

# How to Handle and Administer Insulin

## BACKGROUND

In dogs and cats, like in people, diabetes is a lack of insulin (or inadequate effect of insulin) in the body. The treatment for diabetes, therefore, is to give insulin. One of the easiest ways to ensure successful at-home treatment of a pet that has diabetes is to become comfortable handling and delivering insulin by simple injection.

Insulin injections are not painful because they are not deep (only skin deep) and the needle is very thin: 1/80th of an inch in diameter [0.31 mm], only slightly thicker than a human hair. Most dogs and cats don't even feel them. The key is simply to become comfortable giving the insulin and doing it as part of a daily routine, because consistent and effective insulin administration is lifesaving.

Insulin injections have to be given daily (twice a day in most cases: once in the morning and once at night), and your veterinarian will specify how much to give and whether to give it once or twice a day.

Several types of insulin are available, and they differ from each other in several important ways, including how long they work. This in turn directly affects how often they must be given.

Different types of insulin are formulated in one of two different concentrations. Insulin will either be "U 40 insulin," in which 1 cc contains 40 units of insulin (1 cc = 1 mL, or milliliter), or "U 100 insulin," in which 1 cc contains 100 units of insulin. Being aware of the concentration of insulin that is being used to treat a pet is paramount: it helps you avoid overdosing or underdosing and will ensure that the correct corresponding insulin syringe is also being used.

Insulin is a fragile substance that can lose its activity if it is not treated well. Keeping the insulin intact is important so that the injections retain their antidiabetic effect:

- Always keep insulin refrigerated but never frozen. This may require using a coolpack to bring the insulin home from the veterinary clinic on hot summer days, for example, and making sure that where you store it in your refrigerator and the refrigerator's settings do not cause freezing.
- Be sure to handle the insulin bottle fairly gently. Vigorous shaking can damage the insulin and inactivate it.

## GETTING STARTED

The only supplies needed are the insulin bottle, the insulin syringes, and a container for disposing of the used syringes. Because the needles for administering insulin are extremely thin, giving insulin should be quick and easy for both you and your pet. If, however, there is any hesitancy about placing the needle correctly into the skin, be sure to have a veterinarian or veterinary technician review it with you and demonstrate until it feels like a straightforward thing to do. In very furry pets, it might be helpful to have a small patch of hair shaved between the shoulder blades to allow for easier placement of the needle into the skin. A simple mistake to be avoided in pets with very thick hair coats is to not have the needle even enter the skin, meaning that the insulin is accidentally just squirted onto the skin. This is of no benefit and means the pet did not receive insulin for that dose.

## TROUBLESHOOTING BEFOREHAND

If your veterinarian has changed your pet's insulin type, be sure the concentration of the insulin hasn't changed (U 40 versus U 100). This is always written on the bottle. When the concentration

of insulin has changed, the syringe required to draw up an accurate dose will change as well because the insulin syringes are purpose-made (graded) for a given insulin concentration. *If the concentration of the insulin has changed, all old insulin syringes must be discarded to avoid accidental over- or underdosage.*

Insulin can be damaged in several ways, all of which must be avoided. If any of the following occurs, the insulin bottle should be discarded immediately and replaced:

- The insulin has been heated (left for 6 hours at room temperature [or less than 6 hours if warmer]).
- The insulin reaches freezing temperatures.
- The bottle has been shaken or dropped on the ground.
- The insulin appears stringy or has clumps in it.
- The insulin has changed color (normally it should be clear like water at first and very slightly hazy gray when suspended/gently agitated for administration).

Expect to use a new syringe every time insulin is administered. This will ensure that the needle is both clean and sharp and will minimize the chance for contamination of the insulin.

## PROCEDURE FOR ADMINISTERING INSULIN INJECTIONS

Bring your pet and the supplies into a comfortable area. Use a calm tone of voice and reassuring body language, and help him/her feel relaxed. A cat or small dog may be comfortable on your lap or on a table in front of you. A larger dog will do well sitting or standing on the floor.

Then, practice "tenting" the skin behind the neck between the shoulder blades. This means pulling up some skin (approximately a half inch to an inch [1-2 cm] elevation is usually fine) between your left thumb and index finger if you are right-handed. This creates a triangular tent shape in the skin that lies behind the neck. This should be completely comfortable to your pet; if it isn't, you should try a different area of the body, such as the shoulder or the lower back (area on the back a few inches ahead of the tail). If you are right-handed, it will be easiest to tent the skin with your left hand and hold the syringe with your right hand. Practice holding an empty syringe with your dominant hand first (for example, your right hand if you are right-handed), and handle your pet with the other hand. You should be holding the syringe like a pen: first three fingers (*including thumb*) all bunched together holding the body of the syringe halfway down the length of the syringe, like holding a pen halfway down the length of the pen when writing. Do not place your thumb on the plunger yet (a common mistake).

To start, take the insulin bottle from the refrigerator, and gently roll it between two hands for 30-60 seconds, and then invert it slowly and back again several times. This serves to suspend the insulin uniformly in the solution in the bottle, because insulin gradually settles to the bottom of the bottle when it sits undisturbed for several hours.

A new insulin bottle will have either a metal tab or plastic lid covering the rubberized top. Remove this prior to first use. The rubberized membrane that is exposed this way (usually gray or orange) is the point for inserting the needle into the bottle.

Take a new insulin syringe, remove the syringe cap (typically orange plastic), and insert the needle into the rubberized top. Invert the bottle such that the bottom of the bottle is pointing at the ceiling. With the needle still inserted in the bottle, draw back on the syringe plunger. Visualize the clear liquid insulin entering the

syringe. Should any bubbles enter the syringe, gently tap the syringe until they rise up, and then you can inject them back into the bottle. When you have drawn up the desired volume of insulin, withdraw the needle from the bottle. Some people draw back more than is necessary and then, before withdrawing the needle, push the extra amount back in the vial to be left with the exact correct dose; this is helpful for expelling air bubbles. Others prefer simply to draw up the correct dose right from the start. Any approach is acceptable as long as you are left with the correct dose in the syringe, and no air bubbles, before you withdraw it from the bottle.

Now, to give the insulin, create the skin tent with your non-dominant (e.g., left) hand. Hold the syringe with the insulin in it in your other hand the same way you would hold a pen or pencil. Do **not** place your thumb on the plunger, as this may cause you to expel the insulin before the needle is in place. Direct the needle into the empty space under the skin created by the tent (the “inside” or “base” of the tent). In the process, be sure to avoid stabbing your own fingers holding the skin tent. Because of the thinness of the needle, you will not feel it go in (nor should your pet). Therefore, advance the needle all the way in, until the hub (plastic) of

the syringe is against the skin. Now you can move the thumb of your right hand (holding the syringe like a pen) to the plunger. This means that you gently shift your hold on the syringe from holding it like a pen (three fingers) to holding it like a cigarette between your index and middle fingers. With your thumb, depress the plunger to deliver the insulin. At first this takes time, but with practice, the time from lifting the skin tent to giving the insulin and being finished is typically less than 10 seconds.

## AFTERWARDS

A rigid plastic, purpose-made receptacle for used insulin syringes is helpful. Needles should be stored safely away from children and pets. Used needles can often be returned to your veterinary hospital for disposal, and you should check with your veterinarian regarding laws that govern the disposal of medical sharps in your area.

It is wise to demonstrate your technique (and give an injection of saline instead of insulin as a demonstration to your veterinarian) at the time of recheck, because this helps your veterinarian identify and fix problems with insulin administration. This demonstration, to make sure technique is working well, is one of the simplest and most effective actions to take for optimal treatment of diabetes.

## FREQUENTLY ASKED QUESTIONS

*I left the insulin out of the refrigerator by accident. Is it still good?*

Insulin can stay at room temperature (70°F [18°C]) for up to 6 hours, but it begins to lose its potency quickly. If insulin has been left out at this temperature only once for less than 6 hours, it can continue to be used. If it has been left out for longer than 6 hours cumulatively, it should be discarded and replaced.

*Are there alternatives to insulin, especially oral medications?*

Yes and no. Oral antidiabetic drugs that are commonly used in diabetic people have been tried in pets and are of limited benefit. Fewer than 1% of dogs show any improvement (and the rest worsen), whereas some 20% of cats may improve with oral treatment instead of insulin but generally only for a period of a few months. Then the oral medications lose their efficacy, and insulin

becomes necessary anyway. Therefore, insulin remains the treatment of choice for diabetes.

*Can dogs and cats go into a diabetic coma, like people?*

Yes. Untreated diabetes can deteriorate to diabetic ketoacidosis, a severe state that ultimately can lead to diabetic coma if not treated promptly. The goals of treating diabetes are both to eliminate symptoms (restoring a healthy state of being) and to reduce the risk of such complications.

*Do diabetic dogs and cats have circulatory problems in their legs, like people?*

No, fortunately this is almost unheard of in dogs and cats, unlike in people.



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