

Contents lists available at [ScienceDirect](http://www.sciencedirect.com)

Canadian Journal of Diabetes

journal homepage:
www.canadianjournalofdiabetes.com

 Canadian
Diabetes
Association


Policies, Guidelines and Consensus Statements

Diabetes and Driving: 2015 Canadian Diabetes Association Updated Recommendations for Private and Commercial Drivers


 Robyn L. Houlden MD ^{a,*}, Lori Berard RN ^b, Alice Cheng MD ^c, Anne B. Kenshole MB ^d,
 Jay Silverberg MD ^e, Vincent C. Woo MD ^f, Jean-François Yale MD ^g
^a Division of Endocrinology and Metabolism, Department of Medicine, Queen's University, Kingston, Ontario, Canada^b Winnipeg Regional Health Authority, Health Sciences Centre Winnipeg, Winnipeg, Manitoba, Canada^c Division of Endocrinology and Metabolism, Department of Medicine, University of Toronto, Mississauga, Ontario, Canada^d Medicine and Obstetrics and Gynecology, University of Toronto, Toronto, Ontario, Canada^e Division of Endocrinology, Department of Medicine, University of Toronto, Toronto, Ontario, Canada^f Section of Endocrinology and Metabolism, John Buhler Research Centre, University of Manitoba, Winnipeg, Manitoba, Canada^g McGill Nutrition and Food Science Centre, McGill University, Montréal, Quebec, Canada

ARTICLE INFO

Article history:

Received 17 August 2015

Accepted 17 August 2015

Introduction

For many Canadians, driving is an essential part of daily living and is often a requirement of employment. Diabetes can affect driving performance because of chronic complications that impair sensory or motor functions (retinopathy, neuropathy, amputation, vascular disease) and because of transient cognitive dysfunction or loss of consciousness resulting from antihyperglycemic medication-induced hypoglycemia (related primarily to insulin or insulin secretagogues). The presence and extent of these factors vary from person to person, so the fitness of persons with diabetes to drive should be assessed on an individual basis.

These recommendations represent an update of the 2003 Canadian Diabetes Association's guidelines on diabetes and driving (1). Changes have been made to clarify and expand the older recommendations. A MEDLINE search was performed in October 2014 and did not reveal new compelling evidence that would require major modifications. Guidelines from other countries were also reviewed (2–6). All recommendations are Grade D and represent the consensus of a national expert panel.

The revised recommendations highlight the active role that persons with diabetes should play in assessing their fitness to drive. They identify the important roles for healthcare professionals in educating patients with diabetes in strategies to reduce their risks for hypoglycemia while driving. Healthcare professionals also play critical roles in identifying and informing individuals with diabetes at high risk for motor vehicle accidents.

Currently, 10 Canadian provinces and territories have mandatory reporting systems that oblige legally qualified medical practitioners to report to the appropriate regulatory body those patients who have conditions that impair their driving abilities (5) (Table 1). Federal organizations, such as the Canadian Council of Motor Transportation Administrators, should have consistent, clear and easily accessible reporting mechanisms for physicians and nurse practitioners; in addition, provincial and territorial ministries of transportations should include information on their websites about diabetes and driving.

Driving Risks Associated with Diabetes

Case control studies have suggested that drivers with diabetes pose a modestly increased but acceptable and measurable risk for motor vehicle accidents compared to drivers without diabetes, but many studies are limited and of poor quality (7). Older studies may no longer be relevant due to changes in road conditions, vehicles and diabetes management (8).

Unrecognized hypoglycemia is the most relevant driving hazard for drivers with diabetes. A number of studies have examined driving performance by using driving simulators during induced hypoglycemia in individuals with type 1 diabetes, and they demonstrated that performance starts to deteriorate at blood glucose levels below 3.8 mmol/L (9,10). Only 1 in 3 drivers self-treated their low blood glucose levels, and the treatments occurred only when the blood glucose levels were 2.8 mmol/L or lower. Less than 25% were aware that their driving performance was impaired (10). Studies have demonstrated that cognitive function may not recover until 45 minutes or more after restoration of euglycemia (11–13).

Hypoglycemia is not a problem for drivers with diabetes who are treated by lifestyle and dietary measures alone; nor is it a

* Address for correspondence: Robyn L. Houlden, MD, Division of Endocrinology and Metabolism, Kingston General Hospital, 76 Stuart Street, Kingston, Ontario K7L 2V7, Canada.

E-mail address: houldenr@queensu.ca

Table 1
Canadian regulations for reporting medically unfit drivers (14)

Province/Territory	Reporting ^a
Alberta	Discretionary
British Columbia	Mandatory (only if the driver has been warned of the dangers of driving and still continues to drive)
Manitoba	Mandatory
New Brunswick	Mandatory
Newfoundland and Labrador	Mandatory
Northwest Territories	Mandatory
Nova Scotia	Discretionary
Nunavut	Mandatory
Ontario	Mandatory
Prince Edward Island	Mandatory
Quebec	Discretionary
Saskatchewan	Mandatory
Yukon	Mandatory

^a For more information regarding reporting processes in Canada, please see the Canadian Medical Association Driver's Guide.

problem for drivers with diabetes treated with most non-insulin secretagogue medications, when used as monotherapy or in combination with each other. Treatment with insulin secretagogue antihyperglycemic medication (sulfonylureas, meglitinides) may provoke higher rates of hypoglycemia when used alone or in combination with other non-insulin antihyperglycemic medications (15). Studies of rates of motor vehicle accidents in drivers with diabetes have consistently described the highest rates' occurring in individuals treated with insulin (16–20).

Factors that have been shown to increase driving risk include previous episodes of severe hypoglycemia (21,22), with risk greater in those with lower glycated hemoglobin (A1C) levels (23); previous hypoglycemia while driving (21) and absence of blood glucose monitoring before driving (16,21). Impaired awareness of hypoglycemia is a recognized risk factor for severe hypoglycemia. This risk may be mitigated by frequent blood glucose testing (24) or use of a continuous glucose monitoring device (25). Use of a memory glucose meter is recommended so that measurements can be assessed by the healthcare team and by driving authorities, if indicated.

Recommendations

Private drivers

1. Private drivers treated with nutritional therapy alone or antihyperglycemic agents with minimal risk of severe hypoglycemia
 - a) Fitness of persons with diabetes to drive should be assessed on an individual basis.
 - b) All drivers with diabetes should undergo a medical examination at least every 2 years by a physician or nurse practitioner competent in managing patients with diabetes. This should include an assessment of glycemic control; frequency and severity of hypoglycemia; symptomatic awareness of hypoglycemia and the presence of retinopathy, neuropathy, nephropathy, amputation and/or vascular disease. A decision should be made on whether any of these factors could significantly increase the risk of a motor vehicle accident.
 - c) Persons with diabetes who are well controlled by nutritional therapy alone or by a combination of nutritional therapy and antihyperglycemic medication that carries a minimal risk of a severe hypoglycemic episode (Table 2) may usually drive all types of motor vehicles with

Table 2
Antihyperglycemic agents and risk for hypoglycemia

Antihyperglycemic agents associated with minimal risk for severe hypoglycemia:
Alpha-glucosidase inhibitors
Incretin agents:
• DPP-4 inhibitors
• GLP-1 receptor agonists
Metformin
SGLT2 inhibitors
TZDs

TZD, glitazones.

relative safety provided they remain under regular medical supervision.

2. Private drivers treated with insulin secretagogues
 - a) Fitness of persons with diabetes to drive should be assessed on an individual basis.
 - b) All drivers with diabetes should undergo a medical examination at least every 2 years by a physician or nurse practitioner competent in managing patients with diabetes. This should include an assessment of glycemic control; frequency and severity of hypoglycemia; symptomatic awareness of hypoglycemia and the presence of retinopathy, neuropathy, nephropathy, amputation and/or vascular disease. A decision should be made on whether any of these factors could significantly increase the risk of a motor vehicle accident.
 - c) Persons with diabetes treated with insulin secretagogues may usually drive private vehicles if they are under regular medical supervision.
 - d) Persons with diabetes treated with insulin secretagogues should take an active role in assessing their ability to drive safely by maintaining a log of their self-monitored blood glucose (BG) measurements by using either a memory-equipped BG meter or an electronic record of BG measurement performed at a frequency deemed appropriate by the person with diabetes and their healthcare team. BG logs should be verifiable on request.
 - e) Persons with diabetes treated with insulin secretagogues who experience any episode of severe hypoglycemia while awake (defined as hypoglycemia of sufficient severity to require corrective intervention by another person or producing loss of consciousness, even if spontaneous recovery occurs) must refrain from driving immediately and notify their healthcare provider of the event immediately (no longer than 72 hours).
 - f) Persons with diabetes should know how to avoid, recognize and treat hypoglycemia.
 - g) Persons with diabetes treated with insulin secretagogues should consider measuring their BG level immediately before and at least every 4 hours while driving or wear a real-time continuous BG monitoring device.
 - h) Persons with diabetes treated with insulin secretagogues should always have BG monitoring equipment and supplies of rapidly absorbable carbohydrate within easy reach (e.g. attached to the driver's-side visor or in the centre console).
 - i) Persons with diabetes treated with insulin secretagogues should not drive when their BG level is <4.0 mmol/L. If the BG level is <4.0 mmol/L, persons should not drive until at least 45 minutes after ingestion of a carbohydrate and their BG level is at least 5.0 mmol/L.
 - j) Persons with diabetes should stop driving, test and treat themselves as soon as hypoglycemia and/or impaired driving are suspected. They should not resume driving until at least 45 minutes after ingestion of carbohydrate has increased their BG levels to at least 5.0 mmol/L.

- k) Healthcare professionals should inform persons with diabetes treated with insulin secretagogues to no longer drive and should report their concerns about the person's fitness to drive to the appropriate driving licensing body if any of the following occur:
- 1) Any episode of severe hypoglycemia while driving
 - 2) More than 1 episode of severe hypoglycemia while awake but not driving.
- l) Persons with diabetes should immediately self-report to their driving licensing body if they experience any episode of severe hypoglycemia while driving or if they experience more than 1 episode of severe hypoglycemia while awake but not driving.
- m) Persons with diabetes treated with insulin secretagogues who have had their license suspended due to an episode of severe hypoglycemia or hypoglycemia unawareness may be considered for reinstatement of their license if the following criteria are met:
- 1) No episode of severe hypoglycemia in last 6 months
 - 2) No evidence of hypoglycemia unawareness in last 6 months.
- n) Persons with diabetes treated with insulin secretagogues with severe hypoglycemia that occurs while asleep should be assessed by their physician or nurse practitioner to determine their fitness to drive based on the circumstances surrounding the severe hypoglycemic episode and its likelihood to recur while awake and driving.
3. Private drivers treated with insulin
- a) Fitness of persons with diabetes to drive must be assessed on an individual basis.
 - b) All drivers with diabetes should undergo a medical examinations at least every 2 years by a physician or nurse practitioner competent in managing patients with diabetes. This should include an assessment of glycemic control; frequency and severity of hypoglycemia; symptomatic awareness of hypoglycemia and the presence of retinopathy, neuropathy, nephropathy, amputation and/or vascular disease. A decision should be made on whether the severity of any of these complications could significantly increase the risk of a motor vehicle accident.
 - c) Persons with diabetes treated with insulin may drive private vehicles if they are under regular medical supervision.
 - d) Persons with diabetes treated with insulin should take an active role in assessing their ability to drive safely by maintaining a log of their self-monitored BG measurement, either by using a memory-equipped BG meter or electronic record of BG measurement performed, on average, at least once a day. BG logs should be verifiable on request.
 - e) Persons with diabetes treated with insulin who experience an episode of severe hypoglycemia (defined as hypoglycemia of sufficient severity to require corrective intervention by another person or producing loss of consciousness, even if spontaneous recovery occurs) must refrain from driving immediately and notify their healthcare provider of the event immediately (no longer than 72 hours).
 - f) Persons with diabetes should know how to avoid, recognize and treat hypoglycemia.
 - g) Persons with diabetes treated with insulin should consider measuring their BG level immediately before and at least every 4 hours while driving or wear a real-time continuous BG monitoring device.
 - h) Persons with diabetes treated with insulin with any of the following risk factors for severe hypoglycemia must measure their BG levels immediately before and at least every 2 hours while driving or wear a real-time continuous BG monitoring device:
 - 1) Recurrent severe hypoglycemia
 - 2) Prior history of severe hypoglycemia or hypoglycemia unawareness resulting in license suspension and subsequent reinstatement.
 - i) Persons with diabetes treated with insulin should always have BG monitoring equipment and supplies of rapidly absorbable carbohydrate within easy reach (e.g. attached to the driver's-side visor or in the centre console).
 - j) Persons with diabetes treated with insulin should not drive when their BG level is <4.0 mmol/L. If the BG level is <4.0 mmol/L, persons should not drive until at least 45 minutes after ingestion of carbohydrate and their BG level is at least 5.0 mmol/L.
 - k) Persons with diabetes should stop driving, test and treat themselves as soon as hypoglycemia and/or impaired driving are suspected. They should not resume driving until at least 45 minutes after ingestion of carbohydrate has increased their BG levels to at least 5.0 mmol/L.
 - l) Healthcare professionals should inform persons with diabetes treated with insulin to stop driving and report their concerns about the person's fitness to drive to the appropriate driving licensing body if any of the following occur:
 - 1) Any episode of severe hypoglycemia while driving
 - 2) More than 1 episode of severe hypoglycemia while awake but not driving.
 - m) Persons with diabetes should immediately self-report to their driving licensing body if they experience any episode of severe hypoglycemia while driving or if they experience more than 1 episode of severe hypoglycemia while awake but not driving.
 - n) Persons with diabetes treated with insulin who have had their license temporarily suspended due to severe hypoglycemia or hypoglycemia unawareness may be considered for reinstatement of their license if the following criteria are met:
 - 1) No episodes of severe hypoglycemia in last 6 months
 - 2) No evidence of hypoglycemia unawareness in last 6 months.
 - o) Persons with diabetes treated with insulin with severe hypoglycemia that occurs while asleep should be assessed by their physician or nurse practitioner to determine their fitness to drive based on the circumstances surrounding the severe hypoglycemic episode and its likelihood to recur while awake and driving.

Commercial drivers

- 1) Commercial drivers treated with nutritional therapy alone or antihyperglycemic agents with minimal risk of severe hypoglycemia
 - a) Initial application for commercial license
 - 1) Fitness of persons with diabetes to drive should be assessed on an individual basis.
 - 2) All drivers with diabetes should undergo a comprehensive medical examination at the time of application for a commercial license and at least every 2 years thereafter by a physician or nurse practitioner competent in managing patients with diabetes. This should include an assessment of glycemic control; frequency and severity of hypoglycemia; symptomatic awareness of hypoglycemia and the presence of retinopathy, neuropathy, nephropathy, amputation

and/or vascular disease. A decision should be made on whether any of these factors could increase the risk of motor vehicle accident.

- 3) A full eye examination performed by an ophthalmologist or optometrist should be completed at the time of application for a commercial license and repeated every year or at the discretion of the ophthalmologist or optometrist.
- 4) Persons with diabetes who are well controlled by nutritional therapy alone or a combination of nutritional therapy and antihyperglycemic medication with minimal risk of severe hypoglycemia (Table 1) may usually drive all types of motor vehicles with relative safety provided they remain under regular medical supervision.
- 5) The following are exclusion criteria for obtaining or retaining a commercial license:
 - a) Visual impairment that does not meet the minimum standard for visual acuity in the jurisdiction in which the individual is licensed
 - b) Peripheral neuropathy, amputation or cardiovascular disease of sufficient severity to affect the ability to drive safely
 - c) Failure to complete an assessment (as outlined above) at least every 2 years.
- 2) Commercial drivers treated with insulin secretagogues
 - a) Fitness of persons with diabetes to drive should be assessed on an individual basis.
 - b) All drivers with diabetes should undergo a comprehensive medical examination at the time of application for a commercial license and at least every 2 years thereafter by a physician or nurse practitioner competent in managing patients with diabetes. This should include an assessment of glycemic control; frequency and severity of hypoglycemia; symptomatic awareness of hypoglycemia and the presence of retinopathy, neuropathy, nephropathy, amputation and/or vascular disease. A decision should be made on whether any of these factors could significantly increase the risk of a motor vehicle accident. The assessment should include the completion of a questionnaire that assesses the risk for hypoglycemia, including the nature of the work, type of motor vehicle, flexibility of scheduling, recognition of symptoms of hypoglycemia and ability to treat hypoglycemia, and documents the frequency of mild and severe hypoglycemia in the last 12 months.
 - c) A full eye examination performed by an ophthalmologist or optometrist should be completed at the time of application for a commercial license and should be repeated every year or at the discretion of the ophthalmologist or optometrist.
 - d) Commercial drivers with diabetes treated with insulin secretagogues should take an active role in assessing their ability to drive safely by maintaining a log of their self-monitored BG measurements, either by using a memory-equipped BG meter or an electronic record of BG measurements performed at a frequency deemed appropriate by the person with diabetes and their healthcare team. For initial commercial license application, the record should include the last 6 months (or since the diagnosis of diabetes if less than 6 months). For annual renewal of a commercial license, the record should be complete from the last application. BG logs should be verifiable on request.
 - e) Commercial drivers with diabetes should know how to avoid, recognize and treat hypoglycemia.
- f) Commercial drivers with diabetes treated with insulin secretagogues who experience any episode of severe hypoglycemia (defined as hypoglycemia of sufficient severity to require corrective intervention by another person or producing loss of consciousness, even if spontaneous recovery occurs) must refrain from driving immediately and notify their healthcare provider of the event immediately (no longer than 72 hours).
- g) Commercial drivers with diabetes treated with insulin secretagogues should consider measuring their BG level immediately before and at least every 4 hours while driving or wear a real-time continuous BG glucose monitoring device.
- h) Commercial drivers with diabetes treated with insulin secretagogues should always have BG monitoring equipment and supplies of rapidly absorbable carbohydrate within easy reach (e.g. attached to driver's-side visor or in the centre console).
 - i) Commercial drivers with diabetes treated with insulin secretagogues should not drive when their BG level is <4.0 mmol/L. If the BG level is <4.0 mmol/L, commercial drivers should not drive until at least 45 minutes after ingestion of carbohydrate and their BG level is at least 5.0 mmol/L.
 - j) Commercial drivers treated with insulin secretagogues should stop driving, test and treat themselves as soon as hypoglycemia and/or impaired driving are suspected. They should not resume driving until at least 45 minutes after ingestion of carbohydrate has increased their BG level to at least 5.0 mmol/L.
- k) The following are exclusion criteria for obtaining or maintaining a commercial license in a person with diabetes treated with insulin secretagogues:
 - 1) Any episode of severe hypoglycemia while driving in the last 12 months
 - 2) More than 1 episode of severe hypoglycemia while awake but not driving in the last 12 months
 - 3) Any evidence of hypoglycemia unawareness in the last 12 months
 - 4) Visual impairment that does not meet the minimum standard for visual acuity in the jurisdiction in which the individual is licensed
 - 5) Peripheral neuropathy, amputation or cardiovascular disease of sufficient severity to affect the ability to drive safely
 - 6) Failure to complete an assessment (as outlined above) at least every 2 years
 - 7) Inadequate record of self-monitoring of BG (i.e. unreliable or absent capillary BG measurements)
 - 8) Inadequate knowledge of the causes, symptoms and treatment of hypoglycemic episodes.
- 3) Commercial drivers with diabetes treated with insulin secretagogues who have had their commercial license suspended due to severe hypoglycemia or hypoglycemia unawareness may be considered for reinstatement of their commercial license if the following criteria are met:
 - a) No episodes of severe hypoglycemia in last 12 months
 - b) No evidence of hypoglycemia unawareness in last 12 months.
- 4) Commercial drivers with diabetes treated with insulin secretagogues with severe hypoglycemia that occurs while asleep should be assessed by their physician or nurse practitioner to determine their fitness to drive based on the circumstances surrounding the severe hypoglycemic episode and their likelihood to occur while awake and driving.

- 5) Commercial drivers treated with insulin
- a) Fitness of persons with diabetes to drive should be assessed on an individual basis.
 - b) All drivers with diabetes should undergo a comprehensive medical examination at the time of application for a commercial license and at least every 2 years thereafter by a physician or nurse practitioner competent in managing patients with diabetes. This should include an assessment of glycemic control; frequencies and severities of hypoglycemia; symptomatic awareness of hypoglycemia and the presence of retinopathy, neuropathy, nephropathy, amputation and/or vascular disease. A decision should be made on whether any of these factors could increase the risk of a motor vehicle accident. The assessment should include the completion of a questionnaire that assesses the risk of hypoglycemia, including the nature of the work, type of motor vehicle, flexibility of scheduling, recognition of symptoms of hypoglycemia and ability to treat hypoglycemia, and document the frequency of mild or severe hypoglycemia in the last 12 months.
 - c) A full eye examination performed by an ophthalmologist or optometrist should be completed at the time of application for a commercial license and repeated every year.
 - d) Commercial drivers with diabetes treated with insulin should take an active role in assessing their ability to drive safely by maintaining a log of their self-monitored BG measurements by using either a memory-equipped BG meter or an electronic record of BG measurements performed at a frequency deemed appropriate by the person with diabetes and their healthcare team. For initial commercial license application, the record should include the last 6 months (or since the diagnosis of diabetes if less than 6 months). For annual renewal of a commercial license, the record should be complete from the last application. BG logs should be verifiable on request.
 - e) Commercial drivers with diabetes should be aware of how to avoid, recognize and treat hypoglycemia.
 - f) Commercial drivers with diabetes treated with insulin who experience any episode of severe hypoglycemia (defined as hypoglycemia of sufficient severity to require corrective intervention by another person or producing loss of consciousness, even if spontaneous recovery occurs) must refrain from driving immediately and notify their healthcare provider of the event immediately (no longer than 72 hours).
 - g) Commercial drivers with diabetes treated with insulin should consider measuring their BG level immediately before driving and at least every 4 hours while driving or wear a real-time continuous BG monitoring device.
 - h) Commercial drivers with diabetes treated with insulin with any of the following risk factors for severe hypoglycemia must measure their BG level immediately before and at least every 2 hours while driving or wear a real-time continuous blood glucose monitoring device:
 - 1) Recurrent hypoglycemic reactions
 - 2) Prior history of severe hypoglycemia or hypoglycemia unawareness resulting in license suspension and subsequent reinstatement.
 - i) Commercial drivers with diabetes treated with insulin should always have BG monitoring equipment and supplies of rapidly absorbable carbohydrate within easy reach (e.g. attached to the driver's-side visor or in the centre console).
 - j) Commercial drivers with diabetes treated with insulin should not drive when their BG level is <4.0 mmol/L. If the BG level is <4.0 mmol/L, commercial drivers should not drive until at least 45 minutes after ingestion of carbohydrate and their BG level is at least 5.0 mmol/L.
 - k) Commercial drivers treated with insulin should stop driving and test and treat themselves as soon as hypoglycemia or impaired driving is suspected. They should not resume driving until at least 45 minutes after ingestion of carbohydrate has increased their BG levels to at least 5.0 mmol/L.
 - l) The following are exclusion criteria for obtaining or maintaining a commercial license in persons with diabetes who are taking insulin:
 - 1) Any episode of severe hypoglycemia while awake in the last 12 months
 - 2) Any hypoglycemia unawareness in the last 12 months
 - 3) Visual impairment that does not meet the minimum standard for visual acuity in the jurisdiction in which the individual is licensed
 - 4) Peripheral neuropathy, amputation or cardiovascular disease of sufficient severity to affect the ability to drive safely
 - 5) Failure to complete an assessment (as outlined above) at least every 2 years
 - 6) Inadequate record of self-monitoring of BG (i.e. unreliable or absent capillary BG measurements)
 - 7) Inadequate knowledge of the causes, symptoms and treatments of hypoglycemic episodes.
 - m) Commercial drivers with diabetes treated with insulin who have had their commercial license suspended due to severe hypoglycemia or hypoglycemia unawareness may be considered for reinstatement of their commercial license if the following criteria are met:
 - 1) No episodes of severe hypoglycemia in last 12 months
 - 2) No evidence of hypoglycemia unawareness in last 12 months.
 - n) Commercial drivers with diabetes treated with insulin with severe hypoglycemia that occurs while asleep should be assessed by their physician or nurse practitioner to determine their fitness to drive based on the circumstances surrounding the severe hypoglycemic episode and their likelihood to recur while awake and driving.

Appendix 1: Sample diabetes and driving assessment form**1. Type and duration of diabetes**

- Type 1
 Type 2

Duration:

- <10 years
 10 to 20 years
 >20 years
 Unclear

2. Diabetes treatment

- Nutritional therapy/lifestyle alone
 Insulin
 Sulfonylurea/meglitinide
 Other non-insulin antihyperglycemic agent (metformin, alpha-glucosidase inhibitors, glitazones (TZDs), GLP-1 analogues, DPP-4 inhibitors, or SGLT2 inhibitors)

3. Most recent A1C levels (within the last 6 months)

- ≤7.0 %
 7.1% to 8 %
 8.1% to 11.9 %
 ≥12 %

4. Blood glucose monitoring

Is the driver with diabetes maintaining a log of their self-monitored BG measurements with either a memory-equipped blood glucose metre or electronic record?

- Yes
 No

Are A1C levels consistent with blood glucose logs?

- Yes
 No

For drivers on insulin or insulin secretagogues, is there evidence of blood glucose monitoring at least every 4 hours while driving or wearing of a continuous blood glucose monitoring device?

- Yes
 No

5. Hypoglycemia

Does the driver with diabetes have awareness of early symptoms of hypoglycemia (e.g. palpitations, shakiness, anxiety, sweating, hunger, tingling)?

- Yes
 No

Does the driver with diabetes know how to treat hypoglycemia?

- Yes
 No

For drivers with diabetes treated with insulin or insulin secretagogues, is blood glucose monitoring equipment and supplies of rapidly absorbable carbohydrate within easy reach in the vehicle?

- Yes
 No

For private drivers with diabetes, in the last 6 months, have there been any episodes of severe hypoglycemia . . .

- while awake? Specify number and date _____
 while driving? Specify number and date _____
 while asleep? Specify number and date _____

Has the driver had evidence of hypoglycemia unawareness in the last 6 months?

- Yes
 No

If yes, has there been recovery of hypoglycemia awareness?

- Yes
 No

For commercial drivers with diabetes, in the last 12 months, have there been any episodes of severe hypoglycemia . . .

- while awake? Specify number and date _____
 while driving? Specify number and date _____
 while asleep? Specify number and date _____

Has the driver had evidence of hypoglycemia unawareness in the last 6 months?

- Yes
 No

If yes, has there been recovery of hypoglycemia awareness?

- Yes
 No

6. General health

Does the driver have any of the following complications to an extent that could impair their ability to drive safely?

- Retinopathy
 Neuropathy
 Nephropathy
 Amputation
 Vascular disease
 Other

References

- Begg IS, Yale J-F, Houlden RL, et al. Canadian diabetes association clinical practice guidelines for diabetes and private and commercial driving. *Can J Diabetes* 2003;27:128–40.
- American Diabetes Association. Diabetes and driving. *Diabetes Care* 2012;35: S81–6.
- Commission directive 2009/113/EC of 25 August 2009 amending directive 2006/126/EC of the European Parliament and of the Council on driving licences. *Off J Eur Union* 2006;1223:31.
- Diabetes UK. Diabetes UK position statement. Driving and diabetes; 2015 [accessed August 2015].
- CMA Driver's Guide: determining medical fitness to operate motor vehicles. 8th ed. Canadian Medical Association; 2012.
- International Diabetes Federation Europe. Driving licence and diabetes: key findings IDF Europe Survey. <http://www.idf.org/webdata/docs/idf-europe/DL_report_220910.pdf>, 2010.
- Stork AD, van Haefen TW, Veneman TF. Diabetes and driving: desired data, research methods and their pitfalls, current knowledge, and future research. *Diabetes Care* 2006;29:1942–9.
- Inkster B, Frier BM. Diabetes and driving. *Diabetes Obes Metab* 2013;15:775–83.
- Cox DJ, Gonder-Frederick LA, Kovatchev BP, et al. Progressive hypoglycemia's impact on driving simulation performance: occurrence, awareness and correction. *Diabetes Care* 2000;23:163–70.
- Cox DJ, Gonder-Frederick LA, Clarke W. Driving decrements in type 1 diabetes during moderate hypoglycemia. *Diabetes* 1993;42:239–43.
- Evans ML, Pernet A, Lomas J, et al. Delay in onset of awareness of acute hypoglycemia and of restoration of cognitive performance during recovery. *Diabetes Care* 2000;23:893–7.
- Blackman JD, Towle VL, Lewis JF, et al. Hypoglycemic threshold for cognitive dysfunction in humans. *Diabetes* 1990;39:828–35.
- Gonder-Frederick LA, Cox DJ, Driesen NR, et al. Individual differences in neurobehavioural disruption during mild and moderate hypoglycemia in adults with IDDM. *Diabetes* 1994;43:1407–12.
- CMA Driver's Guide: determining medical fitness to operate motor vehicles. 8th ed. Canadian Medical Association; 2012.
- UK Hypoglycaemia Study Group. Risk of hypoglycaemia in types 1 and 2 diabetes: effects of treatment modalities and their duration. *Diabetologia* 2007;50:1140–7.
- Cox DJ, Penberthy JK, Zrebiec J, et al. Diabetes and driving mishaps: frequency and correlations from a multinational survey. *Diabetes Care* 2003;26:2329–34.
- Skurtveit S, Strom H, Skivarhaug T, et al. Road traffic accident risk in patients with diabetes mellitus receiving blood glucose-lowering drugs: prospective follow-up study. *Diabet Med* 2009;26:404–8.
- Lonnen KF, Powell RJ, Taylor D, et al. Road traffic accidents and diabetes: insulin use does not determine risk. *Diabet Med* 2008;25:578–84.
- Hemmelgarn B, Levesque LE, Suissa S. Anti-diabetic drug use and the risk of motor vehicle crash in the elderly. *Can J Clin Pharmacol* 2006;13: e112–20.
- Harsch IA, Stocker S, Radespiel-Troger M, et al. Traffic hypoglycaemias and accidents in patients with diabetes mellitus treated with different antidiabetic regimens. *J Intern Med* 2002;252:352–60.
- Cox DJ, Ford D, Gonder-Frederick L, et al. Driving mishaps among individuals with type 1 diabetes: a prospective study. *Diabetes Care* 2009;32:2177–80.
- Signorovitch JE, Macaulay D, Diener M, et al. Hypoglycaemia and accident risk in people with type 2 diabetes mellitus treated with non-insulin antidiabetic drug. *Diabetes Obes Metab* 2013;15:335–41.
- Redelmeier DA, Kenshole AB, Ray JG. Motor vehicle crashes in diabetic populations with tight glycemic control: a population-based case control analysis. *PLoS Med* 2009;6:e1000192.
- Graveling AJ, Warren RE, Frier BM. Hypoglycaemia and driving in people with insulin-treated diabetes: adherence to recommendations for avoidance. *Diabet Med* 2004;21:1014–19.
- Choudhary P, Ramasamy S, Green L, et al. Real-time continuous glucose monitoring significantly reduces severe hypoglycemia in hypoglycemia-unaware patients with type 1 diabetes. *Diabetes Care* 2013;36:4160–2.