

# Starting the Person with Diabetes on Insulin in the Outpatient Setting: A Teaching Guide for Physicians and Nurses

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When a physician decides that a diabetic patient requires insulin treatment, more teaching is necessary than when initiating most other medications. It has been found advantageous, in treating persons with diabetes mellitus who are not severely compromised metabolically, to introduce them in an outpatient setting to the administration of insulin. The objective of this article as a teaching guide is to enable the health-care provider to cover all essential points clearly and effectively in a minimal period of time and thereby allow the patient to confidently inject himself/herself properly, and to become a member of the team that is managing and controlling his/her disease.

This paper deals only with the use of insulin in the diabetic patient. It is recognized that other aspects of patient care and patient education must be addressed concurrently in the total care of the patient with diabetes.

Diabetes mellitus is a worldwide disease, the incidence of which appears to be increasing. In 1950 diabetes was the tenth leading cause of death with 16.2 deaths per 100,000 population in the United States; in 1973 the rate was 18.2 per 100,000.<sup>1</sup> It is now the sixth ranked cause of death, accounting for 1.9 percent of all deaths in the United States.<sup>2</sup> The National Commission on Diabetes recently reported that in

1974 more than 600,000 new cases of diabetes mellitus were diagnosed and the incidence appears to be increasing by at least six percent per year. Therefore, the average American born today would have a greater than one-in-five chance of developing diabetes, unless a method of prevention is found.<sup>3</sup>

Possibly as important as the mortality from diabetes is the associated morbidity, affecting the function of many organ systems with resultant peripheral vascular disease, neuropathy, retinopathy, and nephropathy. Several long-term large population studies have shown increased morbidity and mortality among diabetics from all cardiovascular causes.<sup>4</sup> Also, the emotional morbidity and restrictions on life-style that diabetes imposes are of major significance.

Many persons with diabetes are not severely compromised metabolically, but do need lower blood glucose levels. When diet alone does not achieve adequate blood sugar control, the decision is frequently made to employ a hypoglycemic agent. Since the safety of the oral hypoglycemic medications has been questioned<sup>5</sup> and since the oral medications are not effective in achieving adequate blood sugar control in many patients,<sup>6</sup> insulin treatment is frequently prescribed.

However, patients often resist the use of insulin because its administration requires syringes and needles, items which patients think belong in the professional's realm. Physicians and patients may tend to consider the injection procedure difficult and the regulation of dosage complex and troublesome. When the physician decides that insulin is the treatment of choice, he/she can easily introduce insulin injection in the outpatient setting using the principles and procedures outlined in this teaching guide and be confident that the patient is knowledgeable enough to self-inject correctly with insulin at home.

## Advantages of the Outpatient Setting

There are advantages to introducing the administration of insulin in the outpatient setting. Since hospitalization implies a catastrophic situation to many persons, for the patient who is not severely compromised metabolically hospitalization for the introduction of taking insulin may exaggerate the patient's perception of diabetes and the complexities of insulin injection. A distorted picture may be projected concerning the use of this medicine in the patient's life-style. Other disadvantages to hospitalizing the person who is beginning to use insulin include the following.

1. *Abnormal diet:* In the hospital a special and unfamiliar diet is provided which may not be followed at home.
2. *Reduced exercise:* In the hospital, normal activity is usually decreased and may result in differences in effectiveness of a given dosage of insulin from that obtained at home and under normal work settings.
3. *Excessive cost:* In the hospital, costs in both time and money are high and may affect the patient's attitudes

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toward the treatment and toward his/her diabetes.

4. *Difficulty in knowledge transfer:* In the hospital setting, the patient may be upset by the costs being incurred, by the close association with patients much more seriously ill, and by the hospital routine, such that he/she is often unable to fully absorb the teaching of unfamiliar new information.

In contrast, outpatient introduction to insulin use is far less expensive and can help the person integrate the

medication he/she needs into a personal life-style. The health-care providers who will be following the person as an outpatient can introduce consistent methods of diabetes self-management early in the patient's care. Except in a few unusual circumstances, the person who is not severely compromised metabolically can begin using insulin as an outpatient. Most patients can be taught by an office nurse using the following teaching plan to ensure coverage of the knowledge

needed for the first week of insulin treatment at home.

### Teaching Plan

The essential minimal educational requirement for the patient in the first hour's lesson includes six major goals.

1. The patient will inject the prescribed dose of insulin using sterile technique. He will take the insulin at the assigned time.

2. The patient will recognize hypoglycemia. He will avoid hypoglycemia by proper eating habits and will carry some form of sugar at all times and ingest it when necessary to treat even slight symptoms. He will wear a diabetes ID bracelet or necklace and have an up-to-date ID card on his person.

3. The patient will eat at regular intervals. He will not skip meals nor consume concentrated sweets.

4. The patient will test a second voided urine specimen regularly, using proper technique, paying special attention to timing. An accurate record will be kept and brought to clinic.

5. The patient will rotate the sites of insulin injection.

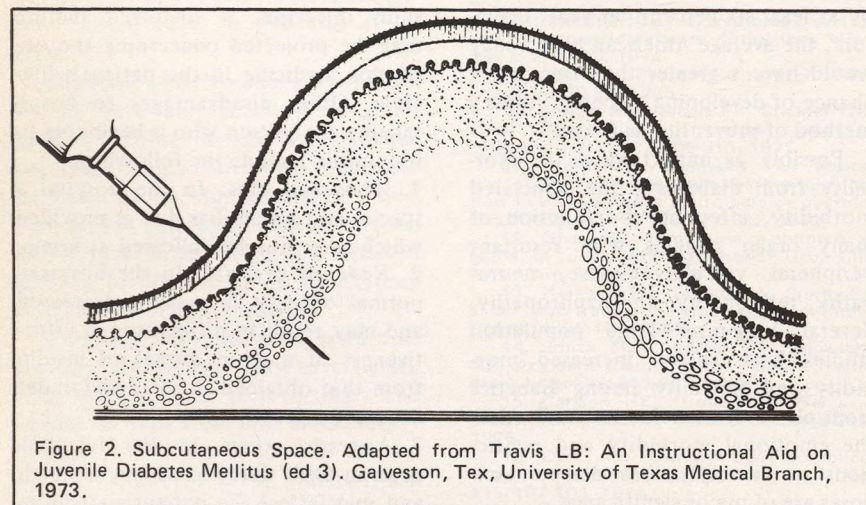
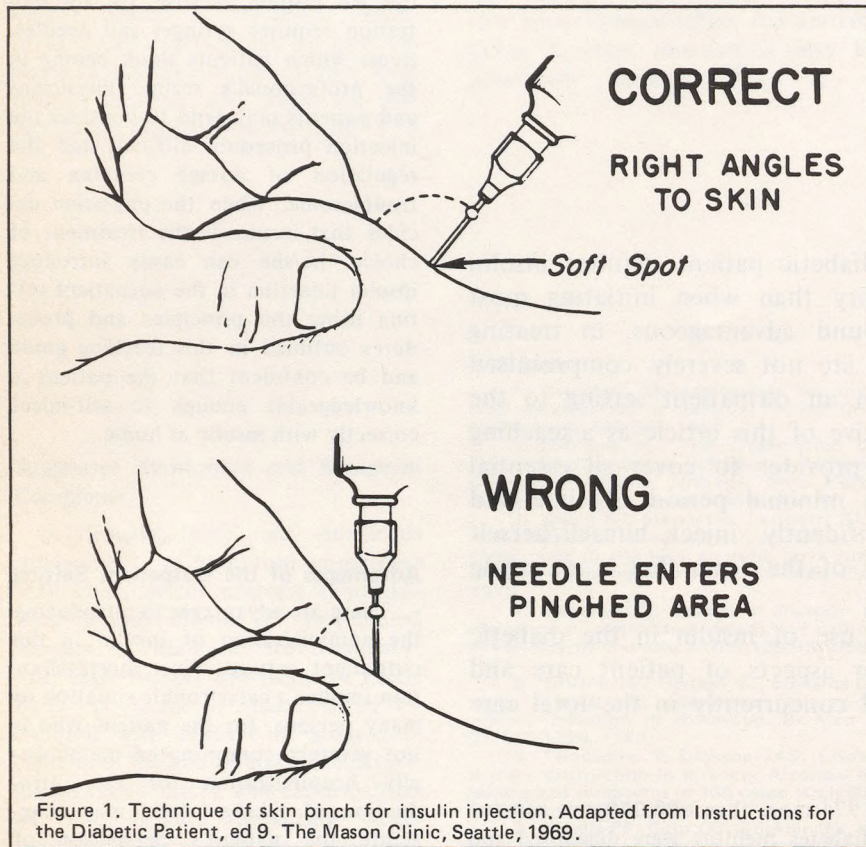
6. The patient will call the appropriate health-care provider whenever questions arise.

It is important that the patient's understanding of each of these goals or desired behaviors be evaluated by the teacher. In this way both patient and health-care team gain confidence that the patient will be able to use insulin properly.

Each of these goals is outlined separately here in tabular form. The goal is the *Desired Behavior*. The specific knowledge the patient must acquire to achieve the desired goal is in the column labeled *Content*. The column labeled *Method* includes ways to convey this knowledge to the patient. The accompanying illustrations are used to facilitate the teaching.

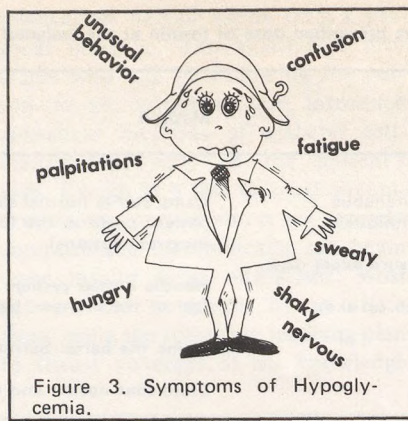
When a person knows he is to begin insulin therapy he may be very apprehensive worrying about self-injection. He absorbs little else of what is said by the teacher. Therefore, the first part of the teaching session is spent in getting the patient to inject himself as soon as possible, using normal saline solution for this self-demonstration.

Many patients coming to clinic to be instructed on insulin injection techniques may have already tried to regulate their disease by diet. A re-



**Goal 1: The patient will inject the prescribed dose of insulin at the assigned time and using sterile technique.**

Desired Behavior	Content	Method
Draws up the prescribed dose accurately.	Sterile subcutaneous injection technique.	Using sterile normal saline solution instead of insulin, have the patient perform the following steps: (hold a syringe yourself and illustrate actions).
Uses sterile technique.	How to measure exact dose.	Handle a used syringe to get an idea of the small needle size, the feel of the plunger, barrel, hub of needle.
Self-injects at the assigned time into the subcutaneous space.	How to pinch up skin.	Name the parts: barrel, plunger, hub of needle.
		State that needle and body of plunger must not be touched.
		Check for tightness of needle.
		Pinch up skin, discuss picture of subcutaneous space and the proper placement of the needle into this space (Figures 1 and 2).
		Wash hands.
		Assemble needed materials: sterile syringe, alcohol pledget, "insulin" (sterile normal saline). A small tray with supplies for teaching purposes is convenient.
		Select and wipe injection site with an alcohol pledget (Figure 7).
		Roll saline bottle gently as though it were insulin.
		Wipe top of saline bottle with alcohol pledget.
		Remove sterile syringe from wrapper, remove needle cover and check for needle tightness.
		Measure dose as air is pulled into syringe. (This also ensures patency of needle.) Push needle through middle of rubber top and inject air into bottle to avoid formation of a vacuum in the bottle.
		Turn bottle and syringe upside down.
		Draw liquid into syringe beyond dosage mark.
		Push plunger slowly to return liquid to vial (wets and lubricates barrel, removes air bubbles).
		Measure prescribed dose, pulling slowly to avoid air bubbles.
		Remove any air bubbles by gently tapping syringe.
		Remove needle from bottle.
		Pinch up skin with thumb and forefinger (Figure 1).
		Look at Figure 1, proper angle.
		Feel for soft spot.
		Look at Figure 2, proper subcutaneous space.
		Hold syringe like a pencil or a dart.
		Put needle into soft spot at 90-degree angle.
		Push full length of needle through skin quickly.
		Release pinch.
		Withdraw on plunger to check for blood return. Should there be any blood, withdraw the needle, put pressure on the puncture site, discard the prepared injection and begin again with a new syringe.
		Inject saline slowly.
		Remove needle straight out.
		Do not rub.
		<b>Teacher:</b> Write down prescribed dosage and assigned time to take insulin in spaces on a take-home page.



**Goal 2:** The patient will recognize hypoglycemia and will avoid it by proper eating habits. Some form of sugar will be carried at all times by the patient and ingested to treat even slight symptoms; an up-to-date ID card will be carried at all times; and a diabetes ID bracelet or necklace will be worn at all times by the patient.

Desired Behavior	Content	Method
Recognizes symptoms of hypoglycemia and responds immediately with a proper source of glucose.	<p>How to recognize hypoglycemia.</p> <p>Symptoms related to decreased cerebral function: unusual behavior, inability to make decisions, fatigue, somnolence, and slurred speech.</p> <p>Symptoms related to increased catecholamines: palpitations, tremulousness, nervousness, sweating.</p> <p>When to expect action from insulin — NPH or Lente.</p> <p><b>Onset:</b> starts one-half to one hour after insulin is taken.</p> <p><b>Peak:</b> Point when action is the strongest: six to eight hours after injection.</p> <p><b>Duration:</b> How long action lasts: 12 to 18 hours.</p>	<p>Show a diagram such as Figure 3 as symptoms are discussed.</p> <p>Discuss onset, peak, and duration of insulin action using Figure 4 as a guide.</p>
Avoids hypoglycemia.	<p>How to schedule exercise.</p> <p>An explanation that muscle cells that are exercised use up glucose and can add to the effect of insulin in lowering blood sugar.</p> <p>How to avoid hypoglycemia.</p> <p><b>Plan ahead.</b> Have glucose available in blood stream from long-acting sources (milk, crackers, cheese, peanut butter sandwich, etc).</p> <p>Have fast acting sources of glucose available on person in case of emergency need (apple, sugar cubes, raisins, honey, candy).</p>	<p>Show Figure 5.</p> <p>Discuss blood sugar lowering effect of exercise using this figure to show how exercise relates to the effect of meals and to the effect of insulin on blood sugar.</p> <p>Show pictures or foods of each type: long acting and fast acting.</p> <p>Have box of raisins, mints, candy bars, sugar cubes wrapped in aluminum foil, packets of sugar from restaurants as demonstrations.</p>
Wears diabetes ID bracelet or necklace.	Importance of quick identification of person on insulin therapy.	Have samples and order blanks for ID bracelet and necklace available.
Carries sugar on person at all times.		
Carries up-to-date ID card.		Give patient blank card to fill in immediately and put into wallet or purse.

**Goal 3: The patient will eat at regular intervals and will not skip meals nor consume concentrated sweets.**

Desired Behavior	Content	Method
Eats approximately the same amount and composition of food at regular intervals.	How to balance food intake and insulin action.	Refer again to Figure 5 to illustrate these points.
Will not skip meals or snacks.	Continuous action of injected insulin. Need for three meals and up to three snacks per day to have glucose available.	
Eats no concentrated sweets in diet except to treat hypoglycemic reaction.	What a concentrated sweet is: cakes, cookies, ice cream, honey, jam, jelly, pop with sugar, sugar.	Have pictures or plastic samples of concentrated sweets.

**Goal 4: The patient will test a second voided urine specimen regularly using proper technique, especially exact timing. An accurate record will be kept and brought to clinic.**

Desired Behavior	Content	Method
Tests urine regularly.	Why urine testing is important: The kidney filters the blood. When the blood sugar is high, sugar spills into the urine; therefore urinary glucose is usually a reflection of blood sugar level. When the urine is negative for glucose, this ability to monitor blood sugar level is lost and there is no assurance that the level is not bordering on hypoglycemia.	Use Figure 6, renal dam illustration, to depict how testing urine for glucose may provide an estimate of blood sugar level, and how no information is obtained if the urine is negative for glucose.  Ask patient to phone if urine tests become all negative.
Tests second voided specimen as instructed.	Explain technique of second voiding:  Void and discard first urine. 30-45 minutes later void again and test this specimen.  Urine that has collected in the bladder since the last time the patient voided is a reflection of his/her blood sugar over this whole time.  A true picture of the body's function at the time of the test can be better obtained if a <i>second</i> voided specimen is used.	Present a written explanation page.
Follows directions of specific test, especially timing.	Importance of testing urine properly.	Show examples of various tests.  Demonstrate timing.  Use dextrose solution and test timing precisely.
Indicates on record which test is being used. Uses sweep second hand on clock or wrist watch.		
Tests regularly.	Preferable times to test: before breakfast, before lunch, before dinner, at bedtime.	Present copy of control record you prefer patients to use.
Records test results accurately on urine test sheet.	Importance of immediate recording to save data.	Suggest taping record and pencil on bathroom cupboard door.  Suggest portable log for away-from-home tests to be transferred to main log.
Brings record to clinic.	Importance of communicating test results to doctor.	Show record with test results filled in.

**Goal 5: The patient will rotate the sites of insulin injection.**

Desired Behavior	Content	Method
<p>Rotates sites of insulin injection systematically.</p>	<p>Importance of rotating sites: Repeat injections in same spot may result in erratic absorption rates.</p> <p>Suggestions for systematic rotation.</p> <p>What areas are available?</p> <p>Self-injection sites: thighs, abdomen.</p> <p>Helper injection sites: arms, buttocks.</p> <p>Spacing: one inch away from the previous injection site until one area has been utilized.</p>	<p>Show pictures of available areas (Figure 7). Have patient pick up skin in each area and point to injection spot.</p> <p>Give chart with illustration of how to space injections.</p>
<p><b>Before patient leaves this session have him independently select a site and inject saline again.</b></p>		

**Goal 6: The patient will call the appropriate health-care provider whenever questions arise.**

Desired Behavior	Content	Method
<p>Does not hesitate to phone the health-care team member.</p>	<p>Assure that staff really cares.</p> <p>Encourage a supportive and interactive relationship.</p>	<p>Have card ready with phone number of clinic, doctor, nurse, teacher, emergency care.</p>
<p>Returns to clinic in one week.</p>	<p>Remind to bring urine test sheet.</p>	<p>Give written appointment. Give summary page of what was taught for reference at home.</p> <p>If possible telephone patient within the next week, preferably around insulin peak time.</p>

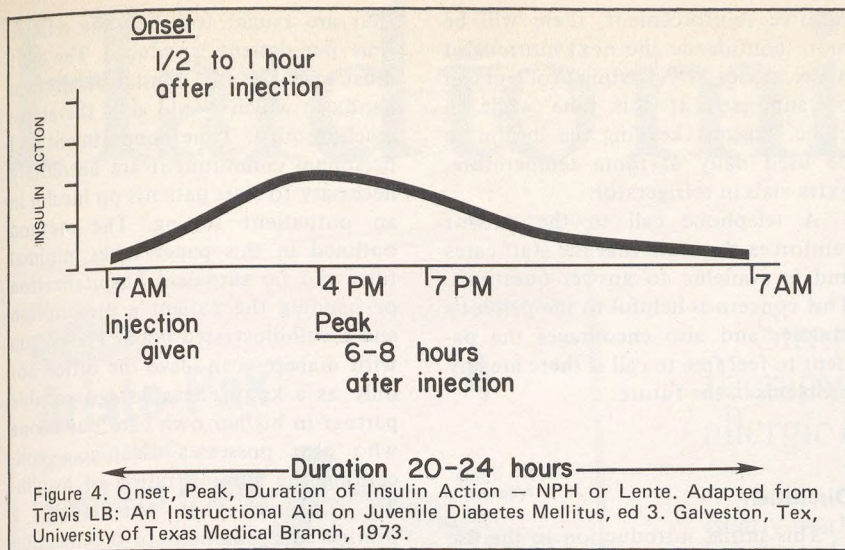


Figure 4. Onset, Peak, Duration of Insulin Action - NPH or Lente. Adapted from Travis LB: An Instructional Aid on Juvenile Diabetes Mellitus, ed 3. Galveston, Tex, University of Texas Medical Branch, 1973.

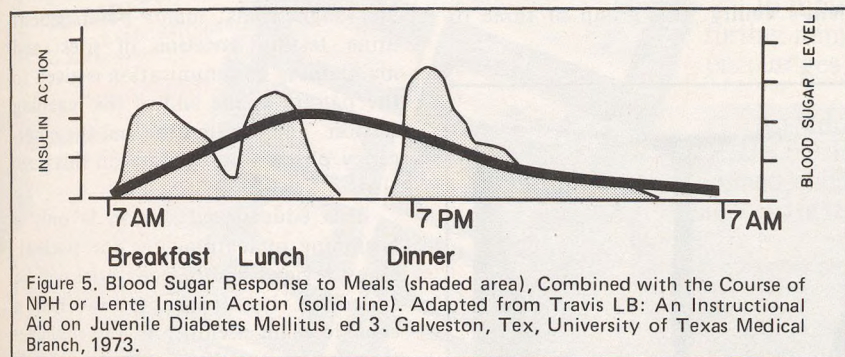


Figure 5. Blood Sugar Response to Meals (shaded area), Combined with the Course of NPH or Lente Insulin Action (solid line). Adapted from Travis LB: An Instructional Aid on Juvenile Diabetes Mellitus, ed 3. Galveston, Tex, University of Texas Medical Branch, 1973.

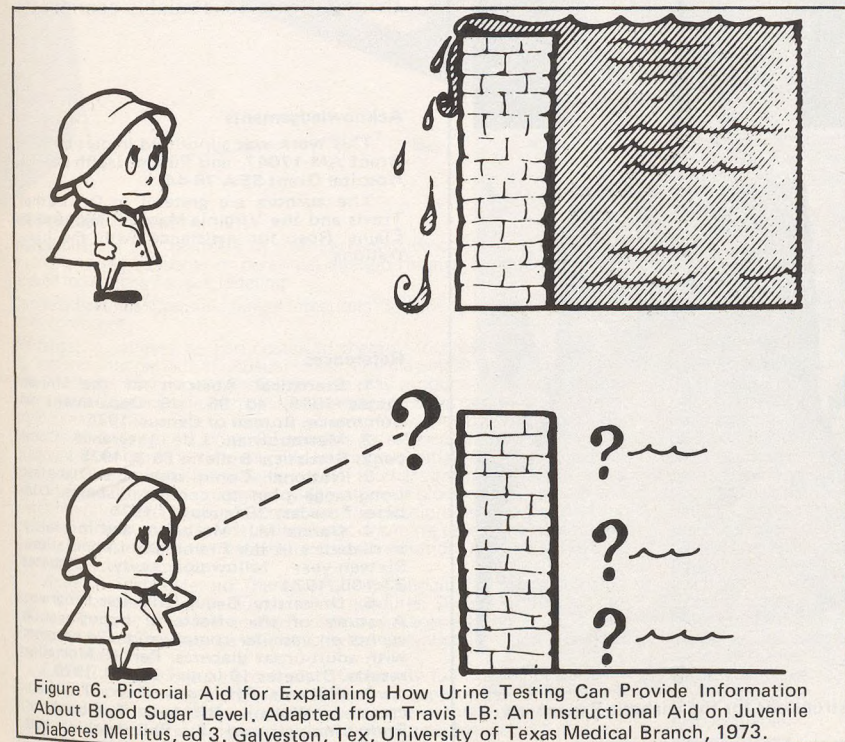


Figure 6. Pictorial Aid for Explaining How Urine Testing Can Provide Information About Blood Sugar Level. Adapted from Travis LB: An Instructional Aid on Juvenile Diabetes Mellitus, ed 3. Galveston, Tex, University of Texas Medical Branch, 1973.

emphasis on regularity of meals in relationship to the injected insulin's action is the major concept to present. The dietician can help plan and reinforce this point. Weight reduction may also be needed as a therapeutic adjunct but at this first teaching session about insulin injection it is not emphasized.

A person on insulin, eating nutritious foods four to six times during the day, exercising regularly, and remembering the action times of the insulin being taken, is free to include most activities in his/her life-style. The experience of hypoglycemia is usually completely avoidable if goals 2 and 3 are understood and applied. When the person on insulin understands how the prescribed insulin acts and is alert to the symptoms of hypoglycemia - Goal 2 - he/she will be able to combine diet and exercise properly and prevent any hypoglycemic episodes. For example he/she will know that heavy exercise eight to ten hours after injection of neutral protein Hagedorn (NPH) or Lente insulin, without a proper snack can result in hypoglycemia.

A person on insulin needs to understand how helpful the accurate testing of his/her urine, and the consistent recording and reporting of results are to the management of his/her diabetes mellitus. The urine record is a reflection of blood sugar fluctuations. The patient needs to know that he/she plays an important role in providing information to assist the team of professionals managing the diabetes.

Even if the patient has previously been instructed in urine testing, each step of his/her method should be carefully reviewed when he/she starts on insulin, because often mistakes are overlooked, especially in timing.

The suggestions to use a portable method for away-from-home tests are given because many persons otherwise would neglect testing when at school, on a shopping trip, or at work.

Avoidance of hypoglycemia is of utmost importance. The patient needs to know that his/her urine should not always be free of sugar but that it is desirable to obtain the occasional trace or 1+ reading as illustrated by the renal dam picture (Figure 6). He/she will learn that insulin needs vary, and that urine testing aids in adjusting insulin doses and also in judging adequacy of control of blood sugar.

Although rotation of sites is often a

neglected area of teaching, we consider it worth covering in the first teaching session to begin establishment of the proper habit. Persons often inject repeatedly into the same spot where they learned to inject their first shot. Rotation planning keeps the person from forgetting where he gave his last injection. Because of the patient's apprehension concerning self-injection, it is best to present site rotation as a goal separate from the actual injection technique. This also emphasizes the importance of rotation of sites.

At this point in the teaching session the patient is given a fresh syringe and alcohol pledget and asked to give him or herself another injection of saline. This is the opportunity needed to cement the learning. By allowing the person to perform the whole injection with minimal correction and much

positive reinforcement, there will be more confidence the next morning at home alone. Any existing problem can be addressed at this time while in clinic. Suggest keeping the insulin to be used daily at room temperature, extra vials in refrigerator.

A telephone call to the patient reinforces the truth that the staff cares and is available to answer questions. This concern is helpful to the patient's morale, and also encourages the patient to feel free to call if there are any problems in the future.

### Discussion

This initial introduction to the use of insulin takes from 30 to 60 minutes depending upon the individual patient's ability. If a group of three or

four are taught together, the relative time per patient is reduced. The staff must evaluate any mental or physical handicap which would alter the above teaching plan. Time commitment and personnel commitment are absolutely necessary to start patients on insulin in an outpatient setting. The method outlined in this paper takes minimal time and far surpasses hospitalization or handing the patient a prescription and a well-illustrated book. The person with diabetes can leave the office not only as a knowledgeable and capable partner in his/her own care but as one who also possesses assurances concerning the administration of insulin. To reinforce what was taught, a printed brief summary of the injection technique; the ways to recognize, avoid, and treat hypoglycemia; some diet suggestions; major points about urine testing; rotation of sites; and maintaining communication is given to the patient at the end of the teaching session. The insulin dose and the emergency phone numbers are on this page also.

This educational session is only a beginning of learning for the patient. Many reviews and new material will be added as he or she grows into a capable team member in the management of his/her disease. More in-depth classes can be established for groups of patients. Private physicians can refer their patients to available community classes.

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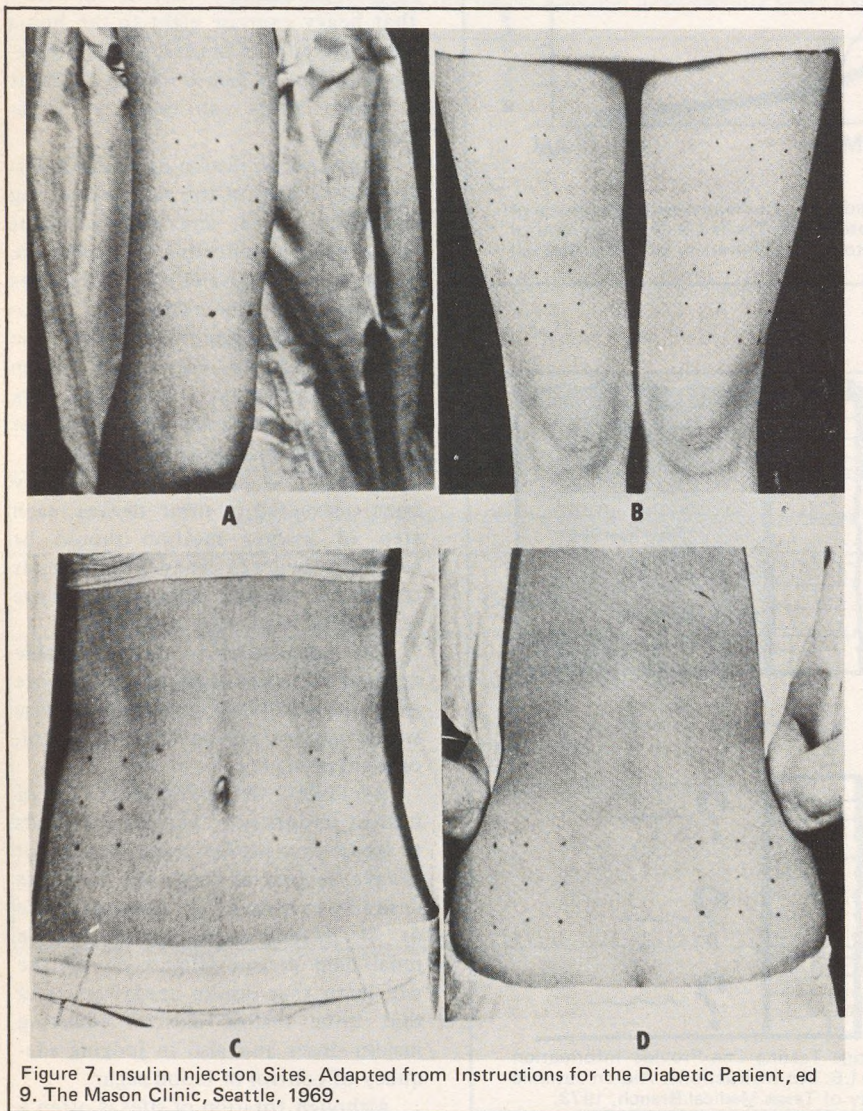


Figure 7. Insulin Injection Sites. Adapted from Instructions for the Diabetic Patient, ed 9. The Mason Clinic, Seattle, 1969.