Carbohydrate Counting for Patients with Diabetes

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Program Purpose

- To increase knowledge of carbohydrate counting skills for nurses caring for patients with diabetes
  - A sound knowledge base of carbohydrate counting is a skill that should be required of all health care professionals caring for patients with diabetes
Program Objectives

At the end of the session Registered Nurses will be able to:

- Define carbohydrate counting
- Identify categories of foods containing carbohydrate
- Identify the relationship between carbohydrates and blood sugar
- Determine the grams of carbohydrate in foods when using the nutritional food label and other carbohydrate counting tools
- Calculate the total grams of carbohydrate per meal
Carbohydrate (CHO) Counting Defined

- Carbohydrate Counting is a meal planning approach that can be used for all patients with diabetes
- It is based on the following ideas:
  1. Carbohydrate is the main nutrient affecting post-prandial glycemic response
  2. Total amount of carbohydrates consumed is more important than the source of carbohydrates
Benefits of Carbohydrate Counting

- It is more flexible than other meal planning methods
- Sugar is not forbidden
- It focuses attention on the foods which are most likely to make blood glucose levels go up
Foods that Contain Carbohydrates

- Breads, cereals, pasta, and grains
- Rice, beans, and starchy vegetables (potatoes, corn, peas)
- Fruit and fruit juices
- Milk and yogurt
- Regular soda, fruit drinks, jelly beans, gum drops
- Cakes, cookies, chocolate candy
Grams of Carbohydrate Per Food Category

- Starch and Fruit: one serving equals about 15 grams of carbohydrate
- Milk: one serving equals about 12 grams of carbohydrate
- Vegetables: one serving equals about 5 grams of carbohydrate

*Please see handout on carbohydrate foods*
Starches
Starch Group

Each amount listed below = 15 grams of carbohydrate

<table>
<thead>
<tr>
<th>Amount</th>
<th>Carbohydrate Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 oz of bagel, bread, roll (1 slice of bread, ¼ of bagel)</td>
<td>15 grams</td>
</tr>
<tr>
<td>¾ cup unsweetened cereal (cheerios, rice krispies, corn flakes)</td>
<td>15 grams</td>
</tr>
<tr>
<td>1/3 cup of higher carbohydrate cereals (raisin bran)</td>
<td>15 grams</td>
</tr>
<tr>
<td>½ English muffin</td>
<td>15 grams</td>
</tr>
<tr>
<td>1/3 cup of cooked pasta, spaghetti, macaroni and cheese</td>
<td>15 grams</td>
</tr>
<tr>
<td>1/3 cup of cooked brown or white rice</td>
<td>15 grams</td>
</tr>
<tr>
<td>½ cup mashed potatoes</td>
<td>15 grams</td>
</tr>
<tr>
<td>½ cup corn, beans, chickpeas, peas</td>
<td>15 grams</td>
</tr>
<tr>
<td>1 small baked potato (3 oz)</td>
<td>15 grams</td>
</tr>
</tbody>
</table>
Fruits and Fruit Juices
Each amount listed below = 15 grams of carbohydrate

<table>
<thead>
<tr>
<th>Amount</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 small fresh fruit (4 oz)</td>
<td></td>
</tr>
<tr>
<td>½ cup canned fruit (in natural juice)</td>
<td></td>
</tr>
<tr>
<td>2 tablespoons of raisins</td>
<td></td>
</tr>
<tr>
<td>17 grapes</td>
<td></td>
</tr>
<tr>
<td>½ cup fruit juice</td>
<td></td>
</tr>
<tr>
<td>1 cup cut up fresh fruit</td>
<td></td>
</tr>
<tr>
<td>1 tablespoon of jelly, jam</td>
<td></td>
</tr>
</tbody>
</table>
Milk and Yogurt
Milk Group

Each amount listed below = approximately 12 grams of carbohydrate

- 8 oz of skim, 1%, 2%, or whole milk
- 1 cup of plain yogurt
- 1 cup of plain or vanilla soy milk
Vegetables
Vegetables

Vegetables are counted as 5 grams of carbohydrate for the following servings sizes:

½ cup of cooked vegetables OR
1 cup of raw vegetables
Foods Without Carbohydrate

The protein and fat group contain 0 grams of carbohydrates.

Examples:

**Protein**: Meat, fish, poultry, cheese, eggs, peanut butter, cottage cheese, tofu

**Fat**: Butter, oils, margarine, mayonnaise, cream cheese, sour cream, nuts, seeds, avocado, salad dressing
# Carbohydrate and Non-Carbohydrate Categories

<table>
<thead>
<tr>
<th>Groups/ Lists</th>
<th>CHO</th>
<th>Protein</th>
<th>Fat</th>
<th>Calories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starch</td>
<td>15</td>
<td>3</td>
<td>1 or less</td>
<td>80</td>
</tr>
<tr>
<td>Fruit</td>
<td>15</td>
<td>0</td>
<td>0</td>
<td>60</td>
</tr>
<tr>
<td>Milk</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skim</td>
<td>12</td>
<td>8</td>
<td>0-3</td>
<td>90</td>
</tr>
<tr>
<td>Low-fat</td>
<td>12</td>
<td>8</td>
<td>5</td>
<td>120</td>
</tr>
<tr>
<td>Whole</td>
<td>12</td>
<td>8</td>
<td>8</td>
<td>150</td>
</tr>
<tr>
<td>Other carbohydrates</td>
<td>12</td>
<td>varies</td>
<td>varies</td>
<td>varies</td>
</tr>
<tr>
<td>Vegetables</td>
<td>5</td>
<td>2</td>
<td>0</td>
<td>25</td>
</tr>
<tr>
<td>Meat and Substitute Group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very lean</td>
<td>0</td>
<td>7</td>
<td>0-1</td>
<td>35</td>
</tr>
<tr>
<td>Lean</td>
<td>0</td>
<td>7</td>
<td>3</td>
<td>55</td>
</tr>
<tr>
<td>Medium-fat</td>
<td>0</td>
<td>7</td>
<td>5</td>
<td>75</td>
</tr>
<tr>
<td>High-fat</td>
<td>0</td>
<td>7</td>
<td>8</td>
<td>100</td>
</tr>
<tr>
<td>Fat Group</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>45</td>
</tr>
</tbody>
</table>
The Relationship Between Carbohydrate and Blood Sugar

- The digestive system converts most digestible carbohydrates into glucose (also known as blood sugar).

- Cells are designed to use this as a universal energy source.

- As blood sugar levels rise, in a non-diabetic individual beta cells in the pancreas churn out more and more insulin, a hormone that signals cells to absorb blood sugar for energy or storage.
Carbohydrate and Blood Sugar in Diabetes

- People with type 1 diabetes, the pancreas does not make any insulin so their cells can't absorb sugar.

- People with type 2 diabetes, the pancreas does not make enough insulin or the insulin is not effective because the cells are insulin resistant.

- Carbohydrates begin to raise blood glucose within approximately 5 minutes after initiation of food intake.

- Carbohydrates are converted to nearly 100% blood glucose within about two hours.
The focus of carbohydrate counting is on the one nutrient that most impacts blood glucose.

Carbohydrate is the primary nutrient affecting blood glucose levels.

People can learn to relate carbohydrate intake with their blood glucose results.
All patients with diabetes should test their blood glucose before and 2 hours after the first bite of the meal.

This is the only way to tell how the choices and amount of carbohydrates they consumed effect their blood sugar.
Blood Sugar Target Ranges

- Fasting/before meals: 90-130 mg/dl
- After meals (2 hours after the 1st bite):
  <180 mg/dl OR 30-50 mg/dl increase from pre-meal to post-meal
Mr. S consumed 90 g of carbohydrate for breakfast (day 1)
- Blood sugar pre-meal = 115 mg/dl
- Blood sugar post-meal = 205 mg/dl

Mr. S consumed 45 g of carbohydrate for breakfast (day 2)
- Blood sugar pre-meal = 125 mg/dl
- Blood sugar post-meal = 150 mg/dl
Carbohydrate Substituting

- When carbohydrate counting, one food item can be substituted for another for a similar impact on blood glucose.

- Example: a small apple (4oz) can be exchanged for 2 small cookies for a similar effect on blood glucose.
Food Labels

*Total Carbohydrate* includes grams of sugar, sugar alcohol, starch, and dietary fiber

*Total Grams of CHO*

To determine amount of carbohydrate eaten, multiply grams of total carbohydrates on the label by the number of servings eaten.
Food Labels

- Example: You just ate 10 crackers from the previous label
- There are 2 crackers per serving
- How many servings did you eat? 5
- How many total carbohydrates did you consume?
  - 10 g per serving x 5 servings = 50 grams
Tools for Carbohydrate Counting

Nutrition Labels

Measuring Tools
Carbohydrate Counting Hand Guide

Fist = 8 fluid oz or 1 cup

Palm = 3 oz.

Handful = 1/2 cup

Thumb = 1 oz.

Thumb tip = 1 tsp.
Carbohydrate allowances for meals and snacks

- Every patient with diabetes should work with a Registered Dietitian or Certified Diabetes Educator to receive an individualized meal plan which will include how many total carbohydrates they should consume at meals and snacks.

- A general guideline for patients would be 45-60 grams per meal and 15-30 grams per snack.
Sample Menu Breakfast

1 ½ cup of cheerios=?
Small banana (4 oz)=?
8 oz 1% milk=?
1 egg =?

How many carbohydrates are in this meal??
*See handout
Sample Menu Breakfast Answers

1 ½ cup of cheerios = 30 grams
Small banana (4 oz) = 15 grams
8 oz 1% milk = 12 grams
1 egg = 0 grams
Total = 52 grams
Sample Menu Lunch

2 slices of bread=?
17 grapes=?
1 cup of raw carrots=?
3 oz tuna fish=?
1 tsp mayonnaise=?

How many carbohydrates are in this meal??
*See handout
Sample Menu Lunch Answers

2 slices of bread = 30 grams
17 grapes = 15 grams
1 cup of raw carrots = 5 grams
3 oz tuna fish = 0 grams
1 tsp mayonnaise = 0 grams
Total = 50 grams
Sample Menu Dinner

1 ½ cups of pasta = ?
1 oz of bread = ?
1 cup of salad = ?
1 tsp of olive oil = ?

How many carbohydrates are in this meal??
*See handout
Sample Menu Dinner Answers

1 ½ cups of pasta = 68 grams
1 oz of bread = 15 grams
1 cup of salad = 5 grams
1 tsp of olive oil = 0 grams
Total = 88 grams
Conclusions

- Carbohydrate counting is a meal planning approach to help people with diabetes attain and maintain glycemic control.
- Carbohydrate counting can help people enjoy a flexible eating plan.
- People with diabetes require education and skill development in order to learn carbohydrate counting.
Thank you!

Questions?