

Diabetes Numeracy in School

Ann Linehan, DNP, MSN, RN Southeast Region School Nurse Consultant annlinehan@bpsma.org

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Objective:

- Calculate appropriate carbohydrate amounts in serving sizes.
- Calculate appropriate insulin doses for students with diabetes.

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Diabetes Overview

Type 1 Diabetes Mellitus (T1D) is a chronic autoimmune disease in which the pancreas does not produce insulin, a hormone that regulates and metabolizes the breakdown of carbohydrates and sugars in foods people consume. Managing insulin delivery and regulating blood glucose levels is necessary to prevent significant chronic microvascular complications and death (Centers for Disease Control and Prevention, n.d.). Type 1 Diabetes, formerly known as Juvenile Diabetes and Insulin-Dependent Diabetes Mellitus (IDDM), is increasingly more prevalent in the pediatric and

adolescent population (American Diabetes Association, n.d.).

For the purpose of this program, Diabetes Mellitus Type I will be called Diabetes or T1D.



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According to the American Diabetes Association (ADA), "About 208,000 Americans under age 20 are estimated to have diagnosed diabetes, approximately 0.25% of that population.

In 2008—2009, the annual incidence of diagnosed diabetes in youth was estimated at 18,436 with type 1 diabetes..." (American Diabetes Association, n.d., para. 7). Locally, the Massachusetts Department of Public Health, School

Locally, the Massachusetts Department of Public Health, School Health Unit collects statistics regarding chronic disease in schoolaged children. In the 2006–2007 school year, 102 Essential School Health Services (ESHS) districts reported 2.5/1000 students to have 110. In the 2010-2011 school year, 156 ESHS districts reported an increase to 3.1/1000 students to have T1D ("MA DPH 2010-2011," 2012, p. 36). It is estimated to be even higher for 2017 ("Diabetes in youth - 10 yr study," 2017). Although this increase may not seem statistically significant, diabetes in adolescence. compounded by age. publicly growth

Although this increase may not seem statistically significant, diabetes in adolescence, compounded by age, puberty, growth, development, social issues, sports and exercise, illness, and more, results in children's insulin requirements fluctuating throughout the day. These variable insulin requirements can overwhelm any student at any age and the school nurses who care for them.



The School Nurse

School nurses are an integral part of the daily activities of many students.

School nurses treat and assist all students with prescribed medications and procedures, respectively, throughout the school day.

Adolescents diagnosed with T1D need both a quality diabetes management plan and emergency plan while in school.

School nurses coordinate and collaborate with the student, family members, the nutritionist, nurse educator, the endocrinologist as well as the student's educators, to manage a proper diabetes regime.

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The school nurse's diabetes education is broad. School nurses may understand the pathophysiology of diabetes, may know the amount of carbohydrates in a particular food, and the signs and symptoms of hypoglycemia versus hyperglycemia, and may also understand the role activity can have on one's blood glucose levels.

However, preparation of numeracy confidence and skills is lacking (Lipkus & Peters, 2009).

School nurses who care for students with diabetes must be educated and capable of quickly assessing the student's insulin/food schedule and calculating and delivering the appropriate insulin dose.

Competency in this skill is essential to prevent hypoglycemia in a learning environment (Ofosu & Jarrett, 2015).

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Carbohydrate counting and insulin calculation require careful assessment and time during the school nurse's day. Many variables have to be determined including, but not limited to: carbohydrate amounts regarding what the student ate for breakfast, any morning snack, potential lunch, amounts consumed, time from last insulin dose, health status, and potential scheduled activity, such as even class or recess.

such as gym class or recess. In potential scheduled activity, such as gym class or recess. In 2012, Marden et al., reported that "Poor numeracy skills are associated with glycaemic control in Type 1 diabetes" and concluded, "Low numeracy skills were adversely associated with diabetes control. Assessment of numeracy skills may be relevant to the structure of diabetes education programmes." (p. 662; McMullan, M. 2010).

diabetes control. Assessment of numeracy skills may be relevant to the structure of diabetes education programmes." (p. 662; McMullan, M. 2010). In 2005; Vanderbilt University students completed a project entitled, "Diabetes Numeracy Test" in which patients answered questions to determine the skill and understanding as well as where education was needed regarding math skills in diabetes management (labnodes, n.d.).



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While there is an abundance of diabetes information, articles, and education available, school nurses do not receive targeted education in diabetes care and management until they need to support a student who is diagnosed with T1D.

Providers order a ratio of insulin to lower glucose to correct the student's current blood glucose, i.e., (Current Glucose (mg/dl) –Target glucose (mg/dl) divided by Correction Factor (i.e., the number of glucose mg/dl lowered by one units of rapid-acting insulin).

This formula can be confusing even to patients who have had diabetes for many years (O'Gorman et al., 2015).



What is Diabetes Numeracy?

Literacy, we know, is the ability to read and write. Numeracy is the ability to perform basic math skills. Diabetes Numeracy is the ability to execute multi-step arithmetic formula <u>and</u> the ability to assess the student and their current blood glucose levels (Labnodes, n.d.).

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Nutrition

Good nutrition is important for every person to maintain optimal health. That includes portion control and exercise.

Good nutrition is essential in the daily life of a person with diabetes. "Students who follow meal plan guidelines will be less apt to experience hyperglycemia or hypoglycemia and should have better attendance and participation... Good nutrition will help children and teens grow and develop properly and help to make them ready to learn. ("Safe At School," n.d.)"

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No, it is mainly higher carbohydrate foods that make blood sugar go up. Carbohydrate foods are also called "<u>Carbs</u>".

Foods with "**higher carbs**" are: • Starches and grains such as bread, pasta or noodles, rice and cereal. • Fruits and finit juice. • Soft drinks, sweet drinks, most energy drinks and sports drinks.

Milk and yogurt.
Sweets including ice cream, cakes, cookies, candy, desserts.
Starchy vegetables such as potatoes, peas, most beans, and corn.



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How to count carbohydrates

You can help control the number of carbs you eat by counting the number of grams in the carbs you eat.

Many school districts now have the nutrition information, including carbohydrates and serving sizes, in the foods they offer listed on their website, or you can speak to your food services department regarding where to find this.

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Vanderbilt University (2007) DNT Toolkit

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Vanderbilt University (2007) DNT Toolkit

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How to count carbohydrates

I. Count all the carb grams in each carb food before you start to eat. Use the food label or look the foods up in a reference book to figure out how many carbs are in the amount of food you are about to eat. 3. Add all the carb foods in your meal. I cup Rice Krispies cereal 22 grams I/2 cup of milk 6 grams I cup strawberries <u>16 grams</u> TOTAL 44 grams for breakfast Vanderbilt University (2007) DNT Toolkit

















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2 Tbsp. pea butter

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Diabetes orders should be involved to include but not limited to: fingerstick schedule, target blood glucose, correction factor, insulin to carb ratio, emergency medications such as glucagon, treatment for hypoglycemia, and ketone testing .. Rachel's orders look like this:

- *For students using an insulin pump or basal/fields insulin regiment (In the control of pump failure, assessment balan assists by group ar peak) * Student will use (NFANASS): Newling (L. Napiro, E. Register given subschareneesly (sc.) * Target Bold geoscies: pre-Mail, [2-2, may(d), 2-3, mars past provided = $\frac{M/A}{2}$, mg/dl * Greenetion/stantistry farter (SSP): Lum lower blood glucose (Bio), 3-0, mg/dl to travers to be diverse in the student consuming carbohydrates, exclusing carbohydrates used to treat a low blood glucose. * Insulin to carbohydrate (B-C) ratio = Lumit por _____D groups carbohydrate at a <u>d</u> [. mdx-] ζ groups carbohydrate at ______

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In using the formula for diabetes numeracy, I have made an ID card for nurses to have handy:

Diabetes Formula to Cover for Carbs & Correct to Target

Step 1 Current BG - Target (from order) =XXX XXX \div Correction Factor (from order) =Y

Step 2 Count Carbs (CHO) to be eaten CHO \div Insulin to Carb ratio (from order) = ${f Z}$

Step 3 Y + Z = units of insulin to be given



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How many units of insulin will Rachel need?

PollEv.com/annlinehan872

Text to: 37607

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In determining an appropriate insulin dose to cover Rachel's lunch today, nurse Jen plugs into the formula as follows:

Step 1 Current BG - Target (from order) =XXX

Rachel's current BG 202 – Target of 120 = 82

XXX \div Correction Factor (from order) =Y 82 \div 30 = 2.73

Step 1 covers for the current blood glucose that is high already at 202 as her target is 120.

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Step 2 Count Carbs (CHO) to be eaten

Nurse Jen and Rachel have already determined her lunch. Pizza was listed as having 30 grams of carbohydrate and chocolate milk was listed at 22 grams of carbohydrate. So her lunch was added that she is having 52 grams of carbohydrate.

CHO \div Insulin to Carb ratio (from order) = ${f Z}$

52 ÷ 10 = 5.2



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Adding the amount of insulin needed to cover Rachel's current BG and the amount of insulin needed to cover her carbohydrates, at this time Rachel is taking:

Step 3 Y + Z = units of insulin to be given

(Step 1 Current BG) 2.73u

(Step 2 to cover for lunch carbs) 5.2u

(Step 3) 7.9u or 8 units.



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Let's review

















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This student comes to the nurses office with this

information regarding their lunch : 60g of carbs

From the previous slide: Step 2 = 6u of insulin

You assess the student and know his target (by order) is 120 mg/dl. He is feeling good and does not have gym today. So in adding Step 1 & Step 2: This student should

take 2 glucose tabs to increase their BG to 116 mg/dl. and only needs the 6u of insulin to cover his lunch

Now you have to figure Step 1. He sits down and checks his blood glucose.

The result is 76 mg/dl.

carbohydrates.

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Activity & Blood Glucose Monitoring

Check before, during, and after physical activity per $\ensuremath{\mathsf{DMMP}}$:

 If blood glucose starts to fall, student should stop and have a snack or quick-acting source of sugar

 Students with pumps may disconnect or adjust the basal rate downward temporarily, prior to physical activity

· Especially when trying a new activity or sport

Safe at School A

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Evaluation of presentation objectives: https://www.surveymonkey.com/r/DLB25F3



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Future:

further competency for all school nurses and nurses alike; education given to individual student from the school nurse. fiber influences and decrease need of

insulin; protein counts; glycemic alcohols, glycemic index, etc. etc.



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Massachusetts Clearinghouse has pamphlets and brochures for teens with diabetes 1. what is diabetes? 2. making healthy food choices 3. staying active All are free of charge. You can order here: http://massclearinghouse.ehs.state.ma.us/category /DIAB.html

Portion size chart: https://i.pinimg.com/originals/6e/59/da/6e59da29 908369349b5100b6639cfd7f.jpg

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