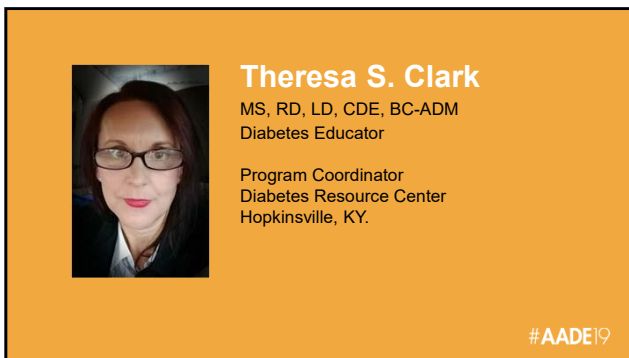
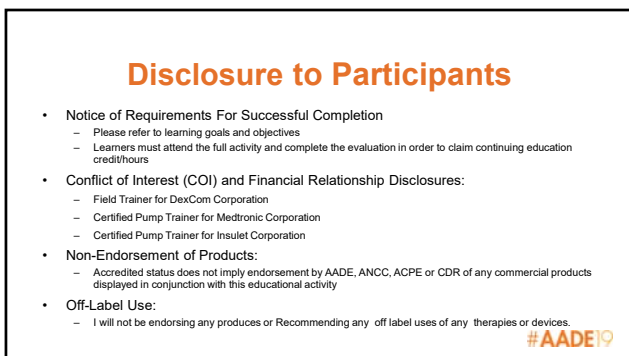


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Learning Objectives

- 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.

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Insulin Boot Camp 101

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 Diabetes Educator

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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.

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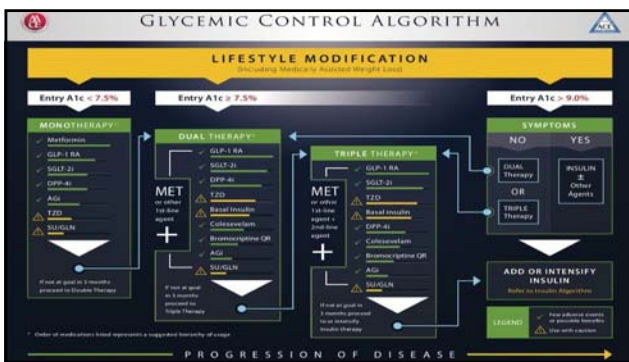
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Billable Services

- 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.

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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.

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Basal Insulins

- Intermediate – NPH – Neutral Protamine Hagedorn
- Long acting – Detemir and Glargine
- Ultra Long – Degludec

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Intermediate Acting Insulin

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

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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

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Long Acting Insulins

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

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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.

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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.

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Ultra Long Acting Insulin

- Degludec: Brand name Tresiba

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Degludec

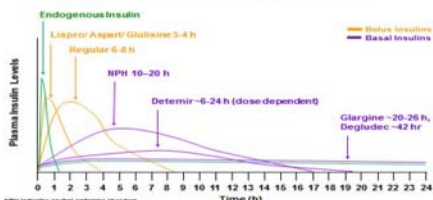
- Begins working within 30 to 90 minutes of injection and remains in the bloodstream for up to 42 hours.
- There isn't a peak time for this insulin.
- It works at a steady rate throughout the day.

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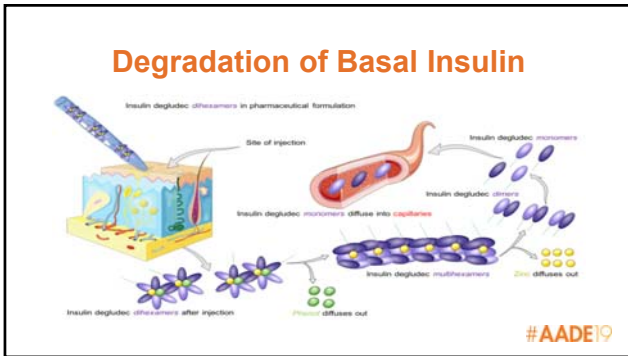
Time Action Profile Comparison

Action Profiles of Basal and Bolus Insulins



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AAACE Guidelines For Calculating an Initial Basal Doses

- A1c < 8% 0.1 – 0.2 U/kg
- A1c > 8% 0.2 – 0.3 U/kg

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Basal Insulin Percentage

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

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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.

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Injection Basics

- Periodically review injection sites
- Proper disposal of pen caps or syringes
- Storage and Insulin shelf life

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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

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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

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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

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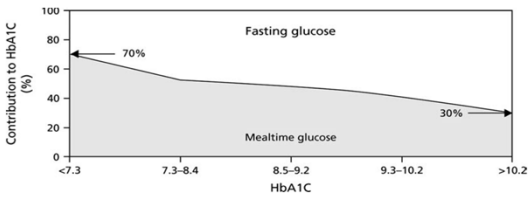
Dosing Adjustment For Basal insulin

- 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%

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Using the A1c to Determining the Need For Mealtime Insulin



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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

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Mealtime Insulins

- Fast Acting - Lispro, Aspart, Glulisine
- Rapid Acting - Fiasp

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Mealtime Insulin Dose Methods

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

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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

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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

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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

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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

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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 1cup and 6 oz. respectively

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Measure Carbohydrate Servings

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

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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 make adjustments for normal pre meal BS or smaller meals

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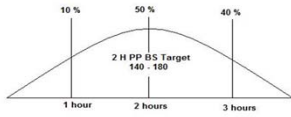
Assess Patient's Math Literacy

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

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Analog Time Action Profile



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Carbohydrate Counting Method

- Dosing mealtime insulin based upon the patients Insulin Carbohydrate Factor

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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

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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 a ICR of 5, 10, or 15

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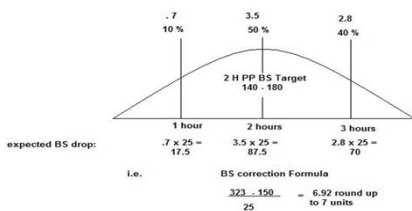
Blood Glucose Correction Formula

- $BS - BS \text{ target} \div \text{Insulin Sensitivity Factor} = \text{the number of units needed to correct pre meal blood sugar to target BS}$

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Predicting Blood Sugar Response



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Effective Mealtime Dosing

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

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Tools To Assist With Calculating Doses

- BS checkbooks
- Phone apps
- Insulin delivery devices

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Technology



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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

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Questions and Answers

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