Type 1 Diabetes: Managing a Critical Ratio

Student Activity

Name _____

Class _____

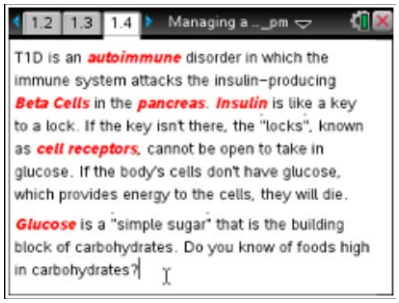
Open the TI-Nspire document *Type_1_Diabetes_Managing_a_critical_ratio.tns.*

Meet Chelcie. Chelcie is a 22 year old nursing student in the last semester of her clinical rotations at a Sanford Hospital. She enjoys sporting events, reading, and watching television in her free time. Chelcie also has Type 1 Diabetes, but she doesn't let it slow her down.

Move to pages 1.2—1.4.

1. Pages 1.2 to 1.4 discuss background information on Chelcie and her career choice to pursue nursing. She wants to help children beat their medical challenges.

2. Read through the page 1.4 to get a summary of Type 1 Diabetes, also known as T1D.



Move to pages 1.5–1.8.

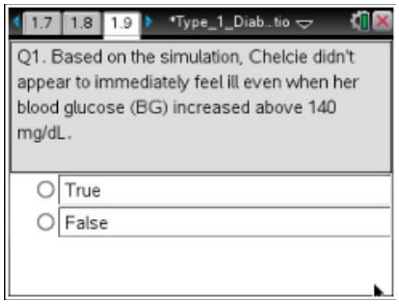
3. Pages 1.5 to 1.8 offer you the opportunity to use a virtual glucose meter. This technology allows diabetics, like Chelcie, the ability to monitor her blood glucose levels. Blood glucose levels must be kept below 140 mg/dL as much as possible. Long term high blood glucose levels indicate the cells in Chelcie's body aren't getting the necessary glucose to stay alive.

Move to pages 1.9. Answer the question here and/or in the .tns file.

Q1. Based on the simulation, Chelcie didn't appear to immediately feel ill even when her blood glucose (BG) increased above 140 mg/dL.

True

False



Move to pages 1.10.

4. A misconception about Diabetes is that it is the high blood glucose that is dangerous. That's not actually the case. The real problem is that the cells in the body aren't getting any of the glucose. Cells require glucose to stay alive.

Move to pages 1.11–1.12. Answer questions here and/or in the .tns file.

Q2. Which organ produces insulin?

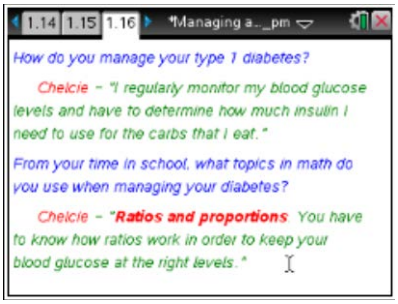
A. kidney
B. pancreas
C. gall bladder
D. liver

Q3. Which of the following best describes the job of insulin?

A. It helps glucose get into cells.
B. It helps glucose get out of cells.
C. It breaks down sucrose into glucose.
D. It prevents glucose from leaving the bloodstream.

Move to pages 1.13–1.18.

5. Pages 1.13 to 1.18 detail a conversation with Chelcie about her career choice in nursing and how she manages her diabetes. You will learn important concepts when reading through the dialog such as the importance of the insulin to carbohydrate ratio, how nursing requires a firm understanding of math, science, and the use of technology, and a challenge to try to figure out Chelcie's specific insulin to carbohydrate ratio (I:C).



Move to pages 2.1 and 2.2.

6. These pages have a different version of the first simulation that you encountered. With this simulation, you must decide which dosage of insulin Chelcie should receive at each meal. Run all three options and compare the graphs on page 2.2.

Move to page 2.3 to 2.6. Answer questions here or in the .tns file.

Q4. The simulation depicts Chelcie continuing to eat after her BG levels are high. In reality, do you think it is likely that she would continue to eat? Explain your answer.

Q5. What I:C ratio was most appropriate for Chelcie for each meal?

A. 1:5
B. 1:10
C. 1:15

Q6. Chelcie's BG levels increase by roughly 4 times that of the number of carbohydrates she eats. Identify the possible ratios (carbs eaten to blood glucose increase) that represent this relationship.

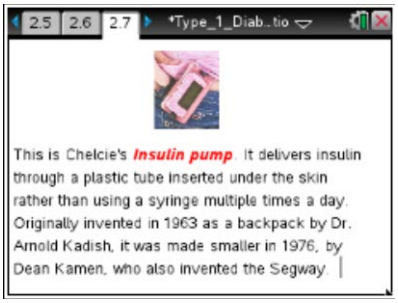
A. 10:40
B. 1:4
C. 5:20
D. 4:1

Q7. Chelcie said that 'ratios and proportions' are important for managing her blood glucose levels. Why do you think this is the case?

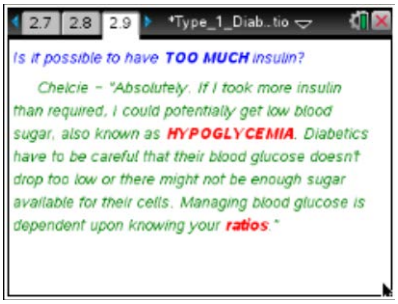
A. Chelcie has to use the right amount of insulin for the amount of carbs she eats.
B. Because she just really likes math and that's important to her.
C. She is wrong. Ratios have nothing to do with diabetes.

Move to pages 2.7 – 2.9

7. Pages 2.7 – 2.9 explain that Chelcie once did injections of insulin before each meal butshe now wears an insulin pump which decreases the amount of injections she needs to have. The insulin pump was invented in 1963 by Dr. Arnold Kadish as a large backpack but was later shrunk into a small box that could be worn on a belt. Dean Kamen, who also invented the Segway, achieved a more wearable design.



8. Page 2.9 gets back to the conversation with Chelcie where she explains that blood glucose can also go too low resulting in HYPOGLYCEMIA. It's important that diabetics know their ratios and keep their blood glucose within healthy ranges (80 mg/dL for fasting glucose and no more than 140 mg/dL after a meal).



Move to page 2.10 -- 2.14. Answer questions here or in the .tns file.

Q8. How might you increase glucose levels in your blood if you found out you had low blood glucose (hypoglycemia)?

A. Remove insulin
B. Take more insulin
C. Eat some candy or drink some juice
D. Eat some whole grains or meat

Q9. Now that you know the I:C ratio for Chelcie (1:5), if she consumed 50 g of carbohydrates at each meal, which of the following would represent her necessary insulin dosage?

A. 1 unit of insulin should do the trick!
B. She will need 5 units of insulin
C. Chelcie should use 10 units of insulin
D. 15 units of insulin are needed for lunch

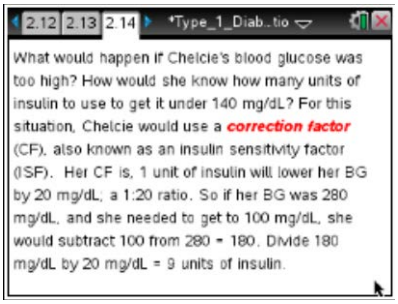
Q10. If Chelcie's I:C ratio is 1:5 but she mistakenly doses as if it was 1:25, what could happen?

A. She may become hypoglycemic
B. She may become hyperglycemic
C. Nothing will happen

Q11. In a single day, an average person consumes 250 grams of carbohydrates. Using what you determined Chelcie's I:C ratio is, calculate the units of insulin she would need for the day?

Move to page 2.14

9. Up to this point, you have learned how to determine insulin needs for meals that are about to be eaten. But what would happen if Chelcie found her BG level to be higher than it should? How would she determine how much insulin to take? This page introduces the concept of the **correction factor.**



10. The correction factor is usually determined by the diabetic's doctor and is based on a number of variables such as insulin sensitivity, or how a person responds to bolus vs. quick-acting insulin. In this example, Chelcie's correction factor is 1 unit of insulin can decrease BG by 20 mg/dL…a 1:20 ratio. You must subtract Chelcie's goal BG level (100 mg/dL in this example) from her current BG level (280 mg/dL in the example) and then divide that difference by 20 to determine the number of insulin units required. 9 units of insulin is what she would need.

Move to page 2.15 Answer questions here or in the .tns file.

Q12. Chelcie's BG is 240mg/dL. How many units of insulin would she need to get to 100 mg/dL? (hint - her CF is 1:20. Use the calculator).

Q13. Chelcie's BG is 260 mg/dL and she plans on eating 50 carbs at lunch. How many units of insulin will she need for lunch and to get her BG back to 100 mg/dL? (hint - use her CF and I:C)

Move to page 2.17

11. Pages 2.17 concludes the activity with a congratulations page for helping Chelcie manage her blood glucose levels using insulin replacement therapy.