

# Nurse Delegation

for Nursing Assistants and Home Care Aides



## Training Manual

*Special focus on diabetes*

Aging and Long-Term Support Administration



Washington State  
Department of Social  
& Health Services

*Transforming lives*

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# Notes



# *Introduction*

# Introduction

Welcome to:

## Nurse Delegation for Nursing Assistants and Home Care Aides *Special Focus on Diabetes*

In spring of 2008, a law was passed by the Washington State legislature allowing qualified credentialed nursing assistants to perform insulin injections as a nurse delegated task.

Because of this law and certified or registered nursing assistants or home care aides like you, clients with diabetes now have the choice and freedom to live in community-based residential facilities when insulin injections are needed.

### Who Must Take This Course?

This course is designed for Long Term Care Workers including Home Care Aides Certified, Nursing Assistants Registered and Nursing Assistants Certified:

- Are registered or certified (HCA's, NA-R's or NA-C's).
- Have successfully completed the Nurse Delegation for Nursing Assistants and Home Care Aides Self-Study Training Course.

### Course Process:

- The course includes this workbook.
- The workbook is divided into three sections or Modules:
  - Module 1: Diabetes Overview & Management
  - Module 2: Insulin Basics
  - Module 3: Insulin Delivery & Administration
- This workbook is yours to keep and use. It contains information, job aids, and checklists that you can use as a valuable resource in the future.
- Use this workbook for each module:
  - Read Module 1.
  - Complete all activities and knowledge checks in the module.
  - Take the Practice Test for Module 1.
  - Review the Answer Key for the Practice Test.
  - Re-read and/or review sections where you missed questions.
- Repeat these steps for Modules 2 and 3.
- For the final exam, study and learn the information in the module reviews at the end of each module. Anything on the exam will be covered in the module review.

## Learning Aids

To help you identify and learn important concepts, the workbook contains the following features:

- Boxes with important information you need to know.
- Summary tables and review boxes.
- Helpful information/job aids in the back.
- Helpful icons.

### Use this key to navigate icons throughout text:



A description of how the delegating RN will work with you on a particular aspect of the client's care.



A section or module review that reinforces key concepts from the text.



A critical safety concept that you must know and apply as you care for the client.



An important rule that you must adhere to when handling and administering insulin.

## Successfully Completing the Course

The Practice Tests at the end of each Module are designed to prepare you for the final written test. The final written test is very similar in format and content.

To successfully complete this course, you will need to:

- Present your workbook and completed practice tests to your instructor for review.
- Successfully complete the final written test, scoring 80% or better.

Once you pass the written test, you can begin your hands-on training with the delegating RN. This on-the-job training is an essential part of learning to work with insulin and administering it safely.



For your own confidence and the safety of your client, you will receive this training, practice, and supervision before and after you begin administering insulin.

Your on-the-job training includes:

- Hands-on practice.
- Learning the specifics about the client's care needs related to the delegated tasks you will be performing.

The delegating RN will work with you to make sure you are competent to administer the client's insulin safely before you give an insulin injection.

As with any delegated task, tell the delegating RN if you have concerns or questions about being able to perform the task safely.

- Once a week for a period of 4 weeks your Delegating RN will check your skill administering insulin.

After you have begun administering insulin to a client, and signed off as competent to administer insulin, the delegating RN will continue to supervise you for a specified period of time.

For each client that you are delegated to administer insulin, you will need to repeat the process as each client has individualized needs and insulin orders.

As you can see, you will have plenty of training, supervision, and support as you take on this task.

*Good luck!*





# *Module 1*

Diabetes Overview  
& Management

# Module 1: Diabetes Overview & Management

## Learning Outcomes:

After completing this module, the caregiver will:

- Define key terms related to diabetes.
- Describe the structure and function of the endocrine system related to the types of diabetes.
- Differentiate the types of diabetes.
- Identify signs, symptoms, and treatment of hyperglycemia.
- Identify signs, symptoms, and treatment of hypoglycemia.
- Identify their role in helping clients manage diabetes safely.

## Lesson 1: Diabetes Overview and Management

### Overview

Diabetes is a chronic health condition of the endocrine system, in which the body does not properly process food for energy. The endocrine system is made of several glands that produce hormones which help control body functions. The pancreas is one of these glands, located in the upper abdomen, behind the stomach. The Islets of Langerhans, or beta cells, are clusters of cells throughout the pancreas that secrete insulin and glucagon. The purpose of insulin is to carry glucose from the bloodstream into the cells for use as energy and fuel. Glucagon releases when there is a drop in blood sugar, preventing blood sugar from dropping too low. It does this by prompting the liver to convert stored glucose into a usable form and then release it into the bloodstream.

## The Pancreas Serves Two Important Functions:

1. Makes enzymes that break down food in the intestines.
2. Makes hormones that regulate blood sugar levels.

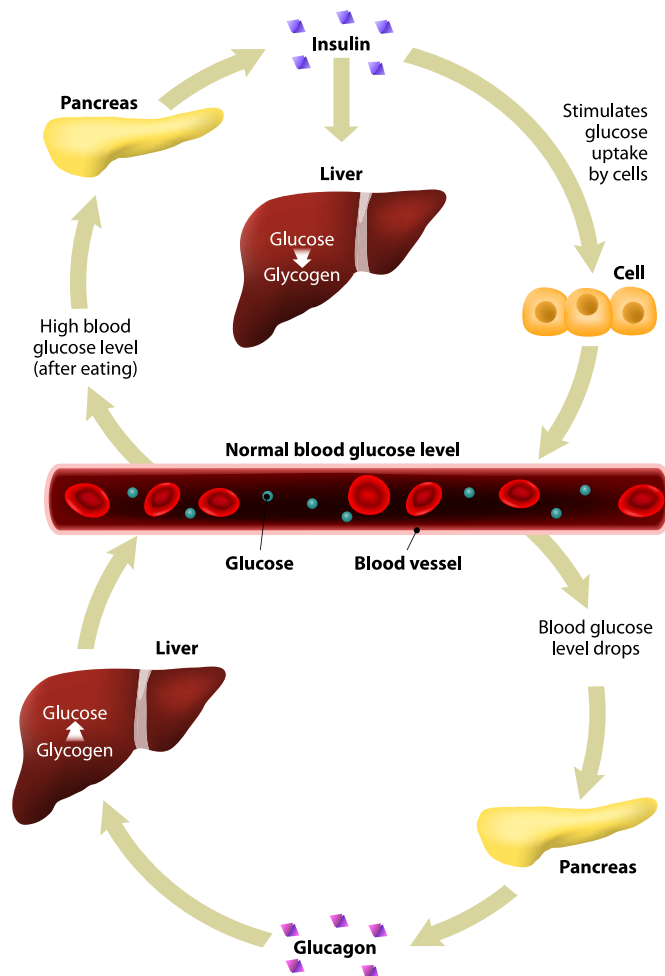
## Three Main Types of Enzymes Produced by the Pancreas:

- Lipase (breaks down fats)
- Protease (breaks down proteins)
- Amylase (breaks down carbohydrates)

## Two Main Hormones Produced by the Pancreas:

- Insulin
- Glucagon

## INSULIN AND GLUCAGON regulate blood glucose levels



Insulin and glucagon regulate blood glucose levels.

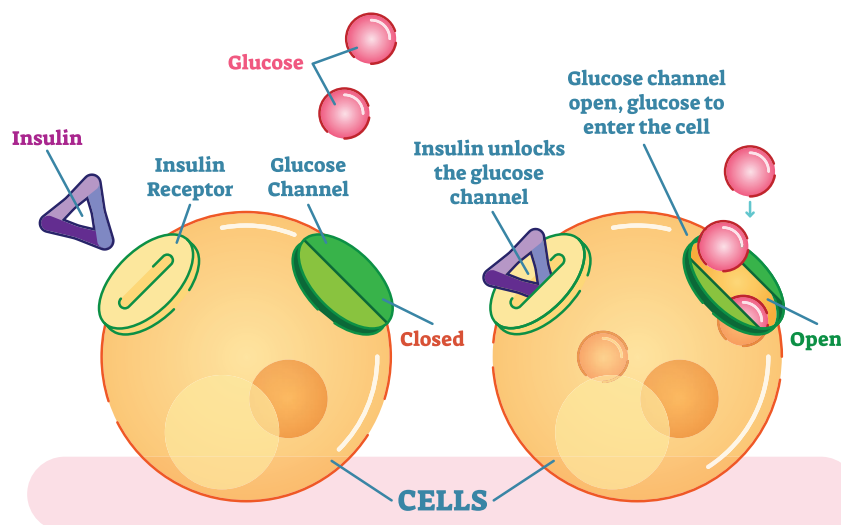
# How the Body Uses Glucose

To better understand diabetes, it helps to know how the body processes food for fuel (or energy). As food digests, carbohydrates break down into glucose (or sugar) and pass from the intestines into the bloodstream. Glucose is the main source of energy for our cells and preferred source of fuel for our brains. But before our bodies can use glucose for energy, it must get into our cells. This is where insulin comes in.

“sugar” and  
“glucose” are used  
interchangeably  
throughout this text

Insulin acts like a key that opens the doors to the cells so the glucose can enter. Once the glucose is in the cells, the body can use it for energy. Insulin transports or moves glucose from the blood stream into the cells of the body. In other words, glucose needs insulin to get into the body’s cells.

## HOW DOES INSULIN WORK



An analogy compares two things that are mostly different from each other but have some traits in common. Here is an analogy to explain how glucose works which may make it easier to remember: Some parking garages need keys for entry. A vehicle approaches the gate, and the driver uses a key card or key fob, and the gate opens, allowing the person to park. If the driver forgot their key card or fob, they will not be able to enter the garage. Cars will start stacking up behind their car, unable to enter the garage.

Think of the key card/fob as insulin, the garage door as the cell wall, the garage as the body cell, and the car as glucose. Insulin (key fob), must be present to open the cell wall/door (garage door), so that glucose (the car) can move into the cell (garage). If the body has little or no insulin, or if the cells won’t accept insulin, glucose cannot move into the body cells. This is diabetes.

Now, think of your own analogy.

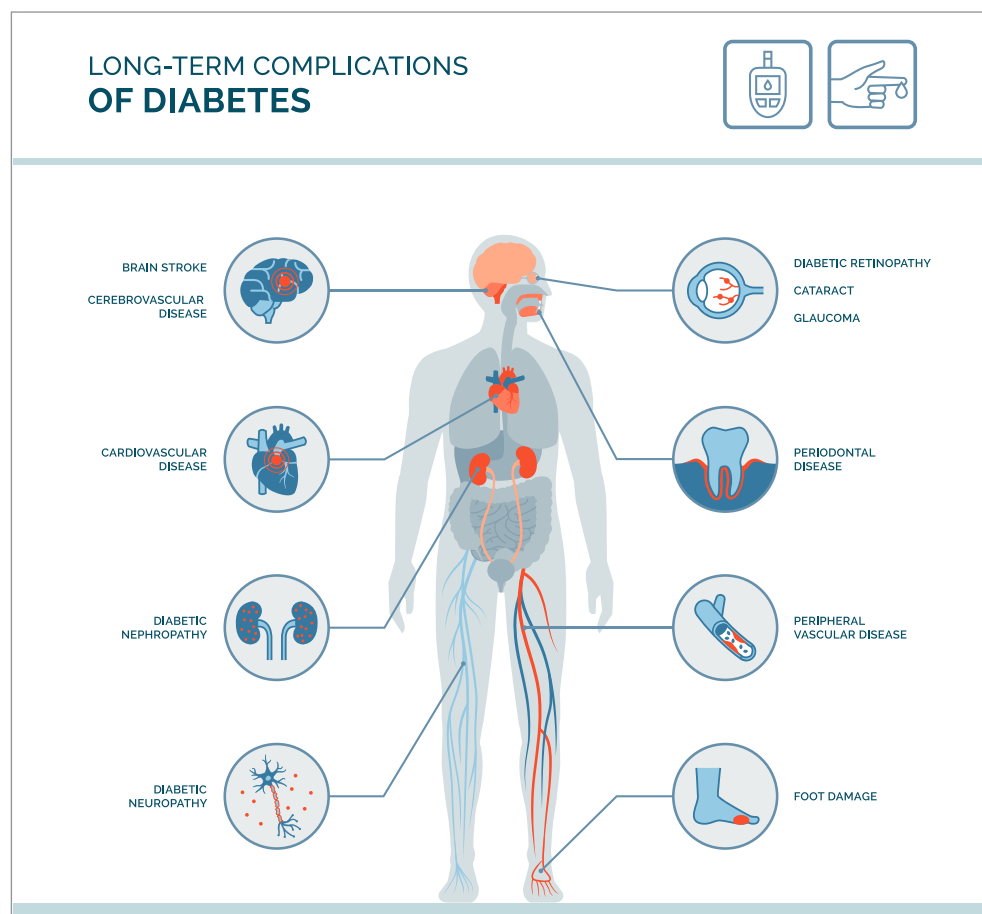


When diabetes occurs, the pancreas makes little or no insulin, or the body's cells do not respond to insulin. In either case, glucose cannot move into the body cells. Instead, it builds up in the bloodstream. Even though glucose is available, the body is unable to use it. The cells now lack the fuel they need to work. Over time, having too much sugar in the blood can lead to serious complications. These may include heart disease, stroke, kidney disease, eye problems, gum disease, nerve damage, and foot problems. Blindness, amputation, and death may also result from these complications. Diabetes is the 7th leading cause of death in the United States.

Diabetes is a very serious health problem and can cause other problems if it is not treated properly. Some of the health problems include the following:

- High blood pressure
- Heart attack
- Stroke
- Eye problems that can lead to blindness
- Kidney disease or failure
- Poor circulation and healing
- Pain
- Dental problems
- Frequent infections
- Loss of feeling and muscle weakness, especially in the feet, legs, and hands

*\*\*The loss of feeling, combined with the reduced ability to fight infection, is a major cause of toe, foot, and leg amputations.*



# There are 3 main types of diabetes:

## Type 1:

A chronic disease caused by an autoimmune reaction where the body's immune system attacks the beta cells that produce insulin. As a result, the body produces very little or no insulin. The exact causes are not yet known, although research suggests a link to a combination of genetic and environmental factors.

### Facts:

- Type 1 is often called juvenile diabetes because it usually begins at a young age and is usually diagnosed in children, teens, and young adults.
- The body produces very little or no insulin.
- Requires multiple daily insulin injections or the use of an insulin pump to maintain blood glucose levels. Without access to insulin, people living with Type 1 will die.
- Approximately 5-10% of the people who have diabetes have type 1.
- Symptoms of type 1 diabetes often develop quickly.
- It's usually diagnosed in children, teens, and young adults.
- Currently, how to prevent Type 1 is unknown.

## Type 2:

With type 2 diabetes, the pancreas produces insulin, but either not enough insulin is produced or the body does not use it effectively. As a result, glucose from food builds up in the blood.

### Facts:

- Usually occurs in people over the age of 40 who are overweight and have long-standing poor eating habits.

- Increased diagnosis in children, adolescents, and younger adults. This is due to rising levels of obesity, physical inactivity, and poor diet.
- It can develop slowly over time and may not be diagnosed for several years as symptoms may go unnoticed.
- About 90-95% of people with diabetes have type 2. Type 2 diabetes can be prevented or delayed with healthy lifestyle changes, such as:
  - A healthy diet, regular blood tests, exercise, maintaining a healthy body weight, and oral medications. As the disease progresses, insulin may be prescribed to help glycemic control.

## Gestational Diabetes:

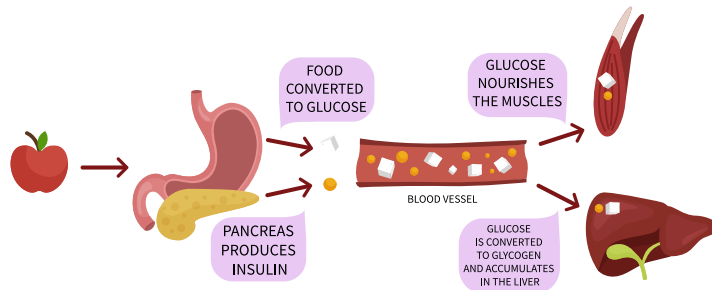
Gestational diabetes occurs during a woman's pregnancy and is a result of the body's increased need or demand for insulin as her pregnancy develops. It may cause complications to both mother and baby.

### Facts:

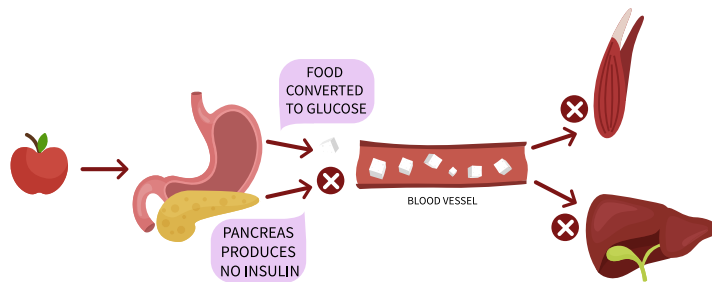
- Result of the body's increased need or demand for insulin as pregnancy develops.
- Treated with diet and exercise and sometimes medications.
- When the baby is born the gestational diabetes disappears.
- Women who have had gestational diabetes are at high risk for developing type 2 diabetes. According to the CDC, 50% will go on to develop type 2 diabetes.

# TYPES OF DIABETES

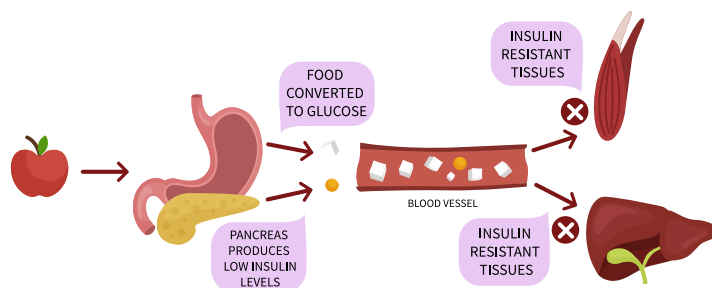
## HEALTHY/ NO DIABETES



## TYPE 1 DIABETES



## TYPE 2 DIABETES



**List the different types of diabetes and one difference between them:**

1.

2.

3.



**Diabetes Review:  
Important Points to Remember**

- Food containing carbohydrates is broken down into sugar (also called glucose) and released into the bloodstream.
- When blood sugar goes up, it signals the pancreas to release insulin.
- Insulin acts like a key to let the blood sugar into the body's cells for use as energy.
- Diabetes is a disease in which the body either does not make enough insulin or cannot use the insulin it makes as well as it should.
- When there is not enough insulin or cells stop responding to insulin, too much sugar stays in the bloodstream.
- Over time, diabetes can cause serious health problems, such as heart disease, vision loss, and kidney disease.
- There are 3 main types of diabetes:
  - Type 1 diabetes may be caused by an autoimmune reaction (the body attacks itself by mistake) that stops the body from making insulin.
  - With type 2 diabetes, the body doesn't use insulin well and can't keep blood sugar at normal levels.
  - Gestational diabetes may develop in pregnant women who have never had diabetes. Women who experienced this type of diabetes are at greater risk of developing Type 2 diabetes later on.

# Lesson 2: Hyperglycemia & Hypoglycemia

For persons living with diabetes, treatment goals are:

- To keep the blood sugar as normal as possible without significant high or low blood sugars.
- To prevent tissue damage caused by too much sugar in the blood stream.

These goals are possible when people living with diabetes do what it takes to keep blood sugar levels in target range. Their provider may recommend a specific target range. The American Diabetes Association (ADA) generally recommends the following target blood sugar levels:

- Between 80-130 mg/dL before meals.
- Less than 180 mg/dL 2 hours after meals.

Goals should be individualized based on duration of diabetes, age/ life expectancy, other chronic health-related conditions, known heart disease or advanced microvascular complications, and individual resident considerations.



Talk with the delegating RN to determine what the client's target range is and what is considered to be a "high blood sugar".

## Hyperglycemia

Hyperglycemia is the technical term for high blood glucose (also called high blood sugar). It occurs when there is too much sugar in the bloodstream. Hyperglycemia is blood glucose greater than 130 mg/dL while fasting and greater than 180 mg/dL at least 2 hours postprandial (after eating). Several factors can contribute to hyperglycemia in people with diabetes:

- In type 1, maybe enough insulin wasn't administered.
- In type 2, the body may have enough insulin, but it is not as effective as it should be.
- Eating more than planned, especially a meal high in carbohydrates.
- Not getting enough exercise (nutrition and physical activity will be discussed more in depth later in this module).
- Physical stress (from illness, a cold, the flu, an infection, etc.).
- Emotional stress (from family conflicts, emotional problems, school, or work stresses, etc.).
- Dawn phenomenon (a surge of hormones that the body produces daily around 4:00 a.m. to 5:00 a.m.).
- Certain medications such as steroids or skipping or missing glucose-lowering medication.
- Current dose of insulin or other diabetes medications is not effective.



## Signs & Symptoms

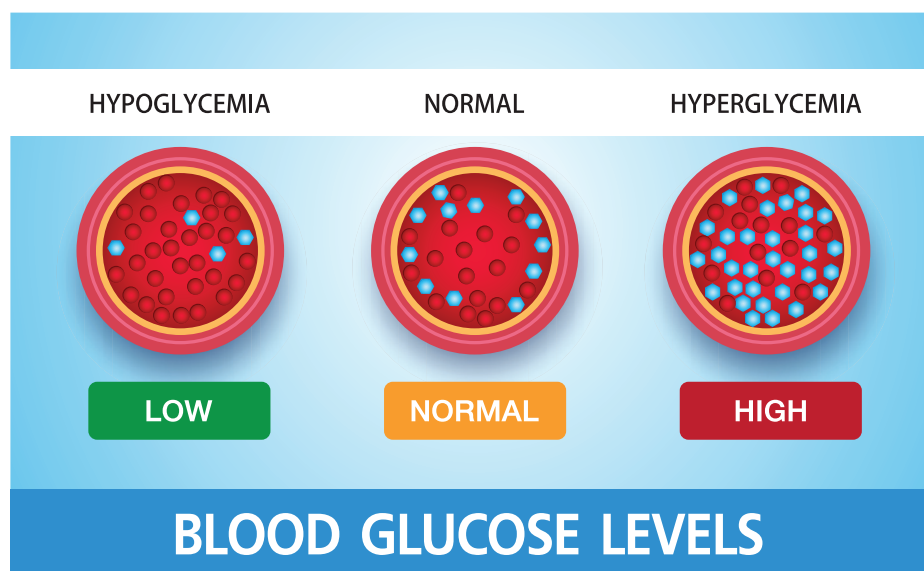
The signs and symptoms of diabetes are related to high levels of glucose in the blood and lack of energy available to the body's cells. Symptoms typically have a gradual onset and usually don't appear until blood glucose has remained significantly high (greater than 180-200mg/dL) for a long duration.

The most common signs and symptoms of hyperglycemia are the three P's:

- Polyuria: Excessive/increased urination; when blood sugar levels are abnormally high, the kidneys cannot reabsorb the additional sugar, which ends up in the urine, causing frequent urination. When a person's blood sugar levels are continually high, their body attempts to remove some of the excess sugar through urine. As urination increases, dehydration may occur because along with the excess blood sugar, the body is also getting rid of water and electrolytes. In turn, to restore balance, the body responds to dehydration by increasing a person's thirst.
- Polydipsia: Increased thirst to make up for fluid loss from polyuria.
- Polyphagia: Increased hunger related to high levels of blood sugar. The extra sugar cannot enter cells and convert to energy due to insulin resistance or a lack of insulin. So, food eaten can't provide energy, and the person with diabetes will continue to feel hungry no matter what they eat.

These are also considered early symptoms of hyperglycemia. Other common symptoms of hyperglycemia include unusual weight loss, blurred vision, fatigue, and irritability.

Hyperglycemia can cause acute and chronic complications, which have a negative impact on the long-term health of people affected by this disease.



## Acute Complications

### Diabetic Ketoacidosis

Diabetic ketoacidosis, also known as DKA, is caused by an overload of ketones present in blood. When cells don't get the glucose they need for energy, the body begins to burn fat for energy, which produces ketones. Ketones are chemicals that the body creates when it breaks down fat to use for energy. The body does this when it doesn't have enough insulin to use glucose, the body's normal source of energy. When ketones build up in the blood, they make it more acidic.

High levels of ketones can poison the body. DKA may happen to anyone with diabetes, though it is rare in people with type 2.

DKA usually develops slowly. But when vomiting occurs, this life-threatening condition can develop in a few hours.

### Warning!

DKA is dangerous and serious. If the client has any of the above symptoms, contact their health care provider IMMEDIATELY, or call 911. Discuss the client's sick day guidelines and DKA protocol with the delegating RN.

### Symptoms of DKA

- Thirst or a very dry mouth
- Frequent urination
- High blood glucose (blood sugar) levels
- High levels of ketones in the urine
- Constantly feeling tired
- Dry or flushed skin
- Nausea, vomiting, or abdominal pain.
  - Vomiting can be caused by many illnesses, not just ketoacidosis. If vomiting continues, contact the client's health care provider.

- Difficulty breathing
- Fruity odor on breath
- A hard time paying attention, or confusion

## Chronic Complications

Untreated and prolonged hyperglycemia can lead to the development of micro (small) and macro (large) vascular issues.

They include damage to the:

- Eye (retinopathy)
- Kidney (nephropathy)
- Peripheral and autonomic neuropathy (nerve loss in the feet and other areas of the body such as the intestine)
- Peripheral artery disease
- Cardiovascular disease
- Bone and joint problems
- Teeth and gum infections
- Foot damage

## Management and Treatment

The best way to avoid high blood sugar is for a person living with diabetes to follow their health care provider's orders/recommendations or diabetes care plan. Many people with diabetes can manage hyperglycemia by eating healthy, being active, and managing stress. In addition, insulin is a critical part of managing hyperglycemia for people with type 1 diabetes, while people with type 2 diabetes may need oral medications and eventually insulin to help them manage hyperglycemia.

If blood sugar has been higher than goal and you don't know why, call the medical provider or other member of the diabetes care team as indicated. The best way to know if blood sugar is high is to check blood sugar regularly, as directed by the provider.

## Diabetes Care Team

Many people living with diabetes will have a diabetes care team. This is a network of people who will work with the individual to help them understand and combat the disease by combining long-term treatment approaches and maintaining communication and goal setting among all team members. The client is the most important part of the diabetes care team, as they are responsible for making dietary and lifestyle changes and following all the instructions given to them. The team is comprised of many professionals who can help the person live a healthy life. You are part of this care team too and may be interacting with other members of the care team to best serve the clients you care for. Other healthcare professionals who may be on the team are:

- Primary Care Provider (PCP)/medical provider: Medical doctor (MD or DO), nurse practitioner (NP) or physician assistant (PA-C)
- Endocrinologist
- Ophthalmologist or Optometrist
- Podiatrist (DPM)
- Pharmacist (PharmD).
- Dentist (DMD or DDS)
- Registered Nurse/Nurse Navigator (RN)
- Registered Dietitian Nutritionist (RD/RDN)
- Certified Diabetes Care and Education Specialist (CDCES)
- Mental Health Professional
- Fitness Professional/Personal Trainer/Physical Therapist

The best way to avoid high blood sugar is for a person living with diabetes to actively participate in the development of and follow their diabetes care plan or doctor's orders/recommendations.

## Prevention of Hyperglycemia

- Exercise helps lower blood sugar.
- Assist client with following a balanced and healthy meal plan.
- Encourage the client to maintain a healthy weight.
- Encourage the client to stop smoking if they are a smoker.
- If the client drinks alcohol, encourage them to limit how much they drink. Alcohol can raise blood sugar levels but can also cause dangerously low blood sugar levels.
- Assure client is taking diabetes medications as prescribed. If client is refusing diabetic medications contact the Health Care Provider.

### How might you support a client with preventing hyperglycemia?

## Diabetes Care Plan

People with diabetes need to manage their blood sugar levels to stay as healthy as possible. A diabetes care plan can outline the steps a person needs to take to reach their health goals.

A healthcare team works with a client to design a tailored care plan covering their medications, blood sugar checks, insulin dosage, and other details that will allow them to manage their condition.

If the client has a diabetes care plan, the nurse delegator may review with you, otherwise, they will be reviewing specific orders and instructions for each client that will include target goals for blood sugar, when to check blood sugar, insulin regimen, as well as other client specific recommendations.



### The delegating RN will:

- Teach you about the client's Diabetes Management Plan.
- Let you know if the client has an individualized Target Range for blood sugar and what that range is.
- Show you how to use the client's glucometer.
- Let you know when the client's blood sugar needs to be checked.
- Let you know when and what to communicate and report to the delegating RN.
- Review the blood sugar target range for the client and the steps you need to take if the client has blood sugar above the Target Range.

**Always follow the plan and steps that come from the delegating RN.**

# Hypoglycemia

## Blood Sugar Ranges to Know

Hypoglycemia is a low level of glucose in the blood or “low blood sugar”. Usually, people develop symptoms of hypoglycemia when their blood glucose falls below 70 mg/dL. Hypoglycemia usually happens suddenly and can lead to loss of consciousness or even cause death if left untreated.

You can help a person with diabetes effectively manage hypoglycemic events by learning to:

1. Recognize the symptoms of hypoglycemia
2. Treat appropriately, and
3. Prevent whenever possible.

## What Causes Hypoglycemia

- Taking too much insulin.
- Not eating enough food to cover the insulin taken.
- Exercising more than usual or doing more exercise than what was planned for.
- Skipping or delaying eating meals or snacks.

## Signs & Symptoms

Hypoglycemia signs and symptoms vary from person to person and may even vary from one episode to the next. They may not always be detected right away. Some people with diabetes may not feel any symptoms of hypoglycemia. It’s important to recognize the early warning signs and symptoms that occur when the client’s blood glucose begins to drop too low.

Be on the alert for the following common signs & symptoms:

- Sweating / chills
- Skin pale, cold, clammy
- Tachycardia (fast heart rate) / fast pulse
- Dizziness / light-headedness
- Nausea
- Fatigue
- Intense hunger
- Blurred vision
- Headache
- Shakiness
- Weakness
- Tingling in lips / hands / feet
- Confusion / trouble concentrating
- Nervous feeling/Restlessness

A low blood sugar level triggers the release of epinephrine (adrenaline). Epinephrine is the “fight-or-flight” hormone and what causes the symptoms of hypoglycemia such as sweating, tachycardia, tingling and anxiety.

If blood sugar level continues to drop, the brain does not get enough glucose and stops working as it should. This can lead to blurred vision, trouble concentrating, confused thinking, slurred speech, numbness, and drowsiness. If blood sugar stays low for too long, starving the brain of glucose, it may lead to seizures, coma, and death. We will review the stages of hypoglycemia in the next section.



# Stages of Hypoglycemia

Hypoglycemia can be mild, moderate, or severe based on the person's blood glucose and condition. Here are the levels:

- **Level 1 (mild) hypoglycemia:** Blood glucose is less than 70 mg/dL but is 54 mg/dL or higher.
- **Level 2 (moderate) hypoglycemia:** Blood glucose is less than 54 mg/dL.
- **Level 3 (severe) hypoglycemia:** A person is unable to function because of mental or physical changes. They need help from another person. In this case, blood glucose is often below 40mg/dL.

**Reminder:** Individuals can have unique reactions to the 3 levels, therefore even if the resident is not in a level 3 blood glucose range but having significant mental or physical changes call 911 for assistance as this could be a medical emergency.

**When low blood sugar isn't treated and requires someone to help, it is considered a severe event. Severe hypoglycemia is a diabetic emergency.**

**TABLE 6.4** Classification of hypoglycemia

Glycemic criteria/description	
Level 1	Glucose less than 70 mg/dL (3.9 mmol/L) and less than or equal to 54 mg/dL (3.0 mmol/L)
Level 2	Glucose less than 54 mg/dL (3.0 mmol/L)
Level 3	A severe event characterized by altered mental and/or physical status requiring assistance for treatment of hypoglycemia.

Reprinted from Agiostratidou G, Anhalt H, Ball D, et al. Diabetes Care 2017; 40:1622-1630.



- **Low blood sugar or hypoglycemia can lead to a medical emergency or death if left untreated. Know the signs!**
- **A person who loses consciousness needs emergency medical help immediately. Without it, an unconscious person with low blood sugar can die.**
- **To work safely with a client who has diabetes, you must be able to recognize LOW BLOOD SUGAR SYMPTOMS when you see them.**

## Hypoglycemia Management and Treatment

The goal is to treat, but not overtreat. Many people who experience low blood sugar want to eat as much as possible until they feel better. This may cause the blood sugar to spike way up. Using the step-by-step approach of the “15-15 Rule” or “rule of 15” will help prevent high blood sugar levels.

You can help a client living with diabetes by recognizing the symptoms of hypoglycemia and by safely helping to provide prompt treatment.

## Follow the “Rule of 15” or “15-15 Rule”

- ✓ Check the blood glucose (sugar) level. If no meter is available and the person has symptoms, assume you need to treat them for hypoglycemia.
- ✓ Have the person eat 15 grams of carbohydrate (CHO). Examples of foods that may be readily available to you that are about 15 grams include:
  - 4 oz. (1/2 cup) of juice or regular soda (not diet)
  - 1 tablespoon sugar, honey, or syrup
  - 1 dose glucose gel (usually 1 tube; follow package instructions)
  - Hard candies, jellybeans, or gumdrops—see food label for how many to consume
  - 3-4 glucose tablets (follow package instructions)
- ✓ Stay with the person, then re-check the person’s blood sugar level in 15 min
- ✓ If it is still too low (below 70 mg/dL), have them eat or drink another 15 grams of carbohydrates
- ✓ Check blood sugar again after another 15 minutes
- ✓ Repeat these steps until blood sugar is back to client’s recommend range
- ✓ Stay with the person if possible and notify the delegating RN (also follow your agency policy and notify other staff as required)



## If the person becomes unconscious, call 911

When treating hypoglycemia, the choice of carbohydrate source is important. Complex carbohydrates, or foods that contain fats along with carbs (like chocolate, milk or a peanut butter sandwich) can slow the absorption of glucose and should not be used to treat low blood sugars.

There are a few important points to keep in mind about using The Rule of 15:

- If the client has symptoms of low blood sugar and you can’t check his or her blood sugar using a glucometer, give the client 15 grams of glucose.
- Always have a source of glucose (such as candy or glucose tablets) available for the client.
- After the client’s low blood sugar has been raised:
  - Observe the client for the return of low blood sugar symptoms.
  - Re-check the client’s blood sugar if symptoms return.
- Encourage the client to eat meals and snacks as planned to keep blood sugar up.
- There are times when a person with low blood sugar is conscious, but may not be able to swallow food, drinks, or tablets safely. You know the client can’t swallow safely if the client is:
  - slurring their speech
  - drowsy or not alert enough to follow directions



- Call 911 immediately if the client passes out or loses consciousness. Never attempt to give an unconscious person a source of glucose by mouth.
- Call 911 immediately if the client cannot safely swallow or use a source of glucose by mouth.
- It is always safest to treat symptoms of low blood sugar, even if you can't check the blood sugar with a glucometer.

Glucagon is available by prescription and is either injected or puffed into the nostril. Speak with the client about whether they are prescribed a glucagon product, and if they know how and when to use it.



Injections of Glucagon cannot be delegated to nursing assistants or home care aides in Washington State. It is important to remember that you cannot administer Glucagon injections under nurse delegation.

Instead, you can follow:

- The client's individualized plan for low blood sugars—as provided by the delegating RN.
- The 15-15 Rule if the client has no individualized plan.

## Causes of Low Blood Sugar

Low blood sugar is common for people with type 1 diabetes. It can also occur in people with type 2 diabetes taking certain medications or insulin, skipping meals, exercising more than usual, or drinking alcohol.

### Insulin

Prescribed insulin works the same way the body's insulin works. Recall from the beginning of this module that insulin acts like a key which unlocks the cell to allow sugar to enter and be used for energy or stored for later use.

One common cause of hypoglycemia is injecting too much insulin. Some of the newer insulins are preferred over regular insulin because they are less likely to cause low blood sugars, specifically overnight. Insulin pumps may also reduce the risk for low blood sugar. Accidentally injecting the wrong insulin type, too much insulin, or injecting directly into the muscle (instead of just under the skin), can cause low blood sugar.



Low blood sugar is the main risk to think about when you administer insulin.

It is important to understand that the person receiving scheduled insulin must eat at scheduled times. A delay in meals or snacks may have significant adverse effects.

## Food

The food the client chooses to eat can cause low blood sugar, including:

- Not enough carbohydrates (carbs) at meals.
- Eating foods with less carbohydrate than usual without reducing the amount of insulin taken.
- Timing of insulin based on whether carbs are from liquids versus solids can affect blood sugar levels. Liquids absorb much faster than solids, so timing the insulin dose to the absorption of glucose from foods can be tricky.
- How balanced is the meal—how much fat, protein, and fiber are present—can also affect the absorption of carbohydrates.

Blood sugar is more likely to stay in the Target Range if a person pairs a regular, consistent meal plan with regular insulin doses.

Hypoglycemia is very likely if a person

- makes a sudden change and skips a meal or
- doesn't eat any carbohydrates at a meal but still doses their usual insulin regimen



If a person skips a meal or snack, blood sugar may be lower than usual. Taking the usual dose of insulin may then cause dangerously low blood sugar.

## Physical Activity

Regular exercise can help to control a person's blood sugar. Exercise lowers blood sugar by using up the body's fuel – or glucose – for energy.

Exercise has many benefits. The tricky thing for people with diabetes is that it can lower blood sugar in both the short and long-term. The intensity, duration and timing of exercise can all affect the risk for blood sugar getting too low. Also, when a person combines a regular pattern of exercise along with regular insulin doses, blood sugar is likely to stay in the Target Range.



If an individual decides to exercise longer or harder, and not decrease their insulin dose, this may result in dangerously low blood sugar.

If a person makes a sudden change to their exercise routine, blood sugar may get lower than usual. Taking the usual dose of insulin may then cause dangerously low blood sugar.

If a client wants to change their current exercise routine, encourage them to call their medical provider or offer to call their provider for them if indicated to see if any changes need to be made to the client's insulin/medication regime.

## Other Factors That Affect Blood Sugar

There are a few more factors that can affect blood sugar and use of prescribed insulin. To work safely with insulin, you need to know about all the factors that can affect blood sugar.

### Prescribed Insulin and Sick days

During times of illness or infection, blood sugar tends to be higher. People living with diabetes need to keep taking insulin when they're sick, even if they're not eating as much as they usually do. This is because the liver is still making glucose and releasing it into the blood.

Some people with diabetes may need more insulin than usual on sick days. These individuals may have created a "sick day plan" with their diabetes care team or medical provider/diabetes educator or doctor/nurse practitioner to use when they have a cold, the flu, an infection, or some other illness.



The delegating RN will let you know if the client has a "sick day plan" and how to use it.

### Prescribed Insulin and Stress

Any time the body and/or mind feels stress, blood sugar will usually be higher.

Stress can be emotional, such as when a person is afraid, angry, or anxious. Stress can be physical, such as when a person gets injured, goes through surgery, or feels pain.



If a client's blood sugar is higher because of these factors, follow the client's plan for high blood sugar as instructed by the delegating RN.

### Prescribed Insulin and Alcoholic Beverages

Alcohol can lower blood sugar.

If people with diabetes drink alcohol, they should work with their diabetes care team or doctor/nurse practitioner/diabetes educator to include these beverages in their meal plan.



If the client is drinking alcohol that is not part of a dietary plan, notify the delegating RN and supervisor immediately so important adjustments to the plan can be made.

If the client uses alcohol, it should be included in the care plan/service plan or instructions you receive from the delegating RN.



If the client drinks alcohol when they typically do not, or drinks more alcohol than usual, blood sugar can drop. Administering the usual dose of insulin can cause dangerously low blood sugar.

## Individualized Client Plans for Low Blood Sugar

The client may have an individualized plan and steps to follow for low blood sugar. The client's individualized plan and steps may be different from The Rule of 15.



### The delegating RN will:

- Let you know if the client has an individualized plan to follow for low blood sugar.
- Instruct you about the plan and steps to follow.

## Reporting Low Blood Sugar

You will need to report to the delegating RN when your client has low blood sugar.

Reporting guidelines are individualized for each client. Depending on your workplace, you may also need to report low blood sugar to certain co-workers and supervisors.

If the client begins to have frequent and/or serious problems with low blood sugar, the client's healthcare provider may make changes to the Diabetes Care Plan and/or insulin orders. A change in insulin doses or other medications may be made.



### The delegating RN will:

- Let you know the specific guidelines for reporting the client's low blood sugar.
- Instruct you when there are changes to your client's Diabetes Care Plan/medical orders.

## Prevention of Hypoglycemia

For a person with diabetes, the first step in preventing severe hypoglycemia is to keep blood glucose levels under good control. This includes:

- Help the person keep their insulin or other diabetes medication, diet, and activity level in balance. For example, if the person with diabetes becomes ill and is unable to eat, or vomits, notify the delegating RN to discuss a plan to keep the person's blood glucose level in the normal range.
  - Encourage the client to eat meals and snacks on a regular schedule after your client has taken their diabetes medications.
  - Sticking to a routine exercise plan.
  - Taking medicines for diabetes on time and as directed.
- Check the person's blood sugar as directed, especially during times that are most likely to cause lows (during physical activity, when drinking alcohol, when skipping a meal or snack, etc.).
- Help the person to monitor their exercise/activity level and to notice or alert you if they do extra exercise or activity beyond their normal routines. The person may need a snack to avoid hypoglycemia.
- Have "15 grams of carbohydrate" readily available as a quick acting source of carbohydrate/sugar to treat the person's symptoms of hypoglycemia quickly and appropriately. Carry juice, candy, or glucose tablets at all times, in the event that a client develops symptoms of hypoglycemia.
- If the person is experiencing frequent lows, they should discuss this with their doctor.

Another step in preventing severe hypoglycemia is to be prepared. It's important to recognize the signs and symptoms of hypoglycemia, and once you can recognize these symptoms, check blood glucose levels as ordered/indicated to confirm if your client is truly hypoglycemic.



## Knowledge Check

Test your knowledge: Read each factor below, then circle the correct arrow.  
Up arrow if the factor increases blood sugar, down arrow if it decreases blood sugar.

- |   |   |   |
|---|---|---|
| 1. Skipping doses of insulin or other diabetes medication .....   | ↓ | ↑ |
| 2. Feeling physical stress such as injury, pain, or surgery .....   | ↓ | ↑ |
| 3. Making changes in other medications .....  | ↓ | ↑ |
| 4. Usual dose insulin with more exercise than usual .....   | ↓ | ↑ |
| 5. Usual dose insulin with more carbohydrates at a meal than usual .....                                  | ↓ | ↑ |
| 6. Too much insulin or diabetes medication .....  | ↓ | ↑ |
| 7. Drinking more alcohol than usual .....   | ↓ | ↑ |
| 8. Feeling emotional stress such as fear, anxiety, or anger .....   | ↓ | ↑ |
| 9. Getting more exercise than usual .....   | ↓ | ↑ |
| 10. Having a cold, the flu, infection, or other illness .....   | ↓ | ↑ |
| 11. Getting less exercise than usual .....  | ↓ | ↑ |
| 12. Extra helpings or snacks, especially those high in carbohydrates (candy, cookies, breads, etc.) ..... | ↓ | ↑ |
| 13. Skipped meals or snacks .....   | ↓ | ↑ |

## Answer key:

- |   |      |       |
|---|------|-------|
| 1. ↑  | 4. ↓ | 9. ↓  |
| 2. ↑  | 5. ↑ | 10. ↑ |
| 3. ↑↓ This depends on the medication and will vary by client. Discuss what medications the client is on with the delegating RN and be aware of any that may affect blood sugar. | 6. ↓ | 11. ↑ |
|   | 7. ↓ | 12. ↑ |
|   | 8. ↑ | 13. ↓ |

# Lesson 3: Diabetes Management in the Community Setting

## Overview

Once a person with diabetes is in this type of facility, they are likely no longer able to properly self-manage their condition. Good quality care helps prevent complications and reduce unnecessary hospital admissions. Good diabetes care may include oral medication or insulin injections, blood glucose tracking, special diets, daily physical activity, and other special medical care. When these tasks are kept up, someone with diabetes can manage their condition and reduce the risk of complications.

Diabetes care plans or diabetes management plans outline everything that staff members need to know so they can best meet the resident's health needs. These types of medical care plans should be uniquely tailored to each resident while covering all the major parts of diabetic care. Your facility may have another term for care plans but they are essentially the specific care and written instructions for the client.

**Diabetes management plans in the community setting** should cover:

- **Blood Sugar Monitoring**
- **Diabetic Medications**
- **Nutrition for the Person Living with Diabetes**
- **Physical Activity**

## Monitoring

In this section, we will focus on blood sugar monitoring, but monitoring involves many pieces of health, such as blood pressure, weight, cholesterol levels, heart health, sleep, mood, medications, and eye, kidney, and foot health.

Monitoring is an important aspect of diabetes management. For people living with diabetes, checking blood sugar is a useful tool to maintain glycemic control and helps people stay on track with treatment goals.

**Following are some tips and best practices for you and the client when checking a client's blood glucose level:**

- The client's hands should be washed in warm water to improve circulation and remove any food residue or lotions.
- When obtaining blood from the finger, drop the client's hand to the side to improve blood flow before sticking the finger.
- Use the sides of the finger rather than the tips to prevent tenderness.
- Try not to squeeze the finger (squeezing leads to bruising and soreness).
- If you suspect hypoglycemia or hyperglycemia, test the client's blood glucose level for verification if indicated in the client's orders.

## Continuous Glucose Monitoring

A continuous glucose monitor (CGM) is a device that helps track glucose levels throughout the day with fewer fingerstick tests. Unlike a traditional glucose meter, which only gives you a blood sugar reading when a fingerstick test is done, a CGM is a wearable glucose monitor that measures glucose levels every few minutes. A CGM can provide more than just a current reading. By showing where glucose has been and where it is going, it provides a more complete picture.



There are several brands of CGM devices with different features, all of which generally work in the same way:

- A tiny sensor filament is placed under the skin of the abdomen or the back of the upper arm.
- The CGM sensor automatically measures the glucose levels in the fluid between cells (called interstitial fluid) every one to five minutes.
- Wireless transmitters send glucose information to a monitor, smartphone, or wearable device.

Each glucometer is different. If the client no longer has the user manual, follow the direction/instruction of the RN delegator supervisor's instructions on how to operate the meter.

### Benefits of CGM:

- Real-time **feedback** on how glucose changes throughout the day can help better manage diabetes over the long term.
- 24/7 monitoring. Steady monitoring builds data, giving hundreds of readings every day, so the effect of food, beverages, exercise, and other activities on glucose levels can be seen in real time.
- Trend tracking and alerts. Features that track glucose trends over several hours can help take action to keep blood sugar within target range and sound an alert if glucose levels become dangerously high or low.
- Fewer fingerstick tests. Less poking and fewer fingerstick pricks giving CGM a real edge in convenience compared to traditional blood glucose monitoring systems.

### Drawbacks of CGM in the home-based setting:

- The CGM device will need to be changed routinely from the abdomen or the back of the upper arm, work with your delegating RN for a schedule when the device needs to be changed.
- Bleeding at site of CGM insertion.
- Occasional technical issues.
- Data and steady monitoring can be overwhelming to the staff, client and responsible party when alerts of highs, lows, trends, and errors are sent out.
- The continual rise and falls of the blood glucose levels can increase concerns. It is important to use trends and information as guides and not be caught up in watching the data constantly. Stick with the schedule of when to check the results instead.
- Cost

## Blood Glucose Testing with Glucometer

These are general instructions for checking blood glucose with a glucometer. They may not be accurate for all meters. Follow instructions that come with the client's meter if they are available, otherwise refer to the instruction from the delegating RN or unit supervisor.

### Step 1: Gather supplies

- Gather the relevant equipment and place in a clean tray:
  - Non-sterile gloves
  - Spring-loaded lancet: to obtain the blood sample.
  - Testing strips: make sure strips are not expired.
  - Blood glucose reader (a.k.a. glucometer): calibrate using calibration fluid if required.
  - Gauze

### Step 2: Perform hand hygiene. Put on gloves.

- Introduce yourself to the client if appropriate including your name and role.
- Confirm the client's name.
- Briefly explain what the procedure will involve using patient-friendly language: "Today I need to measure your blood glucose level, which involves taking a very small blood sample from your fingertip".
- Gain consent to proceed with blood glucose measurement.
- Ensure the client is sitting comfortably.



### Step 3: Prepare the Meter

- Check expiration date on test strips. Take a single, clean test strip out of vial.
- Insert test strip into the allotted slot at the top of the meter.
- Make sure the strip is face up and the sample tip is sticking out of the meter.
- If the test strip is inserted into the meter incorrectly, the meter will not turn on.
- The meter will automatically turn on and beep after the test strip is inserted correctly. When the meter is ready for a sample, a flashing symbol will appear on the screen.



### Step 4: Prepare Lancing Device

- Take a single, unused lancet from supply.
- Remove cover of lancing device by twisting. Insert new lancet into lancing device.
- Carefully remove protective cap from lancet to expose needle by twisting top slightly. Ensure not to poke yourself with tip of needle. Replace cover onto lancing device.



### Step 5: Adjust and Load Lancing Device

- The lancing device has several different depth settings which can be changed depending on individual's skin. Adjusting the cover of lancing device will change the depth of penetration of the skin when device is triggered.
- Twist cover to:
  - 1-2 for delicate skin
  - 3 for normal skin
  - 4-5 for thick skin



- Hold lancing device in one hand and pull back on the colored retractable end until it clicks. After the device clicks, it is now loaded and ready to use. Ensure the trigger button is not accidentally pressed at this time.

### Step 6: Prick Finger

- Ensure the client's finger is cleaned prior to measuring blood glucose:
  - It's important that the skin over the site being tested has been cleaned, as substances on the skin can affect the accuracy of blood glucose results.
  - Cleanse fingertip with alcohol wipe and allow to dry. Make sure the skin over the testing site has dried completely before performing blood glucose measurement.

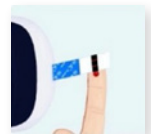
### Step 7: Collect Blood Sample

- Press the lancet against the client's skin firmly and push the trigger to release the lancet. Gently squeeze the finger to produce a drop of blood.
- Pick up meter with test strip inserted with free hand, ensure meter is on, and touch test strip to blood sample on punctured finger. Hold test strip to finger until enough blood is collected in the strip. Allow the blood to be absorbed into the strip.
- The meter will count down from 5 to 1 and beep once it has received enough blood.
- If there was not enough blood received, the countdown will stop, and the meter will read "Error." If this happens, the test must be repeated from the beginning with a new test strip, new lancet, and new puncture.
- If there is difficulty obtaining a drop of blood, try hanging the hand down or very gently squeezing the fingertip.
- Set down meter and wipe finger of any remaining blood; apply pressure to punctured finger with cotton ball or gauze to stop bleeding.



### Step 8: Test Results

- Once you have enough for a blood sample, load the sample into reservoir of the glucose meter to test the client's blood sugar. It's important to make sure the reservoir is fully occupied by the blood sample, or else you may not get an accurate reading.
- After receiving the blood sample, the meter will automatically display the blood glucose results on the screen. Test results range from 20-600 mg/dL. Depending on the displayed results, the individual can then take correct steps to manage their blood sugar as ordered by their doctor.
- If high and low alarms were previously entered into the device, they will sound if the results are out of the individual's personal ranges. "HI" will be displayed if the results were high, and "LO" will be displayed if they were low.
- Document client's results. The results will also be saved automatically on the meter, and they can be viewed later if necessary.



### Step 9: Proper Disposal of Equipment

- Remove used test strip from meter and place it inside the alcohol swab packet. Throw away in the appropriate disposal container.



- Be careful when removing the lancet from the lancing device to ensure there are no accidental pricks or injuries. To remove the lancet, untwist protective cover from lancing device and slide the lancet ejector forward. The lancet will be ejected from the lancing device. Dispose lancet in appropriate sharps container.
- Store test strips in the container provided. Do not expose them to moisture, extreme heat, or cold temperatures.
- Remove gloves. Perform hand hygiene.

**NOTE: THE ABOVE PROCEDURE IS A GUIDELINE OR EXAMPLE. ALL HEALTH FACILITIES SHOULD HAVE POLICIES AND PROCEDURES THAT SHOULD BE FOLLOWED WHEN PERFORMING BLOOD GLUCOSE TESTING WITH A BLOOD GLUCOSE MONITOR, INCLUDING CLEANING AND STORAGE. ALSO, FOLLOW THE DELEGATING RN'S DIRECTIONS FOR PERFORMING BLOOD GLUCOSE MONITORING.**

#### Why monitoring glucose is important

- ✓ Helps the person with diabetes reach their target goals for glucose which helps lower the chance of complications
- ✓ Helps to prevent hypoglycemia and hyperglycemia
- ✓ Help the individual learn how food and physical activity affect their glucose
- ✓ Helps determine the right amount of insulin to take
- ✓ Helps the provider know whether any medication changes are needed

#### Tips for Monitoring Blood Glucose

- Client's skin at testing site should be clean either with soap and water or alcohol swab; follow facility policy/procedure

- Substances on skin (like dirt, food, or lotion) can cause inaccurate results
- If client is wearing a continuous glucose monitor, follow the manufacturer's and/or supervisor's information on the best ways to keep it working well
- The best time to check the effect of a meal on blood level is 2 hours after eating however, follow the client's diabetic plan/physician's orders for when to check blood sugar
- Follow hypoglycemic protocol or client specific instructions if glucose readings are below 70mg/dl
- During times of illness/infection/injury, blood sugar tends to be higher, and the client may need more frequent checks. Refer to client specific instructions
- Encourage the client to bring glucose records to every appointment with provider/physician

#### Obtaining an Adequate Blood Sample Size

- Encourage the client to relax
- Ask the client to wash hands thoroughly
- Hang hands for 30 seconds
- Shake the hand to be pricked
- Milk the finger to be pricked
- Use the correct setting/needle depth on the lancing device



#### The delegating RN will:

- ✓ Show you how to use the client's glucometer.
- ✓ Let you know the monitoring plan for the client and the steps you need to take if the client has low or high blood sugar.
- ✓ Review hypoglycemia and hyperglycemia signs & symptoms.



### Causes for Inaccurate Results:

- Damaged strips
- Meter not calibrated correctly
- Meter not cleaned
- Not enough blood sample
- Dead batteries

### Monitoring Recommendations for Insulin-Treated Individuals

For most people who are on insulin, these are the recommended times to check blood sugar. However, a client will have an order from their medical provider for when and how often to check blood glucose. The delegating RN will review this with you. Some common times to check blood sugar are reviewed below:

### Common Times to Check Blood Sugar:

- Before meals and snacks
- At bedtime
- Occasional post-prandial (2 hrs. after eating)
- Before exercise
- After treating low blood sugar until normal
- When feeling different or ill
- Before driving

### Factors That Affect Blood Glucose

Monitoring is critical when an individual needs to know the impact that certain factors have on their blood glucose, such as drugs, food, activity, changes in body functions, illness, stressors, and other symptoms. Food, medications, stress, and exercise all have an impact on blood glucose levels. Checking at various times reveals different information.

A fasting blood glucose is when a person has not eaten anything for at least 8 hours. It is performed first thing in the morning, typically within 15 minutes of waking up.

Fasting blood glucose level gauges the effect of cortisol, a stress hormone, on glucose control and determines if the individual has enough endogenous (insulin produced by the pancreas) or exogenous (prescribed) insulin to maintain a normal level of sugar in the blood overnight.

### Monitoring & Meals

Carbohydrates have the strongest impact on blood glucose, causing an immediate rise of blood sugar levels. It is typically recommended that an individual monitors their blood glucose 1 to 2 hours from the start of their meal to evaluate the impact of the meal's carbohydrate content, however, the client may have different recommendations from their provider and the delegating RN will review when you are to check the client's blood sugar.

**Pre-prandial** (before meals) levels assess basal (background insulin) control and help make decisions about how much medication to take based on the carbohydrate content of the meal.

**Post-prandial** (after meals) levels evaluate whether the individual is taking the correct amount of medication to cover the meals they are eating.

### Monitoring and Physical Activity

The effects that physical activity can have on glucose levels will vary depending on the duration and intensity of the exercise.

Physical activity can lower glucose levels up to 24 hours post-workout due to the increase in insulin sensitivity (how sensitive the body's cells are in response to insulin). Also, when a person exercises, the body needs extra glucose, which is absorbed by the muscles, causing a decrease in glucose levels. Despite that, it is not unusual for glucose levels to rise temporarily while doing intense exercises. For most people, a safe pre-exercise glucose range is around 180 to 250mg/dL.

## Monitoring & Medications

If the individual is taking insulin, the location of the insulin injection should be noted, as different sites have different absorption rates.

In addition to documenting the medications being used to treat diabetes, it is important to note other medications that could impact glucose levels, like steroids.

Focus on monitoring should be given to the medications that tend to cause more hypoglycemia. The medications classes that can cause low blood sugar are sulfonylureas (chlorpropamide (Diabinese®), glipizide (Glucotrol® and Glucotrol XL®), glyburide (Micronase®, Glynase®, Diabeta®, Glynase® Preistab®), glymepiride (Amaryl®)) and insulins. There are also medications that can cause hyperglycemia, such as steroids. Having a general understanding of which medications the client takes routinely that could impact their blood sugar may better prepare you for detecting signs and symptoms of hypoglycemia and hyperglycemia.

## Monitoring and Stress

Both emotional stress, such as fear, anxiety, anger, or excitement, and physical stress, such as illness, pain, infection, or injury, can elevate glucose levels. This is due to an increase in epinephrine or adrenaline, glucagon, growth hormones, and cortisol levels. When the body is stressed, it prepares itself by ensuring that enough energy is readily available. This is also referred to as “fight or flight”. Insulin levels decrease, glucagon and epinephrine levels increase, and more glucose is released from the liver. Simultaneously, growth hormones and cortisol levels rise, which causes insulin resistance, resulting in hyperglycemia.

## Monitoring and Sleep

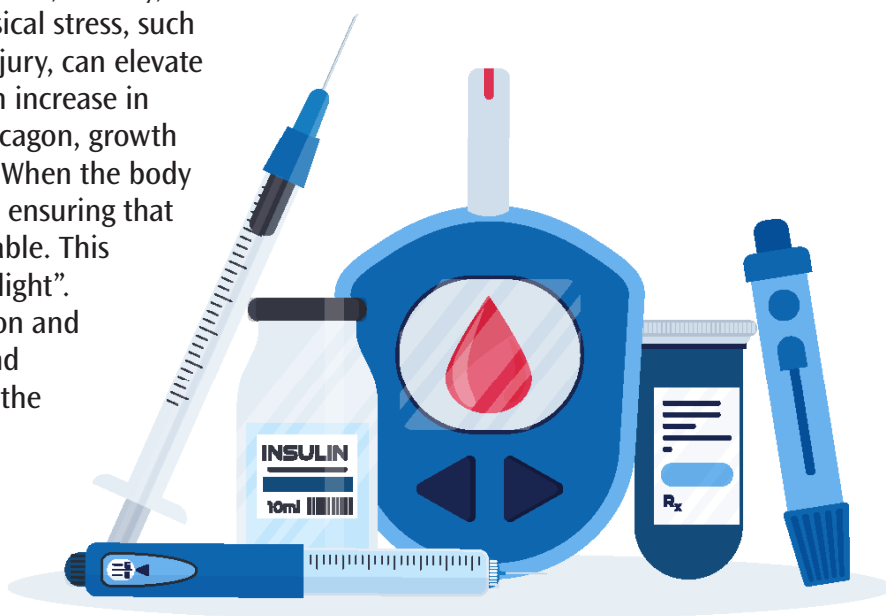
Getting enough sleep is important for everyone’s health. However, in an individual living with diabetes, not getting the recommended 6 to 8 hours of daily sleep can cause a negative impact on glucose control. Recent studies have shown that too much or too little sleep can increase the risk of hyperglycemia. Approximately 40% of people living with diabetes complain of poor sleep patterns. Additionally, type 2 diabetes can increase the risk of sleep disorders.

## Monitoring and Types of Insulins

Insulins will be discussed in depth in the next two modules. Monitoring recommendations depend on what types of insulin the client is on, how it is prescribed, and if the client is also taking oral medications that may cause hypoglycemia.



Refer to the client’s specific orders or instruction from the delegating RN for specific monitoring recommendations for the client.

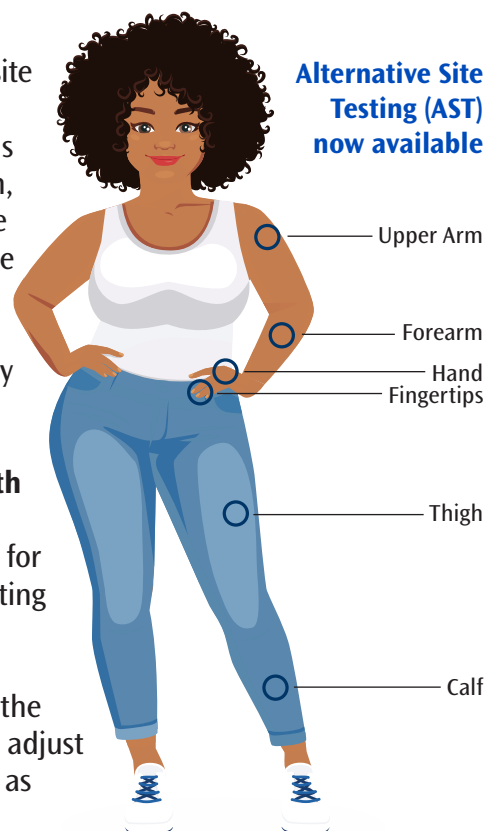


## Alternate Site Testing

Some people living with diabetes would prefer to use an alternative site to check their blood glucose because they find finger sticks or pokes more painful due to more nerve endings in the fingertips. Other areas of the body such as the palm, legs, forearm, upper arm, and stomach, are not as sensitive compared to the fingertips. Testing from alternate sites is not always ideal though. Blood flows more quickly through the blood vessels in the fingers than in these alternate test areas. This results in a lag of blood flow to alternate sites, which may reflect a difference of up to 100 mg/dL. When the blood glucose level is rapidly changing; the difference is greater.

**Before deciding on alternate site testing, the client must speak with their healthcare provider about whether this method will work for them and with their meter.** Not all glucose meters are approved for alternate site testing. Follow the instructions provided with client's testing system for traditional and alternate site testing.

One of the obstacles to managing diabetes is the fear of needles and the pain that comes with testing. Fortunately, today's lancing devices can adjust the puncture depths to ensure clients only prick their fingers as deep as necessary to get a good, accurate test result.



A client tells you they fear needles and do not want to have their blood sugar checked. What type of education can you provide to the client to put their mind at ease?

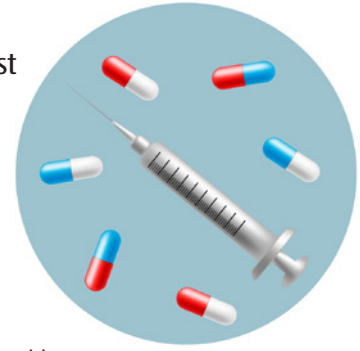


## Medication

Adhering to medication means following the day-to-day prescribed treatment at the right time, dose, and frequency for the required length of time. Taking medication as prescribed also means following the treatment plan that was developed to help avoid complications and stay healthy.

Taking medications consistently help lower the risk for heart attack, stroke, and kidney damage by managing blood glucose, blood pressure and cholesterol levels. Diabetes is a progressive disease so the longer someone has diabetes, the more medications they may be prescribed to keep their heart, eyes, and kidneys healthy.

Healthcare providers work with people individually to create the best list of prescribed medication for them. An individual may be on multiple oral meds while another may be on one or more types of insulin injections. Some people may be on a combination of oral meds and insulin injections or non-insulin injections which will be discussed in the next module. Clients may be on insulin, oral agents, or a combination of these. Two main concerns with diabetes medications are proper timing of the medication administration and monitoring for side effects. It is vital to properly assist with or administer the medication(s).



Time constraints make the administration of multiple medications to clients a challenge for nursing assistants or home care aides who must help with medications for several clients in a timely fashion. Follow the healthcare provider's order exactly to help assure the client will get the most benefit from their prescribed diabetes medications.

To best support the client with taking their medications, follow these tips:

- Keep a list of all current medications
  - Include all prescription and non-prescription medications in the list. This includes vitamin and mineral supplements, herbal remedies and other products purchased without a prescription.
  - A medication list provides valuable information for the health care team. Be sure to include the name, dose and time medication is taken.
- Assure a daily routine for taking and tracking all medications
- Encourage the client to share their medication beliefs and concerns with their diabetes care/medical team
  - Did taking medicine have positive effects on their health?
  - Did their medicine cause low blood glucose (hypoglycemia)?
  - Are they concerned about the number of pills they must take every day?
  - Is their medication plan too complicated for their lifestyle?
- Safely dispose of needles and lancets
  - This will be discussed in depth in the third module

For a more in-depth review of diabetes medications, the Aging and Long-Term Support Administration (AL TSA) offers a Diabetes, level 1, Capable Caregiving course. This course is available through AL TSA approved instructors as part of an expanded specialty curriculum.



### **The delegating RN:**

- Teach you about the client's individualized medication list.
- May give you specific instructions about helping the client with diabetes medications.

# The Rights of Medication Administration:

## A Review

Administering medications is one of the most common tasks completed by most nurses. In home and community-based care settings, medication management is often handled by nursing assistants or home care aides. Medication administration can be a repetitive and time-consuming task. Medication errors can cause injury and even death. The amount of medications errors self-reported to the Food and Drug Administration (FDA) is over 100,000 each year. Many people suspect the number of actual medication errors is much higher than the self-reported number.

When giving medications you are required to:

- Understand each client's medications
- Give medications as ordered by the prescribing practitioner

Each time you are administering medications, you must be aware of the dangers. The best way to prevent medication errors at the point of administration is to follow the six rights of medication administration for each and every medication.

### 6 Rights of Medication Administration

1

#### Right Client

- Ask the client their first and last name.
- Does the order match the client?
- Ask client to identify himself/herself.

2

#### Right Medication

- Does the medication label match the order?
- Pay attention with look-alike and soundalike medications.

3

#### Right Dose

- Does the strength and dosage match the order?

4

#### Right Time

- Does the administration time match the order?
- Check the frequency of the ordered medication.
- Double check that you are giving the ordered dose at the correct time.
- Confirm when the last dose was given.
- Before administering a PRN medication, ensure specified time interval has passed.

5

#### Right Route

- Does the route match the order?

6

#### Right Documentation

- Document administration AFTER giving the ordered medication.
- Chart time, route, and any other specific information as necessary.

How often should you compare the MAR/medication order to the medication label for the client receiving his nighttime 20 Units of Lantus?

- The first time you should compare the MAR to the drug label is when you retrieve the medication from the storage area.
- You should compare the MAR to the medication label as you prepare the medication for administration. This should be the second of three times you will check the medication label to the MAR.
- The last time you should check the medication label to the MAR is after you can confirm the client received the insulin shot.

**What are some ways you could support a client who wants to make some healthy changes to their diet? What are some ways you could help them stick to their plan to eat healthy?**



control blood glucose levels, and maintain appropriate body weight. There is no one ideal eating pattern for diabetes as many diets may work well. Below are some aspects of a healthy, balanced eating pattern for people living with diabetes:

- Meals should be well-balanced, rich in nutrients, high in fiber, low in calories and excess fat.
- Fresh fruits and vegetables, whole grains, lean proteins, and healthy fats should be emphasized.
- Meals should be consumed on a regular schedule. Skipping or omitting meals can cause changes in blood sugar levels, specifically leading to lows.
- Processed foods, fried foods, and foods high in sugar should be reduced and monitored.

You may have little control over what the resident chooses to eat, but it's important to have a general understanding why nutrition is important for diabetes management.

You may have the opportunity to discuss nutrition health with clients or encourage the client to make healthier choices. For a more in-depth review of healthy eating for diabetes management, the Aging and Long-Term Support Administration (AL TSA) offers a Diabetes, level 1, Capable Caregiving course. This course is available through AL TSA approved instructors as part of an expanded specialty curriculum.

## Improving Nutrition Health

Diet can play a significant role in diabetes management. The client may have a dietitian that has developed an individualized meal plan to meet the client's nutritional needs, or the client may choose their meals without any specific meal plan or diet order. All meal plans should meet nutritional guidelines,



Historically, therapeutic “diabetic” diets have been prescribed to individuals living with diabetes. A therapeutic diet:

- is a meal plan that controls the intake of certain foods or nutrients
- is part of the treatment of a medical condition and normally prescribed by a physician and planned by a dietitian
- is usually a modification of a regular diet to fit the nutrition needs of a particular person

There is growing evidence that such therapeutic diets may lead to decreased food intake, unintentional weight loss, and undernutrition. Prevention of malnourishment and poor nutrition are key concerns.

Today, typically a wider variety of food choices, addressing personal food preferences, and providing dining options regarding time and type of meals are being offered. Liberal diets have been associated with improvement in food and beverage intake in this population to better meet caloric and nutrient requirements.

Carbohydrates or carbs, which are turned into glucose once eaten, have the strongest impact on blood sugar, causing an immediate rise in blood glucose. Tracking carbs in meals, snacks and beverages can help people living with diabetes match their activity and medicines to the food they eat. Some clients who take mealtime insulin will count carbs to match their insulin dose. They may also take additional insulin if their blood sugar is higher than their target range before meals or after meals. The delegating RN will review the client’s insulin regimen with you. What type of carbohydrates the resident chooses to eat should be taken into consideration however you may have no control over this. Instead, encouraging the client to eat a meal plan with consistent carbohydrates that allows for a wide variety of food choices may be more beneficial for both nutritional needs and glycemic control in clients with type 1 diabetes or type 2 diabetes on mealtime insulin.

## Points to Remember

Diet Management should include:

- Diet that is well-balanced & consumed on a regular schedule
- Consistent meals and snacks
- Monitoring to identify changes in eating frequency or amounts

## Physical Activity

Physical activity includes all ways one moves the body, decreasing time spent sitting. It means doing any type of daily movement, whether it is structured, like an exercise video, or unstructured, like any activity that increases time spent moving, such as taking the stairs instead of the elevator. In people living with diabetes, being active can also help blood glucose stay closer to ideal target levels and reduce or prevent health issues now and in the future.

Physical activity is an important part of any diabetes plan and the key to staying healthy. It increases the heart rate, burns calories, builds muscles and strengthens bones. Frailty, fear of falls, inadequate staff supervision, and lack of incentives act as barriers to regular physical activity for clients in the residential community setting. However, physical activity should be encouraged in all individuals to improve independence, functionality, and quality of life. The type of activity recommended should depend on the client’s current level of activity and ability. Programs to enhance mobility, endurance, gait, balance, and overall strength are important for all clients in the community facilities.



If the client has a specialized exercise plan, the details will be included in the client’s individualized care plan or the instructions from the delegating RN.

## Other Benefits of Being Active

- Lower risk of all-cause mortality, death from any cause
- Lower risk of cardiovascular disease (improved blood pressure and cholesterol)
- Lower risk of cardiovascular disease mortality
- Improved cognition
- Reduced risk of dementia (including Alzheimer's disease)
- Improved quality of life
- Reduced anxiety
- Reduced risk of depression
- Improved sleep
- Weight loss, particularly when combined with reduced calorie intake
- Prevention of weight regain following initial weight loss
- Improved bone health
- Lower risk of falls
- Lower blood glucose
- Stress reduction



## Safety

If the client is not used to a lot of activity, they may need to check with their healthcare provider to get medical clearance. The provider can advise on medication adjustments that may be needed, specifically any medication that causes hypoglycemia such as insulin, and will let the client know if specific activities need to be avoided based on their health conditions.

Encourage clients to be as physically active as they are able and evaluate physical activity areas for safety.



If the client has a specialized exercise plan, the details will be included in the client's individualized care plan/diabetes management plan.

Think of simple ways you can encourage more daily movement with the client and write them here:

1.

2.

3.

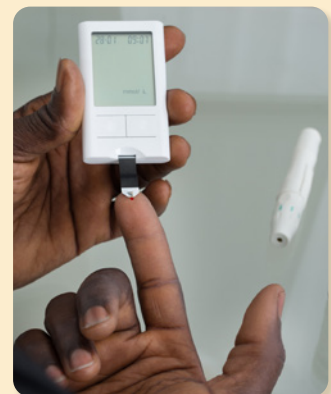


### Module 1 Review Important Points to Remember

- Diabetes is an illness in which the body does not properly process carbohydrates contained in food or beverages for energy properly, causing high blood sugar.
- Insulin is responsible for transporting or moving glucose from the blood stream into the cells of the body. People with diabetes either have insulin resistance or their bodies are not producing enough insulin.

#### Hyperglycemia

- Too much glucose in the blood is called high blood sugar or hyperglycemia.



### **Common symptoms of hyperglycemia are the three “P’s”**

- Polyuria (frequent urination to get excess sugar out of the body)
- Polydipsia (frequent thirst to make up for the fluid loss from polyuria)
- Polyphagia (frequent hunger because the body is trying to get extra sugar for energy)
- Other symptoms include fatigue or drowsiness, and blurred vision.

If hyperglycemia isn’t treated, it can cause toxic acids, called ketones, to build up in the blood and urine. This condition is called diabetic ketoacidosis (DKA). Symptoms include:

- Fruity-smelling breath
- Dry mouth
- Abdominal pain
- Nausea and vomiting
- Shortness of breath
- Confusion
- Loss of consciousness

### **Seek immediate help from the client’s medical care provider or call 911 if:**

- They have ongoing diarrhea or vomiting, and can’t keep any food or fluids down
- Their blood glucose levels stay above 240 mg/dL

### **Know the client’s individualized Target Range for blood sugars**

If the client shows symptoms of high blood sugar:

- Do a blood sugar check using a glucometer if ordered, otherwise encourage/assist the client to do the blood sugar check following his/her doctor’s orders.
- Follow the delegating RN’s instructions for high blood sugar whenever the client’s blood sugar tests above his or her individualized Target Range.
- Call 911 immediately if the client is non-responsive. Notify your supervisor and the delegating RN as soon as possible after the client has received emergency help.

### **The normal range for blood sugar is 80-130 mg/dL mg/dl fasting and <180 mg/dL after meals.**

Over time, high blood sugar causes damage to:

- Large blood vessels or macrovascular complications
  - Brain-increased risk of stroke and CVA (cerebrovascular disease)
  - Heart-high blood pressure and coronary artery disease
  - Extremities-peripheral vascular disease

- Small blood vessels or microvascular complications
  - Retinopathy (eyes) vision problems that can lead to blindness
  - Nephropathy (kidneys) leading cause of end stage renal disease
  - Neuropathy (nerves) pain or numbness, slow healing wounds that may get infected and lead to amputations

### Risk factors

Many factors can contribute to hyperglycemia, including:

- Not using enough insulin or other diabetes medication
- Not injecting insulin properly or using expired insulin
- Not following diabetes eating plan
- During times of illness or infection
- Lack of physical activity
- Using certain medications, such as steroids or immunosuppressants
- Being injured or having surgery
- Experiencing emotional stress

\*\*\*During illness or times of increased stress, a client should discuss with their medical provider whether extra diabetes medication is needed to keep blood glucose in target range

### Prevention

- To help keep blood sugar within a healthy range:
  - Clients should follow their diabetes meal plan if they have been given one, otherwise, they should eat a balanced meal plan. If they take insulin or oral diabetes medication, they should be consistent about the amount and timing of their meals and snacks.
  - You will monitor blood sugar as ordered. Depending on their treatment plan, you may check and record their blood sugar level several times a week or several times a day. Careful monitoring is the only way to make sure that blood sugar level stays within target range. Note when their glucose readings are above or below their target range.
  - Carefully follow their health care provider's directions for how to take their medication.
  - Encourage physical activity per client's treatment plan.

## Hypoglycemia

- When blood sugar level drops below 70 mg/dL

**Recognizing and responding to symptoms of low blood sugar is critical to caring for a client with diabetes safely. Symptoms of low blood sugar include:**

- |                  |                      |                         |                     |
|------------------|----------------------|-------------------------|---------------------|
| • Irritability   | • Confusion          | • Loss of consciousness | • Headache          |
| • Shakiness      | • Personality change | • Dizziness             | • Slurred speech    |
| • Blurred vision | • Weakness/fatigue   | • Hunger                | • Cold, sweaty skin |

**Low blood sugar is a serious problem. The role you play in recognizing and responding to it is important**

- Blood sugar below 70 mg/dl is too low and means the body needs more glucose to work normally. If left untreated, low blood sugar (or hypoglycemia) can lead to a medical emergency or death.
- Changes to a person's individualized plan can create dangerous results for a person with diabetes. For example, you now know that suddenly skipping a meal or exercising more than usual can be dangerous for a client taking insulin.

## Risk Factors

There are many causes of low blood sugar, including:

- Taking too much insulin.
- Delayed or skipping meals
- Not eating enough carbs for how much insulin is administered.
- Timing of insulin administration.
- The amount and timing of physical activity.
- Drinking alcohol.
- How much fat, protein, and fiber are in client's meal.
- Hot and humid weather.
- Unexpected changes in their schedule.
- Taking higher doses of certain antidiabetic medications such as insulin, sulphonylureas (for example, glibenclamide, gliclazide), prandial glucose regulators (for example, repaglinide, nateglinide)



## Prevention

\*\*\*Identifying the symptoms and taking immediate action is the primary preventive measure

- Checking blood sugar as ordered
- A regular eating plan includes meals, snacks, and beverages with enough carbohydrates to help keep blood glucose levels in target range. You may not have much control over what clients eat and when they eat but you can provide them with education and encourage a balanced, consistent meal plan.
- Have a source of fast-acting carbohydrate, such as glucose tablets or a juice box, readily available.
- If a client drinks alcoholic beverages, encourage them to eat some food at the same time.
- Safety during exercise or physical activity. Physical activity can lower blood glucose during the activity and for hours afterward. They will need to be mindful of how they are feeling before, during, and after physical activity and if ordered, need to check their blood glucose before, during and after. They might need to adjust their medicine or carbohydrate intake to prevent low blood glucose. For example, they might eat a snack before physical activity to prevent low blood glucose.

\*\*\*Note: Do not adjust any medications without an order and/or instruction from the delegating RN. If you have concerns about a medication causing hypoglycemia, discuss with your supervisor and /or delegating RN but **DO NOT WITHHOLD OR GIVE ADDITIONAL MEDICATION TO A CLIENT.**

## Treatment

- If the client has symptoms of low blood sugar, use a glucometer to check his or her blood sugar if delegated to perform this task and there is a doctor's order for the test to be done. Otherwise, encourage/assist the client to check his/her blood sugar following the doctor's orders.
- If you suspect the client's blood sugar is below 70 mg/dl but you aren't able to check it with a glucometer, get your client 15 mgs glucose (or sugar) immediately.
- Follow the client's individualized plan for low blood sugar as instructed by the delegating RN.

### Follow The Rule of 15 if the client does not have an individualized plan:

Give the person 15 grams of glucose. There are 15 grams of glucose in:

- 4-6 ounces of fruit juice or regular soda (not sugar-free soda).
- 3-4 glucose tablets.
- 5-7 lifesavers or hard candy.
- Have the person rest and re-check blood sugar in 15 minutes.
- Repeat the steps above as needed if the person's blood sugar is still low or if the person is still having symptoms of low blood sugar.

- After the client's low blood sugar has been raised:
  - Observe client for the return of low blood sugar symptoms.
  - Re-check the client's blood sugar if symptoms return.
  - Have the client eat balanced meals and snacks as planned to keep blood sugar up.

**Call 911 immediately if the client is:**

- Non-responsive or unconscious.
- Unable to swallow or use a source of glucose safely by mouth. For example, when:
  - His or her speech is very slurred.
  - He or she is sleepy or not alert enough to follow directions.

Notify your supervisor and the delegating RN as soon as possible after the client has received emergency help.

Also, study pages 21-24 so you are familiar with other factors that can cause low blood sugar.

**Blood Glucose Testing with Glucometer**

These are general instructions for checking blood glucose with a glucometer. They may not be accurate for all meters. Follow instructions that come with the client's meter if they are available, otherwise refer to the instruction from the delegating RN or unit supervisor.

**Steps condensed from earlier in the module**

**Step 1: Gather supplies**

- Gather the relevant equipment and place in a clean tray.

**Step 2: Perform hand hygiene. Put on gloves.**

**Step 3: Prepare the Meter**

- Check expiration date on test strips. Take a single, clean test strip out of vial.
- To turn most meters on, insert test strip into the slot at the top of the meter.

**Steps 4 and 5: Prepare & Adjust Lancing Device**

- The lancing device has several different depth settings which can be changed depending on individual's skin. Adjusting the cover of lancing device will change the depth of penetration of the skin when device is triggered.

Twist cover to:

- 1-2 for delicate skin
- 3 for normal skin
- 4-5 for thick skin

### **Steps 6 and 7: Prick Finger & Collect Blood Sample**

- Use the lancing device to pierce the side of the finger, next to the fingernail (or another recommended location). This hurts less than lancing the pads of fingers.
- Squeeze finger until it has produced a sufficient-size drop.
- Place the drop of blood on the strip.
- The meter will count down from 5 to 1 and beep once it has received enough blood.
- If there was not enough blood received, the countdown will stop, and the meter will read “Error.” If this happens, the test must be repeated from the beginning with a new test strip, new lancet, and new puncture.
- If there is difficulty obtaining a drop of blood, try hanging the hand down or very gently squeezing the fingertip.
- Set down meter and wipe finger of any remaining blood; apply pressure to punctured finger with cotton ball to stop bleeding.

### **Step 8: Test Results**

- After receiving the blood sample, the meter will automatically display the blood glucose results on the screen. Test results range from 20-600 mg/dL. Depending on the displayed results, the individual can then take correct steps to manage their blood sugar as ordered by their doctor.
- Document client’s results. The results will also be saved automatically on the meter, and they can be viewed later if necessary.

### **Step 9: Proper Disposal of Equipment**

- Dispose of lancets in a sharps container
- Store test strips in the container provided. Do not expose them to moisture, extreme heat, or cold temperatures.
- Remove gloves. Perform hand hygiene.

### **Why monitoring glucose is important**

- ✓ Helps the client with diabetes reach their target goals for glucose which helps lower the chance of complications
- ✓ Helps to prevent hypoglycemia and hyperglycemia
- ✓ Help the client learn how food and physical activity affect their glucose
- ✓ Helps determine the right amount of insulin to take
- ✓ Helps the client’s health care provider know whether any medication changes are needed

### Tips for Monitoring Blood Glucose

- If using a fingerstick meter, the client should wash hands with soap and water, and dry them thoroughly before checking
  - Substances on skin (like dirt, food, or lotion) can cause inaccurate results
  - If client is wearing a continuous glucose monitor, follow the manufacturer's and/or supervisor's information on the best ways to keep it working well
- The best time to check the effect of a meal on blood level is 2 hours after eating however, follow your client's diabetic plan/physician's orders for when to check blood sugar.
- Follow hypoglycemic protocol or client specific instructions if glucose readings are below 70mg/dl.
- During times of illness/infection/injury, blood sugar tends to be higher, and your client may require more frequent checks. Refer to client specific instructions.
  - Encourage the client to bring glucose records to every appointment with provider/physician.

### Medications

To best support the client with taking their medications, follow these tips:

- Keep a list of all current medications
  - Include all prescription and non-prescription medications in the list. This includes vitamin and mineral supplements, herbal remedies and other products purchased without a prescription.
  - A medication list provides valuable information for the health care team. Be sure to include the name, dose and time medication is taken.
  - For facilities, this list is usually kept on a medication administration record, or MAR.
- Assure a daily routine for taking and tracking all medications
- Encourage the client to share their medication beliefs and concerns with their diabetes care team their doctor.
  - Did taking medicine have positive effects on their health?
  - Did their medicine cause low blood glucose (hypoglycemia)?
  - Are they concerned about the number of pills they must take every day?
  - Is their medication plan too complicated for their lifestyle?
- Safely dispose of needles and lancets
  - This will be discussed in depth in the third module

## 6 Rights of Medication Administration

1

### Right Client

- Ask the client their first and last name
- Does the order match the client?
- Ask client to identify himself/herself.

2

### Right Medication

- Does the medication label match the order?
- Pay attention with look-alike and soundalike medications.

3

### Right Dose

- Does the strength and dosage match the order?

4

### Right Time

- Does the administration time match the order?
- Check the frequency of the ordered medication.
- Double check that you are giving the ordered dose at the correct time.
- Confirm when the last dose was given.
- Before administering a PRN medication, ensure specified time interval has passed.

5

### Right Route

- Does the route match the order?

6

### Right Documentation

- Document administration AFTER giving the ordered medication.
- Chart time, route, and any other specific information as necessary.

When giving medications you are required to:

- Understand each person's medications
- Give medications as ordered by the prescribing practitioner

Each time you are administering medications, you must be aware of the dangers. The best way to prevent medication errors at the point of administration is to follow the six rights of medication administration for each and every medication.

## Improving Nutrition Health

- Carbohydrates, which are turned into glucose once eaten, have the strongest impact on blood sugar, causing an immediate rise in blood glucose.
- Tracking carbs in meals, snacks and beverages can help people living with diabetes match their activity and medicines to the food they eat.
- If the client takes mealtime insulin, they'll more than likely count carbs to match their insulin dose. They may also take additional insulin if their blood sugar is higher than their target range before meals or after meals.
- The delegating RN will review the client's insulin regimen with you.
- What type of carbohydrates the resident chooses to eat should be taken into consideration however you may have no control over this. Instead, encouraging the client eat a meal plan with consistent carbohydrates that allow for a wide variety of food choices may be more beneficial for both nutritional needs and glycemic control in patients with type 1 diabetes or type 2 diabetes on mealtime insulin.

### Points to Remember

Diet Management should include:

- Diet that is well-balanced & consumed on a regular schedule
- Consistent meals and snacks
- Monitoring to identify changes in eating frequency or amounts

## Physical Activity

- Physical activity includes all ways one moves the body, decreasing time spent sitting
- Frailty, fear of falls, inadequate staff supervision, and lack of incentives act as barriers to regular physical activity for patients in the residential community setting.
- However, physical activity should be encouraged in all individuals to improve independence, functionality, and quality of life.
- The type of activity recommended should depend on the client's current level of activity and ability.
- Programs to enhance mobility, endurance, gait, balance, and overall strength are important for all clients in the community facilities.

## Other Benefits of Being Active

- Lower risk of all-cause mortality, death from any cause
- Lower risk of cardiovascular disease (improved blood pressure and cholesterol)
- Lower risk of cardiovascular disease mortality
- Improved cognition
- Reduced risk of dementia (including Alzheimer's disease)
- Improved quality of life
- Reduced anxiety
- Reduced risk of depression
- Improved sleep
- Weight loss, particularly when combined with reduced calorie intake
- Prevention of weight regain following initial weight loss
- Improved bone health
- Lower risk of falls
- Lower blood glucose
- Stress reduction



# Module 1 Practice Test:

## Section 1 – Multiple Choice:

Read each statement or question carefully. Select the best answer from the options listed.



1. When people have diabetes:
  - a. It causes them to have frequent low blood sugar.
  - b. Glucose (sugar) passes too easily from the blood.
  - c. Their bodies do not produce glucose (sugar).
  - d. The body's insulin does not work normally, and glucose (sugar) builds up in the blood.
2. Insulin:
  - a. Comes mostly from food – or what a person eats and drinks.
  - b. Acts like a key to help extra glucose (sugar) move out of the blood and into the cells.
  - c. Builds up in the blood and causes high blood sugar.
  - d. Causes damage to large blood vessels.
3. An example of a fasting sugar in the Normal Range is:
  - a. 110.
  - b. 150.
  - c. 65.
  - d. 60.
4. All the following are symptoms of high blood sugar except:
  - a. Fatigue or drowsiness.
  - b. More energy than usual.
  - c. Extreme thirst and frequent urination.
  - d. Blurred vision.
5. All the following are symptoms of low blood sugar except:
  - a. Irritability.
  - b. Shakiness.
  - c. Rashes on the hands and feet.
  - d. Loss of consciousness.

6. When using the Rule of 15, you give a client 15 grams of glucose and then:
  - a. Repeat 15 times.
  - b. Have the person rest and re-check his or her blood sugar in 15 minutes.
  - c. Have the person exercise for 15 minutes.
  - d. Call 911.
7. A person's usual insulin dose can cause blood sugar to become dangerously low when combined with:
  - a. Skipped meals or snacks.
  - b. More alcoholic beverages than usual.
  - c. More exercise than usual.
  - d. All of the above.

### Section 2 – Short Answer:

8. The blood sugar range that is considered normal (2 or more hours after eating) is:  
\_\_\_\_\_ mg/dl.
9. If a client is alert and has symptoms of high blood sugar, what is the first action you should take?  
\_\_\_\_\_.
10. If a client who has diabetes is non-responsive, what action should you take immediately?  
\_\_\_\_\_.
11. The main risk to think about when administering insulin is:  
\_\_\_\_\_.
12. Blood sugar that is below is \_\_\_\_\_ mg/dl is considered too low.
13. If a client is alert and has symptoms of low blood sugar, the first action you should take is:  
\_\_\_\_\_.

14. If a client has low blood sugar and her speech is very slurred, the action you should take immediately is: \_\_\_\_\_.

15. Identify whether each factor below usually raises or lowers blood sugar.  
Put either an  arrow or  arrow in the space provided:

- \_\_\_\_\_ a. More exercise than usual
- \_\_\_\_\_ b. Illness
- \_\_\_\_\_ c. Skipping a meal
- \_\_\_\_\_ d. Forgetting to take insulin
- \_\_\_\_\_ e. Drinking more alcohol than usual

### Section 3 – True or False:

Read each statement carefully. Indicate the best answer by circling “True” if the statement is true or “False” if the statement is false. There will only be one best answer.

- 16. TRUE FALSE People with diabetes can’t have sugar.
- 17. TRUE FALSE You are not working out hard enough if you can carry on a conversation.
- 18. TRUE FALSE Controlling your diabetes can help reduce your risk for heart disease.

**Answer Key:** *Use this Answer Key to check your answers.*

1. When people have diabetes:  
d. The body's insulin does not work normally, and glucose builds up in the blood. (see page 7)
2. Insulin:  
b. Acts like a key to help extra glucose move out of the blood. (see page 8)
3. An example of blood sugar in the Normal Range is:  
a. 110 (see page 13)
4. All of the following are symptoms of high blood sugar except:  
b. More energy than usual. (see page 14)
5. All of the following are symptoms of low blood sugar except:  
c. Rashes on the hands and feet. (see page 17)
6. When using the Rule of 15, you give a client 15 grams of glucose and then:  
b. Have the person rest and re-check his or her blood sugar in 15 minutes. (see page 19)
7. A person's usual insulin dose can cause blood sugar to become dangerously low when combined with:  
d. All of the above (see page 22)
8. The blood sugar range that is considered normal (2 or more hours after eating) is:  
<180 mg/dL (see page 13)
9. If your client is alert and has symptoms of high blood sugar, what is the first action you should take?  
Check his or her blood sugar using a glucometer. (see page 16)
10. If your client is non-responsive, what action should you take immediately: (page 10)  
Call 911. (see page 18)
11. The main risk to think about when administering insulin is:  
Low blood sugar or hypoglycemia. (see page 20)
12. Blood sugar that is below 70 mg/dl is considered too low. (see page 18)
13. If your client is alert and has symptoms of low blood sugar, the first action you should take is:  
Check his or her blood sugar using a glucometer. (see page 19)
14. If your client has low blood sugar and her speech is very slurred, the action you should take immediately is:  
Call 911. (see page 19)
15. Identify whether each factor below usually raises or lowers blood sugar. Put either an arrow or arrow in the space provided.  
↓ a. More exercise than usual  
↑ b. Illness  
↓ c. Skipping a meal  
↑ d. Forgetting to take insulin (see pages 20-22)
16. TRUE. Your blood sugar rises in response to what you've eaten. It takes about 2 hours for the numbers to reflect the full rise.  
(see page 16)
17. FALSE: Sugar is just another carbohydrate and can fit into a meal plan. Sugary foods, however, do not have the same nutrition as grains or vegetables, and can often be high in fat and calories. It's best to limit sugar-containing foods to small portions and be sure to count the carbohydrates toward the total recommended in your meal plan. (see pages 25-27)
18. FALSE. You should be able to talk when doing an activity. If you can't, then your body is working too hard and you need to slow your pace. (see pages 27-28)
19. TRUE. If your blood sugar or blood pressure levels are too high for too long, your blood vessels can become sticky. This makes it easier for blood clots to form...which can lead to a heart attack or stroke. (see page 9)



# *Module* 2

Insulin Basics

# Module 2: Insulin Basics

## Learning Outcomes:

After completing this module, the caregiver will:

- Differentiate the types of insulins.
- Identify the onset, peak and duration of the different insulins.
- Describe how to properly store insulin.
- Identify the different ways insulin may be ordered.
- Identify non-insulin injectable drugs.

## Lesson 4: Insulin Basics

In this lesson, we will review the different types of insulin, proper storage of insulin, and the basics of insulin dosing. In the next module, we will discuss the different methods of insulin administration.

**Insulin therapy must be individualized to the needs and priorities of the client. No single insulin regimen is appropriate for all people living with diabetes.**

Basal insulin and bolus insulin are two types of insulin that control blood sugar. Basal insulin is long-acting and helps keep glucose levels stable during the day and throughout the night.

### **Basal Insulin:**

- Also known as background insulin.
- Keeps blood glucose levels consistent during periods of fasting.
- Usually taken once or twice a day depending on the insulin.
- Longer acting insulin.

**Bolus insulin** is short-acting insulin that works rapidly in controlling blood sugar. Bolus insulin controls spikes of blood glucose after our meals. Hence bolus insulin is also known as mealtime insulin.

### **Bolus insulin:**

- Specifically taken at mealtimes to keep blood glucose levels under control following a meal.
- Bolus insulin needs to act quickly, and so short acting insulin or rapid acting insulin will be used.
- It's also called prandial insulin and mealtime insulin.

Basal-bolus insulin therapy is a form of insulin treatment that is designed to mimic the natural pattern of insulin release seen in a person who does not have diabetes. Some clients may be on just basal insulin while other clients will only have bolus insulin ordered. Other clients will be prescribed basal-bolus insulin therapy.



Insulin is available by injection via pens or syringe, an insulin pump, or inhaled. This class focuses on insulin administration via pens and syringes. An overview of inhaled insulin is provided. Insulin pump therapy is not covered in this class.

## Lesson 5: Types of Insulin

There are many different types of insulin on the market, and they work in different ways after being administered. The differences are comprised of:

- How quickly they work
- When they peak
- How long they last

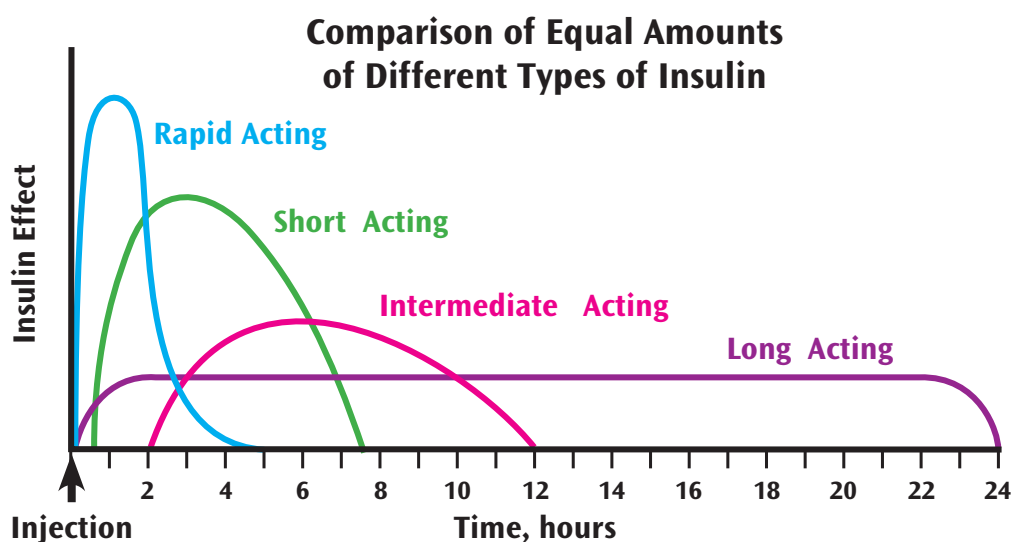
Doctors prescribe the type and amount of insulin according to a person's specific needs.

Insulin has three characteristics:

- **Onset of action:** the point at which the insulin first starts to lower the blood glucose.
- **Peak time:** this is when insulin is at its maximum strength in terms of lowering blood glucose.
- **Duration:** the period of time the insulin is lowering the blood glucose levels.

Insulin types are classified according to their onset, peak and duration.

- rapid-acting
- short-acting
- intermediate-acting
- long acting
- pre-mixed/combined



The Insulin Safety Center is a great place to access information regarding all aspects of insulin, including type of insulin as well as safe insulin use. Here you will learn all about the most frequent types of errors associated with insulin use, how these errors can occur and what you can do to prevent them from happening. The website is: <https://www.consumermedsafety.org/insulin-safety-center/insulin-safety-home>

**TABLE 2.1** Types of insulin and how they work

INSULIN TYPE	ONSET	PEAK TIME	DURATION
Rapid-acting	About 15 minutes after injection	1 hour	2 to 4 hours
Short-acting, also called regular	Within 30 minutes after injection	2 to 3 hours	3 to 6 hours
Intermediate-acting	2 to 4 hours after injection	4 to 12 hours	12 to 18 hours
Long-acting	Several hours after injection	Does not peak	24 hours; some last longer
Ultra long-acting	6 hours after injection	Does not peak	36 hours or longer
Pre-mixed/Fixed Combination	5 mins to 60 mins after injection; most are within 5-15 minutes	Dual	10-16 hours

Table adapted from: Types of Insulin and How They Work. National Institute of Diabetes and Digestive and Kidney Diseases website. External link Last edited 2015. Accessed November 11, 2021.

## Rapid-acting Insulin

The purpose of rapid-acting insulin is to imitate the pancreas production of meal-stimulated insulin. Because the onset is rapid, it allows providers to match the insulin dose with carbohydrate intake and ensure that the insulin and glucose reach the bloodstream at approximately the same time.

This type of insulin is also referred to as rapid-acting analogs (RAAs). Some rapid acting insulins currently available are:

- Insulin aspart is the generic name for Novolog® brand insulin
- Insulin glulisine is the generic name for Apidra® brand insulin
- Insulin lispro is the generic name for Humalog® brand insulin



### Rapid-acting insulin:

Intended to control post-prandial (post-meal) blood sugar

- **Onset:** 15 minutes
- **Peak:** 1 hour
- **Duration:** 2-4 hours.

Properly prescribed and taken, rapid-acting insulin most closely mimics the action of insulin at mealtimes in a person without diabetes.

Rapid-acting insulins are clear. If there is a colored tint to the solution, or if a colored ring has formed at the top, do not use.

Rapid-acting insulins work quickly. Once injected, the insulin enters the blood stream within 15 minutes, therefore food must be consumed within 15 minutes of injecting a rapid-acting insulin. Rapid-acting insulin has a peak effect in 1 hour and will continue lowering glucose until it wears off, which is typically in 2-4 hours. The shorter duration of action lends to a reduction in hypoglycemia between meals. It is recommended to inject rapid-acting insulins no more than 15 minutes before a meal. After injecting the insulin, it's very important that the client eat because of the risk of hypoglycemia.

Rapid-acting insulins are administered by vial and syringe, insulin pen, or inhaled insulin.

**What do you think might happen if you inject a client's rapid-acting insulin 30 minutes before they eat their meal?**

## Short-acting Insulin

Short-acting insulin is called regular insulin or **regular human insulin**. Regular human insulin is also a prandial insulin and is used to cover carb intake at meals. Prandial refers to rapid acting and is administered at mealtime.

The brand names are:

- Humulin R®
- Novolin R®

Short-acting insulins are clear. If there is a cloudy or colored tint to the solution, or if a colored ring has formed at the top, do not use.

Regular Human Insulin has a slower onset and a longer duration of action (**see Table 2.1**). RHI should be injected 30 minutes before a meal. It will peak in 2-3 hours. The insulin will continue to lower the blood glucose levels until it wears off in about 3-6 hours.



### Short-acting insulins:

Used to cover carb intake at meals.

- **Onset:** 30 minutes
- **Peak:** 2-3 hours
- **Duration:** 3-6 hours.

The rapid-acting insulin analogs may have advantages because of their faster onset and shorter durations of action, however, regular short-acting insulins cost considerably less than some of the newer rapid-acting insulin analogs.

## Intermediate-acting insulin

Intermediate-acting insulin is commonly referred to as NPH (neutral protamine Hagedorn). Insulin isophane is the generic name.

NPH insulin has a cloudy white color. These insulins should be agitated or mixed before injection to resuspend the insulin mixture. If you see any white clumps floating in the solution after mixing, or if the bottle has a frosted look to it, do not use.



Some brand names for NPH:

- Humulin® N
- Novolin® N
- Relion® / Novolin®

NPH is used to keep blood sugars at a consistent level when the client is not eating. NPH is typically administered twice a day.



**The solution must be gently and thoroughly mixed before the injection**

**is prepared.** To mix, gently roll the container (vial, pen, or prefilled syringe) between your palms several times. If you shake too hard, bubbles may form.

NPH insulin enters the bloodstream in 2-4 hours. NPH has a long, drawn out peak-time, 4-12 hours after injection. During this time, NPH is actively moving glucose into the body's cells which increases the risk of hypoglycemia.



### Immediate-acting insulins:

Covers insulin needs for half a day or overnight. Often used with rapid- or short-acting insulin.

- **Onset:** 2-4 hours
- **Peak:** 4-12 hours
- **Duration:** 12-18 hours

**If you administered NPH insulin to a client before breakfast, which meal is most affected by the blood glucose rise? Explain (answer below)**

**Answer:** If NPH was administered before breakfast, it will peak about the same time that lunch raises the glucose level. The pre-breakfast dose is intended to best control the lunchtime glucose rise.

**If you administered NPH insulin to a client in the evening but then they ate a very light dinner, would that be a problem? Explain why or why not.**

**If you administered NPH before dinner, what could you suggest the client do to prevent hypoglycemia from occurring during the night? (See below for the answers)**

**Answer:** If NPH is given before dinner, it will peak in the middle of the night. If a person hasn't had enough to eat the evening before, this could cause the blood sugar to drop too low. Eating enough at dinner and having a snack before going to bed can help prevent nighttime hypoglycemia.

If NPH is taken at bedtime, it will peak during the early morning. NPH helps control the glucose rise at this time.

## Long-acting insulin

Long-acting insulins provide background insulin coverage for up to 24 hours or longer, depending on the product. Long-acting insulin covers insulin needs for about one full day. This type is often combined, when needed, with rapid- or short-acting insulin.

Currently, there are 3 forms of long-acting insulins on the market:

- Insulin detemir is the generic name for Levemir®
- Insulin glargine is the generic name for Lantus®, Basaglar®, Toujeo®
- Insulin degludec is the generic name for Tresiba®

Long-acting insulin products are clear. If there is a colored tint to the solution, or if a colored ring has formed at the top, do not use.

Long-acting insulin is meant to mimic the constant and steady release of insulin that

occurs in people who do not have diabetes. Once injected, long-acting insulin begins to enter the bloodstream in 2 hours. It has no peak. Instead, only a little insulin at a time enters the blood stream. Long-acting insulin can work for up to 24 hours or longer after injection. The key is making sure the timing is consistent day-to-day. Some people may need to inject twice daily if the insulin wears off sooner than 24 hours.



### Long-acting insulins:

Cover insulin needs for half a day or overnight. Often used with rapid- or short-acting insulin.

- **Onset:** 2 hours
- **Peak:** Does not peak
- **Duration:** Up to 24 hours, some a little longer

## Premixed Insulin

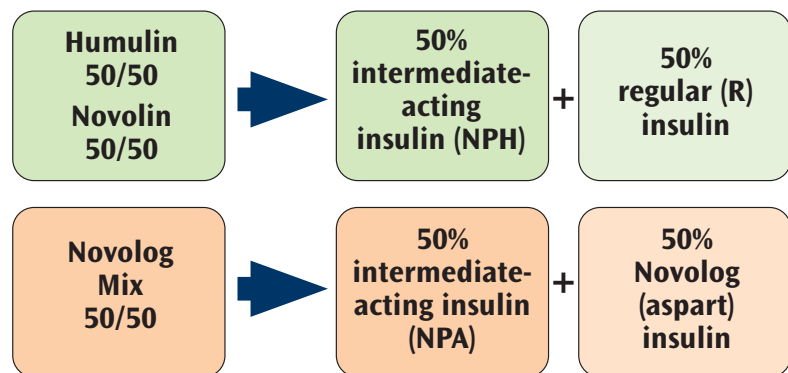
Some insulin products can be combined or “mixed”, in the same syringe to reduce the number of required daily injections. Pre-mixed insulins are usually prescribed for clients needing a simple insulin treatment plan, such as:

- Older clients, with regular meal and activity patterns
- Clients with diminished vision or trouble with dexterity
- Clients just starting insulin therapy

**Not all insulins can be mixed together.** There are several premixed insulins on the market. The main difference between them is they contain different amounts of intermediate-acting insulin and short-acting insulin. The numbers following the brand name indicate the percentage of each type of insulin. The types of premixed insulin formulation are:

- 30% regular and 70% NPH (Humulin 70/30, Novolin 70/30).
- 50% lispro and 50% lispro protamine (Humalog Mix 50)
- 25% lispro and 75% lispro protamine (Humalog Mix 25)
- 30% aspart and 70% aspart protamine (NovoMix 30)

The insulin will start to work as quickly as the fastest-acting insulin in the combination. It will peak when each type of insulin typically peaks, and it will last as long as the longest-acting insulin. The product created provides both background and meal coverage with a single injection. When mixing insulins in a single syringe, the rapid-acting or short-acting insulin should be drawn up first.



### Premixed insulins:

Combines intermediate- and short-acting insulin. Usually taken 10 to 30 minutes before breakfast and dinner.

- **Onset:** 5-60 minutes
- **Peak:** Varies
- **Duration:** 10-16 hours



**You must learn the category and action times of the insulin(s) you are working with in order to:**

- Know the time-frame when the client is at the greatest risk for low blood sugar.
- Recognize and respond to low blood sugar before it becomes a medical emergency.



Insulin pens, which will be discussed in the next module, can make taking insulin more convenient because they combine the medication and syringe in one convenient unit. Unlike syringes, pens come preloaded with insulin—including premixed insulins.

You must learn the category and action times of the insulin(s) you are working with in order to:

- Know the time-frame when the client is at the greatest risk for low blood sugar.
- Recognize and respond to low blood sugar before it becomes a medical emergency.



### The delegating RN:

- Will teach you about the category and action times of the client's insulin(s).
- May use the Insulin Action Chart on page 118 as a resource when working with you.



### Insulin Types Review

**Rapid-acting insulin:** Intended to control post-prandial (post-meal) blood sugar.

- **Onset:** 15 minutes
- **Peak:** 1 hour
- **Duration:** 2-4 hours

**Short-acting insulins:** Used to cover carb intake at meals.

- **Onset:** 30 minutes
- **Peak:** 2-3 hours
- **Duration:** 3-6 hours

**Intermediate-acting insulins:** Covers insulin needs for half a day or overnight. Often used with rapid- or short-acting insulin.

- **Onset:** 2-4 hours
- **Peak:** 4-12 hours
- **Duration:** 12-18 hours

**Long-acting insulins:** Covers insulin needs for about a full day. Often used, when needed, with rapid- or short-acting insulin.

- **Onset:** 2 hours
- **Peak:** Does not peak
- **Duration:** Up to 24 hours, some a little longer

**Premixed insulins:** Combines intermediate- and short-acting insulin. Usually taken 10 to 30 minutes before breakfast and dinner.

- **Onset:** 5-60 minutes
- **Peak:** Varies
- **Duration:** 10-16 hours

## Inhaled Insulin

Inhaled insulin is a newer insulin, approved by the FDA in 2014. The inhaler is similar to the ones people with asthma use, where insulin is released as a fine powder that is breathed into the lungs. There, it enters the blood through tiny blood vessels.

Inhaled insulin is pre-measured, ultra-rapid-acting insulin taken at the beginning of meals.

### Some advantages to inhaled insulin are:

- Acts very quickly and is as effective as injectable rapid-acting insulins
- Can take at the beginning of meals
- May lower risk of low blood sugar
- Might cause less weight gain
- Is not an injection so might be a good alternative for people who have a fear of needles
- Can easily be taken in public and/or on outings.

### Disadvantages of insulin inhalers:

- Might cause mild or severe coughing
- May be more expensive
- Still requires injections or a pump for longer-lasting insulin
- Dosing isn't as precise
- Not recommended for people who smoke or have lung disease such as asthma or COPD

Inhaled insulin peaks in about 15-20 minutes and it is out of the system in 2-3 hours.

Inhaled insulin is delegable. If a client is prescribed this type of insulin, the delegating RN will be reviewing with you.

# Non-Insulin Injectable Medications

There are other medications besides insulin that require an injection and are called non-insulin injectable medications. While not considered insulin, these injectable medications work in similar ways and therefore can be delegated just as insulin is delegated

## Incretin mimetics: GLP-1 Agonists

This type of medication works by increasing the levels of hormones called “incretins”. These hormones help the body make more insulin only when needed and lower the amount of glucose being made by the liver when it’s not needed. They can help lower appetite by slowing the rate of digestion. There are six medications in the Incretin mimetic/GLP-1 analogues family.

### INCRETIN MIMETICS

Generic	Brand Name	Daily Dosage Ranges	Notes
Exenatide	Byetta®	5 mcg – 10 mcg twice a day	Inject between 5 and 60 minutes before morning and evening meals. If you forget, and your client has started eating, skip that dose.
Exenatide (extended release)	Bydureon® and Bydureon® BCise™	2 mg once weekly	Inject once weekly at any time of the day, with or without a meal.
Liraglutide	Victoza®	0.6 mg to 1.8 mg a day	Inject once a day, with or without meal.
Dulaglutide	Trulicity®	0.75 mg – 1.5 mg once weekly	Inject once weekly at any time of the day, with or without a meal.
Lixisenatide	Adlyxin®	10 mcg – 20 mcg once daily	Inject once daily within one hour before the first meal.
Semaglutide	Ozempic®	0.25 mg – 1 mg once weekly	Inject once a day, with or without a meal.

### Possible Side effects:

- Nausea/Vomiting/Diarrhea
- Upset stomach
- Headache
- Weight loss
- Hypoglycemia if client also takes insulin or oral diabetes medications otherwise, the risk is low
- Pancreas inflammation (client should contact doctor if they have any stomach pain)
- Kidney failure in patients with kidney problems.

### Other Considerations:

- Each of the GLP-1 agonists have specific dosing intervals. Careful consideration must be given to ensure that the person with diabetes receives the injections at the correct dosing interval.
- These injectable medications are subcutaneous injections. They can be administered in the thigh, upper arm, or abdomen.

- Oral antibiotics and contraceptives should be taken 1 hour before these injectable medicines.
- If a meal is missed, it is recommended a dose is skipped. If the resident has missed a meal, report immediately to your supervisor and the delegating RN. Follow the employer/facility policy on missed medications.

### Storage:

- Do not freeze. If frozen do not use.
- Refrigerate unopened medicine until expiration date on label. Follow manufacturer's guidance, or the pharmacist or RN delegator regarding the expiration date of this medication once opened.
- Remove needle from pen device in between injections. If the needle stays on the pen device, medicine may leak out and/or air may leak in.

## Amylin mimetics

This injectable medicine is a human-made form of hormone called amylin. When the pancreas makes too little insulin, it also makes too little amylin. This is found in both type 1 and type 2 diabetes.

Normally, the pancreas releases a hormone called amylin along with insulin. People with type 1 diabetes make no amylin; people with type 2 diabetes make too little amylin and eventually no amylin. Pramlintide is the synthetic version of amylin. Amylin works in three ways:

1. Through its action on the brain, it provides a feeling of fullness after eating. This may cause individuals to eat less, resulting in weight loss.
2. It slows down how quickly food leaves the stomach. This helps to reduce the rise of glucose after meals.
3. It limits the amount of glucose that is released by the liver, especially after meals when extra glucose is not needed, through a reduction in how much glucagon is secreted after a meal.

## AMYLIN MIMETICS

Generic	Brand Name	Daily Dosage Ranges	Notes
Pramlintide Acetate	Symlin®	Type 1 – 15 mcg injected just before major meal  Type 2 – 60 mcg injected just before major meal	Must be warmed to room temperature before injecting.  Do not mix into insulin.  <b>DO NOT</b> inject into arms. Inject into abdomen or legs.  <b>DO NOT FREEZE.</b> Refrigerate unopened medicine until expiration date on label. Follow manufacturer's guidance, or the pharmacist or RN delegator regarding the expiration date of this medication once opened.
Available in prefilled pens.			

### Possible Side effects:

- Nausea that typically resolves after a few weeks.
- Hypoglycemia. To keep hypoglycemia from occurring, food and activity should be balanced with the action of Pramlintide and insulin. If hypoglycemia is going to occur, it will do so within three hours of injection. Follow the doctor's orders to monitor blood glucose levels.

### Other Considerations:

- Never mix pramlintide with insulin in the same syringe.
- Space the injections with pramlintide and insulin at least 2 inches apart.
- Use the abdomen or thigh for injection.
- If a meal is skipped, pramlintide should not be taken. Follow the directions of the prescriber and the delegating RN
- If the client is sick and unable to eat, talk with the delegating RN or supervisor.

- Those having lab tests or procedures that require fasting should not take until they can eat again. Work with the prescriber and delegating RN to determine alternate injection timeframes on days when fasting labs are taken.

### Storage:

- Refrigerate unopened medicine until expiration date on label. Follow manufacturer's guidance, or the pharmacist or RN delegator regarding the expiration date of this medication once opened.
- Never freeze. If it has been frozen, do not use.
- Remove needle from pen device in between injections. If the needle stays on the pen device, medicine may leak out and/or air may leak in.



For these classes of medications (Incretin mimetics: GLP-1 Agonists and Amylin mimetics,) you will follow the same guidelines for injecting insulin which will be discussed in module 3.

# Lesson 6: Insulin Storage

Insulin must be stored properly to ensure that it remains safe and effective. Improper storage could result in the breakdown of insulin, affecting its ability to regulate blood sugar. Insulin is sensitive to sunlight and extreme hot or cold temperatures. Exposure to freezing, direct sunlight, or high temperatures will decrease insulin potency.

Depending on the type of insulin prescribed, there may be some differences in how best to store it and how long it will last once open. Ask the delegating RN or pharmacist for specifics on how to store client's insulin.

## General Rules for Insulin Storage

- ✓ **Unopened**, unused insulin vials should be **refrigerated** (36°F to 46°F)
- ✓ Discard opened insulin vial by discard date. Refer to the pharmacist for the most up-to-date information regarding discard dates. Write discard date on the vial.
- ✓ You can store most opened insulin at room temperature for a maximum of 28 days however, as new products are released this is ever changing. Refer to manufacturer website, pharmacist and/or delegating RN for discard dates.
- ✓ **It is best practice to sign and date a new vial of insulin once it has been opened. Include the discard date.**
- ✓ Keep insulin pens refrigerated until you open them; after that, you can store them at room temperature.
- ✓ Do not freeze insulin (some insulin can freeze at the back of the refrigerator). Do not use insulin that has been frozen. **Frozen insulin should be discarded.**
- ✓ Keep insulin away from direct heat and sunlight.
  - Do not leave it outside in extreme heat.
  - Exposure to sunlight can degrade or break down insulin.
- ✓ Always check the expiration date and do not use expired insulin.
- ✓ Inspect your insulin before each use. Look for changes in color or clarity. Look for clumps, solid white particles, or crystals in the bottle or pen. Insulin that is clear should always be clear and never look cloudy.
- ✓ Keep an extra vial, pen, or cartridge available at all times.
- ✓ If at all possible, keep enough insulin and supplies for two weeks ahead in case of bad weather or other unexpected conditions.



All insulins are sensitive to temperatures that are too high or too low.



- Contact the client's medical provider if their insulin needs replaced.
- Most insulin will need to be discarded 28 days after opening, however refer to the pharmacist, manufacturer, or delegating RN for up-to-date information regarding discard dates. Remember it is best practice to sign and date insulin once it is opened. Follow your facility protocol/procedure.



# Handling Insulin

Before using insulin (vials, pens, or cartridges), refer to the instructions below:

- Perform hand hygiene.
- Mix the insulin by rolling the vial between your palms.
- Do not shake the container as it can cause air bubbles.
- The rubber stopper on multi-use vials should be cleaned with an alcohol swab before each use. Wipe for 5 seconds. Let air dry without blowing on the stopper.
- Before using, check the insulin to make sure it is clear. Do not use if the insulin is:
  - Beyond its expiration date
  - Unclear, discolored, or cloudy (Note that certain insulin [NPH or N] is expected to be cloudy after you mix it)
  - Crystallized or has small lumps or particles
  - Frozen
  - Viscous (sticky, gluey)
  - Bad smelling
  - The rubber stopper is dry and cracked



## Insulin Handling Review

- The vial or pen currently being used for a client should be kept at room temperature.
- Unopened, unused insulin vials should be refrigerated. Extra vials and pens should be stored in the refrigerator.
- Make certain the insulin does not freeze or get too warm (above 86 degrees). If the insulin does freeze or get too warm it may not be effective and should be discarded.
- Always check the expiration date on the insulin bottle (vial) or pen. Outdated insulin bottles and pens should be discarded.
- After gently rolling the vial, if there are signs of yellowing or clumping in the vial, discard the vial.
- **Discard opened insulin vial or pen by its discard date. Check with pharmacist for recommendations regarding discard dates.**
- Once you open a new vial, you should sign and date it. Also include the discard date.
- While in use, insulin pens should never be stored with a pen needle attached to prevent contamination of the insulin.

# Lesson 7: Insulin Dosing

Insulin is measured in units. The number of insulin units the person with diabetes is to receive will be ordered by their medical provider. The prescription order will be part of the Diabetes Care Plan, or the order may be listed on a medication administration record (MAR) or other medication list.

The doctor may order insulin doses to be administered in one of three ways:

- Fixed Dose (or Set amount)
- Sliding Scale
- Insulin-to-carbohydrate ratio



The delegating RN will review the client's specific insulin orders with you.

The standard and most commonly used strength in the United States is U-100, which means it has 100 units of insulin per milliliter (ml) of fluid. Recently a U-500 insulin has been developed for people who are extremely insulin resistant. U-500 insulin is 5 times more concentrated or powerful than standard U-100 insulin.

## Fixed Dose (or Set amount)

When a medical provider orders a fixed dose (or set amount) of insulin, the person with diabetes will get the same amount of insulin at the same time every day.

### Examples:

- Give 15 units Regular insulin at 7 a.m. each day.
- NovoLog: 6 units at breakfast, 4 units at lunch, 6 units at dinner.
- Lantus 20 units at bedtime.

## Sliding Scale

Sliding Scale orders mean the person with diabetes will be administered a dose of insulin (or extra units of insulin) based on the results of their blood glucose test. This is called a sliding scale order because the person's dose of insulin units to be administered will 'slide' up or down depending on blood sugar results.



Sliding scale insulin is usually given at mealtimes.

Typically, a rapid-acting insulin is ordered by the medical provider for the sliding scale order. Sometimes a short-acting insulin, (e.g., Regular insulin) is ordered. Sliding scale insulin is usually given at mealtimes but may also be given at other times to bring down a high glucose level.

When a person is getting sliding scale insulin, the blood glucose level needs to be checked first to determine how much insulin to give. Sometimes sliding scale insulin is given alone, and sometimes it is added to a fixed dose of insulin at mealtimes.

### Examples of sliding scale orders

\*Please note SC mean subcutaneous (under the skin)

### Doctor's order for Charlie:

Monitor blood sugar 2 times per day at 9 AM and 5 PM; administer Regular Insulin for blood sugar results according to the following sliding scale:

SLIDING SCALE	
Blood Sugar Results (mg/dL)	Regular Insulin – Dose Scale
<b>Below 70</b>	<b>Follow protocol for hypoglycemia (and notify RN)</b>
<b>70-130</b>	<b>0 units SC</b>
<b>131-180</b>	<b>2 units SC</b>
<b>181-240</b>	<b>4 units SC</b>
<b>241-300</b>	<b>6 units SC</b>
<b>301-350</b>	<b>8 units SC</b>
<b>351-400</b>	<b>10 units SC</b>
<b>&gt;400</b>	<b>12 units SC and follow the client's hyperglycemia protocol</b>



Discuss sliding scale insulin with the delegating RN.  
Check your understanding of giving correct doses of this type of insulin.

### Practice using the sliding scale in the left column:

- On Monday at 9 a.m., Charlie's blood sugar is 210 mg/dl. How many units of insulin should you administer?  
(Answer: 4 units of Regular insulin SC)
- At 5 p.m. Monday, his blood sugar is 312 mg/dl. How many units of insulin should you administer?  
(Answer: 8 units of Regular insulin SC)
- On Tuesday at 9 a.m., Charlie's blood sugar is 128 mg/dl. How many units of insulin should you administer?  
(Answer: he will not receive any sliding scale insulin because he only gets additional sliding scale insulin for blood sugars over 130 mg/dl.)
- At 5 p.m. Tuesday, his blood sugar is 418 mg/dl. How many units of insulin should you administer?  
(Answer: 12 units of Regular insulin SC and follow protocol)

# Insulin-to-Carbohydrate Ratio

Insulin-to-carbohydrate ratio is used to give insulin based on the amount of carbohydrate a person eats at a meal. This method provides more flexibility with meal planning and may help keep a person's blood glucose level more "tightly controlled" or to stay within the recommended blood glucose range.

**Providers may order insulin based off percentage of meal eaten instead of carb intake. The delegating RN will let you know how a client's insulin is ordered and how you are to administer it. Insulin to carbohydrate ratio (Insulin:Carb) will not be on the test nor are you responsible for calculating an insulin-to-carbohydrate ratio. It is included in this training so you are aware of how a provider may order insulin in case you come across it.**



Talk with your delegating RN about your responsibility of determining the dose of insulin using this method.

An example of an insulin-to-carbohydrate ratio order a physician may write is, "Administer 1 unit of Novolog insulin for every 15 grams of carbohydrate eaten"; this is a 1:15 insulin to carbohydrate ratio. The total carbohydrate grams eaten are divided by 15 to determine the number of insulin units that need to be administered.

Below is an example of a meal eaten by a person with diabetes that takes insulin according to insulin to carb ratio of 1:15.

Practice:

Food	Carbohydrate Grams
Turkey sandwich on 2 slices of wheat bread	30
Carrots with Ranch dip	0
Small orange	15
Diet soda	0
Total grams =	45

If the Carb ratio is 1:15, how many units of insulin will they need for this meal.

Divide total grams of carb by 15:  $45/15=3$

The person needs 3 units of insulin administered; this is their "meal" insulin dose.

Below is an example of an order written for insulin dosing based on percentage of meal consumed.

**Humalog KWIKPEN 100units/ML**

Inject 8 Units after each meal

**\*\*Hold insulin if pre meal blood sugar is less than 150, or if patient eats less than 75% of meal.**

OK to give insulin if BG (blood glucose) greater than 350 (despite meal consumption)

**Humalog KWIKPEN 100 unit/ML**

After meals, inject per sliding scale based on pre-meal BG

- **<200 = 0 units**
- **200-250- = 4U HOLD IF EATS LESS THAN 75% of MEAL**
- **251-300 = 6U HOLD IF EATS LESS THAN 75% of MEAL**
- **301 -350 = 8U HOLD IF EATS LESS THAN 75% of MEAL**
- **351 – 400 = 10U**
- **401 – 450 = 12U and CALL PCP**
- **451 – 500 = 14U and CALL PCP**
- **500+ Give 0 units CALL PCP**

\*Call PCP for BG over 400

**\*\*\*Hold if resident did not eat at least 75% of meal \*\*\*unless BG is over 350.**

OK to give insulin despite meal consumption on a routine dose as well

# Correction Factor Dose

A medical provider may also order additional units of insulin to be administered with the sliding scale insulin if the client has a unusually high blood sugar. This is called a correction factor which is how much 1 unit of rapid-acting insulin will lower blood glucose. If the client has a correction factor ordered as part of their insulin regimen, the nurse delegator will review with you.

## Example of a physician order for a correction factor:

Correction factor: blood glucose level minus 150 divided by 50	
Step 1: Obtain current blood glucose level:	350
Step 2: Subtract target blood glucose level from the current blood glucose level:	$350 - 150 = 200$
Step 3: Divide the blood glucose number obtained in Step 2 by the Sensitivity:	$200 / 50 = 4$
Correction factor insulin dose is 4 units	

*Please note you are not being asked to calculate a correction factor dose. This section is reviewing how it is done for your information only.*

Using the above 2 examples, the “meal” dose of 3 units and the “correction factor” dose of 4 units are added together for the TOTAL insulin dose of 7 units of insulin. So, you will need to administer 7 units of insulin.

### A Correction Factor is generally not recommended IF:

- Blood glucose is lower than the correction target.
- It has been less than 3 hours since last meal or correction bolus.
- It has been less than 1 hour since intense exercise.
- At bedtime or during the night unless told otherwise.



## Module 2 Review Important Points to Remember

Insulin increases glucose uptake by muscle and fat tissue and helps suppress glucose release from the liver.

Insulin therapy must be individualized to the needs and priorities of the client, with no single insulin regimen being appropriate for all people living with diabetes.

**Basal insulin:** also referred to as “background insulin”. Basal insulin helps keep glucose levels steady between meals and overnight.

**Bolus insulin:** bolus insulin controls blood sugar at mealtimes, especially when the blood sugar rises suddenly.

Insulin is available by injection, an insulin pump, or inhaled.

Types of insulin fall into these categories:

- rapid-acting
- short-acting
- intermediate-acting
- long acting
- pre-mixed/combination

Insulin is measured by the “**unit**” and requires a special syringe for administration.

All insulins come dissolved or suspended in liquids.

The standard and most commonly used strength in the United States is U-100, which means it has 100 units of insulin per milliliter (ml) of fluid. Recently a U-500 insulin has been developed for residents who are extremely insulin resistant. U-500 insulin is 5 times more concentrated or powerful than standard U-100 insulin.

Insulin has three characteristics:

- **Onset of action:** the point at which the insulin first starts to lower the blood glucose.
- **Peak time:** this is when insulin is at its maximum strength in terms of lowering blood glucose.
- **Duration:** the period of time the insulin is lowering the blood glucose.

### Rapid-acting insulin

- It is given immediately before or right after meals and is administered by vial and syringe, insulin pen, or by insulin pumps.
- **Onset:** 15 minutes
- **Peak:** 1 hour
- **Duration:** 2-4 hours

### Short-acting insulin

- Called Regular or “R”.
- It should be taken 30 minutes prior to eating.
- **Onset:** 30 minutes
- **Peak:** 2-3 hours
- **Duration:** 3-6 hours

### Intermediate-acting

- Intermediate-acting insulin, NPH or “N”, absorbs more slowly into the body and lasts longer.
- When NPH is taken in the morning for instance it may peak before dinner.



- It is often used in the morning or at bedtime to help control blood glucose between meals.
- **Onset:** 2-4 hours
- **Peak:** 4-12 hours
- **Duration:** 12-18 hours

### Long-acting insulin

- Long-acting insulin, Lantus and Levemir, has almost no peak activity and lasts between 20-24 hours for most people.
- It is often used in the morning or at bedtime to help control the blood glucose throughout the day or overnight.
- **Onset:** 2 hours
- **Peak:** Does not peak
- **Duration:** Up to 24 hours, some a little longer

### Premixed insulins

- Combines intermediate- and short-acting insulin. Usually taken 10 to 30 minutes before breakfast and dinner.
- **Onset:** 5-60 minutes
- **Peak:** varies
- **Duration:** 10-16 hours

### Insulin Storage for Vials & Pens

- Do not store your insulin near extreme heat or extreme cold.
- Never store insulin in the freezer, direct sunlight, or in the glove compartment of a car.
- Check the expiration date before using, and don't use any insulin beyond its expiration date.
- Write discard date on box. Most insulins are good for 28 days after being opened, however, refer to pharmacist, manufacturer or delegating RN for the most up-to-date information regarding discard dates.

- The vial or pen currently used for a client should be kept at room temperature.
- Unopened pens and vials can be stored in the refrigerator until you are ready to use them.
- Remove needle from pen device in between injections. If the needle stays on the pen device, medicine may leak out and/or air may leak in.
- Examine the bottle closely to make sure the insulin looks normal before you draw the insulin into the syringe.
- After gently rolling the vial, if there are signs of yellowing or clumping in the vial, discard the vial.
- Inspect Insulin – note any change in color / clarity, white particles or crystals and discard. Insulin that is clear should always be clear and never cloudy.

### The doctor may order insulin doses to be administered in three ways:

- Fixed Dose (or Set amount)
- Sliding Scale
- Insulin-to-carbohydrate ratio or percentage meal eaten
  - **Fixed dose (or Set amount):** When the physician orders a fixed dose of insulin, the person with diabetes will get the same amount at the same time every day.
  - **Sliding Scale:** The person with diabetes will be administered a dose of insulin (or extra units of insulin) based on the results of their blood glucose test. This is called a sliding scale order because the person's dose of insulin units to be administered will 'slide' up or down depending on his or her blood sugar results. Sliding scale insulin is usually given at mealtimes.

- **Insulin-to-carbohydrate ratio:** Used to give insulin based on the amount of carbohydrate a person eats at a meal. This method provides more flexibility with meal planning and may help keep a person's blood glucose levels more "tightly controlled" or to stay within the recommended blood glucose range.

- **Percentage Meal Eaten:** Used to determine how much sliding scale insulin is given based off the percentage of the meal the client consumed.

## Module 2 Practice Test:

### Section 1 – Multiple Choice: Read each statement or question carefully. Select the best answer from the options listed.

1. Basal insulin is also referred to as:
  - a. Background insulin
  - b. Breakfast insulin
  - c. Mealtime insulin
  - d. Body insulin
2. With what delivery devices can insulin be given?
  - a. Syringe
  - b. Pump
  - c. Pen
  - d. All of the above
3. How is insulin measured?
  - a. Milligrams (Mgs)
  - b. Milliliters (Mls)
  - c. Units
  - d. Ounces
4. You are administering rapid-acting insulin. Which statement is true regarding its administration?
  - a. It should be given within 15 minutes of the patient beginning a meal.
  - b. It should be given after the meal is completed.
  - c. It is administered once daily at the time of the midday meal.
  - d. It is taken only in the evenings with a snack before bedtime.

**Section 2: True or False: Read each statement carefully. Indicate the best answer by circling “True” if the statement is true or “False” if the statement is false. There will only be one best answer.**

5. Proper storage of insulin is not important as long as it is administered correctly.  
TRUE    FALSE
6. The vial or pen currently used for a client should be kept at room temperature.  
TRUE    FALSE
7. Outdated insulin bottles and pens can be used within 2 months of the expiration date.  
TRUE    FALSE
8. Bolus insulin is the quick-acting delivery that is administered before mealtimes to keep glucose levels under control following a meal.  
TRUE    FALSE

**Section 3: Read each statement carefully. Follow the directions written for each exercise below.**

9. Match the insulin order to the correct definition.
  - a. Fixed Dose (or Set amount)
  - b. Sliding Scale
  - c. Insulin-to-carbohydrate ratio

\_\_\_\_\_ Insulin given based on the amount of carbohydrate a person eats at a meal.

\_\_\_\_\_ The person with diabetes will be administered a dose of insulin (or extra units of insulin) based on the results of their blood glucose test.

\_\_\_\_\_ The person with diabetes will get the same amount at the same time every day.
10. Knowing how to work safely with insulin is critical.  
For each item below, mark either as “S” for “safe” or “U” for “unsafe.”

\_\_\_\_\_ If your client’s insulin appears discolored, roll it between your palms before using it.

\_\_\_\_\_ If an insulin vial has frost on it, warm it up by placing it next to a heater.

\_\_\_\_\_ Use insulin until it expires.

\_\_\_\_\_ New or unused insulin should be stored in the refrigerator.

11. Please write your answer in the space provided.

When should open insulin be discarded? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Answer Key:** *Use this Answer Key to check your answers.*

1. **a.** Background insulin (see page 50)
2. **d.** All of the above (see page 50)
3. **c.** Units (see page 64)
4. **a.** It should be given within 15 minutes of the patient beginning a meal. (see page 52)
5. **FALSE:** Insulin must be stored properly. Insulin is very sensitive to sunlight and extreme hot or cold temperatures. (see page 62)
6. **TRUE:** The vial or pen currently used for a client should be kept at room temperature. Extra vials and pens should be stored in the refrigerator. (see page 62)
7. **FALSE:** Always check the expiration date on the insulin bottle (vial) or pen. Outdated insulin bottles and pens should be discarded. Insulin should be discarded 28 days after opening it. (see page 62)
8. **TRUE:** A bolus dose is insulin that is specifically taken at mealtimes to keep blood glucose levels under control following a meal. (see page 50)
9. **c.** Insulin-to-carbohydrate ratio; **b.** Sliding Scale; **a.** Fixed Dose (or Set amount) (see pages 64-66)
10. **U** If your client's insulin appears discolored, roll it between your palms before using it.  
**U** If an insulin vial has frost on it, warm it up by placing it next to a heater.  
**S** Use insulin for 28 days or until it expires, whichever comes first.  
**S** New or unused insulin should be stored in the refrigerator. (see pages 62-63)
11. Most insulin is good for 28 days however, refer to pharmacist, manufacturer or delegating RN for the most up-to-date information regarding discard dates. (p 62)



# *Module*3

Insulin Delivery  
& Administration

# Module 3: Insulin Delivery and Administration

## Learning Outcomes:

After completing this module, the caregiver will:

- Describe the different methods in which insulin may be delivered.
- Explain the step-by-step procedure for drawing a single type of insulin into a syringe and injecting it safely.
- Explain the step-by-step procedure for preparing and administering an insulin injection with a pen.
- Describe the proper disposal of sharps.
- Identify where to inject insulin and explain the purpose of site rotation.

## Methods of Delivery

Insulin must be injected and infused into the layers of fat under the skin. This can be done either with pens, vials and syringes, or pumps. Each method has its positives and negatives. What type of delivery system to be used will be discussed between client and medical provider, factoring in the client's resources and preferences.



# Lesson 8: Insulin Delivery Systems

## Vials and Syringes

### Syringes

Vials of insulin are typically less expensive than prefilled insulin pens or insulin cartridges. Insulin syringes always have a bright orange cap.

There are three primary parts of a syringe:

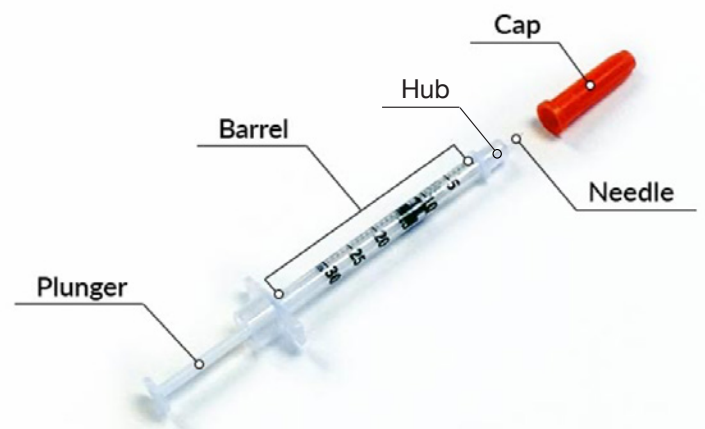
- 1) **the hub** that attaches to the needle,
- 2) **the barrel** that contains the measurement marks and
- 3) **the plunger** that is used to withdraw and inject the medication. When handling a syringe and needle, it is important to touch only the outside of the barrel and plunger. The needle is sterile and must not be touched. The needle may be already attached or separate and needs to be attached to the syringe.

There are syringes made specifically for insulin administration and these are the **ONLY** type of syringe that should be used for injecting insulin to avoid dosage errors. Remember from Module 2 that insulin is measured in “**unit(s)**”. Syringes vary in terms of how much insulin they hold as well as the length and thickness of the needle.

Disposable insulin syringes are available in different sizes, chosen according to the dose of insulin to be injected:



- 0.3 mL – for doses <30 units
- 0.5 mL – for doses <50 units
- 1.0 mL – for doses 50 – 100 units



Only use an insulin syringe to administer insulin.  
No other syringes are appropriate.  
(this syringe is not to scale)

## NEEDLE GAUGES FOR INJECTIONS CHART SIZE



### 14 Gauge

COLOR: OLIVE

OUTER DIAMETER: .072 IN (1.83 MM)



### 15 Gauge

COLOR: AMBER

OUTER DIAMETER: .065 IN (1.65 MM)



### 14 Gauge

COLOR: GRAY

OUTER DIAMETER: .064 IN (1.63 MM)



### 18 Gauge

COLOR: GREEN

OUTER DIAMETER: .050 IN (1.27 MM)



### 20 Gauge

COLOR: PINK

OUTER DIAMETER: .036 IN (.91 MM)



### 21 Gauge

COLOR: PURPLE

OUTER DIAMETER: .033 IN (.83 MM)



### 22 Gauge

COLOR: BLUE

OUTER DIAMETER: .027 IN (.70 MM)



### 23 Gauge

COLOR: ORANGE

OUTER DIAMETER: .025 IN (.63 MM)



### 25 Gauge

COLOR: RED

OUTER DIAMETER: .020 IN (.53 MM)



### 27 Gauge

COLOR: WHITE

OUTER DIAMETER: .016 IN (.42 MM)

**Gauge:** thickness of a needle

- The higher the gauge number, the smaller the diameter of the needle
- The smaller the gauge number, the thicker the needle
- A 31-gauge needle is thinner than a 27-gauge needle

The attached needle length may be:

- 12.7 mm (1/2-in) which is the standard length
- 8 mm (5/16-in) which is a “short” needle
- 5 mm (3/16-in) which is a “mini” needle.

The needle is used to pierce the skin and inject insulin. The capped needle of the insulin syringe is sterile and must remain sterile until used. Needles are very fragile and can bend easily when drawing insulin from a vial. If the needle gets bent before an injection, **you must discard** it and start over with a new syringe.



- The needle must only touch the vial top and insulin as you prepare the insulin dose. If the needle touches anything else, it is contaminated—or no longer sterile—and you must discard it and start over with a new syringe.
- Discard a bent needle and use a new syringe.

### Size chart for common insulin syringes

Needle length	Needle gauge	Barrel size
3/16 inch (5 mm)	28	0.3 mL
5/16 inch (8 mm)	29, 30	0.5 mL
1/2 inch (12.7 mm)	31	1.0 mL

### Vials

Insulin used for injections may be stored in vials. The insulin within the vial is sterile. Vials are glass containers with a rubber stopper on the top of the vial in which a needle is inserted to withdraw the insulin.

To draw insulin through the needle and into the syringe, the needle must be inserted into a vial so that it is completely covered by insulin. Pulling back on the plunger top will draw the insulin into the syringe.



Completely cover the needle with insulin

The dosage measurement line is the edge of the black rubber cap on the end of the plunger. Once insulin is drawn into the syringe, the dosage measurement line is used to measure the amount of insulin in the syringe. If you compare the dosage measurement line to the marks and numbering on the syringe, you can tell how much insulin is in the syringe.

The best way to measure the insulin is to hold the syringe and the dosage measurement line at eye level. You may not see the dose accurately if the syringe is held above or below eye level.



Pull back on the plunger to draw insulin into the syringe.



Pull on the edge of the plunger top only.



Do not touch plunger stem.

To draw up the insulin, pull back on the plunger top. Use your fingers to pull on the edge of the plunger top only, not the stem of the plunger.

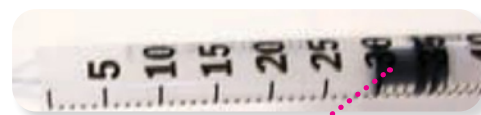
The barrel is the main body of the syringe that holds the insulin dose. Insulin is drawn through the needle of a syringe and into its barrel. The barrel has marks and numbering that relate to the units used for standard doses of prescribed insulin. In simpler terms, if 30 units of insulin is ordered, then insulin is drawn into the syringe to the 30-unit mark.



10 units of insulin



15 units of insulin



30 units of insulin

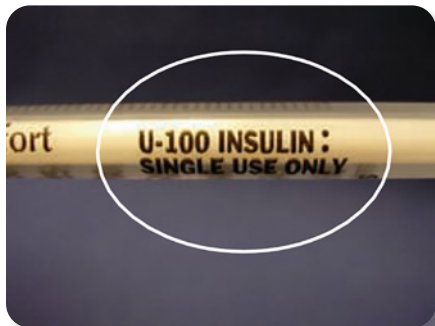
Standard insulin vials and syringes are both marked with U-100 to show that they match. U-100 means that the insulin and the syringe are both made so one millimeter of insulin=100 unit of insulin.

Each time you administer insulin, be sure the insulin and syringe match and are both marked U-100. This step helps you know you have the **Right medication** and the **Right dose** and should be included in the process of checking the **6 Rights of Medication Administration**.

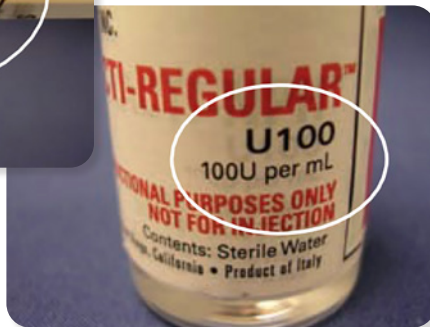


To avoid dangerous insulin dosage errors, follow these two rules each time you administer insulin if using a syringe:

- Always use an insulin syringe for insulin—look for the orange cap!
- Be sure the syringe and insulin match and are both labeled U-100.



U-100 marking on an insulin syringe.



U-100 marking on an insulin vial.



- One note of caution: on the 30 and 50-unit syringes, each unnumbered mark = 1 unit of insulin. On the 100-unit syringe, each unnumbered mark = 2 units of insulin.



**To avoid dosage errors, you will need to:**

- Work with the delegating RN to be sure that you understand the markings on your client's syringe size.
- Be sure to use the same syringe size consistently.

**The delegating RN will:**

- Show you the syringe size that the client uses.
- Teach you how to read the marks on the client's syringe correctly.

There are a couple points to know about vials before you learn the steps of insulin administration.

## Vials have specialized rubber tops

When a vial of insulin is new, there is a cap that covers the rubber top of the vial. For a new vial, remove the cap from the rubber top before cleaning it.



The rubber top of a vial does not lift or come off. Instead, it is soft enough to let a syringe needle pass through it to draw insulin out of the vial.

- The rubber top keeps germs and bacteria out by closing off or sealing over the hole where a needle was placed.
- Each time you use a vial, clean the rubber top with a sterile alcohol wipe to keep germs and bacteria out of vials.
- To do so, start in the center of the rubber top and use a firm, circular motion as you work your way outward to the edge of the rubber top.
- Be sure to let the alcohol dry completely before inserting a needle into the vial.



Inject one unit of air into the vial for every unit of insulin you want to draw out of the vial.

## Vials are sealed and airtight

- Insulin vials are sealed and airtight. This means that you need to inject the same amount of air into a vial before you can draw that amount of insulin out.
  - For example, if you need to draw up 10 units of insulin, inject 10 units of air into the vial first.

## Vials and their prescription and medication labels

The prescription label is on the small box that the insulin comes in.

The medication label is found on the vial itself. The medication label identifies:

- The name or type of insulin in the vial
- The number of units of insulin per milliliter in the vial (U-100 is the standard).
- The **expiration date** of the vial.

Because insulin vials have two labels—one on the box and one on the vial—you will need to store the vial in its original box and check both labels when you are verifying the **6 Rights of Medication**

**Administration. Currently, once opened, vials can last 28 days. Make sure to write discard date on the vial and box 28 days from when it was opened, or by expiration date, whichever comes first. However, many different insulin types, as well as non-insulin injectables, have different “discard by” dates. It is important to work closely with the delegating RN and the pharmacist to identify specific dates by which opened insulin vials or pens must be discarded. Discuss with the delegating RN to assure you are using the correct “discard by” date.**



The expiration date.



Remember: Check the **6 Rights of Medication Administration** three times before you administer insulin:

1. At the start of set-up as you are gathering the medication administration record (MAR), insulin, syringe, and alcohol wipe.
2. During set-up: At the time you are drawing the insulin from the vial into the syringe.
3. After you have the dose in the syringe.

The pharmacy should send the appropriate syringe based on the type and dose of insulin ordered. In general, it is best to use the shortest, thinnest (highest gauge) needles available. A smaller individual would need a shorter needle than a client who weighs more. Insulin must be injected into the fatty layer of tissue just below the skin to ensure it will be absorbed. Long needles tend to increase the risk of injecting medication into the muscle and can cause pain, bruising, bleeding, and increase how quickly insulin is absorbed which can cause hypoglycemia. Short and small needles only go into the fatty tissue, reducing the risk of injecting insulin into the muscle. Blood glucose management may be affected if short- or mini length needles are being used on overweight or obese individuals. If you suspect this may be an issue with a client, call the medical provider and/or discuss with the delegating RN to assess what action should be taken.

## How Long Needles & Syringes Last

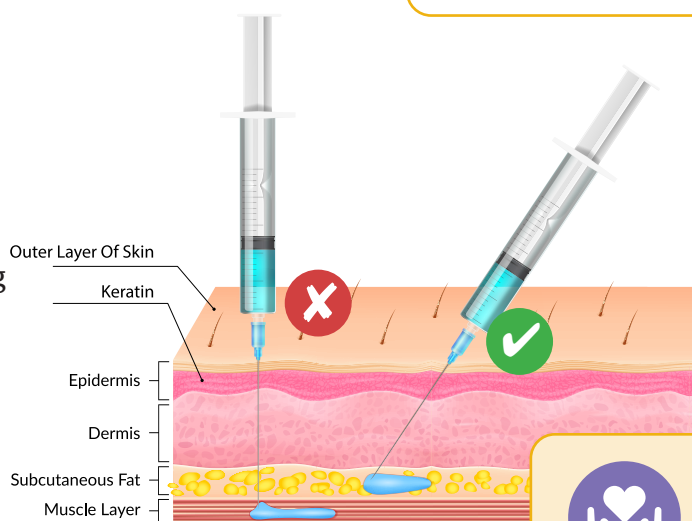
Needles and syringes should NEVER be used more than once nor should they be used on more than one individual. Using a needle more than once may increase the risk of infection. The use of safety syringes prevent the syringe from being used more than once

After use, the syringe and needle must be promptly disposed of properly in a puncture-resistant sharps container. DO NOT recap used needles. Most needle stick exposures occur from recapping or improper disposal of needles. More on safe disposal coming up.



Insulin products contained in vials or cartridges (opened or unopened) may be left unrefrigerated at a temperature between 59°F and 86°F for up to 28 days and continue to work. However, many different insulin types, as well as non-insulin injectables, have different “discard by” dates. The discard date will be included in the manufacturers guide. If this is not available to you, it is important to work closely with the delegating RN and the pharmacist to identify specific dates by which opened insulin vials or pens must be discarded. A job aid has been included in the appendices of this workbook. Please note that the information contained in the job aid is subject to change and newer drugs may be released on the market. Always refer to the instruction from the delegating RN and/or the pharmacist.

**Is it OK to use a needle more than once?**



Needles and syringes should NEVER be used more than once or used on more than one individual.



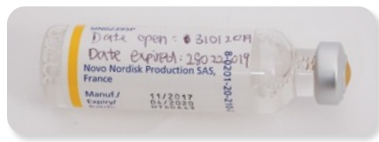
### Pros of Using Syringes & Vials

- Some syringes allow you to mix insulin.
- Less expensive than pens and smartpens.
- Syringes vary in size, gauge and length.
- Syringes are easily available and may not require a prescription to obtain and are covered by most insurance plans.

### Cons of Using Syringes & Vials

- Need to remember all the steps involved in drawing up a dose of insulin.
- Typically marked in 2-unit increments, which can make it hard for people who need to take odd-numbered dosages.
- Wasted insulin since a vial of insulin needs to be used 28 days from opening and must be disposed of after this time, even if there is insulin left over.
- **Remember to write the discard date (currently 28 days from date of opening) unless otherwise instructed on the vial and box!**

### Three examples of 28-Day Discard Date Notification:



**DISCARD AFTER 28 DAYS**  
**EXP. DATE** \_\_\_\_\_

Date Vial Opened \_\_\_\_\_  
Date Vial Expires \_\_\_\_\_  
Discard After 28 Days

### A Note on Safety

Many different medical devices have been developed to reduce the risk of needle sticks and other sharps injuries using current OSHA standards. A safety syringe is a syringe with a built-in safety mechanism to reduce the risk of needlestick injuries to healthcare workers and others. The needle on a safety syringe can be either detachable or permanently attached. On some models, a sheath is placed over the needle, whereas in others the needle retracts into the barrel.



Safety Syringes are used for needle stick prevention. They are:

- Sterile      • Non-toxic
- Some facilities will have safety syringes. The delegating RN will review which syringes you will be using with the residents. The main function of safety syringe is to reduce needlestick injuries to clients and healthcare professionals.

Health care providers can use them right away as they are pre-sterilized. They are easy to handle and require minimal instructions or explanations before use.

The permanently attached sheath is preferred by most clinicians and requires minimal change in training. Complies with OSHA Bloodborne Pathogens Standard for Engineering Controls.

# Insulin Pens

Insulin pens got their name because they are about the size and shape of a writing pen. Insulin pens are preloaded with insulin. There are two types:

- **Disposable pens** that come filled with insulin. You throw the pen away when it is empty or expired.
- **Reusable pens** where you replace the cartridge of insulin. You replace the cartridge when the insulin is used up or expired



Insulin pens provide a more convenient, accurate mode of delivery than insulin administration using a vial and syringe because they are already filled with insulin.



There are many different types of insulin pens. If the client uses an insulin pen, the delegating RN will:  
Give you instructions about using it correctly and safely

The pen uses a needle, but it is shorter than the needle on a syringe. A new needle needs to be attached onto the pen with each shot or injection. The needle then needs to be removed and disposed of after it's been used once.

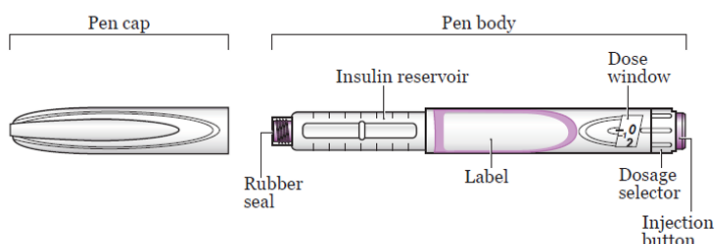
A new disposable pen needle should be tightened on the insulin pen before each use to prevent the needle from falling off and to prevent infection.

As was the case with syringes, pen needles are available in a variety of lengths and thicknesses. Insulin pens are growing in popularity among people because they cut down on medical waste and are considered by most to be more convenient, accurate and easier to use than syringes. Make sure the delegating RN reviews the instructions for the client's specific pen. You can also familiarize yourself with the manufacturer instructions which can be found online.

Insulin pens need to be primed before each injection. Priming is testing the pen by injecting a small amount of insulin into the air, usually 2 units. This confirms that insulin comes out when you push the injection button and removes air that may collect in the insulin cartridge during normal use.

## Insulin Pen Parts

- A **pen cap**. This protects the insulin when you're not using the pen.
- A **rubber seal**. This is where the pen needle connects to the body of the pen.
- A **insulin reservoir**. This holds the insulin. There's a clear plastic area that lets you see the insulin inside the reservoir. You can use this to see about how much insulin is left in the pen.
- A **label**. This tells you the type of insulin in the pen and the expiration date.
- A **dosage selector**. This lets you dial to the right insulin dose.
- A **dose window**. This shows the number of units of insulin selected. There's an arrow pointing to the number in the middle of the dose window. This is the number of insulin units that will be injected.
- An **injection button**. You press down on this to give the injection.





To avoid giving a wrong dose, pens must be primed before they are used.

Insulin pens are for just one person to use, they should never be shared even if the needle is changed. Blood can get into the cartridge after a shot which can expose others to infection if the pen is shared. Pre-filled insulin pens and pen cartridges that have not yet been used should be stored in the refrigerator. And like vials, do not let the insulin get hot or be exposed to direct sunlight. Also, do not freeze.

Disposable pens come in a box. The box has the expiration date for the pens. Cartridges for reusable pens come in a box. That box has an expiration date too. That date is for the pens or cartridges left in the fridge and that have not been opened.

Insulin pens or their cartridges may contain a single type of insulin, or they may contain two types of insulin “pre-mixed” together. All pens will come with a prescription label and an additional medication label on the pen cartridge.

### How Long Pens Last

Some pens are disposable while others have replaceable cartridges of insulin that can be inserted into the pen. The insulin can become less strong after one month. **Currently, once opened and stored at room temperature, a pen is good for 28 days before it must be replaced.** So be sure to throw the disposable pen or cartridge for the reusable pen away after 28 days of using it. Remember that many different insulin types have different “discard by” dates. The discard date will be included in the manufacturers guide. If this is not available to you, it is important to work closely with the delegating RN and the pharmacist to identify specific dates by which opened insulin vials or pens must be discarded to assure you are documenting the correct discard date on the pens and cartridges.

The process of checking for expiration dates and verifying the 6 Rights of Medication Administration is the same for insulin pens as it is for insulin vials.

In fact, many of the rules and concepts you learned about insulin and insulin administration with a syringe are the same whether you are using a pen or a vial & syringe.

# General Pen Rules & Concepts

- Insulin in pens will be either clear or cloudy.
- For cloudy insulin in pens, you need to roll the pen gently between your palms 15-20 times to mix it before use.
- Once used, an insulin pen should be used until it expires. As with vials, write the discard date on the pen. Always defer to the delegating RN and or pharmacist for correct information regarding “discard by” dates.
- Insulin pens should not be stored in the freezer, and they should be discarded if frosted.
- Insulin pens should not be exposed to direct heat or light.
- You should have an extra insulin pen or cartridge available in case the one being used gets lost or damaged.
- Insulin units that are measured on an insulin pen match the units for standard U-100 insulin and U-100 syringes.
- New or unused pens need to be stored in the refrigerator. Once in use, pens must be stored at room temperature. **Insulin pens in use must NOT be stored in the refrigerator.**

- Insulin pens do not have needles attached to them the way syringes do. Instead, the pen has a protective cap that comes off so you can attach a new, sterile needle each time you inject insulin.
- Safety Pen Needles: Some pens will have an automatic safety shield cover that protects the needle tip after use. The shield locks automatically at the injection end after use to prevent needlestick injuries. The main purpose of safety needles is to minimize the risk of needle stick injuries and lower the risk of cross infection.



Rubber seal of an insulin pen

- Disposable needles for insulin pens come in plastic containers so that they remain sterile until use.
- With a pen, there is no rubber vial top to clean. Instead, there is a rubber seal on the end of the pen. The rubber seal must be cleaned with a sterile alcohol wipe before a new needle is attached.
- Insulin pens must be primed before they can be used. Priming means testing the pen by injecting a small sample of insulin into the air—usually two units. Priming has two purposes:
  - It tells you that the pen is working (insulin comes out when you push the injection button).
  - It removes air that may be in the cartridge and needle.

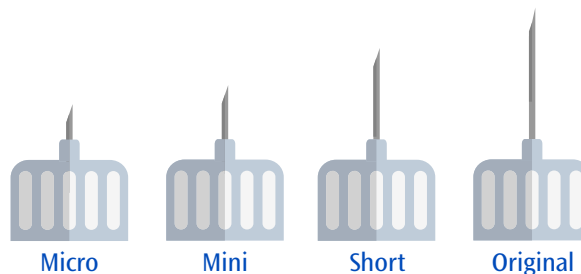


An insulin pen set to give 10 units of insulin.

- Instead of using a plunger, insulin pens use a **dose knob** that you turn to prepare a dose of insulin. The dose usually appears as a number—such as “10”—in a **dosage window** to indicate how many units of insulin will be injected.
- Many types of insulin pens instruct you to push the injection knob in and hold for **10 seconds** when you are injecting insulin.
- Insulin pens are not stored with a needle attached. Needles must be removed and placed in a sharps container immediately after use. Leaving a needle attached to a pen may cause insulin to leak out or clog the needle or create air bubbles in the cartridge.
- Remove the used needle. Put the large needle cap carefully on the needle. Twist the covered needle to unscrew it. Throw the used needle away in a sharps container.

Pen needles come in many lengths: micro, mini, short, and original. The micro needle is smaller than the original.

The smaller the needle, the less painful the shot. So, most people want to use the shortest, smallest needle possible. However, some people will have to use a longer needle, like syringes as described earlier.



### Attaching the needle to the pen:

1. Perform hand hygiene
2. Wipe the end of the pen with alcohol where the needle will be attached
3. Pull paper tab off pen needle
4. Screw needle onto insulin end of pen
5. Remove outer needle cover and keep nearby
6. Remove the inner needle cover to expose the needle
7. Throw inner needle cover in trash

Now you're ready to inject in the insulin. See page 96-99 for insulin administration and pages 122-127 for job aid outlining these steps to be used for your reference.



### Pros Using a Pen

- More discreet than syringes and vials. Small size and likeness to ink pens makes insulin pens a convenient and discreet way of carrying insulin
- Often less painful than syringes because they have smaller needles
- Easier to use than syringes
- Easier to give exact doses
- Already pre-filled
- Normally get enough to last a month
- Fewer steps to inject insulin compared to a syringe

### Cons Using a Pen

- The pen needle needs to stay in the skin slightly longer than a traditional syringe injection, about 10 seconds
- They cost more than vials/syringes
- Some insulin is wasted (1-2 units of insulin) when priming the pen before injecting
- Can't mix insulin, but some pens come with premixed insulin
- Can be easily misplaced/lost
- Must order or purchase insulin pen needles separately
- Not all insulins are available in pen form

# Review

- When you open a new pen or vial of insulin, write the discard date on the pen or vial and discard pen in 28 days or by date provided per manufacture guide, pharmacist or delegating RN.
- New or unused pens need to be stored in the refrigerator. Insulin pens in use must be stored at room temperature.
- Clean the rubber seal with a sterile alcohol wipe before attaching a new needle.
- If you use short or rapid-acting insulin, it should look clear. Do not use clear insulin if it has crystals or discoloration.
- Short or rapid acting insulin brands are:
  - Glulisine (Apidra)
  - Lispro (Humalog)
  - Aspart (NovoLog)
  - Regular (Novolin)
- Long-acting insulin should look cloudy and white. Do not use cloudy insulin if the insulin is discolored or has pieces or clumps stuck to the sides of the vial, cartridge or disposable pen.
- Long-acting insulin brands are:
  - Glargine (Basaglar, Lantus, Toujeo)
  - Detemir (Levemir)
  - Degludec (Tresiba)
- To avoid giving a wrong dose, pens must be primed before they are used.



Clear insulin



Cloudy insulin



# Insulin Pumps

Pumps are small, computerized devices that deliver fast or short-acting insulin 24 hours a day through a catheter placed under the skin. Insulin pumps are popular among those who require multiple daily injections of insulin. Safe and successful use of a pump requires considerable education and training, and their cost can be relatively high. Insulin pumps are not typically used by those who are new to insulin but can be an effective option once a client has a bit more experience. With some training, nursing assistants and home aides are allowed to assist clients with the set-up of an insulin pump. However, nursing assistants and home aides are not allowed to administer insulin through insulin pumps under nurse delegation. As a result, we will not focus on their use in this training.



Certified nursing assistants and home care aides certified are NOT allowed to administer insulin through insulin pumps under nurse delegation.

# Inhaled Insulin

Inhaled insulin is used as a mealtime insulin designed specifically to lower spikes in blood sugar related to eating a meal. It can be used by both individuals living with Type1 or type 2 diabetes. For individuals that are afraid of needles but need mealtime insulin, inhaled insulin can be a great option. It can work faster than traditional injected insulins.

A fine insulin powder is inhaled into the lungs through an inhaler like those used for asthma. Insulin then enters the blood through small blood vessels.

Inhaled insulin can be delegated. Cartridges come in 3 doses:

- 4 units (blue) per cartridge
- 8 units (green) per cartridge and
- 12 units (yellow) per cartridge



4-units



8-units



12-units



Inhaled insulin is rapid-acting, so it must be used at the beginning of a meal. Inhaled insulin is NOT a substitute for long-acting insulin.



### Basic overview of how to administer inhaled insulin:

**Step 1:** ALWAYS make sure to have the correct number of cartridges for the client. You will know this from instructions from the delegating RN.

**Step 2:** Remove the blister card from the foil package and remove the cartridge from the strip by pressing the clear side.

**Step 3:** Hold the cartridge with the cup facing down. The pointed end of the cartridge should line up with the pointed end in the inhaler. Place cartridge into the inhaler, making sure it lies flat in inhaler.

**Step 4:** While keeping the inhaler fully level, have the client exhale. Place the mouthpiece in their mouth and tilt the inhaler toward their chin. Instruct them to form a tight seal with the lips and inhale deeply while holding their breath if comfortable. Then remove the inhaler, tell the client to exhale, and breathe normally.

**Step 5:** Remove the used cartridge by placing the purple mouthpiece cover back on the inhaler to lift the mouthpiece. The cartridge may be disposed of in the regular trash or follow the facility's protocol or the nurse delegator's instruction for proper disposal.

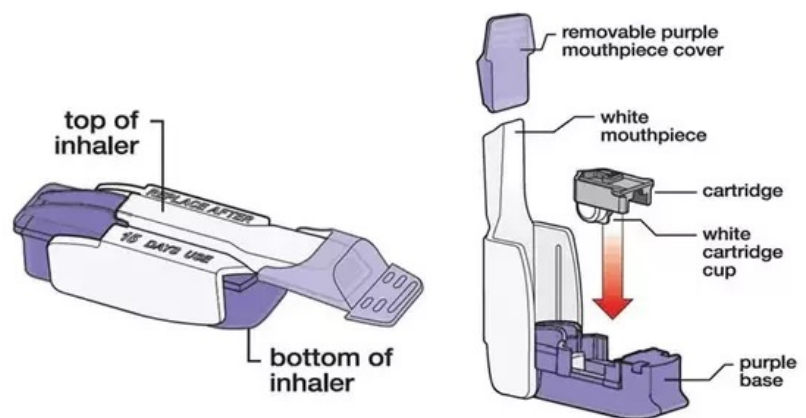
Repeat steps 2 through 5 if necessary to administer the full, prescribed dose.

### Storage and Inhaler Care:

- Cartridges should be at room temperature for 10 minutes prior to use.
- Cartridges NOT in use should be refrigerated and may be used until the expiration date.
- Cartridges in use can be stored at room temperature but must be used within 10 days. Write this discard date on the box.
- An open strip of three cartridges must be used in 3 days. Write this discard date on the strip.
- Use 1 inhaler at a time and replace inhaler every 15 days or as ordered by medical provider.

### Side Effects:

- Like injectable insulin, inhaled insulin can cause low blood sugar. The same precautions about the need to monitor blood sugar and how to treat low blood sugar apply to inhaled insulin.
- If the client develops throat pain or a cough, have them speak with their medical provider, or if indicated, call their provider.



# Lesson 9: Safe Needle Disposal

Syringes are discarded into bright red plastic containers called **SHARPS CONTAINERS**. Sharps containers are made so they can safely hold sharp, infectious waste like used syringes.

If a commercial sharps container is not available, a heavy plastic container with a secure lid—such as an empty laundry detergent bottle - can be used. The container must be clearly labeled, “Medical Waste.” Do not use 2-L soda bottles or water bottles as these containers are not thick enough to prevent a needle from puncturing the sides



Commercial Sharps Container



Non-commercial Sharps Container



## The delegating RN will show you the:

- Sharps container to use at your workplace.
- Correct process for disposing medical waste.

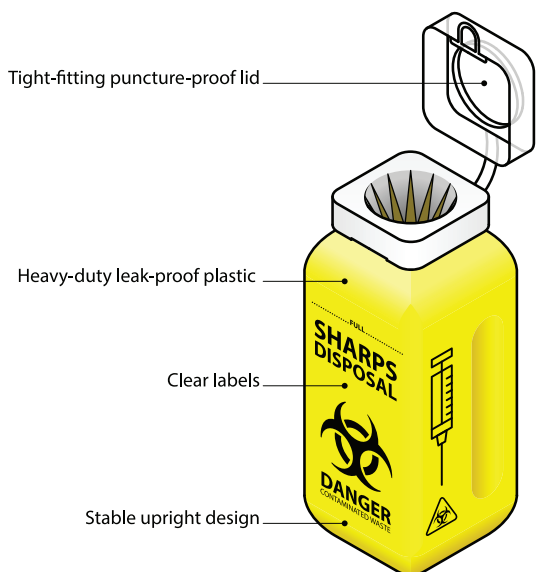
## Do's & Don'ts of Needle Disposal

### Do's

- Immediately place used needles and other sharps in a sharps disposal container to reduce the risk of needle-sticks, cuts, or punctures from loose sharps.
- Use an FDA-cleared sharps disposal container, if possible. If an FDA-cleared container isn't available, some organizations and community guidelines recommend using a heavy-duty plastic household container (i.e. laundry detergent container) as an alternative.
- Make sure that if a household disposal container is used, it has the basic features of a good disposal container. (See box in the next column for more info.)
- Be prepared — carry a portable sharps disposal container to the client's room, keep one on the medication cart (if a cart is used), or store one in the client's room.
- Follow your community guidelines for getting rid of sharp's disposal container.



Disposal of a safety syringe



- Call your local trash or public health department (listed in the county and city government [webpage](https://safeneedledisposal.org/)) to find out about sharps disposal programs in your area. <https://safeneedledisposal.org/>
- Keep all needles and other sharps and sharps disposal containers out of reach of children and pets.

### All sharps disposal containers should be:

- Made of heavy-duty plastic
- Able to close with a tight-fitting, puncture-proof lid, without sharps being able to come out
- Upright and stable during use
- Leak resistance
- Properly labeled

### Don't

- Throw needles and other sharps into the trash
- Flush needles and other sharps down the toilet
- Put needles and other sharps in your recycling bin—they are not recyclable.
- Remove, bend, break, or recap needles. This can lead to accidental needle sticks, which may cause serious infections.
- Attempt to remove the needle without needle clippers because the needles could fall, fly off, or get lost and injure someone.

As a rule, sharps containers are sealed off with a secure lid when they are  $\frac{3}{4}$  full. Filling a sharps container beyond that can put you at risk for needlesticks when you try to discard a syringe or seal the lid of the container.



### Best Way to Get Rid of Used Needles and Other Sharps:

**Step 1:** Place all needles and other sharps in a sharps disposal container immediately after they have been used.

**Step 2:** Dispose of used sharps disposal containers according to your community guidelines.



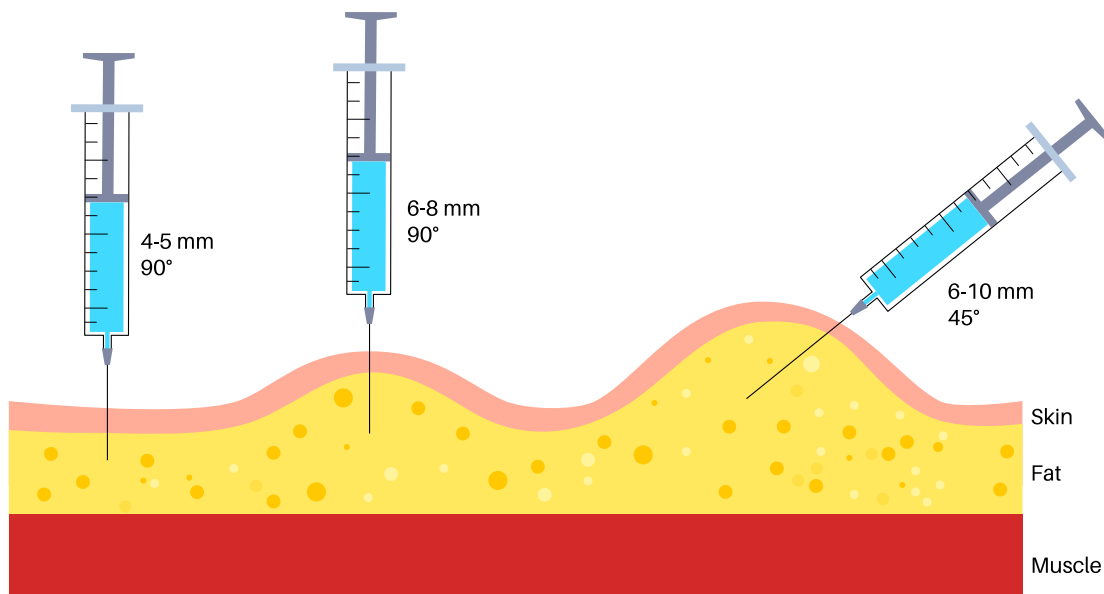
Proper disposal technique of 'sharps'

# Lesson 10:

## Where to Inject & Site Rotation

Injecting insulin into the same spot repeatedly can cause a breakdown or inflammation of the fat tissue, known as lipodystrophy (li-po-dis-tro-phy). This causes a dimpling or hardness in the skin. These areas tend to have less blood flow, so insulin doesn't absorb correctly, if at all. Once a person has developed breakdown or inflammation of the fat tissue, it takes years for that tissue to heal, if it heals at all. The key to preventing this is to rotate site injections. Rotating injection sites evenly over large skin areas will help prevent this from happening and allows for consistent insulin absorption and action.

### INSULIN INJECTION TECHNIQUE



#### The delegating RN will:

- Teach you the best injection angle to use with the client.
- Instruct you on which injection site to use with the client and how you should rotate injections and how to document the site used with each injection.

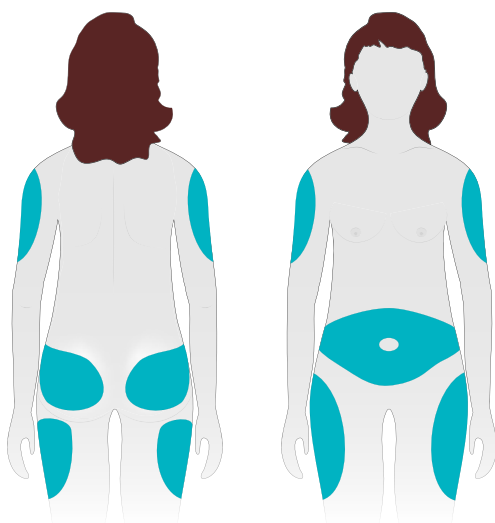
See image below for popular injection areas. These areas include the abdomen, outer thighs and backs of the arm.

- **Abdomen:** The preferred site for insulin injection is the abdomen. Insulin is absorbed more quickly and predictably there, and this part of the body is also easy to reach. Select a site between the bottom of the client's ribs and the client's pubic area, staying two fingers or a few inches away from the belly button.
- You'll also want to avoid areas around scars, moles, or skin blemishes. These can interfere with the way insulin is absorbed. Stay clear of broken blood vessels and varicose veins as well.
- **Outer thighs:** You can inject into the top and outer areas of the thigh, about 4 inches down from the top of the leg and 4 inches up from the knee.
- **Backs of the arms:** Use the fatty area on the back of the arm, between the shoulder and elbow.

These areas are also appropriate for injections:

- Hips
- Upper buttocks
- Lower back

### Insulin injection sites



## How to properly rotate injection sites:

### 1. Choose body part to be injected.

- Rotate sites daily.
- Chart site used. By documenting the injection site location, the next staff person to inject the client's insulin will be aware of the last location used, and can choose another location to avoid skin injury.

### 2. Rotate sites within recommended body part.

- The best way to prevent site overuse, is to rotate sites in an organized manner.
- It is recommended to stay on one side of the body for several site changes, moving just a couple inches each time. Split the selected injection area into four large sections. Select one section and split it into four smaller sections. Rotate clockwise through these four small sections for a week. In the following week, select the next large section clockwise from the previous week and divide it into four smaller sections. Repeat the rotation between the small sections and large sections each following week.
- If the client does not want you to rotate sites, explain the reasons that rotation is preferred; be sure to document and notify the delegating RN.

### 3. Choose one general area and use all possible sites in that area before moving to the next.

### 4. Make sure that each injection is about an inch (two finger-widths) from the last injection.

### 5. Try to work in straight rows.



# Lesson 11:

## The Medication Administration Process & Methods of Insulin Administration

Before we move on to administering insulin, let's review the 6 Rights of Medication Administration that you learned in your previous nurse delegation training as well as module 1. They are:

### Right client

- Ask the client their first and last name.
- If, due to cognitive issues, the client is unable to tell you their first and last name, follow your employer/facility policy to determine you are working with the correct client.
- Does the order match the client?

### Right medication

- Does the medication label match the prescription order.
- Be vigilant with look-alike and sound-alike medications.
- Check the insulin vial to make sure it is the right kind of insulin and that there are no clumps or particles in it.

### Right dose

- Does the strength and dosage match the order?

### Right time

- Does the administration time match the order?

### Right route

- Does the route match the order?

### Right documentation

- Record everything.
- Client, amount of medication and any side effects.
- Assess and evaluate the client and make sure they are responding correctly to the medication. If not, record it in the paperwork.
- Document injection site.



# Methods of Insulin Administration

## Preparing and Giving an Injection Using a Syringe and Vial with One Type of Insulin

**Technique is everything when it comes to making injections easy.**

To give an insulin injection, you need to fill the right syringe with the right amount of medicine, decide where to give the injection, and know how to give the injection. Find general tips and step by step recommendations on the pages that follow. In your appendices, you will find a job aid. Once delegated, you will follow the delegating RN's specific written instructions

### General Tips:

- Do not use expired insulin.
- Insulin should be given at room temperature. If you have stored it in the refrigerator, take it out 30 minutes before the injection.
- Once you have started using a vial of insulin, it can be kept at room temperature for 28 days. Remember to write discard date on vial.

## Step-by-Step: How to Draw One Type of Insulin into a Syringe:

**1. Check blood sugar if ordered and follow protocol.**

- Always check blood sugar if symptoms of low blood sugar are present. Follow your employer/company policy and the delegating RN's directions.

**2. Check 6 Rights**

- Ensure insulin has not expired or been open longer than 28 days or other discard date provided by pharmacist and/or delegating RN.

**3. Gather your supplies:** insulin vial, new, unused syringes, alcohol wipes, and a sharps container for used syringes.

- Check the insulin vial to make sure it is the right kind of insulin and that there are no clumps or particles in it.

**4. Gently stir intermediate or premixed insulin:**

- Intermediate-acting insulin (NPH) is cloudy and must be rolled between your hands to mix it. Do not shake the bottle. This can make the insulin clump.
- Turn the bottle on its side and roll it between the palms of your hands.
- Clear (fast-acting, long acting) insulin generally does not need to be mixed.

**5. Prepare the insulin bottle:** If the insulin vial has a plastic cover, take it off. Wipe the top of the bottle with an alcohol wipe. Let it dry. Do not blow on it.



**6. Perform hand hygiene and put on gloves.**

**7. Recheck 6 Rights.**

**8. Pull air into the syringe:** Know the dose of insulin you are going to use. Remove the cap from the needle. Pull back the plunger on the syringe to draw in an amount of air that is equal to your insulin dose.

- The TIP of the black plunger should correspond to the number of units on the syringe.

**9. Inject air into the vial:** Hold the syringe like a pencil and insert the needle into the rubber stopper on the top of the vial.

- Push the plunger down until all the air is in the bottle. This helps to keep the right amount of pressure in the bottle and makes it easier to draw up the insulin.

**10. Draw up the insulin into the syringe.** With the needle still in the vial, turn the bottle and syringe upside down (vial above syringe). Pull the plunger to fill the syringe to the desired amount.

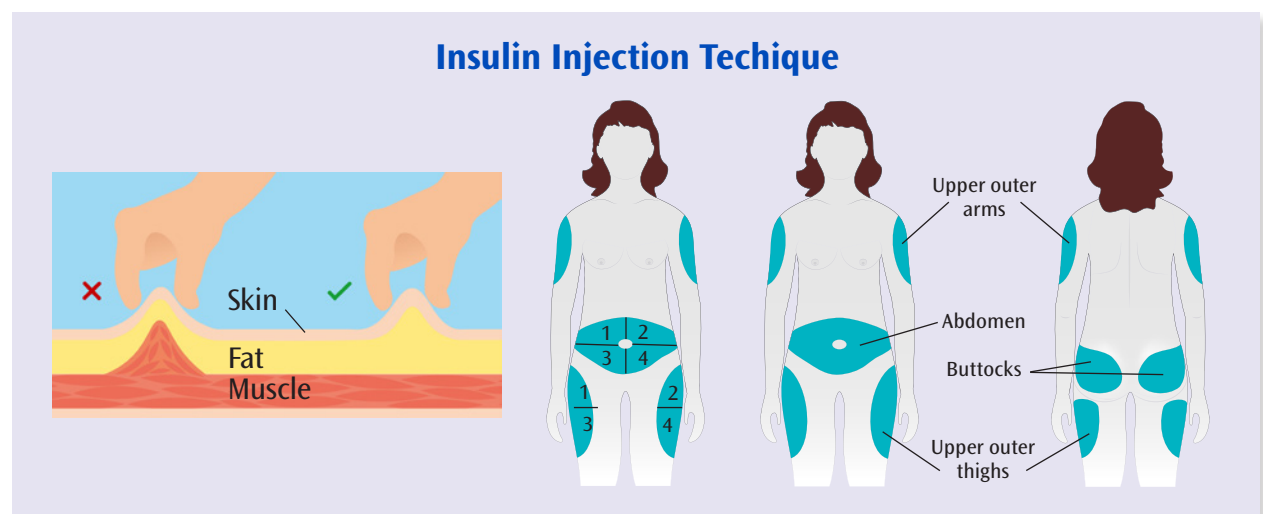
**11. Check the syringe for air bubbles:** If you see any large bubbles, push the plunger until the air is purged out of the syringe. Pull the plunger back down to the desired dose.

- If there are bubbles, hold both the bottle and syringe in one hand, and tap the syringe with your other hand. The bubbles will float to the top. Push the bubbles back into the insulin bottle, then pull back to get the right dose.

**12. Remove the needle from the bottle:** Make sure that the needle does not touch anything until you are ready to inject!

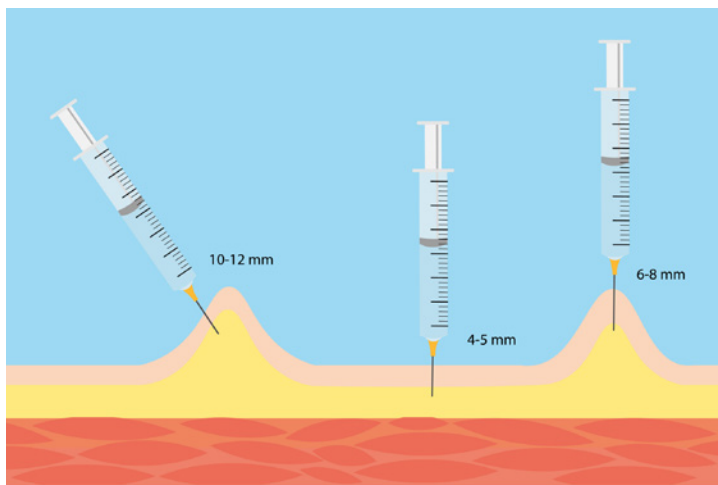
**13. Clean skin at injection site:**

- Select the injection site, ensuring a different site from the previous injection.
- Clean with alcohol and let dry.
- Keep your shots 1 inch (2.5 centimeters, cm) away from scars and 2 inches (5 cm) away from belly button.
- Do not put a shot in a spot that is bruised, swollen, or tender.
- Do not put a shot in a spot that is lumpy, firm, or numb (this is a very common cause of insulin not working the way it should).



**14. Inject insulin:**

- Pinching up skin with a 1-to-2-inch skin fold, holding the syringe like a pen, quickly poke the needle at a 90-degree angle into the fold of skin.
- If the client is thin, it is ok to use a 45-degree angle.
- Push the needle all the way into the skin. Let go of the pinched skin. Inject the insulin slowly and steadily until it is all in.
- Leave the syringe in place for 5 seconds after injecting.



**15. Pull the needle out at the same angle it went in.**

- Do not recap the needle.

**16. Place the syringe in sharps container.**

- Remember never reuse syringes.

**17. Gently press the site with a cotton ball or gauze.**

- Do not rub or massage the area.

**18. Remove your gloves** without touching the outside of the gloves and dispose of them promptly.

**19. Perform hand hygiene.**

**20. Put supplies away and clean workplace.**

**21. Document site of administration and dose and time.**

# Mixing Two Types of Insulin

## How to mix short-acting (clear) insulin and intermediate-acting (cloudy) insulin

Usually, a mixed dose of insulin uses one faster-acting insulin with one slower-acting insulin. Sometimes mixed doses come pre-mixed in a vial or insulin pen cartridge. Pre-mixed insulin can be drawn up using the standard steps you have already learned. However, when mixed doses are not pre-mixed, they need to be mixed manually in one syringe. Mixing insulins manually requires extra steps that must be completed in a specific order.

The main difference between administering a single type of insulin and a mixed dose of insulin is how you prepare the syringe. Once the syringe is prepared, the steps for giving the injection are the same for a single type of insulin or a mixed dose.



Some insulins, like glargine (Lantus®) and detemir (Levemir®), cannot be mixed. Other insulins (NovoLog 70/30®, Humalog 75/25®) are already a combination of two types of insulin and should not be mixed.

As a general example, let's say that you need to mix:

- 8 units of clear (fast-acting)

WITH

- 12 units of cloudy (slow-acting)

Together, you can see that 8 units of one type of insulin mixed with 12 units of another type will give you a total of 20 units of mixed insulin in the syringe. More simply,  $8 \text{ units} + 12 \text{ units} = 20 \text{ units}$ .

# What to Do

The steps below show how to prepare the syringe differently with two types of insulin instead of one.

Follow the other steps of the insulin administration process once the insulin has been mixed.

## Step 1: Roll and clean

- Wash and dry your hands.
- Pick up the cloudy insulin bottle and turn it upside down. Gently, roll the cloudy (intermediate-acting) bottle of insulin between your palms 10 times. Do not shake vigorously. Set the bottle back on the table.
- Clean the top of both vials with an alcohol swab.
- When you are mixing two types of insulin, you need to inject air into two vials instead of one.

## Step 2: Add air to cloudy (intermediate-acting) insulin

- Always inject air into the vial of the slower acting insulin first.
- Remove the caps from the top and bottom of the syringe.
- Draw the required amount of air (equal to the dosage of cloudy insulin, i.e., 12 units) into the insulin syringe. Pull the plunger of the syringe down to the correct unit mark for your cloudy insulin dose as ordered. If you are using a 100- unit syringe, the space between each line is 2 units. The syringe will fill with air.
- Carefully insert the needle into the rubber stopper of the bottle of the cloudy insulin. Push the plunger all the way down to inject air into the bottle.
- Take the needle out of the bottle with cloudy insulin. The syringe will be empty. Set the bottle of cloudy insulin aside.

## Step 3: Add air to clear (short-acting) insulin

- Using the same syringe and needle, pull the plunger down to the correct unit mark for the clear insulin dose as ordered (8 units).
- Insert the needle into the clear bottle.
- Inject air into the clear insulin vial by pushing the plunger down.
- Leave the needle in the bottle.

## Step 4: Withdraw clear (short-acting) insulin first, then cloudy (intermediate-acting) insulin

- Turn the clear insulin bottle upside down, with the needle in the insulin.
- Hold the bottle at eye level.
- Pull the plunger down to the correct unit mark for the clear insulin dose. In this case, 8 units. Support the needle in the bottle so it does not bend.
- Check for air bubbles in the syringe. Air bubbles will take the place of insulin. This could cause you to get less insulin than you need because there is no insulin in the air bubble. If you see air bubbles:
  - ✓ Tap the syringe firmly with your fingertip to move the bubbles to the top of the syringe.
  - ✓ Push the plunger up a few units until the air bubbles go back into the insulin bottle.
  - ✓ Pull down on the plunger and fill the syringe with the correct amount of insulin.
  - ✓ Check again for air bubbles.
  - ✓ If you cannot get rid of the air bubbles, discard the dose and begin again

### Always withdraw clear insulin first before withdrawing cloudy insulin.

- Pull the bottle away from the needle and set aside the clear bottle.
- Pick up the cloudy bottle of insulin. Turn the bottle upside down and push the needle into the bottle. Be very careful not to move the plunger.
- Be careful not to push any clear insulin into the bottle of cloudy insulin.
- Pull the plunger down and withdraw the correct number of units for the cloudy insulin. In this case, 12 units.
- The plunger should now be on the unit mark showing the total units of both the clear and cloudy types of insulin. For this example, 8 units of clear insulin are already in the syringe. Add 12 units of cloudy insulin for a total of 20 units of insulin in the syringe.

### Units of Clear Insulin + Units of Cloudy Insulin = Total Number of Units

- Pull the bottle away from the needle. Set bottle on the table.
  - ✓ If you get more units of cloudy insulin in the syringe than are needed, do not push any insulin back into the bottle. Remove the syringe and throw it into your sharps container. Get a new syringe and start over.
- Look for air bubbles in the syringe. If you see air bubbles, repeat steps above for removing air bubbles. If you cannot get rid of the air bubbles, discard the dose and begin again.
- Set the syringe down. Do not let the needle touch anything.

You now have a mixed dose of insulin in one syringe and can proceed with the standard steps for injection, documentation, and observation of side effects. As a review:

- Pinch or spread the skin at the chosen injection site.
- Wipe the area with alcohol. Let the alcohol air dry.
- Pick up the syringe. Hold it like a dart.
- Insert the needle straight into the skin at a 90-degree angle unless otherwise directed by your delegating RN. Make sure the needle is all the way through the skin.
- Push the plunger down to inject the insulin. Count to five.
- Pull the needle out while applying pressure to the area with an alcohol swab.
- Discard the needle and syringe as advised.

**The steps for mixed doses must be followed in the correct order. Specifically, air must be injected into the vial of the slower-acting insulin first and the faster-acting insulin must be drawn into the syringe first.**



## Preparing and Giving an Injection Using an Insulin Pen

### Disposable Pens:

#### 1. Check blood sugar if ordered and follow protocol.

- Always check blood sugar if symptoms of low blood sugar are present. Follow your employer/ company policy and the delegating RN's directions.

#### 2. Check 6 Rights.

#### 3. Ensure insulin has not expired or been open longer than 28 days or other date provided by pharmacist/delegating RN.

#### 4. Gather and set up supplies: pen, needle, an alcohol wipe, sharps container, gloves and gauze.

#### 5. Inform client what you are going to do.

#### 6. Perform hand hygiene and put on gloves.

#### 7. Recheck 6 rights.

#### 8. Select injection site.

- Rotate sites daily. Refer to section above on site rotation for correct procedure.

**9. Gently stir intermediate or premixed insulin:**

- Turn the pen on its side and roll it between the palms of your hands.
- Clear (fast-acting, long acting) insulin generally does not to be **mixed**.

**10. Attach a new, unused pen needle:**

- Screw or click the needle securely in place according to the manufacturer's instructions.
- Remove the outer cap from the pen needle. Remove the inner cap to expose the needle.

**11. Prime the pen:**

- Pointing the needle up in the air, dial two units on the pen and press the plunger fully with your thumb; a drop of insulin should come out of the needle..

**12. Dial to correct dose.**

- Turn the dial on the pen to the prescribed dose.

**13. Double check dose is correct.**

**14. Clean skin at injection site with alcohol swab.**

- Let skin dry.

**15. Inject insulin:**

- Pinching up skin with a 1-to-2-inch skin fold, holding the syringe like a pen, quickly poke the needle at a 90-degree angle into the fold of skin.
- If the client is thin, it is ok to use a 45-degree angle.

- While holding the insulin pen in place, release the fold of skin before injecting the insulin.
- While still holding the insulin pen in place, push the dose knob all the way down.
- Keep the insulin pen in place for 10 seconds to ensure all insulin is injected.

**16. Pull the needle straight out at the same angle that it was inserted.**

- Lightly press the injection site for 5-10 seconds, to prevent insulin leakage from injection site.

**17. Remove needle from the pen.**

**18. Place used needle in a sharps container.**

- Never recap needle.

**19. Remove your gloves without touching the outside of the gloves and dispose of them promptly.**

**20. Perform hand hygiene.**

**21. Put supplies away and clean workplace.**

**22. Document site of administration and dose and time.**



# Lesson 12:

## Factors That May Affect Absorption

### 1. Site selection:

- As noted above, the abdomen is generally the “fastest” site for insulin to absorb, followed by the backs of the upper arms, outer sides of the thighs, and the upper buttocks or hips.



### 2. Subcutaneous tissue (connective tissue and fat) versus muscle:

- Insulin should be injected into the fatty tissue layer just under the skin. Insulin needles are designed to inject insulin into this layer.
- If insulin is injected into muscle, it will absorb significantly faster. Therefore, we pinch up the skin when we inject — it helps us inject into the fatty layer we’re supposed to inject into instead of muscle.

### 3. Scar tissue:

- Over time, scar tissue can build up, especially if you are not rotating injection sites. Scar tissue will significantly delay absorption.

### 4. Temperature:

- Heat, such as from a hot bath or sauna, can open up blood vessels, increasing the insulin absorption rate, while cold can decrease the absorption rate.

### 5. Activity level:

- Level of physical activity impacts how quickly insulin is absorbed by speeding up the absorption of insulin.
- When someone exercises, they are more sensitive to insulin.

### 6. Certain Medications:

- Some medications which treat high blood pressure, or which help lower lipids (fats) in the blood can make insulin less effective.

### 7. Dehydration:

- If the client isn’t drinking enough fluids, they may not absorb insulin as quickly.
- Dehydration also increases blood sugar which can cause a short-term resistance to insulin.
- Make sure the clients are hydrated.

# Lesson 13:

## General Tips and Safety Measures

### Insulin

**Before using, check the insulin to make sure it is clear. Do not use if the insulin is:**

- Beyond its expiration date
- Unclear, discolored, or cloudy (Note that certain insulin [NPH or N] is expected to be cloudy after you mix it)
- Crystallized or has small lumps or particles
- Frozen
- Viscous
- Bad smelling
- The rubber stopper is dry and cracked

**Don't use bottled insulin past the expiration date printed on the label. And no matter what the expiration date is, throw away a bottle 28 days after you open it.**

**Write the date that you opened the bottle on the bottle's label and write the expiration date 28 days later.**

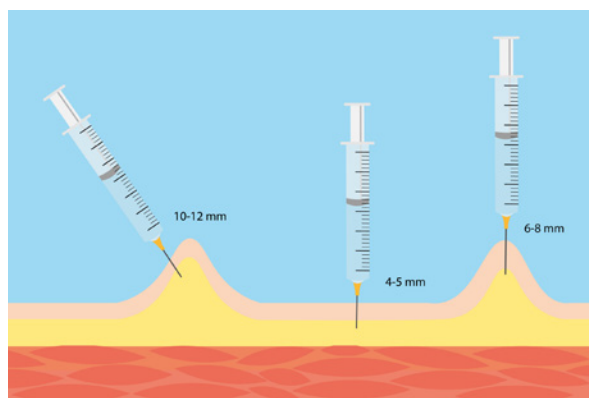
**Discard after 28 days.**

### Syringe and Needle Pen Safety

**Inserting the needle:** Faster is better, inserting slowly will cause more pain. The key to minimizing the pain of an injection is speed. You want to make quick, decisive motions and stick your client at a straight angle — no wiggling the syringe once you've inserted the needle (almost like how you would toss a dart). Make sure the insulin is at room temperature (there's more discomfort when it's cold) and encourage your client to relax his or her muscles before injecting.

**Needle Angle:** For adults or those with good fatty tissue, insert at a 90° angle. For thin adults, you may need to inject at a 45° angle.

- Try to get the needle all the way into fatty tissue below the skin, but not so deep that it hits the muscle below.



**Injecting the insulin:** Push the syringe plunger all the way in with a slow steady motion or firmly press the insulin pen injection button. Wait 5-10 seconds (depends on if you're injecting with a syringe or a pen) before removing the needle. Let go of the skin.

**Remove the needle by pulling straight out.** Twisting or shifting the needle's position will cause pain. You may gently press on the injection site with your finger for a couple seconds. Do not rub or massage the skin where the insulin is injected; it can affect how fast the insulin is absorbed and how it acts within the body.

**Do not reuse syringes.**

**Do not recap needles.**

**Dispose of in a sharps container immediately following use.**

# Rotating Injection Sites

Same general location at the same time each day.

Rotate within each injection site.

**Most insulin enters the blood:**

- Fastest in the stomach
- A little slower in the arms
- Even slower in the legs
- Slowest in the buttocks

**Do not inject close to the belly button. The tissue there is tougher, so the insulin absorption will not be as consistent.**

**For the same reason, do not inject close to moles or scars.**

**If you inject in the upper arm, use only the outer back area (where the most fat is).**

**If you inject in the thigh, stay away from the inner thighs.**

**Do not inject in an area that will be exercised soon. Exercising increases blood flow, which causes long-acting insulin to be absorbed at a faster rate.**



## Module Review Important Points to Remember

### Methods of delivery:

- Vials & syringes
- Pens
- Pump
- Inhaled

### Insulin syringe:

- The plastic, disposable syringes currently are available in three sizes, and hold up to 30, 50 or 100 units of insulin.
- The insulin is injected into the layer of fat (subcutaneous tissue) just under the skin.
- To avoid dangerous insulin dosage errors, follow these two rules each time you administer insulin if using a syringe:
  - **Always use an insulin syringe for insulin—look for the orange cap! No other syringes are appropriate.**
  - **Be sure the syringe and insulin match and are both labeled U-100.**
- Remember: **Check the 6 Rights of Medication Administration** three times before you administer insulin:
  - 1. At the start of set-up.
  - 2. During set-up.
  - 3. After you have the dose in the syringe or pen.
- Needles and syringes should NEVER be used more than once or used on more than once individual

**Insulin pens are preloaded with insulin. There are two types:**

**Disposable pens** that come filled with insulin. You throw the pen away when it is empty or expired.

**Reusable pens** where you replace the cartridge of insulin. You replace the cartridge when the insulin is used up or expired.

- A new disposable pen needle should be tightened on the insulin pen before each use to prevent infection.
- Insulin pens or their cartridges may contain a single type of insulin, or they may contain two types of insulin “pre-mixed” together. All pens will come with prescription label and an additional medication label on the pen cartridge.
- Always defer to the delegating RN and or pharmacist for correct information regarding “discard by” dates. So be sure to write discard date on pen and throw the disposable pen or cartridge for the reusable pen away by discard date.
- New or unused pens need to be stored in the refrigerator. Once in use, pens must be stored at room temperature. **Insulin pens in use must NOT be stored in the refrigerator.**
- Insulin pens must be primed before they can be used. Priming means testing the pen by injecting a small sample of insulin into the air—usually two units. Priming has two purposes:
  - It tells you that the pen is working (insulin comes out when you push the injection button).
  - It removes air that may be in the cartridge and needle.
- Instead of using a plunger, insulin pens use a dose knob that you turn to prepare a dose of insulin. The dose usually appears as a number—such as “10”—in a dosage window to indicate how many units of insulin will be injected.
- Many types of insulin pens instruct you to push the injection knob in and hold for 10 seconds when you are injecting insulin.
- Pen needles come in many lengths: micro, mini, short, and original.
- If you use short or rapid-acting insulin, it should look clear. Do not use clear insulin if it has crystals or discoloration.
- Short or rapid acting insulin brands are:
  - Glulisine (Apidra)
    - Lispro (Humalog)
    - Aspart (NovoLog)
    - Regular (Novolin)
- Long-acting insulin should look cloudy and white. Do not use cloudy insulin if the insulin is discolored or has pieces or clumps stuck to the sides of the vial, cartridge or disposable pen.
- Nursing assistants and home care aides are not allowed to administer insulin through insulin pumps under nurse delegation.
- Nursing assistants and home care aides are allowed to administer inhaled insulin under nurse delegation.
  - Inhaled insulin is used as a mealtime insulin.
  - Cartridges come in 3 doses: 4 units (blue) per cartridge, 8 units (green) per cartridge, and 12 units (yellow) per cartridge.
  - Cartridges should be at room temperature for 10 minutes prior to use.
  - Cartridges NOT in use should be refrigerated and may be used until the expiration date.

- Cartridges in use can be stored at room temperature but must be used within 10 days. Write this discard date on the box.
- An open strip of three cartridges must be used in 3 days. Write this discard date on the strip.
- Use 1 inhaler at a time and replace inhaler every 15 days or as ordered by medical provider.
- Monitor for hypoglycemia.
- Immediately place used needles and other sharps in a sharps disposal container to reduce the risk of needle-sticks, cuts, or punctures from loose sharps.
- Use an FDA-cleared sharps disposal container, if possible. If an FDA-cleared container isn't available, some organizations and community guidelines recommend using a heavy-duty plastic household container (i.e. laundry detergent container) as an alternative.
- Insulin and other injected diabetes medications are meant to be delivered into the fat layer just under the skin. If you inject the insulin deeper into the muscle, it will be absorbed too quickly, it might not last as long, and the injection is usually more painful. This can lead to low blood glucose levels.
- To inject insulin into the subcutaneous tissue, the needle is usually inserted at a 90° angle into a fold of skin.
- Some older or very thin clients may have a thinner epidermal layer, and less subcutaneous fat. To adjust for older or very thin clients, injections are sometimes given at a 45° angle. This angle keeps the needle from going too deeply and hitting the muscles or nerves below.
- Injecting insulin into the same spot repeatedly can cause a breakdown or inflammation of the fat tissue, known as lipodystrophy. This causes a dimpling or hardness in the skin. These areas tend to have less blood flow, so insulin doesn't absorb correctly, if at all.
- Rotating injection sites evenly over large skin areas will help prevent lipodystrophy and allows for consistent absorption and action.
- Abdomen, upper arms and outer thighs are the most common injection sites.
- You'll also want to avoid areas around scars, moles, or skin blemishes. These can interfere with the way insulin is absorbed. Stay clear of broken blood vessels and varicose veins as well.
- Same general location at the same time each day.
- Rotate within each injection site.
- the abdomen is generally the "fastest" site for insulin to absorb, followed by the backs of the upper arms, outer sides of the thighs, and the upper buttocks or hips.
- Do not inject close to the belly button. The tissue there is tougher, so the insulin absorption will not be as consistent.
- If you inject in the upper arm, use only the outer back area (where the most fat is).
- If you inject in the thigh, stay away from the inner thighs.
- Do not inject in an area that will be exercised soon. Exercising increases blood flow, which causes long-acting insulin to be absorbed at a faster rate.

### Study and learn the job aids:

- Skills Competency Checklist for Insulin by Syringe
- Skills Competency Checklist for Insulin by Pen

### General Tips and Safety Measures Insulin:

- Before using, check the insulin to make sure it is clear. Do not use if the insulin is:
  - Beyond its expiration date
  - Unclear, discolored, or cloudy (Note that certain insulin [NPH or N] is expected to be cloudy after you mix it)
  - Crystallized or has small lumps or particles
  - Frozen
  - Viscous
  - Bad smelling
  - The rubber stopper is dry and cracked
- Don't use bottled insulin past the expiration date printed on the label.
- Write the date that you opened the bottle on the bottle's label and write the expiration date.
- Discard by expiration date. Refer to manufacturer guide, pharmacist, or delegating RN for information regarding expiration dates.

### Syringe and Needle Pen Safety

- **Inserting the needle:** Faster is better, inserting slowly will cause more pain. Try inserting the needle almost like you would toss a dart.
- **Remove the needle by pulling straight out.** Twisting or shifting the needle's position will cause pain. You may gently press on the injection site with your finger for a couple seconds. Do not rub or massage the skin where the insulin is injected; it can affect how fast the insulin is absorbed and acts within the body.
- **Do not reuse syringes.**
- **Do not recap needles.**
- **Dispose of in a sharps container immediately following use.**

# Module 3 Practice Test and Answer Key:

## Section 1:

Read each statement or question carefully. Select the best answer from the options listed. Knowing how to give an insulin injection safely is critical. For each item below, mark either an “S” for “safe” or “U” for “unsafe

1. \_\_\_\_ a. Always use an insulin syringe to administer insulin.
- \_\_\_\_ b. Touching the needle of a syringe helps you to remove its cap.
- \_\_\_\_ c. To measure the amount of insulin in a syringe accurately, hold the syringe at eye level.
- \_\_\_\_ d. Clean the rubber top of the insulin vial each time before you use it.
- \_\_\_\_ e. Inject insulin into the fatty subcutaneous tissue.
- \_\_\_\_ f. When giving an injection, choose an area on this skin that is free from irregularities such as cuts and scrapes.
- \_\_\_\_ g. Rubbing and massaging the skin after an insulin injection is safe.
- \_\_\_\_ h. If you notice odd changes in the client’s skin after an injection, you should contact your delegating RN.
- \_\_\_\_ i. If your client skips his afternoon snack and dinner, he can probably take his usual dose of insulin safely

## Section 2 – True or False:

Read each statement carefully. Indicate the best answer by circling “True” if the statement is true or “False” if the statement is false. There will only be one best answer.

2. Standard insulin vials and syringes are both marked with U-50 to show that they match.
  - a. True
  - b. False
3. After giving an insulin injection, immediately put the used syringe into the Sharps container.
  - a. True
  - b. False



4. Insulin syringes and needles can be reused.
  - a. True
  - b. False
5. Unopened insulin should be stored in the refrigerator.
  - a. True
  - b. False
6. Insulin pens should be kept in the freezer.
  - a. True
  - b. False

### Section 3 – Multiple Choice:

Read each statement or question carefully. Select the best answer from the options listed.

7. For adults or those with good fatty tissue, insert needle at a \_\_\_\_\_ angle. For thin adults, you may need to inject at a \_\_\_\_\_ angle.
  - a. 30 degree; 60 degree
  - b. 90 degree; 45 degree
  - c. 80 degree; 20 degree
  - d. 15 degree; 75 degree
8. Which of the following factor may affect absorption of insulin:
  - a. Scar tissue
  - b. Type of gloves worn
  - c. Whether or not alcohol was used on the injection site
  - d. What the client had for lunch

9. Name two common sites, on the body, where insulin can be injected:  
\_\_\_\_\_ and \_\_\_\_\_.

- a. Abdomen and upper arms
- b. Abdomen and lower arms
- c. Upper arms and calves
- d. Upper arms and lower arms

10. Which of the following is true regarding injection via insulin pen.

- a. Click the pen dial to the ordered amount of insulin
- b. Must keep needle in resident for 10 seconds after insulin administration
- c. Insert pen at a 90-degree angle into the skin
- d. All of the above

**Answer Key:** *Use this Answer Key to check your answers.*

1. S a. Always use an insulin syringe to administer insulin. (see pages 79-88)  
U b. Touching the needle of a syringe helps you to remove its cap.  
S c. To measure the amount of insulin in a syringe accurately, hold the syringe at eye level.  
S d. Clean the rubber top of the insulin vial each time before you use it.  
S e. Inject insulin into the fatty subcutaneous tissue.  
S f. When giving an injection, choose an area on this skin that is free from irregularities such as cuts and scrapes.  
U g. Rubbing and massaging the skin after an insulin injection is safe.  
S h. If you notice odd changes in the client's skin after an injection, you should contact your delegating RN.  
U i. If your client skips his afternoon snack and dinner, he can probably take his usual dose of insulin safely.
2. b. False(see page 82) Standard insulin vials and syringes are both marked with U-100 to show that they match. U-100 means that the insulin and the syringe are both made so one millimeter of insulin=100 unit of insulin.
3. a. True (see page 91) Immediately place used needles and other sharps in a sharps disposal container to reduce the risk of needle-sticks, cuts, or punctures from loose sharps.
4. b. False – Insulin syringes and needles should never be reused. (see page 84)
5. a. True (see page 96) Once you have started using a vial of insulin, it can be kept at room temperature for 28 days. Remember to write discard date on vial
6. b. False - Keep insulin pens refrigerated until you open it; after that, you can store it at room temperature. (see page 87)
7. b. 90 degree; 45 degree (see page 101)
8. a. Scar tissue (see page 100)
9. a. Abdomen and upper arms (see page 94)
10. d. All of the above (see page 87)



*Job Aids*

# Module 1 Job Aid:

## Hyperglycemia

### What is Hyperglycemia?

Hyperglycemia or high blood sugar means that your client's blood sugar is out of their target range and at an unsafe level.

This range is typically You The client may or may not have symptoms.

#### Causes:

- Skipping a dose of insulin or diabetes medication
- Eating more than usual
- Less activity than usual
- Stress from illness, such as a cold or flu
- Emotional stress such as familial conflicts or finances
- Medications such as steroids
- Dawn phenomenon (a surge of hormones that the body produces daily around 4:00 a.m. to 5:00 a.m.).



#### Symptoms:

- Extreme thirst or hunger
- Need to urinate more than usual
- Sleepiness
- Blurry vision
- Slow-healing infections or injuries

Healthcare facilities should have specific policies and procedures related to insulin administration and emergency response related to hyperglycemia / hypoglycemia episodes. Also, the medical provider's orders related to insulin administration, blood glucose levels and treatment parameters should be available and followed. These policies, procedures or medical provider's orders should include instructions for blood glucose above or below a certain level, and action for any changes in the client condition. The caregiver must be aware of what action should be taken in an emergency situation and needs to understand the nurse delegator must be notified immediately and the nurse's instruction followed.

## **Treatment:**

The best way to avoid high blood sugar is for the client to follow their medical provider's guidance in managing their diabetes. If their blood sugar remains higher than their target range, follow these steps:

- Check their blood sugar as ordered. Monitor for signs and symptoms of hyperglycemia.
- Only give extra insulin if the client's medical provider has ordered it or the nurse delegator has delegated it.
- Encourage the client to drink plenty of water and stay hydrated.
- Follow the medical provider's orders regarding blood sugar monitoring and follow-up.

## **Notify the delegating RN if:**

- The client's blood sugar is more than 300 mg/dL for two readings or follow the individual client's plan and/or the employer's/facility protocol.
- Their blood sugar is consistently higher than their target range after treatment to try and bring it down.
- They start vomiting and cannot keep fluids down.

**Call 911.**

## **Need to Know for Long Term Care Worker**

- How and when to check blood sugar
- If unconscious, do not give anything by mouth
- Give insulin as prescribed by the client's medical provider
- Client's sick day plan of one is available
- When to call 911

# Hypoglycemia

## What is hypoglycemia?

People living with type 1 or type 2 diabetes may experience hypoglycemia, which is when their blood sugar reaches a low level, usually 70mg/dL or below.

Hypoglycemia can be due to:

- Meals or snacks that are too small, delayed or skipped
- Increased physical activity
- Drinking alcoholic beverages
- Certain medications, including insulin
- Taking too much insulin or eating too few carbohydrates at meals



## Symptoms

### Mild

Feeling shaky and/or sweaty  
Nausea  
Extreme hunger  
Not able to think clearly  
Heart pounding or racing  
Blurred vision  
Having no energy  
Feeling “not right”

### Moderate

Difficulty moving  
Confusion  
Unusual behavior  
Irritable  
Combative

### Severe

Seizure  
Convulsions  
Coma  
Unresponsive  
Unconscious



# Treatment

Remember the “Rule of 15”:

1. Check blood sugar level if a meter is available. If no meter is available and the person has symptoms, assume you need to treat them for hypoglycemia. If blood glucose is:
  - Less than 70 mg/dL: Treat with 15 grams of carbohydrate.
  - Less than 50 mg/dL: Treat with 30 grams of carbohydrate.
2. Stay with the person and wait 15 minutes, then recheck blood sugar.
3. If blood glucose level is still less than 70 mg/dL, repeat treatment. Keep repeating until blood sugar is above 70 mg/d.
4. If your employer/facility has specific protocol, follow that. If the client has specific orders or a plan for hypoglycemia, follow that.
5. Once blood glucose returns to recommended range above 70, give client a small snack with protein and carbohydrate if next meal is more than 1 hour away. This snack could be a slice of cheese and 4 to 6 crackers or a small peanut butter sandwich.
6. Stay with the person if possible and notify the delegating RN (also follow your agency policy and notify others as required).



**If the person becomes unconscious, call for emergency help (dial 911).**

## Examples of 15 grams simple fast acting carbohydrates:

- 4 ounces of fruit juice
- 3- 4 glucose tablets (see label instructions)
- ½ can of regular soda (not diet)
- 1 tube of glucose gel (see label instructions)
- 3-4 pieces hard candy, jellybeans or gumdrops (see label instructions)
- 1 tablespoon of sugar, honey, or corn syrup



## Prevention:

- Take diabetes medication as prescribed
- Eat regular meals and snacks. Don't skip meals.
- Monitor blood sugar as directed.
- Limit alcohol intake.
- Checking blood sugar levels more often, if ordered, especially in conditions that caused low blood sugar in the past.

Many people tend to want to eat as much as they can until they feel better. This can cause blood sugar levels to shoot way up. Using the stepwise approach of the “15-15 Rule” can help you avoid this, preventing high blood sugar levels.

# Module 2 Job Aid: Information About Insulin

## Information to Know About Prescribed Insulin

To work safely with prescribed insulin, knowing this information will keep you and your client safe.

Appearance	
Do's	Don't's
<ul style="list-style-type: none"><li>• <b>Do</b> know that insulin is either clear or cloudy.</li><li>• <b>Do</b> know what the client's insulin normally looks like.</li><li>• <b>Do</b> use a new container of insulin if the client's current insulin looks discolored or unusual in any way.</li></ul>	<ul style="list-style-type: none"><li>• <b>Don't</b> use insulin that is yellow or discolored in any way.</li><li>• <b>Don't</b> use insulin if it has unusual particles in it.</li><li>• <b>Don't</b> use insulin if its vial or container has frost on it or if it appears frozen.</li></ul>

Expiration Dates	
Do's	Don't's
<ul style="list-style-type: none"><li>• <b>Do</b> date and initial the insulin container when you first open it, and identify the date to discard. Refer to manufacturer guide/ website, pharmacist and/or delegating RN for most up-to-date information regarding discard dates. Use permanent ink).</li><li>• <b>Do</b> check at each use to see that insulin has not expired.</li><li>• <b>Do</b> use insulin for a maximum of 28 days, unless otherwise directed by pharmacist/ delegating RN, after its first use (unless it has expired).</li></ul>	<ul style="list-style-type: none"><li>• <b>Don't</b> ever use insulin that has expired.</li><li>• <b>Don't</b> use insulin that has been opened past its discard date.</li></ul>

## Storage

### Do's

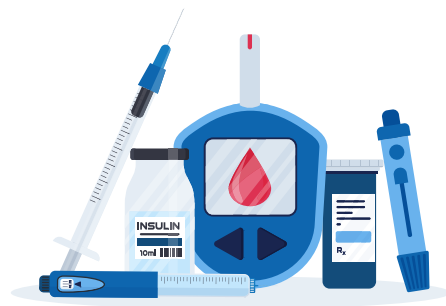
- **Do** store unopened, unused insulin vials in the refrigerator.
- **Do** store vials in use in the refrigerator or at room temperature
- **Do** keep insulin pens refrigerated until you open it; after that, you can store it at room temperature.
- **Do** keep an extra vial, pen, or pen cartridge available at all times.
- **Do** store enough insulin and supplies for 2 weeks ahead in case of bad weather or unexpected conditions.

### Don't's

- **Don't** store in high temperatures or in direct sunlight:
  - Near a window on hot days.
  - Next to a stove or heat source.
  - In a parked car.
- **Don't** store in the freezer. Do not use insulin that has been frozen.
- **Don't** use insulin that is: Beyond its expiration date.
  - Unclear, discolored, or cloudy (unless expected to be cloudy)
  - Crystallized or has small lumps or particles.
  - Viscous.
  - Bad smelling.
  - If rubber stopper is dry and cracked.

## Additional information:

- The insulin you will be working with may come in:
  - Vials
  - Disposable insulin pens
  - Cartridges to load into re-useable insulin pens
  - Cartridges for inhaled insulin
- Check the prescription label as you verify the 6 Rights of Medication Administration three times before you administer insulin.



# Module 2 Job Aid: Insulin Action Chart

In Module 2, you learned that insulin has three characteristics:

- **Onset of action:** the point at which the insulin first starts to lower the blood glucose
- **Peak time:** this is when insulin is at its maximum strength in terms of lowering blood sugar.
- **Duration:** the period of time the insulin is lowering the glucose.

You also learned that insulin types are divided into these broad categories:

- Rapid-Acting
- Short-Acting
- Intermediate-Acting
- Long-Acting
- Pre-mixed/combined

You and the delegating RN can use the table and example below as a resource to help you understand insulin categories and action times and the client's insulin(s), specifically.

Types of Insulin and How They Work			
INSULIN TYPE	ONSET	PEAK TIME	DURATION
Rapid-acting	About 15 minutes after injection	1 hour	2 to 4 hours
Short-acting, also called regular	Within 30 minutes after injection	2 to 3 hours	3 to 6 hours
Intermediate-acting	2 to 4 hours after injection	4 to 12 hours	12 to 18 hours
Long-acting	Several hours after injection	Does not peak	24 hours; some last longer
Ultra long-acting	6 hours after injection	Does not peak	36 hours or longer
Pre-mixed/Fixed Combination	5 mins to 60 mins after injection; most are within 5-15 minutes	Dual	10-16 hours

Let's use the Insulin Table to consider an example. If the client gets an injection of Short-Acting insulin at noon, then you know the insulin will:

- Start to lower your client's blood sugar by 12:30pm.
- Be working its hardest to lower blood sugar between 2-3pm.
- Stop lowering the client's blood sugar between 3-6pm.

In this example, you know the client's insulin will be working between 12:30-6pm and to observe for symptoms of insulin-related low blood sugar (hypoglycemia) during this time. You also know that the client is at greatest risk for insulin-related low blood sugar between 2-3pm. Now you can be sure to observe carefully for symptoms of low blood sugar during this time.

**Knowing the category and action time of the insulin(s) you use is a basic safety step that will help you to recognize and respond to low blood sugar before it becomes a medical emergency.**



Expiration Date of Insulin Products			
INSULIN VIALS	Expiration when Unopened, and stored in the Refrigerator	Expiration when Opened, stored at Room Temp (up to 86 F)	Storage of Opened Vial Special Instructions
<b>Rapid-Acting Insulin</b>			
Novolog (Aspart)	Expiration date on the label	28 days	May refrigerate or store at room temperature.
Humalog (Lispro)	Expiration date on the label	28 days	May refrigerate or store at room temperature.
Glulisine (Apidra)	Expiration date on the label	28 days	May refrigerate or store at room temperature
<b>Short-Acting Insulin</b>			
Regular (Humulin R Regular)	Expiration date on the label	31 days	Store in a cool place
Regular (Novolin R)	Expiration date on the label	42 days	Store in a cool place (below 25 degrees C [77 degrees F]); do not refrigerate.
Humulin R U-500	Expiration date on the label	40 days	May refrigerate or store at room temperature
<b>Intermediate-Acting Insulin (NPH)</b>			
Humulin N	Expiration date on the label	31 days	May refrigerate or store at room temperature
Novolin N	Expiration date on the label	42 days	Store at room temperature; do not refrigerate.

*(continued on next page)*

Expiration Date of Insulin Products <i>(continued)</i>			
INSULIN VIALS	Expiration when Unopened, and stored in the Refrigerator	Expiration when Opened, stored at Room Temp (up to 86 F)	Storage of Opened Vial Special Instructions
<b>Pre-Mixed Insulin</b>			
Humulin 70/30	Expiration date on the label	31 days	May refrigerate or store at room temperature
Novolin 70/30	Expiration date on the label	42 days	Store at room temperature; do not refrigerate.
Humalog 75/25	Expiration date on the label	28 days	May refrigerate or store at room temperature
Novolog 70/30aa	Expiration date on the label	28 days	May refrigerate or store at room temperature
<b>Long-Acting Insulin</b>			
Glargine (Lantus)	Expiration date on the label	28 days	May refrigerate or store at room temperature
Detemir (Levemir)	Expiration date on the label	42 days	May refrigerate or store at room temperature

*(continued on next page)*



Expiration Date of Insulin Products			
INSULIN PENS	Expiration when Unopened, and stored in the Refrigerator	Expiration when Opened, at Room or Refrigerator Temperature	Unopened at Room Temperature
Rapid-Acting Insulin			
Humalog KwikPen (lispro)	Expiration date on the label	28 days Do not refrigerate	28 days
Novolog FlexPen (aspart)	Expiration date on the label	28 days Do not refrigerate	28 days
NovoPen Echo (aspart)	Expiration date on the label	28 days Do not refrigerate	28 days
Apidra Solostar (glulisine)	Expiration date on the label	28 days Do not refrigerate	28 days
Apidra OptiClik	Expiration date on the label	28 days Do not refrigerate	28 days
Humulin R U-500 KwikPen		28 days Do not refrigerate	28 days
Intermediate-Acting Insulin (NPH)			
Humulin N pen	Expiration date on the label	14 days Do not refrigerate	14 days
Novolin N pen	Expiration date on the label	14 days Do not refrigerate	14 days

*(continued on next page)*

Expiration Date of Insulin Products			
INSULIN PENS	Expiration when Unopened, and stored in the Refrigerator	Expiration when Opened, at Room or Refrigerator Temperature	Unopened at Room Temperature
<b>Long-Acting Insulin</b> <i>(continued)</i>			
Lantus SoloStar	Expiration date on the label	28 days Do not refrigerate	28 days
Lantus OptiClik	Expiration date on the label	28 days Do not refrigerate	28 days
Levemir Flex Pen	Expiration date on the label	42 days Do not refrigerate	42 days
Novolog Mix 70/30 Flexpen	Expiration date on the label	14 days Do not refrigerate	14 days
Tresiba Flextouch Pen (degludec)	Expiration date on the label	56 days Do not refrigerate	56 days
Toujeo (glargine)	Expiration date on the label	42 days Do not refrigerate	42 days
Baslaglar	Expiration date on the label	28 days Do not refrigerate	28 days
<b>Pre-Mixed Insulin</b>			
Humalog Mix KwikPen 50/50	Expiration date on the label	10 days Do not refrigerate	10 days
Humalog Mix 75/25 KwikPen	Expiration date on the label	10 days Do not refrigerate	10 days
Humulin 70/30 Pen	Expiration date on the label	10 days Do not refrigerate	10 days
Ryzodeg 7030	Expiration date on the label	28 days Do not refrigerate	28 days

*(continued on next page)*

Expiration Date of Miscellaneous Non-Insulin Injectables		
GLP-PENS	Expiration Upon Opening or Removing from Refrigerator	Storage of Opened Pen Special Instructions
Byetta (exenatide)	30 days	After first use, the Byetta Pen injector can be kept at a temperature not to exceed 77 degrees F.
Trulicity (dulaglutide)	Single use pens. If needed, a single pen may be stored at room temperature not to exceed 86 degrees F for up to 14 days.	Single-use pens. Store under refrigeration until use.
Victoza (liraglutide)	30 days	Store pens that are in use at 59 to 86 degrees F or in a refrigerator at 36 to 46 degrees F. If exposed to temperatures above 86 degrees F, throw the pen away.
Adlyxin (Lixisenatide)	14 days	The pen should be protected from light and kept in its original packaging. Discard pen 14 days after its first use.
Ozempic (semaglutide)	56 days	The open pen can be stored for 56 days below 86 degrees F or in a refrigerator at 36 to 46 degrees F
Bydureon (exenatide)	28 days	28 days
Tanzeum (albiglutide)	28 days	28 days
AMYLIN ANALOGS	Unused pens, refrigerated	Used pens, refrigerated or room temp
Symlin pen (pramlintide)	Good until expiration date	Good for 30 days
Symlin (pramlintide)	Good until expiration date	Good for 30 days

(continued on next page)

Expiration Date of Miscellaneous Non-Insulin Injectables		
MIXED LONG ACTING INSULIN/INCRETIN MIMETICS	Opened at Room or Refrigerator Temperature	Storage of Opened Pen Special Instructions
Soliqua (glargine/lixisenatide)	28 days Do not refrigerate	28 days Do not store unopened at room temp
Xultophy (degludec/liraglutide)	21 days	21 days Do not store unopened at room temp

This is the most up-to-date information as of February 2023, however this information is subject to change as new products are released on the market. Always refer to the manufacturer and/or pharmacist for the most up-to-date information regarding expiration dates.

#### References:

1. DiabetesinControl.com, Stability of Common Insulins. Accessed February 2023.
2. Diabetes Education Services – DiabetesEd.net, Insulin Storage and Dispensing Info. Accessed February 2023.
3. <https://www.hdrxservices.com>, Insulin-Expiration-Dates-an-Update. Accessed February 2023.

# Module 3 Job Aid:

## How to Mix 2 Types of Insulin

When mixed insulin doses are not already pre-mixed, they need to be mixed manually in one syringe. Mixing insulins manually requires extra steps that must be completed in a specific order.

The main difference between administering a single type of insulin and a mixed dose of insulin is how you prepare the syringe. Once the syringe is prepared, the steps for giving the injection are the same for a single type of insulin or a mixed dose.

The steps below show how to prepare the syringe differently with two types of insulin instead of one.

Follow the other steps of the insulin administration process as you have already learned them.

**Purpose of mixing insulin:** To prevent having to give the patient two separate injections (hence better for the patient).

Most commonly ordered insulin that are mixed: NPH (intermediate-acting) and Regular insulin (short-acting).

### Step 1:

- Check the doctor's order and that you have the correct medication:
- Perform hand hygiene. Put on gloves.

### Step 2:

- Roll the “cloudy” insulin vial in between the palms of the hands to mix the ingredients because if you don't mix the contents, it can alter how much cloudy insulin you are actually drawing up.
- Never shake a bottle of insulin because this will cause air bubbles cloudy insulin aside.



### Step 3:

- Wipe the top of both the insulin bottles with an alcohol swab



#### Step 4: You always inject air into the vial of the slower acting insulin first

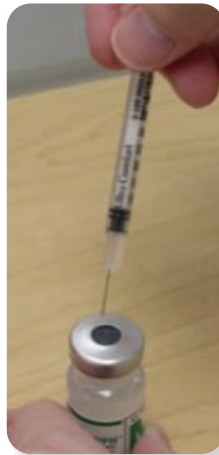
- Pull the plunger down to let \_\_\_\_\_ units of air in your syringe.
- You need air in the syringe equal to the amount of cloudy insulin you will take

#### Step 5:

- Push the needle through the rubber top of the cloudy insulin bottle.

#### Step 6:

- Push the air into the cloudy insulin bottle.
- Pull the needle out of the cloudy insulin bottle. You are not going to draw out any of the cloudy insulin yet.



#### Step 7:

- Pull the plunger down to let \_\_\_\_\_ units of air into your syringe.
- You need air in the syringe equal to the amount of clear insulin you will take.



### Step 8:

- Push the needle through the center of the rubber top of the clear insulin bottle.

### Step 9:

- Push the air into the clear insulin bottle.
- Do not pull the needle out of the bottle.

### Step 10:

- Turn the insulin bottle and syringe upside down

### Step 11:

- Slowly pull down on the plunger to get \_\_\_\_\_ units of clear insulin into the syringe.
- Pull slowly to avoid getting air bubbles in the syringe.
- Air bubbles mean that you will get less insulin.



### Step 12:

- Look for air bubbles in your syringe.
- If you have air bubbles, push the insulin back into the bottle and start from step 11.
- Check your syringe to make sure that you have \_\_\_\_\_ units of clear insulin and no air bubbles.
- Pull the needle out of the clear insulin bottle.

### Step 13:

- Push the needle through the center of the rubber top of the cloudy insulin bottle.
- Turn the bottle upside down.



### Step 14:

- Slowly pull down the plunger to get the total \_\_\_\_\_ units you need.
- Be sure you have the right number of units because you cannot push any insulin back into the bottle.
- Now you should have in the syringe:

\_\_\_\_\_ units of clear

+ \_\_\_\_\_ units of cloudy

= \_\_\_\_\_ total units.

- Pull the syringe out of the bottle.

You now have a mixed dose of insulin in one syringe and can proceed with the standard steps for injection, documentation, and observation of side effects.



**The steps for mixed doses must be followed in the correct order. Specifically, air must be injected into the vial of the slower-acting insulin first and the faster-acting insulin must be drawn into the syringe first.**

Important Points to Keep in Mind:

- Never mix Insulin Glargine “Lantus” with any other type of insulin.
- Administer the dose within 5 to 10 minutes after drawing up because the regular insulin binds to the NPH and this decreases its action.

**Key Concept for Mixing Insulin: Draw up CLEAR TO CLOUDY**

# Module 3 Job Aid: Insulin Administration with Vials and Syringes

## Prepare Insulin Injection

Perform hand hygiene and put on gloves.



### Inspect the insulin vial:

- Be sure that the insulin has not expired. Never use expired insulin. Refer to manufacturer, pharmacist or delegating RN for expiration dates.
- When opening an insulin bottle for the first time, record the date and your initials in permanent ink on the vial label.
- Be sure that the insulin appears as it normally should (clear or cloudy type). If the insulin appears unusual in any way (discolored, floating particles, frost on bottle), do not use the vial. Open a new one.

### If long-acting insulin is used, gently roll the insulin vial between palms to mix the insulin

- Roll the bottle back and forth approximately 15-20 times.
- DO NOT shake the vial of insulin.
- Turn the vial over to make sure no powder is left on the bottom. Observe for clumps and do not use the insulin if clumps are present.



### Wipe the top of the insulin vial with alcohol and allow to air dry

- Use a sterile alcohol wipe to clean the rubber lid of the vial.
- Use a circular motion from the center of the lid outward.
- Wait for the alcohol to dry completely.
- For a new vial, remove the protective cap from the rubber lid before cleaning.



### Uncap the needle of the syringe:

- Once you determine that you have a U-100 insulin syringe with an orange cap, remove the cap.
- Do not touch the needle. If you do, put the syringe into the sharps container and start over with a new one.





**Pull the plunger down on the syringe to pull air into the syringe to a mark equal to the amount of insulin that will be drawn out of the vial**

**Inject drawn air into the vial:**

- With the vial on the table, insert the needle of the syringe into the center of the rubber lid.
- Then push the plunger down so that the air in the syringe is injected into the vial.



**Turn the insulin vial upside down and pull the plunger down slowly to fill the syringe with the correct number of units ordered:**



- With the needle of the syringe still in the vial, turn the insulin vial and syringe upside-down.
- Be sure the end of the needle is covered by insulin. This will prevent air bubbles from being drawn into the syringe.
- The end of the needle will need to be covered by insulin the whole-time insulin is being drawn into the syringe.

**Pull the plunger back to the correct # of insulin units:**

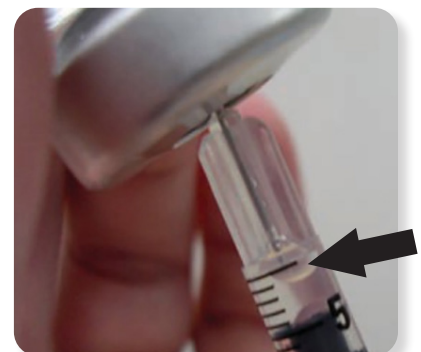
- Hold the syringe with the plunger at eye level to see accurately the number of units you have drawn up.
- Check the syringe to make sure the number of units in the syringe is correct; if not, repeat above two steps until the correct amount of insulin is in the syringe.



30 units of insulin ordered = insulin drawn into the syringe to the 30-unit mark.

**Look for air bubbles in the syringe:**

- Air bubbles take up space where insulin should be and, so, can cause you to measure the wrong dose of insulin.
- If you see an air bubble, use the plunger to push the insulin back into the bottle and then fill the syringe again to the correct number of insulin units. Repeat until the syringe is free of bubbles.



### Remove the needle from the vial:

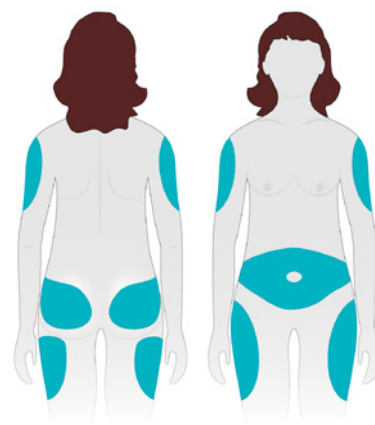
- Remove the needle from the vial and put the syringe down.
- Make sure the needle does not touch anything and that it is not bent.
- If the needle touches anything or is bent, put the syringe in the sharps container and begin again.



## Administer Insulin Injection

### Identify appropriate injection sites to administer insulin

- You can inject insulin into the abdomen, upper arm, buttocks, hip, or the front or side of the thigh.
- Remember, insulin works fastest when it is injected into the abdomen.
- Do not inject insulin within 2 inches of the belly button or into any stretch marks, wounds, bruises or scars.



### Rotate injection sites.

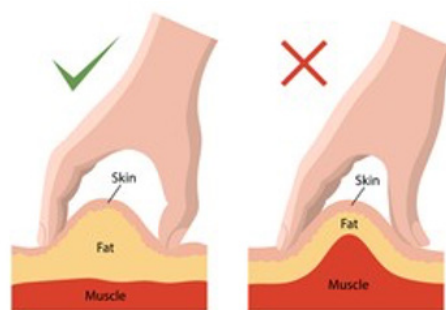
- For example, inject insulin into different areas in the abdomen. Insulin injected into the same area can cause lumps, swelling, or thickened skin.

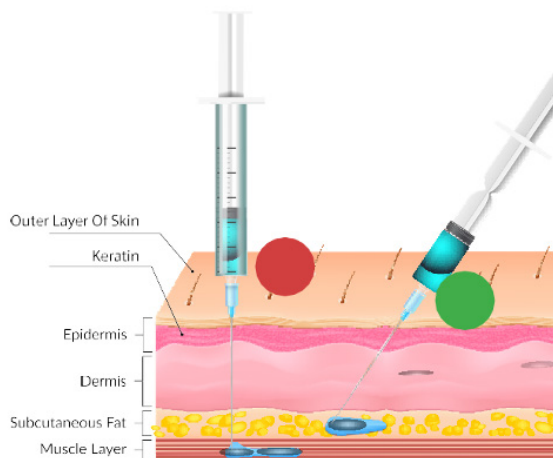
### Clean the skin:

- Clean the skin of the injection site with a sterile alcohol wipe.
- Wait a few seconds for the skin to dry completely.

### With the nondominant hand, gently pinch skin of chosen injection site and with the dominant hand insert the needle into the skin at a 45-to-90-degree angle:

- While holding the syringe in place, release the fold of skin before injecting the insulin.
- Push the plunger all the way down using a firm and smooth motion.
- Count to 5 slowly.





## Remove the needle by pulling the needle straight out

- Press on injection site for 5 to 10 seconds. Do not rub. This will keep insulin from leaking out.

## Dispose into a sharps container immediately and DO NOT re-cap the needle



## Remove gloves and perform hand hygiene

## Document the insulin administration, dose and time

### How can I decrease pain when I inject insulin?

- Inject insulin at room temperature. If the insulin has been stored in the refrigerator, remove it 30 minutes before you inject it.
- Remove all air bubbles from the syringe before the injection.
- When cleaning skin with an alcohol pad, wait until it has dried before you inject insulin.
- Tell client to relax the muscles at the injection site.
- Do not change the direction of the needle during insertion or removal.

### Other Tips:

- Don't forget to check 6 Rights of Medication Administration 3 times during this process
- Observe the Client for Side Effects.
  - Based on the instructions from the delegating RN and the client's individualized care plan.
  - Observe for symptoms of low blood sugar and respond according to the client's individualized plan.
  - Notify your delegating RN about any negative side effects or status changes. Some examples include low blood sugar episodes or skin changes, or problems related to injection sites.
  - **Call 911 for emergency situations.** For example, low blood sugar when the client is not conscious or alert enough to swallow a sugar source such as juice or candy



# Module 3 Job Aid:

## Skills Checklist for Insulin Administration with a Syringe

Insulin Administration with Vial/Syringe	
Supplies Needed	
<input type="checkbox"/>	Insulin syringe
<input type="checkbox"/>	Medication-Insulin vial
<input type="checkbox"/>	Gloves
<input type="checkbox"/>	Alcohol wipe
<input type="checkbox"/>	Sharps container or disposal plan
Insulin Administration Steps	
<input type="checkbox"/>	1. Check/verify the signed order for insulin administration and Blood Sugar (BS) checks <ol style="list-style-type: none"><li>Check Blood Sugar per signed order, record on facility document prior to insulin administration and notify designated staff per facility policy if out of range prior to administering insulin</li><li>Demonstrate specialized infection control measures associated with equipment used for glucose meters, and sharps container.</li></ol>
<input type="checkbox"/>	2. Gather supplies (Insulin vial, insulin syringe, gloves, alcohol wipe)
<input type="checkbox"/>	3. Check 6 Rights of medication administration <ul style="list-style-type: none"><li>• <b>Right client</b></li><li>• <b>Right time</b></li><li>• <b>Right medication</b> by verifying that the name of the insulin on the container matches the MAR</li><li>• <b>Right dose</b> on the medication label matches the MAR</li><li>• <b>Right route</b> of the medication as identified on the MAR</li><li>• <b>Right documentation</b></li></ul>



### Insulin Administration Steps (continued)

- ☐ 4. Check insulin expiration date and appearance-clear, colorless and free of clumps.
  - **REMEMBER:** medication vials should always be entered with a new needle and new syringe; and never re-use needles/syringes to re-enter a medication vial or solution
  - **REMEMBER:** unopened insulin should be refrigerated and after opened kept at room temperature (below 86 degrees Fahrenheit)
  - **REMEMBER:** different types of insulin are either long or short acting and have different peak and duration of action
  - **VERBALIZE** the specific type of insulin ordered for this client including the action onset, peak time, and duration of action
  - **VERBALIZE** any special considerations for the specific type of insulin ordered for this client i.e. administer with meals, requires a bedtime snack, only administer for Blood Sugar above a specific parameter, etc.
- ☐ 5. Perform hand hygiene and don gloves
- ☐ 6. Recheck 6 rights of medication administration.
- ☐ 7. If long-acting insulin is used, gently roll the insulin vial between palms to mix the insulin. DO NOT shake the vial of insulin; observe for clumps and do not use the insulin if clumps are present.
- ☐ 8. Wipe the top of the insulin vial with alcohol and allow to air dry.
- ☐ 9. Pull the plunger down on the syringe to pull air into the syringe to a mark equal to the amount of insulin that will be drawn out of the vial.
- ☐ 10. Push the needle into the vial and push the air into the insulin vial.
- ☐ 11. Turn the insulin vial upside down and pull the plunger down slowly to fill the syringe with the correct number of units ordered.
- ☐ 12. Look for air bubbles in the syringe while the needle is still inserted in the vial, tap the syringe to move the air bubbles to the top and slowly push the bubbles out of the syringe.

### Insulin Administration Steps (continued)

- ☐ 13. Check the syringe to make sure the number of units in the syringe is correct; if not, repeat steps #11 and #12 until the correct amount of insulin is in the syringe
- ☐ 14. Identify appropriate injection sites to administer insulin and verbalize the reasons to rotate sites
- ☐ 15. Choose a site, cleanse the skin with alcohol, and allow to air dry
- ☐ 16. With the nondominant hand, gently pinch skin of chosen injection site and with the dominant hand insert the needle into the skin at a 45-to-90-degree angle.
- ☐ 17. Release pinched skin, and push the plunger in to administer the insulin, count to 5 slowly
- ☐ 19. Remove the needle by pulling the needle straight out
- ☐ 19. Dispose into a sharps container immediately and DO NOT re-cap the needle
- ☐ 20. Remove gloves and perform hand hygiene
- ☐ 21. Document the insulin administration, dose and time and BS in appropriate place per facility protocol

### Signs/symptoms of high blood sugar (hyperglycemia):

Common symptoms of high blood sugar include fatigue, drowsiness, blurred vision, frequent urination, and extreme thirst. You need you know what to do (including immediate actions to take) and who to notify. If the client shows signs of high blood sugar test their blood sugar per medical order/protocol. Call 911 immediately if the client is semiconscious or non-responsive. Notify your supervisor and the delegating nurse as soon as possible after you have contacted emergency help.

### Signs/symptoms of low blood sugar (hypoglycemia):

Include irritability, personality changes, dizziness, weakness, fatigue, headache, confusion, slurred speech, cold sweaty skin, hunger, shakiness, blurred or double vision, loss of consciousness. You need to know what to do (including immediate actions to take) and who to notify.

- For low blood sugar less than 70, give 1/2 glass of juice or soda, 3-4 glucose tablets, or 5-7 lifesavers. Check blood sugar again in 15 minutes per client's individualized plan or per facility guidelines. If client alert, have them recheck their blood sugar. Repeat these steps until blood sugar is greater than 100. Once blood sugar is normal, give 1/2 of a sandwich of meat, peanut butter, or cheese. Protein helps stabilize blood sugar.

# Module 3 Job Aid: Insulin Administration with Pens

## Prepare a Pen for Injection

**Perform hand hygiene and put on gloves.**



## Inspect the insulin pen:

- New or unused pens need to be stored in the refrigerator. Remove a new pen from the refrigerator 30 minutes before you use it. Insulin should be injected at room temperature. Once in use, pens must be stored at room temperature. Insulin pens in use must NOT be stored in the refrigerator.
- Check the pen: Ensure that it contains the proper type of insulin and contains enough to cover the full dose.
- Check the expiration date. Refer to manufacturer, pharmacist, or delegating RN for expiration dates.
- When using a pen for the first time, record the date and your initials in permanent ink on the pen and the refill cartridges.

## Gently stir intermediate or premixed insulin:

- Turn the pen on its side and roll it between the palms of your hands. Clear (fast-acting, long-acting) insulin generally does not need to be mixed.
- Mix the insulin by gently rolling the pen between your hands 10 times and then tipping the pen up and down 10 times. The insulin should look evenly white and cloudy with no lumps or particles. Keep mixing it until you don't see any clumps.

## Remove the needle caps:

- Remove the outer cap and save it. Remove the inner cap and throw it away.

## Wipe the seal of the insulin pen with alcohol and allow to air dry:

- With a pen, there is no rubber vial top to clean. Instead, there is a rubber seal on the end of the pen. The rubber seal must be cleaned with a sterile alcohol wipe before a new needle is attached.
- Use a sterile alcohol wipe to clean the rubber seal of the pen.
- Wait for the alcohol to dry completely.



Rubber seal of an insulin pen

## Attach a new needle to pen:

- Insulin pens do not have needles attached to them the way syringes do. Instead, the pen has a protective cap that comes off so you can attach a new, sterile needle each time you inject insulin.
- Disposable needles for insulin pens come in plastic containers so that they remain sterile until use.
- Remove the tab from the needle. Do not remove the outer cap on the needle. Push the needle straight onto the pen. Turn the needle clockwise until you cannot turn it more. Make sure the needle is straight.



Insulin pen with cap on



Insulin pen with cap off

Sterile needles in plastic containers for an insulin pen



## Prime insulin pen:

- Priming means testing the pen by injecting a small sample of insulin into the air—usually two units.
- Priming has two purposes:
  - It tells you that the pen is working (insulin comes out when you push the injection button).
  - It removes air that may be in the cartridge and needle.
- Pointing the needle up in the air, dial one or two units on the pen. For most insulin pens, you will hear a click for each unit of insulin that you dial. Hold the pen and point the needle up.
- Gently tap the pen to move air bubbles to the top of the pen.
- Press the injection button. You should see a drop of insulin on the tip of the pen. If you do not see a drop, change the needle and repeat this step. If you do not see a drop after you repeat this step 3 times, use a new pen.

## Dial insulin dose:

- Instead of using a plunger, insulin pens use a DOSE KNOB that you turn to prepare a dose of insulin.
- The dose usually appears as a number—such as “10”—in a DOSAGE WINDOW to indicate how many units of insulin will be injected.



An insulin pen set to give 10 units insulin

# Delivering an Injection

## Identify appropriate injection sites to administer insulin

- You can inject insulin into the abdomen, upper arm, buttocks, hip, or the front or side of the thigh.
- Remember, insulin works fastest when it is injected into the abdomen.
- Do not inject insulin within 2 inches of the belly button or into any stretch marks, wounds, bruises or scars.

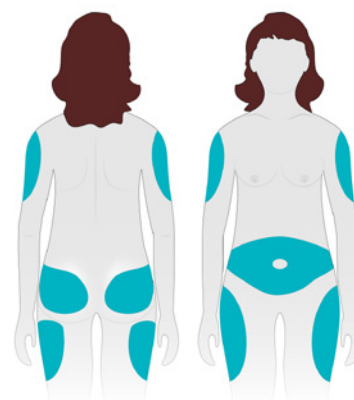
## Rotate injection sites

- Keep track of the injection site you use. Be sure to rotate (change) the injection sites with each injection. Within each injection site, always inject 1 to 2 inches (2.5 to 5 centimeters) away from the last place you injected. This can help you avoid soreness and scar tissue.
- Make sure to inject at least 2 inches (5 centimeters) away from any incisions (surgical cuts), scars, or stretch marks
- Don't inject into an area that's tender, red, bruised, or hard.

## Clean the skin:

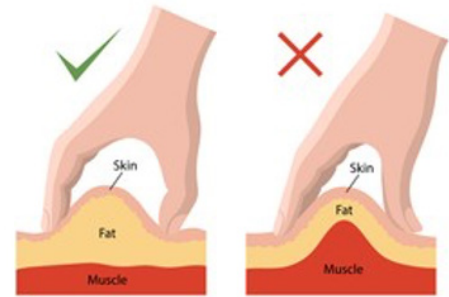
- Clean the skin of the injection site with a sterile alcohol wipe.
- Wait a few seconds for the skin to dry completely.

## Insulin Injection Sites



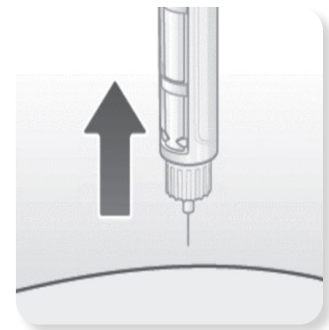
**With the nondominant hand, gently pinch skin of chosen injection site and with the dominant hand insert the needle into the skin at a 45-to-90-degree angle**

- Push injection button down at the end of the pen completely to inject insulin and wait 10 seconds, keeping the needle in place to ensure all insulin is injected.
- Quick stab. Slowly easing the needle into the skin can make it hurt more so inject the needle with a quick jab motion.



**Remove the needle by pulling the needle straight out**

- Replace the needle cap.
- Press on injection site for 5 to 10 seconds. Do not rub. This will keep insulin from leaking out.



**Remove the needle from the pen:**

- Remove the needle from the pen by replacing the large cover and unscrewing. Twist the capped needle counterclockwise.
- Leaving the needle on the pen can result in leakage or air bubbles.

**Dispose into a sharps container immediately and DO NOT re-cap the needle**

**Remove gloves and perform hand hygiene**

**Document the insulin administration, dose and time**



### How can I decrease pain when I inject insulin?

- Inject insulin at room temperature. If the pen has been stored in the refrigerator, remove it 30 minutes before you inject it.
- When cleaning skin with an alcohol pad, wait until it has dried before you inject insulin.
- Tell client to relax the muscles at the injection site.
- Do not change the direction of the needle during insertion or removal.

### Other Tips:

- Don't forget to check 6 Rights of Medication Administration 3 times during this process
- Observe the Client for Side Effects.
  - Based on the instructions from the delegating RN and the client's individualized care plan.
  - Observe for symptoms of low blood sugar and respond according to the client's individualized plan.
  - Notify your delegating RN about any negative side effects or status changes. Some examples include low blood sugar episodes or skin changes, or problems related to injection sites.
  - Call 911 for emergency situations. For example, low blood sugar when the client is not conscious or alert enough to swallow a sugar source such as juice or candy



# Module 3 Job Aid:

## Skills Checklist for Insulin Administration with a Pen

Insulin Administration Using a Pen	
Supplies Needed	
<input type="checkbox"/>	Insulin pen
<input type="checkbox"/>	Gloves
<input type="checkbox"/>	Alcohol wipe
<input type="checkbox"/>	Sharps container or disposal plan
Insulin Administration Skills/Tasks	
<input type="checkbox"/>	1. Check/verify the signed order for insulin administration and Blood Sugar (BS) checks prior to insulin administration <ol style="list-style-type: none"><li>Check Blood Sugar per signed order, record on facility document prior to insulin administration and notify designated staff per facility policy if out of range prior to administering insulin</li><li>Demonstrate specialized infection control measures associated with equipment used for glucose meters, pens, and sharps container.</li></ol>
<input type="checkbox"/>	2. Gather supplies (Insulin pen, gloves, alcohol wipe)
<input type="checkbox"/>	3. Check 6 Rights of medication administration <ul style="list-style-type: none"><li>• <b>Right client</b></li><li>• <b>Right time</b></li><li>• <b>Right medication</b> by verifying that the name of the insulin on the pen and cartridge matches the MAR</li><li>• <b>Right dose</b> on the medication label matches the MAR</li><li>• <b>Right route</b> of the medication as identified on the MAR</li><li>• <b>Right documentation</b></li></ul>

### **Insulin Administration Skills/Tasks (continued)**

- ☐ 4. Check the expiration of the insulin pen cartridge
- ☐ 5. Identify if the pen is Durable (re-fillable) or Prefilled (disposable)
- ☐ 6. Verbalize that unused pens should be refrigerated and after opened kept at room temperature (below 86 degrees Fahrenheit)
- ☐ 7. Recheck 6 rights of medication administration
- ☐ 8. Performs hand hygiene and don gloves
- ☐ 9. Either screw or click a new pen needle to attach it to the insulin pen
- ☐ 10. Remove the cap from the needle
- ☐ 11. Prime the pen to remove any air from the needle. (Follow manufacturer's guidelines).
- ☐ 12. Turn the knob (or "dial") on the end of the insulin pen to the number of units prescribed in the MAR NOTE or signed order: (A small drop of insulin should be visible)
- ☐ 13. Identify appropriate injection sites for insulin, choose a site, and cleanse the skin with alcohol prep and allow to air dry. Verbalize the need to rotate administration sites.
- ☐ 14. Gently pinches skin of chosen injection site and insert pen needle into the skin at a 45-to-90-degree angle
- ☐ 15. Release pinched skin and push injection button down at the end of the pen completely to inject insulin and wait 10 seconds, keeping the needle in place to ensure all insulin is injected
- ☐ 16. Remove the needle from the skin, remove the needle from the pen and dispose the needle in a sharps container
- ☐ 17. Remove gloves and perform hand hygiene
- ☐ 18. Document the insulin administration site, dose and time and BS if checked on the MAR or in appropriate place per facility protocol

### **Signs/symptoms of high blood sugar (hyperglycemia):**

Common symptoms of high blood sugar include fatigue, drowsiness, blurred vision, frequent urination, and extreme thirst. You need you know what to do (including immediate actions to take) and who to notify. If the client shows signs of high blood sugar test their blood sugar per medical order/protocol. Call 911 immediately if the client is semiconscious or non-responsive. Notify your supervisor and the delegating nurse as soon as possible after you have contacted emergency help.

### **Signs/symptoms of low blood sugar (hypoglycemia):**

Include irritability, personality changes, dizziness, weakness, fatigue, headache, confusion, slurred speech, cold sweaty skin, hunger, shakiness, blurred or double vision, loss of consciousness. You need to know what to do (including immediate actions to take) and who to notify.

- For low blood sugar less than 70, give 1/2 glass of juice or soda, 3-4 glucose tablets, or 5-7 lifesavers. Check blood sugar again in 15 minutes per client's individualized plan or per facility guidelines. If client alert, have them recheck their blood sugar. Repeat these steps until blood sugar is greater than 100. Once blood sugar is normal, give 1/2 of a sandwich of meat, peanut butter, or cheese. Protein helps stabilize blood sugar.

Reprinted with permission. The following job aids are for inhaled insulin. If the client is prescribed inhaled insulin, check with the nurse delegator for specific recommendations that may differ from what is included in these job aids.



## HOW TO USE AFREZZA®



### A STEP-BY-STEP GUIDE TO YOUR FIRST DOSE

Before you take your first dose, make sure to learn proper inhalation techniques and how Afrezza works.

Call **AfrezzaAssist®** to discuss instructions and coordinate a virtual or live training demonstration.

**PHONE (TOLL-FREE)** 1-844-323-7399

**HOURS** Monday – Friday 8:00am – 8:00pm ET

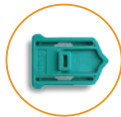
Watch the How to Use Afrezza video at [www.Afrezza.com](http://www.Afrezza.com). For more details, please see full Prescribing Information, including BOXED WARNING, Medication Guide, and Instructions For Use at [www.Afrezza.com](http://www.Afrezza.com).

### STEP 1: SELECT THE CARTRIDGE FOR YOUR DOSE



#### 4 UNITS:

If your Afrezza dose is 4 units, use 1 blue cartridge.



#### 8 UNITS:

If your Afrezza dose is 8 units, use 1 green cartridge.



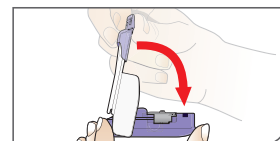
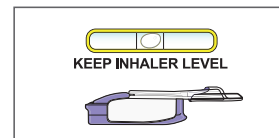
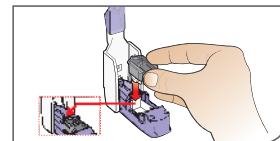
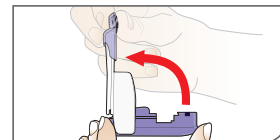
#### 12 UNITS:

If your Afrezza dose is 12 units, use 1 yellow cartridge.

**If your prescribed Afrezza dose is more than 12 units, you will need to use more than 1 cartridge to get your right dose.**

### STEP 2: LOAD A CARTRIDGE

- **HOLD INHALER:** Hold the inhaler level in one hand with the white mouthpiece on the top and purple base on the bottom.
- **OPEN INHALER:** Open the inhaler by lifting the white mouthpiece to a vertical position.
- **PLACE CARTRIDGE:** Hold the cartridge with the cup facing down. The pointed end of the cartridge should line up with the pointed end in the inhaler. Place cartridge into the inhaler, making sure it lies flat in inhaler.
- **KEEP LEVEL:** Now that the cartridge is loaded, keep the inhaler level from this point forward to avoid loss of drug powder. Do not turn it upside down, shake, or drop, as this could cause a loss of drug powder.
- **CLOSE INHALER:** Lower the mouthpiece to close the inhaler (this will open the drug cartridge). You should feel a snap when the inhaler is closed.



## STORAGE AND HANDLING






### HOW TO TAKE CARE OF YOUR AFREZZA® INHALER AND INSULIN CARTRIDGES

For more details, please see full Prescribing Information, including BOXED WARNING, Medication Guide, and Instructions for Use at [www.Afrezza.com](http://www.Afrezza.com)

#### IN USE:

##### ROOM TEMPERATURE STORAGE

Reference the chart below for instructions on taking care of your inhaler and opened foil packages.

OPENED AFREZZA INHALERS	Room Temperature
	Use for up to <b>15 days</b> from the date of first use. After 15 days, inhaler must be discarded and replaced.
SEALED BLISTER CARDS + STRIPS	Room Temperature
	Must be used <b>within 10 days</b>
OPENED STRIPS	Room Temperature
	Must be used <b>within 3 days</b>

Do not put a blister card or strip back into the refrigerator after being stored at room temperature.

#### NOT IN USE:

##### REFRIGERATED STORAGE

Store unopened drug in a refrigerator 36°F-46°F (2°C-8°C).

SEALED FOIL PACKAGES	Refrigerated
	May be used until the <b>expiration date*</b>
SEALED BLISTER CARDS + STRIPS	Refrigerated
	Must be used <b>within 1 month*</b>

\*If a foil package, blister card, or strip is not refrigerated, the contents must be used within 10 days.

#### BEFORE USING YOUR AFREZZA INHALER



Before use, cartridges and inhaler should be at room temperature for 10 minutes.



For any questions regarding storage and handling, or if you need replacement inhalers, please contact **AfrezzaAssist®**.

**PHONE (TOLL-FREE)** 1-844-323-7399  
**HOURS** Monday – Friday 8:00am – 8:00pm ET

**mannkind**



*Resources*



# Curriculum Resources:

**American Diabetes Association (2019)**  
**Nutrition Therapy for Adults with Diabetes or Prediabetes:** A Consensus Report.

**American Diabetes Association.** Diabetes Care Journal. Standards of Medical Care in Diabetes, 2022.

**American Diabetes Association.** Practical Insulin. 5th Edition. 2019

**American Diabetes Association.** DKA. Ketoacidosis & Ketones. Retrieved 2021 from <https://www.diabetes.org/diabetes/complications/dka-ketoacidosis-ketones>

**American Diabetes Association.** What Can I Eat? Retrieved 2021 from <https://www.diabetes.org/blog/what-can-i-eat>

**Association of Diabetes Care & Education Specialists.** Using the ADCEs7 Self-Care Behaviors to Improve Your Health. Retrieved 2021 from <https://www.diabeteseducator.org/living-withdiabetes/Tools-and-Resources>

**Association of Diabetes Care & Education Specialists.** Insulin Delivery. Retrieved 2021 from <https://www.diabeteseducator.org/practice/practice-tools/diabetes-management-tools/iptresources>

**Association of Diabetes Care & Education Specialists.** Insulin injections: promoting insulin and teaching techniques. Retrieved 2021 from <https://www.diabeteseducator.org/news/perspectives/adces-blog-details/carla-cox-phd-rdcde-cssd-faade-cpt/2012/11/13/insulin-injections-promoting-insulin-and-teachingtechniques>

**Association of Diabetes Care & Education Specialists.** Insulin Injection Know How. Retrieved 2021 from chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/[https://www.diabeteseducator.org/docs/default-source/legacy-docs/resources/pdf/general/Insulin\\_Injection\\_How\\_To\\_AADE.pdf](https://www.diabeteseducator.org/docs/default-source/legacy-docs/resources/pdf/general/Insulin_Injection_How_To_AADE.pdf)

**Consumer Med Safety.** Insulin Safety Center. Retrieved 2021 from <https://consumermedsafety.org/tools-and-resources/insulin-safety-center>

**Beyond Type 2.** Insulin for People with Type 2 Diabetes. Retrieved 2021 from <https://beyondtype2.org/insulin-type-2-diabetes/>

**Get Insulin.** All About Insulin. <https://getinsulin.org/>

**Get Insulin.** Insulin Delivery Methods. Retrieved 2021 from <https://beyondtype2.org/insulindelivemethods/>

**Nursing Times.** Injection technique 2: administering drugs via the subcutaneous route. Retrieved 2021; <https://www.nursingtimes.net/clinical-archive/assessment-skills/injectiontechnique-2-administering-drugs-via-the-subcutaneous-route-28-08-2018/>

**Centers for Disease Control and Prevention:** Types of Insulin. Retrieved 2021 from <https://www.cdc.gov/diabetes/basics/type-1-types-of-insulin.html>

**Cleveland Clinic.** Insulin Injection. Retrieved 2021 from <https://my.clevelandclinic.org/health/drugs/23492-regular-insulin-injection-short-actinginsulin?view=print>

**American Diabetes Association.** Insulin Storage and Syringe Safety. Retrieved 2021 from <https://www.diabetes.org/healthy-living/medication-treatments/insulin-otherinjectables/insulin-storage-and-syringe-safety>

**FDA USDA Food & Drug Administration.** Information Regarding Insulin Storage and Switching Between Products in an Emergency. Retrieved 2021 from <https://www.fda.gov/drugs/emergency-preparedness-drugs/information-regarding-insulinstorage-and-switching-between-products-emergency>

**Safe Needle Disposal.** Sharps Management. Retrieved 2021 from <https://safeneedledisposal.org/sharps-management/fda-cleared-sharps-containers/#>

**American Diabetes Association.** Medication Management. Your health care team. Retrieved 2021 from <https://www.diabetes.org/diabetes/medication-management/your-healthcare-team>

**American Diabetes Association.** Medication Management. Your health care team. Retrieved 2021 from <https://www.diabetes.org/diabetes/medication-management/your-healthcare-team>

**American Diabetes Association.** Nutrition. Retrieved 2020 from <https://www.diabetes.org/nutrition> iabetes Association (2019) Nutrition

**National Center for Biotechnology Information.** Role of Self-care in management of diabetes mellitus. Retrieved 2020 from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3599009/>

**National Institute of Diabetes and Digestive and Kidney Disease.** Health Information, Diet and Nutrition. Retrieved 2020 from <https://www.niddk.nih.gov/health-information/dietnutrition>

**Cleveland Clinic.** Non-insulin injectables. Retrieved from <https://my.clevelandclinic.org/health/articles/13901-diabetes-non-insulin-injectable-medications>

**UCSF Diabetes Education Online.** Type 2 Non-Insulin Therapies. Retrieved 2022 from <https://dte.ucsf.edu/types-of-diabetes/type2/treatment-of-type-2-diabetes/medications-andtherapies/type-2-non-insulin-therapies/>

**National Center for Biotechnology Information.** Oral and Injectable (Non-Insulin) Pharmacological Agents for the Treatment of Type 2 Diabetes. Retrieved 2022 from <https://www.ncbi.nlm.nih.gov/books/NBK279141/>

**American Diabetes Association, Insulin Basics,** <https://diabetes.org/healthy-living/medication-treatments/insulin-other-injectables>. Accessed on 10.13.22

**Diabetes.org.uk,** GLP-1 Analogues, <https://www.diabetes.org.uk/guide-to-diabetes/managing-your-diabetes/treating-your-diabetes/tablets-and-medication/incretin-mimetics>. Accessed on 10.13.22  
Association of Diabetes Care & Education Specialists (ADCES); Insulin Injections, [https://www.diabeteseducator.org/docs/Insulin\\_Injection\\_How\\_To\\_AADE.pdf](https://www.diabeteseducator.org/docs/Insulin_Injection_How_To_AADE.pdf). Accessed 10.14.22.

**National Library of Medicine (NIH),** Incorrect Insulin Administration: A Problem That Warrants Attention, <https://pubmed.ncbi.nlm.nih.gov/26807006/>. Accessed 10.14.22.

**American Diabetes Association, Insulin Routines,** <https://diabetes.org/healthy-living/medication-treatments/insulin-other-injectables/insulin-routines>. Accessed on 10.14.22.

**Novo Nordisk, Know Your Pen Needles,** <https://www.novoneedles.com/know-your-needles.html>. Accessed on 10.14.22.

**Beyondtype2.org, Bolus-Insulin,** <https://beyondtype2.org/bolus-insulin/>. Accessed on 11.28.22

**Afrezza, Use Support,** <https://afrezza.appspected.com/afrezza-users>. Accessed on 11.30.22

**DiabetesinControl.com, Stability of Common Insulins.** Accessed February 2023.

**Diabetes Education Services – DiabetesEd.net, Insulin Storage and Dispensing Info.** Accessed February 2023.

<https://www.hdrxservices.com>, **Insulin-Expiration-Dates-an-Update.** Accessed February 2023.

# National Resources for Additional Information:

**American Diabetes Association**  
(800) 342-2383; [www.diabetes.org](http://www.diabetes.org)

**Academy of Nutrition and Dietetics**  
(800) 877-1600; [www.eatright.org](http://www.eatright.org)

**National Diabetes Education Program**  
While visiting this site look for videos and tools available at Diabetes HealthSense;  
[www.ndep.nih.gov](http://www.ndep.nih.gov)

**Medicare Information**  
(800) 633-4227; [www.medicare.gov](http://www.medicare.gov)

**National Diabetes Information Clearinghouse**  
(800) 860-8747; [www.diabetes.niddk.nih.gov](http://www.diabetes.niddk.nih.gov)

**Centers for Disease Control and Prevention Diabetes information;** [www.cdc.gov/diabetes](http://www.cdc.gov/diabetes)

**Findhelp Information Services**  
Phone: just dial 211  
Website: <https://211central.ca/>

**Nutritional Information for Carb Counting:**  
[www.calorieking.com](http://www.calorieking.com)

**Recipes with Nutritional Calculations:**  
[www.Allrecipes.com](http://www.Allrecipes.com)

## Local Resources:

**Washington State Department of Health**  
[www.doh.wa.gov](http://www.doh.wa.gov)

**American Diabetes Association of Washington** <http://www.diabetes.org/in-my-community/local-offices/seattle-tacomawashington/>

**Washington Association of Diabetes Educators** <http://www.wadepage.org>

**Washington State Diabetes Connection**  
<http://diabetes.doh.wa.gov/>

**Washington State Nursing Care Quality Assurance Commission** <http://www.doh.wa.gov/LicensesPermitsandCertificates/NursingCommission>

**Aging and Long-Term Support Administration Caregiver Resources**  
<https://www.dshs.wa.gov/altsa/home-and-community-services/caregiver-resources>

**Washington State Diabetes Connection**  
<https://diabetes.doh.wa.gov/>

**Eastern Washington Diabetes Network**  
<https://diabetes.doh.wa.gov/regional-coalitions/eastern-washington-diabetes-network>

**Tri-Cities Diabetes Coalition**  
<https://diabetes.doh.wa.gov/regional-coalitions/tri-cities-coalition>

## Magazines:

### **Diabetes Forecast**

(800) 806-7801; [www.forecast.diabetes.org](http://www.forecast.diabetes.org)

### **Diabetes Self-Management**

(800) 234-0923; [www.diabetesselfmanagement.com](http://www.diabetesselfmanagement.com)

## Mobile Apps:

### **Lose It!**

[www.loseit.com](http://www.loseit.com)

### **My Fitness Pal**

[www.myfitnesspal.com/apps](http://www.myfitnesspal.com/apps)

### **Glucose Buddy**

[www.glucosebuddy.com/glucose\\_buddy\\_app](http://www.glucosebuddy.com/glucose_buddy_app)

### **Carb Counting with Lenny**

<https://itunes.apple.com/us/app/carb-counting-with-lennyus/id516080517?mt=8&ign-mpt=uo%3D4>

### **Diabetes Pal App**

<https://apps.apple.com/us/app/diabetes-pal-by-telcareblood/id495245376>

## Additional Information and Job Aids:

### **Safeneedledisposal.org.**

<https://safeneedledisposal.org/resource-center/online-brochures/>

Educational materials and information for medical sharps disposal in the US.

### **Novo Medlink..**

<https://www.novomedlink.com/diabetes/patient-support/disease-education/library.html>

Job aids and resources for diabetes management and practical tips and expert advice.

# Notes

# Notes



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