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Diabetes Management and the Role of the Pharmacy Technician

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Learning objectives

After successful completion of this continuing education program, pharmacy technicians will:

1. Understand the complexity of diabetes, including the role of insulin and glucagon.
2. Be familiar with different technologies and devices available to help patients manage diabetes.
3. Recognize signs and symptoms of high and low blood glucose levels and identify how to help patients reduce their risk and manage these events.

Introduction

Diabetes is a complex, chronic condition in which the body either does not produce insulin or does not effectively use the insulin produced. It affects approximately 537 million people worldwide, and is expected to affect 643 million people by the year 2030.[1] In Canada, more than 11 million people are living with diagnosed diabetes or pre-diabetes, and it is estimated that 1.7 million Canadians are living with type 2 diabetes that has not yet been diagnosed.[2,3]

Managing diabetes requires careful monitoring of blood glucose levels. Left untreated, or poorly managed, serious complications of this disease such as neuropathy, kidney disease, retinopathy and heart disease may arise and have a significant, negative impact on individuals.

As an integral part of the pharmacy and healthcare team, pharmacy technicians can assist patients in managing diabetes within their scope of practice and in collaboration with the pharmacist. Pharmacy technicians should

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ensure they are familiar with diabetes, the various technologies available to help individuals in monitoring and managing their condition, and lifestyle recommendations.

Diabetes Overview

Insulin and glucagon are hormones produced naturally in the human body and work together to help the body keep ideal blood glucose levels. Insulin is the only hormone in the body to lower blood glucose. In some individuals, elevated blood glucose related to diabetes is caused by a combination of a lack of insulin to effectively lower blood glucose and a reduction of sensitivity of the cells in the body to the effects of insulin produced. See Table 1 for the role that each of these issues plays in the development of Type 1, Type 2 and Gestational Diabetes.

TABLE 1 - Overview of Types of Diabetes[4,5]

Type 1 Diabetes	• Autoimmune disease in which the pancreas produces little to no insulin • Approximately 1 in 10 individuals living with diabetes have type 1 • Typically develops in childhood or adolescence • Must be treated with insulin injections
Type 2 Diabetes	• Body does not produce enough insulin, or the body cannot effectively use the insulin it does produce • Approximately 90% of individuals living with diabetes have type 2 • Tends to develop in adulthood; however, is starting to be seen in youth • Can be treated with changes in lifestyle, oral medications, and injectable medications, including insulin
Gestational Diabetes	• Body cannot produce enough insulin to handle the effects of a growing baby and changing hormone levels • Tends to develop in second or third trimester of pregnancy, affecting 3%–20% of pregnant women • Temporary condition that tends to resolve after pregnancy • Can increase risk of complications during pregnancy and delivery for both mother and baby, including increased risk of developing diabetes later in life, preeclampsia (high blood pressure during pregnancy), increased size and birth weight of baby

Insulin and Glucagon

After ingestion, carbohydrates are broken down into glucose, the primary energy source for cells, but glucose cannot cross the cell membrane on its own. When glucose enters the bloodstream, the beta cells in the pancreas secrete insulin, which binds to receptors on the cell membrane, allowing glucose transporters to move glucose into cells. This helps lower blood glucose levels. Excess glucose can be transported to the liver and skeletal tissue to be stored as glycogen, which can be used as an energy source later.

When blood glucose levels are too low, the alpha cells in the pancreas secrete glucagon, a hormone that causes the liver to convert stored glycogen into glucose and release it back into the blood stream to balance blood glucose levels.

Insulin produced by the body is meant to keep blood glucose levels within narrow ranges continuously throughout the day. To keep blood glucose levels between 3.3–5.6 mmol/L overnight and between meals, and 7.8 mmol/L or less after meals and snacks, the pancreas releases a low level of insulin overnight and between meals, and a larger quantity after meals and snacks.[6] While "the ultimate goal of insulin therapy is to mimic normal insulin levels," it is important to keep in mind that the endocrine system is continually watching and tightly regulating blood glucose levels in individuals who are not living with diabetes.[6] Individuals living with diabetes who are managing their condition with insulin must check and regulate their blood glucose levels.[6]

Managing Diabetes

Individuals living with Type 1 diabetes must manage their condition with insulin. Most individuals living with Type 2 diabetes can manage their conditions through diet and lifestyle measures or a combination of diet and lifestyle measures with medications (oral anti-diabetic agents and/or injectable GLP1-agonists), however, some individuals living with Type 2 diabetes will require the use of insulin.

Individuals who are managing diabetes with insulin must continuously check their blood glucose levels to help them make decisions about how much insulin they need, food intake and physical activity, and to help them avoid blood glucose levels that are too high or too low. Pharmacy technicians should be knowledgeable on the various devices available to check blood glucose levels to help patients choose the device best suited to them, accurately use their devices, and ensure patients have all the supplies needed to check their blood glucose levels and administer insulin.

Monitoring Blood Glucose Levels

Hemoglobin A1C (HbA1c) blood tests provide information about the percentage of red blood cells with glucose molecules attached to them (glycosylated hemoglobin) and reflect the average blood glucose levels over the previous eight to 12 weeks. For most individuals with diabetes, the target A1C level is 7.0% or less.[7,8] Individuals who have not been meeting their glycemic targets should have their A1C level tested every three months.[7,8]

Historically, A1C blood tests were only performed in a lab with a blood sample from a vein. Pharmacists and pharmacy technicians in some jurisdictions can perform point-of-care testing, including an A1C test. Point-of-care testing in pharmacies is used to monitor a patient's condition and response to treatment.[8] Pharmacy technicians can perform an A1C point-of-care test on a patient only after the pharmacist has completed a clinical assessment and decided that the test is clinically appropriate.[8,9] The technician will collect a blood sample from a finger prick and must ensure they are trained and competent in performing the test and in infection prevention and control measures.[8,9] Test results will be interpreted by a pharmacist, who can then make clinical decisions regarding treatment based on the results.

While A1C levels provide valuable information of chronic blood glucose control, individuals living with diabetes also need to know their blood glucose levels in real time to keep their blood glucose levels within their glycemic targets and effectively manage their condition. This is accomplished through blood glucose monitoring. Glycemic targets should be individualized to each patient and consider a variety of individual factors, including the length of time the individual has been living with diabetes, co-morbidities (i.e., other diseases or medical conditions), functionality and life expectancy.

TABLE 2 - Non-Insured Health Benefits Coverage of Test Strips and Lancets[13]

	Treatment with Insulin	Treatment with medications that have a high risk of causing hypoglycemia (low blood sugar) (e.g., sulfonylureas, such as glyburide)	Treatment with medications that have a low risk of causing hypoglycemia (e.g., biguanides, such as metformin)	Treatment through diet and lifestyle
Test Strips (No prior approval needed)	800 test strips over 100 days	400 test strips over 365 days	200 test strips over 365 days	200 test strips over 365 days
Lancets (No prior approval needed)	800 lancets over 100 days	400 lancets over 365 days	200 lancets over 365 days	200 lancets over 365 days
Pen Needles	No prior approval needed			

However, for most individuals living with diabetes, fasting blood glucose levels should be between 4.0–7.0 mmol/L and post-prandial blood glucose levels (2 hours after eating) should be between 5.0–10.0 mmol/L.[8,11] Glucose monitoring by the individual allows them to see if they are meeting their glycemic targets and helps with making decisions about insulin dosing and the effectiveness of glucose lowering therapies, minimizing the risk of hyper- and hypoglycemia.[12]

Frequency of blood glucose testing is unique to everyone and there are several types of devices patients can use to test their blood glucose levels, including capillary blood glucose (CBG) monitors, intermittently scanned continuous glucose monitors (isCGM), and real-time continuous glucose monitors (rtCGM).

Capillary Blood Glucose

CBG monitoring (formerly called self-monitored blood glucose) measures glucose levels in capillaries using a drop of blood obtained through a finger prick. Use of this modality to measure blood glucose levels requires a glucometer, test strips and lancets. Some public provincial/territorial insurance plans cover the cost of test strips and lancets with a prescription; however, some of these jurisdictions have set eligibility criteria and limits to the quantity of test strips covered in a 365-day period. The Non-Insured Health Benefit (NIHB) program for eligible First Nations and Inuit persons covers insulin, test strips, lancets, needles and other supplies, some with set limitations.[13] Pharmacists can recommend these products and write a prescription for these individuals, documenting the date, patient name, address, and date of birth, product and quantity, and signing with their registration number. Table 2 outlines NIHB coverage of test strips and lancets. Most glucometers are available free of charge for all individuals with an accompanying prescription for test strips. Table 3 reviews factors to consider when choosing a glucometer.

TABLE 3 - Factors to consider when choosing a glucometer[14]

Consideration	Examples
Ease of use	• How much blood is needed for testing? (Although a larger sample size may help increase accuracy of the blood glucose reading, it may require a larger finger prick, which could increase pain) • Are the strips easy to handle? • Does it require calibration or coding with new strips?
Special features	• Illuminated screens • Large, easy to read numbers on the screen • Large, easy to handle buttons • Audio capability
Technology - Information Storage & Retrieval	• Will it track dates, times & results of blood glucose testing? • Will it monitor for trends? • Can results be shared with healthcare providers? • Can the results be downloaded?

Continuous Glucose Monitoring

Continuous glucose monitoring (CGM) uses a small, disposable sensor worn under the skin to measure interstitial glucose levels every few minutes, day and night. This can be beneficial to individuals who are at risk of hypoglycemia, especially, those who experience nocturnal hypoglycemia or who are unable to recognize or communicate symptoms of low blood glucose.[15] The sensor, which is placed under the skin on the arm, buttock or stomach, is attached to a transmitter. The sensor sends blood glucose readings to the transmitter, which sends the data to a separate receiving device, such as a smart phone.[16] Depending on the system used, sensors can be worn for six to 14 days and can be worn in the shower, during exercise and while swimming.[17-19] It should be noted that while some CGM systems do not require finger pricks to test blood glucose levels, some systems require the user to perform finger pricks to confirm results before making treatment decisions or to calibrate their system.[17-19]

Most CGM systems allow users to set alarms on their smart phones, alerting them to glucose levels that are too high or too low. This can be especially helpful for children living with diabetes when they are at school, participating in sports and activities, or with friends. Blood glucose readings and alerts can be sent to the child's and parents' devices.

Intermittently scanned continuous glucose monitoring (isCGM; formerly called flash continuous glucose monitoring) requires an individual to scan the sensor to read blood glucose information, while real-time continuous glucose monitoring (rtCGM) sends blood glucose readings to their device in real time.[12, 20]

Individuals can use their CGM system to help them calculate and adjust insulin doses using daily insulin injections or their CGM system paired with an insulin pump. CGM systems paired with an insulin pump are called integrated CGM and systems not paired with an insulin pump are called stand-alone CGM.[16]

Adjusting Blood Glucose Levels

Individuals using insulin to lower blood glucose levels can measure and administer daily insulin injections or may opt for an insulin pump or pod.

Daily Insulin Injections

Several types of insulin, with varying onsets and durations of action are available to help lower blood glucose levels and mimic insulin produced in the body. Most of these types of insulin can be dispensed in vials or pens.

Insulin Vials and Pens

Many patients administering daily insulin injections use vials or pens, and pharmacy technicians should be able to teach patients how to use these devices. Table 4 reviews use of vials and pens.

When dispensing insulin vials, pharmacy technicians should also ensure patients are made aware of how long an insulin vial can be used after puncturing it for the first time. Affix an auxiliary label that shows how many days the vial is good for once punctured and has space for the patient to document the date they first punctured the vial.

Individuals administering insulin through daily injections may use a long-acting or intermediate-acting insulin such as basal insulin to cover insulin the body would normally produce overnight and between meals and snacks, as well as a rapid-acting or short-acting insulin as a bolus mealtime insulin to adjust blood glucose levels based on the amount of carbohydrates eaten.[22]

TABLE 4 - Using insulin vials and pens

Vials	• Supplies needed include alcohol swabs, sharps container, and enough insulin syringes to ensure each injection is administered with a new syringe • Requires individual or caregiver to withdraw desired amount of insulin from vial using a syringe • Requires good manual dexterity • Requires good vision to be able to read increments on insulin syringe • A new syringe and needle are needed for each injection to help prevent infection and to decrease injection pain • Measure insulin in 1-unit or 2-unit increments • Higher needle gauge means a thinner needle • Covered by some public provincial/territorial drug plans
Pens	• Supplies needed include alcohol swabs, sharps container, and enough pen needles to ensure each injection is administered with a new pen needle • Patients can choose pen needle based on length and gauge (4, 5 and 6mm pen needles are suitable for all people living with diabetes regardless of body type and weight.)[21] • Higher gauge represents a thinner needle, which may be more comfortable for patients • To measure insulin, the user turns the dial at the end of the pen until desired dose is visible in the window and administers by pushing the button on the end • Many find pens easier to travel with compared to vials & more discreet
	Reusable Pens: • Individual or caregiver loads an insulin cartridge into the pen and changes cartridge once empty • Must have a different pen for each type of insulin
	Disposable Pens: • Prefilled pens: pen is manufactured and dispensed with cartridge in it • Once the cartridge is empty, the individual disposes of it and opens a new pen

Insulin Pumps and Pods

For some patients who must administer multiple insulin injections throughout the day, insulin pumps or pods may be a better choice.

Insulin pumps are small, battery-powered devices that use an infusion set to administer insulin via a cannula (a thin tube) inserted under the skin.[23] The infusion set consists of a reservoir that stores insulin and tubing that connects the reservoir to the cannula.[23,24] Reservoirs are typically about the size of a deck of cards and are worn on the body (attached to belt or waistband, strapped to arm, tucked in pocket) all day and night (they can be removed for showering/bathing).[23,24] Reservoirs can hold approximately 1.6–3 mL (160–300 units) of insulin, depending on the system, and typically need to be refilled every two to three days.[25-28] Cannulas should be changed every two to three days.[25]

Insulin pods are insulin pumps with no tubing. The patient wears a pod attached to their skin; the pod has a cannula that is automatically inserted into the skin to deliver insulin.[25,29] Pods connect wirelessly to a personal diabetes manager, which can be carried close to the user (for example, in a pocket, purse or backpack).[25,29] Pods are about the size of a deck of cards, can hold up to 200 units of insulin and typically need to be changed every two to three days.[25,29]

Both insulin pods and cannulas can be worn while swimming, or engaging in other water activities, however different products have different limitations on length of time. Personal Diabetes Managers and reservoirs are not waterproof and will have to be left in a safe place while the individual is in the water.

Insulin pumps, whether with an infusion set or a pod, use only rapid-acting insulin to provide basal insulin, bolus insulin, and doses to correct for high blood sugar. They require the user to program the amount of insulin to be administered into the pump or personal diabetes manager.[22,23,29,30] Most pumps have built-in calculators and users can program their pump to suggest bolus and correction doses, as well as lower doses if it detects active insulin in the body.[30-32] Although the pump can suggest a dose, the user must decide if the suggested dose is the right dose for them and select the dose or change the dose to be administered.[32]

Pumps can also be programmed with different basal rate profiles to reflect differences in the users' daily schedules, for example days at work versus days off, and can adjust doses in increments of 0.05 units.[30,32]

Some public provincial/territorial plans will cover the cost of CGM systems and insulin pumps through various programs. For example, NIHB considers coverage of CGM systems on a case-by-case basis and requires prior approval for coverage of insulin pumps.[13]

To select and administer the correct dose of insulin, individuals must understand how their overall health and lifestyle can affect blood glucose levels.

Nutrition

The food a person eats, especially carbohydrates, affects their blood glucose levels. Counting carbohydrates is important for individuals living with diabetes and they should work with their health team, including a dietician, to help set the amount of carbohydrates that should be eaten. Individuals should monitor the impact different foods have on their blood glucose levels and understand how to decide how much insulin they need to keep their blood glucose levels within their target range. Individuals should be encouraged to choose healthy foods high in fibers and with a low to moderate glycemic index, since fiber does not affect

blood glucose levels and foods with a lower glycemic index will have a lower impact on blood glucose levels.[34] Diabetes Canada offers a Glycemic Index Food Guide which ranks carbohydrate-containing foods and drinks by how much they raise blood glucose levels.[33] See https://www.diabetes.ca/DiabetesCanadaWebsite/media/Managing-My-Diabetes/Tools%20and%20Resources/glycemic-index-food-guide.pdf?ext=.pdf.

Patients will work with their physician to determine their own unique insulin-to-carbohydrate ratio and use this ratio, along with the grams of carbohydrates consumed to calculate the amount of insulin needed.[35,36] For example, if a patient has been told that their insulin-to-carbohydrate ratio is 1:10, this means the patient needs 1 unit of insulin for 10 grams of carbohydrate.[35,36] To calculate the amount of insulin needed to account for the carbohydrates consumed, the grams of carbohydrates is divided by the insulin-to-carbohydrate ratio.[34,36] If the individual consumes 40 grams of carbohydrate in a meal or snack, they will need 4 units of insulin.

Physical Activity

Exercise and physical activity are important for all individuals living with diabetes, regardless of which type. A healthy diet and physical activity can have a positive impact on an individual's weight, which is important in preventing and managing type 2 diabetes. Being overweight or obese increases insulin resistance and exercise can help improve insulin sensitivity, in addition to helping manage weight and decrease blood pressure, blood fats, the risk of heart disease, and improving overall quality of life.[37,38]

Low-moderate intensity exercises appear to help lower blood glucose levels, while high-intensity exercises may cause blood glucose levels to increase as these types of exercises can also stimulate the release of stress hormones, such as adrenaline.[38]

Individuals managing diabetes with insulin need to be aware of how physical activity affects their blood glucose and how to manage the impact. Blood glucose levels can be affected not only by the type of exercise or physical activity performed, but by the duration of activity and blood glucose levels prior to activity.[39]

Maintaining blood glucose levels within an individual's target range is important to help prevent hypo- or hyperglycemic emergencies and complications of chronic high blood glucose levels.

TABLE 5 - Signs and Symptoms of Hypoglycemia[40]

Autonomic/Neurogenic Signs and Symptoms	Neuroglycopenic Signs and Symptoms
Anxiety Hunger Nausea Palpitation Sweating Tingling Trembling	Confusion Difficulty concentrating Difficulty speaking Dizziness Drowsiness Headache Weakness

Hypoglycemia

Hypoglycemia, low blood glucose, occurs most often in individuals living with type 1 diabetes and type 2 diabetes who are managing diabetes with insulin.[40] Symptoms of hypoglycemia can develop at blood glucose levels of less than 4.0 mmol/L and severe hypoglycemia, with the possibility of unconsciousness, typically occurs when blood glucose levels fall below 2.8 mmol/L.[40] It is important for those living with diabetes to recognize the signs and symptoms of hypoglycemia and to carry an emergency kit with them. If an individual experiences severe hypoglycemia, or their blood glucose levels continue to decrease below 4.0 mmol/L, or they start to feel less alert, 911 should be called immediately.[41] Mild to moderate hypoglycemia can usually be treated by the individual by consuming sugar tablets or foods, drinks or candies high in simple sugar.[40] Severe hypoglycemia, however, may require intervention from another person, especially if the individual loses consciousness.[40] Table 5 reviews the signs and symptoms of hypoglycemia.

Glucagon is a hormone produced by the alpha cells in the pancreas. It helps raise blood glucose levels by stimulating the conversion of stored glycogen to glucose and releasing it into the bloodstream. Glucagon is a NAPRA Schedule II medication. It is available in two dosage forms—a powder for injection and a powder for intranasal administration—to treat severe hypoglycemia when the individual cannot be treated with oral carbohydrates.

Glucagon that is supplied as a powder for injection must be reconstituted with the accompanying diluent immediately before administration and can be administered subcutaneously or intramuscularly.[42] Glucagon supplied as a powder for intranasal administration does not need to be manipulated prior to administration.[43] It is administered by inserting the intranasal device tip into one nostril and pushing the plunger down all the way, until the green line no longer shows (one full actuation).[43]

BOX 1 - Emergency Kit for Hypoglycemia[40]

- 15 g of fast-acting carbohydrates for self-treatment of mild-to-moderate hypoglycemia (e.g., glucose tablets, 3 sugar packets dissolved in water, 5 sugar cubes, 150 mL of juice or regular soft drink, 6 Life Savers, 15 mL [1 tablespoon] of honey)
- Glucagon for subcutaneous or intramuscular injection OR glucagon powder for intranasal administration for treatment of severe hypoglycemia

After administering glucagon, call 911 immediately.[41] It can take up to 15 minutes for an individual treated with glucagon to regain consciousness. If emergency services have not arrived within 15 minutes and the person is still unconscious, give another dose of glucagon.[41] When the individual does wake up, they should be given oral carbohydrates and their blood glucose levels should be checked.[42,43] When administering glucagon treatment, someone should also call for medical help in case the individual does not respond to glucagon and needs to be assessed by a physician and possibly treated with intravenous glucose.[42,43]

Individuals at high risk of hypoglycemia should carry an emergency kit with them and should ensure those close to them know where to find their emergency kit and how to prepare and administer glucagon. Box 1 lists items to be carried to treat hypoglycemia.

Hyperglycemia

Uncontrolled or chronically elevated blood glucose levels can also place the patient at risk for other complications. Some patients may experience signs and symptoms of early high blood glucose levels; however, some patients who have had type 2 diabe-

tes for a long time, may not experience symptoms despite having high blood glucose levels.[44] Table 6 reviews signs and symptoms of high blood glucose levels.

Left untreated, high blood glucose can damage blood vessels and nerves, leading to complications such as kidney disease, heart attack, stroke, retinopathy and peripheral neuropathy.[4,44]

High blood glucose levels that are not treated can also lead to diabetic ketoacidosis (DKA), a buildup of toxic acids called ketones.[44,45] This typically occurs in individuals living with type 1 diabetes when they do not have enough insulin and it can, potentially, lead to death.[45] Individuals using an insulin pump can be at risk if they are not aware that their pump has stopped working.[45] When treating diabetes with insulin, individuals should regularly check their blood glucose levels and/or program their monitors and pumps to alert them to high or low glucose levels. They may have to test for ketones if they have multiple high blood glucose readings and should consult with their physician if their ketones are high.[45]

TABLE 6 - Signs and Symptoms of Hyperglycemia[44]

Early Signs & Symptoms	Later Signs & Symptoms
Blurred vision Feeling weak or unusually tired Frequent urination Increased thirst	Abdominal pain Confusion Dry mouth Fruity smelling breath Nausea/vomiting Shortness of breath Loss of consciousness

Conclusion

Diabetes is a very complex condition. Although a variety of technologies are available to help make management of this disease easier, it still requires careful monitoring of blood glucose levels and determination of needed insulin doses. Pharmacy technicians should be familiar with the various technologies patients may be using to help manage diabetes to provide the best care possible, within their scope of practice. They should also encourage patients living with diabetes to follow a healthy lifestyle, including eating foods with a low glycemic index and high in fiber, and to engage in regular physical activity to help regulate blood glucose levels.

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QUESTIONS

Find and answer the questions for this CE lesson online at eCortex.ca. Search using all or part of the course title.

1. Brenda is a 63-year-old female with private insurance and Type 2 diabetes treated with a long-acting basal insulin and a short-acting bolus insulin. She is at her regular community pharmacy (where pharmacy technicians can perform point-of-care testing), for a refill on both her insulins, as well her medications for hypertension and high cholesterol. While the pharmacy technician is gathering information, Brenda says her mouth has been really dry, despite drinking a lot of water as she has been feeling thirsty. She cannot remember the last time she visited her physician or had blood work done. The pharmacy technician checks the clinical viewer and notes that Brenda's last recorded A1C test was 9 months ago. All of the following are appropriate actions for the pharmacy technician EXCEPT:

a) Ask Brenda if she has time to meet with the pharmacist to perform a clinical assessment to determine if an A1C test is appropriate at this time.
b) If an A1C test is going to be conducted, inform Brenda that the tech is trained to perform A1C tests in the pharmacy by obtaining a blood sample from a finger prick.
c) Notify Brenda that A1C tests require a blood sample that can only be obtained from a lab and recommend she schedule an appointment with her physician.
d) Ask Brenda when she last tested her blood glucose levels and what the reading was.

2. Brenda returns to the pharmacy after several months. Her last A1C test revealed her blood glucose levels have been trending down. Readings from her continuous blood glucose monitor (CGM) indicate that her blood glucose levels had been in their target range, but recently a little higher. Brenda says she has been focusing on portion control and primarily eating nutritious foods with a low or moderate glycemic index, while engaging in regular physical activity (she lost 12 pounds). As she has been feeling stronger, she joined her 32-year-old daughter for HIIT (high intensity interval training) workouts. She says she likes short, but intense workouts. Which of the following is true?

a) Brenda must be using her CGM incorrectly and should be advised to return to using her glucometer for blood glucose testing.
b) Brenda should avoid eating foods with moderate glycemic index and only consume those with a low glycemic index, since she is managing diabetes with insulin.
c) Brenda should increase the length of her HIIT workouts to help lower blood glucose levels.
d) Brenda should consider incorporating some low to moderate intensity exercises.

Questions 3-7 refer to the following scenario: Joe is a 28-year-old First Nations male living with Type 1 diabetes. Joe uses a long-acting basal insulin in a disposable pen and a rapid-acting bolus insulin with meals in a reusable pen and capillary blood monitoring to test his blood glucose. Joe has recently moved to a new town and is bringing his prescriptions to a new community pharmacy.

3. While gathering further information to create a profile for Joe, the pharmacy technician notes that Joe cannot remember which test strips, lancets, or pen needles he uses. The technician discovers that Joe has not purchased new supplies in a few months because he does not have a drug plan and prioritizes purchasing insulin over supplies, although his Certificate of Indian Status, or status card, does help with tax exemptions. Which of the following should the pharmacy technician tell Joe?

a) NIHB (Non-Insured Health Benefit) will cover insulin but not supplies.
b) NIHB will cover test strips for insulin-dependent persons with diabetes but not lancets or pen needles.
c) NIHB will cover test strips, lancets, and pen needles for insulin-dependent persons with diabetes, however, Joe's prescriber will have to apply for prior approval.
d) NIHB will cover insulin and supplies for insulin-dependent persons with diabetes.

4. Joe complains to the pharmacy technician about the pain and inconvenience of having to administer multiple daily insulin injections to lower his blood glucose levels. Recognizing that Joe has not been regularly purchasing pen needles, the pharmacy technician asks Joe to demonstrate how he uses his pens to administer insulin. Joe explains that he tries to use a new pen needle as often as possible on his disposable pen. Which of the following is the most appropriate action for the pharmacy technician to take?

a) Confirm that Joe needs to replace the pen needle on the reusable pen with each cartridge change.
b) Remind Joe that it is important to use a new needle on the disposable pen for each injection to help decrease pain and minimize the risk of infection.
c) Remind Joe that it is important to use a new needle on both the disposable and reusable pen for each injection to help decrease pain and minimize the risk of infection.
d) Refer to the pharmacist to review pen needles with Joe.

5. The pharmacy tech shows Joe different test strips, lancets, and pen needles to see if he can identify which ones he uses. Joe recognizes a box of 27-gauge pen needles as the ones he uses. Which of the following is the most appropriate action for the pharmacy tech to take?

a) Document this on Joe's profile and request a prescription from his physician for these to get coverage under NIHB.
b) Ask the pharmacist to write a prescription for the 27-gauge pen needles to get coverage under NIHB.
c) Ask Joe if he has ever tried the 32-gauge needle and tell him that they are thinner and may be less painful.

d) Since Joe is unsure if he has used the 27-gauge pen needles in the past, the pharmacist to help Joe select pen needles.

6. A few weeks after the pharmacy tech helped Joe, he returns to the pharmacy to say he has been managing his diabetes. While feeling pretty good, he says says he is sometimes nauseous, dizzy, and his hands have been trembling. At times he must administer more bolus insulin than he calculates because his pens deliver insulin in 2-unit increments. What should the pharmacy tech do?

a) Reassure Joe that administering a little extra insulin will not affect his blood glucose levels enough to be a cause for concern.
b) Ask Joe if he is familiar with insulin pumps since they can measure insulin in increments of as little as 0.05 units
c) Recommend Joe try using insulin vials as he can use syringes that measure insulin in 0.5-unit increments.
d) Refer to the pharmacist immediately.

7. Joe has recently decided to use an integrated continuous glucose monitoring system. He tells the pharmacy tech, that he has enjoyed not having to perform daily finger pricks or administer multiple daily insulin injections–and that he can program his system to automatically administer insulin. But he still has symptoms of hypoglycemia and misses his daily swim in the lake. The pharmacy tech should do all of the following EXCEPT:

a) Ask Joe if he carries an emergency kit in case of hypoglycemia.
b) Confirm that Joe has programmed correct basal and bolus profiles in his system to ensure it automatically delivers the correct amount of insulin.
c) Confirm that Joe has programmed alerts for low or high blood glucose readings.
d) Inform Joe that insulin pumps can be worn while swimming and help Joe look up any restrictions or parameters regarding his system.

8. Quinn is an insulin-dependent person with diabetes using an integrated continuous glucose monitoring system with a pod. Which of the following is true?

a) Individuals using a pod system must change the cannula every 2-3 days.
b) Pods are accompanied by a personal diabetes manager which must be worn on the person.
c) Pods can hold up to 200 units of insulin
d) Pods need to be refilled every 2-3 days

9. Morgan is an insulin-dependent person with diabetes who just started using an intermittently scanned continuous glucose monitor system and an insulin pump with an infusion set. Previously, Morgan has been administering a long-acting basal insulin once daily and multiple daily insulin injections using a rapid-acting bolus insulin, both in disposable pens. Which of the following is true?

a) Morgan still needs to administer daily injections of their long-acting basal insulin because insulin pumps only administer rapid-acting insulin.
b) Morgan needs to change the cannula on the continuous glucose monitor when they refill the insulin reservoir.
c) Morgan can choose to have the reservoir filled with either the long-acting basal insulin or the rapid-acting bolus insulin and administer the other with the disposable pen.
d) Morgan should return any long-acting insulin remaining at home since the insulin pump only used rapid-acting insulin.

10. Kai is an insulin-dependent person with diabetes who has had hypoglycemic events in the past. He carries an emergency kit in case of hypoglycemia which includes glucagon. Which of the following is true?

a) Glucagon should work immediately in most patients who have lost consciousness due to hypoglycemia.
b) Glucagon should work immediately in all patients who have lost consciousness due to hypoglycemia.
c) Oral carbohydrates should be administered to patients who regain consciousness after administering glucagon.
d) Glucagon should only be administered subcutaneously in patients who have lost consciousness due to hypoglycemia.

11. Which of the following is true?

a) Symptoms of mild to moderate hypoglycemia can start to develop when blood glucose levels fall below 2.8 mmol/L
b) Symptoms of mild to moderate hypoglycemia can start to develop when blood glucose levels fall below 4.0 mmol/L
c) Blood glucose levels below 4.0 mmol/L is considered severe hypoglycemia
d) 911 should only be called in cases of severe hypoglycemia when administration of glucagon is required.

12. Which of the following is true?

a) Patients using an insulin pump may be at an increased risk of hyperglycemia if the pump stops working and they are not aware.
b) Patients with symptoms of hypoglycemia should test for ketones as they may be at risk of diabetic ketoacidosis.
c) Individuals who discover high ketone levels should administer intranasal glucagon.
d) Individuals with hyperglycemia should administer intranasal glucagon.

TECH talk CE

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