-mixed/split insulin regimen

Can adjust NPH and short/rapid-acting insulins separately

INITIATION:

- Total NPH dose = 80% of current NPH dose
- 2/3 given before breakfast
- 1/3 given before dinner
- Add 4 IU of short/rapid-acting insulin to each injection or 10% of reduced NPH dose

TITRATION:

- Titrate each component of the regimen based on individualized needs

Consider twice daily premix insulin regimen

INITIATION:

- Usually unit per unit at the same total insulin dose, but may require adjustment to individual needs

TITRATION:

- Titrate based on individualized needs

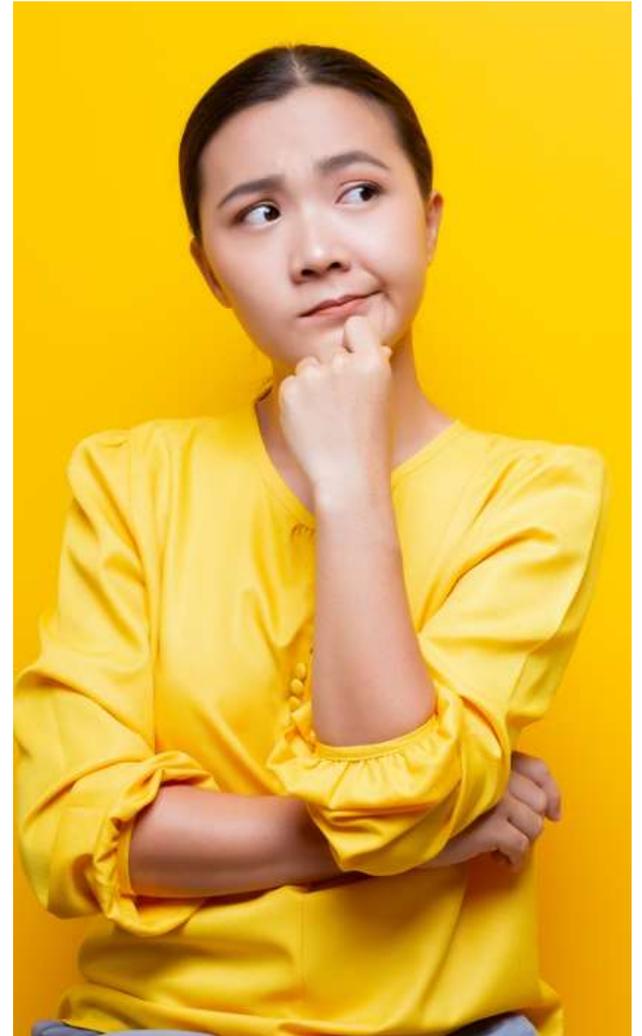
Case Study: Jenny

Jenny is a 50-year-old woman that takes insulin glargine 100 units daily, glipizide 10mg BID, metformin 1000mg BID, and linagliptin 5mg daily. A1C is 9.3%. She weighs 110kg. She checks glucose in the AM only and reports it's 90-130mg/dL. Her eGFR is 70. She previously had UTI's with empagliflozin.

What is the best recommendation to adjust this regimen?

Thinking about the choices

- ▶ Continue glargine?
- ▶ Continue glipizide?
- ▶ Continue linagliptin?
- ▶ Switch to combination GLP1 receptor agonist /insulin injectable?
- ▶ Add GLP-1 agonist?
- ▶ Add prandial insulin?
- ▶ Add SGLT-2 inhibitor?



Piecing it Together

- ▶ New Regimen:
 - ▶ Insulin glargine 80 units once daily (20% reduction)
- ▶ Semaglutide 0.25mg weekly, titrated up to 1.0mg weekly
- ▶ Stop linagliptin
- ▶ Continue glipizide (for now)
- ▶ Next step could be to retry SGLT2i with counseling on how to avoid UTIs
- ▶ Or replacing glipizide with prandial insulin with largest meal



Switching Insulin

How to Switch Basal Insulin

- ▶ When going from twice daily basal insulin to once daily, reduce dose by 20%
 - ▶ Examples:
 - ▶ Insulin NPH BID to insulin glargine daily
 - ▶ Insulin detemir BID to insulin degludec daily
- ▶ When switching between once daily, a unit per unit conversion is okay
- ▶ Long-acting to glargine U300 often requires higher doses (10 to 18%) but start with a unit to unit conversion
- ▶ When switching from glargine U300 to another long-acting insulin, reduce dose by 20%
- ▶ Need to use clinical judgement
 - ▶ For example, if A1C, FBG, and pre-meal BG are all above target, then may not be necessary to reduce basal insulin dose

Poll 7 - Making the switch: Meet Joan

Joan is taking insulin glargine 30 units twice daily. Her insurance formulary wants her to switch to insulin degludec. Her current A1C is 6.9%. What is the best dose recommendation?

- A. Insulin degludec 30 units twice daily
- B. Insulin degludec 60 units once daily
- C. Do not switch since her A1C is well-controlled and get a prior authorization to continue with insulin glargine
- D. Insulin degludec 48 units once daily



Switching Meal time Insulin

- ▶ This is a 1:1 conversion when switching between regular insulin, aspart, lispro, and glulisine including Fiasp[®] and Lyumjev[™].
- ▶ The exception is when switching to Afrezza



Injected Meal Time Dose	Inhaled Insulin Dose
Up to 4 units	4 units
5-8 units	8 units
9-12 units	12 units
12-16 units	16 units
17-20 units	20 units
21-24 units	24 units

Poll 8. Patient Case: Lumy

- ▶ Lumy's insurance formulary changed from insulin lispro to insulin aspart.
- ▶ She was following an insulin to carbohydrate ratio of 1:12 and a correction factor of 1:50.
- ▶ How should she dose insulin aspart when she switches?
 - A. Reduce all doses by 10%
 - B. Increase all doses by 10%
 - C. Same dosing
 - D. Submit prior authorization so she doesn't change insulin



Insulin Pattern Management

Pattern Management –AKA

How to
think
like a
pancreas

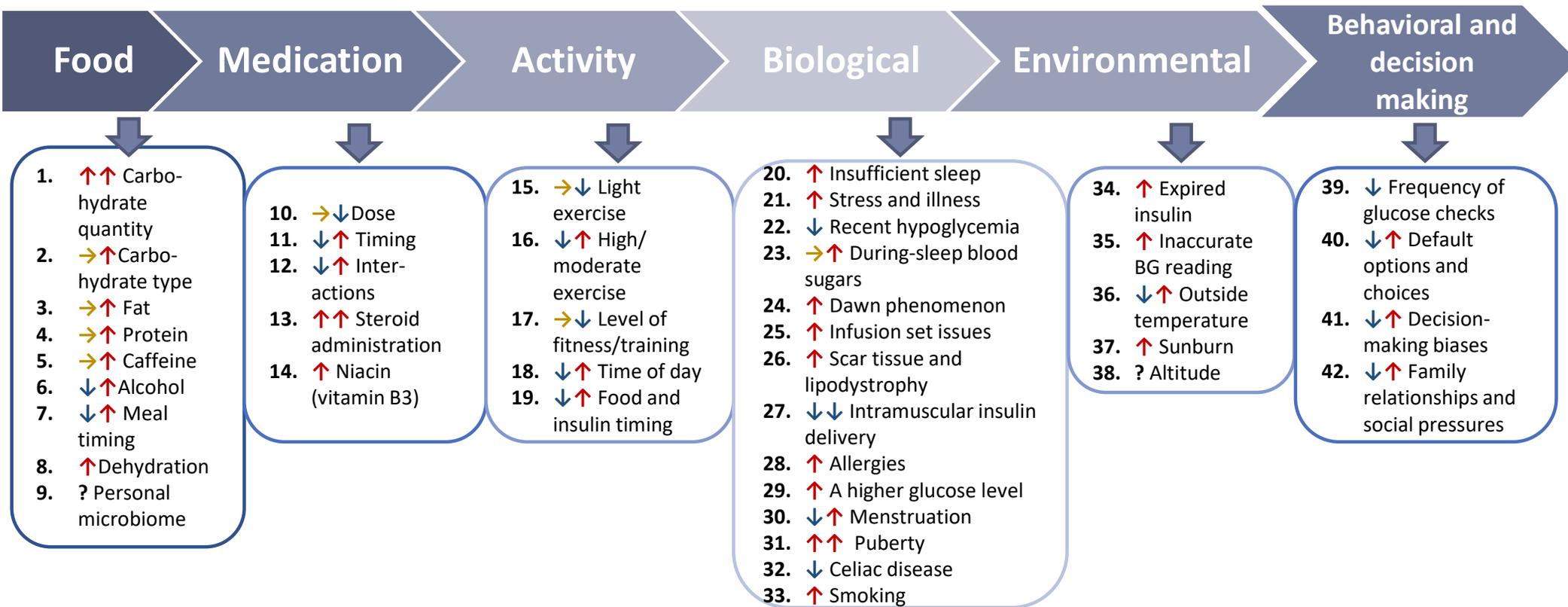


What do the numbers mean?

It's like a BIG puzzle!



At Least 42 Factors Affect Glucose!



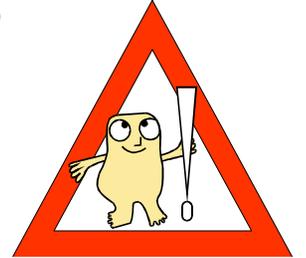
Poll Question 9

- ▶ When looking at glucose patterns, which problem do you fix first?
 - Hyperglycemia
 - Hypoglycemia
 - Non-compliance
 - Legible writing



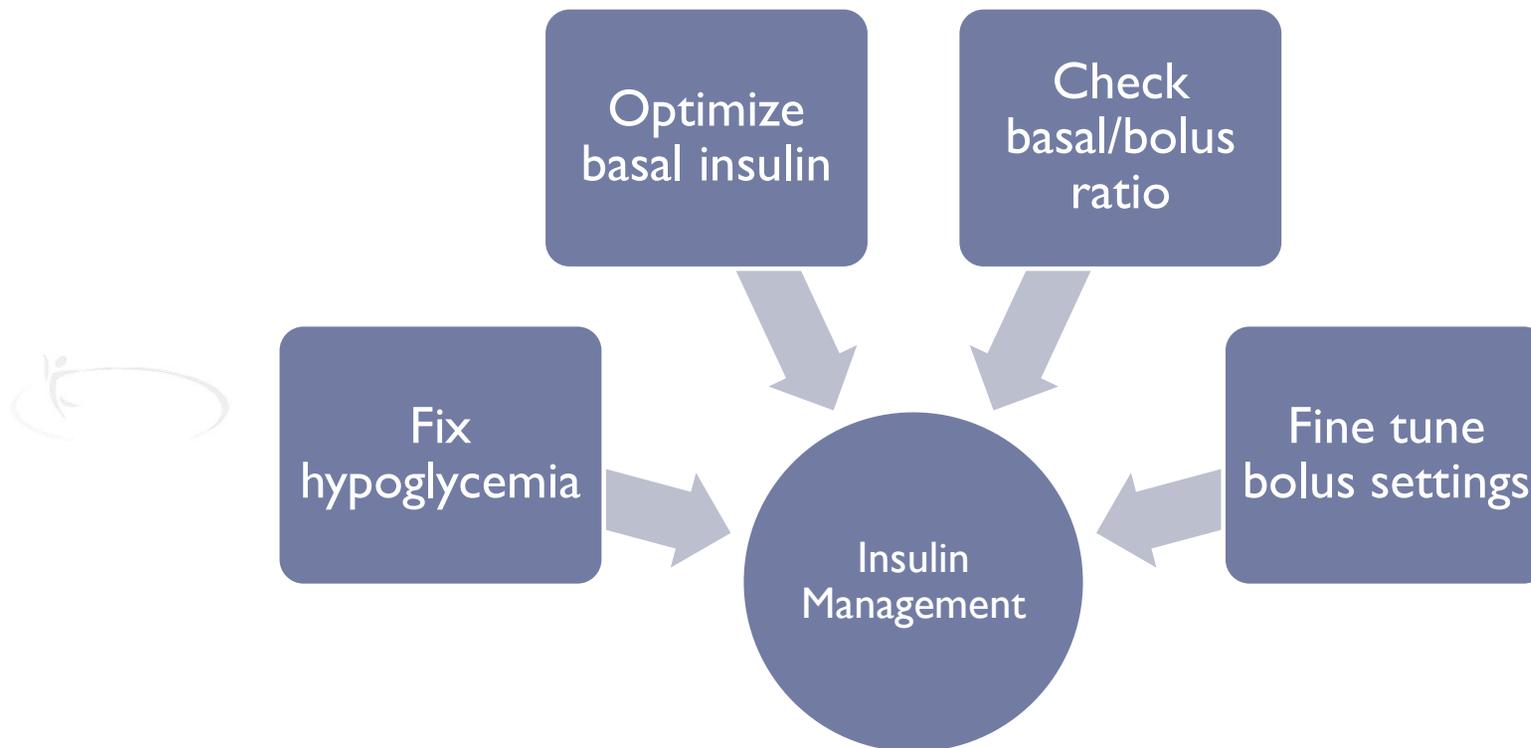
Pattern Management

- ▶ Safety 1st!! - Evaluate 3 day patterns
- ▶ **Hypo:** eval 1st and fix:
 - ▶ If possible, decrease medication dose
 - ▶ Timing of meals, exercise, medications
- ▶ **Hyperglycemia:** evaluate 2nd
 - ▶ Identify patterns
 - ▶ Before increase insulin, make sure not missing something (carbs, exercise, omission)



General Rules in T1DM

- ▶ Optimize basal dose (stay within 30mg/dL when not eating)

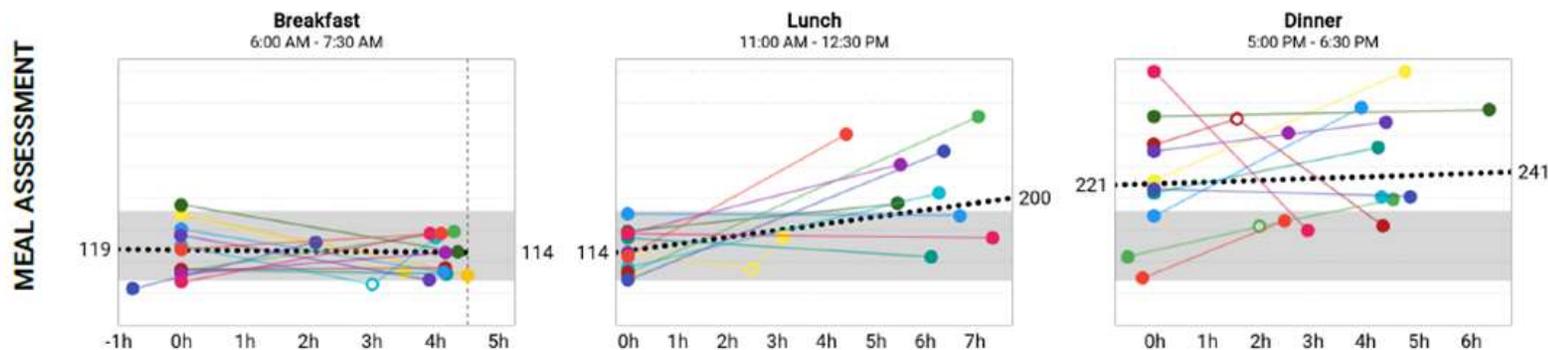


Adjusting Insulin doses in a Basal/Bolus regimen (T1DM & T2DM)

Out of Range Glucose	Insulin to Adjust
Fasting	Long acting insulin or evening NPH
Post-breakfast/pre-lunch	Pre-breakfast rapid/regular insulin
Post lunch/pre-dinner	Pre-lunch rapid/regular insulin or morning NPH
Post-dinner/before bedtime	Pre-dinner rapid/regular insulin

Meal Time Data Review

- ▶ Glucose data before and after breakfast, lunch and dinner
- ▶ Ideally, 2 hour post-meal should not rise above 180mg/dL or 50mg/dL from the pre-meal start
- ▶ By 4-5 hours, glucose should return to pre-meal level



Bolus Pattern Management

- ▶ Does glucose go low after a correction dose?
 - ▶ May need a higher sensitivity
 - ▶ Ex. 1:60 instead of 1:50
- ▶ Does glucose remain high after a correction dose?
 - ▶ May need a lower sensitivity
 - ▶ Ex. 1:40 instead of 1:50
- ▶ Often people are more sensitive overnight (less insulin needed)
- ▶ Does the person spike high after eating?
 - ▶ Is the person bolusing BEFORE the meal
 - ▶ Counting carbs correctly?
 - ▶ May need a more intensive carb ratio
 - ▶ Ex. 1:6 instead of 1:8
- ▶ Does the person go low after eating?
 - ▶ Counting carbs correctly?
 - ▶ May need a less intensive carb ratio
 - ▶ Ex. 1:10 instead of 1:8

Adjustments typically made 10-20% at a time

Evaluating Overnight Basal

Avg Daily Carbs (g)	179 ± 24	
Carbs/Bolus Insulin (g/U)	10.2	
Avg Total Daily Insulin (U)	37.5 ± 3.3	
Avg Daily Basal (U)	19.8	53%
Avg Daily Bolus (U)	17.6	47%

	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM	Daily Totals	
Wednesday 06-06-2018							183	183	45				181	45					244	140				126	Average (6): 176mg/dL Carbs: 175g Insulin: 37.3U Bolus: 46%	
Thursday 06-07-2018							252		164	47			90	45					150	137						Average (6): 174mg/dL Carbs: 177g Insulin: 36.8U Bolus: 46%
Friday 06-08-2018	84						201				201		63	45					198			82				Average (8): 124mg/dL Carbs: 175g Insulin: 35.3U Bolus: 43%
Saturday 06-09-2018		89						170	170	39			93	100					274					299	Average (8): 183mg/dL Carbs: 186g Insulin: 41.6U Bolus: 51%	
Sunday 06-10-2018		225					180	181	40				110	110					278			116		99	Average (8): 162mg/dL Carbs: 163g Insulin: 38.9U Bolus: 48%	
Monday 06-11-2018							155	155	39				163	45			209				117					Average (6): 153mg/dL Carbs: 169g Insulin: 34.8U Bolus: 42%
Tuesday 06-12-2018	186						129	128	34				200	200			245							131	207	Average (8): 178mg/dL Carbs: 167g Insulin: 38.3U Bolus: 48%
Wednesday 06-13-2018							336	100	300	17	45		161	55					102			91			64	Average (9): 156mg/dL Carbs: 221g Insulin: 42.3U Bolus: 52%
Thursday 06-14-2018	82						75	79	40				106	45						97		107				Average (6): 91mg/dL Carbs: 172g Insulin: 32.7U Bolus: 38%
Friday 06-15-2018	185						101	101	33				137			113			137		72					Average (7): 121mg/dL Carbs: 194g Insulin: 35.2U Bolus: 43%
Saturday 06-16-2018	100						193		140	38			135	100					369	103	>400	>400	>400	316	100	Average (14): 231mg/dL Carbs: 220g Insulin: 38.0U Bolus: 56%

Do you see any problems?

Checking the Sensitivity

▶ TDD=49 units

▶ Rule of 1700

▶ $1700/49=35$

▶ Current sensitivity is 40

Total daily dose (per day)	49 units
Bolus amount (per day)	21U (43%)
Auto Basal / Basal amount (per day)	28U (57%)

Carbohydrate Ratio (g/U)			Insulin Sensitivity (mg/dL per U)		
Time	Ratio		Time	Sensitivity	
0:00	15.0		0:00	40	

The calculation is slightly different from the current sensitivity. Look at the glucose data to determine if the sensitivity should be decreased.

Checking the Carb Ratio

▶ TDD=49 units

▶ Rule of 450

▶ $450/49=12.9$

▶ Current carb ratio is 15

Total daily dose (per day)	49 units
Bolus amount (per day)	21U (43%)
Auto Basal / Basal amount (per day)	28U (57%)

Carbohydrate Ratio (g/U)			Insulin Sensitivity (mg/dL per U)		
Time	Ratio		Time	Sensitivity	
0:00	15.0		0:00	40	

The calculation is different from the current carb ratio. Look at the glucose data to determine if the carb ratio should be decreased.

Case Study: Larry Poll Question 12

Larry takes metformin 1000mg BID, insulin glargine 50 units once daily, empagliflozin 10mg daily. His A1C is 7.8%. He weighs 90kg. FBG averages 100mg/dL. PP breakfast=190mg/dL, PP lunch=210mg/dL, and PP dinner is 240mg/dL. What is the best recommendation for an agent to add to the regimen to achieve A1C target?

- A. Initiate insulin aspart 5 units at dinner, decrease insulin glargine to 45 units daily
- B. Initiate insulin aspart 5 units with all meals, decrease insulin glargine to 35 units daily
- C. Initiate insulin aspart 5 units at dinner, continue insulin glargine 50 units daily
- D. Initiate dulaglutide 0.75mg weekly, decrease insulin glargine to 45 units daily

Summary

- ▶ Many different types of insulin
- ▶ Basal + bolus needed for T1DM
- ▶ Weight based dosing and rules of 1700/1800 and 500/450 can be used to calculate correction factor and carb ratio
- ▶ GLP1 agonist preferred 1st injectable in T2DM
- ▶ Avoid overbasalization, if taking more than 0.5unit/kg/day, think about GLP1 agonist +/- prandial insulin
- ▶ Counsel patients on injection site technique, administration and storage
- ▶ Fine tune insulin settings based on BGM and CGM data

Q & A



Activity Break with Stephany

- ▶ **Activity
Volunteer**



Break and Question Time

- ▶ Energizing Ideas
 - ▶ Dance
 - ▶ Walk outside
 - ▶ Get a nourishing snack
 - ▶ Drink some spa water
 - ▶ Do some jumping jacks
 - ▶ Stretch and Breathe





25
years

Diabetes Interview – From Head to Toe & Microvascular Risk

www.DiabetesEd.net

Beverly Thomassian, RN, MPH, BC-ADM, CDCES
President, Diabetes Education Services

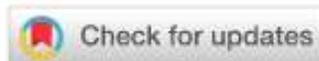
Honing Detective Skills

During interviews, outline strategies to identify previously undiscovered diabetes co-conditions, identify clinical inertia and move to best health.



4. Comprehensive Medical Evaluation and Assessment of Comorbidities: *Standards of Medical Care in Diabetes—2022* **FREE**

American Diabetes Association Professional Practice Committee



Diabetes Care 2022;45(Supplement_1):S46–S59

<https://doi.org/10.2337/dc22-S004>

Objectives

1. Identify common yet often under diagnosed co-conditions associated with type 1 and type 2 diabetes.
2. Describe the interrelationship between glucose, inflammation and diabetes complications.
3. List the elements of a head-to-toe assessment including lower extremity assessment.
4. Discuss barriers to sexual health and communication strategies.



4. Comprehensive Medical Evaluation and Assessment of Comorbidities

- ▶ Person centered communication, strength-based language, active listening, literacy, quality of life
- ▶ It is necessary to take into account all aspects of a person's life circumstance
- ▶ It is important to integrate medical eval, engagement and lifestyle changes.
- ▶ Interdisciplinary teams provide best care



EV Arrives and Requests Help

- ▶ 58 yr old complains of 4 lb wt gain for past month. BMI 31, wt 90 kg. B/P 142/96. A1C 8.3%
- ▶ Meds include:
 - ▶ Sitagliptin, Metformin
 - ▶ Actos 15mg ac breakfast
 - ▶ Basaglar 58 units
 - ▶ Semaglutide 0.5mg weekly
 - ▶ Levothyroxine (ran out)
 - ▶ Lisinopril 10mg
 - ▶ Gabapentin 100 mg TID

What story do these meds tell?

Any med(s) missing?

Any med needs to be stopped?



EV Arrives and Requests Help

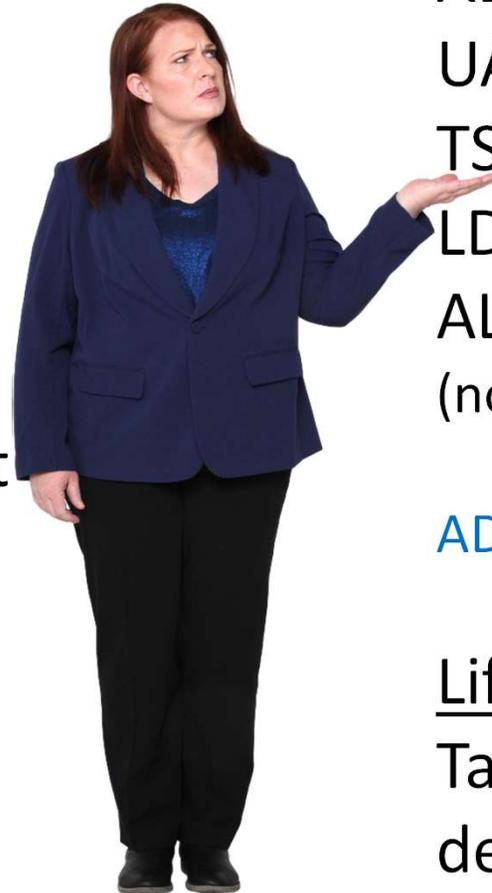
- ▶ 58 yr old complains of 4 lb wt gain for past month. BMI 31, wt 90 kg. B/P 142/96. Checks BG in morning; 150ish. A1C 8.3%
- ▶ Meds include:
 - ▶ Sitagliptin (DPP-IV), Metformin
 - ▶ Basaglar 58 units (Basal)
 - ▶ Semaglutide 0.5mg wk (GLP-1)
 - ▶ Levothyroxine (ran out)
 - ▶ Lisinopril 10mg (ACE)
 - ▶ Lovastatin 20mg (Statin)
 - ▶ Gabapentin 100 mg TID (leg pain)

What does this tell us about EV?

- Struggling with weight
- B/P & A1C above target
- Overbasalized (max dose 0.5 units/kg a day)
- Why not taking thyroid med?
- Lower extremity pain contributing to distress?
- Elevated CV risk?

EV is Gaining Weight and is Tired

- ▶ 58 yr old complains of 4 lb wt gain for past month. BMI 31, wt 90 kg. B/P 142/96. Checks BG in morning; 150ish. A1C 8.3%
- ▶ Meds include:
 - ▶ Sitagliptin, Metformin
 - ▶ Actos 15mg ac breakfast
 - ▶ Basaglar 58 units
 - ▶ Semaglutide 0.5mg weekly
 - ▶ Levothyroxine – ran out
 - ▶ Lisinopril 10mg
 - ▶ Gabapentin 100 mg TID



Labs

A1C – 8.3%

UACR 26 GFR >60

TSH 10.6

LDL 98 mg/dl, Trig 158

ALT 85 IU/L, AST 90 IU/L
(normal range 25-50)

ADA ALT 29-33 men

ALT 19-25

Life situation

Takes care of dad with dementia

Gums inflamed

No eye doctor for year

Both feet hurt at night

ABC's of Diabetes

▶ A1c less than 7% (individualize)

- ▶ Pre-meal BG 80-130
- ▶ Post meal BG <180
- ▶ AGP - Time in Range (70-180) 70% of time

▶ Blood Pressure < 130/80

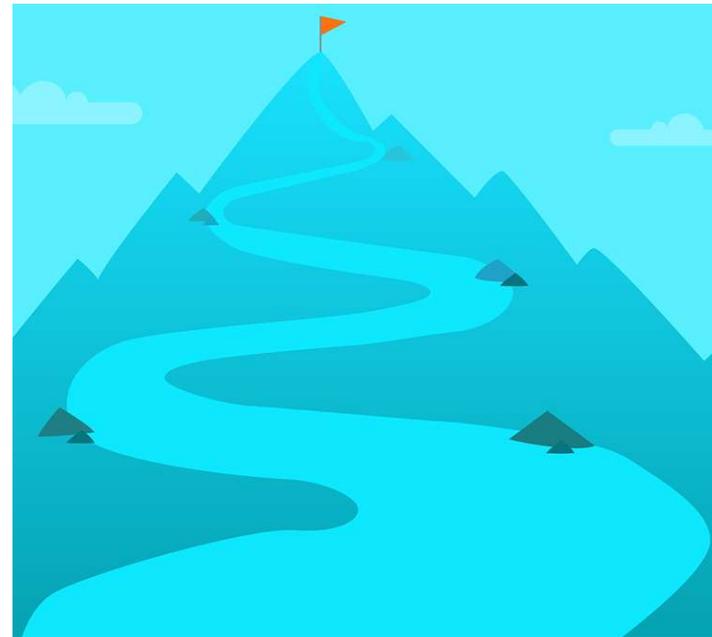
▶ Cholesterol

- ▶ Statin therapy based on age & risk status
- ▶ If 40+ with ASCVD Risk, decrease 50%, LDL <70
- ▶ If 40+ with ASCVD, decrease 50%, LDL <55



Advocating for Best Health for people with Diabetes

- ▶ Modifiable
 - ▶ Sleep
 - ▶ Activity
 - ▶ Smoking
 - ▶ Dietary Habits
 - ▶ Glucose
 - ▶ Blood Pressure
 - ▶ Lipids
 - ▶ Oral Care
 - ▶ Immunizations
 - ▶ Psychosocial care



- ▶ Make small, achievable goals. We are in this for the long run.

Diabetes is a long path



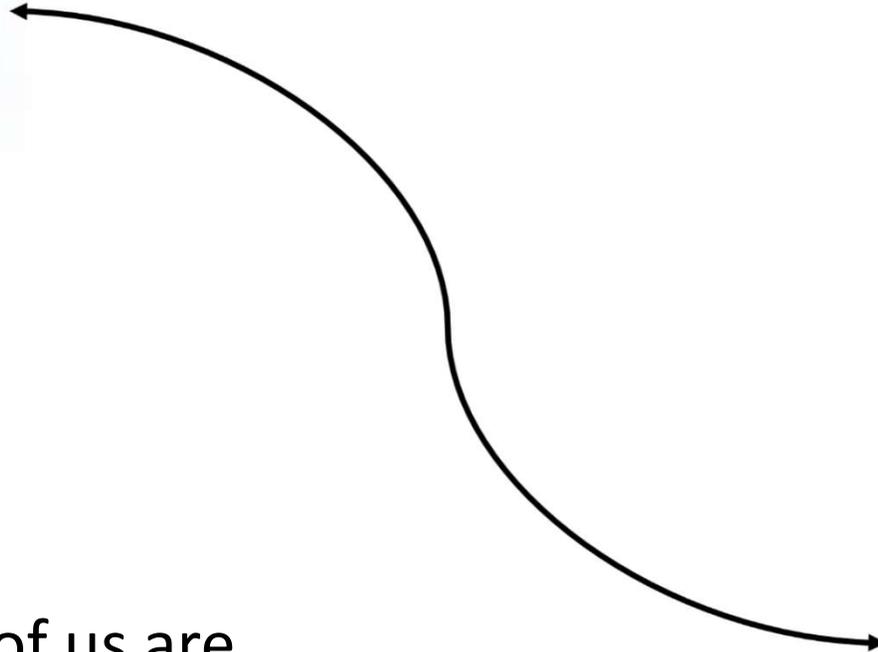
Get at least 7 hours of sleep a night – Check for sleep apnea

Obstructive Sleep Apnea - OSA

- ▶ OSA affects ~25% of people with type 2
 - ▶ Up to 60% of those with type 2 have disordered sleep
- ▶ Associated with increased CVD risk
- ▶ 4-10 increased risk if BMI 30+ with visceral adiposity
- ▶ Treatment:
 - ▶ Lifestyle modification
 - ▶ Continuous positive oral airway pressure and devices
 - ▶ Surgery



Where are we on this continuum?



Only about 50% of us are meeting activity goals



Benefits of Exercise and Diabetes

- ▶ Increase muscle glucose uptake 5-fold
- ▶ Glucose uptake remains elevated for 24 - 48 hours (depending on exercise duration)
- ▶ Increases insulin sensitivity in muscle, fat, liver.
- ▶ Reduce CV Risk factors (BP, cholesterol, A1c)
- ▶ Maintain wt loss
- ▶ Contribute to well being
- ▶ Muscle strength
- ▶ Better physical mobility



Exercise decreases:

- ▶ Sleep apnea
- ▶ Diabetic kidney disease, retinopathy
- ▶ Depression
- ▶ Sexual dysfunction
- ▶ Urinary incontinence
- ▶ Knee pain
- ▶ Need for medications
- ▶ Health care costs



Best Medicine

- ▶ **Exercise is the best medicine.** Structured exercise of 8 weeks duration, has been shown to lower A1c by an average of 0.66% in people with type 2, even without a significant change in BMI.



Smoking and Diabetes

Smoking increases risk of diabetes 30%



- Ask at every visit
- Assess
- Advise
- Assist with stop smoking
- Arrange for referrals
- Organize your clinic

Balancing Calories

- ▶ Enjoy your food, but eat less.
- ▶ Avoid oversized portions.

Foods to Increase

- ▶ Make half your plate fruits and vegetables.
- ▶ Make at least half your grains whole grains.
- ▶ Switch to fat-free or low-fat (1%) milk.

Foods to Reduce

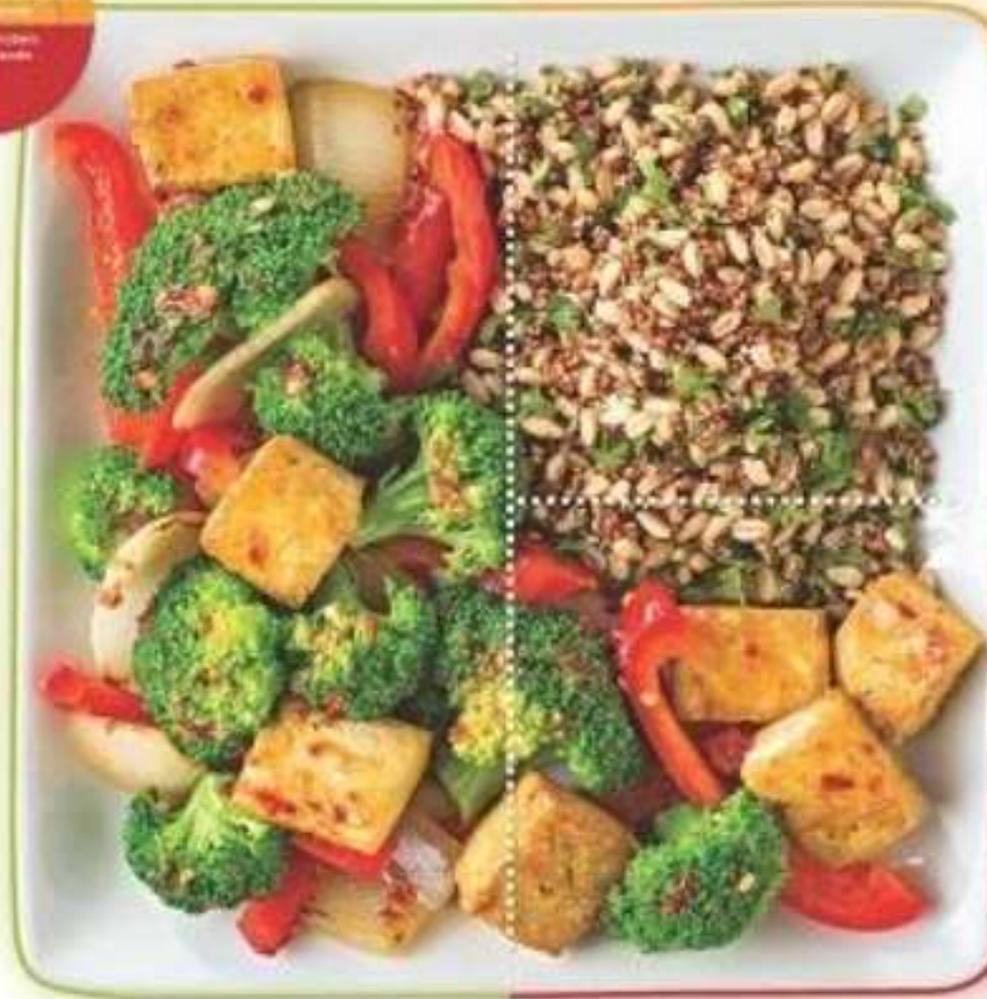
- ▶ Compare sodium in foods like soup, bread, and frozen meals — and choose the foods with lower numbers.
- Drink water instead of sugary drinks.



Plan Your Portions



Plan Your Portions



- Asparagus
- Broccoli
- Bunching green onions
- Cabbage
- Cauliflower
- Cucumbers
- Dark leafy greens
- Eggplant
- Mushrooms
- Onions
- Peas
- Peppers
- Radishes
- Salad greens
- Tomatoes
- Zucchini



Water or no-calorie drinks

- Corn
- Green beans
- Fruit
- Beans
- Whole grains
- Whole grains
- Beans, lentils and peas
- Milk and yogurt
- Cheese
- Eggs
- Nut butter
- Nuts
- Tofu
- Tofu

Use a smaller plate. This is a 9-inch plate to help guide you

9 inches

Diabetes Toolkit

Meter

- Strips that aren't expired?

Medication supply

Pump Supplies

CGM Supplies

Power back-up

- ▶ Diabetes ID
 - ▶ Phone, medic alert, on person
- ▶ Carbohydrate source
 - ▶ Granola bar, glucose tabs, GU, gummy bears
- ▶ Rescue Meds

EV asks why the weight gain?



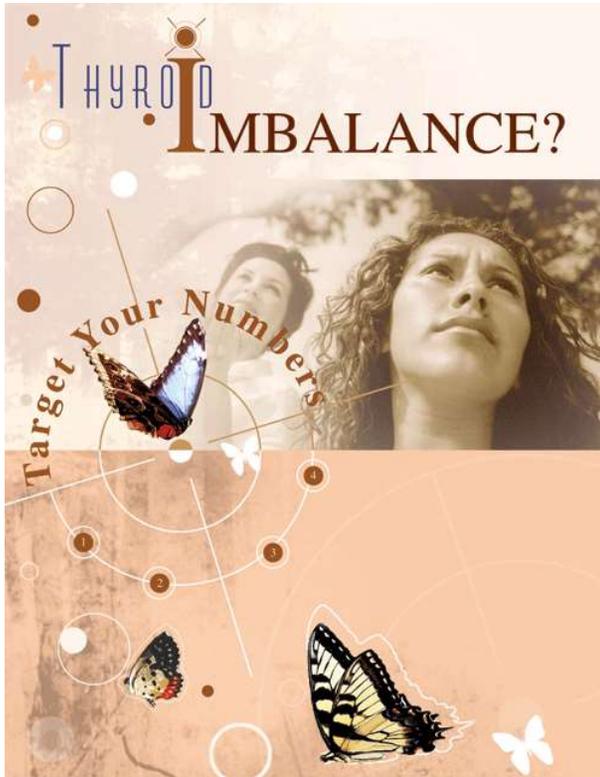
- ▶ Fluid retention - diabetes doubles risk for Congestive Heart Failure (CHF). Check lower extremities.
- ▶ Inaccurate nutrition knowledge
- ▶ Actos and Avandia, (TZD's) associated with edema
- ▶ Blood sugars improving
- ▶ Thyroid disease under treated
- ▶ Novel Antipsychotics
- ▶ Depression / Increased intake

Thyroid Disease and Diabetes

- ▶ 15 to 30% of people w/ diabetes & their siblings or parents are likely to develop thyroid disease
- ▶ Up to 60 percent of those with thyroid disease are unaware of their condition.
- ▶ Women are 5-8x's more likely than men to have thyroid problems.
- ▶ Check TSH on Type 1 & 2 annually or if indicated.
- ▶ Hashimoto's thyroiditis – autoimmune thyroid
 - ▶ most common cause of hypothyroidism w/ dm
 - ▶ Associated with:
 - ▶ Elevated cholesterol levels
 - ▶ Increased risk of CV disease
 - ▶ Weight gain



Thyroid & TSH* Levels



**AACE
Guidelines**

- ▶ *Thyroid Stimulating Hormone - secreted by pituitary gland
 - ▶ controls thyroid hormone thyroxine production
 - ▶ first and best test
 - ▶ TSH Norm = up to 4.5 mIU/mL
 - ▶ Treatment based on TSH plus symptoms.
 - ▶ 4.5 – 10 based on risk, s/s
 - ▶ 10 or more = treat
 - ▶ Lower = hyperthyroidism
 - ▶ Higher = hypothyroidism-

Thyroid Dysfunction

HYPO THYROIDISM

DRY, COARSE HAIR

LOSS OF EYEBROW
HAIR

PUFFY FACE

ENLARGED THYROID
(GOITER)

SLOW HEARTBEAT

ARTHRITIS
COLD
INTOLERANCE
DEPRESSION
DRY SKIN
FATIGUE
FORGETFULNESS
HEAVY
MENSTRUAL
PERIODS
INFERTILITY
MUSCLE ACHES

WEIGHT GAIN

CONSTIPATION

BRITTLE NAILS

HYPER THYROIDISM

HAIR LOSS

BULGING EYES

SWEATING

ENLARGED THYROID
(GOITER)

RAPID HEARTBEAT

DIFFICULTY
SLEEPING
HEAT
INTOLERANCE
INFERTILITY
IRRITABILITY
MUSCLE
WEAKNESS
NERVOUSNESS
SCANT
MENSTRUAL
PERIODS

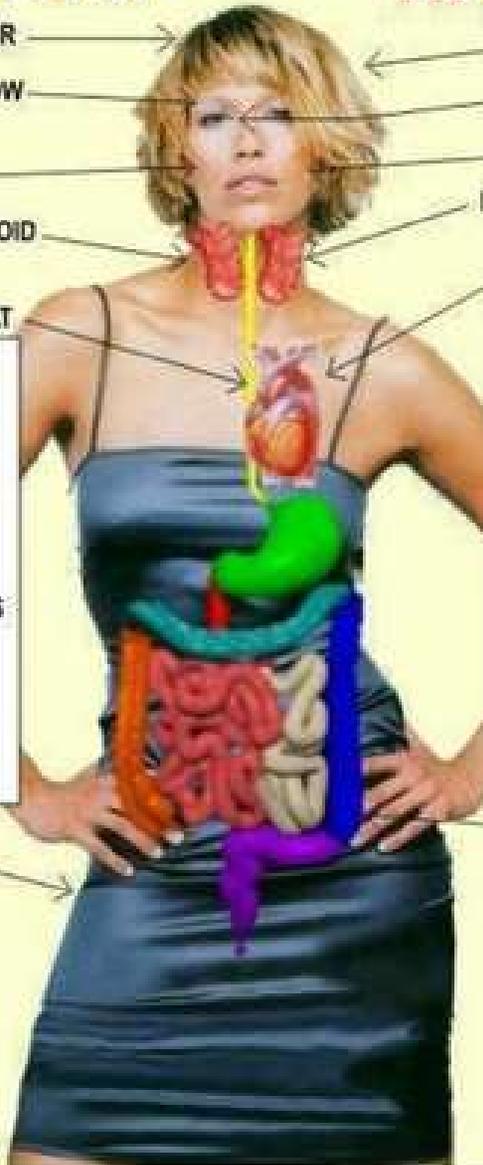
WEIGHT LOSS

FREQUENT
BOWEL
MOVEMENTS

WARM, MOIST
PALMS

TREMOR OF
FINGERS

SOFT NAILS



A TSH above 10 mIU/L, in combination with a subnormal free T4 characterizes overt hypothyroidism.

If TSH in range, but person is symptomatic, Check for thyroid peroxidase antibody or TPO antibodies

A low TSH indicates hyperthyroidism (0.1 ish)

Poll question 13

- ▶ Which of the following is a true statement?
 - a. Atypical antipsychotics are contraindicated for people with diabetes.
 - b. Hyperthyroidism is more common than hypothyroidism.
 - c. Depression can be associated with weight gain or weight loss.
 - d. Hypothyroidism causes LDLs to decrease.



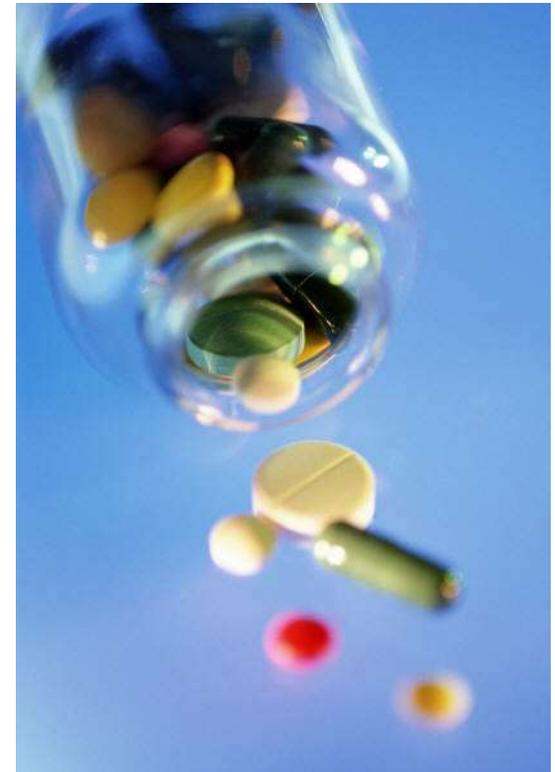
Novel / Atypical Antipsychotics Linked to Hyperglycemia

- ▶ Severe cases of hyperglycemia – even death reported
- ▶ Monitor BG regularly for DM individuals started on this class of med
- ▶ If at risk for DM, determine fasting glucose before initiating therapy and monitor closely during treatment
- ▶ Weight gain may require increased dosing of diabetes therapies.

Summary of FDA warning statement for atypical antipsychotics

Novel/ Atypical Antipsychotics Linked to Hyperglycemia

- ▶ Zyprexa – olanzapine
- ▶ Geodon - ziprasidone
- ▶ Seroquel – quetiapine
- ▶ Risperdal - risperadone
- ▶ Clozaril - clozapine
- ▶ Abilify – aripiprazole
- ▶ Latuda - lurasidone



Consensus Development Conference on Antipsychotic Drugs and

Collaborative Action Plan

- ▶ Increase semaglutide to 1.0mg
- ▶ Decrease basaglar by 10 units
- ▶ Stop sitagliptin, **pioglitazone (Actos)**
- ▶ Walk after lunch during work week
- ▶ Restart levothyroxine, Re-Check TSH - Re-evaluate in 4 weeks.
- ▶ Eat one serving of veggie a day and decrease meat intake to 4 nights a week.
- ▶ Meet with RD/RDN
- ▶ Check BG a few times a week before bed (in addition to am)



What about alcohol intake?

Are these goals realistic?

EV has the beginning of NAFLD



NAFLD is defined as hepatic steatosis in $>5\%$ of hepatocytes based histological analysis or when fat reaches 5% to 10% of the liver's weight

Non-Alcoholic Fatty Liver Disease

NAFLD is when fat reaches 5% to 10% of the liver's weight

Without consumption of significant amounts of alcohol defined as:

- Ingestion of less than 21 standard drinks per week in men and
- Less than 14 standard drinks per week in women

over a 2-year period preceding evaluation) or the presence of other secondary causes of fatty liver disease.



Fatty Liver Disease & Steatohepatitis

Adults with type 2 diabetes.

- ▶ NAFLD is prevalent in >70%
 - ▶ Of those 50% have NASH*
- ▶ 12-20% have fibrosis
- ▶ Need evaluation for nonalcoholic steatohepatitis and liver fibrosis for those:
 - ▶ At high risk: type 2 or prediabetes with cardiometabolic risk factors plus
 - ▶ elevated liver enzymes (ALT) or
 - ▶ fatty liver on imaging or ultrasound



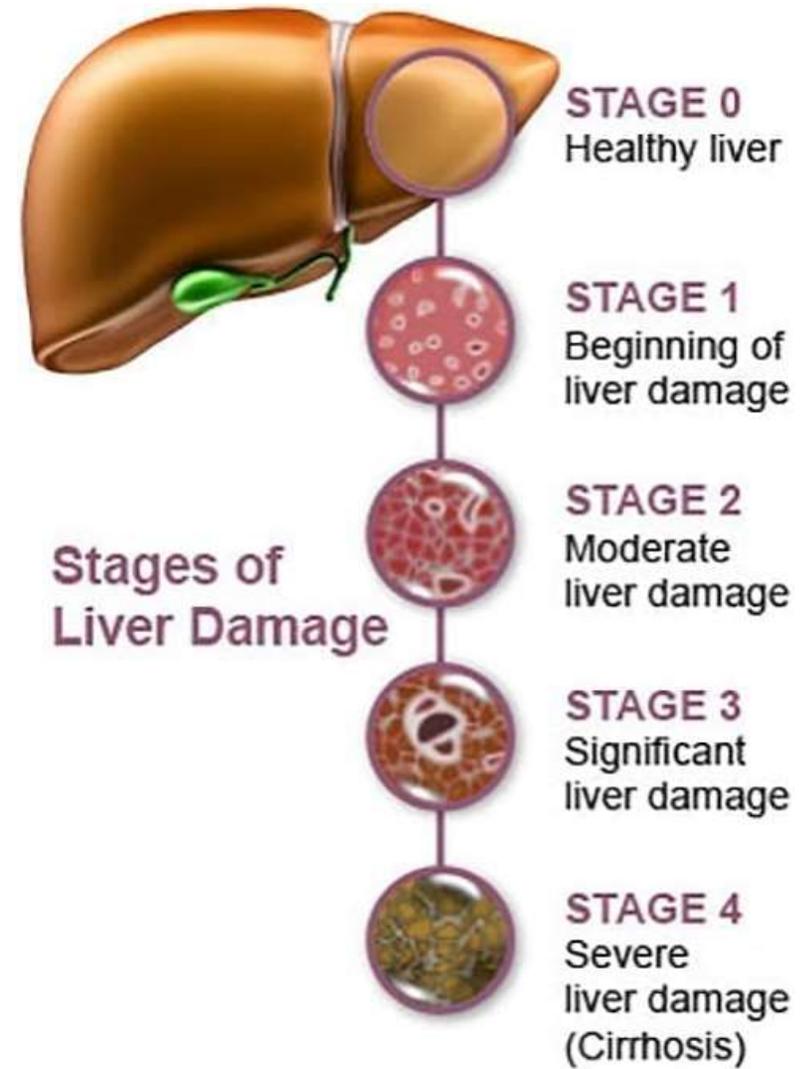
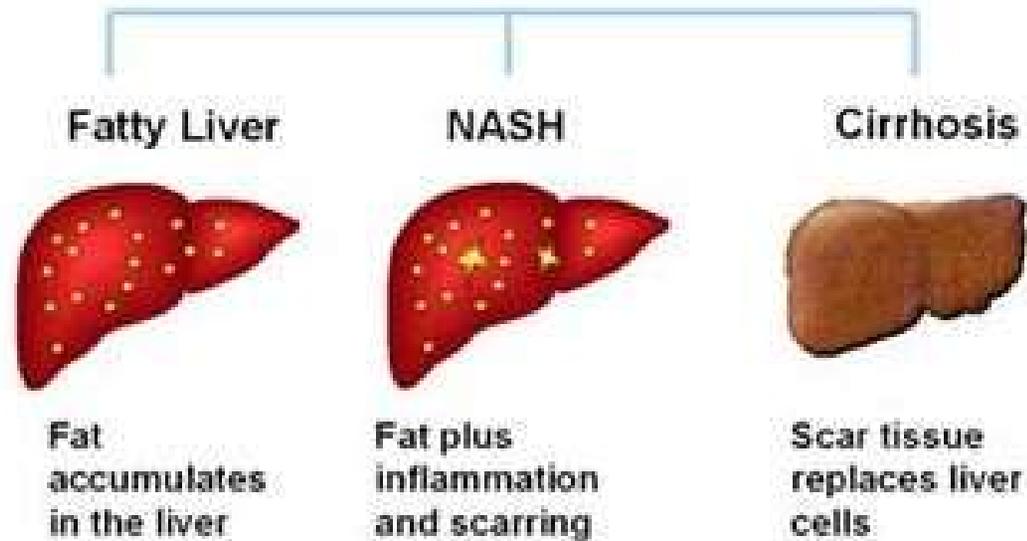
Associated with :

- Increased BMI (30+)
- Cardiometabolic risk factors
- Over 50 yrs
- ALT & AST 30 units/L +

*Non-Alcoholic
Steatohepatitis (NASH)

Natural History of NAFLD to NASH

The Spectrum of NAFLD



NASH – Non-Alcoholic Steatohepatitis

<https://liverfoundation.org/wp-content/uploads/2020/11/StagesFibrosis.jpg>

Stages of Liver Failure

- ▶ NAFLD – nonalcoholic fatty liver disease
 - ▶ NAFL – simple fatty liver, doesn't usually progress to cause liver damage
 - ▶ NASH – nonalcoholic steatohepatitis
 - ▶ Liver inflammation and cell damage.
 - ▶ Can cause fibrosis, scarring
 - ▶ Leading cause of hepatocellular carcinoma and liver transplants (ADA)
- ▶ Cirrhosis – degeneration of cells, inflammation, fibrous thickening
- ▶ End-stage liver disease & Liver Cancer

<https://liverfoundation.org/for-patients/about-the-liver/the-progression-of-liver-disease/#fibrosis-scarring>

Symptoms of Fatty Liver

If symptoms do appear, they may include:

- ▶ A feeling of fullness in the middle or upper right side of the abdomen
- ▶ Abdominal pain, nausea
- ▶ Loss of appetite or weight loss
- ▶ Weakness
- ▶ Jaundice



- ▶ Swelling of the abdomen and legs
- ▶ Mental confusion
- ▶ Extreme fatigue or tiredness
- ▶ Signs of advanced disease include:
 - ▶ Portal hypertension, spider angiomas, reddening of palms, declining platelet counts

Mayo Clinic

Screening for NASH – FIB-4

Fibrosis-4 (FIB-4) Index for Liver Fibrosis

Noninvasive estimate of liver scarring in HCV and HBV patients, to assess need for biopsy.

When to Use 	Pearls/Pitfalls 	Why Use 
---	---	---

Age	<input type="text" value="59"/>	years
-----	---------------------------------	-------

Use with caution in patients <35 or >65 years old, as the score has been shown to be less reliable in these patients

AST Aspartate aminotransferase	<input type="text" value="34"/>	U/L
-----------------------------------	---------------------------------	-----

ALT Alanine aminotransferase	<input type="text" value="28"/>	U/L
---------------------------------	---------------------------------	-----

Platelet count	<input type="text" value="217"/>	$\times 10^3/\mu\text{L}$ 
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1.75 points

Further investigation needed
Approximate fibrosis stage: Ishak 2-3 (Sterling et al 2006)

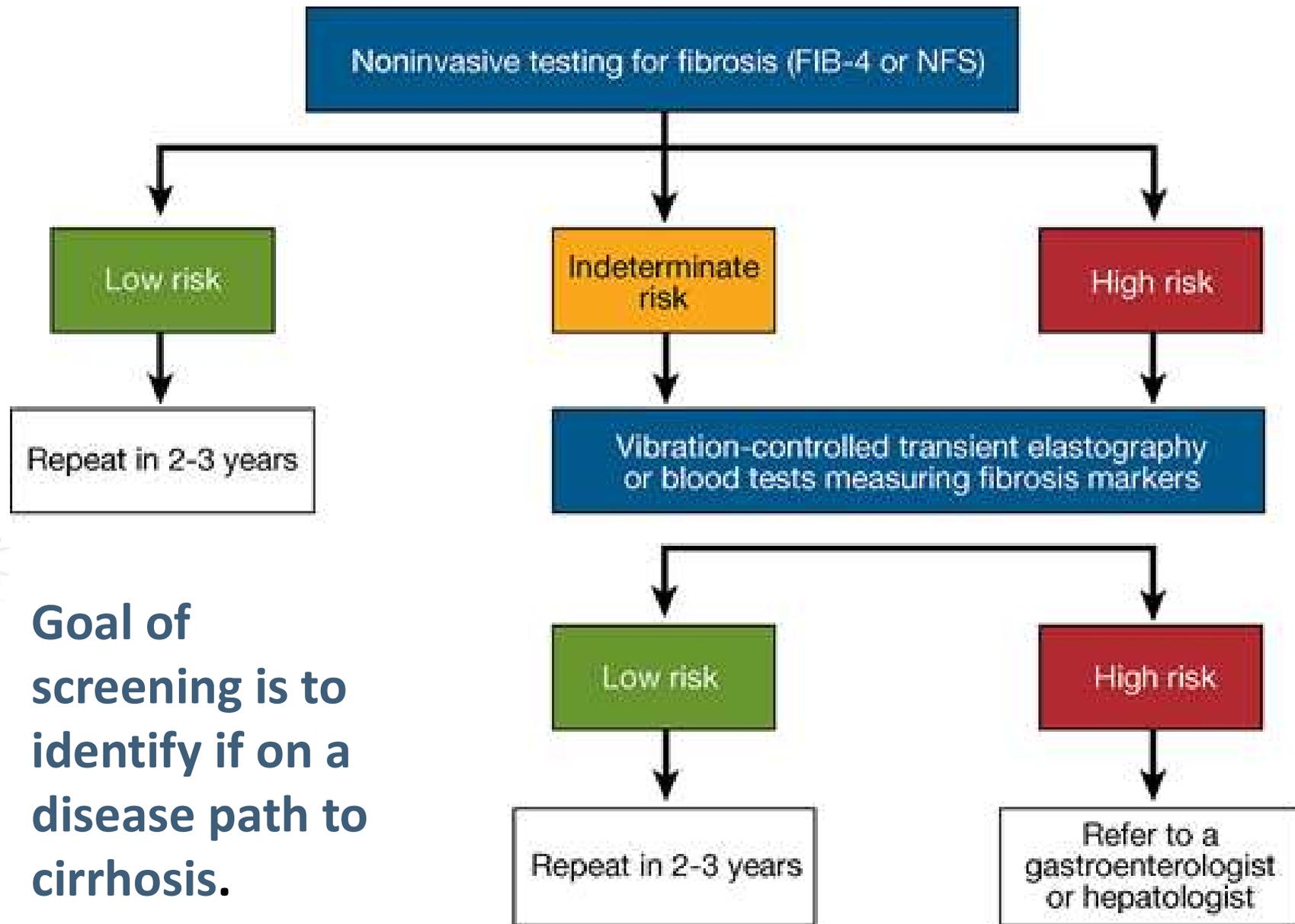
**FIB-4 screening is quick
and simple, tracks changes over time**

(mdcalc.com/calc/2200/fibrosis-4-fib-4-index-liver-fibrosis).

**FIB-4 estimates risk of
hepatic cirrhosis (age 35+):**

- ▶ Calculated by imputing:
 - ▶ Age
 - ▶ plasma aminotransferases (AST and ALT)
 - ▶ and platelet count
- ▶ **FIB-4 Risk Levels**
 - ▶ Lower risk is <1.3
 - ▶ Intermediate 1.3 to 2.67
 - ▶ High risk >2.67
 - ▶ considered as having a high probability of advanced fibrosis (F3–F4).

Screening for Fibrosis Risk



Goal of screening is to identify if on a disease path to cirrhosis.

Finding Liver Disease

- ▶ Imaging procedures used to diagnose NAFLD include:
- ▶ **Abdominal ultrasound**, which is often the initial test when liver disease is suspected.
- ▶ **Transient elastography**, an enhanced form of ultrasound that measures the stiffness of liver. Liver stiffness indicates fibrosis or scarring.
- ▶ **Magnetic resonance elastography**, works by combining MRI imaging with sound waves to create a visual map (elastogram) showing the stiffness of body tissues
- ▶ **Biopsy** by liver specialist confirms definitive diagnosis



Referral to
Hepatologi
st or GI
specialist
may be
needed

Fatty Liver Interventions

- ▶ Nutrition
 - ▶ Weight loss goal of 5-10% or more
 - ▶ Mediterranean Diet
 - ▶ Avoid alcohol
 - ▶ Decrease processed foods, meats and sugary foods.
 - ▶ Increase vegetables and other high fiber foods.
- ▶ Move more – including aerobic activity and strength training.
- ▶ Close follow-up and ongoing monitoring
- ▶ Can be associated with worsening renal function

Other Treatments for NAFLD and NASH

- ▶ Meds that lower glucose, cholesterol and weight
- ▶ Bariatric surgery
- ▶ Pioglitazone (Actos)
 - ▶ Improves lipid and glucose metabolism
 - ▶ Reverses steatohepatitis in prediabetes/diabetes
 - ▶ Causes 1-2% wt gain at 15 mg
 - ▶ 3-5% wt gain at 45 mg
- ▶ GLP-1 Receptor Agonists



Support lifestyle changes

Movement Break – Before Microdisease



EV Dental, Eye, Kidney and Nerve Care



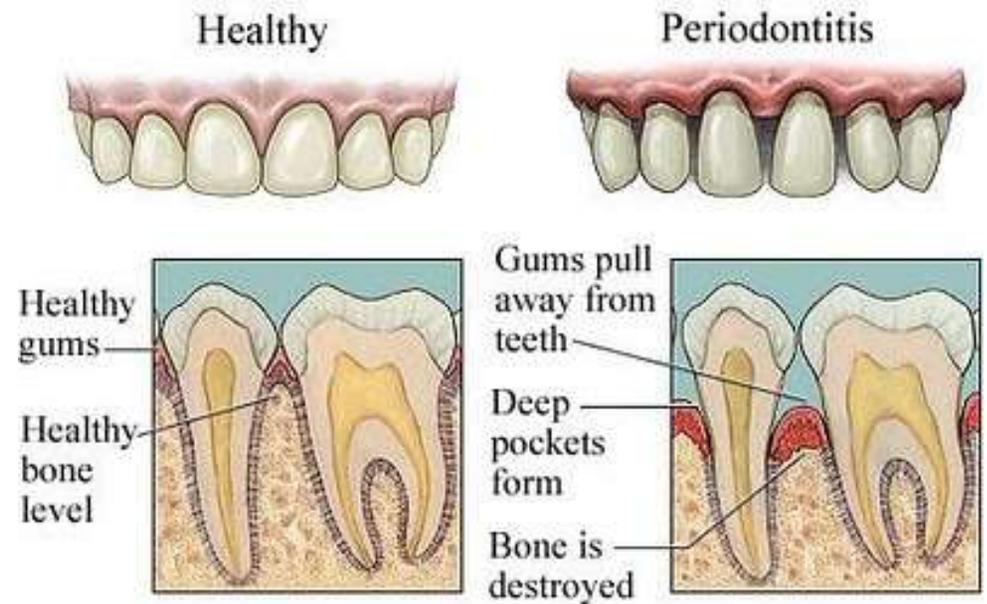
Poll Question 14

▶ Diabetes is associated with an increased risk of oral disease. Which of the following statements is true?

- a. Diabetes is associated with decreased saliva production.
- b. People with diabetes benefit from vinegar gargles to decrease bacterial load
- c. People with diabetes are at greater risk for tongue cancer.
- d. Diabetes is associated with increased tonsillitis.

Periodontal Disease

- ▶ More severe and prevalent with diabetes and elevated A1c levels.
- ▶ periodontal treatment associated with better glycemic control (A1C 8.3% vs. 7.8%)
- ▶ Benefits lasted for 12 mo's
- ▶ People with periodontal disease have higher rates of diabetes.
- ▶ Bidirectional



Gingivitis

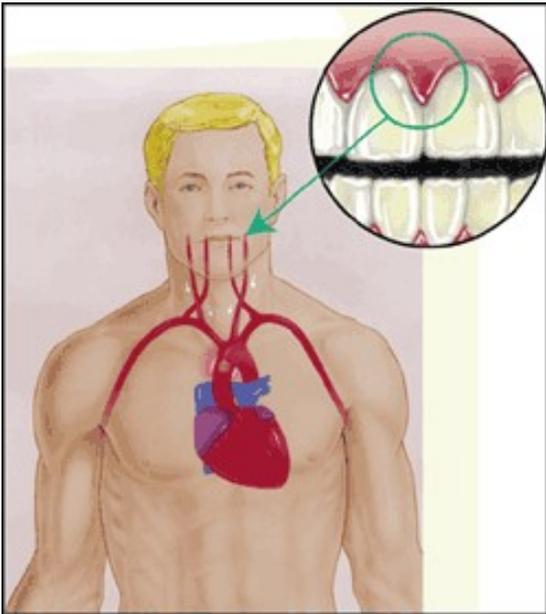


Mild to Severe Periodontitis



Periodontal disease and Heart Disease

- Heart disease link:
 - oral bacteria enter the blood stream, attach to fatty plaques in coronary arteries increasing clot formation
 - inflammation increases plaque build up, which may contribute to arterial inflammation
- Hyperglycemia = Gingivitis = Heart Disease



Salivary Dysfunction and Xerostomia (dry mouth) in DM

- ▶ Less saliva uptake and excretion = less protection against bacteria
- ▶ Hyperglycemia increases glucose levels in saliva, providing medium for bacterial growth-also promotes dry mouth
- ▶ Dry mouth increases risk of infection and can alter nutritional intake (due to chewing, swallowing difficulties)



Keeping Oral Healthy

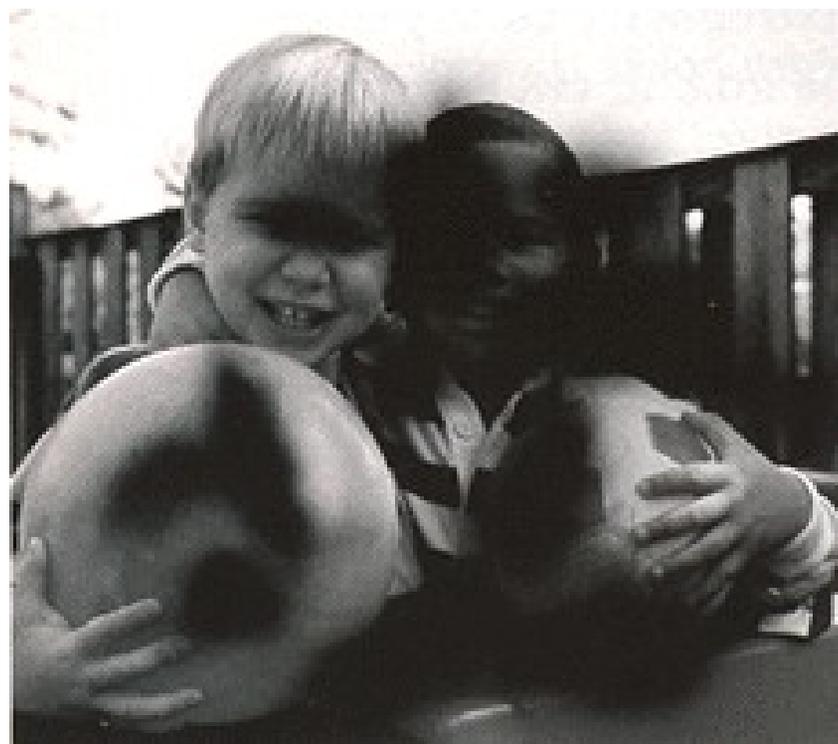
- ▶ Oral disease linked with heart disease
- ▶ Dental exams (every 6 mo's)
- ▶ Metabolic control critical
- ▶ Quit smoking
- ▶ Brush twice daily and floss daily.
- ▶ Help access affordable dental care.
- ▶ Treat infections with ATB's, can lower A1c by 1-2%. Lowering BG shortens infection.



Retinopathy Changes How We See



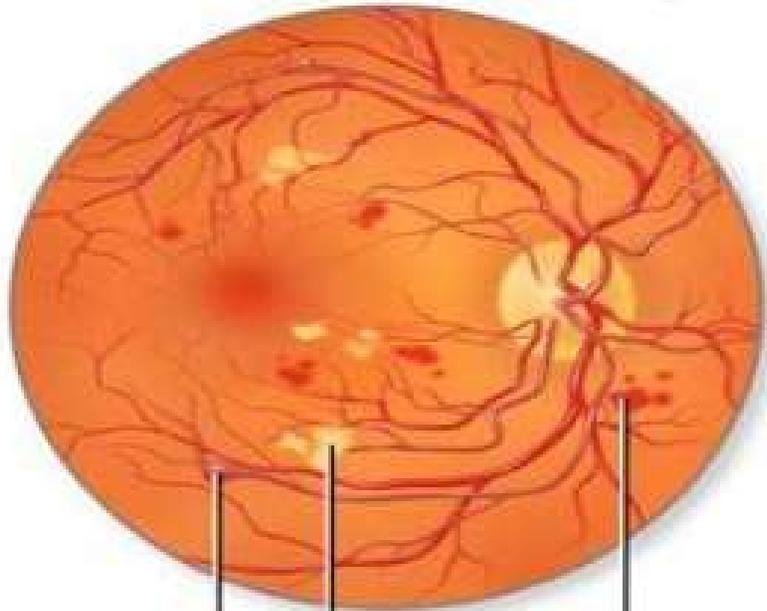
View of boys by person with normal vision



View of boys by person with diabetic retinopathy.

Non - Proliferative to Proliferative Diabetic Retinopathy

Non-proliferative
diabetic retinopathy

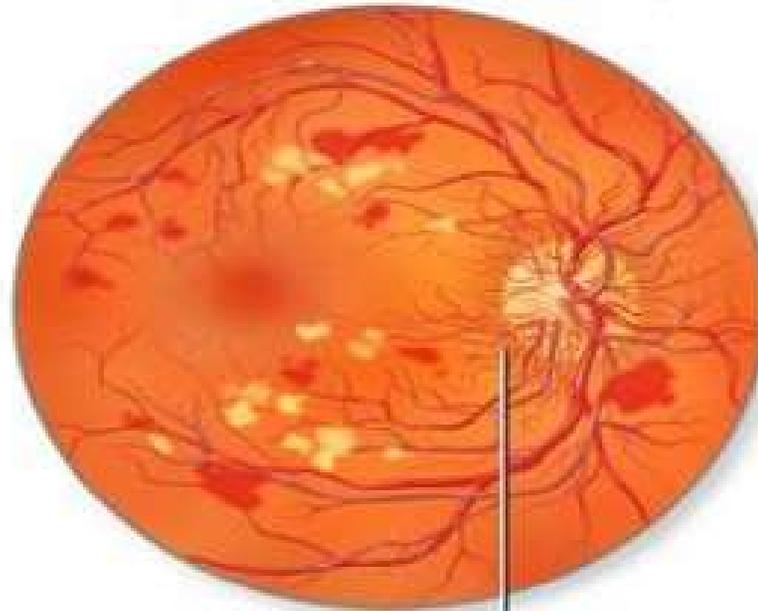


Aneurysm

Hard
exudate

Hemorrhage

Proliferative
diabetic retinopathy



Growth of abnormal
blood vessels

Quick Question 15

- ▶ Which of the following is correct regarding eye screening for people with diabetes?
 - A. All people with diabetes must get a complete eye exam every year
 - B. All people diagnosed with type 1 and 2 should receive an immediate eye exam.
 - C. All people diagnosed with type 2 should receive an immediate eye exam.
 - D. People with diabetes over age of 60 should receive an eye exam every 6 months.



Eye Screening Recommendations

Screen with initial dilated and comprehensive eye exam by ophthalmologist or optometrist

- ▶ **Type 2 at diagnosis, then every one to 2 years**
- ▶ **Type 1 within 5 years of dx, then every 1-2 years**
- ▶ Programs that use validated retinal photography with remote reading can be used for screening with in-person follow-up as needed.
- ▶ Promptly refer those with macular edema, severe non-proliferative disease to trained specialist



Keep Eyes and Kidneys Healthy

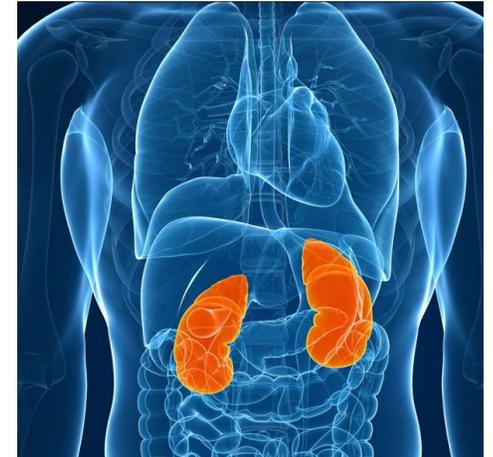
To reduce the risk or slow the progression of nephropathy

- ▶ Optimize glucose control (A)
- ▶ Optimize blood pressure control (A)



Kidney Screening Guidelines

- ▶ Screen Urine Albumin Creatinine Ratio UACR and GFR
 - ▶ Type 2 at diagnosis then yearly
 - ▶ Type 1 with diabetes for 5 years, then yearly
 - Twice annually if:
 - UACR > 300mg/g or GFR 30-60 mL/min



Optimize glucose and B/P to protect kidneys

- ▶ If UACR > 30 mg/g treat hypertension with ACE or ARB
- ▶ Monitor serum creat and K⁺ if on ACE, ARB or diuretics
- ▶ If Chronic Kidney Disease (CKD), consider SGLT2 to slow progression and decrease CV Risk
- ▶ If CKD consider using GLP-1 to reduce CV Risk

Urine Albumin Creatinine Ratio - UACR

- ▶ UACR | Urine albumin – creatinine ratio (spot collection)

<u>Category</u>	<u>mg/g creatinine</u>
▶ normal	<30 mg/g
▶ Moderately increased	30+ mg/g
▶ Severely increased	300 + mg/g

- ▶ 2 of 3 tests w/in 3-6 mo abnormal to confirm
- ▶ Exercise within 24 h, infection, fever, CHF, marked hyperglycemia, and marked hypertension may elevate urinary excretion over baseline values.

Collaborative Action Plan and F/U

- ▶ Make appointment with dentist and eye doctor.
- ▶ Brush twice daily and floss daily.
- ▶ Need some relief from nerve pain.
- ▶ Experiencing vaginal dryness.



Moving on to the Lower Half



Diabetes and Amputations

- ▶ Rate declined 43% - 2000 – 2009
- ▶ Increased 50% from 2009-2015
 - ▶ 2.1 per 1000 then up to 4.2 per 1000
 - ▶ Driven by a 62% increase in minor amputations
 - ▶ Highest rates in young and middle age adults (18- 64 years).
- ▶ 50% of amputations can be avoided through self-care skill education and early intervention

Diabetes Care

Resurgence of Diabetes-Related Nontraumatic Lower Extremity Amputation in the Young and Middle-Aged Adult U.S. Population

<https://doi.org/10.2337/DC18-1380>

Diabetes Care 2018



Poll Question 16

- ▶ Which of the following is true about diabetes and lower extremities?
 - a. Excess hair on the toes indicates compromised circulation.
 - b. People with diabetes need to inspect lower extremities weekly.
 - c. People over 65, with high-risk feet, qualify for a pair of custom shoes annually
 - d. Once a person with diabetes has an amputation, they are not likely to have another.



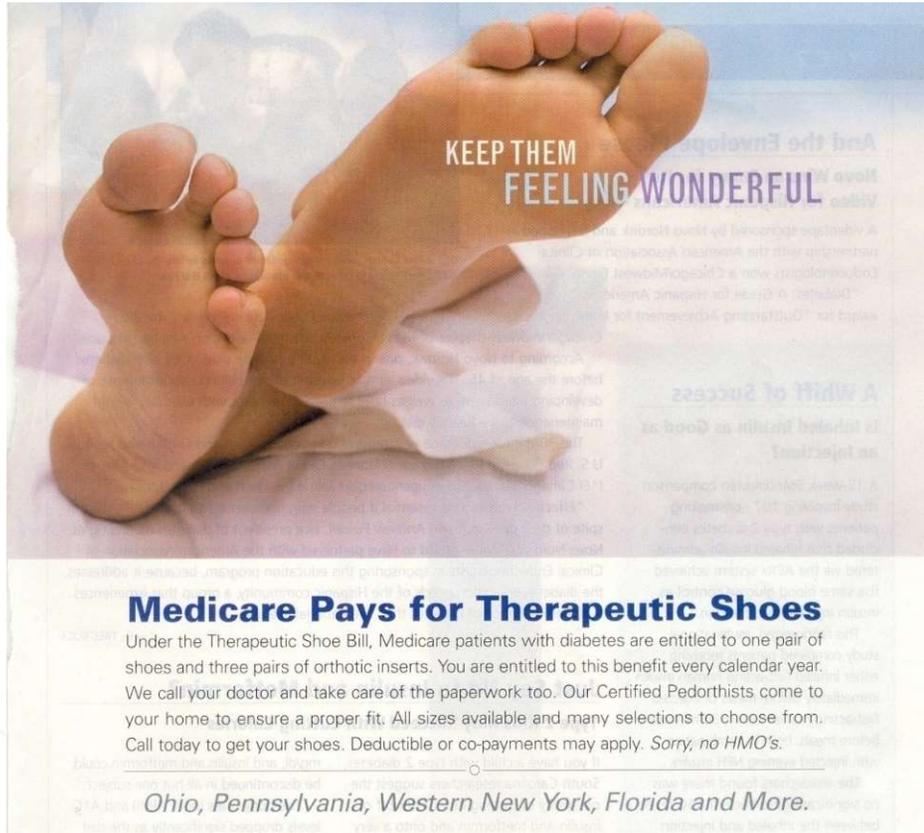
Lower Extremities

- ▶ Lift the Sheets and Look at the Feet



No
DeFEET

Feet Deserve Special Care



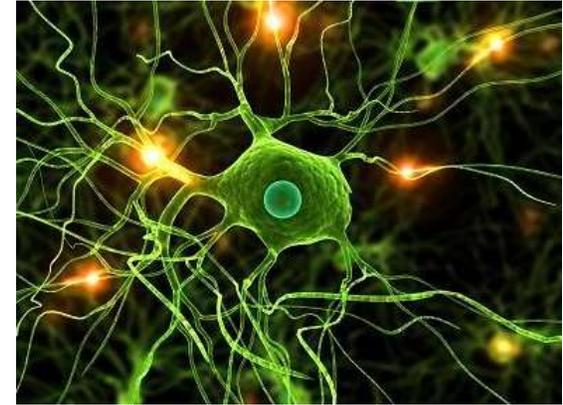
- ▶ Daily inspection
- ▶ With order from MD and Loss of Protective Sensation (LOPS), Medicare Covers:
 - ▶ Annual custom shoes
 - ▶ 3 pairs of orthotic inserts

Medicare and Custom Shoes

- ▶ The doctor who treats your diabetes must certify your need for therapeutic shoes or inserts and be a medicare provider.
- ▶ A podiatrist (foot doctor) or other qualified doctor must prescribe the shoes or inserts, and you must get the shoes or inserts from one of these:
 - A podiatrist
 - A prosthetist
 - A pedorthist
 - An orthotist
 - Another qualified individual

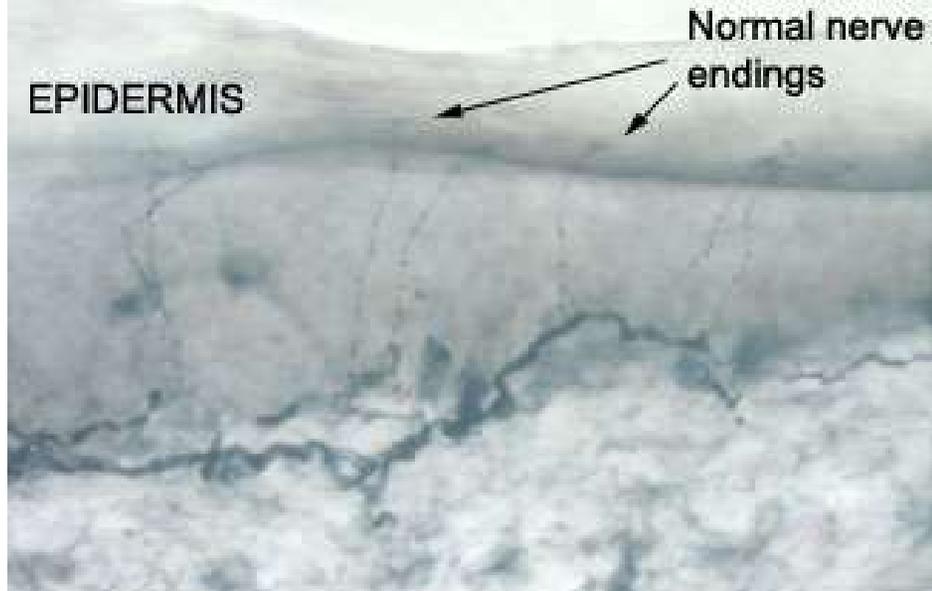
Nerve disease Screening

- ▶ Screen all people with diabetes for nerve disease using simple tests, such as a monofilament
 - ▶ Type 2 at diagnosis, then annually
 - ▶ Type 1 diabetes at 5 years, then annually
- ▶ Glycemic management is the main strategy to prevent or delay the development and progression of neuropathy.
- ▶ Assess and treat to reduce pain and symptoms to improve quality of life.

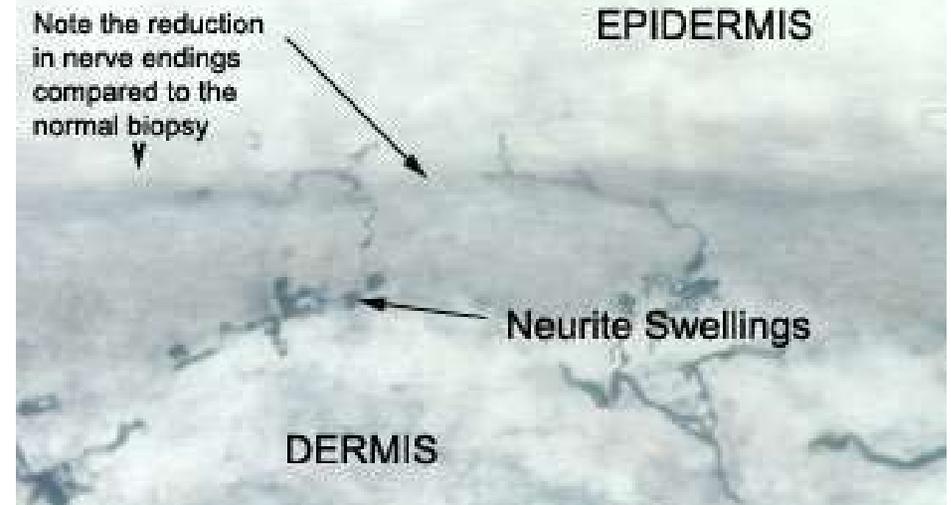


Skin Biopsy to Assess Neuropathy

Normal Skin Biopsy (lower leg)

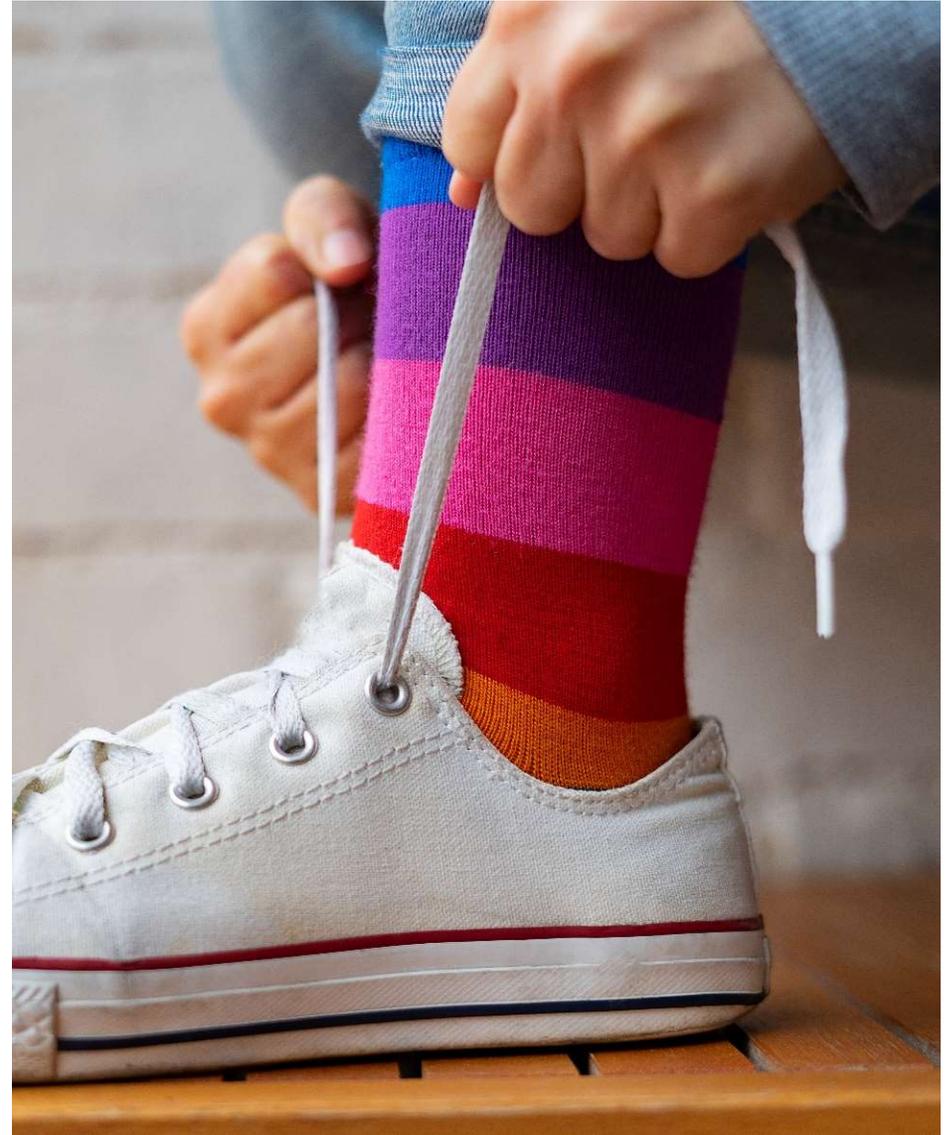


Neuropathic Skin Biopsy (lower leg)

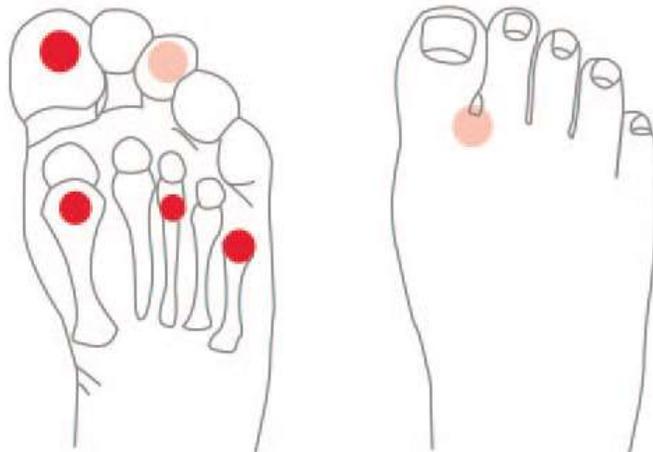
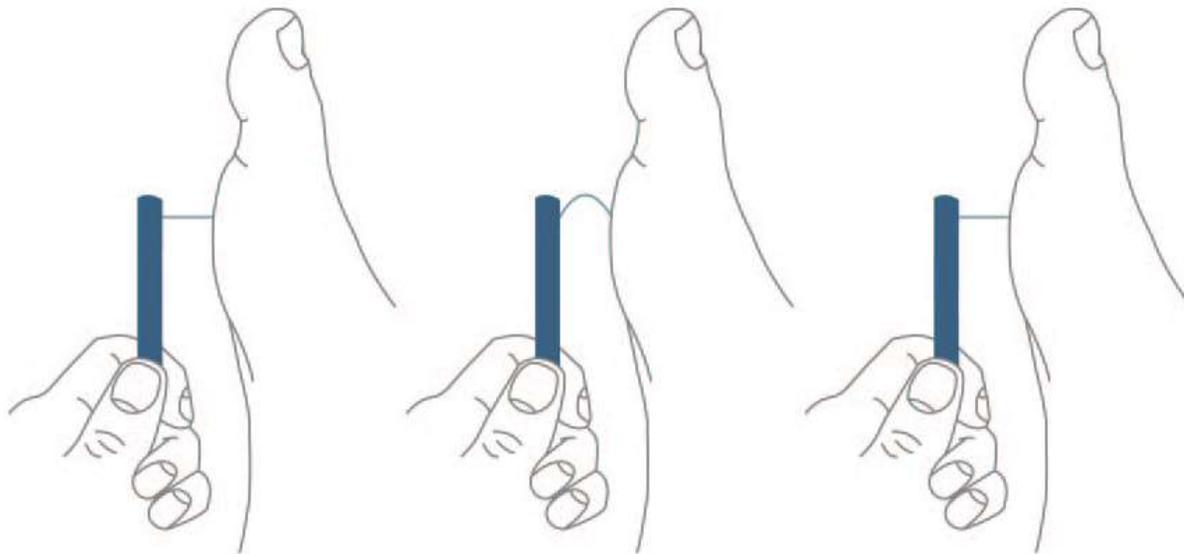


Testing for Small and Large Nerve Fiber Loss

- ▶ Test for nerve fiber function and loss of protective sensation:
 1. Small-fiber function: pinprick and temperature sensation.
 2. Large-fiber function: vibration perception and 10-g monofilament.
 3. Protective sensation: 10-g monofilament.



5.07 monofilament delivers 10gms linear pressure



10 Free Monofilaments
www.hrsa.gov/hansensdisease/leap

Treating Neuropathy

- ▶ Improve glycemic control
- ▶ Control pain
- ▶ Relief from depression from chronic pain
 - ▶ Massage, stretching,
 - ▶ Pain control clinic,
 - ▶ Transcutaneous Electrical Nerve Stimulation (TENS)
 - ▶ Avoid alcohol
 - ▶ Relaxation exercises....



Meds for Neuropathy – Cheat Sheet

Neuropathy Medication for Diabetes

Prevention – Maintain glycemic control; quit smoking, alcohol reduction, exercise.

Pathogenetically Oriented Therapy

- Alpha lipoic acid 600 – 1,800 mg a day

Prescription Therapy:

1st line – Tricyclic Antidepressants (Amitriptyline, Nortriptyline, Desipramine)

- Calcium Channel Modulators (Gabapentin, Pregabalin)
- Serotonin Norepinephrine Reuptake Inhibitors (SNRI – Venlafaxine, Duloxetine)

2nd Line - Topical Capsaicin Cream for localized pain – Apply 2-4 x daily for up to 8 wks

- Opioids (Tramadol, Oxycodone)

Reasons for Treatment Failure

- Dose too low
- Inadequate trial – requires 2-8 weeks of treatment to observe symptom reduction
- Pt expecting elimination of symptoms – only reduces symptoms by about 50%
- Incorrect diagnosis: If in doubt, refer to neurologist
- If patient does not respond or has adverse effects, change medication class
- In patient has some but inadequate relief, raise the dose and consider adding or changing meds.

References: Ziegler, D. Painful diabetic neuropathy. Diabetes Care 2009; 32 (Supp 2): S414-S419

Meds for Neuropathy – Cheat Sheet

Class	Generic / Trade Name	Usual Daily Dose Range	Comments	Side Effects/ Caution
1st Line Agents Tricyclic Antidepressants TCA Improves neuropathy and depression	Amitriptyline / Elavil	25 – 100 mg* Avg dose 75mg	Usually 1 st choice	Take 1 hour before sleep. Side effects; dry mouth, tiredness, orthostatic hypotension. Caution: not for pts w/ unstable angina (<6 mo), MI, heart failure, conduction system disorder.
	Nortriptyline / Pamelor	25 - 150 mg* (for burning mouth)	Less sedating and anticholinergic	
	Desipramine / Norpramine	25 – 150 mg* *Increase by 25mg weekly till pain relieved		
Calcium Channel Modulators	Gabapentin/ Neurontin	100 - 1,200mg TID	Improves insomnia, fewer drug interactions	Sedation, dizziness, peripheral edema, wt gain Caution; CHF, suicide risk, seizure disorder.
	Pregabalin / Lyrica *FDA approved for neuropathy treatment	50 - 200mg TID		
Serotonin Norepinephrine Reuptake Inhibitor SNRI	Duloxetine / Cymbalta *FDA approved for neuropathy treatment	60 mg daily Start at 30 mg	Improves depression, insomnia	Nausea, sedation, HTN, constipation, dizziness, dry mouth, blurred vision. Caution: adjust dose for renal insufficiency, do not stop abruptly, taper dose.
	Venlafaxine/ Effexor	75 - 225 mg daily		
2nd Line Agents Opioids	Weak opioids Tramadol / Ultram	50 – 400 mg	Sedation, nausea, constipation (always prescribe stool softener) Caution: abuse, suicide risk, short acting opioids not recommended for long term tx, can develop tolerance	
	Strong opioids Oxycodone	10 – 100 mg		
Local Treatment	Capsaicin Cream (0.025%) Apply 2-4 x daily for up to 8 wks			
Other choices	If above medications not effective, contraindicated or intolerable consider: Bupropion/Wellbutrin Paroxetine / Paxil Citalopram / Celexa Topiramate / Topamax Topical Lidocaine (for localized pain).			



Other strategies to help ease the pain

- ▶ Music
- ▶ Podcasts
- ▶ Movies
- ▶ Pet's
- ▶ Massage
- ▶ Touch
- ▶ Topical creams
- ▶ Lidocaine patches
- ▶ Mineral salts baths
- ▶ Neurostimulators



- ▶ Tylenol / Ibuprofen
- ▶ Earthing
- ▶ Sleep
- ▶ Hobbies
- ▶ Aromatherapy
- ▶ Time with special people
- ▶ Work / volunteering

We Can Make A Difference

- ▶ Assess
 - ▶ Nail condition, nail care, in between the toes
 - ▶ Who trims your nails
 - ▶ Have you ever cut your self?
 - ▶ Shoes – type and how often
 - ▶ Socks
 - ▶ Skin/skin care and vascular health
 - ▶ Ability to inspect
 - ▶ Loss of protective sensation
 - ▶ Nerve pain treatment



Lower Extremities

- ▶ **"Every time you see your provider, take off your shoes and socks and show your feet!"**
- ▶ For those at high risk for foot complications
 - ▶ with loss of protective sensation, foot deformities, or a history of foot ulcers
- ▶ Everyone else needs a thorough, annual inspection



“DAN” Diabetic Autonomic Neuropathy

- ▶ 50% of ind's with peripheral neuropathy also have DAN
- ▶ DAN associated with higher M/M Rates
 - ▶ hypoglycemia unawareness
 - ▶ resting tachycardia, orthostatic hypotension
 - ▶ gastroparesis, constipation, diarrhea, fecal incontinence
 - ▶ neurogenic bladder
 - ▶ sudomotor dysfunction with either increased or decreased sweating
 - ▶ erectile dysfunction

Who is DAN?



Sexual Functions as We Age

- ▶ 20-30 years trice daily
- ▶ 30-40 years tri weekly
- ▶ 40-50 years try weekly
- ▶ 50-60 years try weakly
- ▶ 60-70 years try oysters
- ▶ 70-80 years try anything
- ▶ 80-90 years try to remember



A touch of humor from AADE-New Perspectives on Erectile Dysfunction, 1999

Asking about sexual health

- ▶ “ I’m going to ask you a few questions *about your sexual health. Since sexual health is very important to overall health, I ask each person these same questions.*
- ▶ Before I begin, *do you have any questions or sexual concerns you’d like to discuss? ”*
- ▶ Have you noticed any changes in your sex life over the past year?
 - ▶ Trouble with erection, lowered libido, decreased sensation, painful intercourse or something else?



Improving Sex Life

People with diabetes get more vaginal and bladder infections

- ▶ Difficulty achieving orgasm due to neuropathy
- ▶ Painful intercourse due to lack of vaginal lubrication



Many people with diabetes have issues with sexual desire, arousal, or orgasm. How about you?"

Treatment

- ▶ Lower blood glucose / blood pressure
- ▶ Treat vaginal infections and UTI's
- ▶ Water based lubricants for vaginal dryness
- ▶ Hormone replacement therapy
- ▶ Eat to prevent lows during intimacy
- ▶ Allow time, touching and romance

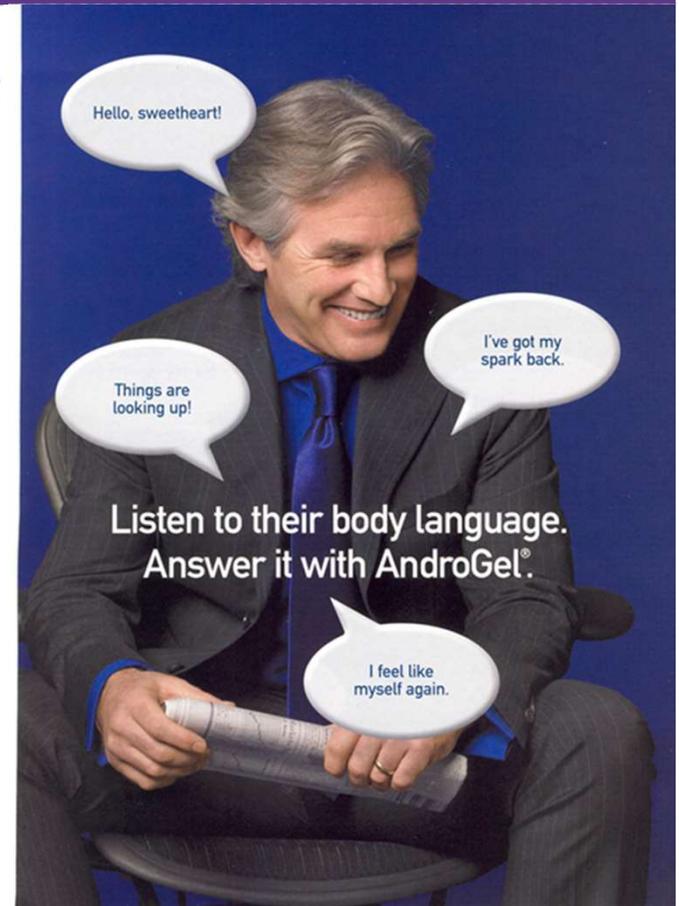
Erectile Dysfunction

- ▶ Affects about 50% of men with diabetes
- ▶ Loss of erections sufficient for intercourse
- ▶ Due to combo of vascular and nerve damage
- ▶ Tests: penile tumescence to eval if organic or psychogenic
- ▶ Treatment:
 - ▶ Sildenafil (Viagra), Vardenafil (Levitra), Tadalafil (Cialis)
 - ▶ Use caution if taking nitrate drugs. Check w/ MD first
 - ▶ Other meds, vacuum devices, prosthetics
 - ▶ HRT- testosterone gel, patches, injections, pills



Low Testosterone

- ▶ Hypogonadism: loss of sex drive or activity
- ▶ Screening: morning serum levels
- ▶ Mean testosterone levels lower in men with diabetes – also associated with elevated BMI
- ▶ Testosterone replacement therapy can improve:
 - ▶ Sexual function, strength, bone density, mood
 - ▶ Repeat am testosterone level after treatment to eval response



EV is feeling Empowered

- ▶ Her A1c has dropped, she feels better about herself with healthier eating and increased activity.
- ▶ She is back on her thyroid medication and has more energy.
- ▶ The pain in her feet is better and she is more hopeful overall!



Important Themes

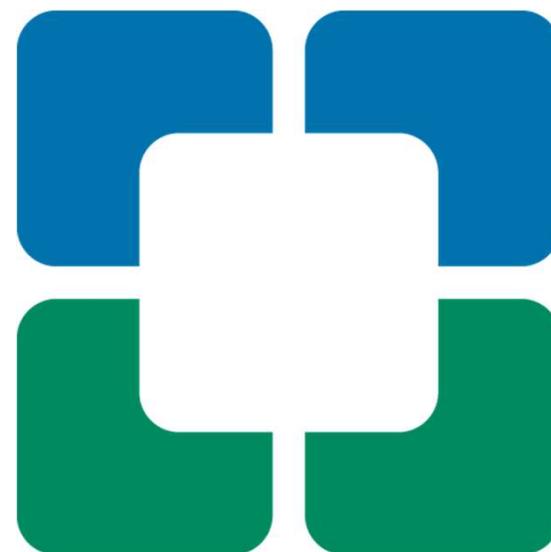
- ▶ Start with the individual
- ▶ Careful listening
- ▶ Be curious
- ▶ Think outside the box
- ▶ Review labs for clues
- ▶ Encourage preventive screenings
- ▶ Collaborate with other members of the health care team



Integrating Technology: CGM Connected Pens and Insulin Pumps DiabetesEd Training Conference – Day 2

Diana Isaacs, PharmD, BCPS, BC-ADM, BCACP
CDCES, FADCES, FCCP

Director, Education & Training in Diabetes
Technology



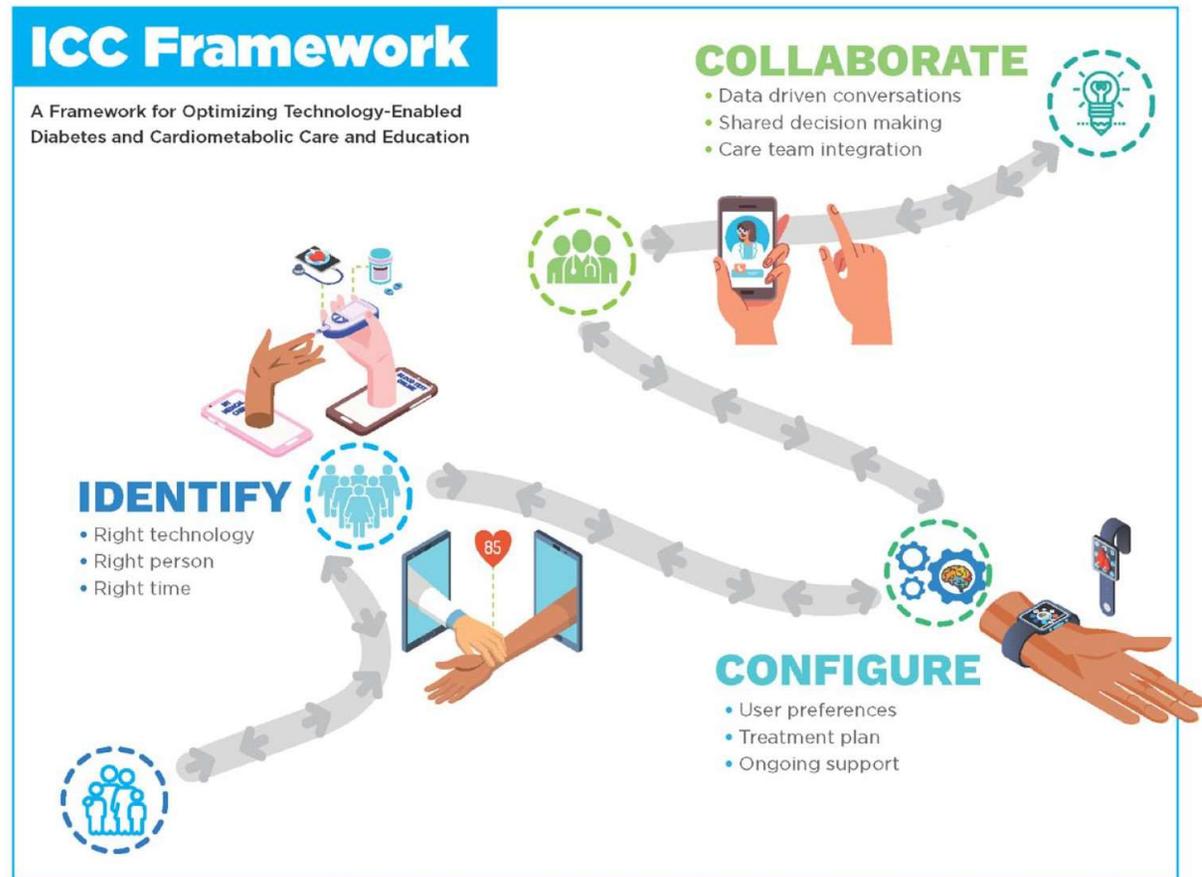
Learning Objectives

- Discuss continuous glucose monitoring (CGM) and the clinical benefits for managing diabetes
- Describe critical teaching content for insulin pump and CGM use
- Compare and contrast the CGM, connected pen and insulin pump devices
- Describe appropriate candidates for insulin pump therapy
- List inpatient considerations for insulin pump therapy and CGMs



ICC Framework – Identify-Configure-Collaborate

A framework to overcome barriers to technology use and therapeutic inertia



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Greenwood DA, Howell F, Scher L, et al. A Framework for Optimizing Technology-Enabled Diabetes and Cardiometabolic Care and Education: The Role of the Diabetes Care and Education Specialist. *The Diabetes Educator*. 2020;46(4):315-322. doi:10.1177/0145721720935125

Technology is Here



CONTINUOUS
GLUCOSE
MONITORS (CGM)



INSULIN PUMPS



CONNECTED
PENS AND CAPS



MOBILE APPS



Identify: PWD Identify the “Right” Technology

DiabetesWise.org

Check Up

Sensors

Device Finder

Wisdom

Resources

Helping You Find The Right Diabetes Devices For Your Life.



DEVICE COMBOS

FINDING WHAT'S RIGHT
FOR YOU.

Get to know how different devices work
together.

Devices



CUSTOM CONTROL
Sensor & Pump



SMART SYSTEM
Sensor & Smart Pump



FEVER INJECTIONS
Meter & Pump



KNOW A GLANCE
Sensor & Injections



NO BELLS, NO WHISTLES
Meter & Injections

Diabeteswise.org, providers.diabeteswise.org/#!/

The Importance of Education & Training

“No device used in diabetes management works optimally without education, training, and follow-up.”



Continuous Glucose Monitors



Continuous Glucose Monitors (CGM)



- Measures glucose (sugar) every 1-5 mins and records it every 5-15 mins (up to 288 readings/day)
- Includes 3 components: transmitter, sensor, receiver/reader

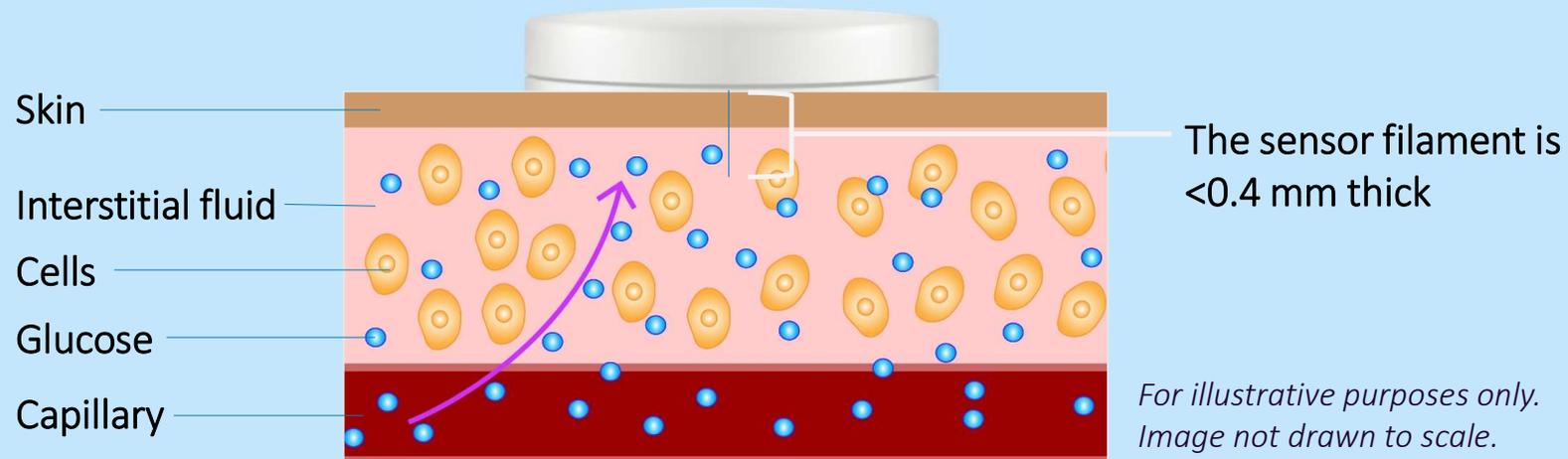
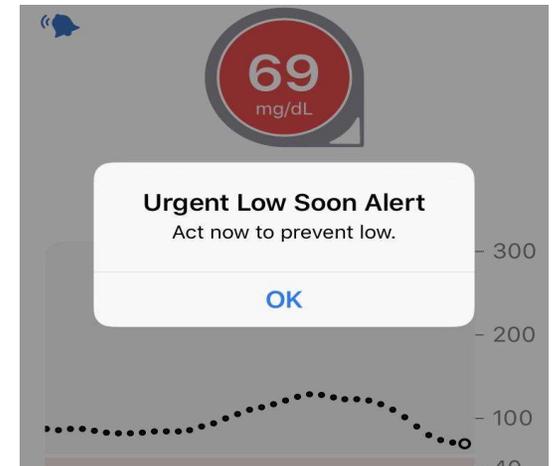


Illustration adapted from: Association of Diabetes Care & Education Specialists. ADCES Practice Paper. Accessed 11/9/21. <https://www.diabeteseducator.org/docs/default-source/practice/practice-documents/practice-papers/the-diabetes-educator-role-in-continuous-glucose-monitoring.pdf?sfvrsn=4>

CGM: Real-Time Data



Types of CGM

Professional	Personal
Owned by the clinic	Owned by the person with diabetes
Blinded and unblinded (real-time feedback) options	Real-time feedback or scan for feedback (flash device)
Short-term use (3-14 days)	Long-term use
Insurance coverage for most people with type 1 or type 2 diabetes	Insurance coverage more focused on type 1 diabetes or those on intensive insulin regimens
Not compatible with insulin pumps or connected pens	Compatible with smartphones, connected pens and insulin pumps with select devices

Professional CGM Comparison



	Dexcom G6 Pro	LibrePro
Blinded vs unblinded	Both	Blinded
Maximum wear time of sensor	10 days	14 days
Calibration	None	None
Downloading reports	Clarity	LibreView
Care between transmitter use	Disposable-1 time use, must attached transmitter	Disposable 1-time use, combined sensors/transmitter
Alarms for high/low glucose alerts	Yes	No
Interfering substances	Hydroxyurea	Salicylic acid and high-dose vitamin C



Personal CGM Options

Owed by the person with diabetes



Typically used long term



Device options include real-time glucose monitoring (rtCGM) or intermittent scanning (isCGM)



Some options can be integrated with insulin pumps or connected insulin pens



Freestyle Libre 2



Freestyle Libre 3



Eversense



Guardian Connect or Guardian 3 or 4



Dexcom G6



Dexcom G7

Slide 13

AS1 Added Dexcome to G6

Added FreeStyle to Libre 2 and Libre 14 Day

Added Sensor to Guardian 3

Alissa Scott, 11/9/2021

Dexcom G6

- 10 day wear
- 2 hour warm-up
- No calibrations required-optional
- 1 press inserter, must attach transmitter
- Reusable transmitter-3 months
- Choice of receiver or smart phone
- High, low, predictive low alert
- Hydroxyurea drug interference
- Dexcom G6, Clarity, and Dexcom follow apps (up to 10 followers)



Dexcom G7

- 10.5 day wear
- 30 minute warm-up
- FDA approved over 2 yrs
- No calibrations required-optional
- Fully disposable
- No more separate transmitter
- Choice of receiver or smart phone
- More customization with alerts
- Hydroxyurea drug interference
- Dexcom G7, Clarity, and Dexcom follow apps (up to 10 followers)



Guardian Connect, G3, G4

- 7 day wear
- Up to 2 hour warm-up
- Guardian 3 or 4 sensor –compatible with 770G and 780G insulin pumps
- Guardian Connect- compatible with smart phone (no separate receiver)
- Calibrations required 2-4 times/day – Guardian Connect, G3
- Calibration to enter auto mode in 780G pump – G4
- Acetaminophen and Hydroxyurea interference
- Reusable transmitter
 - Charge every 7 days, transmitter lasts for 1+ year
- MiniMed, Guardian Connect, and Carelink mobile apps
- 60 minute predictive high or low for guardian connect



<https://www.medtronicdiabetes.com/products/guardian-connect-continuous-glucose-monitoring-system>

Freestyle Libre 2

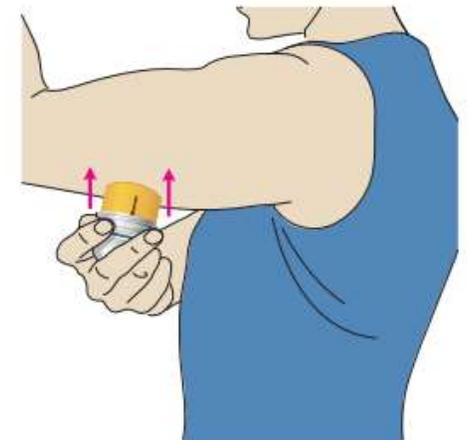
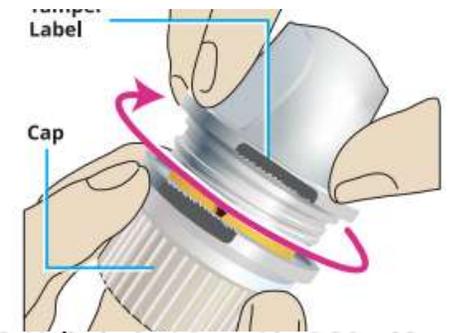
- 14 day wear (soon to be 15 days)
- 1 hour warm-up
- Real time alerts - must scan for actual number
- Confirm glucose in the first 12 hours of use
- Must scan every 8 hours to avoid data gaps
- Vitamin C interference (>500mg)
- 1 press inserter, disposable transmitter included with sensor
- Libre2 mobile app
- LibreLinkUp allows up to 20 followers

<https://www.freestylelibre.us/safety-information.html>



Freestyle Libre 3

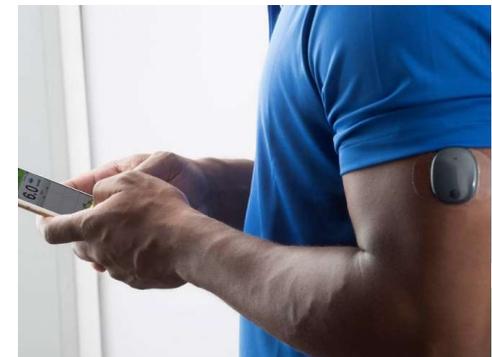
- 14 day wear (soon to be 15 days)
- 1 hour warm-up
- Scan to start sensor then real-time
- Confirm glucose in the first 12 hours of use
- 1 press inserter, disposable transmitter included with sensor
- Libre 3 and LibreLinkUp mobile apps
- Smaller size
- Reduced steps for insertion vs. Libre 2



Eversense

- Implantable CGM sensor – lasts 180 days
 - Sensor is MRI safe (not the transmitter)
- Removable, rechargeable transmitter
 - Taped above sensor
 - Communicates to smartphone (no separate receiver)
 - On-body vibrate high and low glucose alerts
- 24-hour warm-up (dressing for 2 days after insert)
- Requires calibrations every 12 hours x 3 weeks
- Then 1 calibration/day
- Eversense CGM Mobile app with customized predictive alerts (10-30 min in advance of high or low)
- Eversense Now app allows 5 followers

<https://www.eversenseddiabetes.com/>



CGM Comparison

	G6	G7	Libre 2	Libre 3	Guardian	Eversense
Integration	T: Slim X2, Omnipod, InPen	T: Slim X2 (soon)	Bigfoot Unity, T: Slim X2 (Soon)	Not yet	770G, 780G, InPen	No
Type	rtCGM	rtCGM	isCGM	rtCGM	rtCGM	rtCGM
Maximum wear time	10 days	10.5 days	14 days (Soon to be 15 days)		7 days	180 days
Warm-up time	2 hours	30 min	1 hour		Up to 2 hours	24 hours
Calibrations required	0	0	0		At least 2/day	2/day for 21 days, then 1/day
Water depth	8 feet, 24h	8 feet, 24h	3 feet, 30 min		8 feet, 30 min	3.28 feet, 30 min

Product user guides: Dexcom G6, Dexcom G7, Libre 2, Libre 3, Medtronic Guardian Connect, Guardian 3, Eversense

CGM Comparison (Continued)

	G6	G7	Libre 2	Libre 3	Guardian	Eversense
FDA approved sites	Abdomen (ages 2+) Upper buttocks (ages 2-17)	Upper arm (ages 7+) Upper buttocks (ages 2-6)	Upper arm		Upper arm, abdomen Upper buttocks (ages 2-13)	Upper arm
Approved in pregnancy	No	Yes	Yes		No	No
Transmitter	3 months	Disposable	Disposable		Charge weekly	Charge daily
FDA approved ages (years)	≥2	≥2	≥4 (soon to be 2)		≥2 Guardian 3 ≥2 Guardian 4 ≥14 Guardian Connect	≥18
Drug interactions	Hydroxyurea	Hydroxyurea	Vitamin C		Acetaminophen, Hydroxyurea	Tetracycline antibiotics, mannitol

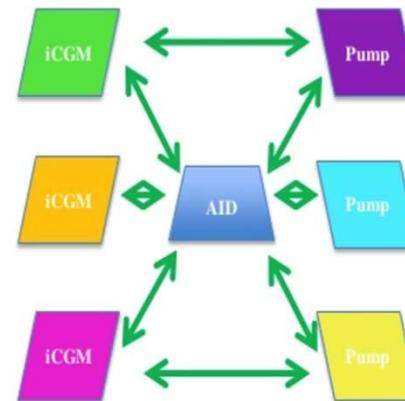
Product user guides: Dexcom G6, Dexcom G7, Libre 2, Libre 3, Medtronic Guardian Connect, Guardian 3, Eversense

Integrated CGM

- Dexcom G6, G7 and Libre 2, Libre 3 are integrated CGM (iCGM)
- Integration with digitally connected devices (eg, pumps, pens, automated insulin dosing [AID] systems)



Goal: Greater Interchangeability



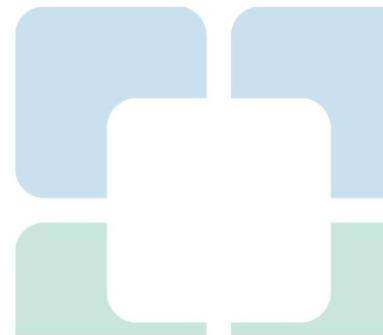
- More efficient regulatory pathways
- Faster innovation
- A more vibrant device ecosystem



Poll Question 12

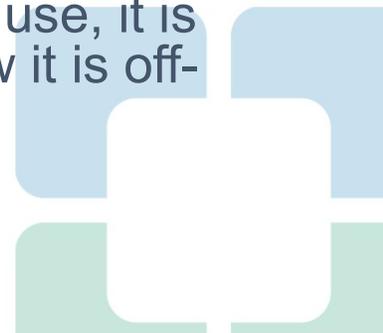
Which of the following drugs interact with the Libre systems?

- A. Aspirin
- B. Vitamin C
- C. Hydroxyurea
- D. Acetaminophen



CGM Counseling Points

- Important to check glucose when indicated
 - Symptoms do not match sensor value
 - During warm-up period
 - When making dosing decisions for select devices
- Sensors are waterproof
 - Showering, bathing, swimming OK
- Avoid with MRI, CT, diathermy
 - Exception: Eversense implantable, transmitter should be removed
- Not FDA approved
 - Dialysis, critically ill
 - Pregnancy-Guardian, eversense, G6
 - If people choose to use, it is important they know it is off-label

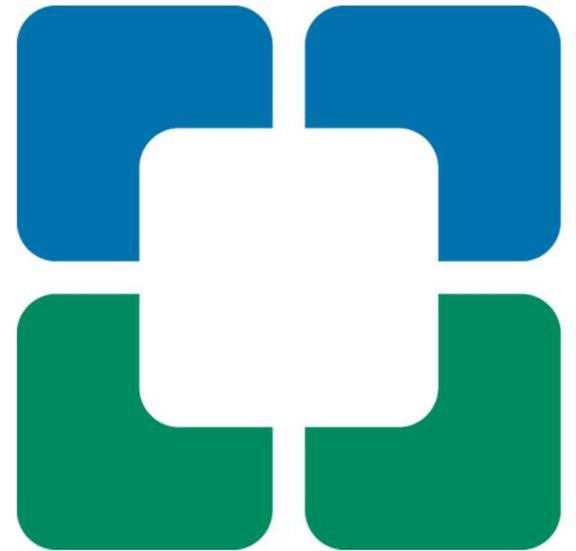


Lag Time

- Refers to a delay in CGM sensor readings compared to finger stick blood glucose readings
 - Estimated CGM sensor reading ~5 minutes behind
- Most apparent when glucose is changing rapidly



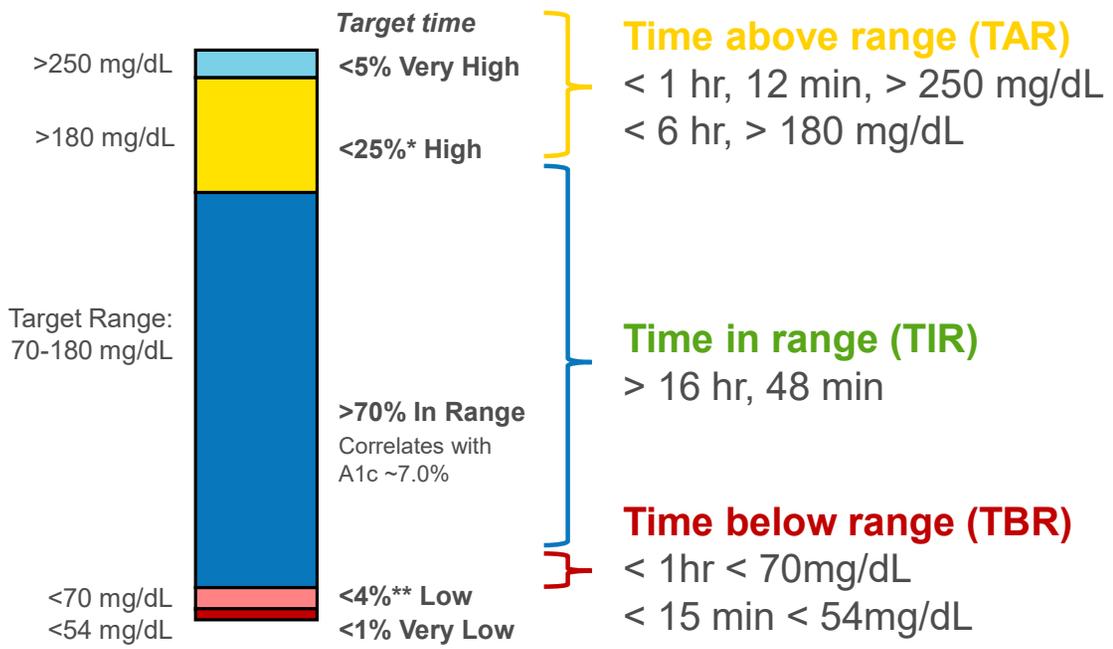
Downloading CGM Data



CGM Key Metrics

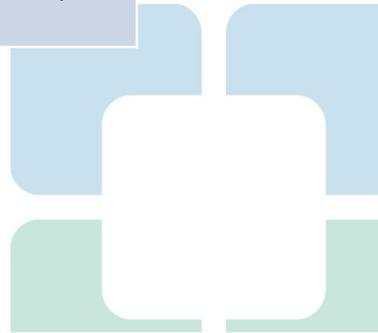


Recommended Time in Range for most people with T1D & T2D



Number of days CGM is worn	14 days is recommended
Percentage of time CGM is active	70% of data from 14 days is recommended
Mean glucose	
Glucose management indicator (GMI)	Estimated A1C
Coefficient of variation (CV)	This is a measure of glycemic variability. A CV >36% is considered unstable.

1. Battelino T et al. *Diabetes Care*. 2019;42(8):1593-1603. . 2. American Diabetes Association. *Diabetes Care* 2021;44(Suppl. 1):S73-S84 | <https://doi.org/10.2337/dc21-S006>.



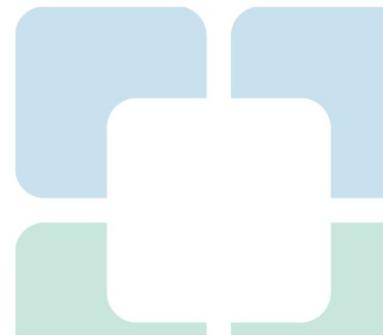
15. What is the goal time in range for most adults with type 1 or 2 diabetes?

A. $\geq 50\%$

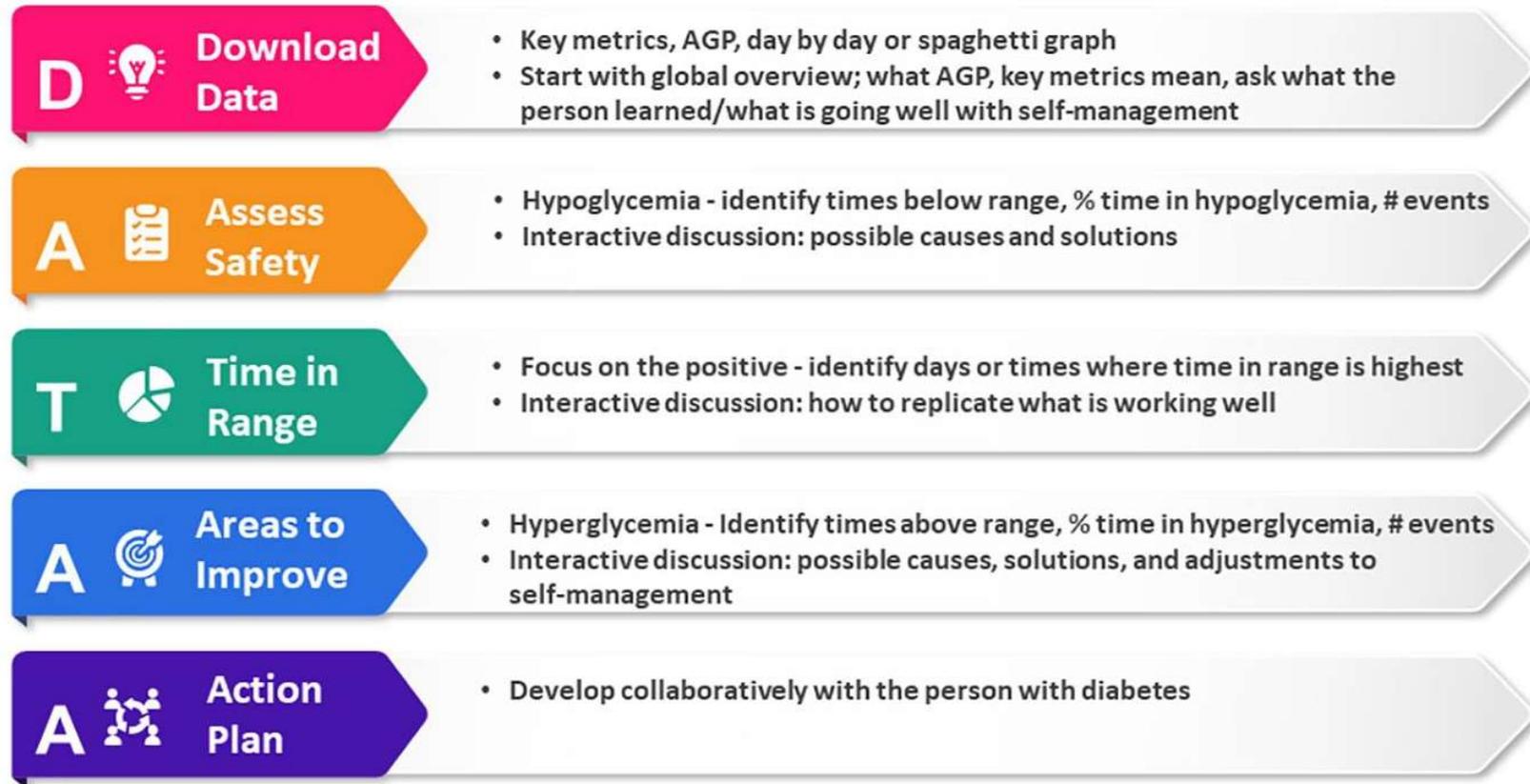
B. $\geq 70\%$

C. $\geq 80\%$

D. $\geq 90\%$



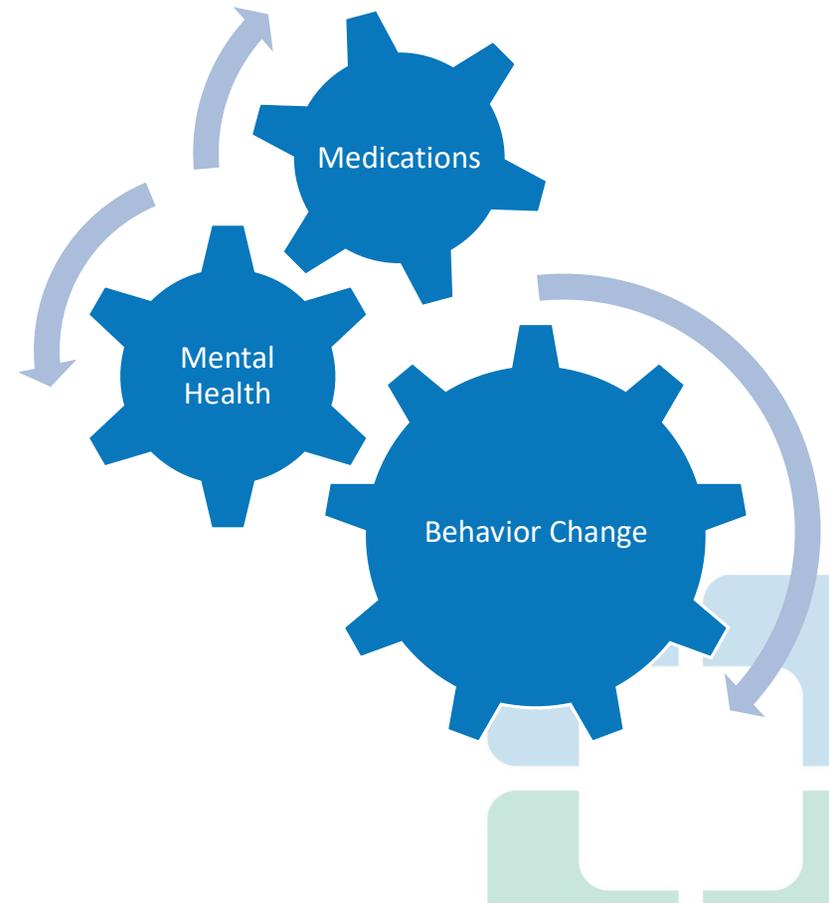
Review of CGM - DATAA



*****At each step, express that this is information, not good or bad*****

Tips for DATA Interpretation

- Start by asking the person what they've experienced and noticed with their glucose patterns
- Avoid judgment
- Learn from 1 time episodes, but make changes based on patterns
- Fix lows first but some amount is expected (<1-4%) and if you remove all lows, you may end up with too many highs
- If it's not making sense, dig deeper (ex. missed doses, rationing, injection technique, food insecurity, etc)



Case Studies & 2 min Stretch



Case

Terrance is a 60-year-old man with T2D x 12 years

Current DM2 meds:

- Metformin 1000 mg twice daily
- Glimepiride 8mg daily

Other conditions

- CKD
- Hyperlipidemia
- Hypertension

Checks BGM once daily

Pertinent Labs

- SCr = 1.38 mg/dL, eGFR = 55
- A1C = 8.2%, BMI = 34 kg/m²

- Works in project management
- Eats 3 meals/day, snacks at night, no regular exercise
- Glucose log

Day	FBG, mg/dL
1	125
2	123
3	110
4	108
5	99
6	81
7	134

Starts CGM



GLUCOSE STATISTICS AND TARGETS

February 26, 2021 - March 25, 2021 **28 Days**
% Time CGM is Active 98%

Ranges And Targets For	Type 1 or Type 2 Diabetes
Glucose Ranges	Targets % of Readings (Time/Day)
Target Range 70-180 mg/dL	Greater than 70% (16h 48min)
Below 70 mg/dL	Less than 4% (58min)
Below 54 mg/dL	Less than 1% (14min)
Above 180 mg/dL	Less than 25% (6h)
Above 250 mg/dL	Less than 5% (1h 12min)

Each 5% increase in time in range (70-180 mg/dL) is clinically beneficial.

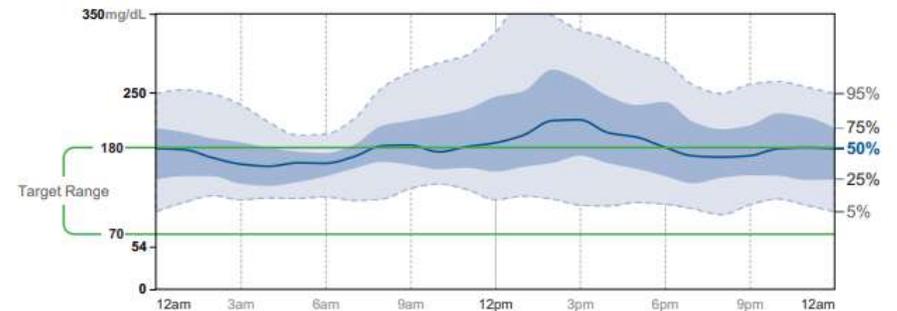
Average Glucose 185 mg/dL
Glucose Management Indicator (GMI) 7.7%
Glucose Variability 29.7%
Defined as percent coefficient of variation (%CV); target ≤36%

TIME IN RANGES



AMBULATORY GLUCOSE PROFILE (AGP)

AGP is a summary of glucose values from the report period, with median (50%) and other percentiles shown as if occurring in a single day.

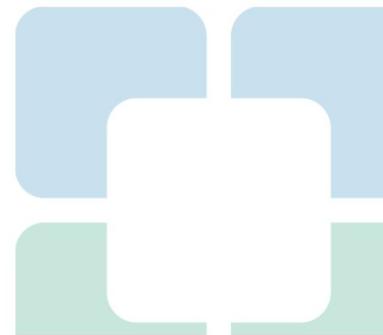


- Which CGM key metrics are at goal?
- Which are not?
- Overall patterns?

Assessment Question

Which CGM key metrics are at goal?

- A. Time in range
- B. Time above range
- C. Time below range
- D. Glucose management indicator

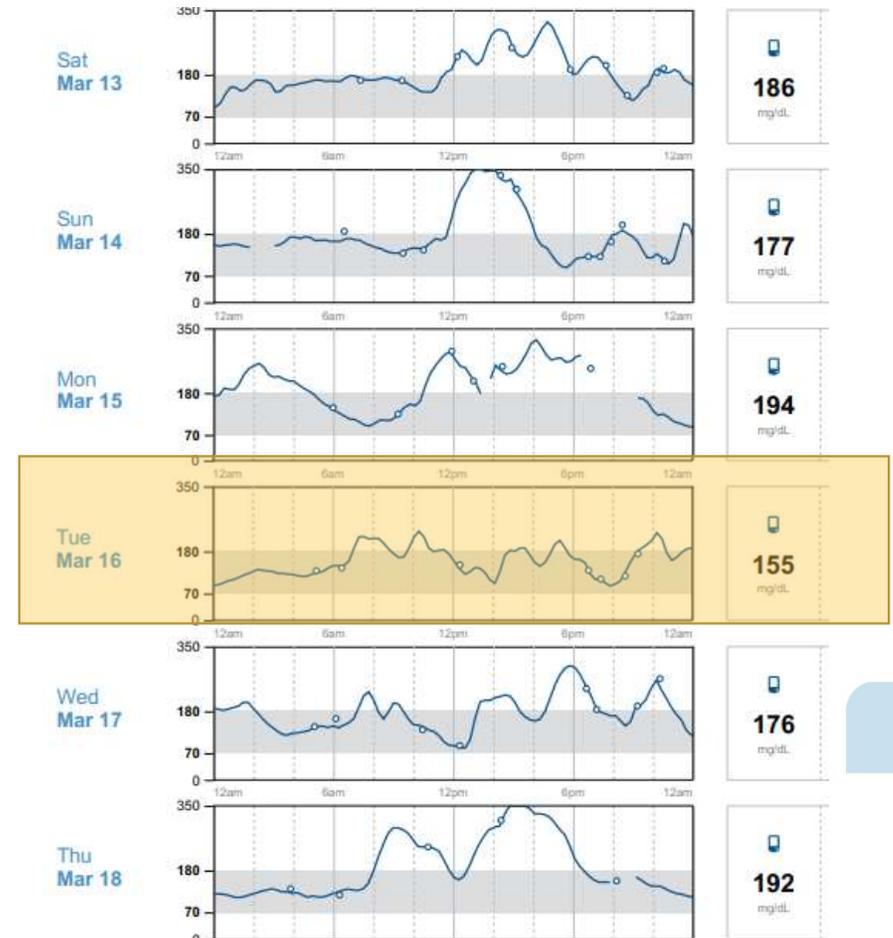


2
0
4

Time in Range



- Focus on the positive: what's worked well on Tue 3/16?
- Time in range is high this day
- Ate a granola bar for breakfast, grilled chicken salad at lunch, steak, greens, potato at dinner
- No missed medication doses
- Good night's sleep, low stress



2
0
5

Areas for Improvement



- Sun 3/14 glucose went high 12 pm
- Reports eating rice bowl and coke
- Silver lining
 - Walked around 3 pm (helped to lower glucose)
 - Avoided afternoon snacking
 - Ate low-carb dinner (salmon, salad, small potato)
 - Denies missed doses

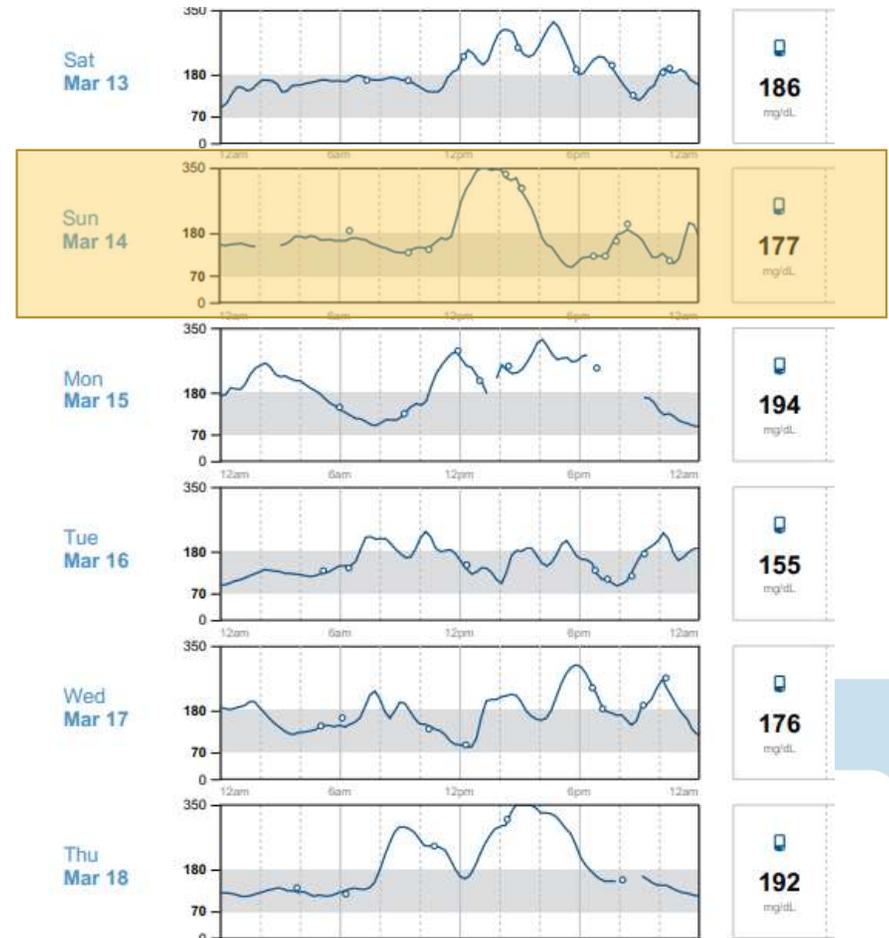
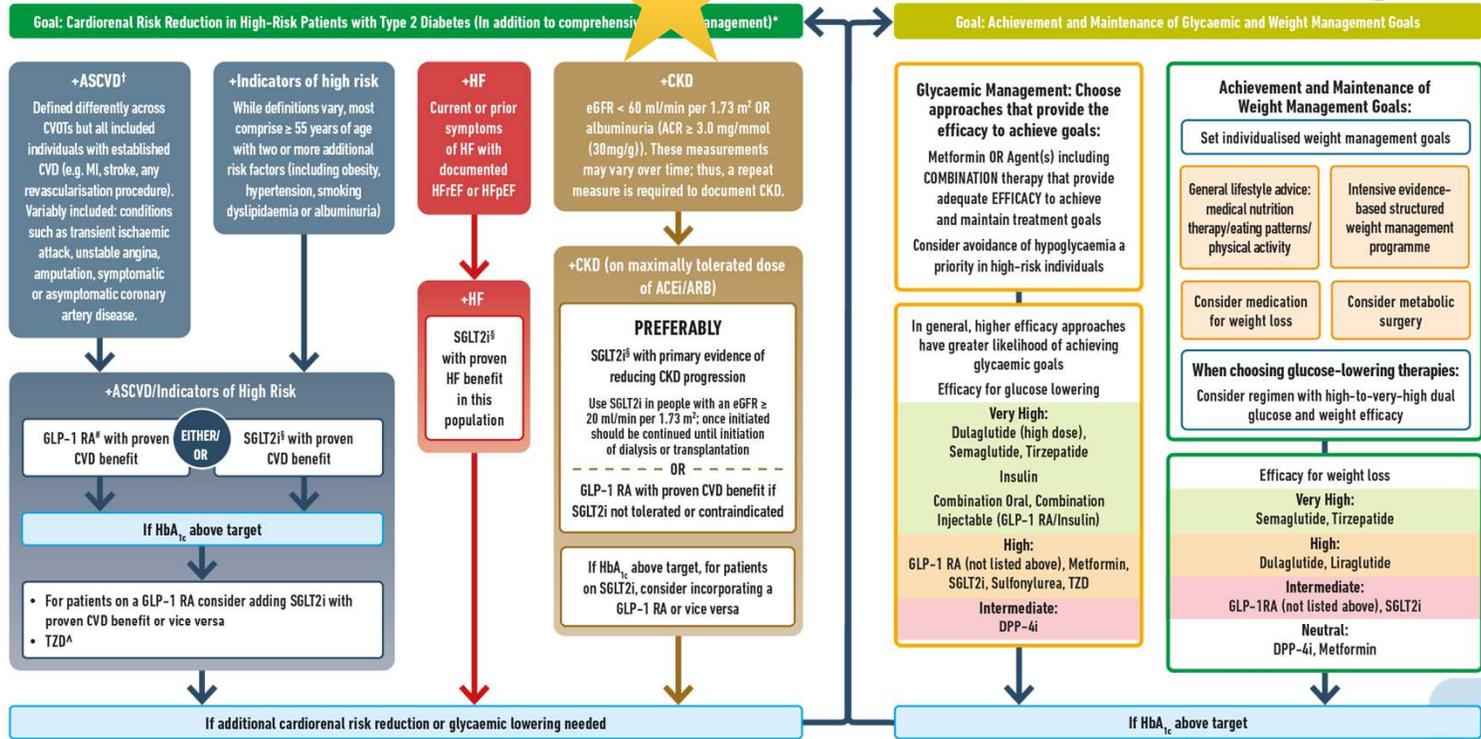


FIGURE 3: USE OF GLUCOSE-LOWERING MEDICATIONS IN THE MANAGEMENT OF TYPE 2 DIABETES

HEALTHY LIFESTYLE BEHAVIOURS; DIABETES SELF-MANAGEMENT EDUCATION AND SUPPORT (DSMES); SOCIAL DETERMINANTS OF HEALTH (SDOH)

TO AVOID THERAPEUTIC INERTIA REASSESS AND MODIFY TREATMENT REGIMENS Q1-4 MONTHS



ACEi, Angiotensin-Converting Enzyme Inhibitor; ACR, Albumin/Creatinine Ratio; ARB, Angiotensin Receptor Blocker; ASCVD, Atherosclerotic Cardiovascular Disease; CGM, Continuous Glucose Monitoring; CKD, Chronic Kidney Disease; CV, Cardiovascular; CVD, Cardiovascular Disease; CVOT, Cardiovascular Outcomes Trial; DPP-4i, Dipeptidyl Peptidase-4 Inhibitor; eGFR, Estimated Glomerular Filtration Rate; GLP-1 RA, Glucagon-Like Peptide-1 Receptor Agonist; HF, Heart Failure; HFpEF, Heart Failure with preserved Ejection Fraction; HFrEF, Heart Failure with reduced Ejection Fraction; HHF, Hospitalisation for Heart Failure; MACE, Major Adverse Cardiovascular Events; MI, Myocardial Infarction; SDOH, Social Determinants of Health; SGLT2i, Sodium-Glucose Cotransporter-2 Inhibitor; TZD, Type 2 Diabetes; TZD, Thiazolidinedione.

* In people with HF, CKD, established CVD or multiple risk factors for CVD, the decision to use a GLP-1 RA or SGLT2i with proven benefit should be independent of background use of metformin; † A strong recommendation is warranted for people with CVD and a weaker recommendation for those with indicators of high CV risk. Moreover, a higher absolute risk reduction and thus lower numbers needed to treat are seen at higher levels of baseline risk and should be factored into the shared decision-making process. See text for details; ‡ Low-dose TZD may be better tolerated and similarly effective; § For SGLT2i, CV/renal outcomes trials demonstrate their efficacy in reducing the risk of composite MACE, CV death, all-cause mortality, MI, HFrEF and renal outcomes in individuals with T2D with established/high risk of CVD; ¶ For GLP-1 RA, CVOTs demonstrate their efficacy in reducing composite MACE, CV death, all-cause mortality, MI, stroke and renal endpoints in individuals with T2D with established/high risk of CVD.

Davies MJ, Aroda VR, Collins BS, Gabbay RA, Green J, Maruthur NM, Rosas SE, Del Prato S, Mathieu C, Mingrone G, Rossing P, Tankova T, Tsapas A, Buse JB

Diabetes Care 2022; <https://doi.org/10.2337/dci22-0034>. Diabetologia 2022; <https://doi.org/10.1007/s00125-022-05787-2>.

Assessment Question

3. **What is the most appropriate medication adjustment for Terrance?**

- A. Add DPP4 inhibitor
- B. Add GLP-1 receptor agonist
- C. Add SGLT2 inhibitor
- D. Lifestyle modifications only



Action Plan

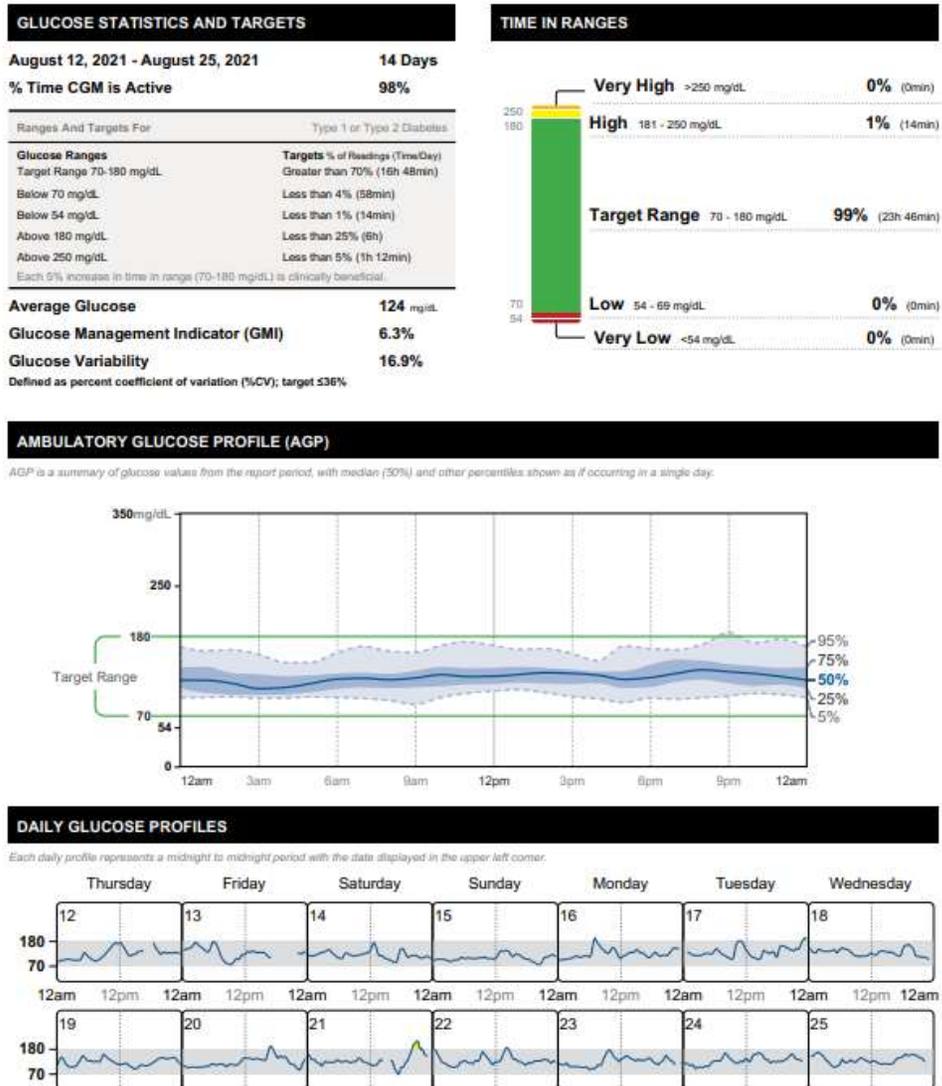


- In collaboration with Terrance
 - Lifestyle changes
 - Incorporate a brisk walk 3 days per week
 - Reduce high-carbohydrate foods like fries
 - CGM optimization
 - Alerts, high for 280
 - Medication adjustments
 - Add a medication to help his CKD + optimize glucose
→ SGLT2 inhibitor
 - Follow-up in 3-4 weeks



3 Months Later

DM2 Meds:
Empagliflozin 10mg qday
Metformin 1000mg BID



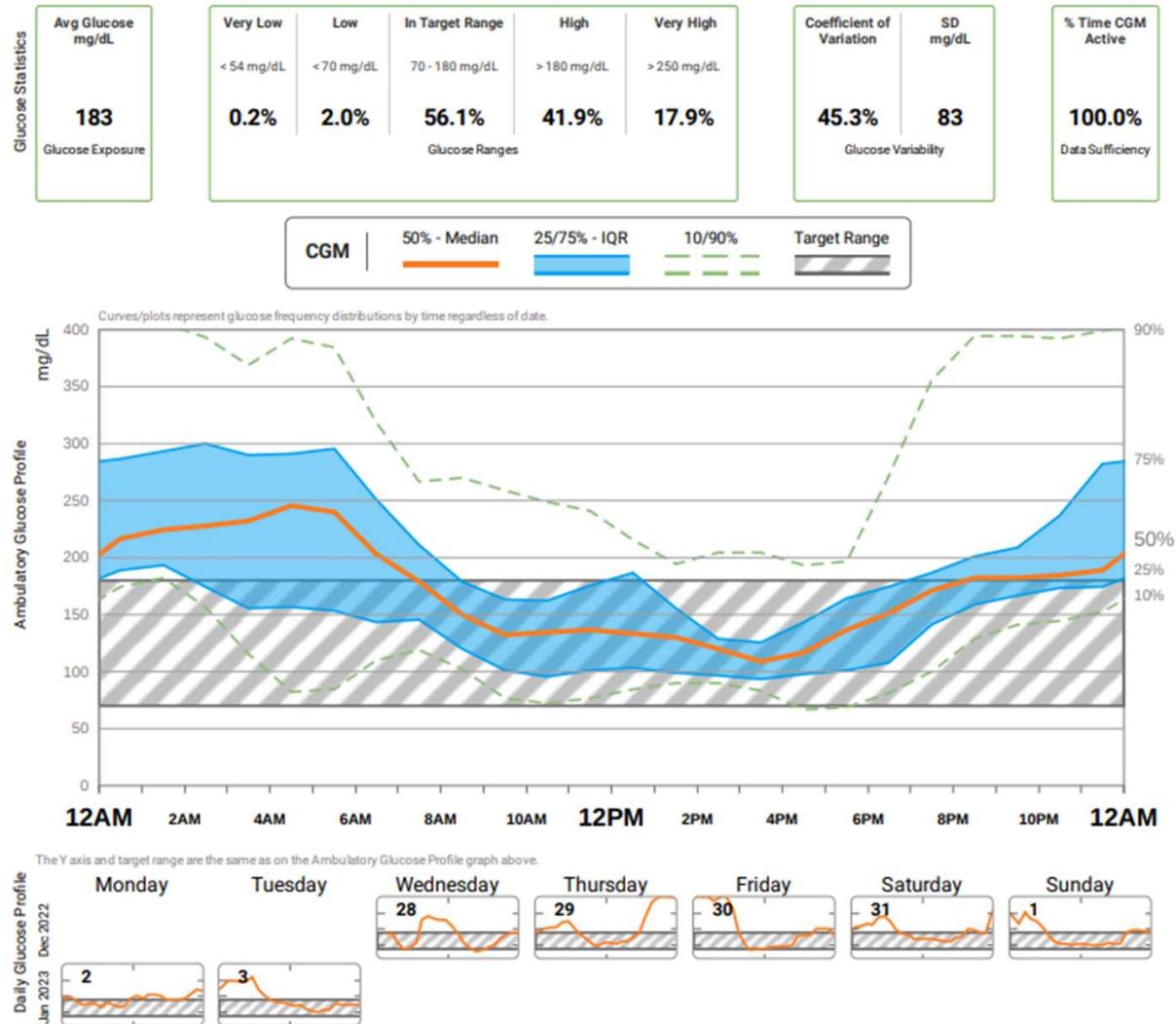
Patient Case

75 yo F with 25 year h/o T2DM.
 PMH includes HTN, hyperlipidemia,
 hypothyroid, obesity, ASCVD.

Current DM Meds

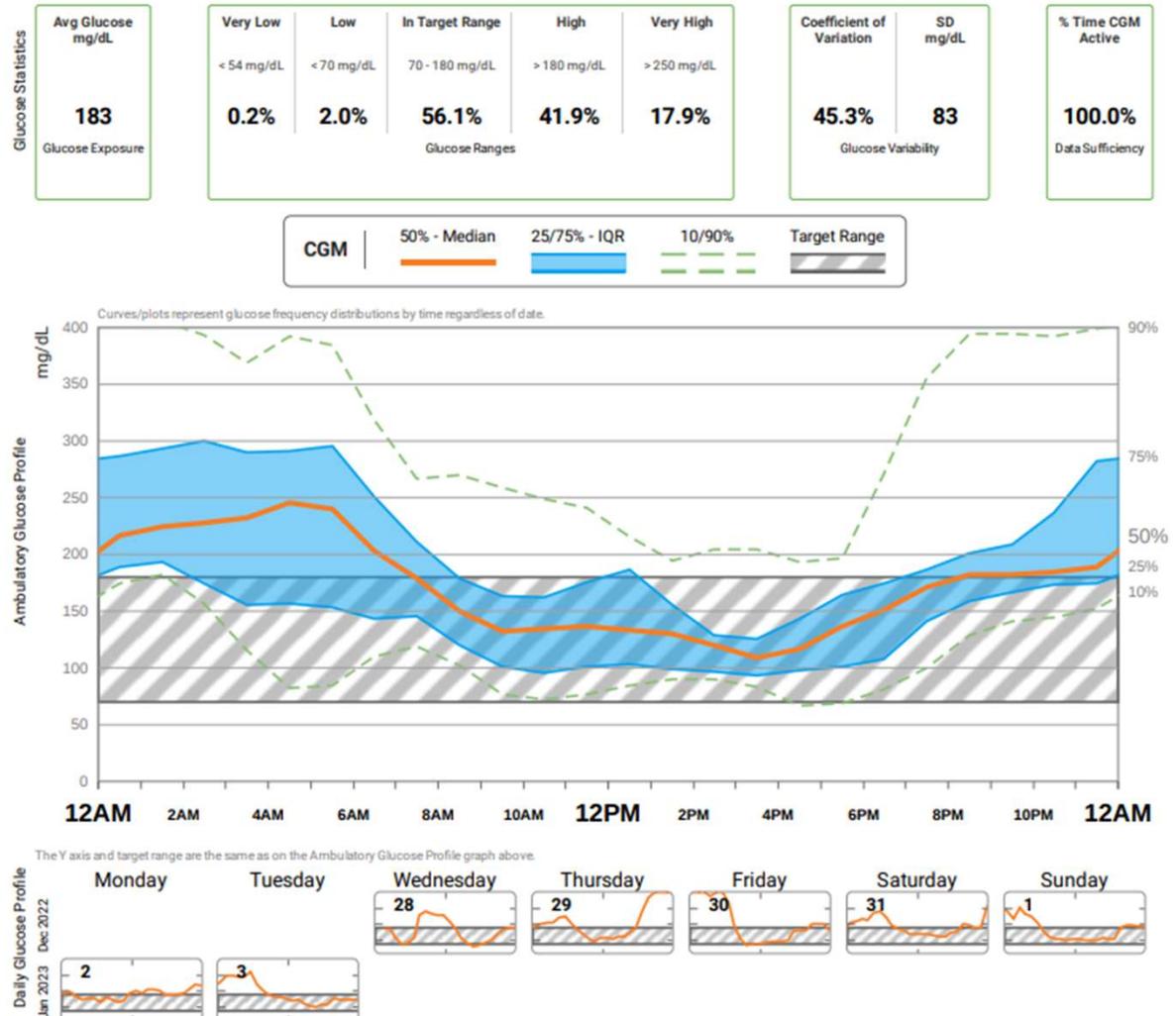
- Insulin glargine inject 50 units QAM and 40 at night
- Insulin aspart 8-10-10 units plus correction scale
- Metformin 1000 mg daily
- Semaglutide, 0.25mg weekly (2 doses so far)

Wears rtCGM



Which of the following CGM key metrics is at target?

- A. Time in range
- B. Time above range
- C. Coefficient of variation
- D. Time below range



Using DATAA

A  Assess Safety

Less of an appetite since taking semaglutide, often going low during the day

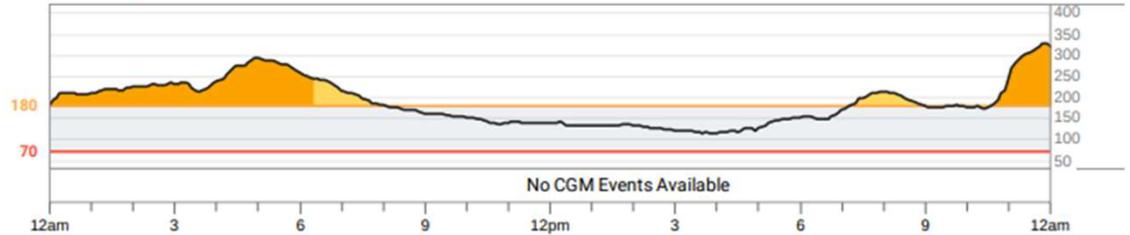
T  Time in Range

During the day, glucose often steady, but also having to drink juice to keep from going low

A  Areas to Improve

Skipping aspart doses because running low, leading to rebound highs

Sat, Dec 31, 2022



Fri, Dec 30, 2022



Thu, Dec 29, 2022

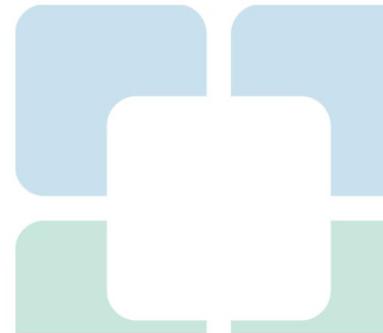


A  Areas to Improve

Action Plan

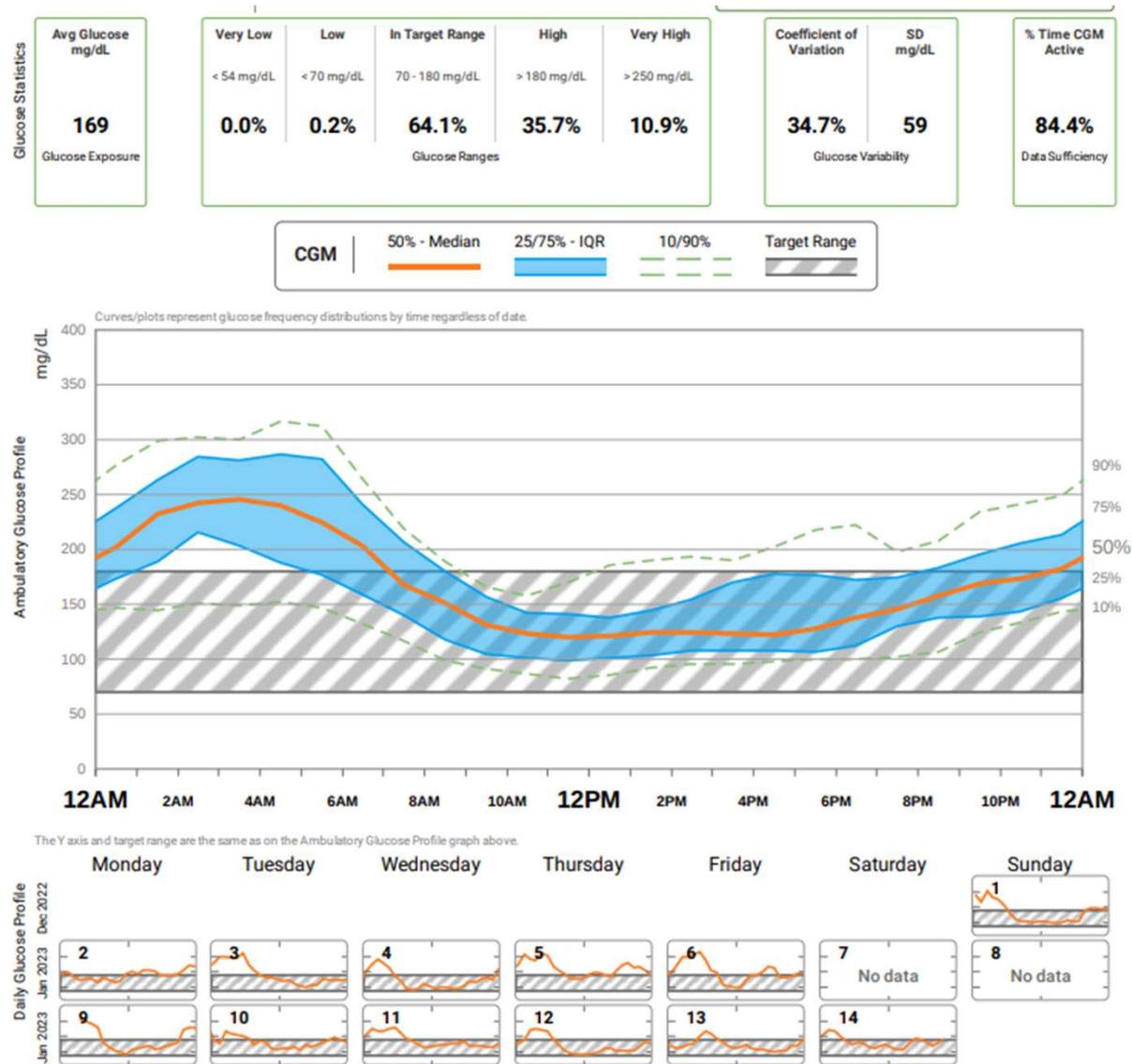


- Continue semaglutide 0.25mg weekly x 2 more weeks, then titrate up to 0.5mg weekly
- Decrease insulin glargine to 45 units qam and 35 units qpm
- Continue insulin aspart 8-10-10 + correction scale
- Continue metformin 1000mg daily



1 month later

- Average glucose improved
- Time in range increased
- Glucose variability improved
- Less hypoglycemia

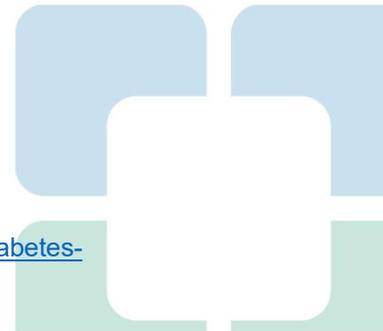


CGM in the Hospital

- Dexcom G6 and Freestyle Libre available for inpatient remote monitoring
 - FDA temporarily approved due to the public health crisis of COVID-19 and the need to preserve PPE and reduce hospital staff exposure to coronavirus
- March 1, 2022
 - FDA grants breakthrough device designation for Dexcom hospital CGM system
 - Designed to expedite the development and regulatory review

<https://www.dexcom.com/news/dexcom-cgm-hospital-covid19>

<https://abbott.mediaroom.com/2020-04-08-Abbotts-FreeStyle-R-Libre-14-Day-System-Now-Available-in-U-S-for-Hospitalized-Patients-with-Diabetes-During-COVID-19-Pandemic>





Dexcom CLARITY

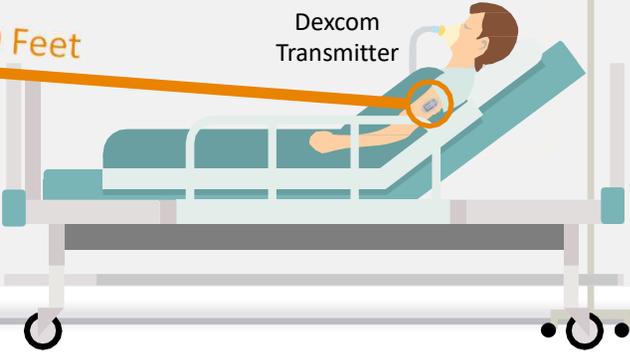


Smart Phone with G6 App

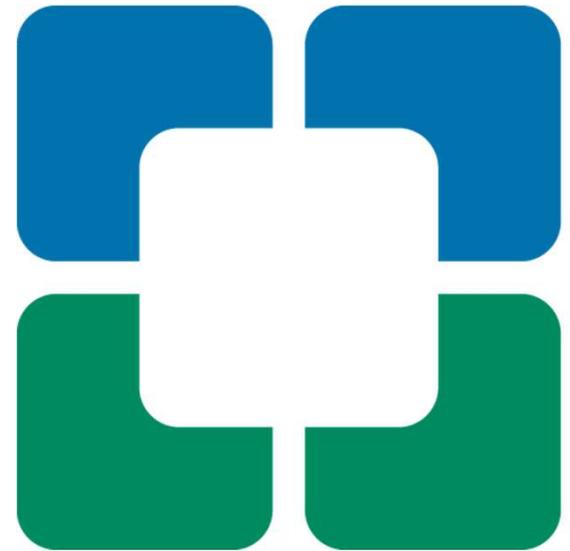


20 Feet

Dexcom Transmitter



Insulin Pumps

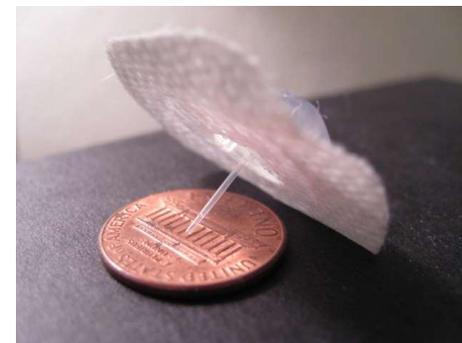
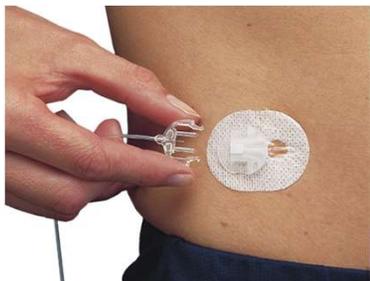


Common Insulin Pump Features

- Bolus calculator
- Temporary basal or temporary target
- Insulin-on-board/active insulin feature to prevent stacking
- Multiple basal patterns
- Small dose increments
- Integration with CGM
- Designed to work with U100 insulin
- Most have a 4-5 year warranty/contract



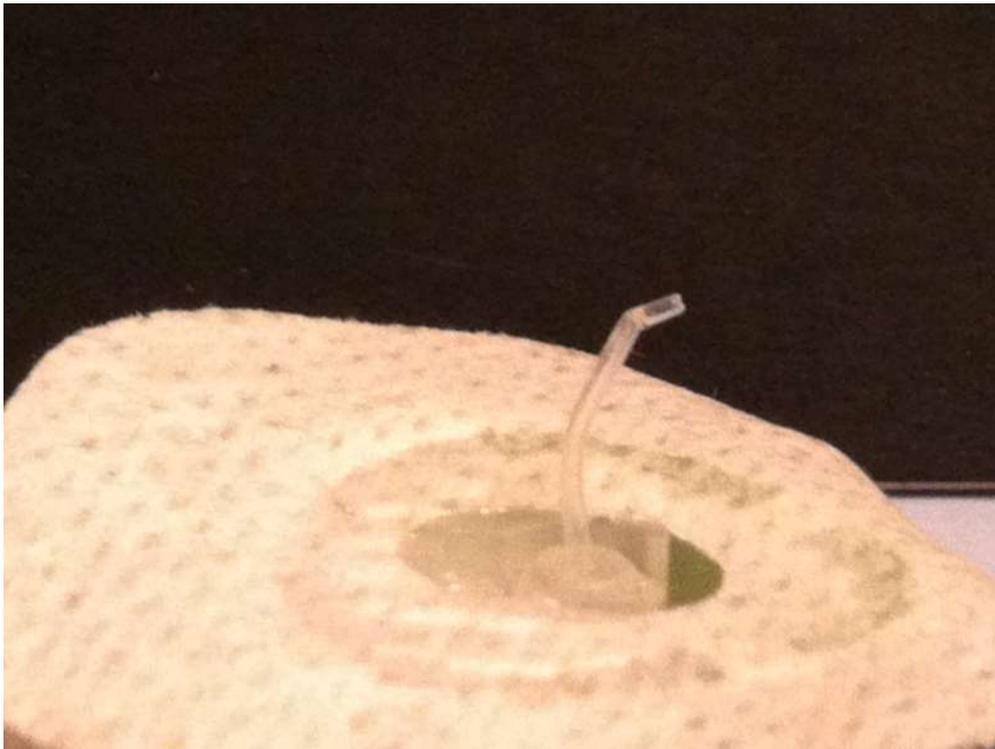
Infusion Sets



- Infusion sets are usually Teflon
 - Available in different sizes (ex. 9mm vs 6mm)
 - Silhouette (angled) may be better for kids/thinner/very active people
 - Steel infusion sets a good option for people with frequent site occlusions
- Insert at least 1 inch from CGM site
 - Auto-injectors vs. manually injecting
- Site selection/rotation
- Longer tubing options
 - Good if connected on leg, arm or wearing pump further from site
- Caution with kids/babies/pets-pouches available to hide pump
- When changing out infusion set, check glucose or CGM 1-2 hours after
 - Don't change right before bed



What Happens with a Bent Cannula?



- A. Hyperglycemia
- B. Hypoglycemia
- C. No effect



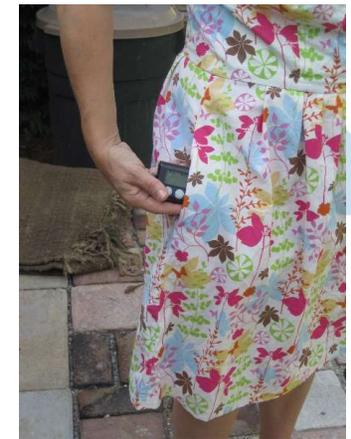
Filling the Pump



- Only fill with how much insulin you expect to use in 3 days + ~30 units
- Pumps hold 200-300 units
- Caution with air bubbles
- Fill cannula amount
 - Steel needle (0 units)
 - 6mm cannula (0.3 units)
 - 9mm cannula (0.5 units)
- If cannula overfilled, can lead to lows
- If cannula under-filled or air bubbles, can lead to highs



Where to Wear?



Ideal Pump Candidates

- Wearing CGM or frequently checking BGM
- Carbohydrate counting or good with estimates
- Ability to learn pump programming
- Willing to follow up regularly with health care team
- Can afford the pump/supplies
- Following hyperglycemia treatment instructions
- Problem solving skills (ex. high or low glucose)





Patch Pumps



Cequr Simplicity

- Bolus pump patch only
- Approved for adults with T1DM or T2DM
- Holds up to 200 units of rapid acting insulin
- On-demand bolus doses in 2 unit increments
- Doses administered via clicks directly on the device
- Must be changed every 3 days

<https://myceqursimplicity.com/>
<https://www.go-vgo.com/>

V-Go

- 24 hr. basal/bolus patch pump
- Approved for adults with T2DM
- Allows 20, 30, 40 unit basal rate options
- On-demand bolus doses in 2 unit increments
 - Up to 36 units/24 hrs
- Doses administered via clicks directly on the device
- Must be changed daily



Automated Insulin Delivery Systems



Omnipod 5
(Insulet)



T:slim X2 (Tandem)
Control IQ



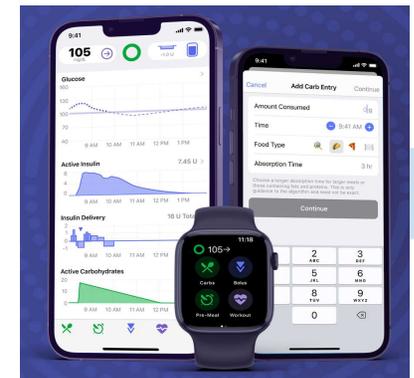
780G
(Medtronic)



iLet
(Beta Bionics)

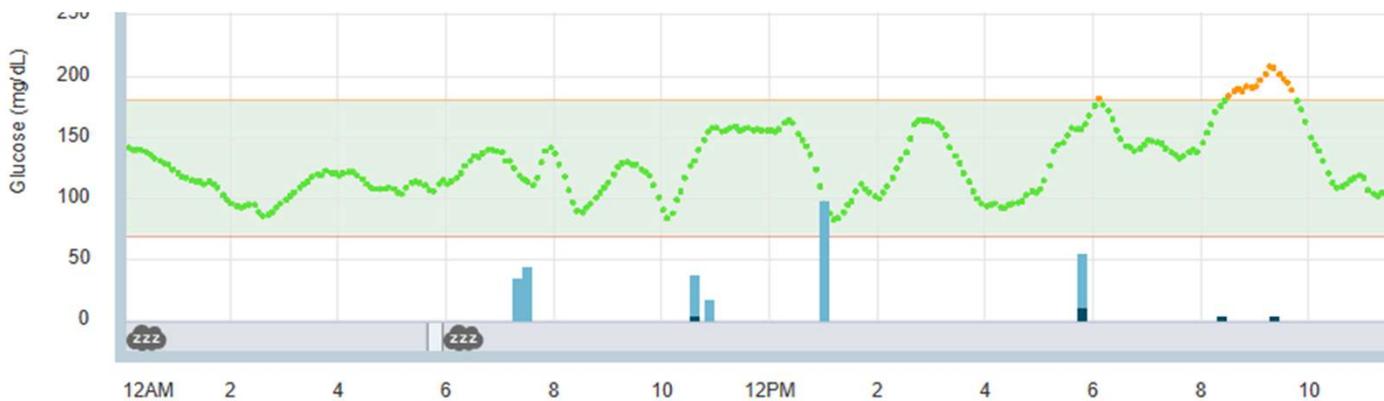


Mobi (Tandem)
Control IQ



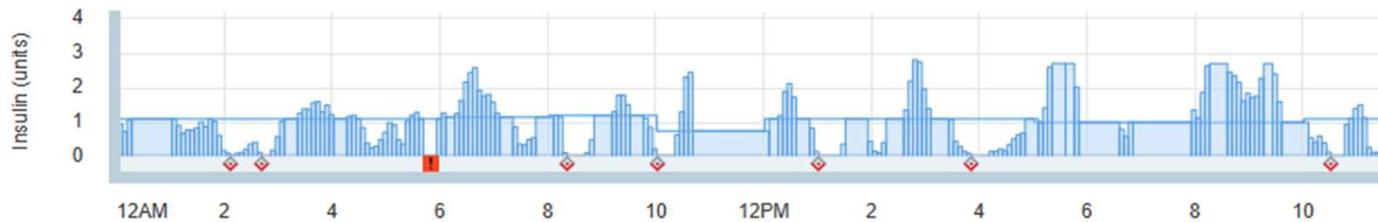
Tidepool Loop

Hybrid-Closed Loop



Basal: Control-IQ Profile Temp Profile Setting

0 u/hr Basal: Manual/Alarm 0 u/hr Basal 0 u/hr Temp Cartridge/Site



- Automated insulin delivery (AID)
- Auto adjust background insulin
- Some systems give auto corrections
- Maximize time 70-180mg/dL

Omnipod® 5

- No tubing
- Holds 200 units
- Uses last 4-5 pods for adjustments, based on TDD
- Control system from a compatible smartphone or controller
- Requires Dexcom G6® use from a compatible smart device
- SmartBolus calculator informed by CGM value and trend
- Glucose targets from 110-150 mg/dL adjustable in 10 mg/dL increments
- HypoProtect mode to reduce risk of lows
- Bluetooth connectivity with glooko, automatic data download
- Requires charging cable

Omnipod® 5 Automated Insulin Delivery System. User Guide.



Medtronic 780G

- Holds 300 units
- Compatible with Guardian Sensor 3 or 4
- Meal detection (auto correction + basal)
- Adjustable target (100, 110, 120)
- Bluetooth connectivity, remote software upgrades
- Suspend before/on low options (in manual mode)
- Bluetooth connectivity
- MiniMed and Carelink apps for data sharing/viewing
- 7 day infusion set
- Uses AA battery



Beta Bionics iLet



- Holds 160 units of insulin
- Works with Dexcom G6
- Future compatibility with pre-filled insulin cartridges
- Programmed by entering body weight
 - No other insulin pump settings
- Enter in meal estimates (usual, less, more)
- Provides calculated back up settings
- Requires charger



Cleveland Clinic

• <https://www.betabionics.com/>



Tandem T: Slim X2 with Control-IQ

- Holds 300 units
- Compatible with Dexcom G6 and future (G7, Libre)
- Algorithm adjusts insulin delivery from programmed “manual” settings
- Automatic correction doses
 - Up to 1 every hour based on projected glucose >180mg/dL
 - Calculated at 60% of programmed correction factor (target of 110)
- T:Connect app to bolus and for remote downloads (changing to Source soon)
- Requires charging cable
- Bolus from T:connect app from phone



Control IQ Targets

		Control-IQ	Sleep Activity	Exercise Activity
  Delivers	Delivers an automatic correction bolus if sensor glucose is predicted to be above ___ mg/dL	180	--	180
 B Increases	Increases basal insulin delivery if sensor glucose is predicted to be above ___ mg/dL	160	120	160
 B Maintains	Maintains active Personal Profile settings when sensor glucose is between ___ - ___ mg/dL	112.5 - 160	112.5 - 120	140 - 160
 B Decreases	Decreases basal insulin delivery if sensor glucose is predicted to be below ___ mg/dL	112.5	112.5	140
 0 Stops	Stops basal insulin delivery if sensor glucose is predicted to be below ___ mg/dL	70	70	80



Tandem Mobi

- FDA approved 6 + years
- 200 unit cartridge
- Half the size of T:Slim X2
- 5 inches of tubing
- Everything controlled from mobile app
- New syringe-driven pump fill
- Wireless charging
- IP28 water resistant rating (8 feet for 2 hours)



Pump Comparison

	Omnipod 5	Control IQ	780G	ILet
Min age	2 years	6 years	7 years	6 years
Min daily insulin	5 units	10 units, 55lbs	8 units	8 units
Max fill	200 units	300 units	300 units	160 units
Basal increment	0.05 units	0.001 units	0.025 units	NA
Bolus increment	0.05 units	0.01 units	0.025 units	NA
Site change frequency	3 days	3 days	7 days (extended infusion set)	3 days
CGM compatibility	G6	G6	Guardian 3, 4	G6
Calibration	No	No	3-4/day	No
CGM trend in calculator	Increase up to 30% Decrease down to 100%	No	No	NA

Pump Comparison

	Omnipod 5	Control IQ	iLet	780G
Algorithm target	110, 120, 130, 140, 150mg/dL	112.5 – 160 mg/dL	110, 120, 130mg/dL	100, 110, 120mg/dL
Basal automation	Calculated from total daily insulin, updated each pod change, 60 min prediction	Increases or decreases from programmed basal rates, 30 min prediction	Initiated based on user weight and adapts with glucose profile	Calculated based on total daily insulin from past 2-6 days
Automated Corrections	No	Max 1/hour if glucose predicted >180 mg/dL, 60% of calculated dose	No	If glucose > 120 mg/dL and at max "auto basal" delivery, up to every 5min
Extended bolus	No, manual mode only	Yes, up to 2 hours	No	No, manual mode only
Insulin action time (IAT)	2-6 hours	5 hours (automated mode)	NA	2-8 hours
Temporary targets	Activity 150 mg/dL	Exercise 140 -160 mg/dL Sleep 112.5 – 120 mg/dL	NA	150 mg/dL
Bolus adjustments	ISF, IAT, ICR, max bolus, reverse correction	ISF, ICR, max bolus, reverse correction	Usual, more, Less meal announcements	ICR, IAT, max bolus
Ability to override bolus	Yes	Yes	No	No

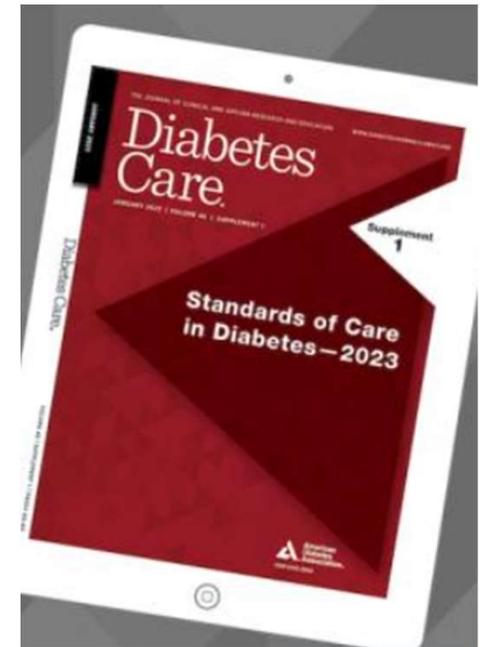
Patient Case

- 47 years old
- T2D x 20+ years
- A1C=8.1%
- BMI=39kg/m²
- Works as a bank teller
- No diabetes complications
- Meds:
 - Insulin glargine 100 units qpm
 - Insulin aspart 45 units TID a.c.
 - Dapagliflozin 10mg daily
 - Dulaglutide 1.5 mg weekly

**Is this a good
candidate for an
insulin pump?**

Guidelines: ADA

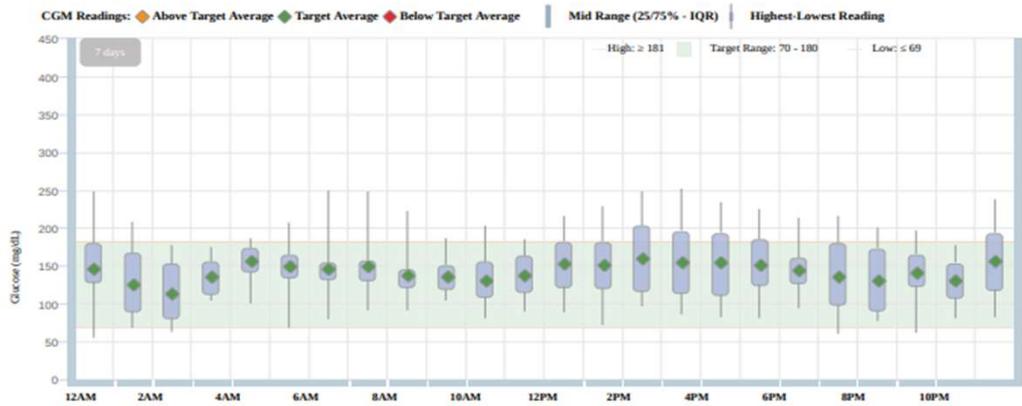
- CGM should be offered for diabetes management in adults with diabetes on multiple daily injections (MDI) or CSII who are capable of using the devices safely (either by themselves or with a caregiver).
- AID systems should be offered for diabetes management to youth and adults with T1D (A) and other forms of insulin deficient diabetes (E) who are capable of using the device safely.
- The choice of device should be made based on the individual's circumstances, preferences and needs.



Patient Case

47yo T2DM, A1C=8.1%, BMI=39kg/m²

CGM Hourly | Tuesday Mar 28, 2023 - Monday Apr 03, 2023 CGM Data by Dexcom

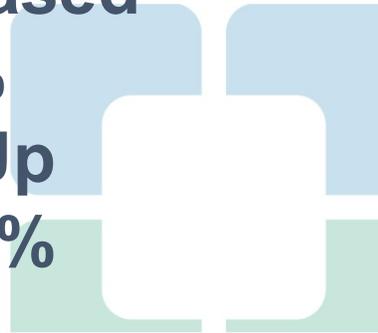


Night 12am - 6am						Morning 6am - 12pm						Afternoon 12pm - 6pm						Evening 6pm - 12am					
Low	Below	Target	Above	High		Low	Below	Target	Above	High		Low	Below	Target	Above	High		Low	Below	Target	Above	High	
Total Readings:						Total Readings:						Total Readings:						Total Readings:					
2%	0%	87%	0%	11%		0%	0%	90%	0%	10%		0%	0%	74%	0%	26%		1%	0%	76%	0%	23%	
Time in range (Avg):						Time in range (Avg):						Time in range (Avg):						Time in range (Avg):					
7 min.	-	5:06 hrs.	-	40 min.		-	-	5:19 hrs.	-	36 min.		-	-	4:19 hrs.	-	1:32 hrs.		4 min.	-	4:28 hrs.	-	1:19 hrs.	
Avg. Glucose (mg/dL): 140						Avg. Glucose (mg/dL): 139						Avg. Glucose (mg/dL): 149						Avg. Glucose (mg/dL): 148					
Standard Deviation (mg/dL): 34						Standard Deviation (mg/dL): 32						Standard Deviation (mg/dL): 43						Standard Deviation (mg/dL): 38					
Avg. Readings Per Day: 93						Avg. Readings Per Day: 87						Avg. Readings Per Day: 84						Avg. Readings Per Day: 90					

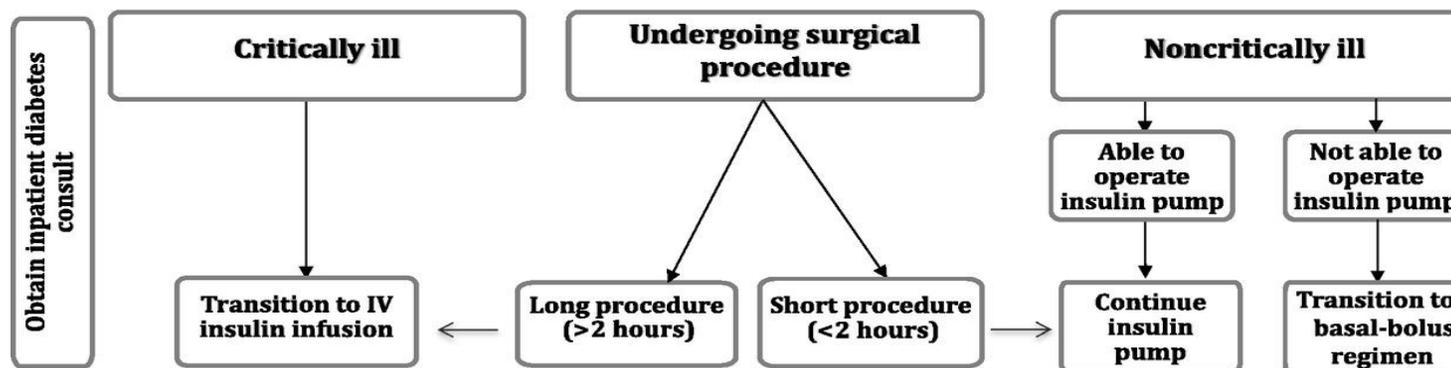
Highest CGM Reading	Average CGM Reading	Lowest CGM Reading
252	144	55

Time in Range			Number of Days CGM in Use 6.9 days
Above Target	18%	> 180 mg/dL	
Target Range	82%	70 - 180 mg/dL	
Below Target	1%	< 70 mg/dL	

TDD decreased
by 30%
Follow-Up
A1C=6.7%



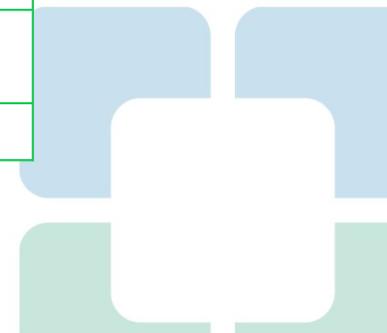
Patient With Insulin Pump Admitted to Hospital



Changes to Pump Therapy With Imaging Studies	
X-ray/CT	Pump should be covered by lead apron
MRI	Pump and metal infusion set should be removed
Ultrasound	No need to remove pump but transducer should not be pointed directly at the pump
Cardiac catheterization	Pump should be covered by lead apron
Pacemaker/automatic implantable cardioverter defibrillator (AICD)	Pump should be covered by lead apron
Colonoscopy/EGD	Pump can remain in place
Laser surgery	Pump can remain in place

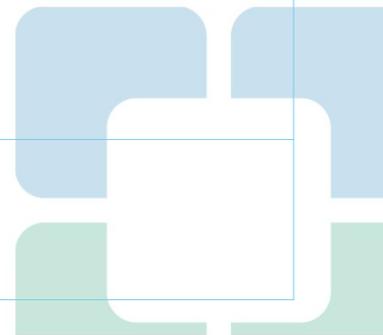
Contraindications to Insulin Pumps in the Hospital

Impaired level of consciousness (except during short-term anesthesia)
Patient's inability to correctly demonstrate appropriate pump settings
Critical illness requiring intensive care
Psychiatric illness that interferes with a patient's ability to self-manage diabetes
Diabetic ketoacidosis and hyperosmolar hyperglycemic state
Refusal or unwillingness to participate in self-care
Lack of pump supplies
Lack of trained health care providers, diabetes educators, or diabetes specialist
Patient at risk for suicide

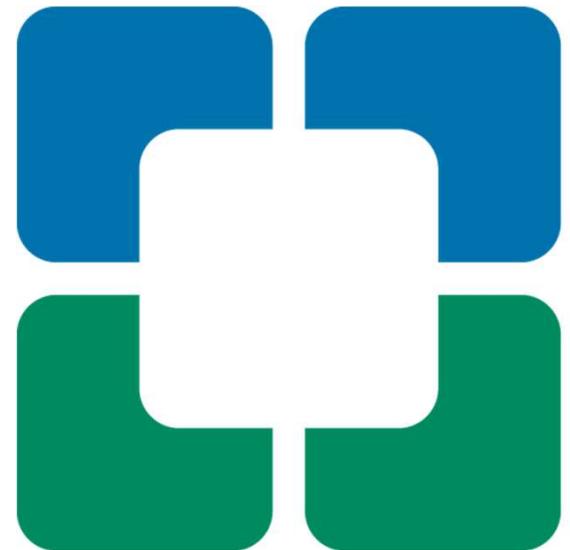


Insulin Pump Data Management Tools

System	Website	Integration
Glooko	glooko.com	Insulin pumps (Omnipod, Tandem), Dexcom, Eversense, many glucose meters
Carelink	carelink.medtronic.com	Medtronic insulin pumps and Medtronic CGM
Tidepool	tidepool.org	Insulin pumps (Medtronic, Tandem, Omnipod), FreeStyle Libre, Dexcom, Guardian Connect, many glucose meters
T:Connect	tconnect.tandemdiabetes.com	Insulin pump (Tandem), Dexcom



Connected Insulin Pens



Connected Pens

See your **real-time** glucose readings

Your glucose history



InPen with Guardian or Dexcom



Bigfoot Unity with Libre 2



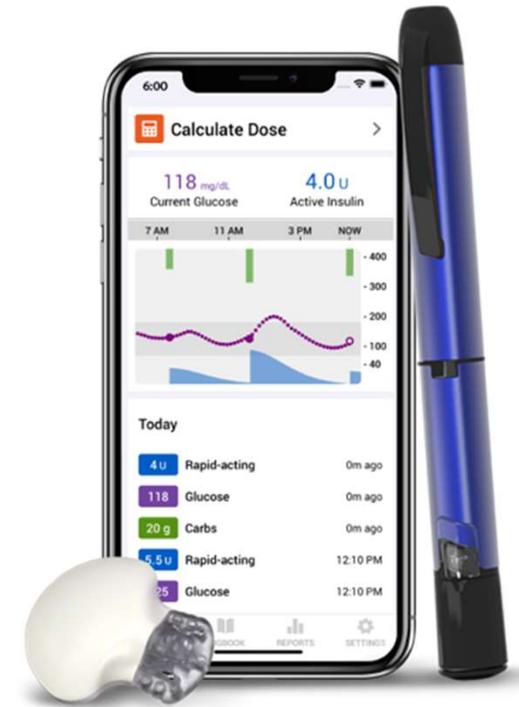
Tempo with Dexcom



Mallaya

InPen

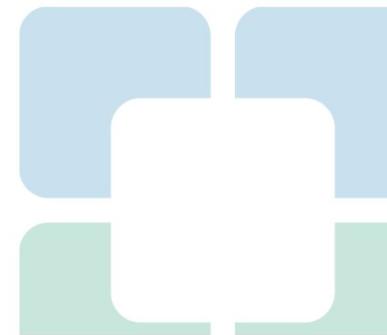
- Delivers up to 30 units of insulin per dose
- Delivers in ½-unit increments
- Disposable needles (not included)
- 1 year life span
- Does not require charging
- Comes in blue, gray, and pink
- Integrates with Apple Health and Glooko
- Requires a prescription, uses cartridges
- Compatible with: Humalog, NovoLog, and Fiasp U100 3.0 mL prefilled cartridges
- Multiple pens can be paired to the InPen app.



<https://www.companionmedical.com/InPen>

Bigfoot Unity Diabetes Management System

- Cleared by the FDA for ages over 12 years
- Smart insulin pen caps fits onto most commercially available insulin pens
- 2 versions of the pen cap:
 - Black for basal and white for bolus
- Uses glucose data from Freestyle Libre 2 CGM
 - Scan the sensor with the pen cap
- Recommended dose displayed by pen cap
 - 3 options based on small, medium large or carb counts
- Will not recommend insulin within 3 hours of last dose
- Records when a dose was taken (pen cap off for >4 seconds)
- Pen caps are rechargeable



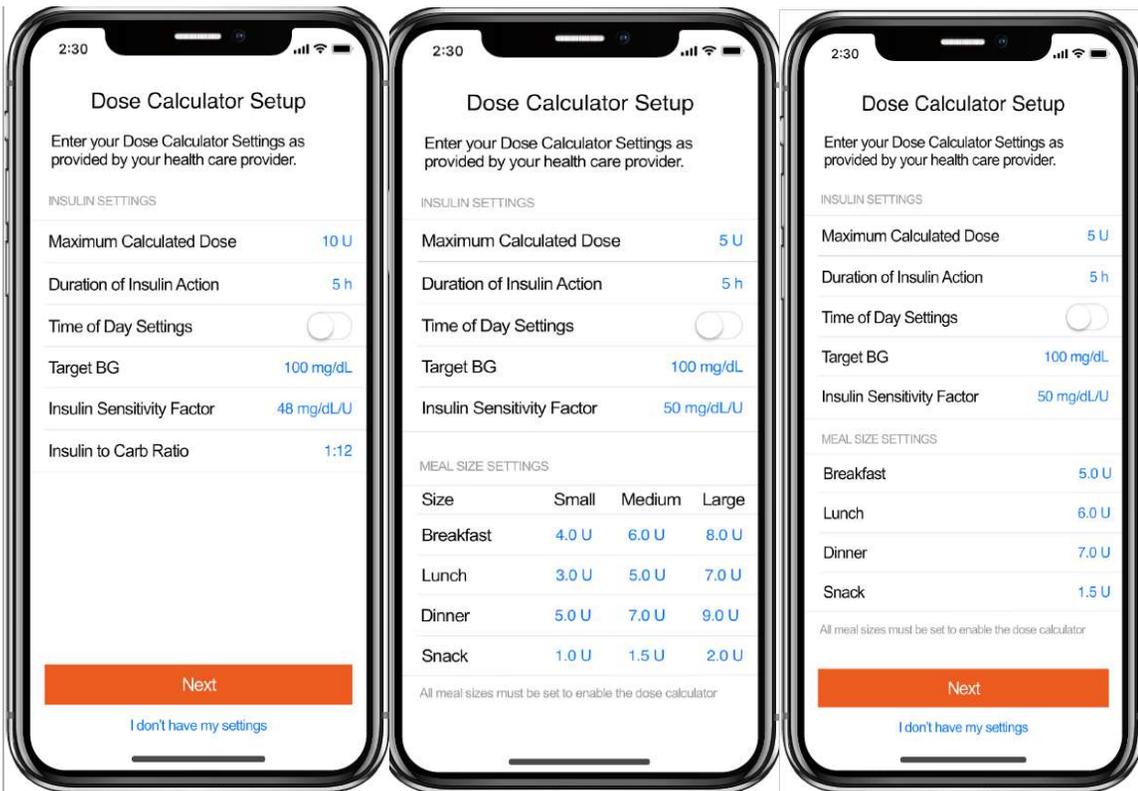
Lilly Tempo Smart Button



- Tempo pen available with Lyumjev, Basaglar, Humalog
- Button uses Bluetooth to transfer insulin dose to mobile app
- TempoSmart App integrates insulin dosing data with glucose, food, exercise, and sleep data
- Set personalized reminders and alerts



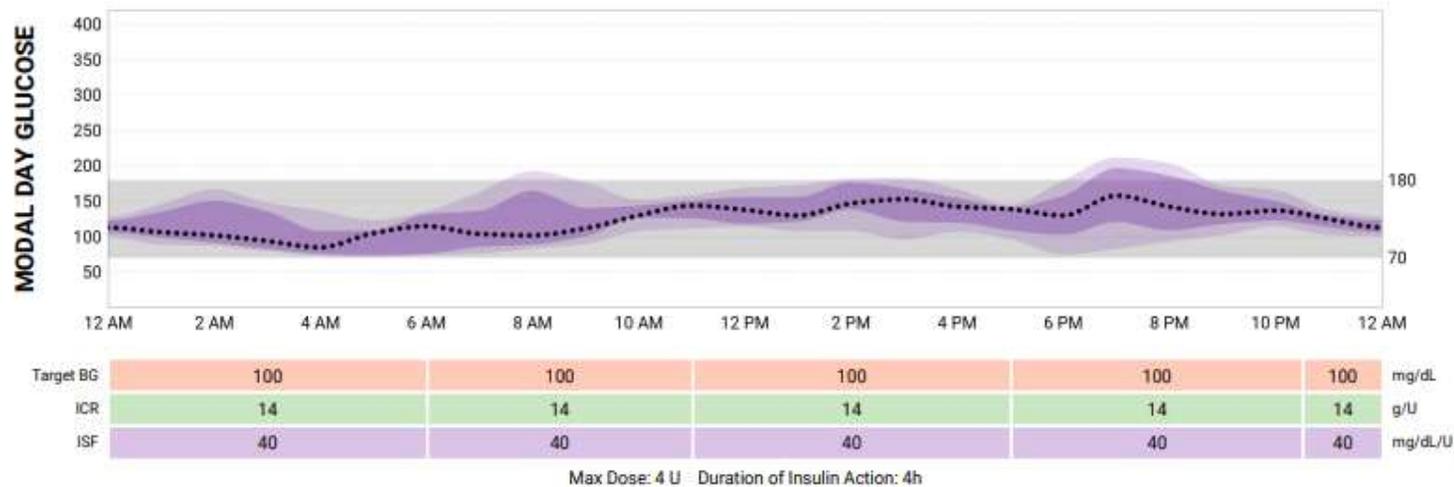
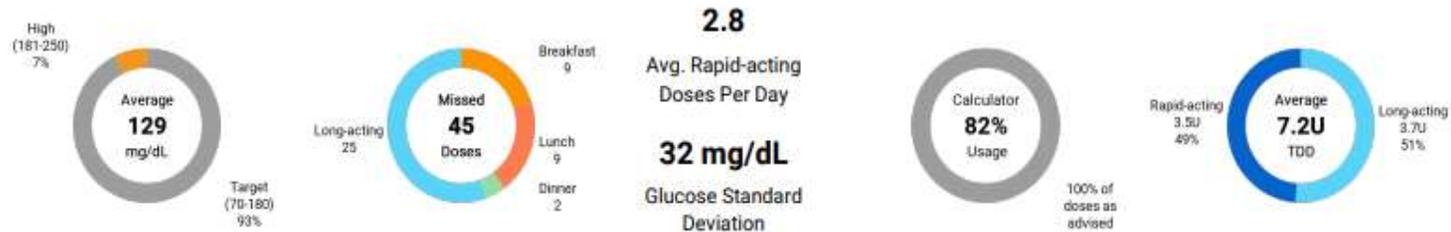
Therapy Settings



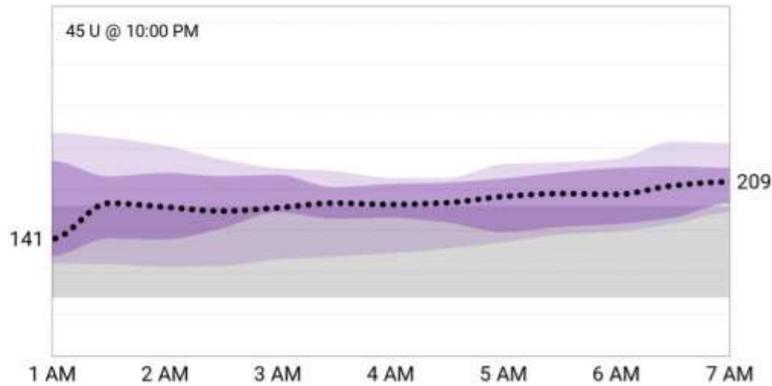
Time of Day Settings

Time of Day	6:00 AM	11:00 AM	5:00 PM	10:00 PM
Target Blood Glucose	100 mg/dL	90 mg/dL	90 mg/dL	110 mg/dL
Insulin Sensitivity Factor	35.0 mg/dL/U	38.0 mg/dL/U	38.0 mg/dL/U	38.0 mg/dL/U
Insulin to Carb Ratio	9.0 g/U	11.0 g/U	11.0 g/U	11.0 g/U

Connected Pen + CGM Data



LONG-ACTING ASSESSMENT

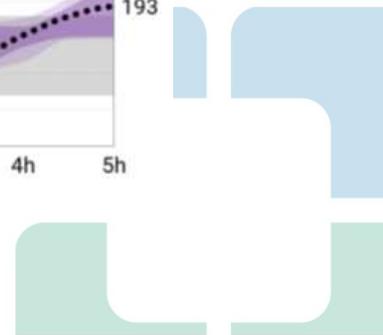
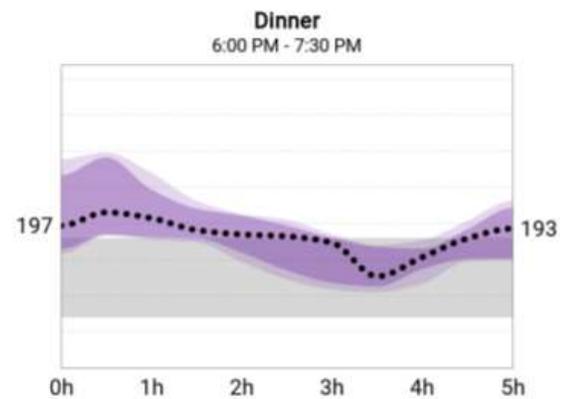
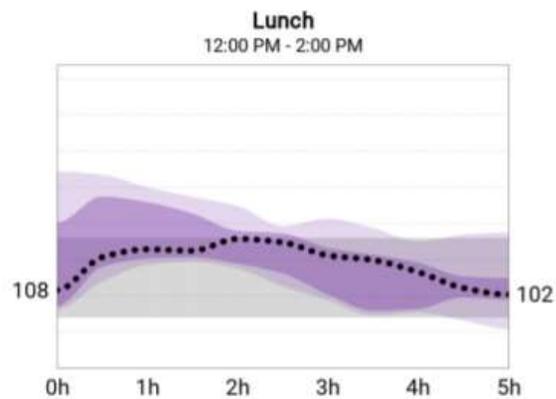
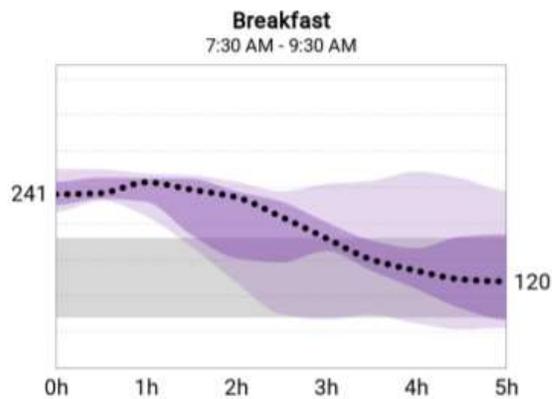


Days Included in Assessment	7 of last 14 days
Average Daily Dose Taken	45 U
# Days with Glucose < 70 mg/dL	0
Median Bedtime to Fasting (Change)	141 to 209 (+68 mg/dL) ▲

Note: Days with overnight boluses are excluded.

- ▲ Rising fasting glucose of 30 mg/dL or more may indicate long-acting dose should be increased.
- ▼ Falling fasting glucose of 30 mg/dL or more or days with glucose < 70 mg/dL may indicate long-acting dose should be decreased.

MEAL ASSESSMENT

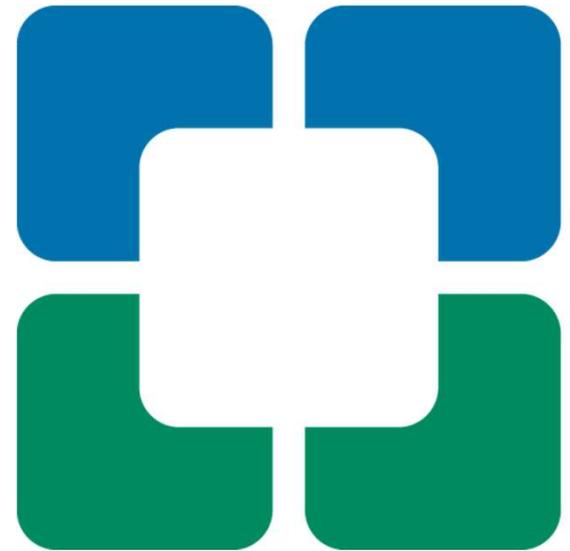


In Summary

- There are several CGM, connected pen and insulin pump options, and the DCES can help PWD select the best device for their individual needs
- New era of hybrid closed loops
- No artificial pancreas yet, but we are getting closer to closing the loop
- Connected data can be used to discussion diabetes self-management with the person with diabetes and help to make meaningful changes-think DATAA



Resources



Collaborate: How to Share Data

System:	Associated Mobile Apps	Data Sources
Glooko	Glooko	Insulin pumps (Omnipod, T:slim X2), Dexcom, Eversense, many glucose meters, InPen
Clarity	Dexcom G6, G7, Clarity, Dexcom Follow, Undermyfork, Sugarmate	Dexcom, InPen
LibreView	LibreLink, LibreLinkUp, Libre 14 day, Libre 2, Libre 3	Libre 14 day, Libre 2, Libre 3
Carelink	Guardian Connect, Carelink	770G, Guardian CGM, InPen
Tidepool	Tidepool Mobile	Insulin pumps (770G, T: Slim X2, Tandem, Omnipod), Dexcom, Guardian, Libre, many glucose meters, InPen
T:Connect	T:Connect Mobile	T: Slim X2, G6
Eversense Data Management System	Eversense	Eversense
InPen Insights Report	InPen	InPen, Dexcom, Guardian Connect
Bigfoot Unity	Bigfoot Unity	Bigfoot Unity pen cap, Libre 2
Tempo Platform	TempoSmart	TempoSmart Button, Dexcom



Learn All About the Tech

DiabetesWisePro

Helping You Find The Right Diabetes Devices For Your Life.

NEW UPDATES

The screenshot displays the DiabetesWisePro website interface. On the left, a prominent banner reads "NEW Device Finder Spanish Version". To the right, under the heading "Explorar por Prioridades", there are several filter buttons: "En General", "Evitar los Altibajos", "Fácil de Usar", "Fácil Dosificación de Insulina", "Estilo de Vida Activo", and "Menos Pinchazos en Los Dedos". Below this, a "Filtros" section shows dropdown menus for "Tipo de Combo", "Bombas & Plumas", and "Sensores & Medidores", with a total of "55 Combos de Dispositivos". At the bottom, there is a section titled "Introducing DiabetesWise for Health Care Professionals" with an icon of hands holding a device, and another section titled "Talking Technology: Real Stories from PWDs" with a "WATCH THE RECORDING" button.

<https://pro.diabeteswise.org/>

AID & INSULIN PUMPS



Find & compare all insulin pumps & AIDs

Updated Insulin Pump Therapy Online Course, 4th Edition

Be prepared with an insulin pump back-up plan

Learn to troubleshoot common pump issues

View all insulin pump and AID resources >



<https://www.diabeteseducator.org/danatech/home>

Panther Tools

PANTHERTOOL™ for
CONTROL-IQ
 t:slim X2 insulin pump with Control-IQ technology



OVERVIEW using C|A|R|E|S Framework

C | How it CALCULATES

- A hybrid closed-loop system that uses CGM glucose data to adjust the basal insulin delivery by increasing, decreasing or suspending programmed basal rates
- Algorithm targets glucose levels 112.5-160 mg/dL
- Automatic correction boluses up to once per hour, 60% of a calculated correction dose

A | What you can ADJUST

- Can change basal rates, I:C ratios, correction factors
- CANNOT change active insulin time (5 hours) or correction bolus target (110 mg/dL)
- "Exercise Activity" targets glucose 140-160 mg/dL (to reduce insulin delivery)
- "Sleep Activity" narrows glucose target to 112.5-120 mg/dL and prevents automated correction doses overnight.

R | When to REVERT to open-loop

The system stays in hybrid closed-loop all the time except when CGM data is not available. Users must turn off Control-IQ if they want to use temporary basal rates.

E | How to EDUCATE

See PANTHERPOINTERS below as well as EDUCATE-bullets found under STEP 3.

S | SENSOR/SHARE characteristics

- Dexcom G6 sensor and transmitter: 10 day sensor life, factory calibrated, can be used for diabetes management decisions without BG check.
- User can connect Dexcom transmitter to the Dexcom G6 app on a phone and share data with others using Dexcom Follow app.
- Sensor glucose levels auto-populate into bolus calculator

PANTHERTOOL™ for
OMNIPOD® 5
 Automated Insulin Delivery System



INSTRUCTIONS FOR USE

- 1 Download user's device to My.Glooko.com → Set report settings to Target Range 70-180 mg/dL
- 2 Create reports → 2 weeks → Select: a. CGM Summary, b. Week View; and c. Devices
- 3 Follow this worksheet for step-by-step guidance on clinical assessment, user education and insulin dose adjustments.

STEP 1 BIG PICTURE (PATTERNS)

→ STEP 2 SMALL PICTURE (REASONS)

→ STEP 3 PLAN (SOLUTIONS)

OVERVIEW using C|A|R|E|S Framework

C | How it CALCULATES

- Automated basal insulin delivery calculated from total daily insulin, which is updated with each Pod change (adaptive basal rate).
- Calculates dose of insulin every 5 min based on glucose levels predicted 60 minutes into future.

A | What you can ADJUST

- Can adjust the algorithm's Target Glucose (110, 120, 130, 140, 150 mg/dL) for adaptive basal rate.
- Can adjust I:C ratios, correction factors, active insulin time for bolus settings.
- Cannot change basal rates (programmed basal rates are not used in Automated Mode).

R | When to REVERT to open-loop

- System may revert to Automated Mode: Limited (static basal rate determined by system; not based on CGM value/trend) for 2 reasons:
 1. If CGM stops communicating with Pod for 20 min. Will resume full automation when CGM returns.
 2. If an Automated Delivery Restriction alarm occurs (insulin delivery suspended or at max delivery too long). Alarm must be cleared by user and enter Manual Mode for 5 min. Can turn Automated Mode back on after 5 minutes.

E | How to EDUCATE

- Bolus before eating, ideally 10-15 minutes prior.
- Tap Use CGM in bolus calculator to add glucose value and trend into bolus calculator.
- Treat mild hypoglycemia with 5-10g carb to avoid rebound hyperglycemia and WAIT 15 min before re-treating to give glucose time to rise.

S | SENSOR/SHARE characteristics

- Dexcom G6 which requires no calibrations.
- Must use G6 mobile app on smartphone to start CGM sensor (cannot use Dexcom receiver or Omnipod 5 Controller).
- Can use Dexcom Share for remote monitoring of CGM data.

PANTHERPOINTERS™ FOR CLINICIANS

- 1 Focus on behavior: Wearing the CGM consistently, giving all boluses, etc.
- 2 When adjusting insulin pump settings, focus primarily on Target Glucose and I:C ratios.
- 3 To make system more aggressive: Lower the Target Glucose, encourage user to give more boluses and intensify bolus settings (e.g. I:C ratio) to increase total daily insulin (which drives the automation calculation).
- 4 Avoid overthinking the automated basal delivery. Focus on the overall Time in Range (TIR), and optimizing system use, bolus behaviors and bolus doses.

Panther Tools

Download / Print PDF

	iLet Bionic Pancreas	MiniMed™ 780G	t:slim X2™ Control-IQ™	Omnipod® 5
				
CALCULATE	iLet	780G	Control-IQ	Omnipod 5
What is automation called?	iLet Bionic Pancreas	SmartGuard™	Control-IQ™	Automated Mode
Basal automation?	Insulin Automation is initialized by entering user's weight. Basal insulin delivery adjusts every 5 minutes based on CGM glucose trends and adapts over time based on the iLet's analysis of the user's daily glucose patterns.	"Auto Basal" calculated from total daily insulin, which is updated each day at midnight. Auto Basal is adjusted every 5 min based on recent CGM glucose trends, aiming for the target glucose value.	Increases or decreases the programmed basal rates based on a 30 min prediction of CGM glucose, aiming for the target glucose range.	"Adaptive Basal" calculated from total daily insulin, which is updated at each Pod change. Adaptive Basal is adjusted every 5 min based on a 60 min prediction of CGM glucose, aiming for the target glucose value.
Bolus automation?	All meal bolus doses and correction bolus doses are automated.	Auto correction boluses (max. every 5 min) if glucose is > 120 mg/dL. Auto corrections can be turned on or off.	Auto correction boluses (max once/hr) if glucose is predicted to be >180 mg/dL in 30 min.	No automated boluses
Algorithm target glucose / target range?	3 target options: "Usual", "Lower", "Higher"	3 target options: 100, 110, 120 mg/dL	Target range: 112.5-160 mg/dL	5 target options: 110, 120, 130, 140, 150 mg/dL
Which insulin does the user give?	User completes a meal "announcement" to prompt the iLet to deliver a meal bolus, which involves indicating the carbohydrate amount for each meal ("Usual for Me"/"More" than usual/"Less" than usual).	User gives boluses for meals by entering total grams of carbs in the bolus menu / bolus calculator. User can deliver correction boluses as needed in the bolus menu / bolus calculator.		

Simulation Apps to Test it Out



MiniMed
Virtual
Pump



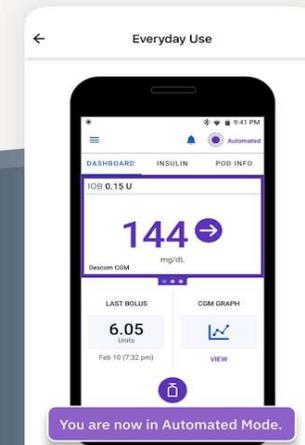
T:Slim Simulator

See Different
CGM Scenarios



Dexcom
Simulator

Automated Mode
Automatically adjusts insulin delivery
using customized glucose targets



Omnipod 5 Simulator



Every life deserves world class care.

Diana Isaacs, PharmD

Instagram/Twitter: @dianamisaacs

Podcast: Diabetes Dialogue available at

<https://www.hcplive.com/podcasts/diabetes-dialogue>



From Dis-Ease to Well-Being. Assessment Tools & Coping

Beverly Dyck Thomassian, RN, MPH, BC-ADM, CDCES
President, Diabetes Education Services
2023

“DAN” Diabetic Autonomic Neuropathy

- ▶ 50% of ind's with peripheral neuropathy also have DAN
- ▶ DAN associated with higher M/M Rates
 - ▶ hypoglycemia unawareness
 - ▶ resting tachycardia, orthostatic hypotension
 - ▶ gastroparesis, constipation, diarrhea, fecal incontinence
 - ▶ neurogenic bladder
 - ▶ sudomotor dysfunction with either increased or decreased sweating
 - ▶ erectile dysfunction

Who is DAN?



Sexual Functions as We Age

- ▶ 20-30 years trice daily
- ▶ 30-40 years tri weekly
- ▶ 40-50 years try weekly
- ▶ 50-60 years try weakly
- ▶ 60-70 years try oysters
- ▶ 70-80 years try anything
- ▶ 80-90 years try to remember



A touch of humor from AADE-New Perspectives on Erectile Dysfunction, 1999

Asking about sexual health

- ▶ “ I’m going to ask you a few questions *about your sexual health. Since sexual health is very important to overall health, I ask each person these same questions.*
- ▶ Before I begin, *do you have any questions or sexual concerns you’d like to discuss? ”*
- ▶ Have you noticed any changes in your sex life over the past year?
 - ▶ Trouble with erection, lowered libido, decreased sensation, painful intercourse or something else?



Improving Sex Life

People with diabetes get more vaginal and bladder infections

- ▶ Difficulty achieving orgasm due to neuropathy
- ▶ Painful intercourse due to lack of vaginal lubrication



Many people with diabetes have issues with sexual desire, arousal, or orgasm. How about you?"

Treatment

- ▶ Lower blood glucose / blood pressure
- ▶ Treat vaginal infections and UTI's
- ▶ Water based lubricants for vaginal dryness
- ▶ Hormone replacement therapy
- ▶ Eat to prevent lows during intimacy
- ▶ Allow time, touching and romance

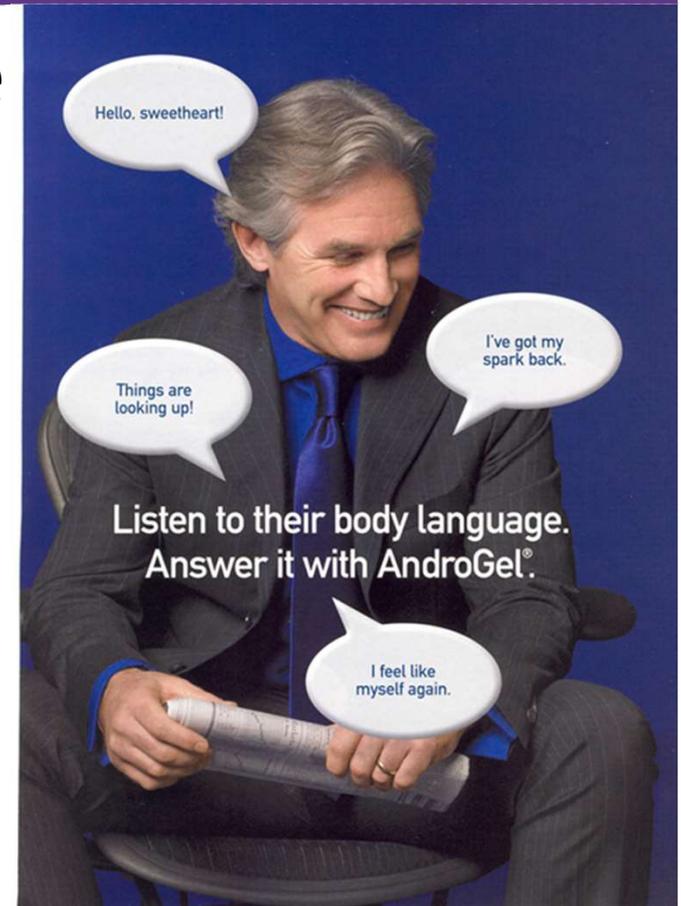
Erectile Dysfunction

- ▶ Affects about 50% of men with diabetes
- ▶ Loss of erections sufficient for intercourse
- ▶ Due to combo of vascular and nerve damage
- ▶ Tests: penile tumescence to eval if organic or psychogenic
- ▶ Treatment:
 - ▶ Sildenafil (Viagra), Vardenafil (Levitra), Tadalafil (Cialis)
 - ▶ Use caution if taking nitrate drugs. Check w/ MD first
 - ▶ Other meds, vacuum devices, prosthetics
 - ▶ HRT- testosterone gel, patches, injections, pills



Low Testosterone

- ▶ Hypogonadism: loss of sex drive or activity
- ▶ Screening: morning serum levels
- ▶ Mean testosterone levels lower in men with diabetes – also associated with elevated BMI
- ▶ Testosterone replacement therapy can improve:
 - ▶ Sexual function, strength, bone density, mood
 - ▶ Repeat am testosterone level after treatment to eval response



Diabetes Bingo “DiaBingo”

Shout out Right Answer



DiaBingo - N

N DPP demonstrated that exercise and diet reduced risk of DM by__%

N Average A1c of 7% = Avg BG of _____

N The goal is to eat 14 gms per 1000 cal of this nutrient a day

N Rebound hyperglycemia

N Scare tactics are effective at motivating behavior change

N Get LDL less than _____ for most people with diabetes 40 years+

N Drugs that can cause hyperglycemia

N 2/3 cups of rice equals _____ serving carbohydrate

N 1% A1c = how many points of blood sugar _____

N One % drop in A1c reduces risk of complications by ____ %

N 1 gm of fat equal _____kilo/calories

N Metabolic syndrome = hyperinsulinemia, hyperlipidemia, hypertension

N Average American consumes 15 teaspoons of sugar a day.

N Medication derived from the saliva of the Gila Monster

From Dis-Ease to Well-Being. Assessment Tools & Coping

- ▶ State strategies to assess and address social determinants of health
- ▶ Discuss health care delivery systems using a person-centered approach
- ▶ List screening tools that can help detect depression, trauma and cognitive decline
- ▶ Describe psycho-social and emotional barriers to diabetes self-management
- ▶ Provide strategies for healthcare professionals to identify and overcome barriers to self-care.



Psychosocial Care

- ▶ Inspired by
- ▶ Psychosocial Care for People with Diabetes: A Position Statement of the American Diabetes Association
- ▶ New Language for Diabetes



Psychosocial Care for People With Diabetes: A Position Statement of the American Diabetes Association

Deborah Young-Hyman¹†, Mary de Groot², Felicia Hill-Briggs³, Jeffrey S. Gonzalez⁴, Korey Hood⁵ and Mark Peyrot⁶

 Author Affiliations

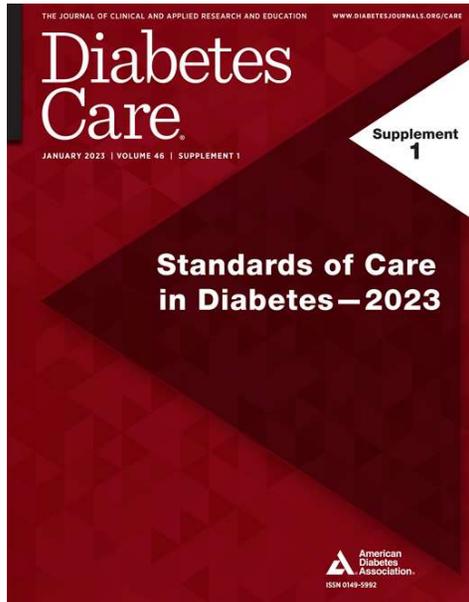
Corresponding author: Deborah Young-Hyman, younghyd@od.nih.gov.

Diabetes Care 2016 Dec; 39(12): 2126-2140.

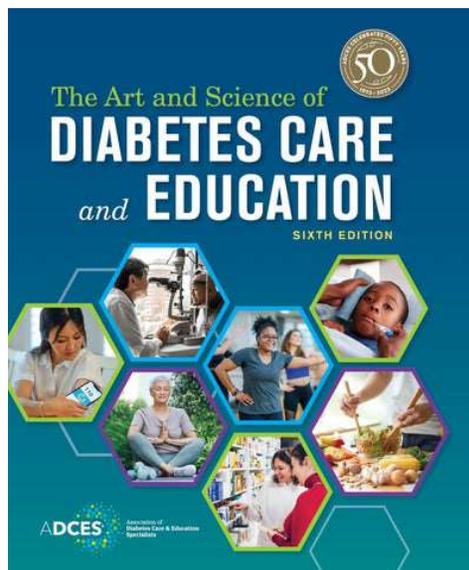
<https://doi.org/10.2337/dc16-2053>



Resources



- ▶ ADA Standard 1 and 5
- ▶ ADCES Art and Science of Diabetes Care, 6th Ed
- ▶ Others as listed



- Ch1 Diabetes Care and Education: Rich Past, Challenging Present, Promising Future
- Ch2 The Diabetes Self-Management Process
- Ch3 Theoretical and Behavioral Approaches to Self-Management of Health
- Ch4 Healthy Coping
- Ch5 Healthy Eating
- Ch6 Being Active
- Ch7 Taking Medication
- Ch8 Monitoring
- Ch9 Reducing Risks
- Ch10 Problem Solving
- Ch11 Diabetes Education Program Management

Well-Being Key Goal of Care

- ▶ Clinical outcomes, health status, and well-being are key goals of diabetes self-management education and support
- ▶ Address as part of routine care
- ▶ Psychological and social barriers can impair the ability for self-care and lead to poor health outcomes.



Warm-Up Poll Question

▶ TR is a health care professional getting ready to take their certification exam. They are interested in providing more person-centered care. Which of the following statements verifies they are on the right track?

1. Adherence to the diabetes self-care plan takes time.
2. Motivating individuals to engage in their self-management is the first step.
3. Adult learners do best when provided a step-by-step demonstration.
4. Creating mutual agreement on the plan for next steps.



Providing Successful Diabetes Care

- ▶ Set up delivery systems using chronic care model of pro-active instead of re-active.
- ▶ Assess the unique needs of each individual
- ▶ Encourage and support diabetes self-management
- ▶ All treatment decisions are made in conjunction with the person's preferences, needs & values.
- ▶ Person centered care.



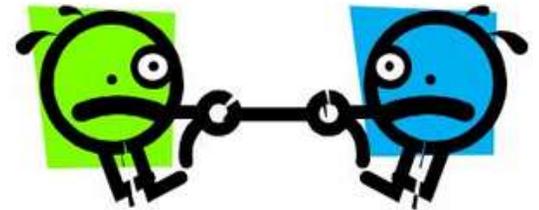
Poll Question 1

- ▶ RT often skips breakfast in the morning so he can sleep as long as possible before going to work. Since he takes morning insulin, this often results in hypoglycemia at work. After meeting with RT, a plan is made to have a granola bar in the car to eat on the way to work. What does this exemplify?
- ▶ A. Problem solving
- ▶ B. Adult learning theory
- ▶ C. Transtheoretical model
- ▶ D. DASH Approach



Problem Solving Strategies

- ▶ Reassess treatment regimen and barriers
 - ▶ Competing demands including those related to family responsibilities and dynamics
 - ▶ Literacy
 - ▶ Diabetes related distress or depression
 - ▶ Poverty
 - ▶ Culturally appropriate education?
 - ▶ Referral to social worker for assistance with insurance coverage
 - ▶ Medication taking behavior and regimen
 - ▶ Other?



How do Diabetes Specialists Help?

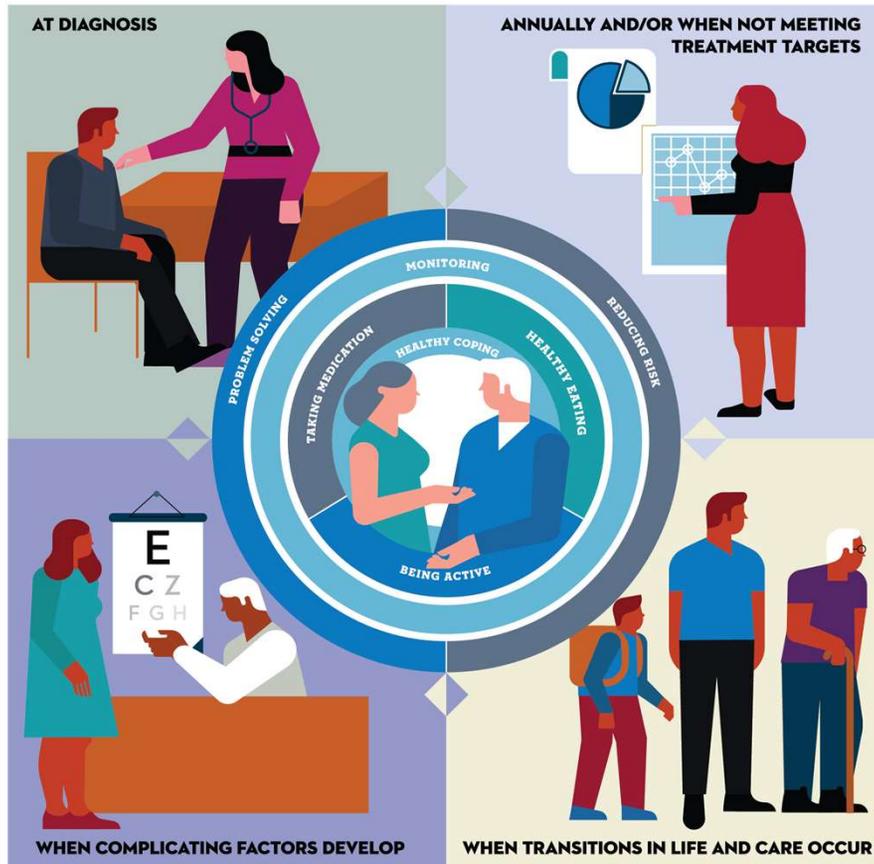
How Do Diabetes Educators Help?

- AADE7™ Self-Care Behaviors:



From Dis-Ease to Well-Being

Four critical times to provide and modify DSMES



Powers MA, Bardsley JK, et al. DSMES Consensus Report, The Diabetes Educator, 2020
ADCES. AADE7 Self-Care Behaviors, The Diabetes Educator, 2020

- 1) At diagnosis.
- 2) Annually and/or when not meeting treatment targets.
- 3) When complicating factors develop.
- 4) When transitions in life and care occur.

5. Facilitating Positive Health Behaviors and Well-being to Improve Health Outcomes:
Standards of Care in Diabetes—2023

Nuha A, ElSayed, Grazia Aleppo, Vanita R, Aroda, Raveendhara R, Bannuru, Florence M, Brown, Dennis Bruemmer, Billy S, Collins, Marisa E, Hilliard, Diana Isaacs, Eric L, Johnson, Scott Kahari, Kamlesh Khuri, Jose Leon, Sarah K Lyons, Mary Lou Perry, Priya Prahalad, Richard E, Pratley, Jane Jeffrie Seley, Robert C, Stanton, Deborah Young-Hyman, Robert A, Gabbay, on behalf of the American Diabetes Association

Abstracts View article PDF

Topics: carbohydrates, diabetes mellitus, type 2, eating, health personnel, hypoglycemia

Diabetes Care December 2022, Vol 46, S68-S96 doi:https://doi.org/10.2337/dc23-8005

(cdc.gov/diabetes/professional-info/training.html)

Diabetes Self Management Ed Benefits

- ▶ Improved knowledge
- ▶ Lower weight
- ▶ Improved quality of life
- ▶ Reduced mortality
- ▶ Positive coping
- ▶ Reduced cost
- ▶ Only 5-7% of Medicare/insured receive DSME)
- ▶ Increased primary care, preventive services
- ▶ Less frequent use of acute care and inpt admissions
- ▶ More likely to follow best practice recommendations (esp those with Medicare)



Diabetes Self-Management Education and Support (DSMES)

- ▶ All people with prediabetes and diabetes should participate in DSMES to facilitate the knowledge, skills and ability necessary to self-manage their diabetes.
- ▶ DSMES provides support to implement and sustain skills and behaviors needed for ongoing self-management.



DSMES is underutilized

ONLY



Of **MEDICARE** beneficiaries with newly diagnosed diabetes used DSMT services¹

ONLY



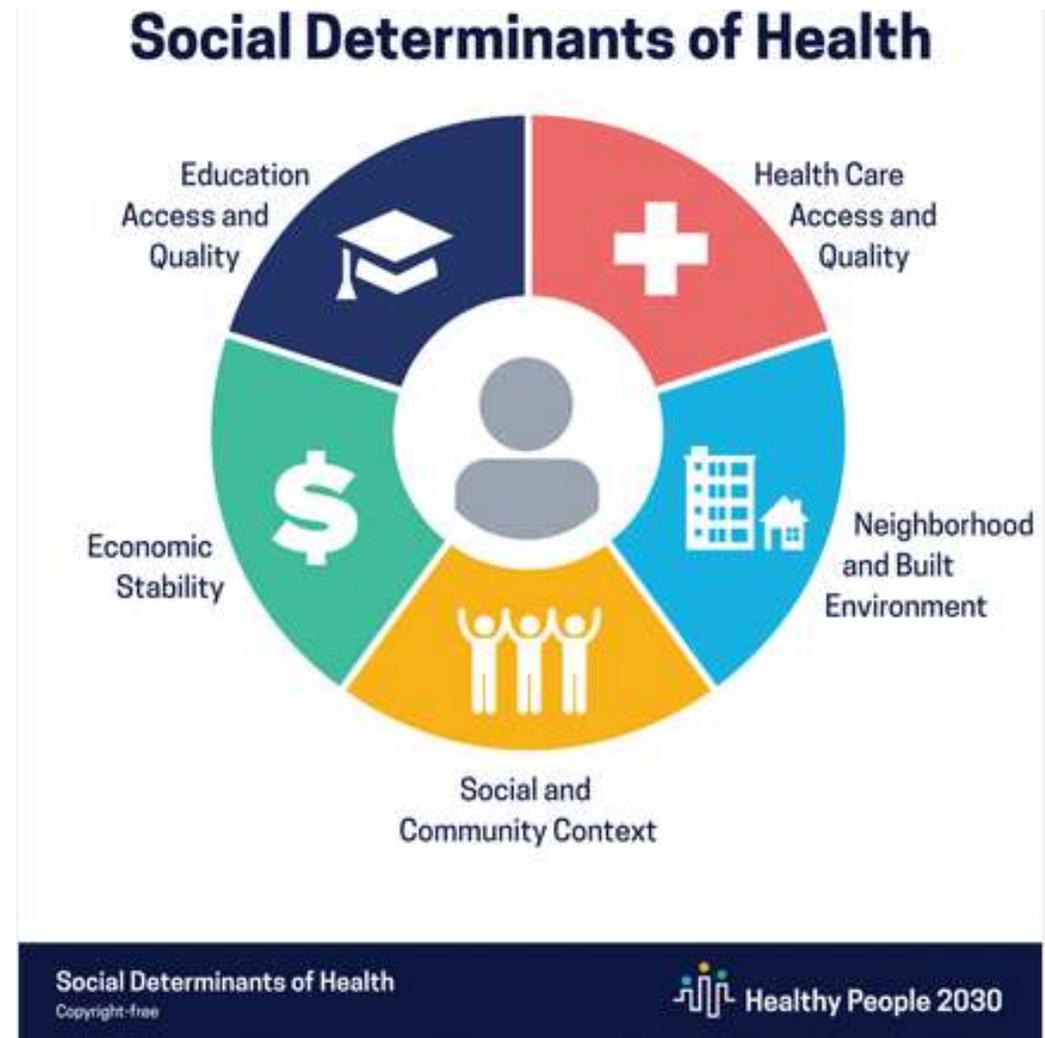
Of individuals with newly diagnosed T2D with **PRIVATE HEALTH** insurance received DSMES within 12 months of diagnosis²

Li R, et al. Morbidity Mortality Weekly Report, 2014

Strawbridge LM, et al. Health Educator, 2015

Social Determinants of Health and Equity

- ▶ Recognize the need to provide person-centered services that embrace each individual and acknowledge their SDOH.
- ▶ Goal is to increase health equity through access to this critical service while focusing *more* on person-centered care and decreasing administrative complexities.



Poll Question 2

- ▶ LS has type 1 diabetes and reports to clinic with unusual hyperglycemia and some weight loss. Tells you they barely have enough money to pay for rent and food. What are you considering?
- ▶ A. Disordered eating
- ▶ B. Food insecurity
- ▶ C. Insulin rationing
- ▶ D. Diabetes distress



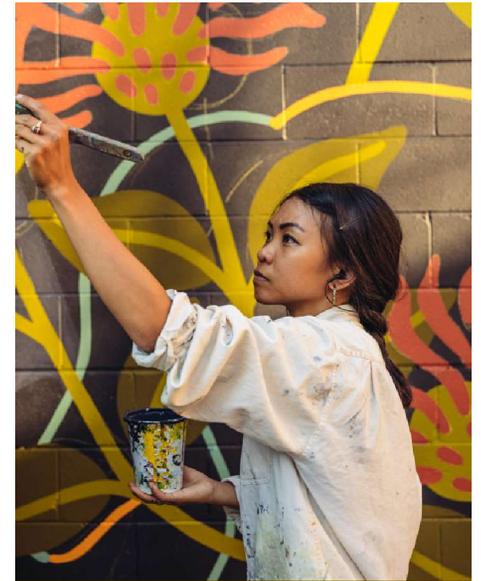
Tailor Treatment for Social Context

- ▶ Consider individualized care and provide resources
- ▶ These factors impair ability to self-manage diabetes.
 - ▶ 20% of people with food insecurity have diabetes
 - ▶ Financial barriers can lead to less healthy food choices and inability to access medications.
 - ▶ Lack of housing – 8% of people without homes have diabetes.



Tailor Treatment for Social Context

- ▶ Consider individualized care and provide resources
 - ▶ Migrant and seasonal workers at higher risk of diabetes due to stress, food insecurity, lack of med care
 - ▶ Health literacy limits ability to navigate HC systems
 - ▶ Social capital/ Community Support
 - ▶ Health inequities related to Social Determinants of Health
 - ▶ Need to make more community connections through Community Health Workers





Members of the lesbian, gay, bisexual, transgender and queer (LGBTQ) community have unique health disparities and worse health outcomes than their heterosexual counterparts, which has clinical relevance in the delivery of diabetes care and education.¹ Diabetes care and education specialists are in a pivotal position to help this medically-underserved and vulnerable population get the best possible care.

Definitions²

Gender Identity: One's internal sense of being male or female, neither of these, both, or another – female/woman/girl, male/man/boy, other gender(s) (e.g. 58 gender options for Facebook users).

Gender Expression: The physical expression of one's gender identity through clothing, hairstyle, voice, body shape, etc. - feminine, masculine, other.

Sex Assigned at Birth: The assignment and classification of people as male, female, intersex or another sex based on a combination of anatomy, hormones and chromosomes – female, male, other/intersex.

Sexual Orientation: Sexually attracted to men, women, other gender(s).

Romantic/Emotional Orientation: Romantically attracted to men, women, other gender(s)

Transgender: An umbrella term for people whose gender identity and/or gender expression differs from what is typically associated with the sex they were assigned at birth.

Cisgender: A term used to describe people who are not transgender, i.e., who identify with the gender assigned at birth. "Cis-" is a Latin prefix meaning "on the same side as," and is therefore an antonym of "trans-."



Other factors - Assess Literacy

- ▶ Numeral
 - ▶ 130 could look same as 310, 013
- ▶ Health
 - ▶ Not sure how to use the health system
 - ▶ Prescriptions, appointments, insurance coverage
- ▶ Functional
 - ▶ Ability to use reading, writing and computation at levels adequate to everyday situations (checkbooks, signs, apps)



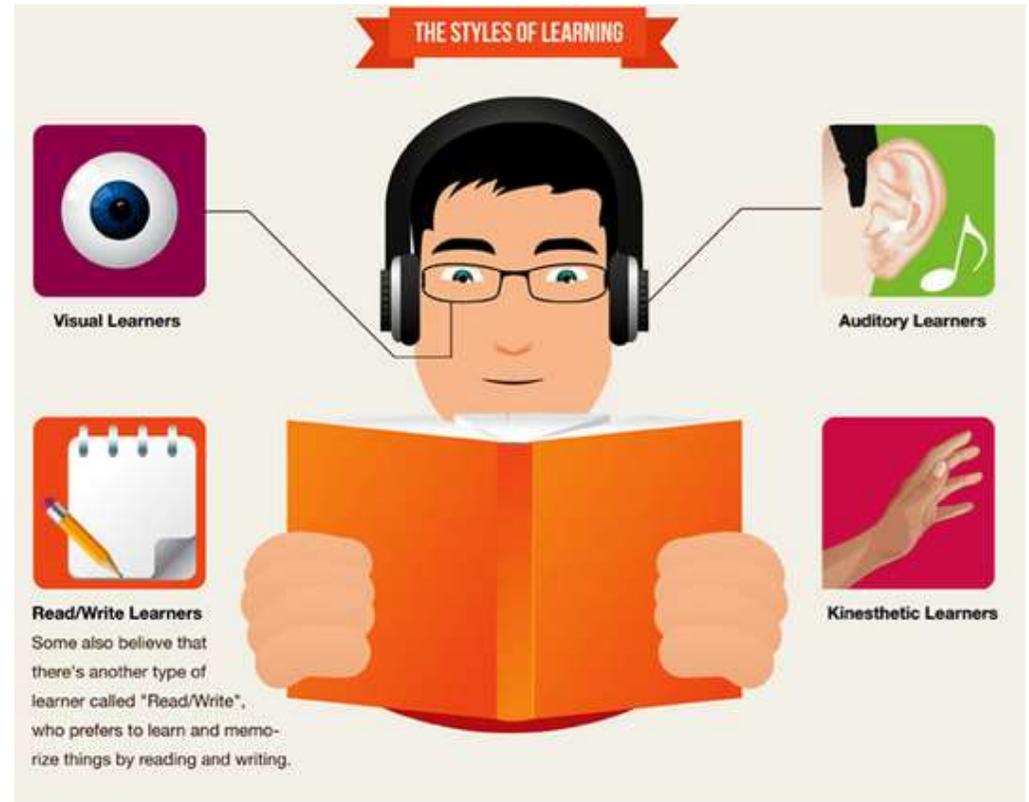
Poll question 3

- ▶ Which of the following strategies are best used when someone has low literacy skills?
 - A. speak slowly and clearly
 - B. underline key points on educational materials
 - C. direct the teaching to the support person and encourage reinforcement.
 - D. be concrete and focus on problem solving



Assess: Learning Style:

- ▶ Method: read, listen, discuss
- ▶ Sensors: problem solving: demo.
- ▶ Feelers: listening, discussion
- ▶ Thinkers: Facts...lecture



Look Beyond – What impacts DSM

- ▶ Improving diabetes treatment outcomes requires looking at multiple factors:
 - ▶ Living situation
 - ▶ Adequacy of medical management
 - ▶ Duration of diabetes
 - ▶ Weight gain / weight loss
 - ▶ Other health related problems
 - ▶ Social structural factors
 - ▶ Childhood trauma – Adverse Childhood Experiences



Question - What is ACE?

- ▶ ACE =
 - ▶ Adverse
 - ▶ Childhood
 - ▶ Experiences
 - ▶ (before 18 yrs)

- ▶ What is the relationship between childhood trauma, diabetes and health?



www.AcesAware.org

10 Assessment Areas for ACE – Use 10 Question Screening Tool to Assess

ABUSE



Physical



Emotional



Sexual

NEGLECT



Physical

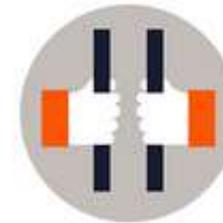


Emotional

HOUSEHOLD DYSFUNCTION



Mental Illness



Incarcerated Relative



Mother treated violently



Substance Abuse



Divorce

<https://www.npr.org/sections/health-shots/2015/03/02/387007941/take-the-ace-quiz-and-learn-what-it-does-and-doesnt-mean>

ACE increases risk for 9 out of 10 leading causes of death in US

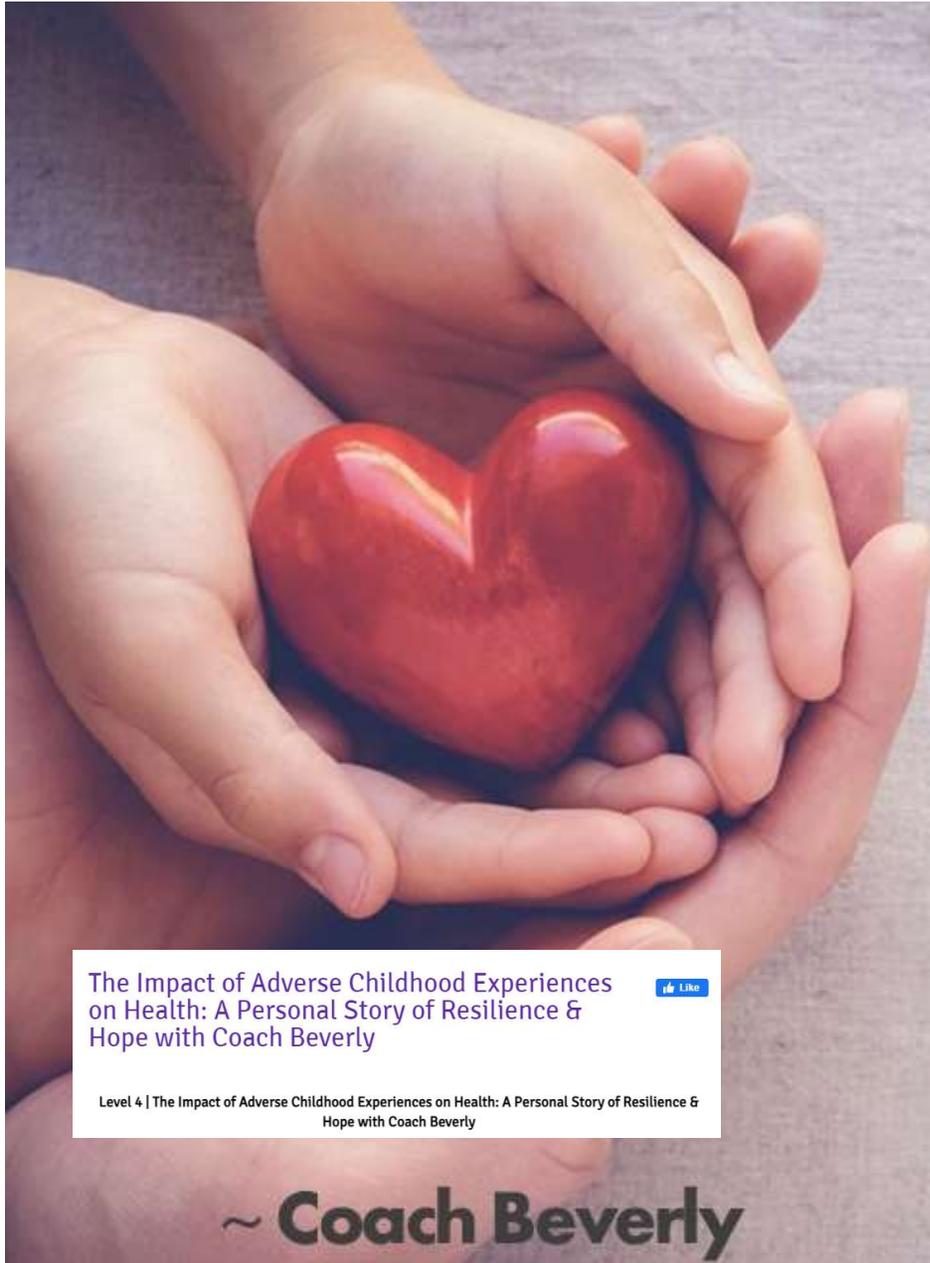
Leading Cause of Death	Odds Ratio with ≥ 4 ACEs
▶ Heart Disease	▶ 2.1
▶ Stroke	▶ 2.0
▶ Diabetes	▶ 1.4
▶ Kidney Disease	▶ 1.7
▶ Cancer	▶ 2.3
▶ Alzheimer's	▶ 4.2
▶ Suicide(attempts)	▶ 37.5

3 Realms of ACEs

Adverse childhood and community experiences (ACEs) can occur in the household, the community, or in the environment and cause toxic stress. Left unaddressed, toxic stress from ACEs harms children and families, organizations, systems and communities, and reduces the ability of individuals and entities to respond to stressful events with resiliency. Research has shown that there are many ways to reduce and heal from toxic stress and build healthy, caring communities.



The Act of Recognition is Healing



**When we provide
trauma informed
care, we give voice
to the unheard.**

**There is hope for
healing.**

**We are part of
breaking the cycle.**

The Impact of Adverse Childhood Experiences
on Health: A Personal Story of Resilience &
Hope with Coach Beverly



Level 4 | The Impact of Adverse Childhood Experiences on Health: A Personal Story of Resilience &
Hope with Coach Beverly

~ **Coach Beverly**

Quick Self-Assessment

- ▶ LS arrives late for appointment and says they forgot their log book. LS has only been taking their metformin a couple times a week and has gone back to getting fast food each morning for breakfast.
- ▶ What feelings would this evoke?
 - ▶ LS doesn't care
 - ▶ Non-compliant
 - ▶ Lazy
 - ▶ Better scare them
 - ▶ Exasperation

curiosity

Expectancy Theory and Language

- ▶ When we label people, we form biases.
- ▶ We act out behaviors based on this label.
 - ▶ Providers also modify behavior in response to label
- ▶ The person labeled may take on attributes of that label.

- ▶ Do our language choices lead to clinical inertia?



Poll Question 4

Which phrase represents the principles for communicating with and about people living with diabetes?

- A. Your BMI indicates you are in the obese category
- B. Your fasting blood sugar is above normal
- C. You should try and exercise 150 minutes a week.
- D. You are checking your blood sugar daily.



Guiding Language Principles

Strength Based

- ▶ Emphasize what people know, what they *can* do.
- ▶ Focus on strengths that empower people



Person-first

- ▶ Words that indicate awareness
- ▶ Sense of dignity
- ▶ Positive attitude toward person with diabetes



DigitalStudio On Demand

Language that Respects the Individual & Imparts Hope Confirmation

What We Say Matters

FREE Webinar (No CEs) or Earn 1.0 CE for \$19

READY TO WATCH

Diabetes Education ONLINE

More info at www.DiabetesEd.net

SPEAKING THE LANGUAGE OF DIABETES:

Language Guidance for Diabetes-Related Research, Education, and Publications



How we talk to and about people with diabetes plays an important role in engagement, conceptualization of diabetes and its management, treatment outcomes, and psychosocial well-being. For people with diabetes, language has an impact on motivation, behaviors, and outcomes.

Four principles guided this work and served as a core set of beliefs for the paper:

- ▶ Diabetes is a complex and challenging disease involving many factors and variables
- ▶ Stigma that has historically been attached to a diagnosis of diabetes can contribute to stress and feelings of shame and judgment
- ▶ Every member of the health care team can serve people with diabetes more effectively through a respectful, inclusive, and person-centered approach
- ▶ Person-first, strengths-based, empowering language can improve communication and enhance motivation, health and well-being of people with diabetes

<https://diabetesed.net/language-and-diabetes/>

Take a Strength Based Approach

- ▶ Individuals asked to take active role in directing the day-to-day planning, monitoring, evaluation and problem-solving.
- ▶ Need to eval perceptions about their own ability and self-efficacy to manage diabetes
- ▶ Explore past situations where they have had past success
- ▶ Use strength-based language



“Mindfulness-based Interventions”

- ▶ Avoid compliance model
- ▶ Focus on empowerment and acceptance
- ▶ Mindfulness
 - ▶ “Pay attention-on purpose “
 - ▶ Non-judgmental
 - ▶ In-the-present
 - ▶ Better chance to be present to life and become less reactive to the tides of distraction.
 - ▶ Really HEAR your clients!



Mindfulness Webinar for Diabetes Specialists



A promotional banner for a webinar. On the left, there is a small video thumbnail showing a woman in a red top sitting at a desk. The main text on the right reads: "DigitalStudio On Demand", "Mindfulness & Compassion in the Diabetes Encounter", "A Special Webinar for Diabetes Specialists with Heather Nielsen, MA, LPC, CHWC", "FREE Webinar (No CEs) or Earn 1.0 CE for \$19", and "More info. at www.DiabetesEd.net". There is also a red "READY TO WATCH" icon.

Mindfulness and Compassion in the Diabetes Encounter.
A Special Webinar for Diabetes Specialists

Psychosocial Assessment

- ▶ Integrate psychosocial care using a collaborative, person centered approach for all people with diabetes, to optimize health outcomes and health-related quality of life
- ▶ Assess for:
 - ▶ Anxiety
 - ▶ Cognitive capacities
 - ▶ Depression
 - ▶ Distress
 - ▶ Disordered eating
- ▶ Use validated tools
- ▶ Initial visit & periodically
- ▶ If over 65, screen for depression & cognitive impairment



Anxiety – Exaggerated response to normal fears

▶ Anxiety

- ▶ Symptoms - (must have 5 for over 6mo's)
 - ▶ restlessness,
 - ▶ keyed-up or on-edge
 - ▶ easily fatigued
 - ▶ difficulty concentrating or mind going blank
 - ▶ irritability
 - ▶ muscle tension
 - ▶ sleep disturbances

Diabetes causes fear –

- ▶ Hypoglycemia
 - ▶ Complications
 - ▶ Living with chronic condition
-
- ▶ **Impact of Anxiety**
 - ▶ 1. Counterreg hormones
 - ▶ 2. Self-care behavior diminishes

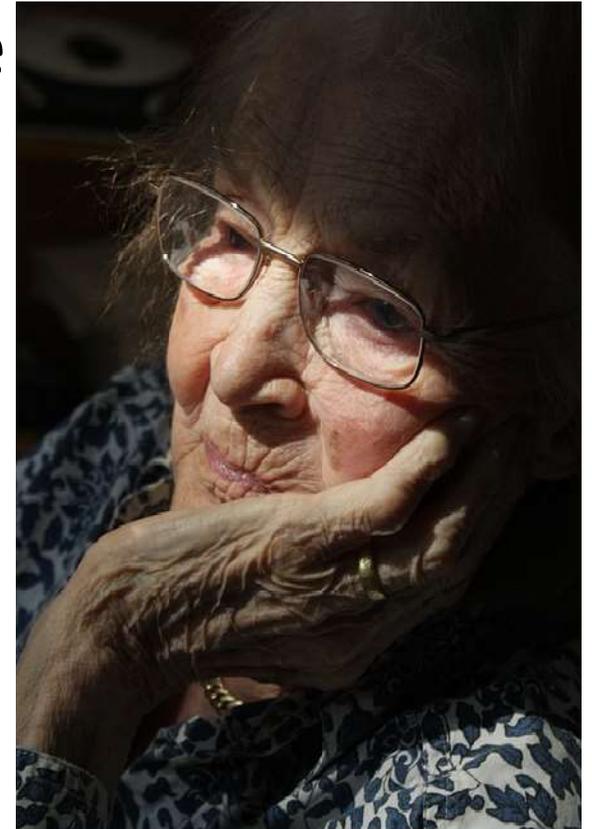
Keeps forgetting insulin

- ▶ Cheerful and fun loving
- ▶ At diabetes support group, isn't feeling well
- ▶ BG 493
- ▶ Ran out of insulin "a while ago"



Cognition, Alzheimer's and Dementia

- ▶ Diabetes increases risk of cognitive impairment
 - ▶ 73% increased risk of dementia,
 - ▶ 56% increased risk of Alzheimer's
 - ▶ 127% increased risk of vasculature dementia
 - ▶ Cognitive impairment influences treatment goals
 - ▶ Less intensive, realistic, get support
- ▶ People with Alzheimer's and dementia are more likely to get diabetes
 - ▶ Rates increase over time



Cognitive Impairment Treatment

- ▶ **Treatment:**
 - ▶ Refer to specialist for assessment
 - ▶ Achieve optimal BG control
 - ▶ Pharmacist to evaluate drug safety and potential drug interactions
 - ▶ Keep physically active
 - ▶ Nutrition and gut health
 - ▶ Community engagement and support



Poll Question 6

- ▶ A 47 year old enters your office and says, “the doctor made me come here. I don’t know why, I just have borderline diabetes”. A1c is 8.7%. What is the most appropriate response?
- A. Based on your A1c level, it looks like you have diabetes.
 - B. We don’t use the term “borderline diabetes anymore
 - C. Let’s just start with carb counting.
 - D. It sounds like you aren’t sure why you are here.



Adaptation to the Emotional Stress of Chronic Disease

(Kubler-Ross, Rubin RR, WHPolonsky)

Denial	Don't agree, but listen Acknowledge Survival Skills only!
Anger	Indicates: Awareness, Learning Begins Be clear, concise instructs No long WHY answers
Bargaining	ID's w/ others Group classes good Ed: "what" pt. wants to know
Depression & Frustration	Realize permanency of DSC Tx Psycho-social support referral Emphasize + change made
Accept & Adapt	Sense of responsibility for Self-care;

Depression

- ▶ Characterized by depressed mood
- ▶ Loss of interest in activities usually found pleasurable
- ▶ Difficulty concentrating, sleeping, changes in appetite
- ▶ Difficulty in following through with self care behaviors
- ▶ Person may actually be experiencing diabetes distress.



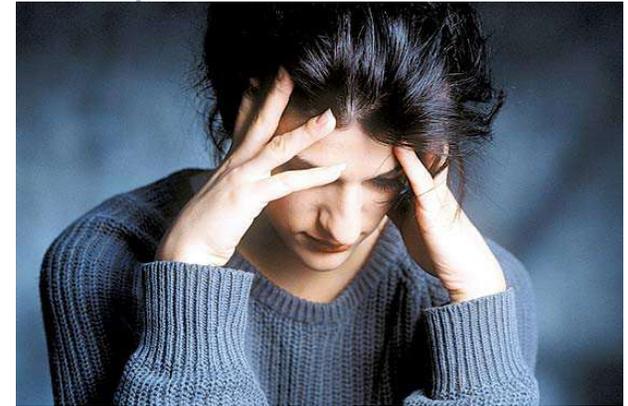
My spouse doesn't want to hear

- ▶ Living with type 1
- ▶ Afraid to exercise due to risk of hypoglycemia
- ▶ Afraid to go to sleep for fear of going low even though has CGM and pump
- ▶ Spouse does not want them to share about day-to-day diabetes issues.



Diabetes Related Emotional Distress=DRED

- ▶ DRED - unique emotional issues directly related to the burdens and worries of living with a chronic disease.
(embarrassed, guilty)
- ▶ More than worry: can overlap with depression, anxiety and stress.
- ▶ Normal-to some extent
- ▶ Associated with stress of living with diabetes
- ▶ Express high levels stress and depressive symptoms; but not clinical depression
- ▶ Not rare: linked to poor health outcomes



DDS 17: Diabetes Distress Scale

- ▶ Yields a total Diabetes Distress Scale score plus 4 sub scores:
 - ▶ Emotional burden
 - ▶ Physician related Distress
 - ▶ Regimen related Distress
 - ▶ Interpersonal Distress



Begin a conversation with any item rated 3 or more – See Distress Scale in your resources page

- ▶ 44.5% of reported diabetes distress
- ▶ Only 24% of providers asked pts how diabetes affected their life (DAWN Study)

Diabetes Distress Scale

1. Feeling that diabetes is taking up too much of my mental and physical energy every day.
2. Feeling that my doctor doesn't know enough about diabetes and diabetes care/ doesn't give me clear enough directions .
3. Feeling angry, scared, and/or depressed ... think about living with diabetes
4. Feeling that I am not testing my blood sugars frequently enough.

	Not a Problem	A Slight Problem	A Moderate Problem	Somewhat Serious Problem	A Serious Problem	A Very Serious Problem
1. Feeling overwhelmed by the demands of living with diabetes.	1	2	3	4	5	6
2. Feeling that I am often failing with my diabetes routine.	1	2	3	4	5	6

Poll question 7

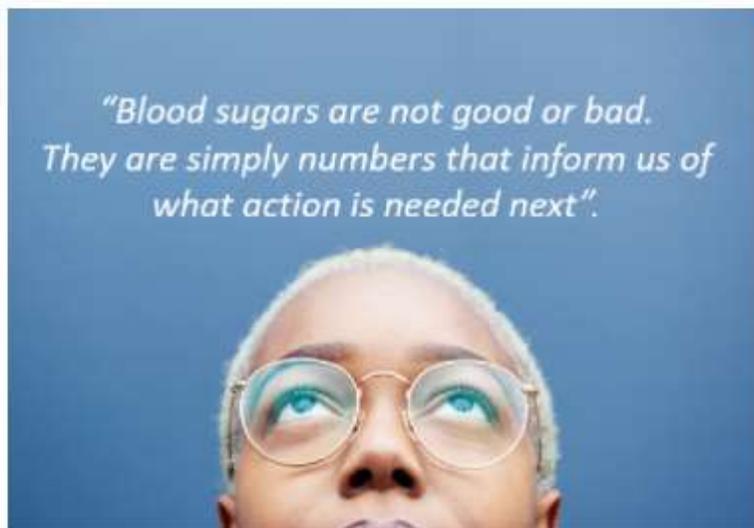
- ▶ You assess that a person with new LADA is struggling with diabetes distress. What is an appropriate intervention?
- ▶ A. Encourage them to ask their provider about starting antidepressants.
- ▶ B. Set a SMART goal that is very challenging to help move them forward.
- ▶ C. Support them in making a realistic goal
- ▶ D. Remind them that alcohol is actually a depressant



Diabetes Distress Reframes

12 Reframes to Help with Diabetes Burnout or Distress

- It's not your fault you have diabetes. It's not your fault your pancreas doesn't work right.
- You can't control your blood sugars all the time, but you can take actions to manage your diabetes to the best of your ability.
- Blood sugars are not good or bad, they are just numbers that inform us of what action is needed next.
- Listen to your self-talk. It is tempting to be overly self-critical and blame ourselves. Try to imagine you are coaching a friend with diabetes. What advice or coaching would you provide?
- Diabetes isn't about perfect or getting it right all the time. Its about taking baby steps to make small improvements and keep safe.
- Take short mental breaks from your diabetes – walk outside, enjoy a hobby, listen to music, volunteer, join a group.
- Talk about your feelings to friends and family. Let them know how to help you succeed and things that don't help.
- Keep active, nourish your body, try meditation, enjoy oxygen cocktails, get out in nature.
- Remind yourself of all the work you ARE doing to manage your diabetes
- Join diabetes camps, social media groups, find your people, your community.
- Consider connecting with a mental health professional.
- Remember, you are not alone. You are resilient. You are not your blood sugars. You got this. Baby Steps.



[Download PDF List of 12 Reframes to Share](#)

[Download List of 12 Reframes to Share](#)

<https://diabeteseed.net/dealing-with-diabetes-burnout-or-distress-12-attitude-shifts-that-can-help/>

ReVive 5 – Diabetes Distress and More

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DIABETES TRAINING

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Mental health – Build a Foundation

- ▶ Although the educator might not feel qualified to treat psychological problems, optimizing the individual / educator relationship as a foundation to increase likelihood of acceptance.
- ▶ Determine if help is needed
- ▶ Have a list of mental health providers
- ▶ Resource list of phone helplines
- ▶ Help individual problem solve to get access
- ▶ If individual cannot act on behalf of themselves, help identify a support person



Psychosocial Assessment

Informal check in or can utilize more formal assessments

- ▶ [Adverse Childhood Experiences](#) – ACE – early childhood experience can affect health outcomes for life. Read more about ACE here.
- ▶ [Psychosocial Care for People with Diabetes: A Position Statement of the American Diabetes Association 2016.](#) (See chart below excerpted from Position Statement)
- ▶ [Diabetes Distress Scale](#)
- ▶ [PHQ-9 Depression Screening Scale](#)
- ▶ [PAID – Problem Areas in Diabetes Survey](#) – Pediatric Version Youth perceived burden of type 1 diabetes.
- ▶ [General Health Numeracy Test](#) – A 6 question assessment on numeral literacy
- ▶ [The Mini–Mental State Examination \(MMSE\)](#) or Folstein test is a 30-point questionnaire that is used extensively in clinical and research settings to measure cognitive impairment. It is commonly used in medicine and allied health to screen for dementia.

Consider Referral to Mental Health Provider for Eval and Treatment

- ▶ Diabetes distress even after tailored education
- ▶ Screens positive for depression, anxiety, FoH*
- ▶ Disordered eating or disrupted eating patterns
- ▶ Not taking insulin/meds to lose weight
- ▶ Serious mental illness is suspected
- ▶ Youth with repeated hospitalizations, distress
- ▶ Cognitive impairment or impairment of DSME
- ▶ Before bariatric/metabolic surgery

*FoH – Fear of Hypoglycemia

Empowering and Promoting Health for Individuals and Populations



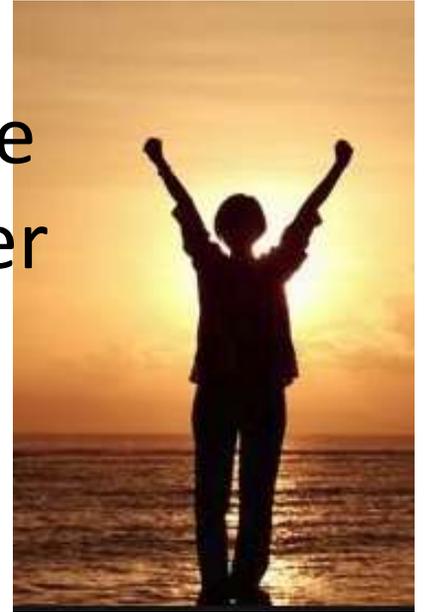
Our Actions Make a Difference

Move away from term “Non-Compliance”

- ▶ People with diabetes are asked to take active role in directing the day-to-day planning, monitoring, evaluation and problem-solving.
- ▶ Non-compliance denotes a passive, obedient role or “following doctor’s orders” without any input
- ▶ Need to eval perceptions about their own ability and self-efficacy to manage diabetes

Empowerment Defined

- ▶ “Helping people discover and develop their inherent capacity to be responsible for their own lives and gain mastery over their diabetes”.
- ▶ Posits:
 - ▶ Choices made by individuals (not HCPs) have greatest impact.
 - ▶ Individuals are in control of their self-management
 - ▶ The consequences of self-management decisions affect the individual most. It is their right and responsibility to be the primary decision makers.



Traditional vs Empowerment Based

Traditional vs Empowerment Based

Table 3.5 Comparison of Traditional and Empowerment –Based DSME and DSMS

Traditional DSME and DSMS	Empowerment-Based DSME and DSMS
Diabetes is a physical illness.	Diabetes is a biopsychosocial illness.
Professional is viewed as teacher and problem solver, and responsible for outcomes.	Patient is viewed as problem solver and self-manager: professional acts as a resource and shares responsibility for outcomes.
Learning needs are usually identified by professional	Problems and learning needs are identified by patient.
Education is curriculum-driven.	Education is patient-centered and consistent with adult learning principals.
Education is primarily didactic.	Patient experiences are used as learning opportunities for problem solving and serve as the core for the curriculum.
Emotional issues are a separate component of the curriculum.	Emotional issues are integrated with clinical content.
Behavioral strategies are used to increase compliance with recommended treatment.	Behavioral strategies are integrated with clinical content and taught to patients to help them change behaviors of their choosing.
Goal of education is compliance/adherence with recommendations.	Goal is to enable patients to make informed choices.
A lack of goal attainment is viewed as a failure by both the patient and the educator.	A lack of goal attainment is viewed as feedback and used to modify goals and action plans.
Behavior changes are externally motivated.	Behavior changes are internally motivated.
Patients is relatively powerless, professional is powerful.	Patient and professional are equally powerful.

Source: Adapted from MM Funnell, RM Anderson, "Patient empowerment: from revolution to evolution," *Treat Strategies Diabetes 3* (2011): 98-105.

This philosophy is important to know for the exam

How to Succeed with Person-Centered Coaching

- ▶ A diagnosis of diabetes often carries a significant emotional response. A person with diabetes might report shame, fear, and guilt as they come to terms with their diagnosis and anticipate their future. As diabetes healthcare providers, we can learn to address these feelings while helping people move forward!
- ▶ Using a person-centered approach, we can identify the individual's strengths and expertise and then leverage this information to open a door of possibilities.
- ▶ Our choice of communication techniques can spark behavior change in people living with diabetes.



Motivational Interviewing

- ▶ The primary goal is to evoke intrinsic motivation and commitment to change by creating a collaborative and non-judgmental atmosphere.
- ▶ The approach recognizes that individuals often have mixed feelings about changing their behaviors, and it aims to guide them towards resolving this ambivalence in a positive and constructive manner.



Motivational Person-Centered Coaching

- ▶ **Express Empathy:**
 - ▶ Active listening and empathy
 - ▶ Open ended questions
 - ▶ Understand the individual's perspective without judgment
 - ▶ Individual feels heard and understood.
- ▶ **Develop Discrepancy:** recognize discrepancy between their current behavior and their broader goals, values, or aspirations.
- ▶ **Roll with Resistance:** Rather than confronting or challenging resistance, "roll with it." Acknowledging and respecting resistance while gently exploring its roots and potential effects.
- ▶ **Support Self-Efficacy:** enhance belief capacity to change. Identify and reflect on their past successes, skills, and resources to achieve their goals.
- ▶ **Develop a Plan:** If ready to change, help them create a concrete plan for moving forward. This plan is collaboratively developed, with the client taking an active role in defining the steps they're willing to take.
- ▶ **Avoid Arguing and Confrontation:** since can lead to resistance and defensiveness. Instead, seek to understand the client's perspective and work from there.

Relationship Building | Three Tools To Make It Happen

Person-Centered Coaching

How to Succeed with Person-Centered Coaching

This cheat sheet provides a dozen simple coaching strategies for providers to help people believe in their ability to self-manage their diabetes successfully.

A diagnosis of diabetes often carries a significant emotional response. A person with diabetes might report shame, fear, and guilt as they come to terms with their diagnosis and anticipate their future. As diabetes healthcare providers, we can learn to address these feelings while helping people move forward!

Using a person-centered approach, we can identify the individual's strengths and expertise and then leverage this information to open a door of possibilities. Our choice of communication techniques can spark behavior change in people living with diabetes.



How to Succeed with Person-Centered Coaching By Beverly Thomason, RPL, MPH, CDCES BC-ADM

A diagnosis of diabetes often carries a significant emotional response. A person with diabetes might report shame, fear, and guilt as they come to terms with their diagnosis and anticipate their future. As diabetes healthcare providers, we can learn to address these feelings while helping people move forward!

This cheat sheet provides a dozen simple coaching strategies for providers to help people believe in their ability to self-manage their diabetes successfully.

Using a person-centered approach, we can identify the individual's strengths and expertise and then leverage this information to open a door of possibilities. Our choice of communication techniques can spark behavior change in people living with diabetes.

Adopting this style of communication can be a dramatic shift for some providers. Think of it this way: In usual care, the diabetes healthcare provider steers the boat, brings the fuel, and charts the course. Using the person-centered approach, the provider is simply the rudder, serving as a guide, and the individual steers.

DO: Mindfully Listen to the individual's problems and fears.

The first strategy is carefully listening to the person's fears and concerns. If someone struggles with nutrition, meds, or behavioral changes, listen to the struggle, and try not to push, advise, or fix it. Listen and reflect on what you think is happening for the first few minutes.

For example, reflecting back could go something like this: "Taking medications is hard for you because you are not sure if they are really working." Or, "It's hard to eat more vegetables because you are a long-haul truck driver." Or, "It sounds like you blame yourself for having

1. C
C

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Mindfully Listen to the individuals' problems and fears.

Listening and then reflecting back the struggles of the individual is the first phase of energizing the visit.

Focus on curiosity before exploring possible changes in behavior can provide comfort and open the door to insights.

With a person-centered approach, spend more time in the "curiosity" phase before moving to the "action" phase.“

Listen for insights and ideas, “what are your ideas about how you can improve this situation?”

Ask questions and collaborate

- ▶ "It's hard to eat more vegetables because you are a long-haul truck driver."
- ▶ "As a truck driver, I am curious to learn more about your food choices when driving.“
- ▶ "I could buy a veggie tray before heading out in my truck,“
- ▶ "So, you think you could buy a vegetable tray before heading out?"

SMART Goals



Avoid and Lean Into

- ▶ **AVOID: Pressure, fix, or control.**
- ▶ We are careful to avoid forced solutions or controlling language. Our job is to help the person with diabetes find their own answers and solutions.
- ▶ **Let's stop "Shoulding" on people.**
- ▶ It's time to let go of terms like "You must, you should, you have to, it's better, it's important, do it for me" since they fall under the category of "controlling motivation"—which can be hurtful and lead to the individual becoming defensive or shutting down.
- ▶ **Ditch the scare tactics too!**
- ▶ **Lean into - A person-centered approach energizes individuals to take the lead in managing their condition, in step with their providers and supporters.**



Support Self-Confidence

- ▶ Support positive expectations for change...
 - ▶ emphasize personal responsibility,
 - ▶ instill confidence and hope,
 - ▶ increase sense of ability to cope.



“From what you’ve told me about your past successes...it really seems like you can do this!”

Celebrate and Recognize

In conclusion: Celebrate and Recognize Each Person's Efforts.

- ▶ Making behavior changes, like losing weight or adjusting lifelong eating habits, can be extremely difficult.
- ▶ **Find a way to recognize and affirm their efforts even if there is no or little change in clinical measures.**



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Behavior Change Theories Made Easy Handout

Providing Extraordinary Diabetes Care and Education

- ▶ Begins with the ordinary. Then moves toward gaining skills, knowledge, succeeding and failing, moving past our fear and then *owning our extraordinary.*
- ▶ **Extraordinary** goes above and beyond what is expected.



Scholarship Recipients

“Flower Exemplar Scholarship” recipient, Camie Delange



As a registered nurse in Maternal-Fetal Medicine in an inner-city ambulatory clinic in Denver, Colorado, **Camie Delange** case manages individuals with gestational diabetes and type 2 diabetes throughout their pregnancy and until 6 weeks postpartum. She provides DSME and reviews blood sugars along with assuring they are receiving the best medical management, plus follows them post-partum providing education on diabetes prevention. In addition, she volunteers her time at local health fairs and at a diabetes summer camp. There are no CDCES's in this clinic that provides care to an underserved population and Camie is determined to obtain her certification to benefit and make sure her community receives the best diabetes care possible. Congratulations Camie Delange.

“Making a Difference Exemplar Scholarship” recipient, Iris McDuffie

Iris McDuffie is our “Making a Difference Exemplar Scholarship” recipient for being an advocate for her community in Florence, SC. As a Registered Dietician, Iris provides care that is sincere, kind, person-centered, and culturally sensitive. Iris is passionate about improving care delivery and using technology to make healthcare and education more accessible. She hosts a nutritional podcast and regular Zoom session to answer nutritional questions, while also utilizing telemedicine in her work and where she volunteers so those who may have difficulty making in-person appointments can receive care. Additionally, she organizes local Health Fairs and creates teaching tools for those she works with. Her dedication to her community and innovation made her a top candidate for this scholarship.



Step 1

Consider Your Emotional And Scientific Relationship With Diabetes



Consider

- How do you perceive diabetes?
- How has diabetes affected your life?
- What are your scientific beliefs around the cause and treatment of diabetes?
- Explore any biases you may be holding about people with diabetes and their communities.

Step 2

Become A Diabetes Scholar & Advocate



- Study and refer to recognized Standards and research
- Share your findings with colleagues
- Pursue diabetes specialty certification
- Keep up-to-date with blogs, articles, conferences and online learning
- Stand up for best care.

Step 3

Discover Colleagues' Gifts

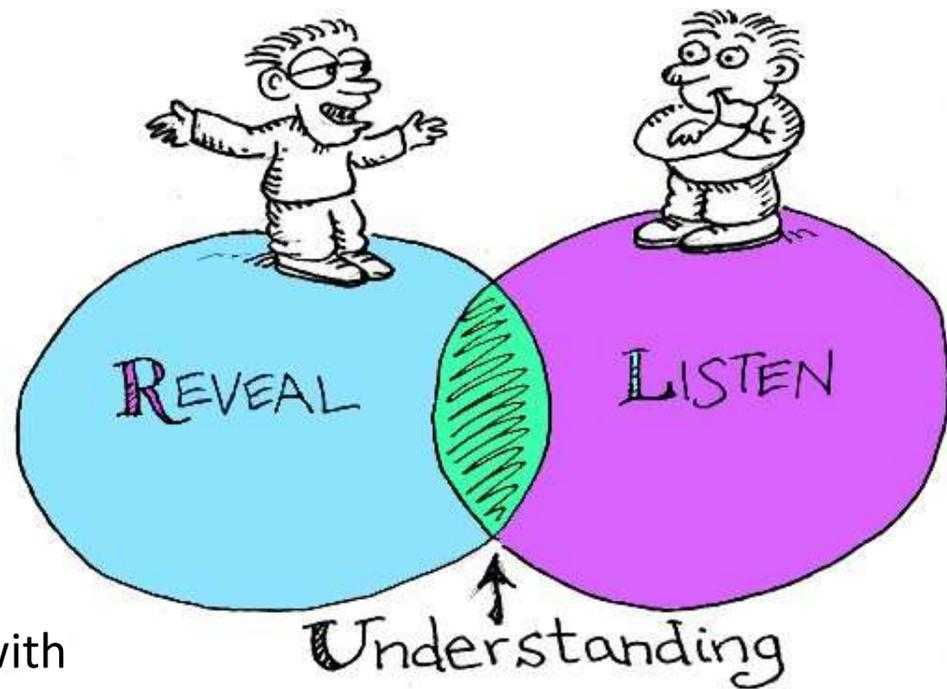
- View diabetes care from another lens
- Make a list of who you would like to shadow and seek them out
- Identify approaches that match your values and that resonate with people with diabetes
- Incorporate observed wisdom into your own practice



Step 4

Fine Tune Empathy

- Practice mindfulness with a sincere intention to understand the persons with prediabetes or diabetes story.
- Pay attention to body language – yours and the person with diabetes. What is it saying?
- Call upon empathy and non-judgement with the belief that this person is doing their best at this moment.
- Meet them where they are at.
- Try to hear what is not said.



Step 5

Highlight What The Person Is Doing Right

- Our belief in people's ability to change is powerful.
- We can transmit our belief in others through body language, affirmation and encouragement.
- When we use a strength-based approach, confidence in success increases – for both parties.
- Use phrases like, “You’ve overcome this in the past and I believe in your ability to figure out what will work best for you now.”



Step 6

Limit Advice Giving, Expand Curiosity

- As the person with diabetes is sharing their “story”, we might be thinking of a whole range of solutions that will fix the situation.
- The truth is, the person sitting across from us knows what will fix the situation. Our goal is to help them in the process of self-discovery.
- By being curious and asking questions, we can help them explore different strategies and determine the best fit.
- “What would you like to work on today?”

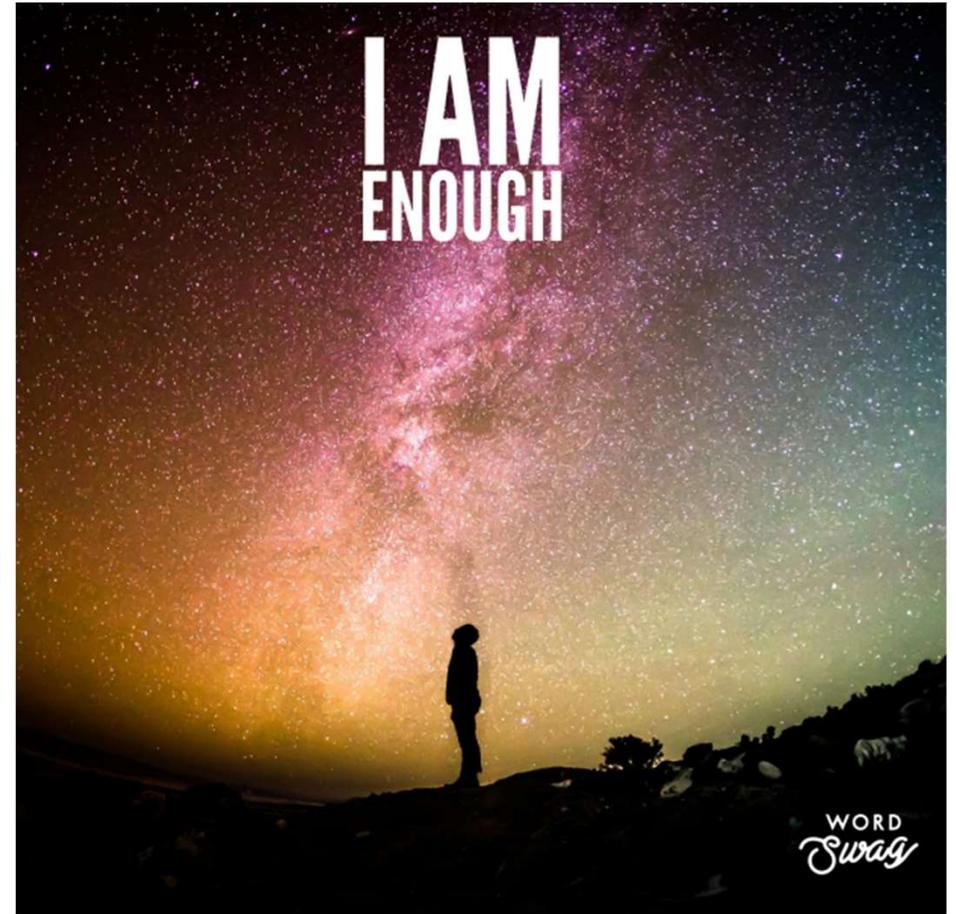


“Our goal is to help in the
process of self-discovery”

Step 7

Believe In You

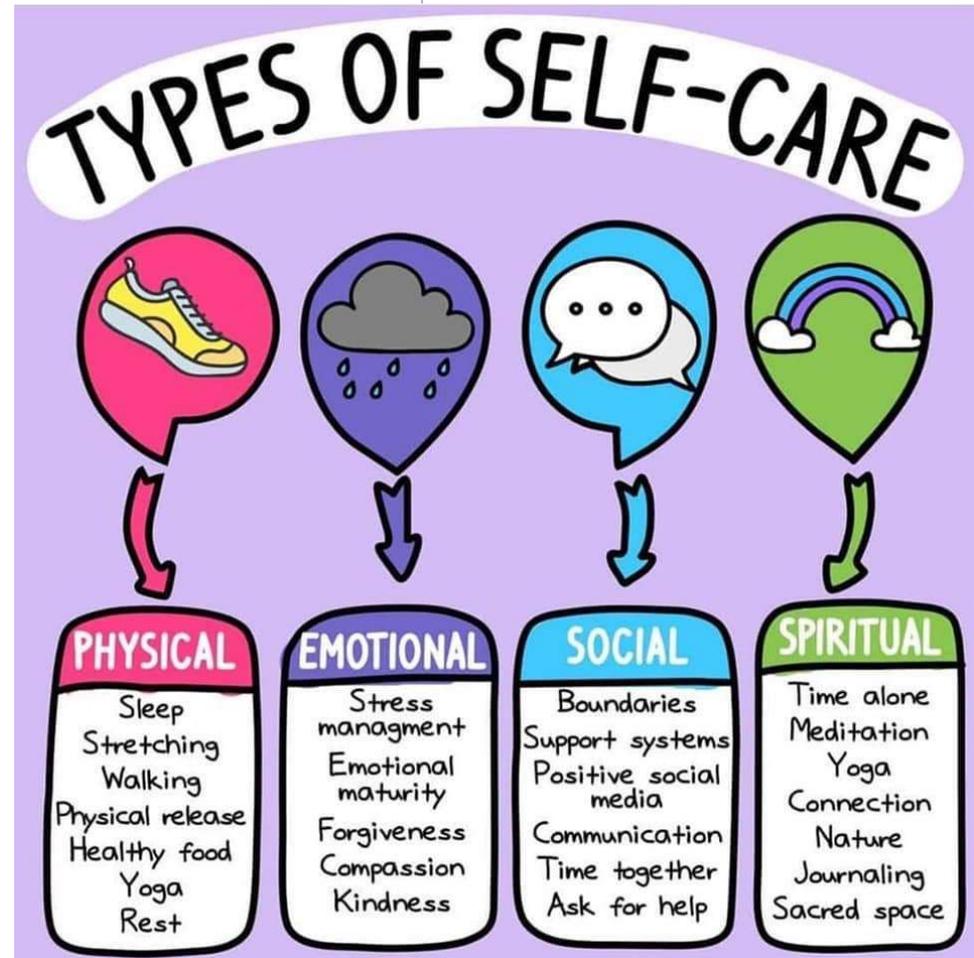
- We may not always know the answer, it's okay.
- Allow room for self-grace.
- Sometimes listening and connecting is more important than providing a solution.
- Seek resources to fill in knowledge gaps.
- If you receive resistance from others, try to seek understanding and consider a different approach.



Step 8

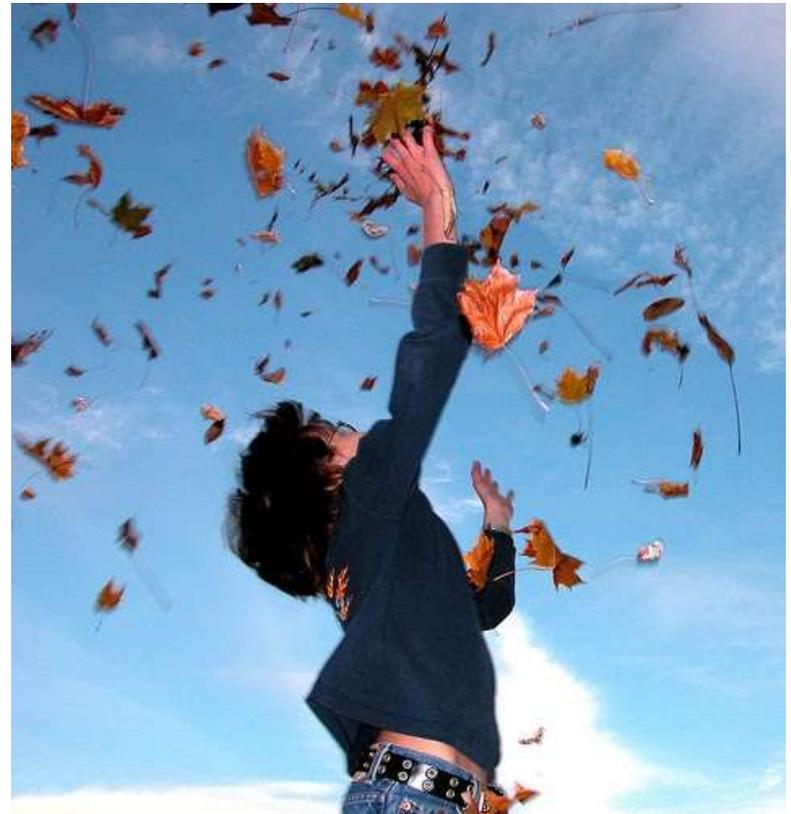
Take Care of Yourself

- Get enough sleep
- Keep active
- Remind yourself that you are not responsible for the decisions of others. Love and release.
- Connect with friends and family
- Investigate unhealthy behaviors
- Nourish your body
- Consider a hobby



Your Turn

- ▶ What extraordinary qualities do you bring to your work?
- ▶ What improvements have you noticed as a result?



Summary

Thank you for
providing
extraordinary
diabetes care, and
education and
advocacy



GREAT DREAM

Ten keys to happier living

Action for Happiness has developed the 10 Keys to Happier Living based on a review of the latest scientific research relating to happiness.

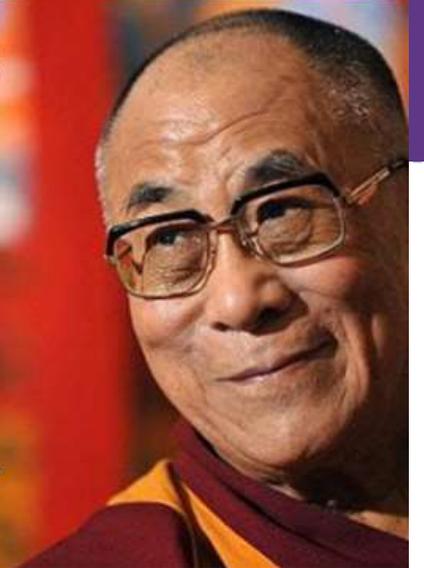
Everyone's path to happiness is different, but the research suggests these ten things consistently tend to have a positive impact on people's overall happiness and well-being.

The first five relate to how we interact with the **outside** world in our daily activities. The second five come more from **inside** us and depend on our attitude to life.

- | | | |
|---------------------|---|---------------------------------|
| GIVING |  | Do things for others |
| RELATING |  | Connect with people |
| EXERCISING |  | Take care of your body |
| APPRECIATING |  | Notice the world around |
| TRYING OUT |  | Keep learning new things |
| DIRECTION |  | Have goals to look forward to |
| RESILIENCE |  | Find ways to bounce back |
| EMOTION |  | Take a positive approach |
| ACCEPTANCE |  | Be comfortable with who you are |
| MEANING |  | Be part of something bigger |

HAPPINESS
is not
something
ready made.
It comes
from your
own actions.

~Dalai Lama



“ People will forget what you said, people will forget what you did, but people will never forget how you made them feel ” ~ Maya Angelou

See you Tomorrow at 0800

Ashley LaBrier, RD, MS, CDCES presents on
Medical Nutrition Therapy.



Thank You – We DID IT



- ▶ Please complete online evaluation
- ▶ Take a walk then come by and
- ▶ Join us tomorrow morning starting at 7:00am for breakfast.

