

## Insulin Therapy: The Question This Issue

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Note: The goal of this section of *Insulin* is to provide answers to frequently asked questions regarding insulin therapy in diabetes. Readers are encouraged to submit their own questions by visiting [www.InsulinJournal.com](http://www.InsulinJournal.com) or by e-mailing [insulin@elsevier.com](mailto:insulin@elsevier.com). One or more questions will be addressed each issue.

#### **Question:**

What choices do my patients have for insulin administration other than syringes and vials?

#### **Answer:**

Traditionally, insulin has been injected subcutaneously with the use of a syringe and a vial. There are several disadvantages to using syringes; many of these shortcomings are addressed by other insulin delivery systems. Examples of these alternate delivery systems include the following:

- An insulin pen is an insulin delivery system that looks like a large pen and has a cartridge prefilled with insulin.
- Insulin pumps inject rapid-acting insulin in basal and bolus format through a cannula inserted subcutaneously.
- Jet injectors force a tiny stream of insulin through the skin under high pressure without using a needle.

#### **Question:**

What kinds of insulin pens are currently available?

#### **Answer:**

Insulin pens were introduced in the United States >10 years ago. Two kinds are available: disposable pens or reusable pens with disposable cartridges. Most pens and cartridges contain 300 U of insulin and are available in boxes of 5. Most pens can inject 60 U, maximum, at one time; an exception is OptiClik®, which can inject 80 U. A list of some of the most commonly used pens is provided in the **table**. NovoLog® FlexPen® is the most commonly prescribed pen in the United States and is the easiest to teach to patients (in the author's opinion).

**Table.** Some insulin pens commonly prescribed in the United States.

Pen Device	Type of Insulin	Usage
NovoLog® FlexPen®	NovoLog, NovoLog Mix 70/30, Levemir	Disposable
NovoPen® 3	NPH, NovoLog	Reusable
InnoLet®	NPH, Regular, Novolin 70/30	Disposable
OptiClik®	Lantus, Apidra	Reusable
Lilly prefilled pen	Humalog, Humalog Mix 75/25, NPH, Humalog Mix 50/50, Humulin 70/30	Disposable
HumaPen® MEMOIR™	Humalog	Reusable

NPH = neutral protamine Hagedorn.

#### **Question:**

Why should my patients use insulin pens?

#### **Answer:**

Insulin pens offer several advantages over vials and syringes:

- Accuracy: Studies have established that there is significant inaccuracy when insulin is withdrawn using a syringe. For example, in one study, when 2 U of insulin were withdrawn with a 100-U syringe by patients and by health care

professionals, the percentage error rate noted was 60% and 45%, respectively. This inaccuracy can be substantially increased for older patients and for those with visual impairment.

- **Convenience:** Insulin pens are simple to carry around and easy to administer under different circumstances. Imagine the scenario of needing to take insulin right before a meal at a restaurant. With a syringe, a patient will need to go to the restroom, find some relatively clean place to place the vial, draw the insulin, and inject. In marked contrast, many patients using insulin pens can discreetly inject insulin right at the table. Thus, there is an enormous difference between the 2 methods in terms of convenience.
- **Social acceptability:** Insulin pens are more unobtrusive and tend to have higher social acceptability at schools and in other circumstances.
- **Less pain:** Overall, insulin pens have smaller-gauge needles. Furthermore, the needle does not need to go through the stopper of a vial and therefore has no chance of being damaged. A damaged needle can cause more pain.
- **Better quality of life and compliance:** Studies have shown that patients using pens perceive a better quality of life. This increases patient compliance, especially the chance of patients adhering to intensive basal-bolus insulin therapy.
- **Less waste of insulin for patients on small doses:** Most insulin vials should not be used for >1 month after opening. Patients with a total daily insulin dose <33 U must discard the remaining insulin. With the use of cartridges that contain 300 U of insulin, this waste is minimized.
- **Appropriate for various patient groups:** Some pens (eg, NovoPen® Junior) can administer insulin in 0.5-U increments and thus are useful for children and patients who are very sensitive to insulin.
- **Practical option for visually impaired patients:** Patients who are visually impaired can administer insulin correctly by dialing up the dose and counting the number of clicks.

**Question:**

If insulin pens have such advantages, why are they not used more commonly?

**Answer:**

Insulin pens are the preferred and predominant way of using insulin in the rest of the developed world, including Europe and Japan. In Europe, ~2 out of 3 prescriptions are written for pen devices; in Japan, ~3 out of 4 prescriptions are written for pen devices. Surprisingly, in sharp contrast, <1 in 20 prescriptions in the United States are written for pen devices. The author finds it perplexing to see such underutilization of pens. Any physician who needs to self-inject insulin would likely consider using a pen rather than a syringe.

Some of the reasons for the infrequent use of pens may include the following:

- Pens are typically more expensive than vials.
- Insurance coverage for pens is not as extensive as for vials. Patients may have to make higher copayments or the pens may not be on the formulary.
- There is a lack of awareness among providers about the advantages of pens.

In addition, insulin pens do have some limitations:

- The maximum dose with one shot is 100 U with a syringe while the maximum dose is 60 to 80 U for most pens.
- Patients taking neutral protamine Hagedorn and bolus insulin twice a day can mix them in one syringe and thus, would need 2 shots daily, as opposed to 4 shots daily with pens.

**Question:**

Are there any special instructions for using pens compared with using syringes?

**Answer:**

- Patients should prime the pens by performing a 1- to 2-U “air shot” before injecting.
- To ensure complete administration, patients should keep the needle in place under the skin after injection by counting to 6.
- HumaPen® MEMOIR™ and OptiClik® pens should not be refrigerated.
- BD pen needles fit all the pens available on the market. Novo Nordisk needles fit on Novo Nordisk pens only.

**Question:**

What is the role of insulin pens in hospitals?

**Answer:**

Insulin pens have several advantages over syringes in the hospital setting (apart from the ones mentioned on the preceding page). It is customary to discard the remaining insulin or give it to the patient at the time of discharge. However, because of the short duration of hospitalization these days, a lot of insulin is wasted with vials. Use of insulin pens would minimize this loss and save a substantial amount of money (eg, one analysis at the author's hospital suggested annual cost savings of \$180,000 by switching to pens). It is also customary for nurses to double-check doses drawn with another nurse. Using pens with a simple number to read may obviate this need and save valuable nursing time.

**Summary:**

- Insulin pens are more accurate, convenient, and discreet than syringes.
- Insulin pens cause less pain than syringes.
- There is a substantial underutilization of pens in the United States compared with other developed countries.
- Providers should always think of pens or other devices when writing a prescription for insulin.
- Pens should become the standard of care in diabetes mellitus management in outpatient as well as inpatient settings.