

Basic Overview and Guide for Carbohydrate Counting in School Food Service Settings

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The federal regulations for the National School Lunch and School Breakfast programs require schools to make accommodations for children who are unable to eat the school meal as prepared because of a disability. In most cases, children with disabilities can be accommodated through the various options offered in the school cafeteria.

For a school to make substitutions that fall outside of the meal pattern requirements, the school must have a written medical statement signed by a recognized medical authority on file that indicates the underlying medical condition and the food to be avoided (i.e., the allergen) and a brief explanation of how exposure to the food affects the child.

Although not required, the medical statement may also include recommended substitutes.

Substitutions are often made relatively easily; however, there are situations that may require additional equipment or technical training and expertise. When these instances occur, it is important that the school food service manager and the parent(s) or legal guardian of the child be involved in the meal planning process.

This guide is provided to assist NSLP/SBP sponsors with general knowledge of diabetes and basic approach to “counting carbohydrates” and is not intended to provide specific diet recommendations on individual student needs.

Terms and Definitions to Know

Carbohydrate - one of the three main macronutrients in food. Foods that provide carbohydrates are grains, vegetables, fruits, dairy products and sugars.

Carbohydrate Counting - a method of meal planning for people with diabetes based on counting the number of grams of carbohydrate in food.

Carbohydrate Choice - a serving size of food that contains 15 grams of carbohydrate. Also called carbohydrate exchange.

Calorie(s) - a unit representing the energy provided by food. Carbohydrate, protein, and fat provide calories in the diet. Carbohydrate and protein have 4 calories per gram, and fat has 9 calories per gram.

Blood Glucose - the main sugar found in the blood and the body's main source of energy. Also called blood sugar.

Blood Glucose Monitoring - checking blood glucose level on a regular basis to manage diabetes. A blood glucose meter (or blood glucose test strips that change color when touched by a blood sample) is needed for frequent blood glucose monitoring.

Diabetes Mellitus (MELL-ih-tus) - a condition characterized by hyperglycemia resulting from the body's inability to use blood glucose for energy. In Type 1 diabetes, the pancreas no longer makes insulin and therefore blood glucose cannot enter the cells to be used for energy. In Type 2 diabetes, either the pancreas does not make enough insulin, or the body is unable to use insulin correctly.

Exchange List - a list of foods that groups carbohydrate choices together and can be used to plan and estimate the grams of carbohydrate in a given meal or snack.

Plate Method - a method of meal planning that estimates carbohydrates by filling a 9-inch plate of food with balanced portions of non-starchy vegetables, protein, and carbohydrate. Half of the plate is filled with non-starchy vegetables, a quarter of the plate with protein, and the remaining quarter with carbohydrate.

Overview of School Nutrition Professionals Responsibility

Sponsors must adhere to the physicians prescribed diet other than when emergency adjustments are needed due to hyperglycemia or hypoglycemia.

Even though this diet may not meet reimbursable meal pattern requirements, the meal may still be claimed as reimbursable with proof of either a Medical Statement Form, Individualized Education Plan (IEP), 504 Plan, or Individualized Healthcare Plan (IHP) that states the required meal accommodation.

Sponsors must follow direction listed in the IHP including but not limited to, providing carbohydrate gram counts, confirming that blood glucose levels were monitored before serving them food, allowing use of emergency snacks on hand.

If possible, work with a Registered Dietitian to learn how to best accommodate the student.

If the school nurse needs an exact carbohydrate gram count, work with them and provide that information. Provide information according to the method of assessing carbohydrate intake the student and/or school health professional is instructed to use.

Types of Diabetes

- o **Type 1:** In this type of diabetes, the body does not produce insulin and insulin injections must be taken daily. Type 1 is usually diagnosed in children and is also known as juvenile diabetes. However, Type 1 diabetes can occur at any age. Children with Type 1 diabetes are usually not overweight and may have lost weight prior to diagnosis. Type 1 diabetes accounts for 5 to 10 percent of people with diabetes.
- o **Type 2:** In Type 2 diabetes, the body either does not produce enough insulin or does not make efficient use of the insulin it does produce. Type 2 diabetes is the most common form of diabetes and used to be called adult onset diabetes. Type 2 diabetes can also occur at any age and accounts for 90 to 95 percent of people with diabetes. Type 2 diabetes is increasing among Americans of all ages, including children.

**In managing both Type 1 and Type 2 diabetes, diet, medication, and exercise must stay in balance to keep blood sugar levels within a normal range.*

Symptoms of Uncontrolled Diabetes

Symptoms that may occur are frequent urination, excessive thirst, unexplained weight loss, extreme hunger, vision changes, and feeling very tired.

Sources of Energy – Macronutrients

Energy or calories from foods come from three main macronutrients. These include protein, carbohydrates, and fat. Proteins and carbohydrates provide about 4 calories per gram and fats, 9 calories per gram.

There are three main types of carbohydrate and include complex, nutrient dense; simple nutrient dense, simple, “empty calorie”/refined sugars, and fiber.

1. Complex carbohydrates, often referred to as "starchy" foods, include:

- Legumes (dried beans, lentils and split peas)
- Starchy vegetables (potatoes, fries, green peas, corn, plantains, winter squash)
- Non-starchy vegetables
- Whole-grain breads, pastas, rice and cereals

2a. Simple carbohydrates that contain vitamins and minerals **occurring naturally** in:

- Fruits and 100% Fruit Juices
- Milk, Milk/Dairy Products – Yogurts and Cheeses

2b. Simple carbohydrates from “added sugars” found in honey, refined sugars in:

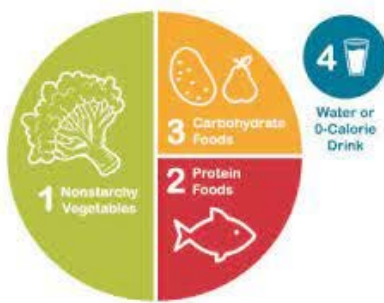
- Candy
- Regular carbonated beverages and soda
- Fruit punch drinks and flavored beverages
- Syrups, jams, and jellies
- Granulated white, brown, raw, and powdered sugars

Refined sugars provide calories, but lack vitamins, minerals, and fiber. Such simple sugars are often called "empty calories" and can lead to weight gain.

3. Fiber is a type of carbohydrate that the body can't digest. Though most carbohydrates are broken down into sugar molecules, **fiber** cannot be broken down into sugar molecules, and instead it passes through the body undigested.

Three Methods of Evaluating Carbohydrate Intake for Students with Diabetes

1. Plate Method



Source: <https://www.diabetes.org/nutrition>

Learn more about the Plate Method:

- <https://www.diabetesfoodhub.org/articles/create-your-plate-simplify-meal-planning-with-the-plate-method.html>

2. Carbohydrate Choices & Exchange List

A carbohydrate choice, also known as a Carbohydrate “Exchange”, is a serving of food that has 15 grams of carbohydrate (1 carbohydrate exchange or choice = 15 g carbohydrate).

Foods that share a similar amount of carbohydrates are grouped together in an exchange list and arranged by food group category. Exchange lists are useful in menu planning because someone can look to add variety to meals by exchanging one carbohydrate choice for another.

For example, if a physician prescribes 2 carbohydrate choices per meal (2 choices = 30 grams of carbohydrate), then someone can use an exchange list to build a variety of meals that offer the equivalent of 2 choices and 30 grams of carbohydrate for each of the meals.

Alternatively, if someone wanted to make healthier carbohydrate substitutions, someone can also use an exchange list to swap carbohydrate choices with each other and still meet the same number of carbohydrates.

For example, if someone previously selected 2 carbohydrate choices from a single portion of 2/3 cup cooked white rice (2/3 cup rice = 30 grams or 2 choices), someone can exchange it for 1/3 cup whole grain brown rice and 1 small orange and still have 2 carbohydrate choices with 30 grams of carbohydrate.

Source: https://diabetesed.net/page/_files/THE-DIABETIC-EXCHANGE-LIST.pdf

3. Carbohydrate Counting

All foods and beverages containing carbohydrates are eventually converted to glucose. Using this method, the grams of carbohydrates consumed are counted and then balanced with an appropriate dose of insulin. The carbohydrate-to-insulin ratio should be determined on an individual basis in conjunction with the diabetes healthcare team.

This is the most precise form of diabetes management. It involves using the nutrition fact labels or other information such as exchange list to determine how many grams of total carbohydrates are in the meal. The student then can adjust their insulin dose based on the grams of carbohydrates consumed.

Average Carbohydrate Content in Foods – Quick Chart		
Food Item	Carbohydrate (grams)	Serving Size
Wheat Bread	15 g	1 oz slice
Fruits & Juices	15 g	½ cup
Milk (unflavored)	12 g	1 cup
Non-Starchy Vegetable	5 g	½ cup
Starchy Vegetable	15 g	½ cup
Other/Toppings (Syrup, honey, sugar, jams, jellies, etc.)	15 g	1 Tbsp.

Nutrition Facts	
8 servings per container	
Serving size	2/3 cup (55g)
Amount per serving	
Calories	230
% Daily Value*	
Total Fat 8g	10%
Saturated Fat 1g	5%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 160mg	7%
Total Carbohydrate 37g	13%
Dietary Fiber 4g	14%
Total Sugars 12g	
Includes 10g Added Sugars	20%
Protein 3g	
Vitamin D 2mcg	10%
Calcium 260mg	20%
Iron 8mg	45%
Potassium 235mg	6%
* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.	

If a different serving size than indicated is used, the amount of carbohydrates consumed will be different and will need to be calculated accordingly.

The total carbohydrate is the count needed. You do not need to subtract fiber from this number unless otherwise directed.

Visit the FDA's Interactive Nutrition Facts Label to learn more [here](#).

Determining Carbohydrates in a Food without a Nutrition Facts Label

By keeping track of how many carbohydrates a person eats and setting a maximum limit, a person can keep blood glucose levels within a desirable target range.

- The carbohydrate count for foods without a label can only be estimated.
- The basic carbohydrate chart listed in this material can be used to assist in the estimation of each food item from standard or pre-set portion sizes.
- When preparing recipes that include fresh fruit and vegetables, keep in mind that added ingredients may contain carbohydrates.
- Look for “sugars” from more complex sources of starch in the ingredients. Starches include flour, corn flour, masa, cornstarch, potato flour, potato starch, rice, breading, etc.

- “Sugars” have a similar nutrient profile but are called a lot of things, including, but not limited to:
- Barley Sugar
 - Brown Rice Sugar
 - Corn Sweetener, Corn Syrup, Corn Syrup Solids
 - Dextrose, Glucose, and Sucrose
 - Fruit Juice Concentrate
 - High Fructose Corn Syrup
 - Honey
 - Molasses
 - Sugars (e.g., brown, raw, turbinado, powdered, table)
- When estimating the carbohydrate amounts without a label, general serving sizes should be used. Please reference the serving sizes for each component reflected in the School Lunch and Breakfast Program Meal Pattern requirements.

General Examples:

Complex Carbohydrates: Bread/Grain	Carbohydrate (grams)	Simple Carbohydrates: Added Sugars	Carbohydrates (grams)
Wheat Bread: 2 Slices/2oz	30 g	Honey - 1Tbsp	15 g
Bran Cereal: 1 c	30 g	Sugar - Tbsp	15 g

Milk	Carbohydrates (grams)	Simple Carbohydrates: Fruit (naturally occurring)	Carbohydrates (grams)
8 fl. oz. Low Fat Unflavored Milk:	12 g	Fresh Peach, Medium - 1/2 c	15 g
8 fl. oz. Fat Free Flavored Milk:	18-20 g	Pears, Canned, Light syrup - 1/2 c	15 g

Vegetable Examples	Vegetable Subgroup	Carbohydrates (grams)
Romaine Lettuce: 1 c	Dark Green	1.5 g
Carrots Cooked: ½ c	Red/Orange	6 g
Black Beans: ½ c	Bean/Pea	20 g
Corn Kernels: ½ c	Starchy	15 g
Green Beans: ½ c	Other	5 g

See USDA Vegetable Subgroups for a more complete list of vegetables.

Best Practices During Meal Services

1. Offer a variety of starchy and non-starchy vegetables on the serving line so students can customize their meal and carbohydrate needs.

Examples of Starchy* & Non-Starchy** Vegetable Options

- Sweet Potato Fries and Broccoli
- Mashed Potatoes and Green Beans
- Corn/Bean Salad and raw Baby Carrots

***Starchy vegetables can be found in the Starchy, Bean & Pea, and a few in the Red/Orange Subgroups such as sweet potato and winter squash.**

****Non-starchy vegetables can be found in the Dark Green, Red/Orange, and the Other Vegetables Subgroups.**

2. Offer a variety of higher carbohydrate and lower carbohydrate fruit choices on the serving line so students can customize their meal and carbohydrate needs.

Examples of lower carbohydrate fruits (7-10 g per ½ cup serving):

- ½ cup Watermelon, Cantaloupe or Honeydew melon
- ½ cup Berries (strawberries, blueberries, raspberries)
- ½ cup sliced Peaches, packed in juice or fresh whole peach

Examples of higher carbohydrate fruits (13-27 g per ½ cup serving):

- ½ cup Mango
- ½ cup Grapes
- ½ cup Banana (1 banana = ½ cup)

Key Points to Remember

Healthier Carbohydrate Choices

- ❑ Higher fiber whole grains such as 100% whole wheat bread, oats, brown rice
- ❑ Whole fresh, frozen, or canned fruits without added sugars
- ❑ Starchy vegetables such as potatoes, sweet potatoes, butternut squash, corn, green peas and pumpkin
- ❑ Beans and legumes such as cooked dried beans, peas, and lentils
- ❑ Low-fat or fat free dairy products such as milk, cheese, and low sugar yogurts

School Food Service Settings

- ❑ Retain all diet prescriptions on file.
- ❑ Diet prescriptions should only be changed by the physician or appropriate health care professional.
- ❑ Document and file conversations with parents and health care professionals regarding special diet requests and needs.
- ❑ When planning special school events and field trips, consider the student with diabetes or other special dietary needs.
- ❑ Provide regular in-service training for staff who share responsibility for the helping manage a student with diabetes diet and blood glucose levels.

Additional Resources:

- [2017 Edition of Accommodating Children with Disabilities in the School Meal Programs | USDA-FNS](#)
- [Accommodating Disabilities in the School Meal Programs: Q&A SP26-2017os](#)
- [Flow Chart for Handling Menu Modifications \(fdacs.gov\)](#)
- [Guidelines for the Care and Delegation of Care for Students with Diabetes \(DOH\)](#)

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