

Initiating Insulin in the Community



Karen McDermaid, BSc, BSP, ACPR, CDE

Presented at the University of Saskatchewan's 4th Annual Peter and Anna Zbeetnoff Memorial Drug Therapy Decision-Making Conference, Regina, Saskatchewan, March 2007.

With the shortage of endocrinologists and the growing number of individuals with diabetes, it is imperative that primary care providers be able to initiate insulin in their clients. Numbers in the US indicate that 39% of people with Type 1 diabetes and 82% of people with Type 2 diabetes are cared for by a primary care physician.¹ While insulin must be used in the management of individuals living with Type 1 diabetes, it can also be used for blood glucose management in gestational and Type 2 diabetes. More than 2 million Canadians have diabetes. Ten per cent have Type 1 diabetes and the remaining 90% have Type 2 diabetes. Gestational diabetes affects approximately 3.5% of all pregnancies and involves an increased risk of developing diabetes for both mother and child.

In order to achieve adequate blood glucose control, it is essential to be aware of the recommended targets for blood glucose based on the type of diabetes (Tables 1, 2, 3).

Gestational diabetes (GDM)

Medical nutritional therapy and exercise is the foundation for management in GDM. Self-monitoring of blood glucose (SMBG) guides management based on fasting and postprandial results. If patients are not at target in two weeks,

Table 1
Targets for blood glucose in most patients²

	A1C (%)	FPG (mmol/L)	PPBG (mmol/L)
Target for most patients	< 7	4-7	5-10
Normal range	< 6	4-6	5-8

FPG: Fasting plasma glucose PPBG: Postprandial blood glucose

Table 2
Targets for women with gestational diabetes²

Preprandial	< 5.3 mmol/L
1-hour postprandial	< 7.8 mmol/L
2-hour postprandial	< 6.7 mmol/L

Table 3
Targets in children and adolescents²

Age (years)	A1C (%)	Preprandial BG (mmol/L)
< 5	≤ 9	6-12
5-12	≤ 8	4-10
13-18	≤ 7	4-7
	≤ 6	4-6

BG: Blood glucose

insulin should be started with multiple daily injections being the most effective for management.² Women with GDM often require ≥ 1 unit/kg of insulin daily. To correct fasting

hyperglycemia, the patient should be started on 10 to 15 units of intermediate acting insulin at bedtime with dose adjustments according to glycemic control.³ When > 20% to 25% of postprandial blood glucose test results are > 7.8 mmol/L at one hour and > 6.7 mmol/L at two hours, pre-meal therapy with rapid or regular insulin should be started.³ Initial meal time dose is calculated at one unit of insulin per 10 g of carbohydrate. Dose adjustments are made to achieve desired control of postprandial glucose.

Type 1 diabetes

The regimen used in Type 1 diabetes is dependent on age, lifestyle, socioeconomic factors, family and patient preferences.² Insulin requirements in Type 1 diabetes are 0.5 units/kg/day to 0.7 units/kg/day or 0.2 units/kg/day to 0.6 units/kg/day during the “honeymoon” phase. Initial regimens should consist of at least two daily injections of intermediate and rapid or regular acting insulin. Multiple daily injections (MDI) is the most successful regimen for control in this patient population. The following are options for initiating insulin in Type 1 diabetes with a total daily dose based on 0.5 units/kg:^{4,5}

- **Option A:** MDI with 40% of the total daily dose of insulin given as basal requirement (intermediate or long-acting insulin) at bedtime and 60% of the total daily dose as bolus or meal time dose (rapid or regular insulin) with 35% given at breakfast, 30% at lunch and 35% at supper or meal time insulin based on carbohydrate count
- **Option B:** Three injections per day with two-thirds of the total daily dose as basal

Frequently Asked Questions

1. What regimen is “best” for a patient?

The regimen selected must meet the needs of the patient and assist them with achieving targets. It has to fit with their lifestyle.

2. How can I best explain to a patient what the blood glucose targets are so they can understand?

It sometimes helps to have a visual of what is meant by blood glucose numbers. A blood glucose of 7 mmol/L can be compared to the consistency of skim milk, whereas a blood glucose of 10 mmol/L is more like corn syrup.

3. What can I do for Type 2 patients that are afraid of insulin?⁶

- Identify the patient’s personal obstacles: “Could you tell me some of the reasons why you feel so strongly about not taking insulin?”
- Restore the patient’s sense of personal control: Introduce insulin as an experiment
- Enhance self-efficacy as quickly as possible: Demonstrate insulin use, keep it simple and follow-up with dose adjustments to ensure improvement
- Consider insulin pens
- Frame the insulin message properly: As time goes on, Type 2 diabetes becomes more difficult to manage and insulin is another tool to assist with the management
- Discuss real risks of hypoglycemia: Severe hypoglycemia is rare in Type 2 diabetes
- Tackle injection phobias: If true needle phobia is present, consider referral to a mental health provider familiar with cognitive behavioural therapy
- Pass along the good news: Document how the patient felt before starting on insulin and review this with them after starting insulin. Also review and discuss target numbers

4. Is there a benefit to using rapid-acting insulin (aspart or lispro) or long-acting insulin (detemir or glargine)?

These insulins have been formulated to be similar to physiologic insulin. They produce more predictable results as their absorption is more consistent, action does not appear to vary based on injection site and duration is not affected to the same extent with larger doses as regular or intermediate insulin.

requirement (intermediate or long-acting) and one-third as meal time (rapid or regular). With intermediate insulin, two-thirds of the basal dose is given at breakfast and one-third at bedtime and two-thirds of the rapid or regular dose is given at breakfast and one-third at supper. With long-acting insulin, the basal requirement could be given as a bedtime dose with the rapid or regular dose given at breakfast and supper as above

- **Option C:** Two injections per day with total daily dose split with two-thirds given before breakfast and one-third given before supper. These doses are further broken down to two-thirds intermediate insulin and one-third rapid or regular insulin

Type 2 diabetes

In Type 2 diabetes, insulin can be added at any time and should be considered especially if A1C is > 9% on oral agents.² Targets should be attained in six to 12 months.² The following are options for initiating insulin in Type 2 diabetes:²

- **Option A:** Single bedtime injection (intermediate or long-acting insulin) added to oral antihyperglycemic agents at dose of 0.1 units/kg to 0.2 units/kg at bedtime
- **Option B:** MDI with 40% of the total dose of insulin (0.5 units/kg) as basal insulin (intermediate or long-acting) at bedtime and 20% of the total insulin dose as meal time insulin three times daily (rapid or regular insulin) or based on carbohydrate count
- **Option C:** Two insulin injections per day with premixed insulin (0.5 units/kg) with two-thirds of total insulin dose in the morning and one-third of total insulin dose

Take-home message

- Insulin regimens must fit the lifestyle of the patient
- Recommended targets should be discussed with the patient
- Regimens outlined are examples of where to start
- Self-monitoring of blood glucose guides dose adjustment

with evening meal

General guidelines for dose adjustment include:

- Fix hypoglycemia first (< 4 mmol/L²)
- Correct morning blood glucose to target
- Assess for Somogyi if unexplained hyperglycemia in the morning is present
- Assist the patient in understanding which insulin impacts the respective blood glucose reading
- Adjust one insulin at a time
- On average, one unit of insulin is needed for every 2 mmol/L increase in blood glucose
- Adjust by two units or 10%, whichever is greater **Dx**

References:

1. DeWitt DE, Hirsch IB: Outpatient Insulin Therapy in Type 1 and Type 2 Diabetes Mellitus. JAMA. 2003; 289(17):2254-64.
2. Canadian Diabetes Association 2003 Clinical Practice Guidelines for Prevention and Management of Diabetes in Canada. Can J Diabetes. 2003;27 (Supplement 2).
3. Aronovitz A, Metzger BE. Gestational Diabetes Mellitus: Treatment. ACP Medicine Online. Posted 12/04/2006
4. Building Competency in Diabetes Education: The Essentials. Diabetes Educators Section, Canadian Diabetes Association and Leadership Sinai Centre for Diabetes
5. Beaser RS and the Staff of Joslin Diabetes Centre. Joslin's Diabetes Deskbook: A guide for Primary Care Providers. 2001, Chapter 9 and 10.
6. Polonsky, WH, Jackson RA. What's so tough about taking insulin? Addressing the problem of psychological insulin resistance in Type 2 diabetes. Clinical Diabetes. 2004;22(3):147-50.0



Ms. McDermaid is the Manager, Rural Pharmacy Practice, Regina Qu'Appelle Health Region, Regina, Saskatchewan.