Diabetes Care

Effective Date: December 9, 2015

Scope

This guideline describes the care objectives for the prevention, diagnosis and management of diabetes mellitus in adults aged ≥ 19 years. It focuses on the approaches and systems that are ideally in place to improve care for the majority of patients the majority of the time. Diabetes in pregnancy (gestational diabetes) is outside the scope of this guideline.

Key Recommendations

• Diabetes care is centred around the person living with diabetes and should include an individualized management plan developed by the patient and their primary care provider(s). [Level 3, amended 2015]
• The 5 R’s describe the key components to consider when organizing diabetes care in the office or clinic: recognize, register, resource, relay and recall. [Level 5, new 2015]
• Glycosylated hemoglobin (A1C; $12.69*) or glucose testing (e.g., fasting plasma glucose (FPG; $1.46) or 2-hour plasma glucose (2hPG; $12.94)) can be used for diagnosis and screening. Best choice of test will depend on clinical circumstances. [Level 2, new 2015]
• Individualized glycemic targets are based on patient’s age, duration of diabetes, risk of hypoglycemia, cardiovascular disease presence, and life expectancy. [Level 5, new 2015]
• Measure A1C every 3 months to assess glycemic goals are met. Consider testing every 6 months if targets are consistently met and treatment and lifestyle are stable. [Level 5, new 2015]
• There are a number of new antihyperglycemic agents available for treatment of type 2 diabetes that can be considered as part of an individualized care plan. [Level 3, new 2015]
• A systematic approach to vascular protection is recommended, including lifestyle management, glycemic control, blood pressure control, and pharmacological interventions. [Level 2, new 2015]

Epidemiology

On average, over 29,000 people are diagnosed with diabetes every year in British Columbia. In 2012/2013, over 387,000 people have diabetes in the province.† Geographic variations exist in rates of diabetes and some regions have higher or lower rates of incidence and prevalence compared to the provincial totals. To find more data on diabetes in your local community, see the interactive BC Community Health Atlas or the BC Community Health Data, at website: www.phsa.ca.

Classification and Risk Factors

Diabetes mellitus (diabetes in this guideline) is a complex chronic disease characterized by hyperglycemia due to defective insulin secretion, defective insulin action or both.† Diabetes is classified into four categories: type 1, type 2, gestational, and other specific types due to other causes (e.g., MODY [maturity onset diabetes of the young] after genetic defects). See Table 1, or the Canadian Diabetes Association (CDA)’s Etiologic Classification of Diabetes Mellitus at website: guidelines.diabetes.ca, for more information.

* Prices as per the Schedule of Fees – Laboratory Services Payment Schedule as of October 1, 2015.
Table 1. Diabetes categories

<table>
<thead>
<tr>
<th>Type 1 Diabetes</th>
<th>Type 1 Diabetes is primarily due to beta cell destruction, usually leading to total insulin deficiency and is susceptible to ketoacidosis.1,2 Type 1 diabetes may be due to autoimmune processes or unknown etiology. The risk for developing type 1 diabetes is influenced by family history of type 1 diabetes and other autoimmune diseases. Type 1 diabetes includes Latent Autoimmune Diabetes in Adults (LADA) a slow, progressive form of autoimmune diabetes that shares clinical characteristics of type 2 diabetes.1,3-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 2 Diabetes</td>
<td>Type 2 Diabetes is due to a combination of insulin resistance and inadequate insulin secretory response. It may range from predominantly insulin resistance with relative insulin deficiency to predominantly an insulin secretory defect with insulin resistance.1,2 Risk factors include, but are not limited to: age &gt; 40 years; first-degree relative with type 2 diabetes; member of a high risk population (e.g., Aboriginal, Hispanic, South Asian, Asian, or African descent); history of prediabetes (impaired glucose tolerance [IGT], impaired fasting glucose [IFG], or A1C 6.0 – 6.4%); history of gestational diabetes; history of delivery of macrosomic infant; presence of end organ damage associated with diabetes; presence of vascular risk factors (e.g., dyslipidemia, hypertension, overweight, abdominal obesity, vascular disease); presence of associated diseases (e.g., polycystic ovary syndrome, acanthosis nigricans, human immunodeficiency virus-1 [HIV], psychiatric disorders [e.g., bipolar disorder, depression, schizophrenia]); and use of medications associated with diabetes (e.g., atypical antipsychotics, highly active antiretroviral therapy, glucocorticoids).6</td>
</tr>
<tr>
<td>Gestational Diabetes</td>
<td>Gestational Diabetes is defined as glucose intolerance with onset or first recognition during pregnancy, regardless of whether the condition persists after pregnancy. Gestational diabetes does not exclude the possibility of preexisting, undiagnosed diabetes or glucose intolerance. Note: gestational diabetes is outside the scope of this guideline.</td>
</tr>
</tbody>
</table>

Prevention

- **Type 1 Diabetes**
  Safe and effective therapies for the prevention of type 1 diabetes have not yet been identified.7

- **Type 2 Diabetes**
  The onset and course of type 2 diabetes can be ameliorated using lifestyle modification, including regular physical activity and/or pharmacologic intervention.8 Pharmacologic therapy with metformin or acarbose can be considered for patients with IGT.9, 10, 11

Screening and Diagnosis

- **Screening**
  Note: general screening for type 1 diabetes is not recommended. Screening for type 2 diabetes should be performed every 3 years in individuals ≥ 40 years of age or those at high risk. Screen more frequently in people with additional risk factors for diabetes or at very high risk according to a validated risk assessment tool and test with either A1C ($12.69‡) and/or FPG ($1.46), or 2hPG ($12.94) in a 75g oral glucose tolerance test (OGTT). Best choice of test will depend on clinical circumstances.
  - See Appendix A: Screening Algorithm for Type 2 Diabetes in Adults.
  - Canadian Diabetes Risk Assessment Questionnaire (CANRISK) is a statistically valid risk tool appropriate for use in the Canadian population, at website: www.healthycanadians.gc.ca.
  - The CDA offers an interactive screening tool, at website: guidelines.diabetes.ca/ScreeningAndDiagnosis/Screening

- **Diagnosis (type 1 & 2)**
  Diabetes can be diagnosed using any of the following criteria:
  - A FPG§ of ≥ 7.0 mmol/L.
  - A1C¶ of ≥ 6.5%.12 See notes for contraindications.
  - 2hPG of ≥ 11.1 mmol/L in a 75g OGTT.
  - In a patient with classic symptoms of hyperglycemia (e.g., polyuria, polydipsia, and unexplained weight loss), a random plasma glucose (PG) ≥ 11.1 mmol/L.**

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‡ Prices as per the Schedule of Fees – Laboratory Services Payment Schedule as of October 1, 2015.
§ Fasting = no caloric intake for at least 8 hours. Note that fasting for lipids is no caloric intake for at least 10 hours, and if both tests are requested concurrently, the higher amount should be followed.
¶ Standardized, validated assay required; may be used for adults in absence of factors that might impact accuracy of A1C. Not used for diagnosis in suspected type 1 diabetes, pregnant women, children or adolescents.
** Random = any time of day, regardless of the interval since the last meal.
Management

1. Organization of Care

Diabetes care is centered around the person living with diabetes and it includes an individualized management plan developed by the patient, their family/caregivers and primary care provider(s). The 5 R's describe the key components to consider for organizing diabetes care in the office or clinic.

Table 2. The 5 R’s of diabetes care

| Recognize | Consider diabetes risk factors for all patients and screen appropriately. See above. |
| Register | Develop a list of patients with diabetes to facilitate recall and track changes in practice management. See guidelines.diabetes.ca/OrganizingCare/The5Rs/registry for more information. |
| Resource | Support self-management through the use of inter-professional teams, including a primary care provider, diabetes care educator, nurses, dietitian, pharmacist and specialist. Consider referral to a diabetes education clinic. A team specialized in diabetes is suggested for the following situations: - Patients with Type 1 diabetes at diagnosis and at least annually, - Women with diabetes who require pre-gestational assessment and counseling, - Women with diabetes in pregnancy (gestational/pre-gestational), - Individuals with complex type 2 diabetes or who are not reaching target. Self-management support consists of collaborative self-management education, incorporating problem solving and goal setting. Patients may require education in clinical management measurements such as blood glucose, A1C, blood pressure, and lipid profile. For further information on self-management, see Associated Document: Patient Education and Resources or CDA resources, at website: guidelines.diabetes.ca/SelfManagementEducation. |
| Relay | Facilitate information sharing between the patient with diabetes and the diabetes care team (e.g., telephone, electronic means, paper-based). See Associated Document: Diabetes Patient Care Flow Sheet. |
| Recall | Develop a system to remind patients of timely review and reassessment. |

2. Individualized Targets

- Blood Glucose: Glycemic Targets
  - The focus of glycemic goals is on achieving target A1C levels and on minimizing symptomatic hyper- and hypoglycemia. Glycemic targets are individualized based on the patient’s age, duration of diabetes, risk of hypoglycemia, cardiovascular disease presence, and life expectancy. See Figure 1 for recommended targets, or to find a target for an individual patient, use the interactive CDA tool for A1C targets, at website: guidelines.diabetes.ca/BloodGlucoseLowering/A1Ctarget.
Blood Glucose: Hypoglycemia

- **Hypoglycemia can be a serious complication of therapy.** Use less stringent glycemic targets in patients at risk of hypoglycemia.

- **Risk factors for hypoglycemia:** Prior episode of severe hypoglycemia, long-term diabetes, current low A1C (< 6.0%), autonomic neuropathy, hypoglycemia unawareness, current treatment with insulin, and the elderly. Severe hypoglycemia is less common in persons with type 2 diabetes but the elderly and those on insulin, secretagogues are more vulnerable.

- **Harm reduction for patients at high risk of hypoglycemia:**
  - Educate patients and families about prevention, detection and treatment of hypoglycemia.
  - Reevaluate glycemic control targets.
  - Consider education for patients and family/caregivers in glucagon administration.
  - In BC, a driver with a medical condition, like diabetes, that has the potential to affect their fitness to drive may be required to have a Driver’s Medical Examination Report completed by their primary care provider. See the BC Driver Fitness Handbook for Medical Professionals for further information, at website: www.pssg.gov.bc.ca/osmv/medical-fitness/.

  - To reduce the risk of hypoglycemia: increase the frequency of SMBG (including episodic assessment during sleeping hours), make glycemic targets less stringent, and consider multiple insulin injections.

  - **Treatment:** See Appendix B: Treatment of Hypoglycemia in Diabetes.

Blood Glucose: Long-Term Control

- Studies suggest there is a long-term “legacy” benefit of glucose lowering early in the course of type 1 & 2 diabetes, in terms of reducing complications. \(^\text{14,15}\)

- Measure A1C every 3 months to ensure that glycemic goals are being met or maintained.

- **Consider testing A1C every 6 months if treatment and lifestyle remains stable and if targets have been consistently met.**

- Focus on minimizing symptomatic hypo- and hyperglycemia, in addition to A1C levels.
Blood Glucose: Self-Monitoring of Blood Glucose (SMBG)

- Offer to develop a SMBG schedule with the patient and review records as needed. Frequency and timing of SMGB is individualized, based on type of diabetes, treatments (e.g., use of insulin), need for information, and individual’s capacity to use testing to modify behaviours or medications.
- SMBG is more important when using a drug that can cause hypoglycemia. People with low risk of hypoglycemia may need less frequent SMBG testing frequency and people at higher risk of hypoglycemia may need more frequent testing.
- For most adults with type 2 diabetes using oral antihyperglycemic agents (without insulin) or lifestyle management only to meet glycemic targets, the value of routine use of SMBG is limited. In these situations, SMBG may only be needed 1 or 2 times per week.
- SMBG frequency guidance tool is available at: guidelines.diabetes.ca/bloodglucoselowering/smbgtool.
- Annual accuracy verification of glucose meter is recommended (simultaneous fasting glucose meter/lab comparison within 20%).
- Blood glucose test strips are a Pharmacare benefit for those holding a valid Certificate of Training in SMBG from a BC diabetes education centre. See Appendix C: PharmaCare quantity limits for blood glucose test strips for information on coverage.

3. Non-Pharmacological Management

- Healthy Living and Lifestyle Management
  - Patients with diabetes will benefit from health behaviour education and healthy living interventions, including regular physical activity (at least 150 minutes per week of aerobic exercise and two sessions per week of resistance training, if not contraindicated), nutrition therapy, healthy diet, maintenance of a healthy body weight, and smoking cessation.
  - For more information, see BCGuidelines.ca – Lifestyle & Self-Management Supplement.

- Bariatric Surgery
  - Bariatric surgery is an emerging intervention for patients with diabetes type 2 in association with marked obesity (body mass index ≥ 35.0 kg/m²). Some procedures are covered by the Medical Services Plan.
  - For more information on obesity management, see BCGuidelines.ca – Overweight and Obese Adults: Diagnosis and Management.

4. Individualized Pharmacologic Management

- Type 1 diabetes: Multiple (3 – 4) daily insulin injections or the use of Continuous Subcutaneous Insulin Infusion (insulin pump) should be considered as part of an intensive diabetes management program.
- Type 2 diabetes: please refer to Appendix D: Management of Hyperglycemia in Type 2 Diabetes, including details on when to initiate oral antihyperglycemic medications or insulin without a 2 – 3 month trial of lifestyle modifications alone.
  - For more information, see:
    - Appendix E: Antihyperglycemic Agents and Adjunctive Agents for Use in Type 2 Diabetes.
    - Appendix F: Insulin and Therapeutic Considerations.
    - Canadian Agency for Drugs and Technologies in Health reviews of second and third-line pharmacotherapy, at website: www.cadth.ca.
5. Preventing complications and comorbidities

- **Global Cardiovascular Management**
  - People with diabetes are at significantly increased risk of cardiovascular disease. The BCGuideline.ca – Cardiovascular Disease: Primary Prevention recommends using a risk assessment tool, medical history, physical examination, and full fasting lipid profile.22
    - See Controversies in Care (page 7) about use of risk calculators in the type 2 diabetes population.
    - A risk assessment calculator is not recommended for people with type 1 diabetes.
  - The time interval (e.g., 1 – 5 years) for a reassessment for cardiovascular disease is based on the initial risk stratification, if the patient’s risk factors change and clinical indication.
  - A systematic approach to vascular protection is recommended, including lifestyle management, glycemic control, blood pressure control, and pharmacological interventions. ‘Consider the ABCDEs’ is a useful mnemonic device for vascular protection strategies and is described in table 3 below.

### Table 3. Consider the ABCDEs

| A – A1C and optimal glycemic control | Glycemic control: while there is evidence to show the benefit of intensive glycemic control on microvascular complication of diabetes, the impact of hyperglycemia levels on cardiovascular disease is less clear. However, if achieved early in the disease, there might be a macrovascular benefit, particularly as part of multifactorial approach. See glycemic control section above for targets. |
| B – Blood pressure | See Blood Pressure section below |
| C – Cholesterol | See Lipid Lowering Strategies section below |
| D – Drugs for vascular protection | Consider using angiotensin converting enzyme inhibitors (ACE-I) for any patient ≥ 55 years of age or with evidence of organ damage, even in absence of hypertension. In patients with diabetes and hypertension, consider an ACE-I or angiotensin receptor blockers (ARB).1,23 Routine use of acetylsalicylic acid (ASA) in primary cardiovascular disease prevention is not recommended. ASA therapy has been recommended in the general population for primary prevention of serious vascular events, although recent studies have questioned it24,25 and evidence for ASA therapy in persons with diabetes is even less apparent.26-29 Risk of bleeding from ASA is higher in patients with diabetes. In patients with diabetes and established cardiovascular disease, low dose ASA (75 – 162 mg) may be considered. The decision to prescribe antplatelet therapy for secondary prevention of cardiovascular disease events should be based on individual clinical judgement.30 |

### Blood Pressure

- Blood pressure control is a priority for patients with diabetes. Record at diagnosis and regularly thereafter.31
- The BCGuidelines.ca – Hypertension: Diagnosis and Management recommends a desirable blood pressure reading of ≤140/90 for patients with diabetes.32 See controversies in care section below.
- If lifestyle modification is not sufficient, pharmacological treatment may be required:
  - Diabetes with moderately or severely increased albuminuria, chronic kidney disease, cardiovascular disease or cardiovascular disease risk factors:
    - First-line – ACE-I or ARB (if ACE-I intolerant).
    - Second-line – Dihydropyridine calcium channel blocker (DHP-CCB; e.g., amlodipine, felodipine, and nifedipine).
  - Diabetes (no chronic kidney disease or cardiovascular disease risk factors):
    - First-line – ACE-I or ARB or Thiazide/Thiazide-like diuretic or DHP-CCB.
    - Second-line – Combination of first line drugs (note: in combination with ACE-I, a DHP-CCB is preferable to a thiazide/thiazide-like diuretic).
Lipid Lowering Strategies

- Primary prevention: Lifestyle interventions are usual first-line strategies in vascular protection. Statin therapy is a second-line intervention, considered in an individualized discussion with the patient and after evaluation of risk and benefits.
- Recent meta-analyses and other guidelines have indicated that statin therapy in people with diabetes who are at moderate or high risk of cardiovascular disease events, may be considered.\textsuperscript{1,2,33-38}
- The CDA recommends statin therapy to reduce cardiovascular disease risk in adults with type 1 or type 2 diabetes with any of the following features:
  - Clinical macrovascular disease;
  - Age $\geq 40$ years;
  - Age $< 40$ years and 1 of the following: diabetes duration $> 15$ years and age $> 30$ years; microvascular complications; or other circumstances that warrant therapy based on particular risk factors according to 2012 Canadian Cardiovascular Society (CCS) guidelines.
- Treatment with a statin is expected to result in a significant reduction in elevated baseline lipids levels. Treating to a specific target is not recommended by the BCGuidelines.ca – Cardiovascular Disease: Primary Prevention guideline, although the CCS and CDA recommend treating high risk and intermediate risk patients to a specific low density lipoprotein cholesterol (LDL-C) target of $\leq 2.0$ mmol/L.\textsuperscript{1,22,30} The National Institute for Health and Clinical Excellence (NICE) and American College of Cardiology and American Heart Association (ACC/AHA) guidelines do not recommend target LDL-C levels, but they recommend specific target statin doses.\textsuperscript{35,39}
- If statin therapy is decided upon, select statin based on tolerability, potential for drug interactions, and cost.\textsuperscript{40} For information on dosages, see BCGuidelines.ca – Cardiovascular Disease: Primary Prevention.

Retinopathy

- Early recognition and treatment of retinopathy can prevent vision loss.\textsuperscript{1,2}
- Ensure patient receives dilated pupil retinal examination at diagnosis, then every 1 – 2 years or as indicated (for patient with type 1 diabetes the first follow-up pupil retinal exam can start at 5 years post-diagnosis, then every 1 – 2 years). Annual referral to optometrist/ophthalmologist recommended.
- Retinopathy can worsen during pregnancy. Women with existing diabetes considering pregnancy or in early pregnancy should be assessed by an ophthalmologist.

Nephropathy and Chronic Kidney Disease

- Optimize blood pressure and glucose control to prevent or slow progression of nephropathy.
- Screen for macroscopic proteinuria and non-renal disease with urine dipstick.
- Measure albumin/creatinine ratio (ACR), creatinine/estimated glomerular filtration rate (eGFR), and urinalysis annually: If tests are normal, screen and monitor annually.\textsuperscript{41} If tests are abnormal, repeat within 3 months in a well hydrated state to confirm, unless there is deteriorating renal function which requires urgent investigation, management and referral.

Neuropathy

- The best way to prevent diabetic neuropathy is to achieve long-term glycemic control.\textsuperscript{1}
- Screening can be performed via 10-g monofilament or 128-Hz tuning fork during foot exam.
- Check at least annually for symptoms or findings such as peripheral anesthesic neuropathy or pain, or autonomic neuropathy (e.g., erectile dysfunction, gastrointestinal disturbance, orthostatic hypotension).
Foot Examination
- Examine feet annually, and more frequently for those at high risk (e.g., neuropathy, macrovascular complications, smokers, patient with foot or leg abnormalities).
- Management of foot ulceration requires interdisciplinary care approach to address infection, wound care, glycemic control, lower-extremity vascular status, and off-loading of high pressure areas.
- Encourage regular self-examination of feet. A foot care patient’s checklist is available, at website: guidelines.diabetes.ca/Browse/Appendices/Appendix9

Psychosocial Aspects of Diabetes
- Psychosocial factors affect many aspects of diabetes management and glycemic control.
- Screen for depression, anxiety and eating disorders. Treatment of these conditions may improve outcomes.7
- Cognitive behaviour therapy (CBT) based techniques such as stress management strategies and coping skills can be implemented to improve outcomes.42

Communicable Diseases
- Annual influenza vaccination is recommended.
- In adults with diabetes, pneumococcal vaccination is recommended. Note: re-vaccination is not routinely recommended. Once-only revaccination 5 years after the initial dose is suggested for specific medical conditions (e.g. chronic kidney disease, chronic liver disease, sickle cell disease, immunosuppression due to disease). For further information, see the BC Centre for Disease Control Immunization Manual, at website: www.bccdc.ca.43

Sick Days
- Patients who experience illness and are unable to maintain adequate fluid intake, or have acute decline in renal function (e.g., gastrointestinal upset or dehydration) should increase the frequency of SMBG and they may need to adjust doses of insulin, oral antihyperglycemic agents and/or other medications.1 See the Sick Day medication list, at website: guidelines.diabetes.ca/Browse/Appendices/Appendix7.
- Encourage individuals with type 1 diabetes to perform ketone testing during acute illness accompanied by elevated blood glucose. Blood ketone testing may be preferred over urine ketone testing.

6. Special Populations
- Geriatric Population
  In frail elderly people with diabetes:
  - Pay attention to potential for polypharmacy. Review medication list periodically, particularly if patient presents with depression, falls, cognitive impairment, perceptual difficulties, or urinary incontinence.
  - Use sulfonylureas (especially glyburide) with caution as the risk of hypoglycemia increases with age. Generally, initial doses can be half of those for younger people and increased more slowly.
  - Monitor postural blood pressure.
  - Consider less strict glycemic targets (7.1 – 8.5% A1C) if the individual has limited life expectancy, high functional dependency, extensive disease or multiple co-morbidities etc.
  - Consider a cognitive assessment before initiating insulin. See the BCGuidelines.ca – Cognitive Impairment: Recognition, Diagnosis and Management in Primary Care for assessment tests.44

Pregnancy
- Contraception and pre-pregnancy planning in all patients with diabetes is encouraged.
- Identify patients with previous gestational diabetes. These patients can develop type 2 diabetes and special attention prior to next pregnancy and in later life, is necessary.
- See the CDA guide on women of child-bearing age, at website: guidelines.diabetes.ca/SpecialPopulations/WomenPregnancyRefGuide
7. Controversies in Care

Controversies in Care: Cardiovascular Risk Calculators

Some controversy exists around the use of risk calculator tools with the type 2 diabetes population. Risk calculators generally predict an individual's proximate (5 – 10 year) risk for a cardiovascular event. The CDA guideline does not promote use of a cardiovascular disease risk calculator to assess risk and notes that lifetime risk is generally very high in all people with diabetes, even if as a younger individual, they can have a low proximate risk. Very high lifetime risk may justify early interventions. Alternatively, the CCS and the BCGuidelines.ca – Cardiovascular Disease: Primary Prevention recommends using a risk calculator tool to assess cardiovascular disease risk. Two tools that can be used for the type 2 diabetes population are:

- Cardiovascular Risk/Benefit Calculator, at website: chd.bestsciencemedicine.com/calc2.html
- United Kingdom Prospective Diabetes (UKPDS) risk engine, at website: www.dtu.ox.ac.uk/riskengine

Some recent validation studies have shown conflicting results about effectiveness of cardiovascular risk calculator tools (including UKPDS) and more evidence is needed. It is also important to note that cardiovascular disease risk scores were developed mainly with caucasian populations and there may be variability in predictive ability with different populations.

Controversies in Care: Blood Pressure

This guideline aligns with the BCGuidelines.ca – Hypertension: Diagnosis and Management guideline in recommending a desirable blood pressure reading of 140/90 for the diabetes population. This does not match the CDA or Canadian Hypertension Education Program (CHEP)'s targets of 130/80 but is consistent with 2014 Eight Joint National Committee (JNC 8) and 2013 European Society of Hypertension (ESH)/European Society of Cardiology (ESC) guidelines and is similar to NICE (140/80 in type 2 and 135/85 type 1) and ADA (140/80) guidelines. A recent Cochrane review and other systematic review and meta analyses have indicated there is no evidence to support blood pressure targets lower than standard targets in people with hypertension and diabetes, although there may be a small reduction in risk for stroke. Due to the lack of convincing evidence to support more intensive blood pressure control, this guideline recommends the same desirable blood pressure reading in adults with diabetes and hypertension as the general population.

Controversies in Care: Sulfonylureas

There is some conflicting evidence about the cardiovascular safety of sulfonylureas. Some studies suggest that sulfonylureas may be associated with poorer outcomes after a myocardial infarction. Cohort studies have found higher risks of death and cardiovascular outcomes, though it is unclear if these results demonstrate the protective effect of the metformin comparator rather than harm from the sulfonylurea, and observational studies cannot establish causality. In addition, older agents, higher historical doses and tighter glucose targets were used which may have contributed to seen differences, and cohort populations were highly heterogeneous. This potential harm does not appear to be as well associated with gliclazide. Cardiovascular safety of sulfonylureas is supported by a meta-analysis and the ADVANCE trial. In addition, the UKPDS trial reported long term mortality and cardiovascular benefit in patients given a sulfonylurea. At present, there is a lack of evidence clearly demonstrating cardiovascular harm, and clinicians should interpret this data cautiously.
References


> Diagnostic code: 250 – Diabetes mellitus
Appendices

• Appendix A: Screening Algorithm for Type 2 Diabetes in Adults
• Appendix B: Treatment of Hypoglycemia in Diabetes
• Appendix C: PharmaCare quantity limits for blood glucose test strips
• Appendix D: Management of Hyperglycemia in Type 2 Diabetes
• Appendix E: Antihyperglycemic Agents and Adjunctive Agents for Use in Type 2 Diabetes
• Appendix F: Insulin and Therapeutic Considerations

Associated Documents

The following documents accompany this guideline:

• Diabetes Patient Care Flow Sheet
• Patient Education and Resources

This guideline is based on scientific evidence current as of the Effective Date.

This guideline was developed by the Guidelines and Protocols Advisory Committee, approved by the British Columbia Medical Association, and adopted by the Medical Services Commission.

THE GUIDELINES AND PROTOCOLS ADVISORY COMMITTEE

The principles of the Guidelines and Protocols Advisory Committee are to:

• encourage appropriate responses to common medical situations
• recommend actions that are sufficient and efficient, neither excessive nor deficient
• permit exceptions when justified by clinical circumstances

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Disclaimer

The Clinical Practice Guidelines (the “Guidelines”) have been developed by the Guidelines and Protocols Advisory Committee on behalf of the Medical Services Commission. The Guidelines are intended to give an understanding of a clinical problem, and outline one or more preferred approaches to the investigation and management of the problem. The Guidelines are not intended as a substitute for the advice or professional judgment of a health care professional, nor are they intended to be the only approach to the management of clinical problem. **We cannot respond to patients or patient advocates requesting advice on issues related to medical conditions. If you need medical advice, please contact a health care professional.**
Appendix A: Screening Algorithm for Type 2 Diabetes in Adults

Note: an interactive form of this tool is available at website: guidelines.diabetes.ca/ScreeningAndDiagnosis/Screening

Screen every 3 years in individuals > 40 years of age or in individuals at high risk using a risk calculator.
Screen earlier and/or more frequently in people with additional risk factors for diabetes or in people at very high risk.

FPG and/or A1C*

FPG < 5.6 mmol/L and/or A1C < 5.5%

No risk factors

Fasting value: < 6.1 mmol/L and 2-h value: < 7.8 mmol/L

A1C < 6% or NA

Normal Rescreen as recommended

At risk Rescreen more often

Fasting value: 6.1 – 6.9 mmol/L and/or A1C 5.5 – 5.9%

If > 1 risk factors consider:

75 g OGTT

FPG and/or A1C*

FPG 6.1 – 6.9 mmol/L and/or A1C 6.0 – 6.4%

≥ 7.0 mmol/L and/or A1C ≥ 6.5%

Fasting value: 6.1 – 6.9 mmol/L and/or A1C 6.0 – 6.4%

Fasting value: ≥ 7.0 mmol/L and/or A1C ≥ 6.5%

Fasting value: ≥ 7.0 mmol/L and/or A1C ≥ 6.5%

Repeat lab test to confirm diagnosis§

Abbreviations: A1C= glycated hemoglobin; FPG= fasting blood glucose; 75-g OGTT= 75 gram oral glucose tolerance test; 2hPG= 2-hour plasma glucose; IFG= impaired fasting glucose; IGT= impaired glucose tolerance; NA = Not available; PG= plasma glucose.

* If both FPG and A1C are available but conflict, use the test that appears to the furthest to the right of the algorithm.
† The term “prediabetes” refers to IFG and/or IGT, or A1C 6.0-6.4%. These individuals are at risk of developing diabetes, should be monitored regularly, and benefit from cardiovascular disease risk factor modification.
‡ If a single lab test is in the diabetes range, then a confirmatory laboratory test (FPG, A1C or a 2hPG in a 75 g OGTT) must be done on another day (in timely fashion) in all cases of unequivocal hyperglycemia accompanied by acute metabolic decompensation. It is preferable the same test is repeated. If two lab tests are available and both are above cutoff points, then diagnosis is confirmed.

### Appendix B: Treatment of Hypoglycemia in Diabetes

<table>
<thead>
<tr>
<th>Severity</th>
<th>Definition</th>
<th>Initial Treatment</th>
<th>Follow-up</th>
</tr>
</thead>
</table>
| **Mild** | Autonomic symptoms present. Individual able to self-treat. | Oral ingestion of 15 g of carbohydrate, preferably as glucose or sucrose tablets or solution:  
• 15 g glucose as glucose tablets  
• 15 mL (3 teaspoons) or 3 packets of table sugar (sucrose) dissolved in water  
• 175 mL (3/4) of juice or regular soft drink  
• 6 LifeSavers (1 = 2.5 g carbohydrate)  
• 15 mL (1 tablespoon) honey  
• Following initial treatment, retest blood glucose in 15 minutes and re-treat with another 15 g carbohydrate if the BG level remains < 4.0 mmol/L. | Once the hypoglycemia has been reversed, the person should have the usual meal or snack that is due at that time of the day to prevent repeated hypoglycemia. If a meal is > 1 hour away, a snack (including 15 g carbohydrate and a protein source) should be consumed.  
Discuss episode with the diabetes healthcare team as soon as possible.  
Individuals (and their families/caregivers) at high risk of severe hypoglycemia should be taught to administer glucagon by injection. |
| **Moderate** | Autonomic and neuroglycopenic symptoms present. Individual able to self-treat. |  
• Conscious: Oral ingestion of 20 g carbohydrate, preferably glucose tablets.  
• Retest blood glucose in 15 minutes and re-treat with another 15 g carbohydrate if the BG level remains < 4.0 mmol/L.  
• Unconscious:  
  • Seek emergency assistance  
  • 1 mg glucagon subcutaneously or intramuscularly  
  • Discuss with the diabetes healthcare team as soon as possible |  

| Patients on Acarbose (GlucoBay™) |  
• Glucose (dextrose) or if unavailable honey or milk  
• Avoid table sugar (sucrose) |  

## Appendix C: PharmaCare quantity limits for blood glucose test strips

<table>
<thead>
<tr>
<th>TREATMENT CATEGORY</th>
<th>NOTES – For combination therapy, the highest eligible quantity limit applies. (e.g., If a patient takes insulin, this higher limit applies, regardless of other diabetes medications.)</th>
<th>ANNUAL QUANTITY LIMIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managing diabetes with insulin</td>
<td></td>
<td>3,000</td>
</tr>
<tr>
<td>Managing diabetes with anti-diabetes medications with a high risk of causing hypoglycemia</td>
<td>Drugs with a higher risk of hypoglycemia (insulin secretagogues-sulfonylureas, meglitinides).</td>
<td>400</td>
</tr>
<tr>
<td>Managing diabetes with anti-diabetes medications with a low risk of causing hypoglycemia</td>
<td>Drugs with a lower risk of hypoglycemia (acarbose, metformin, Dipeptidyl Peptidase-4 Inhibitors (DPP4I’s), incretin mimetics/glucagon-like peptide (GLP-1) agonists, sodium-glucose cotransporter 2 (SGLT2) inhibitors and thiazolidinediones (TZDs).)</td>
<td>200</td>
</tr>
<tr>
<td>Managing diabetes through diet/lifestyle</td>
<td></td>
<td>200</td>
</tr>
</tbody>
</table>

### SPECIAL AUTHORITY ADDITIONAL STRIP COVERAGE

If a patient meets one of the criteria below and is not on insulin, BC PharmaCare will cover 100 extra strips per year on receipt of a Special Authority Request from a physician or from a health professional at a Diabetes Education Centre recognized by the BC Ministry of Health.


For patients requiring 100 additional blood glucose test strips **AND** who are not using insulin **AND** are experiencing at least one of the following:

- Not meeting glycemic targets, as determined by a physician, for 3 months or more **OR**
- Acute illness or comorbidities that may impact blood glucose control **OR**
- Changes in drug therapy that may impact blood glucose control (e.g., starting or stopping hypo- or hyperglycemic inducing medications, or drug-to-drug or drug-to-disease interactions) **OR**
- Occupations where hypoglycemia presents a significant safety risk (e.g., pilots, air traffic controllers, commercial drivers) **OR**
- Gestational diabetes

For more information on BC PharmaCare coverage of test strips, please see their website at [www.health.gov.bc.ca/pharmacare/bgts-pro.html](http://www.health.gov.bc.ca/pharmacare/bgts-pro.html).

**Note:** In the rare case that a patient has a medical need for even more frequent testing, or when a **patient on insulin** needs to test more frequently, an endocrinologist may submit a written request to PharmaCare for additional strips. Requests will be considered on a case-by-case basis. The letter should outline the need for the additional strips and the quantity required.

### References

Appendix D: Management of Hyperglycemia in Type 2 Diabetes

Clinical Assessment

Lifestyle Intervention (initiation of nutrition therapy and physical activity) ± metformin

A1C < 8.5%
- If not at target (2-3 months)
  - Start/increase metformin

A1C > 8.5%
- Initiate metformin immediately. Consider initial combination with another antihyperglycemic agent
- If not at target
  - Make timely adjustments to attain target A1C within 3-6 months

Symptomatic hyperglycemia with metabolic decompensation
- Initiate insulin ± metformin (For information on insulin, see Appendix F)

If A1C > 8.5% and symptomatic hyperglycemia:
- Initiate insulin ± metformin

Add an antihyperglycemic agent best suited to the individual based on patient characteristics, risks and benefits, and cost. For information on antihyperglycemic agents, see Appendix E.

If not at glycemic target: add another agent from a different class; or add/intensify insulin regimen

# Appendix E: Antihyperglycemic Agents and Adjunctive Agents for Use in Type 2 Diabetes

<table>
<thead>
<tr>
<th>Generic Name (Trade Name), Dosages</th>
<th>Adult Dose</th>
<th>Cost/30 days (usual dose)</th>
<th>PharmaCare Coverage (definitions under resources)</th>
<th>Therapeutic Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Biguanides</strong></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
| Metformin (generic) 500, 850 mg tablets, Glumetza 500, 1000 mg SR tablets | Initial: 250 or 500 mg PO BID Usual: 1000 mg BID (Glumetza-daily dose) Max: 2550 mg/day. | $6.50 (3x500 mg) $40 – Glumetza | Regular benefit Glumetza-no coverage | Pro: Usual first line drug for type 2 diabetes; low rates of hypoglycemia; weight neutral to modest weight loss (2-3 kg).<sup>5,6</sup>  
Con: GI side effects, Vitamin B12 deficiency. Use with caution / reduce dose if eGFR < 60 mL/min.  
Contraindicated: eGFR < 30 mL/min, hepatic or cardiac failure.  
Effect: lowers A1C 1.5%, decreases micro and macrovascular endpoints events.<sup>7,8</sup> |
| Glimepiride (Amaryl™, generic) 1, 2, 4 mg tablets | Initial: 1 mg PO daily Usual: 1-4 mg daily Max: 8mg daily | $16 (1x4 mg daily) | No Coverage | Pro: Extensive clinical experience.  
Con: Hypoglycemia variable based on drug (more with glyburide), dose, patient, modest weight gain<sup>9,10,11</sup> (2-3 kg).  
Use with caution / reduce dose if eGFR < 50 mL/min (glyburide), eGFR < 30 mL/min (glimepiride, gliclazide).  
Not recommended: eGFR < 30 mL/min (glyburide), eGFR < 15 (glimepiride, gliclazide).  
Effect: lowers A1C 1-2%.<sup>12,13,14</sup> |
| Glyburide (Diabeta®, generic) 2.5, 5 mg tablets | Initial: 5 mg PO daily Usual: 2.5-20 mg (divide BID if >10 mg) Max: 20 mg daily | $2 (2x5 mg) | Regular Coverage |                                                   |
| **Insulin Secretagogues, Meglitinides** |            |                          |                                                   |                           |
| Repaglinide (GlucoNorm®) 0.5, 1, 2 mg tablets | Initial: 0.5mg (treatment-naïve) or 1 mg PO TID AC Max: 16 mg daily<sup>3</sup> | $32 (4x2 mg) | No Coverage | Pro: No risk sulfa allergy, no dosage adjustment for decreased eGFR.  
Con: some hypoglycemia and weight gain, TID dosing.  
Contraindicated: pregnancy.  
Effect: lowers A1C 0.5-1%.<sup>15,16,17</sup> |
<p>| Nateglinide (Starlix) 60, 120 mg tablets | Initial and maintenance: 60-120 mg PO TID AC&lt;sup&gt;3&lt;/sup&gt; | $55 (any dose TID) | No Coverage |                                                   |</p>
<table>
<thead>
<tr>
<th>Generic Name (Trade Name), Dosages</th>
<th>Adult Dose (usual dose)</th>
<th>Cost/30 days (usual dose)</th>
<th>PharmaCare Coverage (definitions under resources)</th>
<th>Therapeutic Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alpha-glucosidase inhibitor</strong></td>
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</tbody>
</table>
| Acarbose (Glucobay®) 50, 100 mg tablets | Slowly titrate (every 1-2 weeks) from 50mg daily to 50 mg TID. Max 100 mg TID. AC meals. | $27 (3x50 mg) | No Coverage | Pro: low risk hypoglycemia, weight neutral to modest weight loss.  
Con: frequent GI side effects.  
Not recommended if eGFR < 25 mL/min.  
Contraindicated: IBS and IBD.  
Note: Must use glucose (dextrose) for hypoglycemia, not sucrose as complex sugars are ineffective. |
| **Thiazolidinediones (TZDs)**     |                         |                          |                                                 |                           |
| Pioglitazone (Actos®, generic) 15, 30 mg tablets | Initial: 15-30 mg PO daily  
Max: 45 mg daily | $29 (1x30 mg) | Limited Coverage*  
(Requires Special Authority). Criteria: part of a combination treatment for type 2 diabetes:  
1. When insulin NPH is not an option AND  
2. After inadequate glycemic control on maximum tolerated doses of dual therapy of metformin AND a sulfonylurea.  
See Pharmacare website: pioglitazone. | Pro: low risk of hypoglycemia, increase HDL.  
Con: weight gain (4-6 lbs, fluid retention contributes), fluid retention, can precipitate heart failure, increased risk fractures, cardiovascular risk-benefit unclear.  
Use with caution: if eGFR < 30 mL/min.  
Contraindicated: pregnancy, metabolic bone disease, NYHA II/IV heart failure.  
Effect: Lowers A1C 1-1.5%. Pioglitazone may reduce cardiovascular harm.18  
Pioglitazone can cause significant fluid retention, particularly in heart failure. Contraindicated in active bladder cancer or history of bladder cancer. Risk of bladder cancer may increase with high dose and duration of use. |
| Rosiglitazone (Avandia®) 2, 4, 8 mg tablets  
*Use of rosiglitazone is not recommended.* | 4 mg PO daily in 1-2 doses  
Max: 8 mg daily (4 mg if taking sulfonylurea) | $70 (1x4 mg) | No Coverage | Rosiglitazone can cause fluid retention, heart failure, and may be associated with an increased risk of cardiac ischemia.19 Use of rosiglitazone is not recommended. |
<table>
<thead>
<tr>
<th>Generic Name (Trade Name), Dosages</th>
<th>Adult Dose</th>
<th>Cost/30 days (usual dose)</th>
<th>PharmaCare Coverage (definitions under resources)</th>
<th>Therapeutic Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dipeptidyl Peptidase-4 Inhibitors (DPP4Is)</strong></td>
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<tr>
<td>Sitagliptin (Januvia™) 25, 50, 100 mg Tabs</td>
<td>100 mg PO daily</td>
<td>$96 (all doses)</td>
<td>No Coverage</td>
<td>Pro: weight neutral.</td>
</tr>
<tr>
<td>Saxagliptin (Onglyza™) 2.5, 5 mg tablets</td>
<td>5 mg PO daily</td>
<td>$77 – 2.5 mg $92 – 5 mg</td>
<td>Limited Coverage* (Requires Special Authority). Criteria: part of a combination treatment for type 2 diabetes: 1. When insulin NPH is not an option AND 2. After inadequate glycemic control on maximum tolerated doses of dual therapy of metformin AND a sulfonylurea. See Pharmacare website: saxagliptin.</td>
<td>Con: rare reports of pancreatitis, emerging concerns about HF (saxagliptin), modest lowering effect on A1C, may cause severe joint pain. Dosage reduction required if eGFR &lt; 50 mL/min (sitagliptin, saxagliptin). Contraindicated: pregnancy, hepatic failure, previous lactic acidosis. Effect: lowers A1C 0.75%.20 Trials up to 3 years in length show no cardiovascular disease benefit over placebo.20-22</td>
</tr>
<tr>
<td>Linagliptin (Trajenta) 5 mg tablets</td>
<td>5 mg PO daily</td>
<td>$73</td>
<td>Limited Coverage* (Requires Special Authority). Criteria: As saxagliptin above See Pharmacare website: linagliptin</td>
<td></td>
</tr>
<tr>
<td>Alogliptin (Nesina) 6.25 mg, 12.5 mg, 25 mg</td>
<td>25 mg daily</td>
<td>$85 (1x25 mg)</td>
<td>No Coverage</td>
<td></td>
</tr>
<tr>
<td><strong>Glucagon-Like-Peptide 1 (GLP-1) Agonists</strong></td>
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<tr>
<td>Albiglutide (Eperzan)</td>
<td>30 mg SC once weekly, may increase to 50 mg SC once weekly after 4 weeks if needed.</td>
<td>Not available in BC as of 2015/09/28</td>
<td>Not available in BC as of 2015/09/28</td>
<td>Pro: modest weight loss (up to 2-3 kg)23, low hypoglycemia. Con: GI side effects, rare reports of pancreatitis, increased heart rate, injectable. Use with caution / not recommended if eGFR &lt; 50 mL/min. Contraindicated: pregnancy, history of pancreatitis, personal or family history of medullary thyroid carcinoma or multiple endocrine neoplasia syndrome type 2. Effect: lowers A1C 1%.24</td>
</tr>
<tr>
<td>Liraglutide (Victoza®) pre-filled pen (0.6 mg/0.1 ml) Pack size: 2x3 ml, 3x3 ml (3 ml=15 doses of 1.2 mg/ml)</td>
<td>Initial: 0.6 mg SC once daily x 1 week Increase to 1.2-1.8 mg SC once daily (1.8 is more expensive, similar A1C effect)</td>
<td>$175 (1.2 mg)</td>
<td>No Coverage</td>
<td></td>
</tr>
<tr>
<td>Exenatide (Byetta) Pre-filled pen. 5 mcg/0.02 ml Pack size: 1.2 ml (60 doses of 5 mcg/dose) and 2.4 ml (60 doses of 10 mcg/dose)</td>
<td>Initial: 5 mcg SC BID within 60-minute period before the two main meals of the day, at least 6 hours apart. Increase to 10 mcg BID as tolerated</td>
<td>$150 (all doses)</td>
<td>No Coverage</td>
<td>Effect: lowers A1C 1%.24</td>
</tr>
<tr>
<td>Generic Name (Trade Name), Dosages</td>
<td>Adult Dose(^1,2,3)</td>
<td>Cost/30 days (usual dose)</td>
<td>PharmaCare Coverage (definitions under resources)</td>
<td>Therapeutic Considerations</td>
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<tr>
<td>Sodium-Glucose Cotransporter 2 Inhibitors</td>
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<tr>
<td>Canagliflozin (Invokana) 100, 300 mg tablets</td>
<td>100 mg PO daily prior to first meal. May increase to a maximum of 300 mg daily. Use only 100 mg dose if eGFR 45-60 mL/min.</td>
<td>$84 (all doses)</td>
<td>Under Review</td>
<td><strong>Pro:</strong> weight loss (2-3 kg), low rates of hypoglycemia, blood pressure lowering (unknown clinical significance). <strong>Con:</strong> decreased bone mineral density and increased risk of bone fractures (canagliflozin), reports of euglycemic diabetic ketoacidosis, volume depletion (more in age &gt; 65 years), genital mycotic infections, UTI, increased LDL, glucose lowering is independent of beta cell function and insulin sensitivity.</td>
</tr>
<tr>
<td>Dapagliflozin (Forxiga) 5, 10 mg tablets</td>
<td>Initial: 5 mg once daily; may increase to 10 mg once daily</td>
<td>$84 (all doses)</td>
<td>Under Review</td>
<td><strong>Contraindicated:</strong> pregnancy, eGFR &lt; 45 mL/min (&lt; 60 mL/min if dapagliflozin), renal disease, dialysis, bladder cancer imbalance (dapagliflozin). <strong>Effect:</strong> lowers A1C 0.5 – 0.7%.(^2,5) limited by filtered load of glucose, osmotic diuresis and kidney function.</td>
</tr>
<tr>
<td>Empagliflozin (Jardiance) 10, 25 mg tablets</td>
<td>10 mg once daily; may increase to 25 mg once daily</td>
<td>Under review</td>
<td>Under Review</td>
<td></td>
</tr>
<tr>
<td>Combinations</td>
<td></td>
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</tr>
<tr>
<td>Rosiglitazone plus metformin (Avandamet(^TM)) 2/500, 2/1000, 4/500, 4/1000 mg tablets</td>
<td>2 mg/500 mg PO BID with meals, max 8 mg/1000 mg BID</td>
<td>$52 (4 mg/500 mg)</td>
<td>No Coverage</td>
<td>See individual drug components. Rosiglitazone not recommended.</td>
</tr>
<tr>
<td>Sitagliptin plus metformin (Janumet(^TM)) 50 mg/500, 50/1000 mg tablets</td>
<td>50 mg/500 mg PO BID; Max: 50 mg/1000 mg BID</td>
<td>$104 (all doses)</td>
<td>No Coverage</td>
<td></td>
</tr>
<tr>
<td>Alogliptin-metformin (Kazano) 12.5/500 mg, 12.5/850 mg 12.5 mg/1000 mg</td>
<td>One tablet BID</td>
<td>$89 (all doses)</td>
<td>No Coverage</td>
<td></td>
</tr>
<tr>
<td>Linagliptin plus metformin (Jentadueto) 2.5/500 mg, 2.5/850 mg, 2.5/1000 mg Tablets</td>
<td>Max: 2.5 mg/1000 mg BID</td>
<td>$77 (all doses)</td>
<td>Limited Coverage(^*) (Requires Special Authority). Criteria: As saxagliptin and linagliptin above.</td>
<td></td>
</tr>
<tr>
<td>Saxagliptin plus metformin (Komboglyze) 2.5/500 mg, 2.5/850 mg, 2.5/1000 mg Tablets</td>
<td>Max: 2.5 mg/1000 mg BID</td>
<td>$82 (all doses)</td>
<td></td>
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</tr>
</tbody>
</table>

**Abbreviations:** AC=before meals; A1C=glycosylated hemoglobin; BID= twice a day; BC=British Columbia; eGFR= estimated glomerular filtration rate; ER= extended release; GI=gastrointestinal; HDL= high density lipoprotein; IBD= inflammatory bowel disease; IBS= Irritable bowel syndrome; LDL = low density lipoprotein; mg=milligram; NPH= Neutral protamine hagedorn (e.g., Humulin N); NYHA= New York Heart Association Functional Classification; PO=orally; SC=subcutaneous; TID= three times a day; URTI=upper respiratory tract infection; UTI=urinary tract infection

- Limited Coverage Criteria are current as per Pharmacare 2014/12/01 and are subject to change. Refer to Pharmacare website for updated criteria.
- Pricing is approximate as per PharmaNet 2014/08/26 and does not include dispensing fee and retail markup.
- For information on the current costs, please visit BC PharmaCare Formulary Search, website: pcbl.hlth.gov.bc.ca/pharmacare/benefitslookup/
PharmaCare Coverage Definitions:

Regular coverage: also known as regular benefit; does not require Special Authority; patients may receive full coverage*

Partial coverage: Some types of regular benefits are only partially covered* because they are included in the Low Cost Alternative (LCA) program or Reference Drug Program (RDP) as follows: LCA: When multiple medications contain the same active ingredient (usually generic products), patients receive full coverage* for the drug with the lowest average PharmaCare claimed price. The remaining products get partial coverage. RDP: When a number of products contain different active ingredients but are in the same therapeutic class, patients receive full coverage* for the drug that is medically effective and most cost-effective. This drug is designated as the Reference Drug. Remaining products get partial coverage.

Special Authority: requires Special Authority for coverage. Patients may receive full or partial coverage* depending on LCA or RDP status. These drugs are not normally regarded as first-line therapies or there are drugs for which a more cost-effective alternative exists. Pharmacare coverage period is indefinite, 3rd party payers may require re-confirmation.

No coverage: does not fit any of the above categories

* coverage is subject to drug price limits set by PharmaCare and to the patient’s PharmaCare plan rules and deductibles.

See www.health.gov.bc.ca/pharmacare/ for further information.

References:

# Appendix F: Insulins and Therapeutic Considerations


<table>
<thead>
<tr>
<th>Insulin Action</th>
<th>Insulin Name</th>
<th>Trade Name – Supplied as either Vials (1x10 ml), Cartridges (5x3 ml) and/or Prefilled Pens (5x3 ml)</th>
<th>Cost per 100 IU of insulin (Cost per supply – 10 ml vial or 5x3 ml Pen/Cartridge)</th>
<th>Pharmacare Coverage</th>
<th>Therapeutic Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RAPID</strong></td>
<td>Insulin aspart NovoRapid(Vial, Pen/Flex Touch Pen) Insulin glulisine Apidra (Vial, Cartridge, Solostar pen) insulin lispro Humalog (Vial, Cartridge, Kwikpen)</td>
<td>Aspart $3 ($31)-Vial $4.25 ($65)-Pen Glulisine $2.70 ($27)-Vial $3.60 ($54)-Pen/Cartridge lispro $2.9 ($29)-Vial $4 ($56)-Pen/Cartridge</td>
<td>Partial Benefit</td>
<td>Bolus Insulin&lt;br&gt;Onset: 10-15min. Peak 60-90min.&lt;br&gt;Duration 4-5h</td>
<td></td>
</tr>
<tr>
<td><strong>SHORT</strong></td>
<td>Insulin regular Humulin R (Vial, Cartridge) Novolin ge Toronto (Vial, Pen)</td>
<td>Humulin R $2.40 ($24)-Vial $3.2 ($48)-Cartridge Novolin Toronto $2.30 ($23)-Vial $3 ($45)-Pen</td>
<td>Regular benefit</td>
<td>Bolus&lt;br&gt;Onset: 0.5-1h. Peak 2-4h.&lt;br&gt;Duration 5-8h.</td>
<td></td>
</tr>
<tr>
<td><strong>INTERMEDIATE</strong></td>
<td>Insulin NPH Humulin N (Vial, Cartridge, Kwikpen) Novolin ge NPH (Vial, Pen)</td>
<td>Humulin N $2.5 ($25)-Pen $3.2 ($48)-Vial Novolin NPH $2.3 ($23)-Vial $3.1 ($46)-Pen</td>
<td>Regular benefit</td>
<td>Basal Insulin&lt;br&gt;Onset: 1-2h. Peak: 5-8h.&lt;br&gt;Duration 14-18h.</td>
<td></td>
</tr>
<tr>
<td><strong>LONG</strong></td>
<td>Insulin glargine Lantus (Vial, Cartridge, Pen) Insulin detemir Levemir (Cartridge, Pen)</td>
<td>Insulin glargine $6.6 ($66)-Vial $6.6 ($100)-Pen Insulin detemir $7.3 ($110)-Cartridge $7.7 ($116)-Pen</td>
<td>Limited Coverage for insulin glargine and insulin detemir (Requires Special Authority or prescription written by endocrinologist). See Pharmacare website on insulin detemir or insulin glargine</td>
<td>Basal Insulin&lt;br&gt;Onset: 1.5h. Peak: Flat.&lt;br&gt;Duration: 24h (6-24h Levemir)&lt;br&gt;Do not mix with other insulins. Levemir: at low dose may require BID administration&lt;br&gt;Lantus: SC only</td>
<td></td>
</tr>
<tr>
<td><strong>LONG</strong></td>
<td>Long-acting Basal Analogue Insulin Glargine U300 Toujeo SoloSTAR 4504/1.5 mL</td>
<td>Note: Insulin Glargine U300 solution is 300U/mL Toujeo SoloSTAR is 1.5 mL pen 3-pack/4.5 mL $80 5-pack/7.5 mL $135</td>
<td>To be determined</td>
<td>Basal Analogue&lt;br&gt;Onset: Up to 6h. Peak: Not applicable.&lt;br&gt;Duration: Up to 30h.&lt;br&gt;SC only. Must not be mixed with any other insulin or diluted with any other solution</td>
<td></td>
</tr>
<tr>
<td><strong>PREMIXED</strong></td>
<td>Premixed (% short (regular) to % intermediate (NPH)) Humulin 30/70 (Vial, Cartridge) Novolin ge 30/70, 40/60, 50/50 (Pen, Vial (30/70 only))</td>
<td>Humulin 30/70 $2.40 ($24)-Vial $3.2 ($48)-Cartridge Novolin 30/70, 40/60, 50/50 $2.3 ($23)-Vial $3 ($45)-Pen</td>
<td>Regular benefit</td>
<td>Action is combination of individual components.</td>
<td></td>
</tr>
<tr>
<td><strong>PREMIXED</strong></td>
<td>Premixed Insulin Analogues insulin lispro/lispro protamine Humalog Mix25, Humalog Mix 50 (Cartridge, Pen) insulin aspart/aspart protamine (NovoMix 30) (Cartridge)</td>
<td>Lispro/Lispro Protamine and aspart/aspart protamine $4 ($60)-Cartridge, Pen</td>
<td>Partial benefit – covered to cost of short-acting insulin, no SA coverage</td>
<td>Humalog-Onset: 10-15 min, Peak and Duration unavailable. Novomix 30-Onset: 10-15min Peak: 60-90min Duration: 15-18h</td>
<td></td>
</tr>
</tbody>
</table>

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RDP: When a number of products contain different active ingredients but are in the same therapeutic class, patients receive full coverage for the drug that is medically effective and the most cost-effective. This drug is designated as the Reference Drug. The remaining products get partial coverage.

Special Authority: requires Special Authority for coverage. Patients may receive full or partial coverage depending on LCA or RDP status. These drugs are not normally regarded as first-line therapies or there are drugs for which a more cost-effective alternative exists. Pharmacare coverage period is indefinite, 3rd party payers may require re-confirmation.

No coverage: does not fit any of the above categories

* coverage is subject to drug price limits set by PharmaCare and to the patient’s PharmaCare plan rules and deductibles. See www2.gov.bc.ca/gov/content/health/health-drug-coverage/pharmacare-for-bc-residents for further information.

References: