Disclosure to Participants

- Notice of Requirements For Successful Completion
  - Please refer to learning goals and objectives.
  - Learners must attend the full activity and complete the evaluation in order to claim continuing education credit/hours.

- Conflict of Interest (COI) and Financial Relationship Disclosures:
  - Field Trainer for DexCom Corporation
  - Certified Pump Trainer for Medtronic Corporation
  - Certified Pump Trainer for Insulet Corporation

- Non-Endorsement of Products:
  - Accredited status does not imply endorsement by AADE, ANCC, ACPE or CDR of any commercial products displayed in conjunction with this educational activity.

- Off-Label Use:
  - I will not be endorsing any products or recommending any off-label uses of any therapies or devices.
Learning Objectives

• Learner will understand the difference between basal and mealtime insulin.
• Learner will understand the time action profile of basal and mealtime insulins.
• Learner will understand how to calculate an insulin carbohydrate ratio and insulin sensitivity factor.
• Learner will understand the guidelines for teach patients to dose insulin.

Insulin Boot Camp 101

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Understanding Insulin Therapies

• In order to teach patient diabetes self management skills an educator must be fluent in diabetic medications and their action on the body.
• Educators must also understand the time action profile of an insulin in order to effectively teach carbohydrate counting, insulin dosing and the interaction between diet and insulin on BS control.
Billable Services

- Accredited DSME/T programs can bill DSME code G0108 – for instruction on insulin administration.
- Registered dietitian can bill MNT code 97802 or 97803 – for teach carbohydrate counting and mealtime insulin dosing.

Role of Basal Insulin

- The primary role of basal insulin is to keep blood glucose levels stable during periods of fasting such as; during sleep cycles or between meals.
- While fasting the liver continues to secrete glucose into the bloodstream. Basal insulin keeps these glucose levels under control.
Basal Insulins
- Intermediate – NPH – Neutral Protamine Hagedorn
- Long acting – Detemir and Glargine
- Ultra Long – Degludec

Intermediate Acting Insulin
- NPH – Neutral Protamine Hagedorn isophane insulin is a crystalline suspension of protamine and zinc
- Brand names: Humalin, Novalin and Walmart “Reli-On” Brand

NPH
- NPH insulin is administered once or twice daily using the 2/3 – 1/3 rule
- NPH frequently comes mixed with regular insulin such as; Humalin or Novalin 70/30
- It works hardest in the 4 to 8 hours after injection and the effects start waning after about 12-16 hours
Long Acting Insulins

- Detemir – brand name: Levemir
- Glargine – brand names: Toujeo, Lantus, Basaglar

Glargine and Detemir

- These basal insulin begin working 90 minutes to 4 hours after injection.
- Remains in the bloodstream for 12 – 18 hours. The length of action is dose dependent.
- They work at a steady rate throughout the day.

Glargine U 300

- This basal insulin begin working 90 minutes to 4 hours after injection.
- Remains in the bloodstream for 20 – 26 hours. The length of action is dose dependent.
- It works at a steady rate throughout the day.
Ultra Long Acting Insulin

- Degludec: Brand name Tresiba

Degludec

- Begins working within 30 to 90 minutes of injection and remains in the bloodstream for up to 42 hours.

- There isn’t a peak time for this insulin.

- It works at a steady rate throughout the day.

**Time Action Profile Comparison**

*Action Profiles of Insulin and Bolus Insulins*

- Basal Insulins
  - Long-Acting
  - Intermediate-Acting
- Basal-Bolus Insulins
  - Regular 6-8 h
  - Regular 22-26 h

*Source: AADE (American Association of Diabetes Educators)*
Degradation of Basal Insulin

• Basal insulin should constitute 40 to 60% of the total daily dose of insulin (TDD).

AACE Guidelines For Calculating an Initial Basal Doses

• A1c < 8% 0.1 – 0.2 U/kg
• A1c > 8% 0.2 – 0.3 U/kg
Injection Basics

• When teaching patients to dose basal insulin encourage dosing at a consistent time
• Injection site locations - abdomen, thigh and arm.
• Rotation injection sites using a M W or clockwise motion.

Safety Basics

• Teach BS targets and a BS testing scheduled
• Teach signs and symptoms of hypoglycemia such as; shaking, sweating, anxiety, hunger and dizziness
• Teach treatment of hypoglycemia using the "The 15 – 15 Rule" and instruct patient to carry glucose source with them at all times
Blood Glucose Targets
• A FBS goal of 90 to 130 is generally considered to be an acceptable initial target for non-pregnant DMT2
• BS targets may vary depending upon patient age
• Patient with a history of heart disease or stroke may need a more liberal target of 140 or 150

Basal Dosing
• If FBS target is not met a patient may be instructed to begin increasing the dose per HCP or AACE guidelines
• Remember FBS targets may vary depending on the starting BS levels

Dosing Adjustment For Basal insulin
• FBS is the plumb line for basal insulin adjustments
• Increase dose every 2-3 days or a using Tuesday-Thursday schedule until BS target is reached
• FBS > 180 add 4 units
• FBS 140 – 180 add 2 units
• FBS 110 – 139 add 1 units
• FBS < 70 reduce 10 – 20%
Using the A1c to Determining the Need For Mealtime Insulin

- Basal insulin corrects FBS but may have little effect on post meal BS
- When A1c levels are between 7.5 – 8.5% post meal BS are involved
- When control is not obtained with oral medications or a GLP-1 receptor agonist mealtime insulin may need to be considered

Transitioning to Mealtime Insulin

- Basal insulin corrects FBS but may have little effect on post meal BS
- When A1c levels are between 7.5 – 8.5% post meal BS are involved
- When control is not obtained with oral medications or a GLP-1 receptor agonist mealtime insulin may need to be considered

Mealtime Insulins

- Fast Acting - Lispro, Aspart, Glulisine
- Rapid Acting - Fiasp
Mealtime Insulin Dose Methods

- Sliding Scale or pre-meal BS correction
- Fix Dose
- Fix Dose + Sliding Scale combination
- Dosing using CHO Counting

Sliding Scale

- Temporary system used to teach when time is limited – discharge from hospital or newly diagnosed
- Based upon a predetermined Insulin Sensitivity Factor
- Usually HCP will use a “Low-Moderate-Intense” Chart

Calculating Insulin Sensitive Factors

- “The Rule of 1800”
- 1800 divided by the total daily dose of insulin = number of points 1 unit of insulin will drop the blood sugar
Fix Doses

• Safer for patients with poor math literacy skills or patients with low motivation

• Start by calculating a meal pattern to match the dose determined by the HCP

• Teach patient to count CHO servings

Meal Pattern

• Pre-determine the meal pattern based on the dose ordered by the HCP

• Teach to patient to count CHO servings and the minimum-maximum number of servings per meal

• Teach patient how to reduce dose for smaller meals

Carbohydrate Counting by Servings

• Three basic carbohydrate containing groups:
  - Bread, cereal, rice, pasta, and starchy vegetables – serving size is 1 slice or 1/3 cup - 1/2 cup
  - Fruits – serving size is 1/2 cup for canned fruit and 1 cup for fresh
  - Milk/yogurt – serving size is 1 cup and 6 oz. respectively
Measure Carbohydrate Servings

- Advise patients to measure foods from the CHO containing food groups using measuring cups

Fix Dose + Sliding Scale

- Patient is instructed by HCP to take a set dose of insulin and add units insulin BS above target based upon the sliding scale provided
- Patient must count CHO servings and follow a meal pattern
- Patient must be taught to make adjustments for normal pre meal BS or smaller meals

Assess Patient's Math Literacy

- Ask the patient if they are good with math?
- Can they do simple math problems?
- Can they make change for a dollar?
Analog Time Action Profile

Carbohydrate Counting Method
- Dosing mealtime insulin based upon the patient's Insulin Carbohydrate Factor

Calculating an Insulin Carbohydrate Ratio
- "500 Rule"
- 500 divided by the Total daily dose of insulin  i.e. 500/50 = 10
- 1 unit of insulin for every 10 grams of CHO
Using Insulin Carbohydrate Ratio

- Calculating a mealtime insulin dose based on grams of CHO is an advanced skill
- Not all patients have math literacy skills and will be able to grasp this concept
- A patient needs to be able to total the number of CHO grams being consumed and divide it by an ICR of 5, 10, or 15

Blood Glucose Correction Formula

- BS – BS target divided by the Insulin Sensitivity Factor = the number of units needed to correct pre meal blood sugar to target BS

Predicting Blood Sugar Response
Effective Mealtime Dosing

• The most effective method of dosing mealtime insulin uses a combination of CHO counting and pre meal BS correction

Tools To Assist With Calculating Doses

• BS checkbooks
• Phone apps
• Insulin delivery devices

Technology
Teaching Reminders

• Assess a patient’s abilities and motivation
• Ask patient about math literacy skills
• Do knowledge check during training
• Watch for the blank stares

Questions and Answers

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