



Diabetes Workshop

Jennifer Allen, PharmD, CDE, BCACP

Sonia Freitas, PharmD, CDE, BCACP

Brigham and Women's Primary Care

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Conflict of Interest Disclosure

Jennifer Allen, PharmD, CDE, BCACP

Sonia Freitas, PharmD, CDE, BCACP



We have no financial relationships with commercial entities producing healthcare-related products and/or services.

Objectives



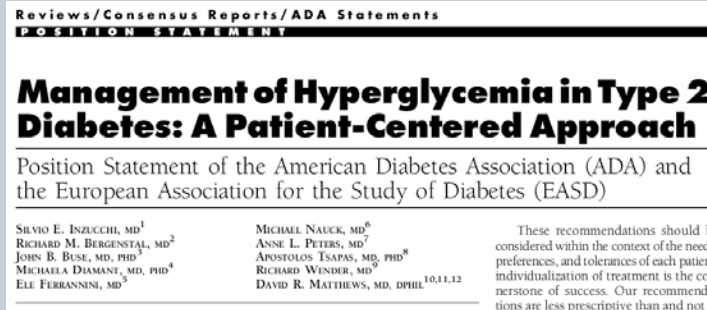
- Describe the individualized approach to type 2 diabetes management recommended by the American Diabetes Association (ADA) and European Association for the Study of Diabetes (EASD)
- Apply patient-centered and shared-decision making principles to common patient case scenarios
- Outline and compare the role and characteristics of glucose-lowering agents recommended for the treatment of type 2 diabetes
- Discuss useful dosing strategies that support adherence to treatment regimens and subsequent attainment of therapeutic goals

Introductions



- **Patient-Centered Medical Home**
 - Optimize medication therapy
 - Support medication adherence
- **Collaborative Drug Therapy Management (CDTM)**
 - Initiate and modify medication regimens per protocol
 - Midlevel prescriptive privileges
- **Perspective**
 - Pharmacist
 - Diabetes Educator

ADA/EASD Updated Position Statements: April 2012, January 2015



Management of Hyperglycemia in Type 2 Diabetes, 2015: A Patient-Centered Approach

Update to a Position Statement of the American Diabetes Association and the European Association for the Study of Diabetes

Diabetes Care 2015;38:140–149 | DOI: 10.2337/dc14-2441

Silvio E. Inzucchi,¹ Richard M. Bergenstal,² John B. Buse,³ Michaela Diamant,⁴ Ele Ferrannini,⁵ Michael Nauck,⁶ Anne L. Peters,⁷ Apostolos Tsapas,⁸ Richard Wender,^{9,10} and David R. Matthews^{11,12,13}

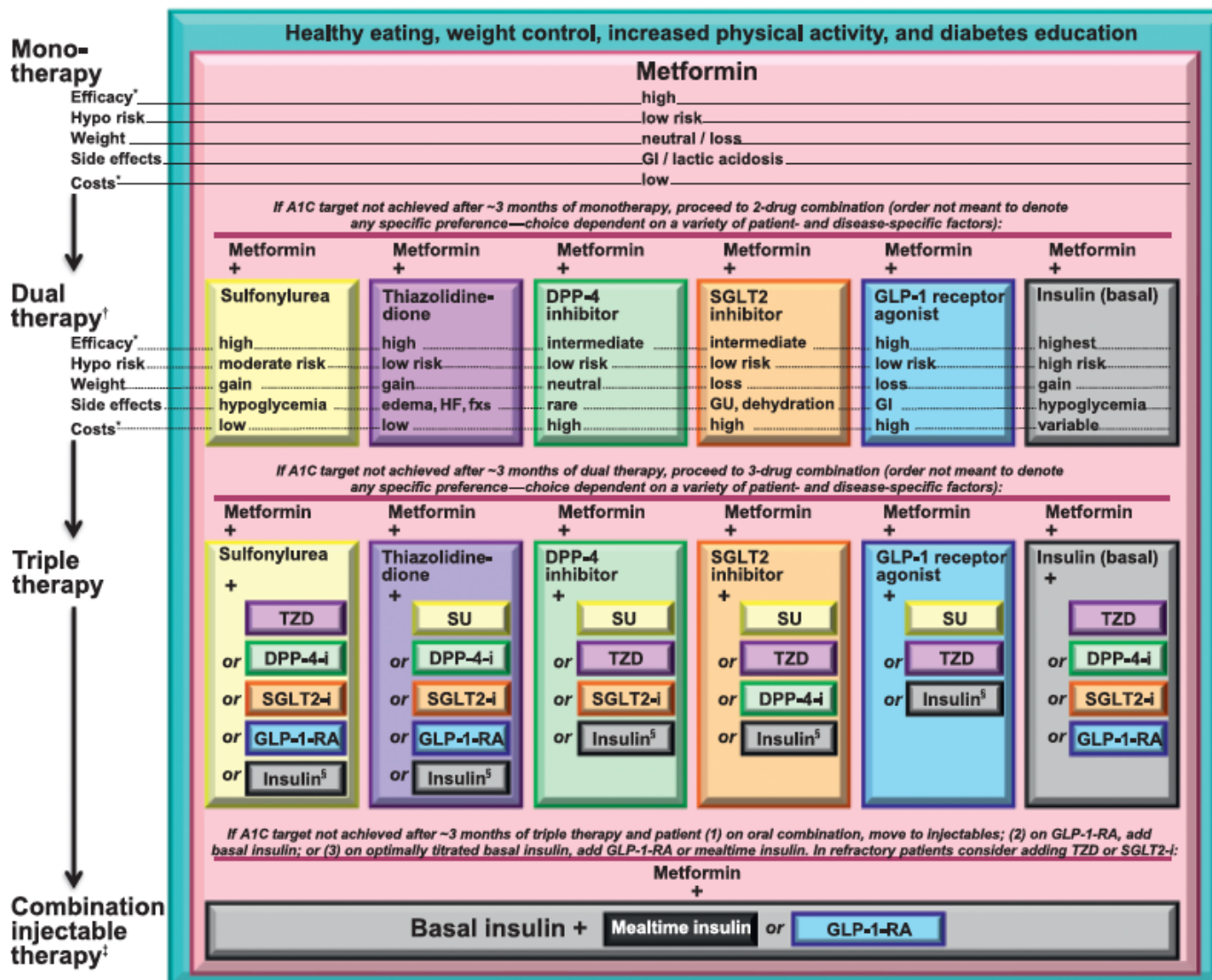
“Ultimately, it is patients who make the final decisions regarding their lifestyle choices and, to some degree, the pharmaceutical interventions they use; their implementation occurs in the context of the patients’ real lives and relies on the consumption of resources (both public and private).”

2015 ADA/EASD Treatment Guidelines



- Lifestyle modification as mainstay of therapy
- Metformin as first-line treatment
- Subsequent pharmacologic treatment based upon
 - Efficacy
 - Non-glycemic benefits
 - Safety, tolerability
 - Ease of use
 - Cost

2015 ADA/EASD Treatment Recommendations



Medication Adherence: Diabetes



- Medication nonadherence → *failure to take medications as prescribed*
- Barriers to effective use of medications for diabetes
 1. Poor provider-patient communication
 2. Inadequate knowledge about a drug and its use
 3. Reluctance to start insulin
 4. Complex regimens
 5. Lack of follow-up to monitor treatment response
 6. Lack of treatment titration
 7. Cost and access barriers

Considerations for an Optimal Medication Regimen



- Behavioral

- Patient-reported goals
- Adherence
 - ✦ Adverse effects
 - ✦ Dosing frequency
 - ✦ Cost
 - ✦ Misconceptions, fears
- Activity patterns
 - ✦ Medication use
 - ✦ Home glucose monitoring
 - ✦ Meal regularity
 - ✦ Sleep/work
 - ✦ Exercise

- Medical

- Renal dysfunction
- Hepatic dysfunction
- GI comorbidities
- Fall risk
- Weight
- Glycemic control
 - ✦ HbA1c reduction needed
 - ✦ Glucose patterns



Patient Cases

Case 1: Part 1



- JS is a 52 y/o black female with a PMH significant for T2DM, HTN and obesity (s/p gastric sleeve 2012)
- Vitals
 - BP 124/82
 - HR 76
 - Height = 5'3"
 - Weight = 185 lbs
 - BMI = 33
- Medications
 - Losartan 25 mg once daily
 - Simvastatin 40 mg QHS
 - Metformin ER 1000 mg BID
 - Glipizide ER 20 mg QAM
- Current HbA1c = 8.2%

Case 1: Part 1



- **Diabetes History:**

- Diagnosed with T2DM 5 years ago
- Started on an oral regimen of metformin, with subsequent addition of glipizide within 2 years
- Gastric sleeve in 2012
- Initially lost 50 lbs, managed on metformin monotherapy
- Restarted glipizide within the last year in response to a rising HbA1c resulting from recurrent weight gain.

“I don’t want to go back to where I was before the surgery, I need to keep my weight down, but my cravings are hard to control.”

Audience Poll



- What additional information would be most helpful to have?
 - A. Adherence patterns
 - B. Blood glucose data
 - C. Patient-reported goals
 - D. Hypoglycemia frequency

Considerations for an Optimal Medication Regimen



• Behavioral

- Patient-reported goals
- Adherence
 - ✦ Adverse effects
 - ✦ Dosing frequency
 - ✦ Cost
 - ✦ Misconceptions, fears
- Activity patterns
 - ✦ Medication use
 - ✦ Glucose monitoring
 - ✦ Meal regularity
 - ✦ Sleep/work
 - ✦ Exercise

• Medical

- Renal dysfunction
- Hepatic dysfunction
- GI comorbidities
- Fall risk
- Weight
- Glycemic control
 - ✦ HbA1c reduction needed
 - ✦ Glucose patterns

Behavioral Interview



- **Adherence**
 - **Adverse Effects:** *“I need to keep my weight down...”*
 - **Dosing Frequency:** *“I have a busy work schedule where I am with people for most of the day, so I want a medication that I don’t have to use at work.”*
 - **Misconception/Fears:** *“I never thought about injecting myself, but I think I could if I had to as long as someone taught me how.”*

Behavioral Interview



- **Activity Patterns**

- **Medication Use:** *"I only take my medications when I'm at home, before breakfast and at bedtime."*
- **Meal Regularity:** *"I can't stop eating."*
 - ✦ Breakfast: Greek yogurt, coffee (cream, no sugar)
 - ✦ Lunch: Often skips, depending on daily work demands. Snacks through lunch when no time to eat a meal.
 - ✦ Dinner: Home cooked meal prepared by husband.
Last night, 2 pieces fried fish breaded, mashed potato, green salad
 - ✦ Snacks: During lunch and before bed
Peanuts, Smartfood popcorn, cookies, ice cream
- **Sleep/Work:**
 - ✦ Wake-time 7-8 AM, Bedtime 10 PM – 12 AM
 - ✦ Working variable day shifts, Monday - Friday
- **Exercise:** *"I haven't found the time."*

Chart Review



- **GI comorbidities**
 - Gastric sleeve in 2012
- **Weight**
 - Weight = 185 lbs
 - BMI = 33
- **Glycemic control**
 - Current HbA1c = 8.2%
 - Glucose Patterns: Checking occasionally
 - ✦ FBG: 110-140 mg/dL
 - ✦ PPBG: 170-250 mg/dL

Assessment



- Behavioral

- Patient-Reported Goals:
 - ✦ Weight loss
 - ✦ Appetite control
 - ✦ Convenient dosing regimen
- Open to using an injection

- Medical

- Gastric sleeve no longer helping with satiety
- Obese
- HbA1c elevated
 - Requires > 1.0% point lowering to achieve goal
- Prandial glucose elevated

Audience Poll



- What would be the best next step in her treatment plan?
 - A. Start basal insulin
 - B. Start GLP-1 receptor agonist
 - C. Start DPP-IV inhibitor
 - D. Start SGLT2 inhibitor

Comparison of Second-Line Options



| Drug class | Expected HbA1c Reduction | Effects on Weight | Hypoglycemia Risk | Cost | Dosing Frequency | Notable adverse effects/Precautions |
|--------------------------|--------------------------|-------------------|-------------------|--------------|--------------------------------|--|
| Basal Insulin | 1.5% to 3.5% | Gain | High | Moderate | Once to twice daily | |
| DPP-4 inhibitors | 0.5 to 1% | Neutral | Low | High | Once daily | <ul style="list-style-type: none"> •? Acute pancreatitis •? Increased CHF hospitalizations |
| GLP-1 agonists | 1 to 1.5% | Loss | Low | High | Once weekly to twice daily | <ul style="list-style-type: none"> •GI side effects •? Acute pancreatitis •? Thyroid cancer |
| SGLT-2 inhibitors | 0.5 to 1% | Loss | Low | High | Once daily | <ul style="list-style-type: none"> •Genital mycotic infections •UTI •Diuretic effects •↑SCr (transient) |

Case 1: Part 2



- It has been 2 years since JS started Liraglutide 1.8 mg daily in addition to her previous regimen of metformin and glipizide. Her HbA1c initially dropped to 6.8% within 3 months, however on her most recent check it seems to have climbed up to 8.9%.
- Per patient's report, family stressors occurring during the last year have caused her to "fall-off" of her healthy eating plan and she admits to worsened emotional eating during this time.
- **Vitals**
 - BP 128/76
 - HR 80
 - Height = 5'3"
 - Weight = 200 lbs
 - BMI = 35.4
- **Medications**
 - Losartan 25 mg once daily
 - Simvastatin 40 mg QHS
 - Metformin ER 1000 mg BID
 - Glipizide ER 10 mg QAM
 - Liraglutide 1.8 mg daily
- **Current HbA1c = 8.9%**

Audience Poll



- What additional information would be helpful to have?
 - A. Adherence patterns
 - B. Blood glucose data
 - C. Patient-reported goals
 - D. Hypoglycemia frequency

Considerations for an Optimal Medication Regimen



• Behavioral

- Patient-reported goals
- Adherence
 - ✦ Adverse effects
 - ✦ Dosing frequency
 - ✦ Cost
 - ✦ Misconceptions, fears
- Activity patterns
 - ✦ Medication use
 - ✦ Glucose monitoring
 - ✦ Meal regularity
 - ✦ Sleep/work
 - ✦ Exercise

• Medical

- Renal dysfunction
- Hepatic dysfunction
- GI comorbidities
- Fall risk
- Weight
- Glycemic control
 - ✦ HbA1c reduction needed
 - ✦ Glucose patterns

Behavioral Interview



- **Adherence**
 - **Adverse Effects:** *“I can’t keep gaining weight...”*
 - **Dosing Frequency:** *“I’ve been busy trying to balance work and taking care of my mother.”*

Behavioral Interview



- **Activity Patterns**

- **Medication Use:** *“The one thing I’m good at! I always take them in the morning and before bed.”*
- **Meal Regularity:** *“I’m snacking more, can’t find time to eat right.”*
 - ✦ Breakfast: Greek yogurt, coffee (cream, no sugar)
 - ✦ Lunch: Often skips, depending on daily work demands. Snacks through lunch when no time to eat a meal.
 - ✦ Dinner: Often skips, husband returned to work, patient has no time to cook
 - ✦ Snacks: During lunch and before bed
Peanuts, Smartfood popcorn, cookies, ice cream
- **Sleep/Work:**
 - ✦ Wake-time 7-8 AM, Bedtime 10 PM – 12 AM
 - ✦ Working variable day shifts, Monday - Friday
- **Exercise:** *“Not happening.”*

Chart Review



- **GI comorbidities**
 - Gastric sleeve in 2012
- **Weight**
 - Weight = 200 lbs
 - BMI = 34.5
- **Glycemic control**
 - Current HbA1c = 8.9%
 - POCT Glucose = 259 mg/dL
 - Glucose Patterns: Has not been checking sugars lately, does not have meter. Recalls lowest BG of 150 in the morning before breakfast, 240 at bedtime.

Assessment



- Behavioral

- Patient-Reported Goals:
 - ✦ Weight loss
 - ✦ Convenient dosing regimen
- Adherence
 - ✦ Struggling with healthy lifestyle choices
 - ✦ Inconsistent fingerstick checks

- Medical

- Recurrent weight gain
- Obese
- HbA1c elevated
 - Requires > 1.0% points lowering to achieve goal
- Fasting and prandial glucose elevated

Audience Poll



- What would be the best next step in her treatment plan?
 - A. Start DPP-IV inhibitor
 - B. Start SGLT2 inhibitor
 - C. Start basal insulin
 - D. Start basal/bolus insulin regimen

Self-Titration of Basal Insulin



- Your fasting blood sugar **TARGET RANGE** is: **80-130**
 - Your starting dose of *Lantus*[†] insulin is **10** units
 - Take your insulin at ***bedtime***
 - Take your insulin at about the same time every day
 - You will increase your insulin dose by **2** units every 2 days until your fastings sugars have reached the target range, as explained on the instruction sheet provided
 - Do not increase your dose above **30** units a day without contacting your care team
 - For any questions, please contact your care team

[†]**Bolded text** indicates customizable fields that should be updated to reflect the patient-specific plan

Case 2: Part 1



- TH is a 48 yo Caucasian male patient with a PMH of T2DM, HTN, hyperlipidemia, and GERD who presents to clinic for routine follow-up.

Vitals:

- BP 138/76
- HR 68
- Wt 224 lbs
- Ht 5'10"
- BMI 32.1

Medications:

- Lisinopril 20mg daily
- ASA 81mg daily
- Amlodipine 5mg daily
- Atorvastatin 40mg daily
- Insulin glargine (Lantus®) 36 units BID
- Insulin aspart (NovoLog®) sliding scale TID AC
- Omeprazole 20mg daily

Insulin aspart sliding scale:

- BG <100: Hold insulin
- 100-150: 12 units
- 151-200: 14 units
- 201-250: 16 units
- 251-300: 18 units
- 301-350: 20 units
- >351: 22 units and contact provider.

Pertinent Labs:

- HbA1c = 8.9%
- SCr = 0.9 mg/dL
- LDL = 105 mg/dL

Case 2: Part 1



- **Diabetes History:**

- Diagnosed 6 years ago
- Insulin initiated 2 years ago
- No known complications from diabetes

“My morning readings are pretty good, usually around 150, sometimes a little higher, but never above 200.”

“I don’t want to take any more insulin. I’m already taking too much.”

Audience Poll



What would you do next?

- A. Consider use of an SGLT2 inhibitor
- B. Investigate concerns about increasing insulin dose
- C. Reduce Lantus[®] dose and address lifestyle modification
- D. Transition to pre-mixed insulin

Audience Poll



What additional information would you most like to have?

- A. Details regarding meal patterns and insulin use
- B. Additional blood glucose data
- C. Hypoglycemia treatment strategy
- D. Medication use history

Considerations for an Optimal Medication Regimen



- Behavioral

- Patient-reported goals
- Adherence
 - ✦ Adverse effects
 - ✦ Dosing frequency
 - ✦ Cost
 - ✦ Misconceptions, fears
- Activity patterns
 - ✦ Medication use
 - ✦ Meal regularity
 - ✦ Sleep/work
 - ✦ Exercise

- Medical

- Renal dysfunction
- Hepatic dysfunction
- GI comorbidities
- Fall risk
- Weight
- Glycemic control
 - ✦ HbA1c reduction needed
 - ✦ Glucose patterns

Behavioral Interview: Adherence



- **Adverse effects**

“I can feel my blood sugar dropping in the middle of the night. I wake up sweaty and shaking about three times a week.”

“I keep a bag of Sour Patch Kids and a Pepsi next to my bed just in case. If I feel like my blood sugar is low, I eat the candy and drink the soda and try to go back to bed.”

Behavioral Interview: Activity Patterns



- **Medication use: when and how?**

“I take the long-acting insulin twice a day at 9:00AM and 1:00AM, and the mealtime insulin before breakfast and lunch if I need to.”

“I can’t give my insulin at work because I usually don’t have my meter with me. I try to remember to bring it to work but sometimes I forget.”

“I can’t risk having my blood sugar drop too low at work. I try to eat a big dinner to make sure I can get through my shift.”

“I always check my blood sugar when I get home from work. If it’s too high, I give my insulin then instead.”

Behavioral Interview: Activity Patterns



- **Meal patterns**

- ✦ Breakfast (9:00AM): Often skips. Otherwise, 1-2 scrambled eggs, coffee w/ cream and Splenda.
- ✦ Lunch (1:00PM): Turkey sandwich and an apple.
- ✦ Dinner (8:00PM): Pizza, pasta, or rice w/ beans and chicken. Sometimes small piece of pie or ice cream.

- **Sleep/work schedule**

- ✦ Sleeps 1AM - 8:30AM
- ✦ Works in kitchen at a local hotel restaurant, typically 2PM-12AM.

- **Exercise**

- ✦ *"I walk a lot at work."*

Chart Review



- **Weight**

- Weight = 224 lbs
- BMI = 32.1

- **Glycemic control**

- HbA1c = 8.9%
- Glucose patterns:
 - ✦ AM FBG: 150s-180s
 - ✦ Pre-lunch: 80s-110s
 - ✦ Bedtime: 280-320s

Assessment



- Behavioral

- Patient-Reported Goals:
 - ✦ Avoid additional insulin, hypoglycemia
- Adherence hindered by hypoglycemia
- Inappropriate prandial insulin use
- Hypoglycemia treatment:
 - ✦ Overcompensating with candy and soda

- Medical

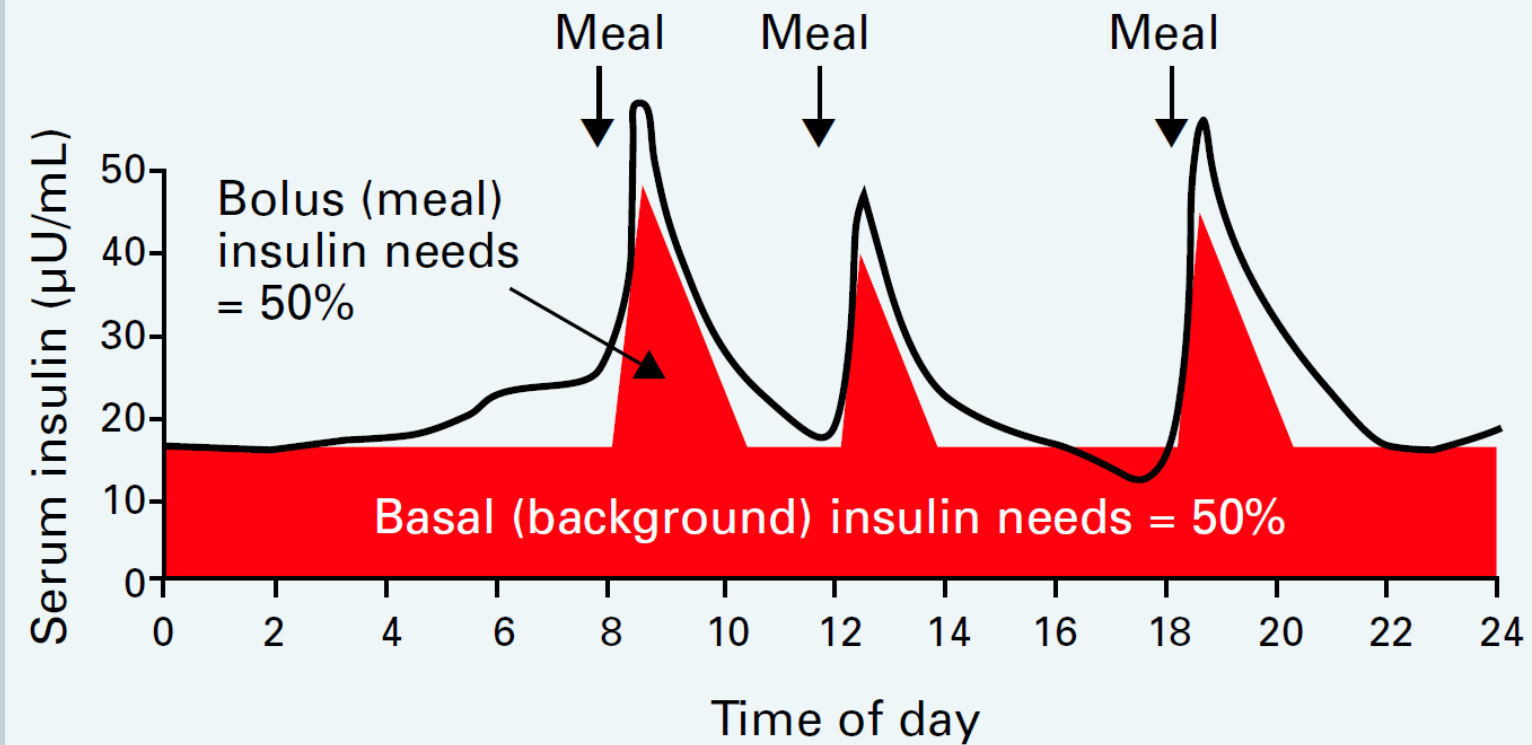
- Obesity (BMI 32.1)
- Glycemic control:
 - ✦ HbA1c elevated at 8.9%
 - ✦ AM FBG elevated (goal 80-130 mg/dL)
 - ✦ PPG (HS) elevated (goal <180 mg/dL)

Assessment



| | Blood Glucose | Prandial Insulin Use | Carb Intake |
|------------------|---------------|----------------------|-------------|
| Breakfast | 150s-180s | 14 units | Minimal |
| Lunch | 80s-110s | 0-12 units | Average |
| Dinner | ? | None | High |
| Bedtime | 280s-320s | 18-20 units | None |

Endogenous Insulin Secretion



Audience Poll



What step would you take next?

- A. Increase glargine dose
- B. Hold aspart before breakfast and emphasize use before dinner
- C. Transition to standing doses of aspart before meals
- D. Lower glargine dose and consolidate into once-daily dosing

Audience Poll



You decide to continue with Lantus 36u BID and Novolog sliding scale before lunch and dinner.

When would you request that the patient test BG?

- A. Before meals and 2 hours after meals
- B. Before meals and at bedtime
- C. Before meals
- D. Before meals and 2 hours after dinner

Case 2: Part 2



TH returns to your clinic in 6 months for follow-up. He has been followed by the diabetes educator in your clinic to adjust his insulin and is no longer experiencing any signs or symptoms of hypoglycemia.

Vitals:

- BP 132/74
- HR 72
- Wt 222 lbs
- Ht 5'10"
- BMI 31.9

Pertinent Labs:

- HbA1c = 6.9%
- SCr = 0.9 mg/dL
- LDL = 105 mg/dL

Medications:

- Lisinopril 20mg daily
- ASA 81mg daily
- Amlodipine 5mg daily
- Atorvastatin 40mg daily
- Insulin glargine (Lantus®) 18 units BID
- Insulin aspart (Novolog®) 4 units before breakfast, 6 units lunch, 6 units dinner
- Omeprazole 20mg daily

Case 2: Part 2



“I’ve been working on my diet because I really want to lose weight and get off of this insulin. I’ve cut out all of the foods I like – desserts, pizza, pasta - and all I’m eating for dinner now is chicken or fish and vegetables. I’m frustrated because I haven’t lost any weight, and I’m tired of poking myself so many times every day. I feel like I just want to give up.”

Audience Poll



What would you do next?

- A. Add metformin
- B. Add a GLP-1 agonist and discontinue mealtime insulin
- C. Consolidate Lantus dosing to once-daily
- D. Transition to pre-mixed insulin

Audience Poll



What additional information would you most like to have?

- A. Details regarding meal patterns and insulin use
- B. Blood glucose patterns throughout the day
- C. Hypoglycemia treatment strategy
- D. Medication use history

Considerations for an Optimal Medication Regimen



- Behavioral

- Patient-reported goals
- Adherence
 - ✦ Adverse effects
 - ✦ Dosing frequency
 - ✦ Cost
 - ✦ Misconceptions, fears
- Activity patterns
 - ✦ Medication use
 - ✦ Meal regularity
 - ✦ Sleep/work
 - ✦ Exercise

- Medical

- Renal dysfunction
- Hepatic dysfunction
- GI comorbidities
- Fall risk
- Weight
- Glycemic control
 - ✦ HbA1c reduction needed
 - ✦ Glucose patterns

Behavioral Interview: Adherence



- **Adverse effects:** *“I can’t lose weight...”*
- **Dosing frequency:** *“It’s not easy to get my insulin dose in at work.”*
- **Cost:** *“I have great insurance.”*

Behavioral Interview: Activity Patterns



- **Medication use: when and how?**

“I take the long-acting insulin twice a day at 9:00AM and 1:00AM, and the mealtime insulin before breakfast and lunch if I need to.”

“For my mealtime insulin, I give 4 units before breakfast, 6 units before lunch, and 6 units before dinner.”

“I skip my mealtime dose if I’m not eating or if my blood sugar is lower than 80.”

“I used to take pills for my diabetes, but I stopped those when I started the insulin. They just weren’t strong enough for me anymore.”

Behavioral Interview: Activity Patterns



- **Meal patterns:**

- ✦ Breakfast: 1-2 scrambled eggs, 1 piece of whole wheat toast with butter, coffee w/ skim milk and Splenda.
- ✦ Lunch: Turkey sandwich and an apple.
- ✦ Dinner: Chicken or white fish; broccoli, cauliflower or spinach salad; ½ cup of brown rice. Sometimes a piece of fruit.

- **Sleep/work schedule:**

- ✦ Sleeps 1AM - 8:30AM
- ✦ Works in kitchen at a local hotel restaurant, typically 2PM-12AM.

- **Exercise:** *“I walk a lot at work.”*

Chart Review



- **Weight**

- Weight = 222 lbs
- BMI = 31.9

- **Glycemic control**

- HbA1c = 6.9%
- Glucose patterns:
 - ✦ AM FBG: 90s-110s
 - ✦ Pre-lunch: 110s-130s
 - ✦ Pre-dinner: 100s-130s

Assessment



Patient-reported goals:

- Weight loss

Glycemic control:

- HbA1c at goal
- AM FBG at goal (80-130 mg/dL)
- Pre-meal readings at goal (80-130 mg/dL)

Adverse effects:

- None reported

Weight Considerations:

- Obese (BMI 31.9)

Medication use:

- Administering appropriately
- Prandial insulin doses are balanced with reported carb intake

Assessment



- Behavioral

- Patient-Reported Goals:
 - ✦ Weight loss
 - ✦ Convenient dosing regimen
- Activity Patterns:
 - ✦ Insulin use appropriate
 - ✦ Meals are healthier and more consistent

- Medical

- No weight loss despite improvement in diet
- Glycemic control:
 - ✦ HbA1c at goal
 - ✦ Pre-meal glucose readings at goal

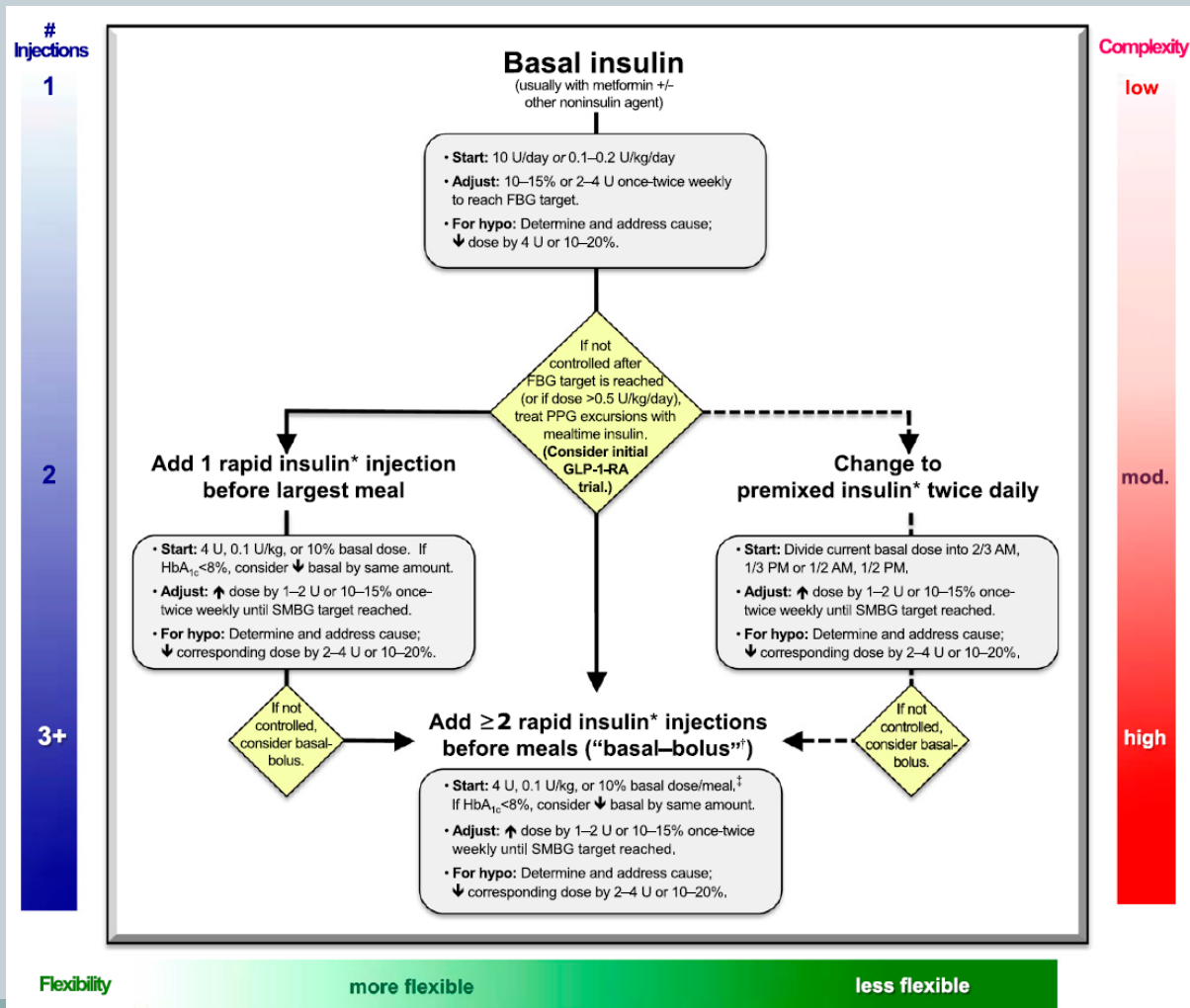
Audience Poll



What step would you take next?

- A. Add metformin
- B. Add a GLP-1 agonist and discontinue mealtime insulin
- C. Consolidate Lantus dosing to once-daily
- D. Transition to pre-mixed insulin

Considering Regimen Complexity



Comparison of Second-Line Options



| Drug class | Expected HbA1c Reduction | Effects on Weight | Hypoglycemia Risk | Cost | Dosing Frequency | Notable adverse effects/Precautions |
|--------------------------|--------------------------|-------------------|-------------------|----------|--------------------------------|---|
| Sulfonylureas | 1 to 1.5% | Gain | Moderate | Low | Once to twice daily | |
| DPP-4 inhibitors | 0.5 to 1% | Neutral | Low | High | Once daily | <ul style="list-style-type: none"> •? Acute pancreatitis •? Increased CHF hospitalizations |
| GLP-1 agonists | 1 to 1.5% | Loss | Low | High | Once weekly to twice daily | <ul style="list-style-type: none"> •GI side effects •? Acute pancreatitis •? Thyroid cancer |
| SGLT-2 inhibitors | 0.5 to 1% | Loss | Low | High | Once daily | <ul style="list-style-type: none"> •Genital mycotic infections •UTI •Diuretic effects •↑SCr (transient) |

Pre-Mixed Insulins



Advantages

- Easy to use
- Fewer daily injections than physiologic regimens
- Cover basal, prandial insulin requirements

Disadvantages

- Meals must be very well planned and consistent
- Difficult to target fasting vs. post-prandial goals
- Increased risk of hypoglycemia

Audience Poll



You decide to do the following:

- Consolidate Lantus to 36u daily
- Discontinue Novolog insulin
- Initiate liraglutide 0.6mg once daily
- Initiate metformin XR 500mg once daily

When would you request that the patient test BG?

- A. Before meals and 2 hours after meals
- B. Before meals and at bedtime
- C. Before meals
- D. Before breakfast and 2 hours after dinner

Questions?



Jennifer Allen, PharmD, CDE, BCACP
jnallen@partners.org

Sonia Freitas, PharmD, CDE, BCACP
sfreitas@partners.org



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