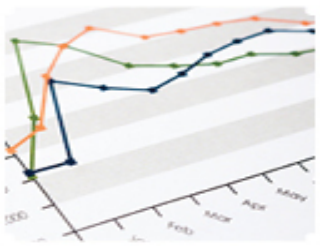


# HRSA Outreach Program

*Western Oklahoma Wellness*

*September 27, 2022*



# Agenda

- Housekeeping Items
- HRSA Outreach Program – Western Oklahoma Wellness
  - Sandra Burchill – OFMQ
- To Insulin and Beyond: Inpatient Diabetes Management
  - Mary Shreffler, PharmD, BCPS
    - OU Health
- Questions & Closing

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# About WOW

- Western Oklahoma Wellness is a program to advance rural healthcare through increased access to care, education, and opportunities to reduce the onset of diabetes and other chronic conditions.
- Counties We Work In:
  - Beckham, Greer, Kiowa, Washita, Roger Mills

# Funded Through HRSA

- We Work With:
  - **ONIE Project**: The Oklahoma Nutrition Information and Education (ONIE) Project promotes healthy living through innovative and creative strategies for communities, families and individuals.
  - **SWOSU Rural Health Center**: The RHC develops programs for community-based healthcare services collaborating with local pharmacies and hospitals for the advancement of the health and well-being of the medically underserved population in Oklahoma.
  - **Community Partners**: County-Specific Health Departments, State Health Department, OSU Extension, Town of Granite, Mangum Regional Hospital, Elkview General Hospital, Cordell Memorial Hospital, Roger Mills Hospital, City of Elk City
- WOW is funded through the HRSA Rural Health Care Outreach Services Program, Grant No. D04RH40277

# Mary Shreffler, PharmD, BCPS



Mary Shreffler is a graduate from the University Of Oklahoma College Of Pharmacy. After graduation, she attended a 24-month Pharmacotherapy Residency in Amarillo, TX at the Texas Tech University School of Pharmacy. She currently is a clinical pharmacist at the Family Medicine Center at University of Oklahoma Health Sciences Center when she splits her time between the inpatient and outpatient setting. In her spare time she enjoys traveling to the National Parks with her family and hosting themed dinner parties for her friends and loved ones.

# Relevant Disclosures

Under the Oklahoma State Medical Association CME guidelines disclosure must be made regarding relevant financial relationships with commercial interests within the last 24 months.

Mary Shreffler, PharmD, BCPS **has no** financial relationships or affiliations to disclose.



# To Insulin and Beyond: Inpatient Diabetes Management

WESTERN OKLAHOMA WELLNESS

MARY SHREFFLER, PHARMD, BCPS

OU HEALTH

SEPTEMBER 27<sup>TH</sup>, 2022

# Financial Disclosures

- ▶ I have no financial disclosures to report

# Objectives

1. Recognize appropriate in-hospital glycemic targets for patients with diabetes.
2. Identify when an A1c should be obtained in hospitalized patients with diabetes.
3. Develop patient-specific insulin titrations when provided diet status, fasting and mealtime blood glucose readings, and total insulin received in a 24-hour period.
4. Evaluate the criteria for continuing oral anti-diabetic medication in hospitalized patients with diabetes

# Outline

- ▶ Inpatient Goals
- ▶ Insulins
- ▶ Non-insulin Medications
- ▶ Patient Cases

# Inpatient Goals

# Monitoring A1c

- ▶ A1c is a marker for the average blood sugar over the last 3 months
- ▶ Should be checked in the following patients:
  - ▶ Diagnosed with diabetes, unless known A1c within the last 3 months
  - ▶ With elevated FSBS > 140

Hgb A1c (%)	Estimated Average Blood Glucose
7	154
8	183
9	212
10	240
11	269
12	298
13	326

# Inpatient Blood Sugar Goals

## Target Glucose Range

- Majority of patients goal is 140 – 180
- Stricter goals may be considered if able to do so without hypoglycemia
- More lenient goals in terminally ill patients

## Monitoring FSBS

- NPO – q4-6h
- Diet – AC HS
  - Continuous tube feeds = consider q6h
- IV insulin – Q2H

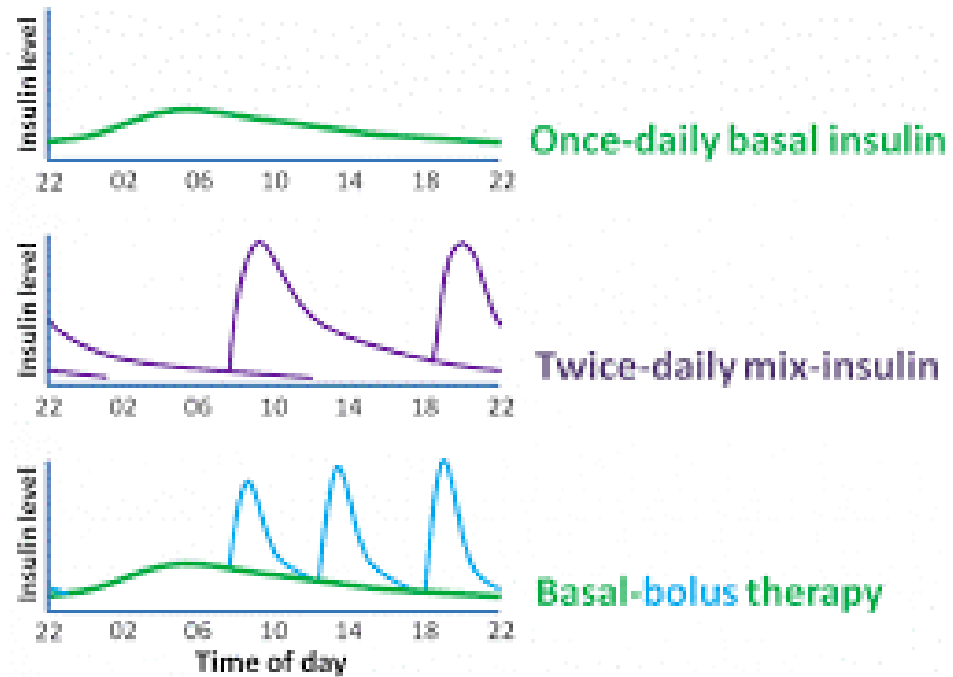
# Management in Older Adults

- ▶ Increase risk for complications
- ▶ Hypoglycemia
  - ▶ Cognitive decline leading to difficulties managing and monitoring medications
  - ▶ Severe hypoglycemia events have an increased risk of dementia
- ▶ Lenient blood glucose goals can still be patient specific
  - ▶ Continue strict goals for an otherwise healthy individual
  - ▶ Relaxed goals for a patient with multiple comorbidities



# Insulin Products

# Pharmacokinetic Review



# Insulin Review

## Basal Insulin

- ▶ Long-acting insulin
- ▶ 18-24 hr duration depending on formulation and dose
  - ▶ Daily vs. BID dosing
- ▶ Includes Intermediate Insulin
  - ▶ NPH

## Bolus Insulin (Meal-time)

- ▶ Short/Rapid acting insulin
- ▶ Needs to be taken with meals
- ▶ Used for treating the postprandial glucose increase

# Basal Insulin Products

Product	Onset of Action	Peak	Duration
Insulin glargine (Lantus <sup>®</sup> , Toujeo <sup>®</sup> , Basaglar <sup>®</sup> , Semglee <sup>®</sup> )	4-5 hours	Peakless	24 hours
Insulin detemir (Levelmir <sup>®</sup> )	2 hours	6-10 hours	12-20 hours
Insulin degludec (Tresiba <sup>®</sup> )	1-4 hours	Peakless	Up to 42 hours
Intermediate Insulin			
NPH	2-4 hours	4-6 hours	8-12 hours

# Basal Insulin Pearls

- ▶ Glargine
  - ▶ Doses that are greater than 60 units can be separated for better tolerability
  - ▶ Toujeo (insulin glargine U-300) is more concentrated, good for patients who are requiring very large doses
    - ▶ Lantus<sup>®</sup> 100 u = 1 mL
    - ▶ Toujeo<sup>®</sup> 300 u = 0.33 mL
- ▶ Detemir
  - ▶ Doses that are less than 0.4 units/kg will not last the full 24 hours
  - ▶ Smaller doses should be dosed BID
- ▶ Degludec
  - ▶ Different titrations due to long half-life
  - ▶ Time to steady state ~ 3 days

# Intermediate Insulins

## NPH

- ▶ Dose BID, can be equal doses
  - ▶ Acts as a basal insulin
- ▶ Q8H can be used
  - ▶ Increased risk of insulin stacking

## NPH 70/30

- ▶ Mix of NPH with regular insulin
- ▶ Dosing is BID
  - ▶ 2/3 of Total Daily Dose (TDD) in AM
  - ▶ 1/3 of TDD in PM
- ▶ Advise for patient to eat protein rich snack at bedtime
- ▶ Used when patient has coverage/cost difficulties

# Insulin Basal Conversions

Starting → Converting to:	Glargine	Levemir	Degludec	NPH
Glargine	1:1 conversion. If levemir is twice daily, reduce by 20% and give daily		Reduce dose by 20% Give levemir in divided doses	1:1 conversion Give as one daily dose Do not titrate more than every 3 to 4 days
Levemir				
Degludec	Reduce dose by 20%, Do not titrate more than every 3 to 4 days		-----	
NPH	1:1 conversion, or reduce by 20% NPH given twice daily (50/50)		Reduce dose by 20% Give NPH in divided doses	-----

# Bolus Insulins

Product	Onset of Action	Peak	Duration
Insulin, regular	30-60 minutes	2-3 hours	4-6 hours
Rapid Acting Insulins			
Aspart Lispro Glulisine	10-15 minutes	1-2 hours	4-6 hours



# Bolus Insulin Pearls

- ▶ Needs to be taken with meals
  - ▶ Regular needs to be dosed before meals or with the first bite
  - ▶ Rapid acting insulins can be taken before meals or IMMEDIATELY after
- ▶ Regular insulin has a higher potential for insulin stacking if patient eats meals closer together
- ▶ Rapid acting insulins are interchangeable with each other, but not interchangeable with regular insulin

# Starting Insulin

## Common Methods

1. Start 10 – 20 units of basal insulin
2. Use chart to the right →
3. If inpatient, can start a sliding scale\*

Total Daily Dose can be all basal or basal/bolus

Patient Characteristic	Est. total daily dose (units / kg)
Normal weight	0.4
Stage 4 CKD, no HD	0.25
Underweight, elderly, HD	0.3
Overweight	0.5
Obese, insulin resistant, Oral steroids	≥ 0.6

# Insulin Therapy – Special Circumstances

## Glucocorticoid Therapy

- ▶ NPH can be considered, given concomitantly with steroids when given daily or twice daily
  - ▶ Pharmacodynamics match up
- ▶ Long-acting insulin should be first choice when long-acting glucocorticoids are being prescribed

## Enteral Nutrition Considerations

### Continuous

NPH every 8 to 12 hours can be considered

If tube feeds are interrupted, consider dextrose 10% infusion

### Bolus

Short or rapid insulin should be considered

Given before each tube feed

# Hypoglycemia Treatment

## Levels of Hypoglycemia

- ▶ Blood glucose  $< 70$  mg/dL = hypoglycemia
- ▶ Level 1: Blood glucose 54-70 mg/dL
- ▶ Level 2: Blood glucose  $< 54$  mg/dL
- ▶ Level 3: altered mental status or physical function requires assistance from another person

## Treatment Options

- ▶ Depends on diet status and level of hypoglycemia
- ▶ 4 – 6 oz of juice or regular soda
- ▶ Glucose tabs 4 tabs po once
- ▶ D50, 25 mL IV push
- ▶ Glucagon 1 mg IM
- ▶ Recheck blood sugar in 15 minutes

# Patient Cases

# Inpatient #1

- ▶ JE is a 43 y/o woman, recently diagnosed with T2DM. Current A1c is 11.3%. She is 5' 7" and weighs 93 kg, with a BMI 32. She is hesitant on starting insulin so only wants to take one shot a day.
  1. What dose of basal insulin would you start?
  2. Which product would you start?
  3. What dose would you start if she was 68 y/o?
  4. How would the original dose change if she had renal dysfunction, CrCl of 32 mL/min?

# Inpatient #2

- ▶ HG, 64 y/o F, 82 kg, recently transferred to the service from the ICU. While in the ICU, she was started on insulin NPH 8 units q8h and her blood sugars are ranging from 170 – 210.
- 1. How would you transition her to basal insulin therapy?
- 2. What change would you make if her blood glucose was consistently above 250?

# Inpatient #3

- ▶ BB, 46 yo, 94 kg, male has been admitted for COVID-19. He was started on remdesivir and continued to have worsening shortness of breath. He was then started on dexamethasone 20 mg po daily.
- 1. What would be an initial insulin treatment for BB?
- 2. How would your recommendation change if:
  1. BB was intubated and started on TPN?
  2. BB was transferred to the floor with recommendations to change to methylprednisolone 125 mg IV q6h?
  3. BB was already taking 35 units basal insulin at home?



# Oral Diabetes Medications Review

# Metformin

- ▶ Remains backbone of diabetes therapy
- ▶ Can be continued inpatient
- ▶ Should be avoided inpatient with increased risk for lactic acidosis
  - ▶ Septic patients
  - ▶ Renal dysfunction
  - ▶ Liver dysfunction
- ▶ Initiating metformin
  - ▶ Recommend daily dosing with biggest meal then increase to twice daily
  - ▶ Helps avoid GI upset

# DDP-4 Inhibitors

- ▶ Well tolerated and effective for blood sugar control
- ▶ Can be utilized with basal insulin
- ▶ Similar blood sugar control to basal-bolus insulin regimen
  - ▶ May have less hypoglycemia risk
- ▶ Recommended to continue if patient is on outpatient therapy
- ▶ May need renal adjustment in renal dysfunction.
- ▶ Examples: sitagliptin, linagliptin

# GLP-1 Receptor Agonists

- ▶ An injectable anti-diabetic medication
- ▶ Recommended first-line in patients with diabetes with concomitant cardiovascular disease
- ▶ Studies have shown use inpatient with basal insulin can help achieve blood sugar goals more often than basal-bolus insulin regimens
- ▶ Use maybe limited by hospital formularies.
- ▶ Examples: liraglutide, exenatide

# SGLT2-Inhibitors

- ▶ Drug of choice for patients with diabetes and concomitant heart failure or diabetic kidney disease
- ▶ Concerns
  - ▶ Euglycemic diabetic ketoacidosis
  - ▶ Increased risk for fungal urinary tract infections
- ▶ More information is needed to know if continuing the medication is more beneficial at this time.
- ▶ Examples: empagliflozin, dapagliflozin

# Sulfonylureas

- ▶ Higher risk of hypoglycemia
  - ▶ Older age
  - ▶ Concurrent treatment with other medications at high risk for hypoglycemia
- ▶ Bottom line
  - ▶ Avoid while inpatient
- ▶ Examples: glipizide, glyburide, glimepiride,

# Thiazolidinodiones, TZDs

- ▶ Outpatient use has decreased significantly
- ▶ Increased risk for heart failure and fluid retention
- ▶ Recommended against use while inpatient
- ▶ Examples: pioglitazone, rosiglitazone

# Oral Diabetes Medication Review

## Consider Continuing

- ▶ Metformin
- ▶ DPP-4 Inhibitors
- ▶ GLP-1 Receptor agonists

## Hold While Inpatient

- ▶ Sulfonylureas
- ▶ SGLT2 Inhibitors
- ▶ Thiazolidinediones, TZDs

\*DPP-4 inhibitors and GLP-1 receptors agonists should not be used together



# Additional Patient Case

# Inpatient Case #4

- ▶ JB is a 58y/o female with the following blood sugars taken while inpatient. Which insulin would you adjust?

	Fasting	Pre-Lunch	Pre-Dinner	Bedtime
Monday	221	177		270
Tuesday	187		180	309
Wednesday	240	149		278
Thursday	216		207	300
Friday	199	162		274
Saturday	182		212	291
Sunday	206	134		267

# Considerations for Discharge

- ▶ Diabetes education
  - ▶ How to administer medications
  - ▶ How to test blood sugars
  - ▶ How to treat hypoglycemia
- ▶ Continuing outpatient medications
  - ▶ Dose adjustments may be needed in continued renal dysfunction
- ▶ Close follow-up
  - ▶ Recommend to see primary care physician in 2 weeks or less
  - ▶ Outside diabetes management

# To Insulin and Beyond: Inpatient Diabetes Management

WOW OUTREACH

MARY SHREFFLER, PHARM.D, BCPS

OU HEALTH

SEPTEMBER 27<sup>TH</sup>, 2022

# Questions?



# Upcoming Events

- *Webinar Series: Food Insecurity in Rural Communities*
  - Hunger Free Oklahoma
  - Wednesday, November 9<sup>th</sup> 11am – 12pm
- **WOW Consortium Meeting**
  - December 20<sup>th</sup> 2-3pm
  - Teams Meeting

**For more information on WOW and to join our consortium:**

**Email [jnoble@ofmq.com](mailto:jnoble@ofmq.com)**

