

New trends in diabetes care

By Lorraine Samis, RN, CDE

There are many new advances in the field of diabetes care. Not only are there new insulin, new insulin delivery devices, advanced blood glucose meters, and lower targets for lipids and blood sugar levels, but also there is much discussion about prevention. It is challenging for staff that works directly in diabetes care to keep up with the changes, let alone nursing staff working in other specialties! The basic cornerstones of diabetes care, nutrition and physical activity, still exist. More emphasis is being placed on weight loss and obesity. Obesity is increasingly recognized as a health epidemic and a modifiable risk factor for diabetes and cardiovascular disease.

Blood glucose meters

The glucose monitoring industry has conducted significant studies in the past year, and there are more than 20 meters on the market. Some meters require as little as 0.3 microlitres of blood. Most meters can obtain a result within five to 15 seconds and have a memory system, but manual recording by clients is still beneficial. Some meters have a computer chip in them that can graph values, store insulin dose values, and program in carbohydrates and minutes of exercise. A few meters will allow patients to test "alternative sites" rather than relying on fingers (i.e., forearm, thighs and lower thumb area), though testing sites other than fingers is not advised when patients are checking for hypoglycemia. We are all waiting for the "non-invasive meter." Reports are that we may see this in 2006. There already is a "glucowatch" available in the U.S. that has a sensor pad that picks up readings, but self-blood glucose monitoring is still suggested. Initial pricing on this non-invasive technology will be prohibitive for many.

Lancing devices all have a depth setting and are much kinder than they used to be. There is even a preloaded lancing device on the market making testing easier for the person with diabetes.

Oral agents for Type 2 diabetes

There are many new medications available for people with diabetes. We are seeing a decrease in the use of old standbys such as Diabeta® and Diamicon®. The following chart taken from the Canadian Diabetes Association's (CDA) 2006 pamphlet identifies the available oral agents, the recommended dosing and indicators for use (Figure One). We know that compliance is improved if we can simplify the regimen, so many companies are starting to combine two different types of oral agents together. An example of this is Avandamet® (a combination of Avandia® with Metformin®).

Insulin and insulin devices

There is renewed energy across the entire treatment spectrum to use insulin earlier and more intensively (CDA, 2006). Currently, all insulin is produced synthetically. Premixed insulins are still popular with the rapid-acting insulins used extensively. In Canada in 2005, new insulin, Lantus®, was

introduced that did not have "peak" times. Since this new "peak-less", long-acting "basal insulin" hit the market, we have seen many clients switch. A second company released similar insulin, Levemir®, in 2006 making the much-used combos of intermediate insulin (N) and regular insulin (R) at breakfast and at supper out of date.

Regular or short-acting insulin

Humulin R® or *Novolin Toronto®* reach the blood stream within 30 to 60 minutes after injection, peak from two to four hours and are effective for five to eight hours.

Rapid-acting

Humalog® or *Novo Rapid®* begin to work 10 to 15 minutes after they are injected, peak in about one hour and continue to work for four to five hours. People inject just before a meal or, occasionally, after a meal. These are considered mealtime insulins.

Intermediate-acting insulin

Humulin N® or *Novolin NPH®* generally reach the blood stream in one to three hours, peak in five to eight hours and are effective for up to 18 hours.

Long-acting insulin

Reaches the blood stream in three to four hours and is effective for 22 to 26 hours. It does have a peak action and can be absorbed at different rates.

Extended long-acting

Lantus® or newly released *Levemir®* have continuous peak-less action that mimics natural basal (background) insulin secretion. This insulin is clear in appearance and should not be mixed with any other types of insulin. It starts to work in 90 minutes and the duration is about 24 hours.

Inhaled insulin

Similar to asthma puffers, the insulin aero-chambers should be released this year. They will be used to replace short, fast-acting insulin to cover meals.

The majority of people on insulin who have visited a diabetes education centre in the past few years will use an insulin pen. This device has a 3ml cartridge of insulin inserted into a pen-like device with a disposable needle-tip screwed on. Needles are getting shorter and finer. The most common is the 8mm (short) needle, which is 31G, but the trend is to move to the 6mm 32G (mini) needle. A few patients with diabetes still use the old 12mm 29/30G. Adiposity and patient preference are considerations in choosing a needle size.

As previously mentioned, the trend is to initiate insulin therapy earlier in those with Type 2 diabetes. Most may be started on bedtime insulin using intermediate insulin or long-acting insulin. The goal is to lower the morning sugars so that oral agents can control the daytime sugars. If this approach is not successful, then daytime insulin needs to be added.

As Haire-Joshu (1996) states, "Insulin pumps are far more utilized than in the past, especially for children" (p. 218). There

Figure One. Oral agents for Type 2 diabetes

Name/Dosage/mg	Class	Comments
Diamicon [®] , 40-160 mg (usually BID) or Diamicon [®] , MR (usually OD) (glicazide)	• • •	• 1 Usually once or twice daily dosing with meals • 2 Less risk of lows – preferred to glyburide in elderly • 3 Shown to decrease blood stickiness
Diabeta [®] , 2.5-20 mg daily (usually BID) (glyburide) – modified release		• 4 Usually once or twice daily dosing with meal
Amaryl [®] , OD 1 - 4 mgm tablets 1 - 8 mm dosing (glimepride)		• 5 Usually once daily dosing with meal • 6 Less risk of low blood sugar • 7 Weight neutral +improves after meal insulin
Gluconorm [®] , (repaglinide) 0.5-1 mg, 2 mg, max daily 16 mg (with meals)	• •	• 1 Rapid onset short duration • 2 Take right before a meal • 3 If you miss a meal – do not take tablet • 4 Weight neutral • 5 Interacts with some drugs treating fungal and bacterial infections • 6 Can be combined with metformin & TZDs. Gluconorm’s effects last 4 hours
Starlix [®] , (nateglinide) supplied 60, 120, 180 mgm 360 mlg – 540 mgm		• 1 Starlix effects last 2 hours.
Glucophage [®] , 500-2500 mg (BID or TID) (metformin)	• 2 biguanide • 3 Used to treat excessive glucose release by the liver and improves insulin resistance	• 4 Useful in obese, high cholesterol individuals • 5 Given 2-3 times a day with food • 6 Can be used in combination with other oral agents and insulins • 7 Avoid with active heart disease, kidney or liver disease • 8 Stomach side effects may occur initially – loose stools, metallic taste in mouth • 9 May lower side effects if using brand name • 10 Does not cause weight gain, low risk of low blood sugar when used alone
Avandia [®] , 2-8 mg (OD or BID) (rosiglitazone)	• • • •	• 1 Used alone or in combination therapy • 2 Taken once or twice daily • 3 Side effects: upper respiratory tract infection • 4 If you develop shortness of breath, edema, nausea and vomiting, yellowing of skin, contact doctor • 5 Can cause weight gain and fluid retention • 6 Do not use with some heart conditions
Actos [®] , 15-45 mg (OD) (pioglitazone)		• 7 Used alone or in combination therapy, side effects as above • 8 Taken once daily only • 9 May increase HDL, lower Trigs
Prandase [®] , 25-300 mg daily (acarbose)	• 1 alpha-glucosidase inhibitor • 2 Used to slow absorption of carbohydrates and decrease after meal blood sugar	• 1 Take with meals at first bite of food • 2 Start at low dose and increase slowly to minimize stomach symptoms such as gas and stomach discomfort, can be used in combination with all oral agents and insulin • 3 May affect absorption of some drugs • 4 Very low risk of low blood sugar when used alone • 5 If low blood sugar does happen, treat with 3 glucose tablets
OD – Once a day	BID – Twice a day	TID – Three times a day

are several pumps on the market. Insulin pumps can be programmed to release a basal amount of insulin and a bolus dose on an as-needed basis (usually meal coverage).

User-friendly, most pumps can be programmed with about the same amount of difficulty as programmed wristwatches and contain alarms for malfunctions and dosage ceilings. Subcutaneous access is achieved by a small flexible plastic catheter (inserted with a needle). The catheter may be used for two to three days before it is replaced. Usually, fast-acting insulin is used in a pump. Pumps offer light control that mimics what a pancreas should do, giving motivated patients the benefits of flexibility. Initially reserved for Type 1 diabetes, pumps can now be used in Type 2 as well.

One risk for pump users is diabetic ketoacidosis (DKA) if, for some reason, the tubing gets kinked or disconnected by accident. Pumps retail for about \$500.00 and clients can also expect to pay approximately \$1,200.00 in tubing costs. Some private insurance companies offer coverage for these costs.

Ongoing diabetes research in this area continues to be exciting. We can look forward to pump companies integrating with continuous glucose monitoring that displays real-time glucose readings while incorporating trend graphs every five minutes.

Nutrition therapy

The traditional standards of nutrition therapy in diabetes still exist: lower sugar, lower fat, following Canada's Food Guide, portion control and timing of meals. Counting calories per day diet is seldom used anymore (i.e. 1,200 calories). The new buzz words are glycemic index (GI) and carb counting.

Glycemic index measures the increase in blood glucose after a certain food is eaten. Different types of carbohydrate foods have different effects on blood glucose levels. A lot of starchy foods have a high glycemic index. People with diabetes are encouraged to choose food with a lower glycemic index, for example, choosing stone ground whole wheat versus white bread.

Carbohydrate counting is a way of counting how much sugar and starch are in a meal. A registered dietitian will set up target carb amounts for each meal and snack based on lifestyle and medication. Sources of carbs are starches, fruit and some vegetables, milk and yogurt, sugars and sweets.

Physical activity

Exercise is a key component of management. A minimum of 30 minutes of regular moderate physical activity per day is recommended. For most, walking is the answer and building up to 45 to 60 minutes per day is beneficial. Some choose to use a pedometer. Here, the goal of 10,000 steps a day is recommended. Resistance training such as lifting weights three times a week is also recommended.

Target values

The following table highlighting the recommended blood glucose targets for people with diabetes was taken from the Canadian Diabetes Association's (2003) clinical practice guidelines.

Complications

Improving quality of life and preventing complications are goals of diabetes care. There are strong links between diabetes and cardiovascular disease. Current research (CDA, 2003) stresses the importance of adhering closely to targeted levels for blood pressure, lipids and blood glucose control. Aspirin therapy is also recommended for people with diabetes. As well, exercise stress tests are being completed for these people to rule out cardiac complications. Regular dental and eye exams are a must, daily foot inspection with early and appropriate interventions is being stressed.

Identifying and dealing with stress is a key in management. We also look at sleep deprivation and its effect on blood glucose values. There are strong links between diabetes (CDA, 2003) and sleep apnea and more research is being done in this area.

Research

There is a vast amount of research being conducted all over the world in the field of diabetes. Canadian and Albertan

	A1C*	Blood glucose level after meals	Blood glucose level after two hours after meals
Target for most people with diabetes	7.0% or less	4.0-7.0 mmol/l	5.0-10.0 mmol/l
Normal range	6.0% or less	4.0-6.0 mmol/l	5.0-8.0 mmol/l

**A glycosylated hemoglobin or A1C test is a test that tells us about a patient's blood glucose levels over the past three months and should be done every three to four months.*

Targeted blood pressure for people with diabetes is <130/80. For those people with kidney damage, the targeted blood pressure is < 125/75.

Total cholesterol < 4.5 mmol/l is recommended with HDL > 1 mmol/l and LDL < 2.5 mmol/l. Triglycerides < 1.5 mmol/l with a Ratio < 4 mmol/l


Annual monitoring for kidney function (serum urea, creatinine), urine microalbumin and albumin creatinine ratio as well as creatinine clearance need to be completed. Regular kidney function tests are crucial for both Type 1 and Type 2 diabetes. Referrals to a nephrologist are done early if needed.

researchers are certainly leading the way, not only in Canadian trials, but international trials as well. Edmonton is world-renowned for pioneering the islet cell transplants. Still in the research stage, fewer than 90 procedures have been performed in the province. Research is also being completed on prevention, understanding Type 2 diabetes, new drugs to combat complications and weight loss, as well as drugs to treat neuropathy.

Two new injectable drugs released recently in the U.S. will be interesting to watch. Byetta® is a prescription for those with Type 2 diabetes who take oral medication. It enhances insulin secretion in the presence of high blood glucose. It is available in pen delivery and is taken one hour before meals. Symlin® is an injectable prescription for Type 1 or 2 diabetics who take insulin. It enhances the way insulin works and is taken just before the meal. As well, research is ongoing in the areas of: links between schizophrenia and diabetes, dealing with depression in diabetes, and herbal and vitamin mineral therapy (CDA, n.d.).

In conclusion, the field of diabetes is ever-changing. There are fewer “norms” than we have seen in the past and each person’s care is tailored to them. As with every disease process, you see motivated and educated clients and others that place diabetes on the back burner until a health event “hits” them.

We know that few people with diabetes are actually seen in specialized centres due to lack of resources and waiting lists. The family physician is increasingly being asked to deal with these complicated clients.

Diabetes is a chronic disease with co-morbidities. Health system transformation is underway around the world. Multi-dimensional care is crucial in chronic disease management. Healthy lifestyle and prevention is the key. National strategies for public health change are crucial. 

About the author

Lorraine is a graduate of the Holy Cross School of Nursing in Calgary. She coordinates the Diabetes Education Centre in Brooks, Alberta, in the “Living Healthy Program” of the Palliser Health Region. Lorraine has been a certified Diabetes Educator since 1992. Lorraine was honoured with the National Diabetes Educator of the Year Award in 1999.

Lorraine devotes a tireless amount of effort to diabetes education for all patients in our region. There has been a significant impact on the volume of people with diabetes needing to access information through the emergency department since Lorraine took on this educator position. We are only seeing patients who are in crisis or, as Lorraine mentions in her article, have been non-compliant in their care.

References

- Canadian Diabetes Association. (2003). **Clinical practice guidelines for the prevention and management of diabetes in Canada.** Toronto, Ontario: Author.
- Canadian Diabetes Association. (2006). **Insulin: Things you should know.** Toronto, Ontario: Author.
- Haire-Joshu, D. (Ed.). (1996). **Management of diabetes mellitus: Pharmacological therapies in the management of diabetes mellitus** (pp. 202-233). St. Louis: Mosby.

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