



**FIT Forum  
for Injection  
Technique  
Canada**



**4<sup>th</sup>  
Edition**



**Recommendations  
for Best Practice in  
Injection Technique**

Available online:  
[www.fit4diabetes.com](http://www.fit4diabetes.com)



Optimizing  
Diabetes Care



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## Introduction

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Forum for Injection Technique (FIT) Canada provides evidence-based best practice recommendations for people with diabetes who are using injectable therapies.

This handy condensed version of the FIT recommendations has been designed as a reference document for key selected sections to be used alongside the full *FIT Recommendations for Best Practice in Injection Technique (4th Edition)*, which can be accessed at [www.fit4diabetes.com](http://www.fit4diabetes.com).



**BD**



embecta, formerly part of BD.  
BD is the manufacturer of the advertised products.

Supported by BD – Diabetes Care

## Preparing for Injection

It is important that healthcare professionals explain that finding the right combination of therapies – which may include injectable therapy – to achieve optimal glycemic targets is the primary treatment goal.

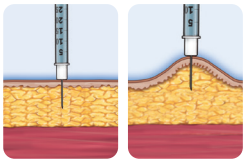
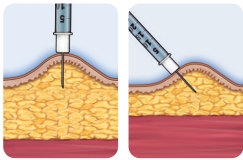
### How can you make a difference?

- Be positive when talking about insulin. How you view insulin is very important and shapes the insulin conversation that you will have with your patient.
- Explain the natural course of type 2 diabetes. Emphasize that insulin and injection therapy should not be seen as personal failure.
- Let them try it. Having your patient perform a self-injection or “dry poke” at diagnosis can help reduce injection-related anxiety.



## 2.0

# The Correct Use of Devices – Syringes

6 mm	Recommended, with or without a skin lift*	
8 mm	Use with a skin lift**	

\*Based on assessment of the injection site and amount of subcutaneous tissue

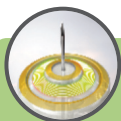
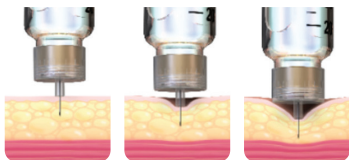
\*\*To prevent intramuscular injection, lean individuals may need to inject into a skin lift at a 45-degree angle

A syringe should never be used to remove insulin from a pen with concentrated insulin, as the scale on insulin syringes is made for U-100 insulin only. The use of current insulin syringes with concentrated insulin (U-200 or U-300) could result in an overdose.

## 2.0

# The Correct Use of Devices – Pen Needles

Increased application force on the pen needle may result in deeper injection of insulin in the tissue.



**Contoured  
base**



**Flat  
base**

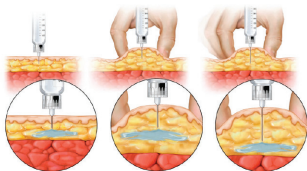


**Conventional  
posted base**

**new**

**Use of non-posted (contoured) pen needle designs may reduce the impact of unintended user pressure across a range of injection forces and subsequent inadvertent IM injections vs. conventional posted-hub pen needle devices of equivalent lengths.**

Proper injection technique for subcutaneous absorption of insulin and GLP-1 receptor agonists: 4 mm pen needle with no skin lift (left); 8 mm pen needle with skin lift (right).



## 2.0

# The Correct Use of Devices – Tips For Making Injections More Comfortable

### Tips for comfort

1. Inspect and palpate the injection site prior to each injection. Any areas with signs of lipodystrophy, edema, inflammation or infection should be avoided.
2. Keep injectable therapy currently in use at room temperature.
3. Use needles of shorter length and smaller diameter.
4. Use a new needle for each injection.
5. Insert the needle through the skin using a quick, smooth movement without excess force.



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FIT Technique Plus - Making Injections more Comfortable

## 5.0

# Site-related Factors that May Affect Insulin Absorption

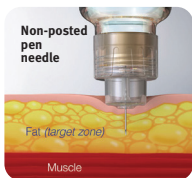
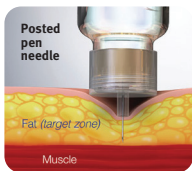
Avoid injections into damaged skin (e.g. from surgical scars or lipohypertrophy) when injecting insulin and GLP-1 receptor agonists. The upper arm and lateral side of the thigh, not proximal to the knee, have a moderate insulin absorption rate.

Intramuscular (IM) injection of all human insulin, as well as rapid- and long-acting analogues, should be avoided due to the risks of erratic blood glucose control and severe hypoglycemia.

Excessive injection force can increase the risk of IM injection. Use of non-posted pen needle may reduce unintended IM injections as compared to posted pen needles.

Massaging the injection site immediately before or after injections is not recommended, as it increases the insulin absorption rate and results in an unpredictable time-action profile.

Insulin is absorbed most consistently from the abdominal area.



Sections 3.0 and 4.0 can be found at [www.fit4diabetes.com](http://www.fit4diabetes.com)

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## 6.0

# Concentrated Insulin – Practical Tips and Special Considerations

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**Concentrated insulin provides an equivalent dose in a smaller volume. There is currently no data available regarding the incidence of lipohypertrophy with concentrated insulins.**

**new**

**Concentrated insulin is available in a pre-filled pen device, in which the dosing window indicates the number of units that will be delivered in a smaller volume. No calculations are required when switching or starting these insulins: 1 unit on the pen = 1 unit of insulin.**

There should be no pen-to-syringe transfer, to avoid dosing errors. Concentrated insulins should not be removed from the pre-filled pen device for use in a syringe, pump or other delivery device, in order to avoid potential overdose or hypoglycemia.

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## 6.0

# Factors Affecting Volume of Injection

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Larger doses of insulin are associated with more leakage and potentially more discomfort.

In obese patients, there is no difference in glycemic control, safety, leakage rates and patient ratings between 4 mm, 5 mm, 8 mm and 12.7 mm pen needle lengths.

The volume of leakage is generally  $<0.1$  IU (or  $<1.0\%$  of total insulin, for most patients) and hence almost always clinically insignificant.

### **Effect of volume on insulin action**

**There is no evidence to support splitting of insulin analogues to improve the pharmacokinetic profile.**

**The decision to use 2 injection sites may be a function of the device (i.e. a maximum single dose of 80 units) or discomfort with injection volume.**

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Check out the **FIT Forum**, a place where Canadian healthcare professionals can stay connected and up to date with all that is new in the area of injection technique.

**Register today:**  
[www.fit4diabetes.com](http://www.fit4diabetes.com)

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# 7.0

## Injectable Therapy – GLP-1 Receptor Agonists

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The injection technique for GLP-1 receptor agonists is similar to insulin; however, there are a few practical differences. GLP-1 receptor agonists are absorbed equally from each of the usual injection sites (i.e. abdomen, arm and thigh).

### Practical Tips

**Regular priming of reusable devices with each injection is not required. Due to the design of these pen devices, priming or flow check (Ozempic® and Victoza®), or “activation” (Adlyxine®), is required only once, prior to administration of the first dose.**

**Trulicity™ and Bydureon® are available in single-use pens with pre-attached needles for once-weekly injections. Bydureon® requires reconstitution prior to injecting. No priming is required for Trulicity™ or Bydureon®.**

While no studies have been published regarding the effect of injecting a GLP-1 receptor agonist into an area of lipohypertrophy, it may be hypothesized that, similar to insulin, erratic absorption of GLP-1 receptor agonists may occur.

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## 9.0

# Effects of Lipohypertrophy

The effects of injecting or infusing insulin into a lipohypertrophic site have been documented as a decrease in the rate of insulin absorption, as well as a variable rate of absorption, thereby resulting in variable glycemic response, unexpected hypoglycemia and increased A1C.

When insulin is injected into lipohypertrophic sites, larger daily doses of insulin are needed to achieve glycemic targets.

Due to the potential for the thickness of the subcutaneous fat layer to vary, even within the same anatomical area, the use of a 4 mm pen needle minimizes the potential for intramuscular injection and allows patients to use a larger area for injection (i.e. a postcard-sized area vs. a postage-stamp-sized area).



Find FIT online – [www.fit4diabetes.com](http://www.fit4diabetes.com)  
FIT Technique Plus – Site Selection and Site Rotation

## 9.0

# Assessment, Prevention and Avoidance of Lipohypertrophy

Education regarding lipohypertrophy should be included during all insulin initiations and reinforced during all discussions with insulin-using patients.



Structured education on injection technique and lipohypertrophy has resulted in improved diabetes control.

### Tips for your practice

1. Inspect and palpate injection sites at each visit.
2. Teach patients to manually inspect and palpate their injection sites prior to injection to detect lipohypertrophy.
3. Teach a proper site rotation pattern using larger injection zones and a new needle for each injection.
4. Caution patients to reduce their insulin dose initially and monitor their blood glucose levels more frequently when moving to healthy tissue.



Find FIT online – [www.fit4diabetes.com](http://www.fit4diabetes.com)  
FIT Technique Plus - Lipohypertrophy

# 10.0

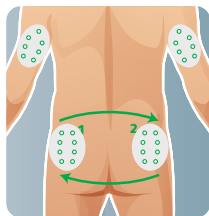
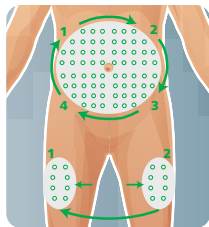
## Site Rotation

Site rotation is essential to avoid lipohypertrophy and to facilitate consistent medication absorption. Injection technique and site rotation should be discussed and demonstrated by the patient at each visit.

Each new injection should be 1 to 2 cm (or 1 finger width) away from the last injection. Structured rotation is recommended in the same anatomical site at the same time of day.

### Sample rotation plan

Divide the injection area into zones. Use 1 zone per week and move clockwise.



**Self-injection in the back of the arm is not recommended. The abdomen is the preferred site for self-injection.**



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FIT Technique Plus – Site Selection and Site Rotation

## 12.0

# Pregnancy

**The abdomen is the preferred area of injection for pregnant women.**

Shorter needles (4 mm or 5 mm) should be used to decrease the potential for intramuscular injection. Use of non-posted pen needle may reduce unintended IM injections as compared to posted pen needles.



During the third trimester of pregnancy, when the skin is taut over the central abdomen, the lateral sides of the abdomen are the recommended areas for injection.

Education should include discussion of the psychological adjustment to insulin use, changes to insulin requirements during pregnancy, appropriate injection sites and their rotation, and prevention of hypoglycemia.



Find FIT online – [www.fit4diabetes.com](http://www.fit4diabetes.com)  
FIT Technique Plus – FIT for Pregnancy

# 13.0

## Older Persons

Assessing cognitive and functional abilities affected by aging is a primary concern when evaluating safety in injection technique in the older person.

### Tips for your practice

1. Assess cognitive function – clock test.
2. Assess depression – Geriatric Depression Scale.
3. Insulin pen use is recommended vs. vial and syringe.
4. Simplified insulin regimens with the use of basal insulins are preferred for safety in older persons.

The recommended area for self-injection in the older person is the abdomen. The use of an insulin pen device with a 4 mm pen needle is encouraged, to avoid the need for a skin lift. Healthcare professionals may recommend the outer aspect of the arm as an alternate site for caregivers who have been educated in injection technique and are responsible for injecting.



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FIT Technique Plus – FIT for the Older Person

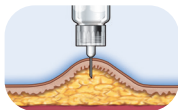


## Pediatrics

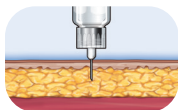
**Assess each individual to determine the amount of subcutaneous fat thickness at each injection site.**

Insulin pens are the injection devices of choice, due to their shorter needle lengths (4 mm, 5 mm or 6 mm);\* 4 mm needles are the safest needle length currently available.

\* In lean children and adolescents, 5 mm and 6 mm needles require a 45-degree angle injection with a skin lift.



**Children aged 2–6**  
4 mm, with skin lift



**Children >6,  
adolescents**  
4 mm, no skin lift

### Adolescents

**Adolescence involves training to become an independent adult and their healthcare and emotional needs are different than younger children or young adults.**

**Many adolescents have a greater tendency to skip insulin, due to peer pressure, rebellion, pain, depression or diabetes burnout, and association of insulin with weight gain.**



Sections 8.0 and 11.0 can be found at  
[www.fit4diabetes.com](http://www.fit4diabetes.com)

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# 15.0

## Insulin Infusion – Practical Tips for Insulin Infusion

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### Consider selecting the proper infusion set based on:

- Patient or caregiver preference
- Ability to self-inject
- Lifestyle and physical activity level
- Cannula length and composition (steel or Teflon)

### Skin preparation:

- Hygiene education is a priority to prevent infection

### Site selection and rotation:

- Apply the same criteria as recommended for site injections
- Inspect infusion sites daily

### Practice Pearl

**Avoid changing infusion set prior to bedtime, as user may not be able to assess proper infusing of insulin.**

### Inserting an infusion set into healthy subcutaneous tissue

- **Manual:** All patients should know how to perform this in case an automatic insertion device is unavailable
  - **Automatic:** Recommended for Teflon catheters to lessen the risk of kinking
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## 15.0

# Insulin Infusion – Troubleshooting

Sudden onset of unexplained hyperglycemia, particularly accompanied by nausea and vomiting, requires prompt attention. DKA can develop quickly after insulin infusion is interrupted. Consider giving insulin by an alternate source (i.e., injection) followed by an assessment of the infusion set, tubing and insulin reservoir and changing if required. The presence of lipohypertrophy and insertion technique should be assessed in the presence of unexplained recurrent hyperglycemia.

- Lipohypertrophy is the most common complication associated with infusion sets when sites are not rotated; the presence of lipohypertrophy and insertion technique should be assessed in the presence of unexplained recurrent hyperglycemia.
- Stabilize the insertion set securely to reduce the risk of movement, dislodgement, and discomfort; pain and discomfort may result from poor insertion technique, type of cannula material used, skin-related issues or site location.

### **Education is the key to success!**

**Education about the functionality of insulin pumps is the most important education. Failure to understand pump mechanics could have serious consequences.**

# 16.0

## Institutions

**All institutions should have an established education program in injection technique to ensure best practice.**

Safety engineered devices (i.e. syringes or pen needles) should be used by healthcare professionals for all injections in an institutional setting, thereby eliminating the need to recap needles.

**One pen, one person.**

To avoid intramuscular injection, the use of a shorter safety engineered pen needle (5 mm), or an angled injection (syringe only), is preferred over a skin lift, to reduce the risk of a needle stick injury. Safety engineered pen needles should have protection from exposure at both ends of the needle to prevent needlestick injury before and after use.



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FIT4Safety Recommendations