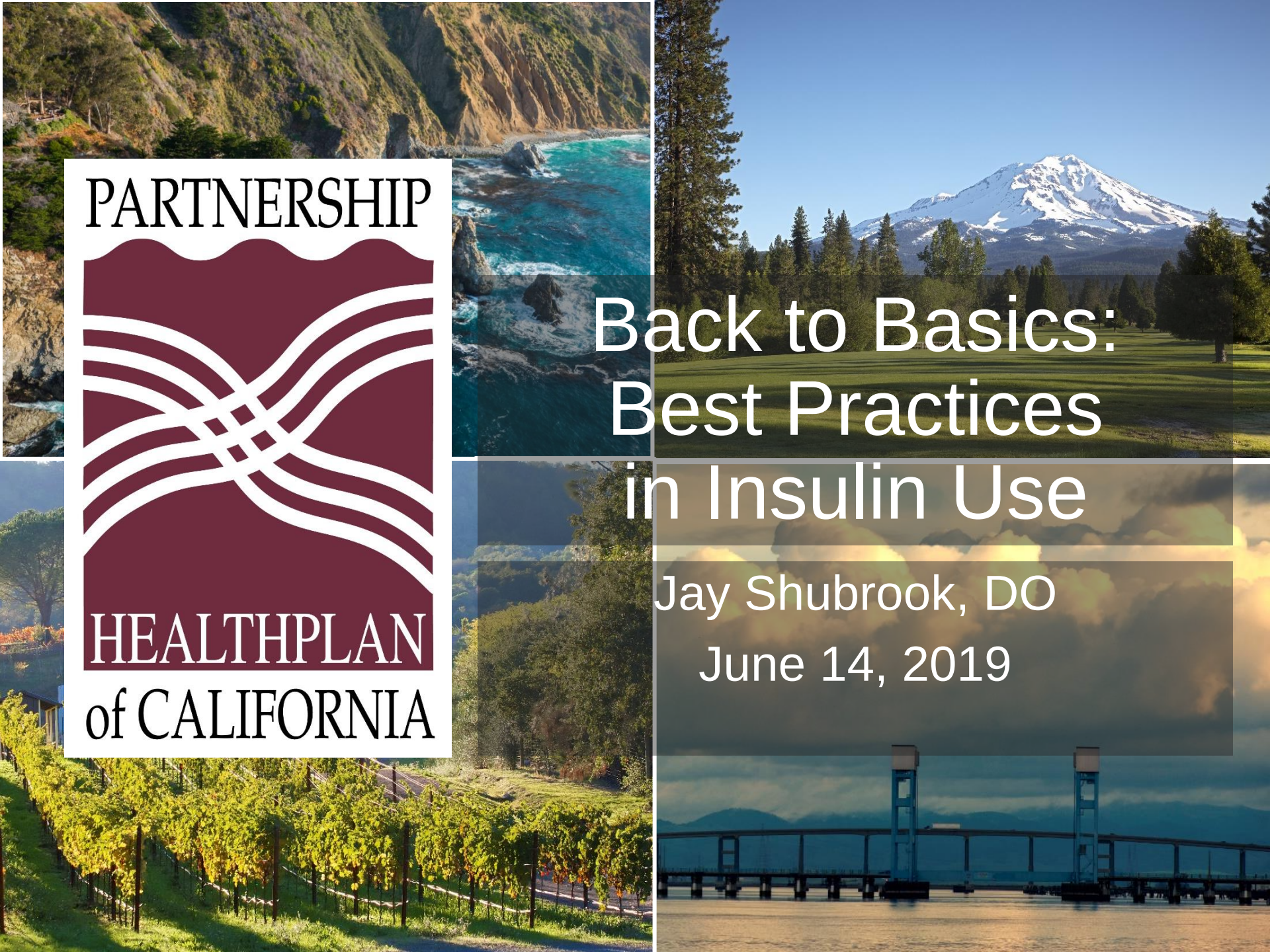


PARTNERSHIP HEALTHPLAN of CALIFORNIA

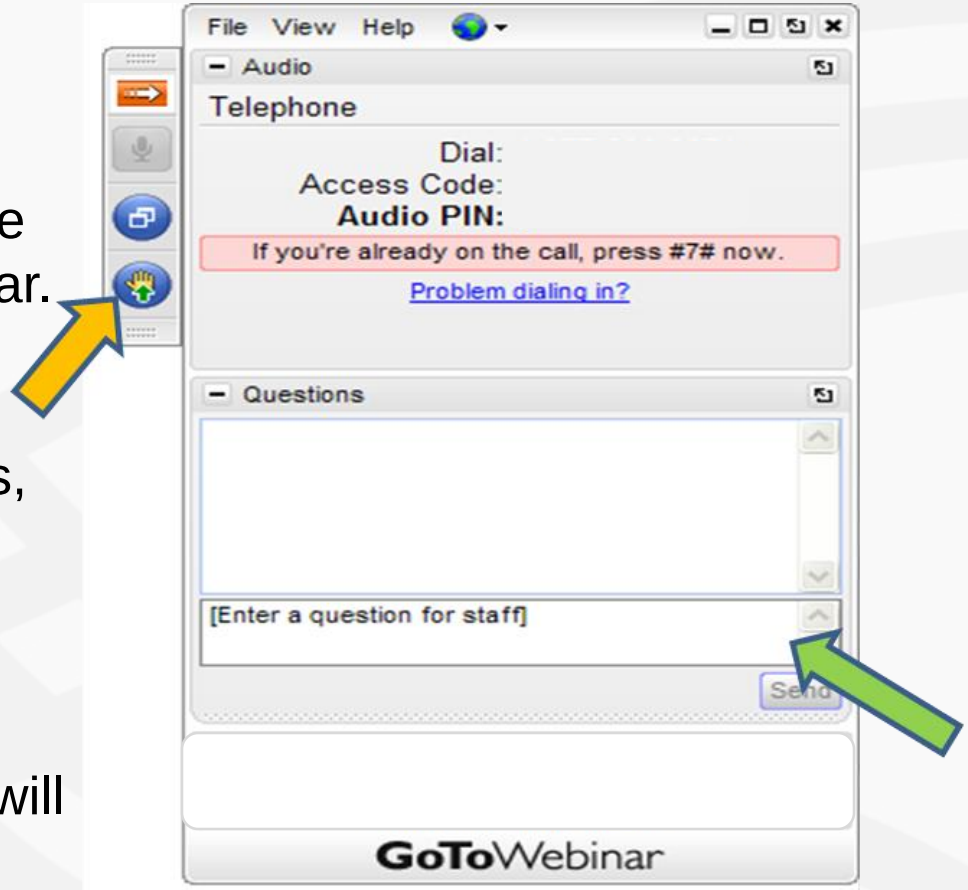
Back to Basics: Best Practices in Insulin Use

Jay Shubrook, DO

June 14, 2019

Technical Instructions

To avoid echoes and feedback, we request that you **use the telephone** instead of your computer microphone for listening/talking during the webinar.



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This webinar is being recorded and will be available on Partnership HealthPlan's website. Please visit www.partnershiphp.org

PARTNERSHIP HEALTHPLAN of CALIFORNIA

About Me

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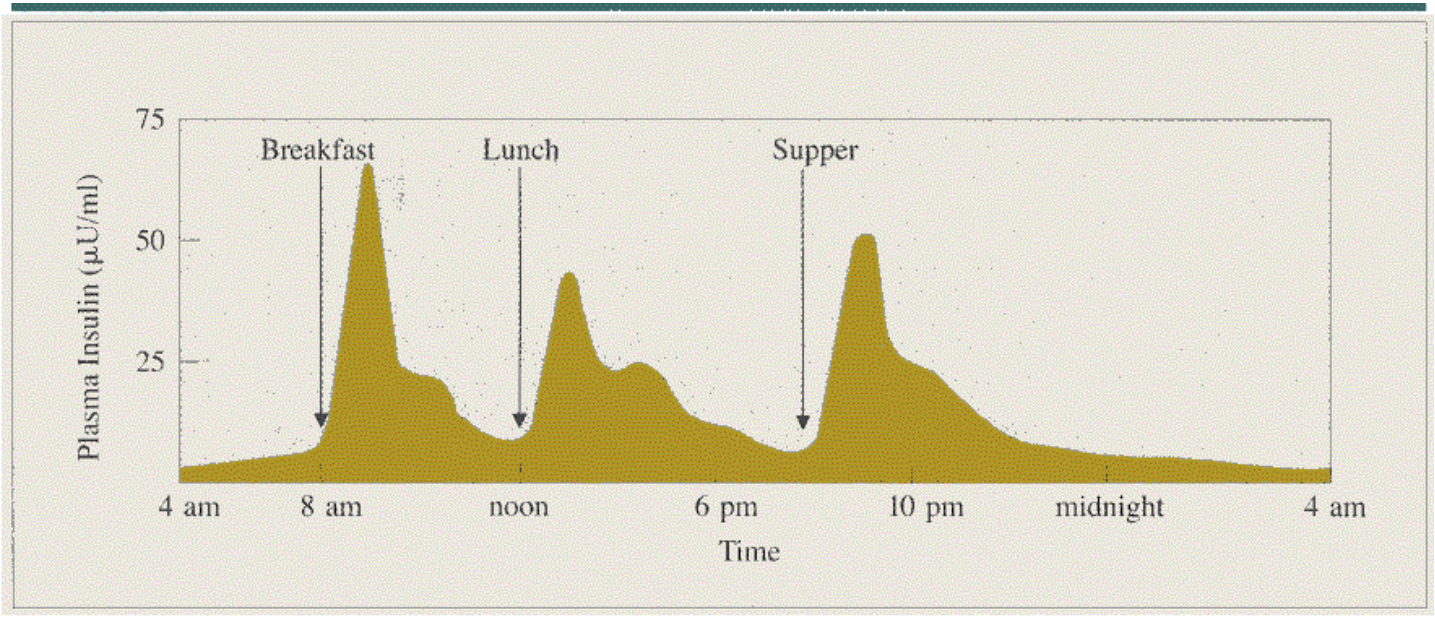
Objectives

- Discuss clinical aspects of pharmacologic insulin formulations
- Review common challenges with insulin use
- Use a case based approach to demonstrate best practices for insulin use in T2DM

Physiologic Insulin Release



Basal and Prandial Insulin

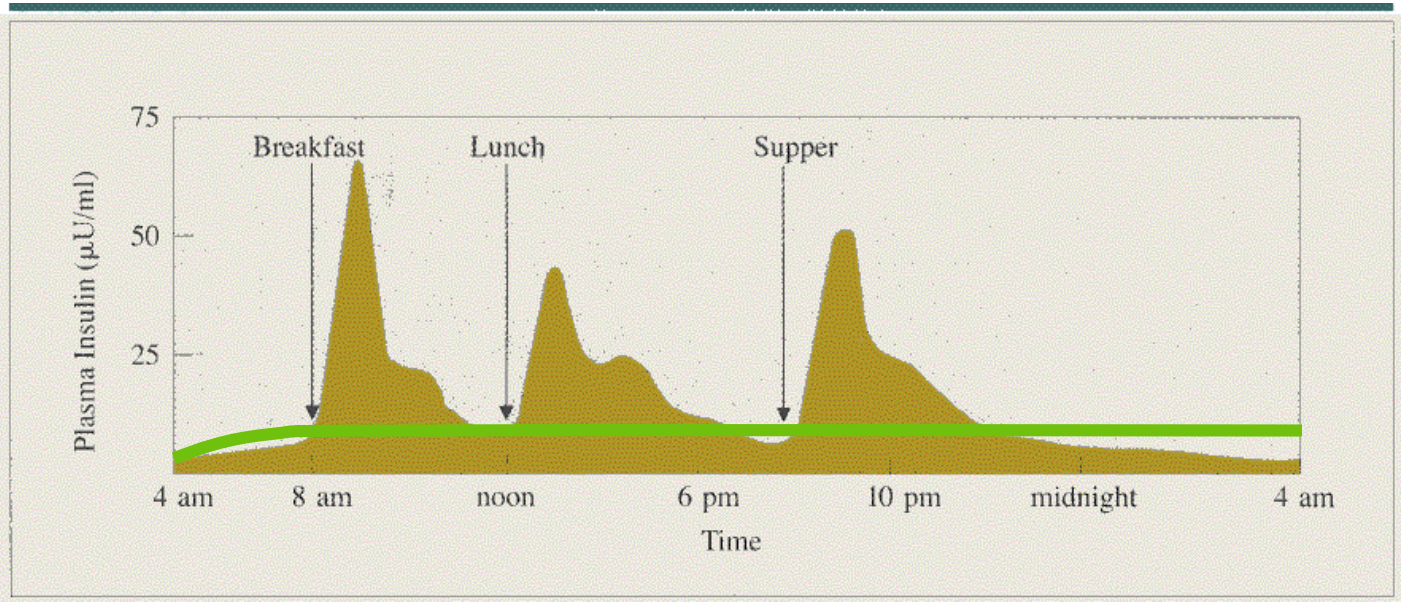
Basal insulin

- Required for resting metabolic needs
- Suppresses glucose production at night and between meals
- Stays relatively constant
- Usually is half of total daily insulin needs

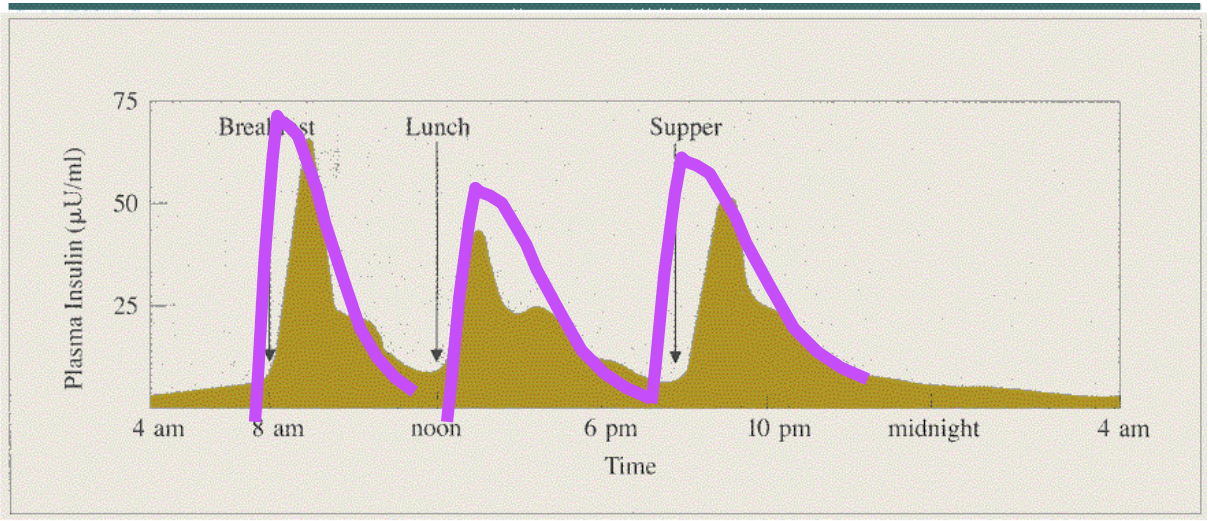
Prandial insulin

- Limits/prevent post-prandial hyperglycemia
- Physiologic two phase release
  - First phase immediate and lasts 1-2 hours
  - Delayed slower to peak second phase
- Each meal about 10-20% of daily insulin needs

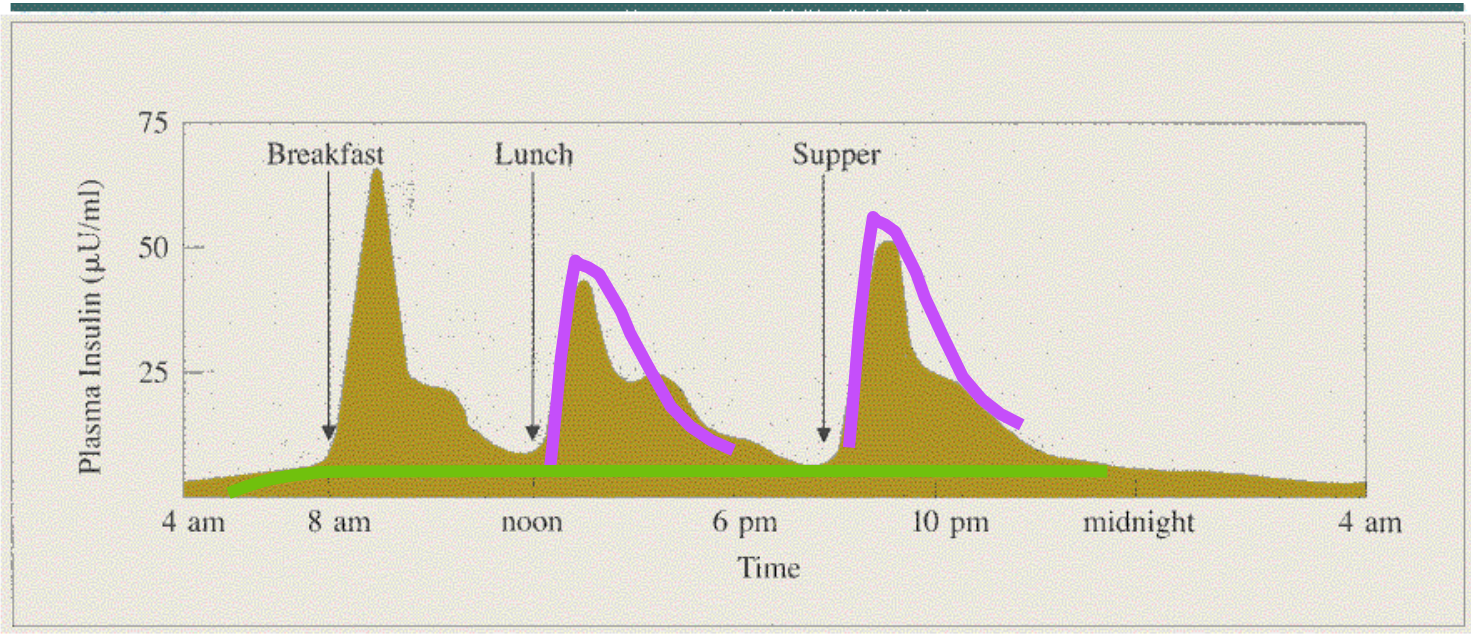
Physiologic Insulin Replacement



Physiologic Insulin Replacement



Physiologic Insulin Replacement



Factors Affecting Absorption

- Injection site
- Depth of injection
- Exercise
- Body temperature
- Insulin type and dose
- Insulin mixture

Best Practices in Insulin Use

- Do not use insulin as a weapon
- Insulin does not have to be a lifetime medication
- Start a weight-based dose
- First injection in the office
- Have a titration plan
- Do not under estimate the value of glucose readings
- Always look at injection sites

Insulin Landscape: Basal Insulin

	Branded names	Onset	Peak	Duration	Cost	Notes
NPH	**HumuLIN** **NovoLIN** **ReliON**	1-2 hours	4-8 hours	6-12 hours	$100 $100 $26	Pens,vials Pens.vials vials
Glargine (U100)	Lantus **Basaglar**	1-4 hours	No peak	24 hours	$200 $150	Pens,vials Pens only
Detemir	Levemir	1-4 hours	No peak	20-23 hours	$300	Pens, vials
Glargine U300	Toujeo	6 hours	No peak	24 hours	$300	Pens only
Degludec U100, U200	Tresiba	1 hour	No peak	42 hours	$500	Pens only

Insulin Landscape: Meal-Time Insulin

	Branded names	Onset	Peak	Duration	Cost	Notes
Regular (R)	**HumuLIN** **NovoLIN** **ReliON**	30-45 minutes	2-5hours	4-8 hours	$100 $100 $26	Pens, vials Pens, vials Vials only
Aspart	NovoLOG	15 minutes	1-2 hours	2-4 hours	$300	Pens, vials
Glulisine	Apidra	15 minutes	1-2 hours	2-4 hours		Pens, vials
Lispro	Humalog **Admelog**	15 minutes	1-2 hours	2-4 hours	$180 $240	Pens, vials Pens, vials

Bold products are PHP preferred

Case 1: Betty

Betty is a 48 year old female with 10 years of type 2 diabetes. She had GDM with each of her three pregnancies, and it never went away after the birth of her third child.

She has been to diabetes education (in pregnancy) and thinks she has a good idea of how to handle it, but it is hard as she is the main caregiver for her family.

She currently takes metformin 1000 mg bid, glipizide 10 mg bid. This has worked in the past, but she is having a hard time keeping up with managing her diabetes.

Case 1: Betty

Vitals: Bp 128/78, P 72 R 12 Wt 220 lbs (100 kg), BMI 34
Exam – truncal obesity, acanthosis
Otherwise normal exam
HbA1c 11.4%
Fasting glucose 248 mg/dl
Random SMBG mean 278 mg/dl
Total cholesterol 248, trigs 220, LDL 168, HDL 36 (diabetic dyslipidemia)
Mild elevation of AST, ALT

Case 1: Betty

What is the next treatment step?

A. send to diabetes education- restart lifestyle efforts

B. start basal insulin

C. start a GLP-1 Receptor Agonist

D. start a SGLT-2 Inhibitor

Case 1: Betty

Key times to recommend diabetes self management education and support

- At diagnosis
- When new complicating factors arise
- When transitions of care occur
- Annually for health maintenance

Diabetes education 10 years ago and while pregnant may look different than now

Case 1: Betty / Starting Insulin

Key times to start insulin

- New diagnosis and unsure what type of diabetes
- When patient is experiencing glucose toxicity
- Polys and /or weight loss
- Fasting above 200 mg/dl

How to start a basal insulin (weight based is best)

- Glargine/Detemir– 0.2 units/kg once daily
- NPH- 0.1 unit/kg twice daily at least 10 hours apart

Case 1: Betty

Case 1: Insulin titration Question

Which of the following has been shown to be most effective?

A. Health care provider driven insulin titration

B. Insulin titration only at face to face appointments

C. Insulin titration completed by patient with scheduled plan

Basal Insulin Titration

Many options for titration

Patient driven (provider guided) titration are best

- 1 unit per injection per day
- 3-5 units per injection per 1 -2 x week

Stop titration at:

- Dose is 0.5 units/kg/day
- Hypoglycemia

Examples

Let's try a couple examples

- Robert 55 year old male. His A1c is 10.4%.
  He weighs 80 kg.

- Please share how you would start glargine (basaglar)
- Include starting dose
- titration
- Plan for when he should return
- What you will do with metformin and glipizide?

Examples

Let's try a couple examples

- Betty-she weighs 100 kg and her A1c is 11.4%
- She is on metformin and glipizide
- How would you start NPH?
- How would you titrate this medication?
- What would you do with metformin and glipizide?

Key Steps to Use Best Practices

- Start a weight-based dose
- First injection in the office
- **Have a titration plan**
- Do not use insulin as a weapon
- Insulin does not have to be a lifetime medication
- Do not underestimate the value of glucose readings
- Always look at injection sites

Case 2: Maria

Maria is a 58 year old female with 10 years of type 2 diabetes. She currently takes metformin 1000 mg bid, glipizide 10 mg bid and Glargine 80 units once daily evening.

She is frustrated. She checks her glucose each morning, and it is usually pretty good – 60mg/dl- 140 mg/dl. She does get random high readings some mornings and is not sure why.

If she misses lunch she gets real hungry and shaky.

Every time she comes to the doctor, her glucose is high, and she cannot seem to get her A1c below 8.4%

Case 2: Maria

Question

- What do you suggest as a next step?
  - A. Move glargine injection to the morning
  - B. Split the glargine injection to half morning and half evening
  - C. Change to NPH twice daily
  - D. Add meal time insulin
  - E. Add a different agent

Case 2: Maria's Logs

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	142	68	112	120	56	246
278 church event				248 2 pm office		

What do you notice on these logs?

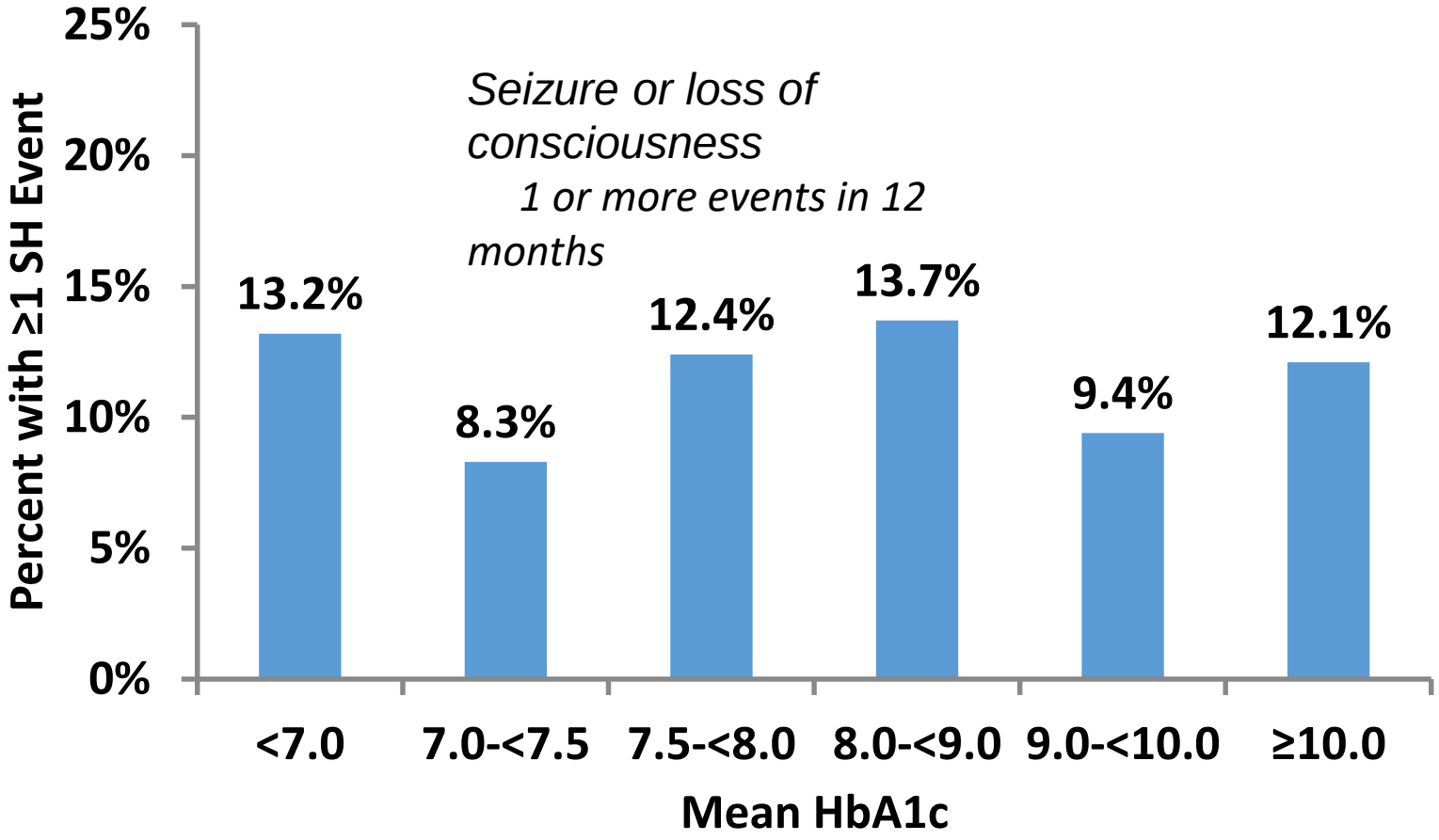
Case 2: Maria

Case 2: Problem List

- She is over-basalized (too much basal insulin)
  - She has first am glucose variability
  - She will drop low if she misses a meal
- She has inadequate coverage for her meals
- She is on 2 agents that could drop her low (SU and insulin)
- She is not using her SMBG as a tool to her direct therapy

Severe Hypoglycemia

Severe Hypoglycemia is Not Related to A1C Level



Case 2: Maria

Best Practices

Limit titration of basal insulin to:

- Glucose in am at goal (Regardless of HgA1c)
- Dose of 1 unit/kg/day (risks> benefits about 0.7 units/kg/day)
- If there is a big drop in the BE.AM. –bedtime to am glucose

Target glucose monitoring to provide you with needed info

- First am while titrating basal insulin
- Once at goal move glucose checks to other times in the day

Case 2: Maria

Case Continued

Maria comes back for a recheck

- You gave her the choice to stop Glipizide or reduce insulin
- She wanted to reduce insulin first (she says the shots burn)
  - You eventually got her down to 55 units per day
  - She is still taking the Glipizide and metformin
- Her hypoglycemic episodes have decreased
- Her am readings 100-140 mg/dl
- After dinner 180-240 mg/dl
- No lows seen on her logs
- A1c =8.4%

Case 2: Maria

What is Your Next Step for Maria?

- She is on basaglar and metformin for her fasting glucose
- She is taking Glipizide 2 times per day for meal time hyperglycemia but she is still jumping high after meals
- She is trying to be more moderate with her carb intake
  - Will choose 1 carb choice per meal
    - 2 small corn tortillas
    - Rice or juice
- She walks her grandkids to and from school on weekdays

Case 2: Maria

What is Your Next Step for Maria?

- Increase basal insulin
- Add a meal time insulin (Biosimilar Lispro-Admelog ® preferred)
- Add a GLP-1 receptor agonists (Liraglutide-Victoza ® PHP preferred)
- Add a DPP-4 inhibitor (alogliptin- Nesina® preferred)
- Add a SGLT-2 inhibitor (ertugliflozin-Steglatro® preferred)

Meal-Time Focused Medications

Medication	Strength	Side effects	Notes
DPP-4 inhibitors	Weak 0.4-0.7 % A1c	Joint pain, URI	Weakest option—always start at highest dose
GLP-1RA	Strong	GI side effects	CV benefits, Renal benefits Weight loss
SGLT-2 inhibitors	moderate	UTI Genial mycotic infections Fournier's gangrene Euglycemic DKA	CV benefits, Renal benefits Heart Failure Benefit, Weight loss Lower BP Glucoretic
Meal time insulin	Strong	Weight gain hypoglycemia	Greatest risk of hypoglycemia

Case 3: Junior

Junior is a 64-year-old male who says his insulin is not working anymore. He has had diabetes for 15 years, and he has been on insulin for 5 years. He is taking glargine (U100) 60 units per day.

He said he really noticed a difference when he started this, but he thinks his body is rejecting it now. He also is between jobs, and he is worried about the cost of his insulin.

He also takes metformin 1000 mg bid, glipizide 10 mg bid, lisinopril HCT 20/25 daily and atorvastatin 40 mg daily.

He is recently divorced and has had to assume more self care.

His A1c is 10.2% and he is wanting to get back in control to have more time with his grandkids.

Case 3: Junior

Question: Next Steps?

What would you do next to evaluate Junior?

A. Review timing of medication schedule
B. Send back to diabetes education
C. Review location and technique of insulin dosing
D. Remind him that diabetes is progressive

Case 3: Junior / Technique

He has been doing his own injections for the past year

Has his favorite spots

Has gotten really good at doing it quick

Admits he hits hard spots

Says he can sometimes smell the insulin

Case 3: Junior

Junior's Injection Sites: What Do You See?

Injection Sites

Case 3: Junior

Question

The cost of his medications are major concern for him. What can we do to reduce his medication expenses? Assuming you want to put him on a human insulin routine how would you do this?

A. Regular insulin alone
B. NPH alone
C. NPH and R together
D. Premixed- NPH and R

Case 3: Junior

Clinical Pearl

- Make sure you specify who is teaching insulin injection
- Write prescription in patient's primary language
- Write with max units per day specified
- Review injection technique at least annually

Human Insulin

Converting to Human Insulin

- Typically unit per unit switch
- Must decide if only replacing basal or basal and meal time needs
- NPH and R
- Typically 2/3 NPH 1/3 R and typically 2/3 a.m. and 1/3 p.m.
- BUT many Americans eat more than 50% of their calories after 6 p.m.
  - So I do a 50/50 dosing schedule but will do 2/3 NPH and 1/3 R-this would need to be dose 30 minutes before breakfast and dinner

Human Insulin

Converting to Human Insulin: Example

He was taking 60 units of glargine and glipizide 10 mg bid. (Stop both)

Start Relion brand 70/30

- 30 units before breakfast
- 30 units before dinner
- Ideally 10-12 hours from breakfast to dinner

Alternative

- 23 units of NPH before Breakfast
- 7 units of R before breakfast
- 20 units of NPH before dinner
- 10 units of R before dinner

Questions

- What are the questions you have in relation to interfacing with your patients and other providers when it comes to insulin and type 2 diabetes management?
- What are you commonly seen problems?
- What are the biggest challenges your patients face?
- Any best practices you want to share with the group?

You are invited!

High Impact Diabetes Conference November 9-10th

https://www.eventbrite.com/e/2019-diabetes-update-high-impact-management-for-clinicians-registration-59495303053

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Thanks so much

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