Carbohydrate Counting for Patients With Diabetes

Review Date 4/08    D-0503
Program Objectives

At the end of the session you will know how to:

- Define carbohydrate counting
- 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/meal
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 nondiabetic 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

- Individuals with type 1 diabetes—the pancreas does not make any insulin so their cells can't absorb sugar
- Individuals 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 2 hours
Carbohydrate and Blood Sugar in Diabetes

- The focus of carbohydrate counting is on the 1 nutrient that most impacts blood glucose.
- Carbohydrate is the primary nutrient affecting blood glucose levels.
- Individuals can learn to relate carbohydrate intake with their blood glucose results.
Carbohydrate and Blood
Blood Sugar Target Ranges

- Fasting/before meals: 90-130 mg/dL
- After meals (2 hours after first bite): <180 mg/dL or 30-50 mg/dL increase from premeal to postmeal
Carbohydrate and Blood Sugar in Diabetes—Example

- Mr. S consumed 90 g of carbohydrate for breakfast (day 1)
  - Blood sugar premeal = 115 mg/dL
  - Blood sugar postmeal = 205 mg/dL

- Mr. S consumed 45 g of carbohydrate for breakfast (day 2)
  - Blood sugar premeal = 125 mg/dL
  - Blood sugar postmeal = 150 mg/dL
Carbohydrate (CHO) Counting Defined

- A meal-planning approach for all patients with diabetes, based on the following ideas:
  - Carbohydrate is the main nutrient affecting postprandial glycemic response
  - Total amount of carbohydrates consumed is more important than the source of carbohydrates
Benefits of Carbohydrate Counting

- More flexible than other meal-planning methods
- Sugar is not forbidden
- Focuses attention on the foods that 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, and gum drops
- Cakes, cookies, and chocolate candy
Follow these rules:

- 2 to 3 servings of nonstarchy vegetables
- 2 servings of fruit
- 6 servings of grains, beans, and starchy vegetables
- 2 servings of low-fat or fat-free milk
- About 6 oz of meat or meat substitutes
- Small amounts of fat and sugar

* Page 2 in your book “Choose your Foods”
IMPORTANT!

- Eat meals at the same times
- Never skip meals
- Eat 3 meals a day and healthy snacks between meals
- Your goal is 45 – 60 g of carbohydrates per meal
- This method focuses on counting carbohydrates
- It doesn’t mean that you can eat as much foods as you want from groups that don’t contain any carbohydrates!
Grams of Carbohydrate (per Food Category)

- **Starch**: 1 serving equals about 15 g carbohydrate
- **Fruit**: 1 serving equals about 15 g carbohydrate
- **Milk**: 1 serving equals about 12 g carbohydrate
- **Nonstarchy Vegetables**: 1 serving equals about 5 g carbohydrate

* Open your book on page 4
Starches
### Starch Group

Each amount listed below = 15 g carbohydrate

<table>
<thead>
<tr>
<th>Amount</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 oz of bagel, bread, roll</td>
<td>(1 slice of bread, one fourth of a bagel)</td>
</tr>
<tr>
<td>¾ C unsweetened cereal</td>
<td>(Cheerios®, Rice Krispies®, corn flakes)</td>
</tr>
<tr>
<td>⅓ C higher-carbohydrate cereals</td>
<td>(raisin bran)</td>
</tr>
<tr>
<td>One half of an English muffin</td>
<td></td>
</tr>
<tr>
<td>⅓ C cooked pasta, spaghetti, macaroni</td>
<td>and cheese</td>
</tr>
<tr>
<td>⅓ C cooked brown or white rice</td>
<td></td>
</tr>
<tr>
<td>½ C mashed potatoes</td>
<td></td>
</tr>
<tr>
<td>½ C corn, beans, chickpeas, peas</td>
<td></td>
</tr>
<tr>
<td>1 small baked potato</td>
<td>(3 oz)</td>
</tr>
</tbody>
</table>
Important things to know about starch group

- 6 exchange choices from this group are preferred
- Remember that fiber is a type of complex carbohydrate
- Make sure that half of your 6 exchanges are whole grain
- It is easy to spot high fiber foods in your book. They have a smiley face next to them
Fruits and Fruit Juices
## Fruit Group

<table>
<thead>
<tr>
<th>Each amount listed below = 15 g carbohydrate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 small fresh fruit (4 oz)</td>
</tr>
<tr>
<td>½ C canned fruit (in natural juice)</td>
</tr>
<tr>
<td>2 Tbsp raisins</td>
</tr>
<tr>
<td>17 grapes</td>
</tr>
<tr>
<td>½ C fruit juice</td>
</tr>
<tr>
<td>1 C fresh fruit (cut up)</td>
</tr>
<tr>
<td>1 Tbsp jelly, jam</td>
</tr>
</tbody>
</table>
Milk and Yogurt
## Milk Group

<table>
<thead>
<tr>
<th>Description</th>
<th>Carbohydrate Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 fl oz of skim, 1%, 2%, or whole milk</td>
<td>approximately 12 g</td>
</tr>
<tr>
<td>1 C plain yogurt</td>
<td></td>
</tr>
<tr>
<td>1 C plain or vanilla soy milk</td>
<td></td>
</tr>
</tbody>
</table>
Vegetables
Vegetables

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

- $\frac{1}{2}$ C cooked vegetables
- 1 C raw vegetables
Foods Without Carbohydrate

Protein and fat groups contain 0 g carbohydrate

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 Counting Hand Guide

Fist = 8 fluid oz or 1 cup

Palm = 3 oz.

Handful = 1/2 cup

Thumb = 1 oz.

Thumb tip = 1 tsp.
Tools for Carbohydrate Counting

Nutrition Labels

Measuring Tools

![Nutrition Facts]

- **Nutrition Facts**
  - **Serving Size**: 2 crackers (14 g)
  - **Servings Per Container**: About 21
  - **Amount Per Serving**
    - Calories: 60  (Calories from Fat: 15)
    - Total Fat: 1.5g  (2%)
    - Saturated Fat: 0g  (0%)
    - Trans Fat: 0g  (0%)
    - Cholesterol: 0mg  (0%)
    - Sodium: 70mg  (3%)
    - Total Carbohydrate: 10g  (3%)
    - Dietary Fiber: Less than 1g  (3%)
    - Sugars: 0g
    - Protein: 2g
  - **Vitamin A**: 0%  * (Vitamin C: 0%)
  - Calcium: 0%  * (Iron: 2%)
  - Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:
    - Calories: 2,000 - 2,500
    - Total Fat: Less than 65g  - 80g
    - Sat Fat: Less than 20g  - 25g
    - Cholesterol: Less than 300mg  - 300mg
    - Sodium: Less than 2,400mg  - 2,400mg
    - Total Carbohydrate: Less than 375g  - 375g
    - Dietary Fiber: Less than 25g  - 30g
Food Labels

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

Total Grams of Carbohydrate—to determine amount of carbohydrate eaten, multiply grams of total carbohydrates on the label by the number of servings eaten
Carbohydrate Substituting

- When carbohydrate counting, it is possible to substitute 1 food item for another for a similar impact on blood glucose.
- Example: Exchange 1 small apple (4 oz) for 2 small cookies for a similar effect on blood glucose.
Carbohydrate Allowances for Meals and Snacks

- Patients with diabetes should work with a registered dietitian or certified diabetes educator to receive an individualized meal plan, which includes how many total carbohydrates they should consume at meals and snacks.

- A general guideline for patients is 45-60 g/meal and 15-30 g/snack.
Sample Menu Breakfast

How many carbohydrates are in this meal?

1½ C of Cheerios=
Small banana (4 oz)=
8-fl-oz 1% milk=
1 egg=

TOTAL=
How many carbohydrates are in this meal?

2 slices of bread=
17 grapes=
1 C raw carrots=
3 oz tuna fish=
1 tsp mayonnaise=
Sample Menu Dinner

How many carbohydrates are in this meal?

1½ C pasta =
1 oz of bread =
1 C salad =
1 tsp olive oil =

Total =
Conclusions

- Carbohydrate counting is a meal-planning approach to help people with diabetes attain and maintain blood sugar control.
- Carbohydrate counting provides flexibility and helps people increase their confidence to manage diabetes.
- Patients should consult a registered dietitian or certified diabetes educator to help them master carbohydrate-counting skills.
References