Canadian Diabetes Association
2013 Clinical Practice Guidelines

Presentation by: Kerry Mansell, PharmD, CDE
Learning Objectives

By the end of this session, participants will be:

1. familiar with most major changes within the 2013 CDA clinical practice guidelines
2. able to apply the recommendations in clinical practice and be familiar with online resources
“Neither evidence nor clinical judgment alone is sufficient.

Evidence without judgment can be applied by a technician.

Judgment without evidence can be applied by a friend.

But the integration of evidence and judgment is what the healthcare provider does in order to dispense the best clinical care.”

(Hertzel Gerstein, 2012)
What is new in making the diagnosis of diabetes?
Diagnosis of Diabetes 2013

FPG ≥7.0 mmol/L
Fasting = no caloric intake for at least 8 hours

or

A1C ≥6.5% (in adults)
Using a standardized, validated assay, in the absence of factors that affect the accuracy of the A1C and not for suspected type 1 diabetes

or

2hPG in a 75-g OGTT ≥11.1 mmol/L

or

Random PG ≥11.1 mmol/L
Random = any time of the day, without regard to the interval since the last meal

2hPG = 2-hour plasma glucose; FPG = fasting plasma glucose; OGTT = oral glucose tolerance test; PG = plasma glucose
# Diagnosis of Prediabetes*

<table>
<thead>
<tr>
<th>Test</th>
<th>Result</th>
<th>Prediabetes Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fasting Plasma Glucose (mmol/L)</td>
<td>6.1 - 6.9</td>
<td>Impaired fasting glucose (IFG)</td>
</tr>
<tr>
<td>2-hr Plasma Glucose in a 75-g Oral Glucose Tolerance Test (mmol/L)</td>
<td>7.8 – 11.0</td>
<td>Impaired glucose tolerance (IGT)</td>
</tr>
<tr>
<td>Glycated Hemoglobin (A1C) (%)</td>
<td>6.0 - 6.4</td>
<td>Prediabetes</td>
</tr>
</tbody>
</table>

* Prediabetes = IFG, IGT or A1C 6.0 - 6.4% → high risk of developing T2DM
## A1C Level and Future Risk of Diabetes: Systematic Review

<table>
<thead>
<tr>
<th>A1C Category (%)</th>
<th>5-year incidence of diabetes</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.0-5.5</td>
<td>&lt;5 to 9%</td>
</tr>
<tr>
<td>5.5-6.0</td>
<td>9 to 25%</td>
</tr>
<tr>
<td>6.0-6.5</td>
<td>25 to 50%</td>
</tr>
</tbody>
</table>

• http://guidelines.diabetes.ca/ScreeningAndDiagnosis/Screening
If you choose to use a diabetes risk calculator …

- For people 40 - 74 years old
- Components
  - Age, sex, BMI, waist circumference
  - Physical activity level, eating veg and fruits
  - Hypertension, history of dysglycemia (GDM, acute illness etc.) macrosomia
  - Family history, ethnicity, level of education
- Calculates low, moderate or high risk groups
THE CANADIAN DIABETES RISK QUESTIONNAIRE

CANRISK

→ Are you at risk?

The following questions will help you to find out if you are at higher risk of having pre-diabetes or type 2 diabetes. Pre-diabetes is a condition where a person's blood sugar levels are higher than normal, but not high enough to be diagnosed as diabetes. You can have pre-diabetes or undiagnosed type 2 diabetes without having any obvious warning signs or symptoms.

Knowing your risk can help you make healthy choices now that will reduce your risk or even prevent you from developing diabetes.

Please answer the questions honestly and completely as you can. If you wish, a friend or family member can help you to complete this form. The answers to these questions are completely confidential. Answer all questions. Enter your scores for each question in the box on the right-hand side and then add them up to calculate your total risk score.

This questionnaire is intended for adults aged 40 to 74 years.

→ AS YOU GET OLDER, YOUR RISK OF DEVELOPING DIABETES GOES UP.

1. Select your age group:
   - 40-44 years
   - 45-54 years
   - 55-64 years
   - 65-74 years
   0 points
   7 points
   13 points
   15 points

2. Are you male or female?
   - Male
   - Female
   6 points
   0 points

→ BODY SHAPE AND SIZE CAN AFFECT YOUR RISK OF DIABETES.

3. How tall are you and how much do you weigh?

   On the left-hand side of the BMI chart below, circle your height, then on the bottom of the chart circle your weight. Find the square on the chart where your height crosses with your weight, and note which shaded area you fall into.

   For example, if you were 5 feet 2 inches (or 157.5 cm) and 163 pounds (or 74 kg) you would fall in the LIGHT GREY area.

   Select your BMI group from the following choices:
   - White (BMI less than 25)
   - Light grey (BMI 25 to 29)
   - Dark grey (BMI 30 to 34)
   - Black (BMI 35 and over)
   0 points
   4 points
   9 points
   14 points

   WEIGHT (kg)
   10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60
   HEIGHT (m)
   1.51 1.52 1.53 1.54 1.55 1.56 1.57 1.58 1.59 1.60 1.61 1.62 1.63 1.64 1.65 1.66 1.67 1.68 1.69 1.70 1.71 1.72 1.73 1.74 1.75 1.76 1.77 1.78 1.79 1.80 1.81 1.82 1.83 1.84 1.85 1.86 1.87 1.88 1.89 1.90 1.91 1.92 1.93 1.94 1.95 1.96 1.97 1.98 1.99 2.00
   4 foot 9 inch
   4 foot 10 inch
   4 foot 11 inch
   5 foot 0 inch
   5 foot 1 inch
   5 foot 2 inch
   5 foot 3 inch

   WEIGHT (kg)
   10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60
   BMI
   18.5 19 19.5 20 20.5 21 21.5 22 22.5 23 23.5 24 24.5 25 25.5 26 26.5 27 27.5 28 28.5 29 29.5 30 30.5 31 31.5 32 32.5 33 33.5 34 34.5 35 35.5 36 36.5 37 37.5 38 38.5 39 39.5 40 40.5
   4 foot 9 inch
   4 foot 10 inch
   4 foot 11 inch
   5 foot 0 inch
   5 foot 1 inch
   5 foot 2 inch
   5 foot 3 inch

4. Using a tape measure, place it around your waist at the level of your belly button. Measure after breathing out. Do not hold your breath and try to breathe freely while you do it. Then check the box that contains your measurement. (Note: this is not the same as the "waist size" on your pants).

   MEN – Waist circumference: ________ inches OR ________ cm
   - Less than 94 cm or 37 inches
   - Between 94-102 cm or 37-40 inches
   0 points
   4 points
   6 points
   0 points
   4 points
   6 points

   WOMEN – Waist circumference: ________ inches OR ________ cm
   - Less than 80 cm or 31.5 inches
   - Between 80-88 cm or 31.5-35 inches
   - Over 88 cm or 35 inches
   0 points
   4 points
   6 points

5. Do you usually do some physical activity such as brisk walking for at least 30 minutes each day? This activity can be done while at work or at home.
   - Yes
   - No
   0 points
   2 points
   1 point

6. How often do you eat vegetables or fruits?
   - Every day
   - Not every day
   0 points
   2 points

→ HIGH BLOOD PRESSURE, HIGH BLOOD SUGAR, AND PREGNANCY-RELATED FACTORS ARE ASSOCIATED WITH DIABETES.

7. Have you ever been told by a doctor or nurse that you have high blood pressure OR have you ever taken high blood pressure pills?
   - Yes
   - No or don't know
   0 points
   4 points
   0 points

8. Have you ever been found to have a high blood sugar either from a blood test, during an illness, or during pregnancy?
   - Yes
   - No or don't know
   0 points
   14 points
   0 points

9. Have you ever given birth to a large baby weighing 9 pounds (4.1 kg) or more?
   - Yes
   - No, don't know, or not applicable
   1 point
   0 points
   0 points

→ SOME TYPES OF DIABETES RUN IN FAMILIES.

10. Have any of your blood relatives ever been diagnosed with diabetes?
   - Check all that apply
   - Mother
   - Father
   - Brothers/Sisters
   - Children
   - Other
   - No/Don't know
   2 points
   2 points
   2 points
   2 points
   2 points
   0 points

→ OTHER FACTORS ARE ALSO RELATED TO DEVELOPING DIABETES.

11. Please check off which of the following ethnic groups your biological (blood) parents belong to:
   - White (Caucasian)
   - Aboriginal
   - Black (African-Caribbean)
   - East Asian (Chinese, Vietnamese, Filipino, Korean, etc.)
   - South Asian (East Indian, Pakistani, Sri Lankan, etc.)
   - Other non-whites (Latin American, Arab, West Asian)
   0 points
   3 points
   5 points
   10 points
   11 points
   3 points

→ ADD YOUR SCORE FROM QUESTIONS 1 TO 12.

   Your combined score cannot be more than 80 points.

   (6 points for each category, do not count multiple children or siblings twice.)

Total Score

→ LOWER THAN 21 → LOW RISK
   Your risk of having pre-diabetes or type 2 diabetes is fairly low. Use these tools to maintain a healthy lifestyle.

   21-32 → MODERATE RISK
   Based on your identified risk factors, your risk of having pre-diabetes or type 2 diabetes is moderate. You may wish to consult with a health care practitioner about your risk of developing diabetes.

   33 and over → HIGH RISK
   Based on your identified risk factors, your risk of having pre-diabetes or type 2 diabetes is high. You may wish to consult with a health care practitioner to discuss getting your blood sugar tested.

Diabetes is a serious chronic disease and uncontrolled diabetes can lead to heart disease, kidney disease and other conditions.

If you have any concerns, please consider discussing your results with a health care practitioner (e.g. family doctor, nurse practitioner, pharmacist).

Adding up your points from questions 1 to 12.

Thank you for completing the Canadian Diabetes Risk Questionnaire.
Glycemic Targets:
New Targets and why?
Targets Checklist

✓ **A1C ≤ 7.0%** for MOST people with diabetes

✓ **A1C ≤ 6.5%** for SOME people with T2DM

✓ **A1C 7.1-8.5%** in people with specific features
Why $\leq 7\%$?

Macro and Microvascular Benefits?
A1c ≤ 7.0%

- Large trials support this number with reduced complications
- It can usually be safely achieved in most people with diabetes
Why $\leq 6.5\%$ ?
A1c ≤ 6.5%

- Encourage in those in whom it is safe to do so
- Some evidence of reduced microvascular complications (ADVANCE)
- Recurrent hypoglycemia is associated with detrimental effects on vasculature, increased risk of falls, cognitive decline
Why 7.1-8.5%?
Consider A1C 7.1-8.5% if ... 

- Limited life expectancy
- High level of functional dependency
- Extensive coronary artery disease at high risk of ischemic events
- Multiple co-morbidities
- History of recurrent severe hypoglycemia
- Hypoglycemia unawareness
- Longstanding diabetes for whom is it difficult to achieve an A1C ≤ 7%, despite effective doses of multiple antihyperglycemic agents
A target A1C $\leq 6.5\%$ may be considered in some patients with type 2 diabetes to further lower the risk of nephropathy and retinopathy which must be balanced against the risk of hypoglycemia.

**Consider 7.1-8.5% if:**
- Limited life expectancy
- High level of functional dependency
- Extensive coronary artery disease at high risk of ischemic events
- Multiple co-morbidities
- History of recurrent severe hypoglycemia
- Hypoglycemia unawareness
- Longstanding diabetes for whom it is difficult to achieve an A1C $\leq 7\%$, despite effective doses of multiple antihyperglycemic agents, including intensified basal-bolus insulin therapy
Diabetes in the Elderly Checklist 2013

✓ ASSESS for level of functional dependency (frailty)

✓ INDIVIDUALIZE glycemic targets based on the above (A1C ≤ 8.5% for frail elderly) but if otherwise healthy, use the same targets as younger people

✓ AVOID hypoglycemia in cognitive impairment, frail elderly

✓ SELECT antihyperglycemic therapy carefully
  ✓ caution with sulfonylureas or thiazolidinediones
  ✓ Basal analogues instead of NPH or human 30/70 insulin
  ✓ Premixed insulins instead of mixing insulins separately

✓ GIVE regular diets instead of “diabetic diets” or nutritional formulas in nursing homes
1 Very Fit – People who are robust, active, energetic and motivated. These people commonly exercise regularly. They are among the fittest for their age.

2 Well – People who have no active disease symptoms but are less fit than category 1. Often, they exercise or are very active occasionally, e.g. seasonally.

3 Managing Well – People whose medical problems are well controlled, but are not regularly active beyond routine walking.

4 Vulnerable – While not dependent on others for daily help, often symptoms limit activities. A common complaint is being “slowed up”, and/or being tired during the day.

5 Mildly Frail – These people often have more evident slowing, and need help in high order IADLs (finances, transportation, heavy housework, medications). Typically, mild frailty progressively impairs shopping and walking outside alone, meal preparation and housework.

6 Moderately Frail – People need help with all outside activities and with keeping house. Inside, they often have problems with stairs and need help with bathing and might need minimal assistance (cuing, standby) with dressing.

7 Severely Frail – Completely dependent for personal care, from whatever cause (physical or cognitive). Even so, they seem stable and not at high risk of dying (within ~ 6 months).

8 Very Severely Frail – Completely dependent, approaching the end of life. Typically, they could not recover even from a minor illness.

9 Terminally Ill – Approaching the end of life. This category applies to people with a life expectancy <6 months, who are not otherwise evidently frail.

**Scoring frailty in people with dementia**
The degree of frailty corresponds to the degree of dementia. Common symptoms in mild dementia include forgetting the details of a recent event, though still remembering the event itself, repeating the same question/story and social withdrawal.

In moderate dementia, recent memory is very impaired, even though they seemingly can remember their past life events well. They can do personal care with prompting.

In severe dementia, they cannot do personal care without help.
Among frail elderly

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1C</td>
<td>≤ 8.5%</td>
</tr>
<tr>
<td>FPG or preprandial glucose</td>
<td>5.0-12.0 mmol/L (depending on level of frailty)</td>
</tr>
</tbody>
</table>

**AVOID HYPOGLYCEMIA**

FPG= fasting plasma glucose
http://guidelines.diabetes.ca/BloodGlucoseLowering/A1Ctarget
Self-Monitoring of Blood Glucose (SMBG)

What should we tell patients to do?
Regular SMBG is Required for:

A. **REGULAR SMBG IS REQUIRED** if the person with diabetes is:

<table>
<thead>
<tr>
<th>SITUATION</th>
<th>SMBG RECOMMENDATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using multiple daily injections of insulin (≥ 4 times per day)</td>
<td>SMBG ≥ 4 times per day (see page 2 – QID – [basal-bolus/MDI])</td>
</tr>
<tr>
<td>Using an insulin pump</td>
<td>SMBG at least as often as insulin is being given (see page 2 – premixed or basal insulin only)</td>
</tr>
<tr>
<td>Using insulin &lt; 4 times per day</td>
<td>SMBG individualized and may involve SMBG ≥ 4 times per day</td>
</tr>
<tr>
<td>Pregnant (or planning a pregnancy), whether using insulin or not</td>
<td>SMBG individualized and may involve SMBG ≥ 4 times per day</td>
</tr>
<tr>
<td>Hospitalized or acutely ill</td>
<td>SMBG individualized and may involve SMBG ≥ 2 times per day</td>
</tr>
<tr>
<td>Starting a new medication known to cause hyperglycemia (e.g. steroids)</td>
<td>SMBG individualized and may involve SMBG ≥ 2 times per day</td>
</tr>
<tr>
<td>Experiencing an illness known to cause hyperglycemia (e.g. infection)</td>
<td>SMBG individualized and may involve SMBG ≥ 2 times per day</td>
</tr>
</tbody>
</table>
**Increased frequency of SMBG may be required:**

### B. INCREASED FREQUENCY OF SMBG MAY BE REQUIRED if the person with diabetes is:

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<tr>
<th>SITUATION</th>
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<td>Using drugs known to cause hypoglycemia (e.g. sulfonylureas, meglitinides)</td>
<td>SMBG at times when symptoms of hypoglycemia occur or at times when hypoglycemia has previously occurred</td>
</tr>
<tr>
<td>Has an occupation that requires strict avoidance of hypoglycemia</td>
<td>SMBG as often as is required by employer</td>
</tr>
<tr>
<td>Not meeting glycemic targets</td>
<td>SMBG ≥ 2 times per day, to assist in lifestyle and/or medication changes until such time as glycemic targets are met</td>
</tr>
<tr>
<td>Newly diagnosed with diabetes (&lt; 6 months)</td>
<td>SMBG ≥ 1 time per day (at different times of day) to learn the effects of various meals, exercise and/or medications on blood glucose</td>
</tr>
<tr>
<td>Treated with lifestyle and/or oral agents AND is meeting glycemic targets</td>
<td>Some people with diabetes might benefit from very infrequent checking (SMBG once or twice per week) to ensure that glycemic targets are being met between A1C tests</td>
</tr>
</tbody>
</table>

**Daily SMBG is not usually required if patient:**

### C. DAILY SMBG IS NOT USUALLY REQUIRED if the person with diabetes:

- Is treated only with lifestyle AND is meeting glycemic targets
- Has pre-diabetes
**Self-Monitoring of Blood Glucose (SMBG) Recommendation Tool for Healthcare Providers**

**Basic SMBG requirements (must be met)**
The person with diabetes (or a family member/caregiver) must have the knowledge and skills to use a home blood glucose monitor and to record the results in an organized fashion.

The person with diabetes and/or members of the healthcare team must be willing to review and act upon the SMBG results in addition to the A1C results.

**A. REGULAR SMBG IS REQUIRED if the person with diabetes is:**

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<td>SMBG individualized and may involve SMBG ≥ 4 times per day</td>
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<tr>
<td>Starting a new medication known to cause hyperglycemia (e.g. steroids)</td>
<td>SMBG individualized and may involve SMBG ≥ 2 times per day</td>
</tr>
<tr>
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<td>SMBG individualized and may involve SMBG ≥ 2 times per day</td>
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</table>

**B. INCREASED FREQUENCY OF SMBG MAY BE REQUIRED if the person with diabetes is:**

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<tr>
<th>SITUATION</th>
<th>SMBG RECOMMENDATION</th>
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<tr>
<td>Has an occupation that requires strict avoidance of hypoglycemia</td>
<td>SMBG ≥ 4 times per day, to assist in lifestyle and medication changes until such time as glyemic targets are met</td>
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<tr>
<td>Not meeting glyemic targets</td>
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</tr>
<tr>
<td>Newly diagnosed with diabetes (&lt; 6 months)</td>
<td>SMBG ≥ 4 times per day (at different times of day) to learn the effects of various meals, exercise and/or medications on blood glucose</td>
</tr>
<tr>
<td>Treated with lifestyle and oral agents AND is meeting glyemic targets</td>
<td>SMBG once or twice per week to ensure that glyemic targets are being met between A1C tests</td>
</tr>
</tbody>
</table>

**C. DAILY SMBG IS NOT USUALLY REQUIRED if the person with diabetes:**
- Is treated only with lifestyle AND is meeting glyemic targets
- Has pre-diabetes

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**Suggested SMBG Patterns for Patients Using Insulin**

**Basal Insulin Only** – NPH or long-acting insulin analog, typically given at bedtime. SMBG at least as often as insulin is being given. Optional, less frequent SMBG can be done at other times of day to ensure glycemic stability throughout the day.

**Premixed** – typically given pre-breakfast and pre-supper. SMBG at least as often as insulin is being given. SMBG QID until glycemic targets are met; SMBG BID (alternating times) is usually sufficient once glycemic targets are met.

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**No funding sources were used by the CDA for the development or launch of this document on SMBG.**
Medications for glycemia
How do we choose?
Pharmacotherapy in T2DM checklist 2013

✓ CHOOSE initial therapy based on glycemia

✓ START with Metformin +/- others

✓ INDIVIDUALIZE your therapy choice based on characteristics of the patient and the agent

✓ REACH TARGET within 3-6 months of diagnosis
AT DIAGNOSIS OF TYPE 2 DIABETES

Start lifestyle intervention (nutrition therapy and physical activity) +/- Metformin

<table>
<thead>
<tr>
<th>A1C &lt;8.5%</th>
<th>A1C ≥8.5%</th>
<th>Symptomatic hyperglycemia with metabolic decompensation</th>
</tr>
</thead>
</table>

- If not at glycemic target (2-3 mos)
  - Start / Increase metformin

- Start metformin immediately
  - Consider initial combination with another antihyperglycemic agent

- If not at glycemic targets
  - Add an agent best suited to the individual:

  **Patient Characteristics**
  - Degree of hyperglycemia
  - Risk of hypoglycemia
  - Overweight or obesity
  - Comorbidities (renal, cardiac, hepatic)
  - Preferences & access to treatment
  - Other

  **Agent Characteristics**
  - BG lowering efficacy and durability
  - Risk of inducing hypoglycemia
  - Effect on weight
  - Contraindications & side-effects
  - Cost and coverage
  - Other

- Initiate insulin +/- metformin

See next page…
### Add an agent best suited to the individual (agents listed in alphabetical order):

<table>
<thead>
<tr>
<th>Class</th>
<th>Relative A1C lowering</th>
<th>Hypoglycemia</th>
<th>Weight</th>
<th>Other therapeutic considerations</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha-glucosidase inhibitor (acarbose)</td>
<td>↓</td>
<td>Rare</td>
<td>neutral to ↓</td>
<td>Improved postprandial control, GI side-effects</td>
<td>$$</td>
</tr>
<tr>
<td>Incretin agents: DPP-4 Inhibitors</td>
<td>↓↓ to ↓↓↓↓</td>
<td>Rare</td>
<td>neutral to ↓</td>
<td>GI side-effects</td>
<td>$$$</td>
</tr>
<tr>
<td>GLP-1 receptor agonists</td>
<td></td>
<td>Rare</td>
<td>↓</td>
<td></td>
<td>$$$$</td>
</tr>
<tr>
<td>Insulin</td>
<td>↓↓↓↓</td>
<td>Yes</td>
<td>↑↑</td>
<td>No dose ceiling, flexible regimens</td>
<td>$-$-$$$$</td>
</tr>
<tr>
<td>Insulin secretagogue: Meglitinide</td>
<td>↓↓</td>
<td>Yes</td>
<td>↑</td>
<td>Less hypoglycemia in context of missed meals but usually requires TID to QID dosing</td>
<td>$$</td>
</tr>
<tr>
<td>Sulfonylurea</td>
<td>↓↓</td>
<td>Yes</td>
<td>↑</td>
<td>Glicazide and glimepiride associated with less hypoglycemia than glyburide</td>
<td>$</td>
</tr>
<tr>
<td>TZD</td>
<td>↓↓</td>
<td>Rare</td>
<td>↑↑</td>
<td>CHF, edema, fractures, rare bladder cancer (pioglitazone), cardiovascular controversy (rosiglitazone), 6-12 weeks required for maximal effect</td>
<td>$$</td>
</tr>
<tr>
<td>Weight loss agent (orlistat)</td>
<td>↓</td>
<td>None</td>
<td>↓</td>
<td>GI side effects</td>
<td>$$$</td>
</tr>
</tbody>
</table>

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If not at glycemic target

- Add another agent from a different class
- Add/Intensify insulin regimen

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Make timely adjustments to attain target A1C within 3-6 months
Antihyperglycemic agents and Renal Function

Macrovascular Disease

Vascular Protection: Who and When?
Vascular Protection Checklist 2013

✓ A • A1C – optimal glycemic control (usually ≤7%)
✓ B • BP – optimal blood pressure control (<130/80)
✓ C • Cholesterol – LDL ≤2.0 mmol/L if decided to treat
✓ D • Drugs to protect the heart
   A – ACEi or ARB | S – Statin | A – ASA if indicated
✓ E • Exercise – regular physical activity, healthy diet, achieve and maintain healthy body weight
✓ S • Smoking cessation
Who Should Receive Statins? 2013

- ≥40 yrs old or
- Macrovascular disease or
- Microvascular disease or
- DM >15 yrs duration and age >30 years or
- Warrants therapy based on the 2012 Canadian Cardiovascular Society lipid guidelines

Among women with childbearing potential, statins should only be used in the presence of proper preconception counseling & reliable contraception. Stop statins prior to conception.
If on a statin: target is LDL ≤2 mmol/L or >50% reduction in LDL

- If Triglycerides > 10.0 mmol/L:
  - Use a FIBRATE to reduce the risk of pancreatitis
- Optimize glycemic control
- Implement lifestyle interventions
  - Weight loss
  - Optimal dietary strategies
  - Reduce alcohol
Who Should Receive ACEi or ARB Therapy?

- ≥55 years of age or
- Macrovascular disease or
- Microvascular disease

At doses that have shown vascular protection (ramipril 10 mg daily, perindopril 8 mg daily, telmisartan 80 mg daily)

Among women with childbearing potential, ACEi or ARB should only be used in the presence of proper preconception counseling & reliable contraception. Stop ACEi or ARB either prior to conception or immediately upon detection of pregnancy.
Summary of Pharmacotherapy for Hypertension in Patients with Diabetes

Threshold equal or over 130/80 mmHg and Target below 130/80 mmHg

With Nephropathy, CVD or CV risk factors

ACE Inhibitor or ARB

Without the above

1. ACE Inhibitor or ARB or
2. Thiazide diuretic or DHP-CCB

Combination of 2 first line drugs may be considered as initial therapy if the blood pressure is >20 mmHg systolic or >10 mmHg diastolic above target

> 2-drug combinations

Monitor serum potassium and creatinine carefully in patients with CKD prescribed an ACEI or ARB

Combinations of an ACEI with an ARB are specifically not recommended in the absence of proteinuria

More than 3 drugs may be needed to reach target values

If Creatinine over 150 µmol/L or creatinine clearance below 30 ml/min (0.5 ml/sec), a loop diuretic should be substituted for a thiazide diuretic if control of volume is desired
ASA for 1st Prevention in Diabetes

Meta analysis of 6 studies

No overall benefit for:
- Major CV events
- MI
- Stroke
- CV mortality
- All-cause mortality


<table>
<thead>
<tr>
<th>No. of events/No. in group</th>
<th>ASA</th>
<th>Control/placebo</th>
<th>RR (95% CI)</th>
<th>RR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Major CV events</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JPAD</td>
<td>68/1262</td>
<td>86/1277</td>
<td>0.80 (0.59-1.09)</td>
<td></td>
</tr>
<tr>
<td>POPADAD</td>
<td>105/638</td>
<td>108/638</td>
<td>0.97 (0.76-1.24)</td>
<td></td>
</tr>
<tr>
<td>WHS</td>
<td>58/514</td>
<td>62/513</td>
<td>0.90 (0.63-1.29)</td>
<td></td>
</tr>
<tr>
<td>PPP</td>
<td>20/519</td>
<td>22/512</td>
<td>0.90 (0.50-1.62)</td>
<td></td>
</tr>
<tr>
<td>ETDRS</td>
<td>350/1856</td>
<td>379/1855</td>
<td>0.90 (0.78-1.04)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>601/4789</td>
<td>657/4795</td>
<td>0.90 (0.81-1.00)</td>
<td></td>
</tr>
<tr>
<td><strong>Myocardial infarction</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JPAD</td>
<td>28/1262</td>
<td>14/1277</td>
<td>0.87 (0.40-1.87)</td>
<td></td>
</tr>
<tr>
<td>POPADAD</td>
<td>90/638</td>
<td>82/638</td>
<td>1.10 (0.83-1.45)</td>
<td></td>
</tr>
<tr>
<td>WHS</td>
<td>36/514</td>
<td>24/513</td>
<td>1.48 (0.88-2.49)</td>
<td></td>
</tr>
<tr>
<td>PPP</td>
<td>5/519</td>
<td>10/512</td>
<td>0.49 (0.17-1.43)</td>
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</tr>
<tr>
<td>ETDRS</td>
<td>241/1856</td>
<td>283/1855</td>
<td>0.82 (0.69-0.98)</td>
<td></td>
</tr>
<tr>
<td>PHS</td>
<td>11/275</td>
<td>26/258</td>
<td>0.40 (0.20-0.79)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>395/5064</td>
<td>439/5053</td>
<td>0.86 (0.61-1.21)</td>
<td></td>
</tr>
<tr>
<td><strong>Stroke</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JPAD</td>
<td>12/1262</td>
<td>32/1277</td>
<td>0.89 (0.54-1.46)</td>
<td></td>
</tr>
<tr>
<td>POPADAD</td>
<td>37/638</td>
<td>50/638</td>
<td>0.74 (0.49-1.12)</td>
<td></td>
</tr>
<tr>
<td>WHS</td>
<td>15/514</td>
<td>31/513</td>
<td>0.46 (0.25-0.85)</td>
<td></td>
</tr>
<tr>
<td>PPP</td>
<td>9/519</td>
<td>10/512</td>
<td>0.89 (0.36-2.17)</td>
<td></td>
</tr>
<tr>
<td>ETDRS</td>
<td>92/1856</td>
<td>78/1855</td>
<td>1.17 (0.87-1.58)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>181/4789</td>
<td>201/4795</td>
<td>0.83 (0.60-1.14)</td>
<td></td>
</tr>
<tr>
<td><strong>Death from CV causes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JPAD</td>
<td>1/1262</td>
<td>10/1277</td>
<td>0.10 (0.01-0.79)</td>
<td></td>
</tr>
<tr>
<td>POPADAD</td>
<td>43/638</td>
<td>35/638</td>
<td>1.23 (0.80-1.89)</td>
<td></td>
</tr>
<tr>
<td>PPP</td>
<td>10/519</td>
<td>8/512</td>
<td>1.23 (0.49-3.10)</td>
<td></td>
</tr>
<tr>
<td>ETDRS</td>
<td>244/1856</td>
<td>275/1855</td>
<td>0.87 (0.73-1.04)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>298/4275</td>
<td>328/4282</td>
<td>0.94 (0.72-1.23)</td>
<td></td>
</tr>
<tr>
<td><strong>All-cause mortality</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>JPAD</td>
<td>34/1262</td>
<td>38/1277</td>
<td>0.90 (0.57-1.14)</td>
<td></td>
</tr>
<tr>
<td>POPADAD</td>
<td>94/638</td>
<td>101/638</td>
<td>0.93 (0.72-1.21)</td>
<td></td>
</tr>
<tr>
<td>PPP</td>
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<td>20/512</td>
<td>1.23 (0.69-2.19)</td>
<td></td>
</tr>
<tr>
<td>ETDRS</td>
<td>340/1856</td>
<td>366/1855</td>
<td>0.91 (0.78-1.06)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>493/4275</td>
<td>525/4282</td>
<td>0.93 (0.82-1.05)</td>
<td></td>
</tr>
</tbody>
</table>
What are the benefits if we do all of the vascular protective steps?
Use a Multifaceted Vascular Protection Strategy

Healthy Lifestyle/weight

Smoking Cessation

Physical Activity

BP <130/80

A1C ≤7%

Rx: Statins ACEi/ARB
STENO-2: Intensive Group had Improved CV Outcomes

Any CV event

NNT = 5

$P = 0.007$

Conventional therapy

Intensive therapy

RRR = relative risk reduction

What about Microvascular Disease?

• Nephropathy
Chronic Kidney Disease (CKD) Checklist

- **SCREEN** regularly with random urine albumin creatinine ratio (ACR) and serum creatinine for estimated glomerular filtration rate (eGFR)

- **DIAGNOSE** with repeat confirmed ACR ≥ 2.0 mg/mmol and/or eGFR < 60 mL/min

- **DELAY** onset and/or progression with glycemic and blood pressure control and ACE inhibitor or angiotensin receptor blocker (ARB)

- **PREVENT** complications with “sick day management” counselling and referral when appropriate
**Instructions for Healthcare Professionals:**
If patients become ill and are unable to maintain adequate fluid intake, or have an acute decline in renal function (e.g. due to gastrointestinal upset or dehydration), they should be instructed to hold medications which will:

**A) Increase risk for a decline in kidney function:**
- Angiotensin-converting enzyme inhibitor
- Angiotensin receptor blockers
- Direct renin inhibitors
- Non-steroidal anti-inflammatory drugs
- Diuretics

**B) Have reduced clearance and increase risk for adverse effects:**
- Metformin
- Sulfonylureas (gliclazide, glimepiride, glyburide)

---

**S** sulfonylureas  
**A** ACE-inhibitors  
**D** diuretics, direct renin inhibitors

**M** metformin  
**A** angiotensin receptor blockers  
**N** non-steroidal anti-inflammatory

---

Please complete the following card and give it to your patient.

Patients should be instructed that increased frequency of self blood glucose monitoring will be required and adjustments to their doses of insulin or oral antihyperglycemic agents may be necessary.

---

**Instructions for Patients**
When you are ill, particularly if you become dehydrated (e.g. vomiting or diarrhea), some medicines could cause your kidney function to worsen or result in side effects.

If you become sick and are unable to drink enough fluid to keep hydrated, you should STOP the following medications:

- Blood pressure pills
- Water pills
- Metformin
- Diabetes pills
- Pain medications
- Non-steroidal anti-inflammatory drugs (see below)

---

Please be careful not to take non-steroidal anti-inflammatory drugs (which are commonly found in pain medications (e.g. Advil) and cold remedies).

Please check with your pharmacist before using over-the-counter medications and discuss all changes in medication with your healthcare professional.

Please increase the number of times you check your blood glucose levels. If they run too high or too low, contact your healthcare professional.

If you have any problems, you can call:
CKD in diabetes

$\text{ACR} \geq 2.0 \text{ mg/mmol}$

and/or

$\text{eGFR} < 60 \text{ mL/min}$
How can we keep track of all these parameters for our patients?
Tools to help us keep track of our patients.

Sample Diabetes Patient Care Flow Sheet For Adults

<table>
<thead>
<tr>
<th>Name:</th>
<th>Type of diabetes: Type 1 □ Type 2 □ Other □</th>
<th>Date of birth:</th>
<th>Date of Diagnosis:</th>
</tr>
</thead>
</table>

**Risk factors, co-morbidities**

- Hypertension □
- Dyslipidemia □
- Coronary Artery Disease (CAD) □
- Peripheral Artery Disease □
- Mental health diagnosis □
- Polycystic Ovarian Syndrome □
- Foot disease □
- Erectile Dysfunction □
- Smoking □ (Date stopped)
- Alcohol: ________________________ (Assess/documented)

**Self-management** (discuss with patient add date and location in chart)

- Patient Goals: ________________________
- Possible barriers to self-management: ________________________
- Diabetes self-management education: ________________________
- Weight management: ________________________
  - Ht: ________________________
  - Target Wt: ________________________
  - Target BMI: ________________________
- Physical activity (aerobic 150 min/week; resistance 2-3 times/week)
- Glucose meter/lab comparison
- Patient Care Plan (Pregnancy Planning/ Driving License):
  - ________________________ date discussed

**Vaccinations**

- Flu (annual), Date: __________ Date: __________
- Pneumococcus, Date: __________

**Visits (Every 3 to 6 months)**

<table>
<thead>
<tr>
<th>Date</th>
<th>BP</th>
<th>Weight</th>
<th>A1C</th>
<th>Target ≤7% or ___</th>
<th>Notes (Goals, clinical status)</th>
<th>Hypoglycemia</th>
<th>Antihyperglycemic Agents / CV protection agents (ACEi / ARB / Statin / ASA as indicated)</th>
</tr>
</thead>
</table>

**Review SMBG records.** Target: pre-prandial 4.7 mmol/L; 2-hour post-prandial 5.9-10 mmol/L; 15.8 mmol/L if A1C not at target

**Screen for diabetes complications annually or as indicated**

<table>
<thead>
<tr>
<th>Nephropathy</th>
<th>Diabetes complications annually or as indicated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>ACR</td>
</tr>
<tr>
<td>__________</td>
<td>__________</td>
</tr>
<tr>
<td>Findings:</td>
<td>__________</td>
</tr>
<tr>
<td>Date:</td>
<td>__________</td>
</tr>
</tbody>
</table>

**Neuropathy**

- Check feet for lesions and sensation (10-g monofilament or 128 Hz tuning fork)
- Check for pain, ED, G1 symptoms

<table>
<thead>
<tr>
<th>Date</th>
<th>ACR</th>
<th>eGFR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Findings:</td>
<td>__________</td>
<td>__________</td>
</tr>
<tr>
<td>Date:</td>
<td>__________</td>
<td>__________</td>
</tr>
</tbody>
</table>

**Retinopathy**

- Annual eye exam:
  - Date: __________
  - Findings: __________

**Ophthalmologist/ Optometrist:**

**For vascular protection:**

- Stroke if ≥60 yrs OS >10 yrs and >15 yrs duration or end organ damage
- ACEi/ARB if ≤55 yrs or end organ damage (even in the absence of hypertension)

**Lipids Targets if indicated to treat LDL-C ≤2 mmol/L**

<table>
<thead>
<tr>
<th>Date</th>
<th>Medication</th>
<th>LDL-C</th>
<th>HDL-C</th>
<th>TG</th>
<th>(Non-HDL-C)</th>
<th>Apo B</th>
</tr>
</thead>
</table>

**CVD Assessment**

- ECG:
- Stress ECG:
- Other:

See reverse side for care objectives and targets
### Care Objectives

- **Self-monitoring of Blood Glucose**: Ensure patient can use glucose meter, interpret results and modify treatment as needed. Develop a blood glucose monitoring schedule with patient and review records.
- **Blood Glucose Control**: Measure A1C every three months for most adults. Consider testing at least every 6 months in adults during periods of treatment and lifestyle stability when glycemic targets have been consistently achieved.
- **Hypoglycemia**: Enquire about hypoglycemia at each visit. Discuss recognition and treatment of hypoglycemia and risk benefit of hypoglycemia and pharmacologic management.
- **Blood glucose meter accuracy**: Meter results should be compared with laboratory measurements at least annually, and when indicators of glycemic control do not match meter.
- **Hypertension**: Measure BP at diagnosis and at every diabetes clinic visit.
- **Waist Circumference**: Measure as an indicator of abdominal fat.
- **Body Mass Index**: Calculate BMI (mass in kilograms/height in metres²).
- **Nutrition**: Encourage nutritional therapy (by a registered dietitian) as an integral part of treatment and self-management (can reduce A1C by 1-2%).
- **Physical Activity**: Discuss and encourage aerobic and resistance exercise. Evaluate those with possible CAD or microvascular complications undertaking exercise substantially more vigorous than brisk walking.
- **Smoking**: Encourage patient to stop at each visit; provide support as needed.
- **Chronic Kidney Disease (CKD)**: Identification of CKD requires screening for proteinuria using random urine ACR (2 out of 3 samples over 3 mths) and assessment of renal function using a serum creatinine converted to eGFR. Type 1 diabetes-Screen at 5 years duration and then annually if no CKD. Type 2 diabetes-Screen at diagnosis and then yearly if no CKD.
- **Retinopathy**: Type 1 diabetes-Screen 5 years after diagnosis, then screen annually. Type 2 diabetes-Screen at diagnosis and 1-2 years after initial screening if no retinopathy is present. The interval for follow-up assessment should be tailored to the severity of the retinopathy. Screening should be conducted by an experienced eye care professional.
- **Neuropathy/Foot examination**: Type 1 diabetes-Screen 5 years duration and annually. Type 2 diabetes-Screen at diagnosis, then annually. Screen for neuropathy with 10-g monofilament or 128 Hz tuning fork at dorsum of great toe. In foot exam look for: structural abnormalities, neuropathy, vascular disease, ulceration, infection.
- **Coronary Artery Disease (CAD)**: Conduct CAD risk assessment periodically: CV history, lifestyle, duration of DM, sexual function, abdominal obesity, lipid profile, BP, reduced pulses, bruits, glycemic control, retinopathy, eGFR, ACR. Baseline ECG and every 2 years if >60 years, >30 years and duration >15 years, end organ damage, cardiac risk factors.
- **Dyslipidemia**: Fasting lipid levels (TC, HDL, TG and calculated LDL) at diagnosis, then yearly if treatment not initiated. More frequent testing if treatment initiated.

### Target Objectives

- **Premeal (mmol/L) = 4.0-7.0 mmol/L for most patients**
- **2hr Postmeal (mmol/L) = 5.0-10.0 mmol/L for most patients**
- **5.0-8.0 mmol/L if not achieving A1C target**
- **A1C ≤7.0% for most patients**
- **Individualized based on life expectancy, functional dependency, extensive coronary artery disease at high risk of ischemia, multiple comorbidities, recurrent severe hypoglycemia, hypoglycemia unawareness, longstanding diabetes unable to achieve A1C ≤7% despite best efforts (including intensified insulin)**
- **Avoidance of hypoglycemia especially in the elderly, those with hypoglycemia unawareness, and those with criteria for less stringent control**
- **Simultaneous fasting glucose/meter lab comparison within 20%**
- **<130/80**
- **Central obesity defined as:**
  - WC ≥102 cm (North America)
  - WC ≥94 cm (Europe: Middle Eastern; Sub-Saharan Africa; Mediterranean)
  - WC ≥90 cm (Asia; Japanese; South and Central Americas)
- **Healthy body weight target: BMI: 18.5-24.9**
- **Meet nutritional needs by following Eating Well with Canada’s Food Guide**
- **Aerobic: ≥150 minutes/week**
  - **Resistance: 3 sessions/week**
- **Normal ACR <2.0 mg/mmol**
- **Normal eGFR >60 ml/min**
- **Early detection and treatment**

### Care Objectives

People with diabetes will have better outcomes if primary care providers (1) identify patients with diabetes in their practices; (2) encourage self-management and use interdisciplinary team approach to attain care objectives; (3) schedule diabetes-focused visits; (4) use diabetes patient care flow sheets and systematic recall.