

Insulin Delivery

Syringes... pumps... jet injectors... pens... infusers... they all do the same basic thing: deliver insulin through the outermost layer of skin and into fatty tissue so it can be used by the body.



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INSULIN DELIVERY

Syringes

Today's syringes are smaller and have finer points and special coatings that work to make injecting as easy and painless as possible. When insulin injections are done properly, most people discover they are relatively painless.

Check with your doctor or diabetes educator; you may want to test several brands before you buy. Your equipment should suit your needs.

Questions to ask:

■ Does your syringe match your insulin dosage? If you take 30 units or less of insulin per dose, you may use the $\frac{3}{10}$ -cc syringe. The $\frac{1}{2}$ -cc syringe may be used by those taking 50 units or less, and the 1-cc syringe is designed for those needing up to 100 units of insulin. If your insulin needs have been increasing, you might want to buy syringes that give you an opportunity to increase your dose if need be. For example, if you take 29 units, consider buying a 50-unit syringe. Using a syringe that more closely matches your dose may help you more accurately draw up your insulin.

If you are changing the syringe you use, check dosage lines carefully.

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SYRINGES (U-100)

Manufacturer/Distributor and Name	Needle Gauge	Needle Size	Packaging
1-cc syringes			
Abbott Laboratories Pharmacy brands* Precision Sure Dose Precision Sure Dose	29G 29G 28G	½" ½" ½"	100 (individually sterile wrapped) 100 (individually sterile wrapped) 100 (individually sterile wrapped)
Aimsco Ultra Thin II Short	30G	⅝"	100 (individually sterile wrapped)
Aimsco Ultra Thin II	29G	½"	100 (10 packs of 10 individually wrapped)
Aimsco Maxi Comfort	28G	½"	100 (10 packs of 10 individually wrapped)
Allison Medical, Inc. SureComfort SureComfort SureComfort SureComfort SureComfort	31G 30G 30G 29G 28G	⅝" ½" ⅝" ½" ½"	100 (10 packs of 10) 100 (10 packs of 10) 100 (10 packs of 10) 100 (10 packs of 10) 100 (10 packs of 10)
BD SafetyGlide Syringe	29G	½"	100 (individually sterile wrapped) safety-engineered
BD Safety-Lok Syringe	29G	½"	100 (individually sterile wrapped) safety-engineered
BD Integra Syringe	29G	½"	100 (individually sterile wrapped) safety-engineered
BD Ultra-Fine Short	31G	⅝"	100 (10 packs of 10)
BD Ultra-Fine	30G	½"	100 (10 packs of 10)
BD Micro-Fine	28G	½"	100 (10 packs of 10)
Cam-Am Care Corp. Monoject Ultra Comfort Short Monoject Ultra Comfort Short Monoject Ultra Comfort 29 Monoject Ultra Comfort 28 Various store brands† Various store brands† Various store brands† Various store brands†	31G 30G 29G 28G 31G 30G 29G 28G	⅝" ⅝" ½" ½" ⅝" ⅝" ½" ½"	100 (individually sterile wrapped) 100 (individually sterile wrapped) 100 (individually sterile wrapped) 100 (individually sterile wrapped) 100 (individually sterile wrapped) 100 (individually sterile wrapped) 100 (individually sterile wrapped) 100 (individually sterile wrapped)
Medicare Lite Touch	30G	⅝"	100 (10 packs of 10)
Medicare Lite Touch	29G	½"	100 (10 packs of 10)
Medicare Lite Touch	28G	½"	100 (10 packs of 10)
UltiMed, Inc. UltiCare, UltiSmooth UltiCare, UltiFine UltiCare, UltiThin UltiCare, UltiThin Short UltiCare, UltiFine II Short UltiGuard, UltiFine** UltiGuard, UltiThin** UltiGuard, UltiThin Short** UltiGuard, UltiFine II Short**	28G 29G 30G 30G 31G 29G 30G 30G 31G	½" ½" ½" ⅝" ⅝" ½" ½" ⅝" ⅝"	100 (10 packs of 10) 100 (10 packs of 10) 100 (10 packs of 10) 100 (10 packs of 10) 100 (10 packs of 10) 100 (10 packs of 10) with disposable container 100 (10 packs of 10) with disposable container 100 (10 packs of 10) with disposable container 100 (10 packs of 10) with disposable container
½-cc syringes			
Abbott Laboratories Pharmacy brands* Pharmacy brands* Precision Sure Dose Precision Sure Dose Precision Sure Dose	30G 29G 30G 29G 28G	⅜" ½" ⅝" ½" ½"	100 (individually sterile wrapped) 100 (individually sterile wrapped) 100 (individually sterile wrapped) 100 (individually sterile wrapped) 100 (individually sterile wrapped)

SYRINGES (U-100) *continued*

Manufacturer/Distributor and Name	Needle Gauge	Needle Size	Packaging
½-cc syringes (continued)			
Aimsco Ultra Thin II Short	31G	5/16"	100 (10 packs of 10 individually wrapped)
Aimsco Ultra Thin II Short	30G	5/16"	100 (10 packs of 10 individually wrapped)
Aimsco Ultra Thin II	29G	1/2"	100 (10 packs of 10 individually wrapped)
Aimsco Maxi Comfort	28G	1/2"	100 (10 packs of 10 individually wrapped)
Allison Medical, Inc.			
SureComfort	31G	5/16"	100 (10 packs of 10)
SureComfort	30G	1/2"	100 (10 packs of 10)
SureComfort	30G	5/16"	100 (10 packs of 10)
SureComfort	29G	1/2"	100 (10 packs of 10)
SureComfort	28G	1/2"	100 (10 packs of 10)
BD SafetyGlide Syringe	29G	1/2"	100 (individually sterile wrapped) safety-engineered
BD Safety-Lok Syringe	29G	1/2"	100 (individually sterile wrapped) safety-engineered
BD Ultra-Fine Short	31G	5/16"	100 (10 packs of 10)
BD Ultra-Fine	30G	1/2"	100 (10 packs of 10)
BD Micro-Fine	28G	1/2"	100 (10 packs of 10)
Can-Am Care LLC			
Monoject Ultra Comfort Short	31G	5/16"	100 (individually sterile wrapped)
Monoject Ultra Comfort Short	30G	5/16"	100 (individually sterile wrapped)
Monoject Ultra Comfort 29	29G	1/2"	100 (individually sterile wrapped)
Monoject Ultra Comfort 28	28G	1/2"	100 (individually sterile wrapped)
Various store brands†	31G	5/16"	100 (individually sterile wrapped)
Various store brands†	30G	5/16"	100 (individually sterile wrapped)
Various store brands†	29G	1/2"	100 (individually sterile wrapped)
Various store brands†	28G	1/2"	100 (individually sterile wrapped)
Medicore Lite Touch	30G	5/16"	100 (10 packs of 10)
Medicore Lite Touch	29G	1/2"	100 (10 packs of 10)
Medicore Lite Touch	28G	1/2"	100 (10 packs of 10)
UltiMed, Inc.			
UltiCare, UltiSmooth	28G	1/2"	100 (10 packs of 10)
UltiCare, UltiFine	29G	1/2"	100 (10 packs of 10)
UltiCare, UltiThin	30G	1/2"	100 (10 packs of 10)
UltiCare, UltiThin Short***	30G	5/16"	100 (10 packs of 10)
UltiCare, UltiFine II Short***	31G	5/16"	100 (10 packs of 10)
UltiGuard, UltiFine**	29G	1/2"	100 (10 packs of 10) with disposable container
UltiGuard, UltiThin**	30G	1/2"	100 (10 packs of 10) with disposable container
UltiGuard, UltiThin Short**	30G	5/16"	100 (10 packs of 10) with disposable container
UltiGuard, UltiFine II Short**	31G	5/16"	100 (10 packs of 10) with disposable container
3/10-cc syringes			
Abbott Laboratories			
Pharmacy brands*	30G	3/8"	100 (individually sterile wrapped)
Pharmacy brands*	29G	1/2"	100 (individually sterile wrapped)
Precision Sure Dose	30G	5/16"	100 (individually sterile wrapped) 1/2-unit barrel markings
Precision Sure Dose	30G	5/16"	100 (individually sterile wrapped)
Precision Sure Dose	29G	1/2"	100 (individually sterile wrapped)
Aimsco Ultra Thin II Short	30G	5/16"	100 (10 packs of 10 individually wrapped)
Aimsco Ultra Thin II	29G	1/2"	100 (10 packs of 10 individually wrapped)

SYRINGES (U-100) *continued*

Manufacturer/Distributor and Name	Needle Gauge	Needle Size	Packaging
3/10-cc syringes (continued)			
Allison Medical, Inc.			
SureComfort	31G	5/16"	100 (10 packs of 10)
SureComfort	30G	1/2"	100 (10 packs of 10)
SureComfort	30G	5/16"	100 (10 packs of 10)
SureComfort	29G	1/2"	100 (10 packs of 10)
BD SafetyGlide Syringe	29G	1/2"	100 (individually sterile wrapped) safety-engineered
BD Safety-Lok Syringe	29G	1/2"	100 (individually sterile wrapped) safety-engineered
BD Ultra-Fine Short	31G	5/16"	100 (10 packs of 10), available in 1/2- and whole-unit barrel markings
BD Ultra-Fine	30G	1/2"	100 (10 packs of 10)
BD Micro-Fine	28G	1/2"	100 (10 packs of 10)
Can-Am Care LLC			
Monoject Ultra Comfort Short	31G	5/16"	100 (individually sterile wrapped)
Monoject Ultra Comfort Short	30G	5/16"	100 (individually sterile wrapped)
Monoject Ultra Comfort 29	29G	1/2"	100 (individually sterile wrapped)
Various store brands†	31G	5/16"	100 (individually sterile wrapped)
Various store brands†	30G	5/16"	100 (individually sterile wrapped)
Various store brands†	29G	1/2"	100 (individually sterile wrapped)
UltiMed, Inc.			
UltiCare, UltiFine	29G	1/2"	100 (10 packs of 10)
UltiCare, UltiThin	30G	1/2"	100 (10 packs of 10)
UltiCare, UltiThin Short	30G	5/16"	100 (10 packs of 10)
UltiCare, UltiFine II Short	31G	5/16"	100 (10 packs of 10)
UltiGuard, UltiFine**	29G	1/2"	100 (10 packs of 10) with disposable container
UltiGuard, UltiThin**	30G	1/2"	100 (10 packs of 10) with disposable container
UltiGuard, UltiThin Short**	30G	5/16"	100 (10 packs of 10) with disposable container
UltiGuard, UltiFine II Short**	31G	5/16"	100 (10 packs of 10) with disposable container

*Sold at Brooks Pharmacy and CVS stores. †Sold at Albertson's, Wal-Mart (ReliOn), Medicine Shoppe, Kroger, Leader, Longs, Kmart (Value Plus), Meijer, Sunmark, Brite Life, Good Neighbor, Family Pharmacy, Shop Rite, Preferred Plus, and Winn Dixie. **Sold under CareOne Rx brand at Stop & Shop, Giant, and Tops. ***Sold under Schnuck's brand. NOTE: The above packaging descriptions represent the most common available for sale. Other packaging configurations may exist.

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In some syringes, one line is equal to one unit of insulin, but in others, each line is equal to two units of insulin. Some syringes have 1/2-unit markings to accommodate children who require small doses and people who are very sensitive to insulin.

■ Be familiar with the gauge of your needle and what it means. The higher the gauge number of your needle, the thinner it is.

■ Can you easily draw up your dosage in a particular syringe? Does the syringe barrel have the kind of markings you can read eas-

ily—or are they too close together? Does having a plunger that's a different color make it easier for you?

■ Would a shorter needle be a better choice for you or your child with diabetes? Some syringes now have shorter needles that many people find to be more comfortable. However, the depth of the injection can change the rate of absorption. Ask your doctor or diabetes educator to assess whether this would be a good alternative to your current syringe.

■ Does this brand come packaged as you prefer?

Cost is another factor because many stores use insulin syringes as key sale items. Shop around for a good price, but ask yourself: Is giving up a good local pharmacist to save \$2 at an out-of-the-way store worth the money?

You may be interested in reusing your syringes. Most manufacturers do not recommend this, and there may be some increased risk to patients (i.e., needle dullness causing discomfort, possible infection, or tissue damage). While this

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MISCELLANEOUS SYRINGE PRODUCTS

Product Name (Manufacturer/Distributor)	Comments
BD Home Sharps Container (BD)	For disposal of used insulin syringes, pen needles, and lancets. Holds 70 to 100 syringes or 300 pen needles.
BD Safe-Clip (BD)	Needle clipping and storage device. Clips and stores up to 1,500 needles. Portable.
BD Sharps Disposal by Mail (BD)	For disposal of insulin syringes, pen needles, and lancets by mail. Holds 70 to 100 syringes or 300 pen needles.
Clip & Stor Insulin Needle Safety System (Links Medical Products Inc.)	For disposal of insulin syringes and pen needles.
UltiGuard Syringes & Disposable Container Unit (UltiMed, Inc.)	UltiGuard syringe line combines 100 syringes with a syringe dispenser and disposal unit. UltiGuard syringe sizes include 1-cc, ½-cc, and ⅓-cc syringes in 29G, 30G, and 31G.

INJECTION AIDS

Product Name (Manufacturer/Distributor)	Description	Syringe Used	Needle Visible	Adjustable Depth of Skin Penetration	Comments
Autoject, Autoject 2 (Owen Mumford, Inc.)	Spring-loaded plastic syringe holder positioned over skin. Press device against site, push button to insert needle automatically without seeing the needle penetrate the skin to deliver the dose.	Autoject: most 1-cc, ½-cc, and ⅓-cc plastic syringes; Autoject 2: Abbott Labs, Precision Sure Dose 1-cc, ½-cc; BD 1-cc, ½-cc	no	yes	Increases injection-site alternatives.
BD Inject-Ease Automatic Injector (BD)	Spring-loaded plastic syringe holder positioned over skin. Insert syringe needle at the touch of a button. Designed for those who have anxiety about injections.	BD 1-cc, ½-cc, and ⅓-cc syringes	no	yes (1 adjustment)	Increases injection-site alternatives, 5-year guarantee.
Inject-Ease (Palco Labs, Inc.)	Spring-loaded plastic syringe holder designed to shield injection from view and reduce pain of injection. One-handed use helps reach alternative sites. Single-button activation inserts needle at proper angle.	BD 1-cc, ½-cc, and ⅓-cc syringes	no	yes (2 adjustments)	Includes clear plunger cap to preload syringes.
Instaject (Medicoool, Inc.)	Combination syringe injector and blood lancet device. Button-activated.	Most 1-cc, ½-cc, and ⅓-cc syringes	no	yes	Self-contained as injector. Lancet adapter only.
NeedleAid (Needle Aid, Ltd.)	Stabilizing guide for injection using an insulin pen or syringe. Broad base hides the needle, masks the sensation of needle entry, provides safety as needle is automatically withdrawn, and ensures injection at the proper angle and to proper depth. Insulin is injected manually. Needle is hidden from view to reduce fear and pain perception.	FlexPen, NovoPen 4, 3, 1.5, Junior, Novo Nordisk disposable pens; Lilly insulin pens; most 1-cc, ½-cc, ⅓-cc syringes	no	no	Appropriate for people with needle phobias, the visually impaired, beginning insulin users, and home care.
NovoPen 3 PenMate (Novo Nordisk, Inc.)	Attachment to conceal the needle to help reduce pain perception.	Fits NovoPen Junior and NovoPen 3 insulin delivery systems	no		

INSULIN PENS, PEN NEEDLES, AND OTHER DELIVERY SYSTEMS

Product Name (Manufacturer/Distributor)	Comments
INSULIN PENS	
Autopen (Owen Mumford, Inc.)	Automatic side injection for delivery from 1.5- or 3-ml insulin cartridge. Available in four models. The Autopen AN 3000 (1.5 ml) delivers 2–32 units in 2-unit increments. The Autopen AN 3100 (1.5 ml) administers 1–16 units in 1-unit increments. The AN 3800 (3 ml) delivers 2–42 units in 2-unit increments. The AN 3810 (3 ml) delivers 1–21 units in 1-unit increments; compatible with Eli Lilly 3-ml cartridge.
Humalog Mix 75/25 Pen (Eli Lilly and Company)	Same as Humalog Pen (see below).
Humalog Pen 50/50 Pen (Eli Lilly and Company)	Same as Humalog Pen (see below).
Humalog Pen (Eli Lilly and Company)	Prefilled, disposable insulin delivery device that holds 3 ml (300 units) of insulin. Knob can be dialed forward or backward in single-unit increments until the number of units appears in the magnifying dose window. No refrigeration needed after first use.
HumaPen Luxura HD (Eli Lilly and Company)	Reusable pen delivers from 1 to 30 units of Humalog in half-unit increments, beginning after the first unit. Allows for dosing to be adjusted either forward or backward with no loss of insulin.
HumaPen Memoir (Eli Lilly and Company)	Reusable pen with memory. Digital display allows user to record and review last 16 insulin doses, including the priming dose. Allows for dosing to be dialed one unit at a time. Dosing size can be altered without wasting any insulin. 1 to 60 units of Humalog from a 3-ml cartridge (100 U/ml).
Humulin N Pen (Eli Lilly and Company)	Same as Humalog Pen.
Humulin 70/30 Pen (Eli Lilly and Company)	Same as Humalog Pen.
Lantus SoloStar (Sanofi-Aventis)	Prefilled, disposable insulin pen. Allows patients to dial dose from 1 to 80 units of insulin. Keep in cool storage (36°F–46°F) until first use. After first use, can be kept at room temperature <86°F, away from direct heat. Can be used for up to 28 days.
Levemir FlexPen (Novo Nordisk)	Prefilled disposable insulin pen that contains 3 ml (300 units) of Levemir. Dose steps are in 1-unit increments for up to 60 units. Large dialing window and audible clicks. Dose dial can be turned backward or forward for dose correction. Dose scale resets to zero after injection. Designed for use with the NovoFine 30G or 31G disposable needles.
NovoLog FlexPen (Novo Nordisk)	Prefilled disposable insulin pen that contains 3 ml (300 units) of NovoLog. Dose steps are in 1-unit increments. Large dialing window and audible clicks. Dose dial can be turned backward or forward for dose correction. Dose scale resets to zero after injection. Designed for use with the NovoFine 30G or 31G disposable needles.
NovoLog Mix 70/30 FlexPen (Novo Nordisk)	Prefilled disposable insulin pen that contains 3 ml (300 units) of NovoLog Mix 70/30. Dose steps are in 1-unit increments. Has large dialing window and audible clicks. Dose dial can be turned backward or forward for dose correction. Dose scale resets to zero after injection. Designed for use with NovoFine disposable needles.
NovoPen Junior (Novo Nordisk)	Insulin delivery in ½-unit increments. Provides precision dosing. Color-coded options provide flexibility for various types of insulin regimens. Designed for use with all Novo Nordisk PenFill 3-ml (300-unit) cartridges and NovoFine 30G or 31G disposable needles.
NovoPen 3 (Novo Nordisk)	Durable insulin pen that delivers insulin in precise 1-unit increments from 2 to 70 units; large, easy-to-read dose indicator for dose setting; designed for use with all Novo Nordisk PenFill 3-ml (300-unit) insulin cartridges and NovoFine 30G or 31G disposable needles.
OptiClik (Sanofi-Aventis)	Reusable insulin delivery device (insulin pen) for use with 3-ml Lantus (insulin glargine [rDNA origin] injection) cartridge (U-100) system or 3-ml Apidra (insulin glulisine [rDNA origin] injection) cartridge U-100 system.

INSULIN PENS, PEN NEEDLES, AND OTHER DELIVERY SYSTEMS

Product Name (Manufacturer/Distributor)	Comments
PEN NEEDLES	
BD Ultra-Fine Pen Needles (BD)	Three sizes: Ultra-Fine Original is BD's widest inner diameter insulin needle (29G, 12.7 mm [$\frac{1}{2}$ "]); makes it easier to press the push button and expel insulin. Recommended for people who take large doses or those with limited manual dexterity. Ultra-Fine Mini is BD's shortest, thinnest needle available (31G, 5 mm [$\frac{3}{16}$ "]); eliminates the need to "pinch up." Can be safely used by both children and adults. Ultra-Fine Short is BD's thinnest needle (31G, 8 mm [$\frac{5}{16}$ "]); offers the best size for most adults. In all sizes, BD-engineered point geometry and patented, micro-bonded needle lubricant for maximum comfort during injection. Paper tab and inner shield are color-coded for easy size/gauge recognition. Can be used with all makes of diabetes pens and dosers sold in the United States.
NovoFine Disposable (Novo Nordisk)	Disposable. Two sizes: 30G, 8 mm and 31G, 6 mm. Thin-wall technology and ultra-sharp points designed to help increase injection comfort. For use with the Novo Nordisk line of insulin delivery systems.
Pen Needles (Can-Am Care, LLC)	Universal pen needles available in 29G/12-mm needles or 31G/8 mm. "Click on" feature makes application to an insulin pen easier. Sold in 100-count box at Publix, Kroger, Wal-Mart (ReliOn).
SureComfort Pen Needles (Allison Medical, Inc.)	Three sizes: 31G/5 mm for children and thin adults; 31G/8 mm for adults; and 29G/12 mm for those needing a longer needle. Color coded on paper tab and needle cover. Silicone coated for injection comfort. All sizes compatible with pens sold in the United States.
UltiCare/Private Label Pen Needles (UltiMed, Inc.)	UltiCare and private label pen needles available in mini (6 mm, 31G), short (8 mm, 31G), and original (12 mm, 29G). Compatible with all brand-name insulin delivery pens. Available in 100- and 50-count boxes.
Unifine Pentips Pen Needles (Owen Mumford, Inc.)	Three sizes: 31G/6 mm ($\frac{1}{4}$ "), 31G/8 mm ($\frac{5}{16}$ "), and 29G/12 mm ($\frac{1}{2}$ "). Ultra-thin lubricated pen needles compatible with all brand-name reusable and disposable cartridge pens. Color-coded hub to distinguish needle size. Available in 100-count box with reusable pen needle remover.
OTHER DELIVERY SYSTEMS	
Innovo (Novo Nordisk)	Insulin delivery system. Insulin can be dosed in 1-unit increments, from 1 to 70 units. Large display features a memory function, which indicates when the last insulin dose was taken and the number of units of the last dose. In addition, a 6-second countdown display indicates when the entire insulin dose has been delivered and the needle may be withdrawn. Designed for use with all Novo Nordisk PenFill 3-ml insulin cartridges (including NovoLog, Novolin R, N, and 70/30) and NovoFine disposable needles.

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practice remains controversial, many patients reuse syringes without any problems. Once again, your health care team can advise you on the practice. (Pen needles, however, should *always* be removed immediately after use; when left in place, they create an open passage to the insulin chamber. The open passage may create air bubbles in the cartridge, which could trap some of the insulin and affect how much actually reaches your body.)

Always follow appropriate

guidelines when disposing of your syringes and lancets. Some states have very specific laws governing disposal of such items. Even if no guidelines exist in your state, you should be considerate of those who could possibly come in contact with used syringes and lancets. Used syringes and lancets can be safely placed in a puncture-proof container that can be sealed shut before it is placed in the trash. (Label the container "USED SHARPS" with a heavy magic marker.) An even better choice?

There are "needle clipping" devices that will clip off your used needles and store them safely for you.

Pumps

The insulin pump is not an artificial pancreas (because you still have to monitor your blood glucose level), but pumps can help some people achieve better control.

Insulin pumps are computerized devices, about the size of a

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INSULIN PUMPS

Accu-Chek Spirit	Animas 2020	CozMore Insulin Technology System
Manufacturer: Disetronic Medical Systems AG	Manufacturer: Animas Corporation	Manufacturer: Smiths Medical MD, Inc.
Size (inches): 3.2 X 2.2 X 0.8	Size (inches): 2.9 X 2.0 X 0.86	Size (inches): 3.2 X 1.8 X 0.9
Wt.: 4.0 oz. with battery and 315-unit cartridge and infusion set	Wt.: 3.13 oz. with battery and full cartridge	Wt.: 3.3 oz. with battery and insulin
Battery Type/Life: (1) 1.5 volt AA alkaline (4 weeks); or NiMH AA rechargeable (1 week)	Battery Type/Life: (1) AA lithium (1.5 volt) 6–8 weeks; can use AA alkaline (shorter life)	Battery Type: (1) AAA
Infusion Set: All standard luer-lock connectors.	Infusion Set: All commercially available sets with standard luer connection.	Infusion Set: All standard luer-lock infusion sets.
Basal #: Five profiles with up to 24 rates each. Temporary basal rate in 10% increments from 0% to 200%, and 15-minute increments from 15 minutes to 24 hours.	Basal #: Up to 12 basal rates in four personalized programs, plus a temporary basal rate; the duration of temporary rates can be adjusted from 30 minutes to 24 hours in 30-minute intervals; 10% increments.	Basal #: Four programmable basal patterns. Temporary basal set in either percent or U/hr, for 30 minutes to 72 hours.
Basal Range: 0.1-unit increments from 0.1 to 25.0 U/hr	Basal Range: 0.025–25 U/hr	Basal Range: 0.05–35 U/hr
Smallest Bolus: 0.1 units	Smallest Bolus: 0.05 units	Smallest Bolus: 0.05 units
Occlusion Alarm: Yes	Occlusion Alarm: Patented sensor and algorithm to detect occlusions promptly.	Occlusion Alarm: Yes
Over-Delivery Alarm: No	Over-Delivery Alarm: Prevented by continuous self-tests, layers of redundancies, and other safeguards.	Over-Delivery Alarm: Yes
Near-Empty Alarm: Yes	Near-Empty Alarm: Yes. User set: 10, 20, 30, 40, or 50 units.	Near-Empty Alarm: Yes
Warranty: 4 years.	Warranty: 4 years.	Warranty: 4 years.
Features: Basal frequency is $\frac{1}{20}$ of hourly basal rate every 3 minutes (fixed time interval). Non-volatile: 90 days history recall of last 30 boluses, last 30 alerts, last 30 daily insulin totals, and last 30 temporary basal rate increases and decreases. Customizable user menus. Resilient end caps add shock resistance. Supports wireless data transfer. Menu navigation with text and icons. Reversible display. 315-unit cartridge size. Side-mounted tactile buttons allow discreet bolus programming. Backlit display. Accu-Chek Pocket Compass software with bolus calculator on fully operational PDA or smartphone available.	Features: Flat panel, high contrast color display screen. ezCarb software stores up to 500 food items from CalorieKing database on the pump. Personalized food lists. Calculator features for carbohydrates, blood glucose corrections, and insulin; reminders for time of day and when to perform blood glucose checks; waterproof tested to 12 feet/24 hours; PrimeSmart step-by-step priming for safety; precise basal rate adjustment in 0.025-unit increments; 24-hour, toll-free customer service; PC download and upload with ezManager. Available in Spanish.	Features: All-in-one pump and blood glucose meter. Cozmonitor snaps onto the Cozmo pump and uses FreeStyle test strips. Blood glucose results are displayed on the Cozmo screen. Bolus calculation based on grams of carbohydrate eaten and personalized insulin-to-carb ratios. Continuously calculates insulin delivery from previous boluses to prevent overdosing. Special alerts (adjustable sound levels) for eight specific reminders can be set daily or for a one-time event. Up to 12 custom meal boluses. Waterproof. CoZmanager PC communications download programs available to view all blood glucose, carbohydrate, bolus, and basal history. 24-hour toll-free help line; insurance reimbursement support; customer training plan; key pad lockout feature; screen backlight; personalized duration of insulin action.

DANA Diabecare IIS	MiniMed Paradigm 522/722 Pump with Continuous Glucose Monitoring System	OmniPod Insulin Management System
Manufacturer: Sooil Development	Manufacturer: Medtronic Diabetes	Manufacturer: Insulet Corporation
Size (inches): 2.95 X 1.77 X 0.74	Size (inches): 3.0 X 2.0 X 0.8 (522 model); 3.6 X 2.0 X 0.8 (722 model)	Size (inches): Omnipod: 1.6 X 2.4 X 0.7; Personal Diabetes Manager (PDM): 2.6 X 4.3 X 1.0
Wt.: 2.52 oz. with battery and full 300-unit cartridge	Wt.: 3.5 oz. (522 with battery; 176-unit reservoir); 3.8 oz. (722 with battery; 300-unit reservoir)	Wt.: 1.2 oz. OmniPod (with full reservoir); 4.0 oz. PDM (with batteries)
Battery Type/Life: (1) 3.6-volt DC (2 to 3 month life)	Battery Type: (1) AAA	Battery Type/Life: OmniPod batteries are integrated into each pod; PDM (2) AAA (up to 4 weeks' life)
Infusion Set: Proprietary sets, including cannula and needle, straight and angled insertion available in 27" and 43" tubing.	Infusion Set: 23" and 43" lengths; inserters available: Quick set (6 mm or 9 mm; at-site disconnect); Sof-set (6 mm or 9 mm; away-from-body disconnect); Silhouette (13 mm or 17 mm; at-site disconnect); Sure-T (6 mm; steel needle; away-from-body disconnect; 23: length only; no serter available).	Infusion Set: Integrated infusion set with automated cannula insertion and no tubing.
Basal #: 24 basal rates plus temporary basal in 10% increments +/- 100% in 60-minute durations up to 12 hours.	Basal #: Three patterns; up to 48 basal rates per pattern; temporary basal rate (fixed rate or percent of basal pattern for 30 minutes to 24 hours in 30-minute increments).	Basal #: Seven basal programs with up to 24 rates per program; temporary basal rates can be set in either percentage or U/hr for 30 minutes to 12 hours in 30-minute increments.
Basal Range: 0.00–16 U/hr in 0.01 increments or 0.1-unit increments	Basal Range: 0.05–35.0 U/hr	Basal Range: 0.05–30.0 U/hr
Smallest Bolus: 0.5 units	Smallest Bolus: 0.1 units	Smallest Bolus: 0.05 units
Occlusion Alarm: Yes	Occlusion Alarm: Yes	Occlusion Alarm: Yes
Over-Delivery Alarm: Yes; internal cross checks.	Over-Delivery Alarm: Yes. Integrated safety check motor with Bio-Pulse helps ensure no over-delivery.	Over-Delivery Alarm: Pumping mechanism design eliminates the risk of over-delivery. Comprehensive safety systems monitor delivery.
Near-Empty Alarm: Yes; audible alerts at 20 units.	Near-Empty Alarm: Yes; by time or volume (user-settable).	Near-Empty Alarm: Yes, with adjustable user settings.
Warranty: 4 years.	Warranty: 4 years.	Warranty: 4 years.
Features: Carbohydrate counting feature, light, watertight, 300-U capacity. Icon-driven programming with PIN access. Presetting of meal-specific, default, or extended boluses. Bolus frequency may be limited, and a "lockout" feature can be enabled. Features selection of 12 languages, 24-hour toll-free technical support.	Features; Pump displays readings every 5 minutes. Low and high glucose alarm. Bolus Wizard calculator. Multiple bolus options include normal, square wave, and dual wave. Works with the Paradigm Real-Time continuous glucose monitoring kit (purchased separately) or as a stand-alone pump. Upgrade program available. Data can be downloaded using the Web-based CareLink Therapy Management software.	Features: OmniPod System consists of two components: OmniPod and PDM. Omnipod is a compact insulin infusion set; inserter and insulin reservoir; automated cannula insertion; no tubing. The PDM is a wireless handheld device that programs the OmniPod and has an integrated FreeStyle blood glucose meter; suggested bolus calculator; food reference library with 1,000+ common food items. Set-up wizard; memory to store 90 days of data (5,400 records). Programmable reminders and alerts; personalized ratios/factors/targets/presets; adjustable auto off; LCD backlight; and child lock-out feature.

INSULIN PUMP SUPPLIES

Product Name (Manufacturer/Distributor)	Type of Product	Features
Accu-Chek Rapid-D (Disetronic Medical Systems)	Infusion set	90° insertion angle, surgical stainless steel needle infusion set with 28-gauge needle. 6-, 8-, and 10-mm needle length with 24", 31", or 43" tubing. Simple connect/disconnect. Low profile. Various insertion site options. Accommodates people with low vision. Compatible with all standard luer-lock insulin pumps. Hypoallergenic self-adhesive. No insertion device needed.
Accu-Chek Tender (Disetronic Medical Systems)	Infusion set	20° to 45° insertion angle with a soft Teflon cannula. 13- and 17-mm cannula lengths with 24", 31", or 43" tubing. Variable angled insertion provides good control and helps avoid contact with muscles and nerves. Connect/disconnect at site. Kink-resistant tubing. Compatible with all standard luer-lock pumps. No insertion device needed.
Accu-Chek UltraFlex (Disetronic Medical Systems)	Infusion set	8- and 10-mm cannula lengths with 24", 31", and 43" tubing. 90° insertion angle. Teflon cannula; tapered; rounded edge reduces risk of snagging and dislodging. Kink-resistant tubing. Simple connect/disconnect at site. Compatible with all standard luer-lock insulin pumps. Accu-Chek LinkAssist now available for UltraFlex infusion sets for automated insertion.
Cleo 90 (Smiths Medical)	Infusion set	Insertion needle automatically retracts into the insertion device, standard luer connection, transparent skin adhesive, Flex-Attach system for 360° site connection and rotation, straight in (90°) soft cannula in 6- and 9-mm lengths.
Fifty50 Medical Infusion Set (Fifty50 Medical)	Infusion set	90° insertion angle with quick disconnect at site. Flexible, non-metal cannula available in 6- and 9-mm lengths. 23" and 43" tubing. Low profile. SetSaver feature protects site from accidental tubing pulls.
Fifty50 Medical Reservoirs (Fifty50 Medical)	Reservoirs	Model 3050: disposable, single-use insulin reservoir for use with Medtronic MiniMed 504, 506, 507c, and 508 insulin pumps. Model 1850 and 3070: single-use insulin reservoir for use with Medtronic MiniMed Paradigm pump. 1.8- and 3-ml capacity. Design allows Paradigm users to connect any standard infusion set to their pump.
Orbit 90 (ICU Medical, Inc.)	Infusion set	360° connector for easy rotation. Low profile, smooth dome shape to reduce snagging. One-handed activation.
Quick Set with Quick-serter (Medtronic Diabetes)	Infusion set compatible with automatic insertion device	90° insertion angle with 6-mm or 9-mm soft, tapered cannula. No overtaping needed; built-in adhesive; at-site disconnect. Available with 23" and 43" tubing. Can be inserted manually or via the Quick-serter insertion device.
Silhouette with Sil-sertable (Medtronic Diabetes)	Infusion set compatible with automatic insertion device	Variable insertion angle with 13- and 17-mm soft, tapered cannula. Conforms to the body's twists and bends. No overtaping needed; built-in adhesive; at-site disconnect. Available with 23" and 43" tubing. Can be inserted manually or via the Sil-serter insertion device.
Sure-T (Medtronic Diabetes)	Infusion set	90° insertion angle with 6-mm fine steel needle. Low-profile design. No overtaping needed; built-in adhesive. Tubing disconnects 4 inches from insertion site for easy detachment from pump.

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call-beeper, that you can wear on your belt or in your pocket. They deliver insulin in two ways: in a steady, measured, and continuous dose (the “basal” insulin) and as a

surge (“bolus”) dose, at your direction, around mealtime. Doses are delivered through a flexible plastic tube called a catheter. With the aid of a small needle, the catheter is in-

serted through the skin into the fatty tissue and is taped in place. In the newer products, the needle is removed and only a soft catheter remains in place.

AIDS FOR PEOPLE WHO ARE VISUALLY OR PHYSICALLY IMPAIRED

Product Name (Manufacturer/Distributor)	Description/Use
SYRINGE AND PUMP MAGNIFIERS	
BD Magni-Guide (BD)	Syringe is slipped into curved channel of Magni-Guide. At opposite end, insulin vial is snapped into collar. Guide magnifies entire scale 1.7 times. Uses BD 1-cc, ½-cc, or ⅜-cc syringe. Available from BD; local pharmacies; Medicoool, Inc.; Gemco Medical.
Pump Monocle (Magnifics, Inc.)	Display magnifier for insulin pumps. Two styles. Soft Monocle wraps around the device with 2X to 3X magnifying lens; or flip version. Available at www.thephonemonocle.com .
Syringe Magnifier (Apothecary Products)	Clips firmly to syringe barrel. Easy calibration readings of ½-cc and 1-cc syringes. Uses any standard-size syringe. Available from local pharmacies.
Tru-Hand (Whittier Medical)	Insulin bottle holder/syringe guide/magnifier. Locks in syringes with direct guide into vial stopper. Magnifies entire scale. Insulin bottles can be changed without removing syringe from device. Available from local pharmacies.
NONVISUAL INSULIN MEASUREMENT	
Count-a-Dose (Medicoool, Inc.)	Syringe-filling device. Empty syringe secured in easy-to-locate platform; slide moves syringe plunger to control insulin intake. Click wheel activates slide to ensure accurate dosage in 1-unit increments. Click heard and felt as wheel is rotated. Holds one or two bottles of insulin for mixed doses. Use with BD U-100, ½-cc Lo-Dose syringe. Available from Medicoool, Inc., and Science Products.
NEEDLE GUIDES AND VIAL STABILIZERS	
Inject Assist (Apothecary Products)	Holds syringe and insulin bottle steady as syringe is filled. Preset dosage guide for accuracy. Holds U-100, U-80, and U-40 syringes.
Injection Safety Guard (Apothecary Products)	Protects hands from accidental injection. Fits over the top of insulin vial, allowing user to place hands underneath safety guard and begin filling the syringe.
NeedleAid (NeedleAid, Ltd.)	Stabilizing guide for injection using an insulin pen or syringe. The broad base indicates where the injection will be made. Ensures injection at the proper angle and to proper depth. Shields the needle for increased safety. Suitable for use with one hand. Insulin is injected manually. Needle is hidden from view to reduce needle fear and pain perception.
VIAL SYRINGE GUIDE	
Vial Syringe Guide (Apothecary Products)	Eliminates blunted or broken needles by safely connecting syringe to insulin bottle.
AUDIBLE GLUCOSE METERS	
Advocate Speaking Meter 4223A (Diabetic Supply of Suncoast)	Speaking glucose monitor walks the patient through performing a glucose check. The Advocate states the room temperature, tells the patient when to apply the sample to the test strip, and gives audible results. Speaks in English and Spanish.
Advocate DUO Speaking Glucose + Blood Pressure Monitor 2 in 1 System 3223A (Diabetic Supply of Suncoast)	Speaking blood glucose plus blood pressure monitor that walks the patient through performing a glucose check. The Advocate states the room temperature, tells the patient when to apply the sample to the test strip, and gives audible results. Speaks in English and Spanish. Checks glucose and blood pressure with the same product.

If you use rapid-acting insulins, you can direct your pump to release a bolus dose close to mealtime to blunt the rise in blood glucose after a meal.

Because the pump also releases incredibly small doses of insulin continuously, this delivery system mimics the body's normal release of insulin. Also, pumps deliver

very precise insulin doses for different times of day, which in many instances are necessary to correct for situations like the dawn phenomenon, the rise of blood

JET INJECTORS

Product Name (Manufacturer/Distributor)	Size/Weight	Features
Advanta Jet (Activa Brand Products, Inc.)	Size: 6 X 1" Weight: 5.6 oz.	Standard model injector for the average skin type. Delivers from ½ to 50 units of all types and mixes of U-100 insulin; 14 comfort settings; 2-year warranty; tactile detents for visually impaired; lifetime benefit program available to all users; video included; toll-free help line; immediate service.
Advanta Jet ES (Activa Brand Products, Inc.)	Size: 6 X 1" Weight: 5.6 oz.	An extra-strength Advanta Jet for those whose skin conditions require additional power from an injector; same features as Advanta Jet.
Gentle Jet (Activa Brand Products, Inc.)	Size: 6 X 1" Weight: 5.6 oz.	A lower-power model Activa Jet specifically designed for children and those with low levels of subcutaneous tissue; 2-year warranty; same features as Advanta Jet.
Medi-Jector Vision (Antares Pharma, Inc.)	Size: 6 X ½" Weight: 4.6 oz.	Needle-free injector. Clear plastic needle-free syringe lets you see dose and eliminate bubbles. Single or mixed doses of U-100 insulin from 2 to 50 units. Digital dose window. Automatic safety switch adds convenience. Training manual, video, and carrying case included. 30-day trial period.

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glucose that occurs in the hours before and after waking.

Many people have chosen the insulin pump because it enables them to enjoy a more flexible lifestyle. To use a pump, however, you must be willing to check your blood glucose frequently and learn how to make adjustments in insulin, food, and physical activity in response to those test results. (These things should be done with insulin injections as well.)

You'll want to check with your insurance carrier before you buy a pump and all the supplies. Although most carriers do cover these items, some do not. Medicare now covers pumps and supplies for people with diabetes (both type 1 and type 2) who meet its eligibility requirements, including those regarding fasting C-peptide levels.

If you are interested in using a pump, talk to your health care team to see if one might be appropriate for you. Your health care team can provide the forms and letters needed to start the process. Pump company representatives can also

help with the process. You and your team can select the brand. For more information on the basic features of each pump see the tables on pages RG24 and RG25.

Injection Aids and Alternatives

This category includes devices that make giving injections easier as well as syringe alternatives.

Talk with your doctor or diabetes educator about these kinds of products. Often, they will make sample products available to you before you make a purchase. You'll want to look for an item that is easy for you to use and is durable. Some items require more skill and dexterity on the part of the user than others, so try several before you buy.

Make sure that the injection aid you purchase works with your brand of syringe and needle length. Some injection aids have adapters for short needles.

Insertion aids. These devices accelerate needle insertion into the skin. Some even aid in push-

ing down the plunger. Most are spring-loaded and hide the needle from view.

Syringe alternatives. At present, this category includes insulin pens, infusers, and jet injectors.

Carrying around an insulin pen is like having an old-fashioned cartridge pen in your pocket—only instead of a writing point, there's a needle, and instead of an ink cartridge, there's an insulin cartridge. (See note on removing pen needles after use, page RG23, first column.) Disposable insulin pens are also available. These devices are convenient, accurate, and often used by people on a multidose regimen.

Insulin pens contain regular, NPH, insulin lispro, insulin aspart, insulin glulisine, or 70/30 or 75/25 premixed insulin. They are particularly useful for people whose coordination or vision is impaired, or for people who are on the go. It's important to double-check your prescriptions after receiving prefilled cartridges to make

sure you got what you asked for.

If you are using a pen with NPH, 70/30, or 75/25, you'll need to follow package instructions to ensure the insulin is well mixed.

Infusers create “portals” into which you inject insulin. With an infuser, a needle or catheter is inserted into subcutaneous tissues and remains taped in place, usually on the abdomen, for 48–72 hours. The insulin is injected into it, rather than directly through the skin into the fatty tissue. Some people are prone to infections with this type of product, so be sure to discuss the necessary cleaning procedures with your health care team.

Jet injectors release a tiny jet stream of insulin, which is forced through the skin with pressure, not a puncture. These devices have

no needles. However, they can sometimes cause bruising.

You will need to work with your health care team to ensure good blood glucose control while you adjust to one of these devices.

You'll want to ask manufacturers about training on the use of a jet injector, as well as how to clean it and how to troubleshoot. If jet injectors interest you, discuss their use with your health care team. Before buying, check to be sure your insurance covers jet injectors.

Aids for People With Visual Impairments

There are several products designed to make injections easier for people who are visually

impaired. Some products handle more than one task.

Nonvisual insulin measurement helps you measure an accurate dose of insulin. Some “click” at each 1- or 2-unit increment of insulin.

Needle guides and vial stabilizers help you insert the needle into the correct insulin vial for drawing up an injection.

Syringe magnifiers help to enlarge the measure marks on a syringe barrel.

It's important to note that some of these aids fit only with specific brands of syringes, so check to be sure the product you want works with your syringe.

Information about blood glucose monitoring aids for people who are visually impaired is found on page RG27. ▲