Insulin Therapy
What You need to Know

Beverly Dyck Thomassian, RN, MPH, BC-ADM, CDCES
President, Diabetes Education Services
www.DiabetesEd.net

Insulin – Ultimate Hormone Replacement Therapy

Objectives:

1. Discuss the actions of different insulins
2. Describe pattern management as an insulin adjustment tool
3. State how to Incorporate national guidelines into practice
4. Using basal/bolus insulin therapy to improve blood glucose levels
5. Discuss glucose pattern and adjustment strategies
6. Emphasize importance of Insulin Education for Dietitians

Coach Bev has no conflicts of interest

- Not on any speaker's bureau
- Does not invest in pharmaceutical or device companies
- Gathers information from reading package inserts, research and standards

Majority of content from ADA Standards
www.Diabetes.org

Standard 9

The Miracle of Insulin

J.L., December 15, 1922

February 15, 1923

Type 1 is 5- 10% of all Diabetes

- Auto-immune pancreatic beta cells destruction
- Most commonly expressed at age 10 – 14
- Insulin sensitive (require 0.5 - 1.0 units/kg/day)
- Expression due to a combo of genes and environment:
  - Autoimmunity tends to run in families
  - Exposure to virus or other environmental factors

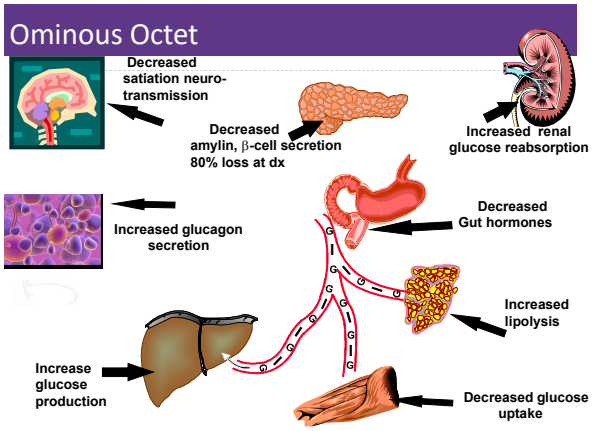
What is Type 2 Diabetes?

- Complex metabolic disorder ….
  (Insulin resistance and deficiency)

with social, behavioral and environmental risk factors unmasking the effects of genetic susceptibility.

New Diagnosis?
Call 800 – DIABETES to request "Getting Started Kit"
www.Diabetes.org

Ominous Octet



ABC's of Diabetes - 2023

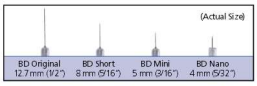
- A1c less than 7% (individualize)
  - Pre-meal BG 80-130
  - Post meal BG <180
  - AGP - Time in Range (70-180) 70% of time
- Blood Pressure < 130/80
- Cholesterol
  - Statin therapy based on age & risk status
  - If 40+ with ASCVD Risk, decrease 50%, LDL <70
  - If 40+ with ASCVD, decrease 50%, LDL <55
  - Triglycerides <150, HDL> 40

Consider the Way we Present Insulin

- Use language and images that promotes the benefit of insulin therapy.
- Ideas include:
  - "Your pancreas can't make enough insulin, so we need to help it".
  - "Insulin is just hormone replacement therapy".
  - "It's not your fault you need insulin, your pancreas just can't make enough".

Problem Solving Tips for more comfortable injections

- Short, fine needles hurt less
- Make sure they are injecting subcutaneously, not in muscle
- If participant thin, inject at an angle
- Avoid areas with scar tissue
- Use needle once and toss in sharps container
  - Needle gets duller with each injections
- To avoid leakage, count to 5-10 before withdrawing needle from skin
- Prime pen needles with 1-2 units



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

Insulin Teaching Keys

- Abdomen preferred injection site
- Stay 1" away from previous site
- Don't re-use syringes
- Keep unopened insulin in refrigerator
- Look for:
  - Lipodystrophy (a)
  - Lipohypertrophy (b)
- Make sure insulin isn't expired
- Proper disposal
- Review person's ability to withdraw and inject.
- Report hypoglycemia and have plan in place

Poll question 1

- A participant tells you she doesn't want to start on insulin. What is your best response?

a. The needles are so small, you won't feel a thing.

b. If you don't take insulin, you risk of complications increase.

c. Tell me why.

d. Gently tell them there is a doctors' order to start insulin.

Tell me Why

People have legitimate reasons for not wanting to start on insulin.

Give them space to share their story.

Help them sort out fact from myth.

Common Barriers and Responses

Barrier	Response
Insulin will make me gain weight.	Yes, you may gain a few pounds, but that is a sign your body is healing
People who need insulin are really sick	It only means your pancreas can't make enough, so you can help it by injecting insulin
Injecting insulin will hurt	Most people are surprised that they barely feel the injections

Devices to Inject insulin

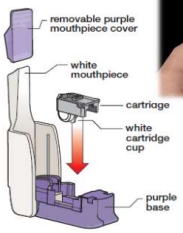
Syringe Pen Injector Pump

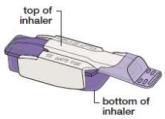
Choice of device is person centered and based on:

- Preference
- Cost
- Convenience

Afrezza Inhaler

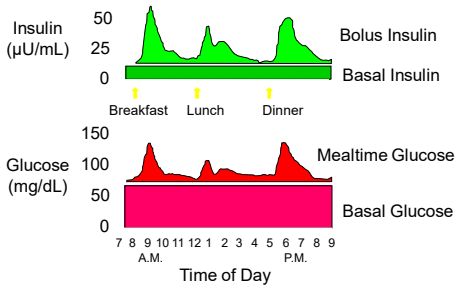
Know your AFREZZA® inhaler:





Replace inhaler every 15 days – Do not wash

Physiologic Insulin Secretion: 24-Hour Profile



Poll question 2

What best describes the role of bolus insulins?

a. cover carbs at meals and hyperglycemia
b. helps to lower fasting blood glucose
c. keeps overnight blood sugars on target
d. used during hypoglycemic episodes

Insulin PocketCard™

Diabetes Education Services 25

Download Succeed! Get Our Free CDCES Coach App

Action		Insulin Name	Onset	Peak	Effective 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. Discard most open vials after 28 days. For pen storage guidelines, see package insert.
		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	
	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	
	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

Concentrated & Inhaled Insulins

Name/Concentration	Insulin/Action	Considerations
Humulin Regular U-500 • 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.

The information listed here are not guidelines. Please consult prescribing information for details. DiabetesEd.net © 2023

Insulin Action Teams

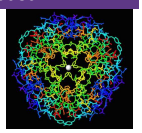
- Bolus: lowers after meal glucose levels
  - Very Rapid Acting – aspart, lispro aabc
  - Rapid Acting
    - Aspart, Lispro, Admelog, Glulisine, Afrezza
  - Short Acting - Regular
- Basal: controls glucose between meals, hs
  - Intermediate
    - NPH
  - Long Acting
    - Detemir (Levemir)
    - Glargine (Lantus, Basaglar, Semglee, Rezvoglar)
    - Degludec (Tresiba)

Bolus Insulins
(½ of total daily dose ÷ meals)

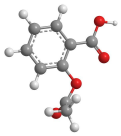
	Insulin Name	Effective Onset	Peak	Duration
Very Rapid Acting Analogs	Aspart (Fiasp)	16 - 20 min	1 - 3 hrs	5 - 7 hrs
	Lispro-aabc (Lyumjev)	15 - 17 min	2 - 3 hrs	5 - 7 hrs
Rapid Acting Analogs	Aspart (Novolog)	20 - 30 min	1 - 3 hrs	3 - 7 hrs
	Lispro (Humalog*/ Admelog)	30 min	2 - 3 hrs	5 - 7 hrs
	Glulisine (Apidra)	15 - 30 min	1 - 3 hrs	3 - 4 hrs
Short Acting	Regular*	30 - 60 min	2 - 4 hrs	5 - 8 hrs

Biosimilar Insulins –
Lispro (Admelog) – bolus
Glargine (Basaglar/ Semglee/Rezvoglar) – basal

- Copycat insulins
- Can't use the term generics for *large* molecule biologicals because they are manufactured in living organisms (bacteria and yeast)
- Each batch may be slightly different
- Currently - Pharmacist to contact Provider before switching Basasglar (Semglee/Rezvoglar can be switched without provider preapproval)



Insulin – Large Molecule



Aspirin – Small Molecule

Bolus Insulin Summary

- Regular, aspart, lispro, glulisine,
- Starts working fast (15-30 mins)
- Gets out fast (3-6 hours, avg ~ 4 hrs)
- Post meal BG reflects effectiveness
- Comprise about ½ total daily dose
- Covers food or hyperglycemia.
- 1 unit
  - Covers ≈ 10 -15 gms of carb (insulin to carb ratio)
  - Lowers BG ≈ 30 – 50 points (insulin sensitivity)

Poll question 3

JR has type 1 diabetes for 30 years. They inject aspart (Novolog) before meals and glargine (Basaglar) at night. When you ask if he brought a log book he says "I can just tell how much insulin I need". What is the best response?

a. Checking your BG is important to prevent hypoglycemia.

b. Usually insulin dosing is based on blood sugar levels?

c. Sounds like you know how you feel.

d. How has this strategy worked so far?

Bolus Insulin Timing

- How is the effectiveness of bolus insulin determined?
  - 2-hour post meal (if you can get it)
  - Before next meal blood glucose

- Glucose goals (ADA) – may be modified by provider/participant
  - 1-2 hours post meal <180
  - Before next meal – 80 - 130

Bolus – Insulin Sliding Scale

Starts at 150, 2 units for every 50 mg/dl >150

	Break	Lunch	Dinner	HS
Day 1	94 no insulin	212 4 uR	148 no insulin	254 6 uR
Day 2	243 4uR	254 6 uR	201 4uR	199 no insulin
Day 3	189 2uR	243 4uR	162 2uR	244 4uR
Day 4	66 No insulin	287 6uR	144 none	272 6uR

Basal Insulins
(½ of total daily dose)

Intermediate Acting	Peak Action	Duration
NPH	4-10 hrs	10-16

Long Acting	Peak Action	Duration
Detemir (Levemir)	No Peak	20 hrs
Glargine (Lantus)		24 hrs
Glargine (Basaglar, Semglee/Rezvoglar)		24 hrs
Degludec (Tresiba)		42 hrs

Fasting BG reflects efficacy of basal

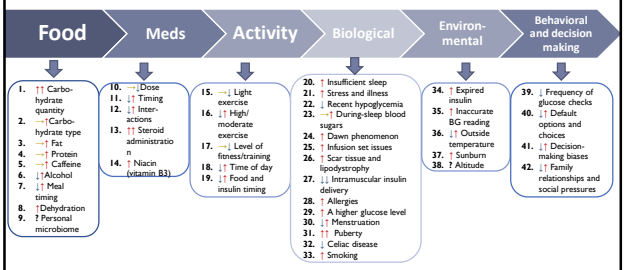
Basal Insulin Summary

- NPH, Detemir, Glargine, Degludec
- Covers in between meals, through night
- Starts working slow (2-4 hours)
- Stays in long
  - NPH 12 hrs
  - Detemir, Glargine 20-24 hrs
  - Degludec – up to 42 hrs
- Fasting blood glucose reflects effectiveness

Pattern Management

Let's take a S T R E T C H Break

At least 42 factors affect glucose!



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

Poll Question 4

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)

Type 2 on 5 units lispro (Humalog) before meals. 10u glargine (Basaglar) pm

	Break	Lunch	Dinner	HS
Day 1	164	94	66	162
Day 2	169		59	195
Day 3		84	81	242
Day 4	159		43	211

Insulin Storage and Dispensing Info

Diabetes Education Services

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
Long-Acting Insulins				
Detemir (Levemir) -Vial -Flex Pen	 42 Days 42 Days	 1 Vial 5 Pens	 1000 Units 300 Units in 3 mL	 80 Units
Glargine (Lantus/Basaglar) -Vial -SoloStar Pen	 28 Days 28 Days	 1 Vial 5 Pens	 1000 Units 300 units in 3 mL	 80 Units
Degludec (Tresiba) - Pen	 56 Days	 5 Pens	 300 units in 3mL	 80 Units
Concentrated Insulins				
Degludec (Tresiba) U-200 Pen	56 Days	3 Pens	600 Units in 3 mL	160 Units
Humulin R U-500 - Pen - Vial	 28 Days 40 Days	 2 Pens 1 Vial	 1,500 units in 3 mL 10, 000 units	 300 units 5 unit dosing increments
Lispro (Humalog) U-200 - Pen	 28 Days	 5 pens	 600 units in 3 mL	 60 Units

Basal + Metformin 2000mg daily Type 2, 60kg – A1c 10.1%

	Break	Lunch	Dinner	HS
Mo 1	170s			298 10uGl
Mo 2	160s			233 20uGl
Mo 3	140s	303	335	206 30uGl

Intensifying Injectable Therapy – Type 2

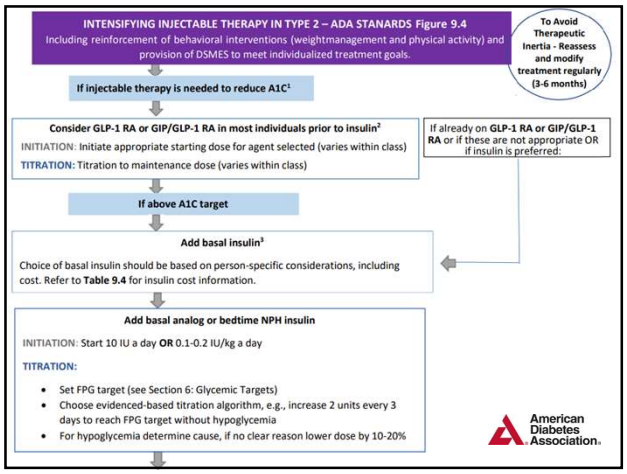
- Consider GLP-1 RA first
- Start basal insulin 10 units or 0.1 to 0.2 units/kg day
- Titrate up 2 units every 3 days, until FBG at goal
- If AM hypo, decrease basal insulin 20%
- Over basalization if basal >0.5 unit/kg day, add bolus insulin
- Adding bolus
  - Start with 4 units bolus at largest meal or
  - Start 1-2 injections with 10% of basal or
  - Switch to basal bolus combo (like 70/30 ins)

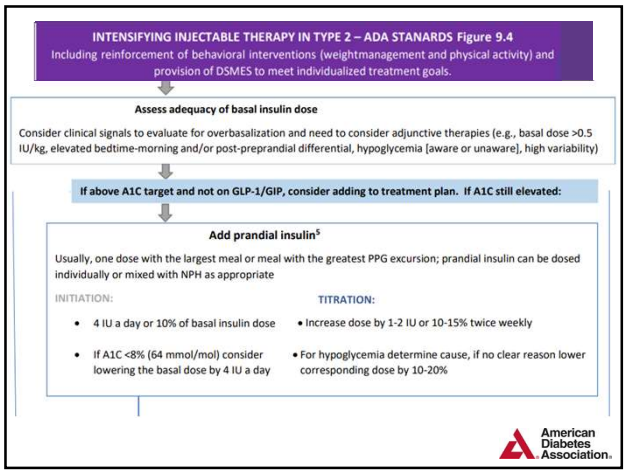
American Diabetes Association
Diabetes Care 2023

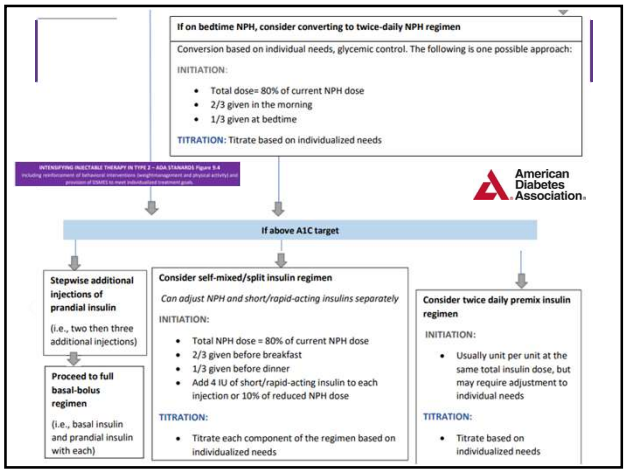
If A1C 10%, insulin or sulfonylurea is indicated.

Quick Question 5

- JR is on 3 different diabetes oral medications and 100 units of glargine insulin. A1C is 8.9% and JR weighs 100kg. What best describes this clinical picture?
- A. Overbasalization
- B. Non-compliance
- C. Fear of hypoglycemia
- D. Clinical inaction







Intensifying Injectable Footnotes

- Consider insulin first if person has hyperglycemia symptoms for when:
  - A1C levels >10% or
  - blood glucose levels ≥300mg/dL
  - or type 1 diabetes is a possibility.
- When selecting GLP-1 RA, consider: individual preference, A1C lowering, weight-lowering effect, or frequency of injection. If CVD, consider GLP-1 RA with proven CVD benefit. Oral or injectable are appropriate.
- 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 and would be better with an AM dose of long-acting basal insulin
- If adding prandial insulin to NPH, consider initiation of a self-mixed or premixed insulin regimen to decrease the number of injections required. 70/30 or 50/50 insulin

ADA Standards of Care 2023 Figure 9.4 – Intensifying to injectable therapies.

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)	**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 (Adlyxin) GLP-1 Receptor Agonist	**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 **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.**

Observe precautions of each component drug. DiabetesEd.net ©2023

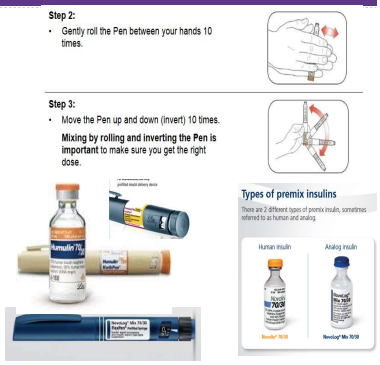
Combo Sub-Q Insulin

Insulin Type	Onset	Peak
Humalog Mix 75/25: 75% NPL, 25% lispro 50/50: 50% NPL, 50% lispro	0.25 - 0.5 hr	0.5-6.5 hrs
NovoLog Mix 70/30: 70% NPA, 30% aspart	0.25 - 0.5 hr	1 – 4 hrs
NPH + Reg Combo 70/30: 70%N /30%R 50/50: 50%N /50%R	0.5 – 1.0 hr	2 - 16 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	

70/30 Insulin

- Gently roll to mix insulin
- Prime pens – give 2 unit "air shot" to make sure pen and needle functional
- After injecting insulin, count to 5 before pulling needle out
- Use new needle with each injection



Case Study- YL

- 70 yr old, avid walker
- BMI 24, Weighs 60kg, GFR 58
- A1c – 10.1%, BG 300s for past weeks
- 30 units glargine Pen (60kg x .5 = 30units max dose)
- Oral Meds: Metformin 2000 mg daily
  - What medication changes? Keep metformin
  - Add on changes?
    - Add GLP-1 RA or basal insulin/GLP combo (iGlarlixi or IDegLira)
    - Add on SGLT-2 Inhibitor (protect kidneys)
    - Add 1 bolus injection at largest meal (10% of basal or 4units)
    - Switch to 70/30 twice daily

Convert to 70/30 Insulin

Starting 70/30?
Consider 4 factors:

- Current insulin dose
- Insulin dose based on wt
- Current BG /A1C
- Risk of hypoglycemia

YL

- BMI 24, Weighs 60kg, GFR 58
- A1c – 10.1%, BG 300s for past weeks

Convert to 70/30 insulin

Current dose x 80%

30 units x 0.8 = 24 units

2/3 am and 1/3 pm

16 units am and 8 units pm

By wt: 60 kg x 0.5 u/ins/kg = 30 units a day

2/3 am and 1/3 pm

20 units am and 10 units pm

16u 70/30 am, 8u 70/30 pm Patterns? Changes needed?

	Break	Lunch	Dinner	HS
Day 1	102	63	92	181
Day 2	112	67	106	195
Day 3	98	56	112	201
Day 4	99	71	132	211

Poll Question 6

- 6. Which of the following are suggested insulin teaching keys?

a. Poke, inject, eat (PIE)

b. Abdomen is preferred injection site

c. Use a sharps container to dispose of needles/lancets

d. Always have treatment for hypo available

e. All of the above

Basal Bolus – What Adjustments? Participant weighs 80kg

	Break	Lunch	Dinner	HS
Day 1	69 7H	79 5H	245 8H	190 22u Det
Day 2	81 7H	87 5H	170 8H	133 22u Det
Day 3	73 7H	94 5H	194 8H	110 22u Det
Day 4	62 7H	83 5H	211 8H	127 22u Det

Intensive Diabetes Therapy Insulin Dosing Strategy

50/50 Rule

- 0.5-1.0 units/kg day
- Basal = 50% of total
  - Glargine QD
  - NPH or Detemir BID
- Bolus = 50% of total
  - usually divided into 3 meals

Example

- Wt 50kg x 0.5 = 25 units of insulin/day
- Basal dose: 13 units
- Bolus dose: 12 units
  - 4 units bolus each meal

Intensive Diabetes Therapy
Insulin Dosing Strategy - *poll question 6A*

50/50 Rule

- 0.5-1.0 units/kg day
- Basal = 50% of total
  - Glargine QD
  - NPH or Detemir BID
- Bolus = 50% of total
  - usually divided into 3 meals

Example – You Try

- Wt 60 kg x 0.5 = ___ units of insulin/day
- Basal dose: ____ units
- Bolus dose: ____ units
  ___units each meal

Intensive Diabetes Therapy
Insulin Dosing Strategy

50/50 Rule

- 0.5 -1.0 units/kg day
- Basal = 50% of total
  - Glargine QD
  - NPH or Detemir BID
- Bolus = 50% of total
  - divided into 3 meals

Example – You Try

- Wt 60kg x 0.5 = 30 units of insulin/day
- Basal dose: 15 units
- Bolus dose: 15 units
  - **5 units** each meal

Basal Bolus – Using 50/50 Rule - Participant weighs 80kg

	Break	Lunch	Dinner	HS
Day 1	84 6H	89 7H	145 7H	190 20 u Det
Day 2	81 6H	97 7H	107 7H	133 20u Det
Day 3	79 6H	104 7H	124 7H	110 20u Det
Day 4	69 6H	103 7H	208 7H	193 20u Det

Fine Tuning Bolus Insulin

- Carb counting
- Prandial coverage
- Correcting for hyper and hypoglycemia

Poll Question 7

- Mary takes 6 units lispro (Humalog) before dinner. Which BG result reflects that it was the right dose?

a. Before breakfast BG of 97
b. 1 hr post dinner BG of 189
c. Before dinner blood glucose of 102
d. 2 hour post dinner BG of 178

Bolus Basics

- Carbohydrate/ Prandial Coverage
  - Match the insulin to the carbohydrates
  - 1 unit for 15 gms - Common starting point
  - Or can use Carb/Insulin ratio formula
- Correction Bolus - targets hyperglycemia
  - 1 unit for every 30-50 points over target
  - Use 1500 – 1700 rule (based on provider preference and glucose levels)
- Adjust ratios depending on sensitivity and response

Carb to Insulin Ratio > 450-500 / Total Daily Dose

Carb-to-Insulin Ratio		
	500 Rule	450 Rule
Total Daily Insulin Dose	Grams of Carb Covered by 1 Unit of **Humalog**	Grams of Carb Covered by 1 Unit of **Regular**
20	25	23
25	20	18
30	17	15
35	14	13
40	13	11
50	10	9
60	8	8

500 Rule - Humalog and Novolog

- Divide 500 by total daily insulin dose.
- Equals – Grams of carb covered by one unit of Humalog/Novolog.
- Example: Takes 33 total units /day. 500/ 33 (total dose) = 15
- 1 unit insulin covers 15 grams carb

450 Rule for Regular Insulin

- Divide 450 by total daily insulin dose.
- Equals Grams of carb covered by one unit of regular insulin.
- Example: Takes 45 units daily. 450 / 45 (total dose) = 10
- 1 unit covers 10 grams of carb

Carbohydrate Ratio How does that work?

Rapid/Fast Acting Insulin

- Dinner **(60 gms cho)**
  - Lemon Chicken
  - 1 cup rice pilaf (45 gms cho)
  - Asparagus
  - Dinner Roll (15 gms cho)

Blood Glucose 165mg/dl

Serving Size	Gms CHO	Insulin
1	15 gms cho	1 unit
2	30 gms cho	2 units
3	45 gms cho	3 units
4	60 gms cho	4 units

Poll Question 8

- JR on insulin pump takes 1 unit aspart (novolog) for 15 gms of carb. Meal 1 cup rice, bbq steak, 1 c. skim milk, ½ banana, Sugar Free ice tea. BG 118. How much insulin?

a. 4.8 units
b. 6.0 units
c. 5.2 units
d. 5.0 units

Rice - 45gm
Steak 0
1 c. skim milk – 12gm
½ banana – 15 gm
SF Ice tea – 0
Total 72 gms / 15 – 4.8

Adjusting Bolus and Correction Doses Carbohydrate-to-Insulin Ratio

Based on four questions before meals:

1. How much carbohydrate am I going to eat?
2. What is my insulin dose for this amount of carbohydrate?
3. Should I lower the dose because I plan to be very active or have recently been active?
4. What is my starting blood sugar?

Correction Bolus

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

Poll Question 9

- AR uses lispro (Humalog) insulin and the previous correction bolus. His blood glucose is 68 and he is going to eat 60 gms of carb (takes 1 unit for 15 gms carb). How much insulin should he inject?

1. 3.0 units
2. 4.5 units
3. 4.0 units
4. 5.0 units

60 / 15 = 4.0
BG < 70 = minus 1 unit
Total dose = 3.0 units

Poll Question 10

- Bob's correction scale is 1 unit for every 30 above his target of 120. His BG is 270. How much correction insulin?

1. 4 units
2. 5 units
3. Needs to count carbs first
4. Depends on his activity level

270 – 120 = 150 over target
150 / 30 = 5 units

Correction Factor

- Insulin correction factor (ICF)
- Total Daily Insulin Dose (TDD)
- 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 for analog insulins
  - 1700/TDD = estimated ICF
  - 1800/TDD = estimated ICF
- For regular insulin, 1500 rule is typically used
  - 1500/TDD
- JR takes 100 units total insulin a day.
- 1500 rule
  - 1 unit lowers BG 15 points
- 1700 rule
  - 1 unit lowers BG 17 points
- 1800 rule
  - 1 unit lowers BG 18 points

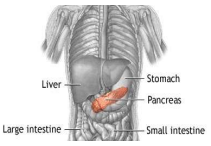
Poll Question 11

- JR takes 25 units glargine and 25 units of bolus insulin daily. Based on the 1700 rule, how much would 1 unit of insulin lower JR's glucose?
- A. 34 points
- B. 36 points
- C. 48 points
- D. 68 points

1700 \ 50 = 34

Review "How to Think Like a Pancreas"

- Goal is to imitate the work of the pancreas.
- The pancreas releases little doses of insulin through out the day and night.
  - basal insulin
- The pancreas also releases a squirt of insulin with meals or if blood sugars are running above target
  - bolus insulin (for food plus correction if needed)



Thank You

- Questions?
- Email info@diabetesed.net
- 530-893-8635
- Bryanna and Coach Bev are here to help!

Diabetes Education SERVICES