Revisions to the BC *Guide for Physicians in Determining Fitness to Drive a Motor Vehicle*

Thank you for taking the time to review the draft Cardiovascular Diseases and Disorders chapter.

Please provide any feedback to:
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Feedback due by:
MONDAY, JULY 28, 2008

The Office of the Superintendent of Motor Vehicles (OSMV), in partnership with the British Columbia Medical Association (BCMA) is revising the BC *Guide for Physicians in Determining Fitness to Drive a Motor Vehicle* (the Guide) in order to ensure that it reflects changes in the case law and the best evidence available regarding medical conditions and fitness to drive.

Once the Guide chapters have been revised, the OSMV will create 2 separate documents:

1. a Physicians Handbook for use by physicians, and
2. an OSMV Driver Fitness Assessment Manual for use by the OSMV

The Cardiovascular Diseases and Disorders chapter that you are reviewing will become the OSMV Driver Fitness Assessment Manual chapter. Once the OSMV Manual chapter is finalized, a **much briefer** chapter on Cardiovascular Diseases and Disorders will be created for the Physician's Handbook.

Methodology for revisions to the current Guide

This chapter has been drafted using the following process:

1. Dr. Bonnie Dobbs, University of Alberta provided updated research regarding the medical condition and driving.
2. The chapter was revised by OSMV based on Dr. Dobbs' research as well as a review of the Canadian Medical Association's (CMA) *Determining Fitness to Drive – A Guide for Physicians,* and the Canadian Council of Motor Transport Administrators (CCMTA) National Safety Code (NSC).
3. Specifically identified subject matter experts reviewed the draft chapter and provide feedback for revisions.
4. The draft is now published on the BCMA web site for review by physicians and on drivesafe.com for review by stakeholders and the broader road safety community.

5. The chapter will be further revised and ultimately approved by the OSMV and the BCMA.

Background

The Office of the Superintendent of Motor Vehicles (OSMV), in partnership with the British Columbia Medical Association (BCMA) is revising the BC *Guide for Physicians in Determining Fitness to Drive a Motor Vehicle* (the Guide). The last major update to the Guide was completed in 1997. The current edition of the Guide is based on consensus opinion of practicing physicians including members of specialty sections within the BCMA. Since the 1997 edition, a number of significant changes have occurred which have created a need to undertake another major revision to the Guide.

<u>Changes in the law</u>

- Developing case law has established that government must consider fitness to drive on an individual basis. This means that, where possible, the OSMV must move away from the current diagnostic model for determining driver fitness to a primarily functional model for determining driver fitness. The functional model focuses on the individual's functional ability to drive, including the individual's ability to compensate for their condition, when determining ability to drive safely.

<u>Strength of evidence</u>

- The evidence for setting the standards in the current Guide is consensus opinion of subject-matter experts. While this type of evidence is valid, it is not as strong as evidence from epidemiological, experimental or descriptive studies. The OSMV is committed to revising the Guide so that, as much as current research allows for, the guidelines in the Guide are based on research studies. Nonetheless, expert opinion will remain a key component of establishing driver fitness standards.

<u>Other jurisdictions</u>

- Consistency with national and international standards is an important consideration for the OSMV. Commercial drivers, in particular, need to be able to drive in other jurisdictions; if the BC standards for driver fitness were to significantly depart from standards accepted in other jurisdictions, this may create a hardship for commercial drivers.

Please provide feedback by July 28 2008 to
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Cardiovascular Diseases and Disorders

1. OVERVIEW

About Cardiovascular Diseases

Cardiovascular disease is an umbrella term used to describe a variety of disorders relating to the heart and blood vessels. This chapter is concerned with the following cardiovascular disorders:

Coronary artery disease

Coronary artery disease, which is also called coronary, ischemic or atherosclerotic heart disease, is characterized by the presence of atherosclerosis in the arteries of the heart. Atherosclerosis is the progressive build up of fatty deposits called plaque, which narrows the coronary arteries and reduces blood flow to the heart. Complications of coronary artery disease include angina (pain or discomfort due to lack of oxygen to the heart muscle), myocardial infarction (heart attack), and ischemic cardiomyopathy (permanent damage to the heart muscle).

Disturbances of cardiac rhythm

Disturbances of cardiac rhythm, or arrhythmias, include tachycardia (rapid heart rate), bradycardia (slow heart rate), fibrillation or flutter (abnormal twitching of the heart muscle) and heart block. These arrhythmias may arise from the heart muscle itself or the conduction system and are often secondary to underlying heart disease. This chapter addresses:

- ventricular arrhythmias
- paroxysmal (intermittent) supraventricular tachycardia, atrial fibrillation (AF) or atrial flutter (AFL)
- Persistent or permanent AF or AFL
- Sinus node dysfunction
- Atrioventricular and intraventricular block
- Miscellaneous arrhythmias
- Pacemakers and implantable cardioverter defibrillators (ICDs).
- Catheter ablation and electrophysiology study (EPS)

Valvular heart disease

Disease affecting the heart valves may result in stenosis and regurgitation, and is associated with an increased risk of thromboembolism.

In valvular stenosis, the valve opening is smaller than normal due to hardening or fusing of the valve's leaflets. This may cause the heart to have to work harder to pump blood through the valves. In valvular regurgitation or "leaky valve", the valve does not close tightly enough, allowing some blood to leak backwards across the valve. As the leak

worsens, the heart has to work harder to make up for the leaky valve, and less blood may flow to the rest of the body. Stenosis and regurgitation may coexist.

While stenosis and regurgitation can occur in any of the four heart valves, this chapter is concerned with the aortic and mitral valves.

Individuals who have undergone valve replacement surgery are subject to a certain irreducible incidence of late complications such as thromboembolism, dehiscence, infection and mechanical malfunction, and therefore must be thoroughly assessed before being permitted to drive commercial vehicles.

Congestive heart failure

Congestive heart failure usually is a chronic, progressive condition in which the heart is unable to pump the quantity of blood required to meet the body's needs. It is generally the result of heart disease but may be secondary to non-cardiac conditions such as fluid overload and anemia. Symptoms of congestive heart failure that may affect driving are shortness of breath, fatigue or lack of stamina, and cognitive impairment.

The severity of congestive heart failure can be assessed by measuring the fraction of blood being pumped out of the left ventricle with each beat. This is expressed as a ratio called the left ventricle ejection fraction (LVEF). Healthy individuals generally have an LVEF greater than 55%. The New York Heart Association (NYHA) functional classification system provides a simple, clinical measure for assessing the degree of heart failure. See Part 3 of this chapter for a description of the NYHA classification system.

Cardiomyopathy

Cardiomyopathy refers to a change is the size, strength of flexibility in the heart muscle. These changes can reduce the amount of blood being pumped out of the heart, and may lead to congestive heart failure. Cardiomyopathy is associated with an increased risk of arrhythmias.

Syncope

Syncope refers to a partial or complete loss of consciousness, usually resulting from a temporary reduction in blood flow to the brain. The onset of syncope is relatively rapid and recovery is generally prompt, spontaneous and complete. Syncope has many different causes, including cardiovascular disease. Of 7,814 subjects followed in the Framingham Heart Study for an average of 17 years, 822 (10.5%) patients reported syncope. In 36.6% of the syncope reported, the cause was unknown. Of the known causes, 21.2% was vasovagal (neurocardiogenic), 9.5% was cardiac, and 9.4% was orthostatic.

Abnormal blood pressure

Hypertension (high blood pressure) is the most common and most important risk factor for developing cardiovascular disease and stroke. Hypotension (low blood pressure) is less common than hypertension. Individuals with hypotension may experience syncope. The biggest concern for individuals with persistent hypertension is the potential for co-

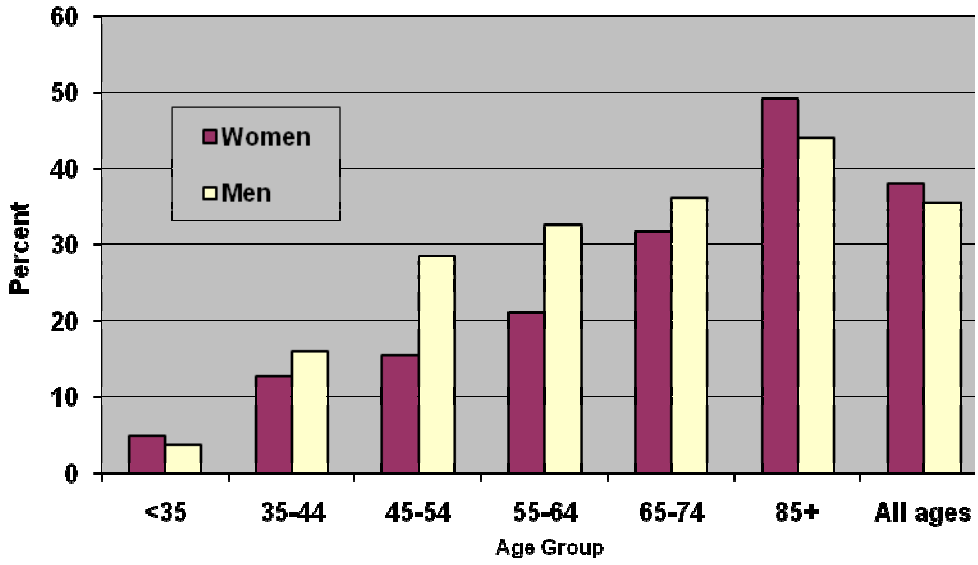
morbidities that can effect driving, including damage to the heart, eyes, kidneys, and brain.

Prevalence and incidence

Cardiovascular disease

Cardiovascular disease is a major cause of death, disability and health care costs in Canada. Although cardiovascular disease death rates have been declining since the mid-1960s, Statistics from 1997 indicate that cardiovascular disease was still the leading cause of death in Canada, accounting for 36% of all deaths in men and 38% in women[1]. As shown in Figure 1, the proportion of deaths caused by cardiovascular disease increases dramatically with age.

Figure 1 -
Percentage of total deaths due to cardiovascular disease



Post-operative cognitive decline (POCD)

There is a substantial body of literature indicating that individuals undergoing coronary artery bypass graph (CABG) surgery commonly experience post-operative cognitive decline (POCD) for several months after surgery. Declines in memory, attention, speed of processing, and executive functioning have been observed. Although there has been little research directly assessing the impact on driving, the nature and breadth of the cognitive decline suggests that driving performance is likely to be impaired where POCD is present.

A review of POCD studies indicated that between 20% and 79% of individuals undergoing CABG surgery experience POCD between 6 weeks and 6 months of the

[1] Statistics Canada, 1997

surgery. Eleven of the 14 studies included in the review indicated a rate of 45% or higher.

The few studies that have looked at rates POCD after more than 6 months post-surgery indicate that up to 35% will show POCD one year after surgery.

Cardiovascular diseases and co-morbidities

Co-morbidities that may be associated with cardiovascular diseases are chronic kidney disease and diabetes, peripheral vascular disease, and cerebral vascular disease, as well as cognitive impairment due to heart failure, cardiac arrest, or post-operative cognitive decline.

Cardiovascular diseases and adverse driving outcomes

Research indicates that drivers with cardiovascular disease as a whole have a higher risk for adverse driving outcomes than those without cardiovascular disease. However, there is relatively little research on the effects of specific cardiovascular diseases and driving outcomes.

2. EFFECT ON FUNCTIONAL ABILITY TO DRIVE

The effect of cardiovascular diseases on an individual's functional ability to drive may be episodic or persistent.

Episodic impairment

The potential episodic impairment is a partial or complete loss of consciousness that incapacitates the driver. This may be caused by a variety of cardiovascular events such as:

- Bradyarrhythmias
- Tachyarrhythmias
- Myocardial disease (massive myocardial infarction)
- Left ventricular myocardial restriction or constriction
- Pericardial constriction or tamponade
- Aortic outflow tract obstruction
- Aortic valvular stenosis
- Hypertrophic obstructive cardiomyopathy

Persistent impairment

Individuals with congestive heart failure may develop persistent cognitive impairment, loss of stamina or general debility as result of a reduction of oxygen to the brain, organs and tissues. Persistent cognitive impairment may also result from cardiac arrest or

through post-operative cognitive decline associated with coronary artery bypass graft surgery.

Condition	Potential impact on driving	Primary Functional Ability Affected
Coronary artery disease Arrhythmias Valvular heart disease Cardiomyopathy	Episodic	All – incapacitation
Congestive heart failure	Episodic	All- incapacitation
	Persistent	Cognitive General debility
Post cardiac arrest Post-operative cognitive decline (POCD)	Persistent	Cognitive

3. ASSESSMENT APPROACH

Condition	Assessment approach	Assessment Tools
Cardiovascular disease	Medical assessment: likelihood of episodic impairment	Doctor's Medical Report including test results
Congestive heart failure Post cardiac arrest Post-operative cognitive decline (POCD)	Medical assessment: likelihood of episodic impairment	Doctor's Medical Report including test results
	Functional assessment	Functional assessment by OT or driver rehabilitation specialist ICBC road test OT or driver rehabilitation specialist road test

New York Heart Association (NYHA) Functional Classification

One of the tools used in a medical assessment of individuals with cardiovascular disease is the New York Heart Association (NYHA) Functional Classification system. This system describes the effect on cardiovascular disease on an individual's general physical activity, according to the following categories:

Category	Description
I	No symptoms and no limitation in ordinary physical activity. Comfortable at rest.
II	Mild symptoms and slight limitation during ordinary activity. Comfortable at rest.
III	Marked limitation in activity due to symptoms, even during less-than-ordinary activity. Comfortable only at rest.
IV	Severe limitations. Experiences symptoms even while at rest.

4. FITNESS TO DRIVE GUIDELINES

The following are general guidelines for determining fitness to drive. They are based primarily on recommendations contained in the final report of the 2003 Canadian Cardiovascular Society (CCS) Consensus Conference Assessment of the Cardiac Patient for Fitness to Drive and Fly.

The CCS recommendations focus exclusively on the potential episodic impairments associated with cardiovascular diseases. Additional guidelines have been added to address potential persistent impairments caused by congestive heart failure, cardiac arrest, and post-operative cognitive decline.

The CCS provides a number of recommendations for waiting times related to transient conditions. While these recommendations provide important guidance for doctors advising their patients, transient conditions do not have any direct implications for licensing and are therefore not included in the fitness to drive guidelines. These recommendations can be found in the appendix to this chapter.

The specific circumstances of individual drivers should be taken into account when applying these guidelines.

A. Congenital heart defects

Congenital heart defects
All licence classes
Individuals with a congenital heart defect may drive if • they meet any guidelines related to a specific cardiovascular condition or event, and • OSMV determines that they are fit to drive.

B. Coronary artery disease

Coronary Artery Disease - General
Private vehicles
Individuals with coronary artery disease may not drive if • they have an angiographic demonstration of 70% or greater reduction in the diameter of the left main coronary artery, unless successfully treated with revascularization.
Commercial Vehicles
Individuals with coronary artery disease may not drive if • they have an angiographic demonstration of 50% or greater reduction in the diameter of the left main coronary artery, unless successfully treated with revascularization.

Asymptomatic coronary artery disease (CAD) or stable angina
All licence classes
No restrictions

Coronary artery bypass graft (CABG) surgery

Post CABG surgery
Private Vehicles
Individuals who have had CABG surgery may drive if • it has been 1 month or more since CABG surgery • they have sufficient cognitive function to drive, and • OSMV determines that they are fit to drive.
Commercial Vehicles
Individuals who have had CABG surgery may drive if • it has been 3 months or more since CABG surgery • they have sufficient cognitive function to drive, and • OSMV determines that they are fit to drive.

C. Disturbances of cardiac rhythm and arrhythmia devices

In general, a decision to licence an individual with a history of rhythm disorder will depend on the type of disorder, its frequency (if paroxysmal), whether or not the arrhythmia is associated with impairment (i.e. symptoms of cerebral ischemia) and whether or not satisfactory control has been achieved. (This paragraph is really about specific factors that are particularly relevant when working through decision-making criteria. It may be moved depending on decision about the final format of the OSMV manual.)

Cardiac arrest

Cardiac arrest
All licence classes
Individuals who have experienced cardiac arrest may drive if • they have sufficient cognitive function to drive • they meet any other applicable cardiovascular disease guidelines, and • OSMV determines that they are fit to drive.

Premature atrial or ventricular contractions

Premature atrial or ventricular contractions
All licence classes
Individuals with premature atrial or ventricular contractions may drive if • they have no associated impaired level of consciousness, and • OSMV determines that they are fit to drive.

Ventricular arrhythmias

Ventricular fibrillation (VF) with no reversible cause
Private Vehicles
Individuals who have VF with no reversible cause may drive if • it has been 6 months or more since their last episode of VF • they have sufficient cognitive function to drive, and • OSMV determines that they are fit to drive.
Commercial Vehicles
Individuals who have VF with no reversible cause may not drive commercial vehicles.
Notes: • Examples of reversible causes of VF: ▪ VF within 24 hours of myocardial infarction ▪ VF during coronary angiography ▪ VF with electrocution ▪ VF secondary to drug toxicity • If VF has a reversible cause, it is considered a transient condition. The Canadian Cardiovascular Society recommendation for VF with a reversible cause is included in the appendix to this chapter.

Hemodynamically unstable ventricular tachycardia (VT)
All licence classes
Individuals who have hemodynamically unstable VT may drive if • the underlying condition has been successfully treated, and • OSMV determines that they are fit to drive.

Sustained ventricular tachycardia (VT) with no associated impaired level of consciousness
Private vehicles
With an LVEF < 30% Individuals who have sustained VT without an impaired level of consciousness, and who have an LVEF < 30% may drive if • it has been 3 months or more since their last episode • they have been treated with an ICD and meet the guidelines for an ICD, and • OSMV has determined that they are fit to drive. **With an LVEF ≥ 30% and an implantable cardioverter defibrillator (ICD) has not been recommended** Individuals with an LVEF of ≥ 30% and an implantable cardioverter defibrillator (ICD) has not been recommended may drive if • it has been 4 weeks or more since their last episode • they have satisfactory control, and • OSMV has determined that they are fit to drive.
Commercial Vehicles
With an LVEF < 30% Individuals who have sustained VT without an impaired level of consciousness, and who have an **LVEF < 30%** may not drive. **With an LVEF ≥ 30% and an implantable cardioverter defibrillator (ICD) has not been recommended** Individuals with an LVEF of ≥ 30% and an implantable cardioverter defibrillator (ICD) has not been recommended may drive if • it has been 3 months or more since their last episode • they have satisfactory control, and • OSMV has determined that they are fit to drive.
Notes: **Sustained VT**: VT having a cycle length of 500 msec or less and lasting 30 seconds or more or causing hemodynamic collapse **LVEF**: Left ventricular ejection fraction **ICD:** Implantable cardioverter defibrillator **Satisfactory control of Sustained VT with no associated impaired level of consciousness**: an LVEF ≥ 40%, successfully treated with radiofrequency ablation, and the relevant waiting period has passed (see above).

Nonsustained ventricular tachycardia (VT) with no associated impairment of consciousness
All licence classes
No restrictions
Notes: **Nonsustained VT**: VT ≥ 3 beats; having a cycle length of 500 msec or less and lasting less than 30 seconds without hemodynamic collapse

Paroxysmal SVT, AF, and AFL

Paroxysmal supraventricular tachycardia (SVT)
All licence classes
Individuals who have had paroxysmal SVT may drive if they have had no associated impaired level of consciousness. Where there has been an associated impaired level of consciousness, then they may drive if • their SVT has been successfully treated with radiofrequency ablation or they have been on medical therapy for a minimum of 3 months with no recurrence of SVT with impaired level of consciousness, and • OSMV determines that they are fit to drive.

Paroxysmal atrial fibrillation (AF) or atrial flutter (AFL)
All licence classes
Individuals who have had paroxysmal AF or AFT may drive if they have had no associated impaired level of consciousness. Where there has been an associated impaired level of consciousness, they may drive if • they have been on medical therapy for a minimum of 3 months with no recurrence of AF or AFL with impaired level of consciousness, or • for AF, they have had AV node ablation and pacemaker implantation, or • for AFL, they have had a successful isthmus ablation with proven establishment of bidirectional isthmus block, and • OSMV determines that they are fit to drive.

Persistent or permanent SVT, AF or AFL

Persistent or permanent supraventricular tachycardia (SVT), atrial fibrillation (AF) or atrial flutter (AFL)
All licence classes
Individuals who have persistent or permanent SVT, AF, or AFL may drive if • they have adequate ventricular rate control • they do not experience an impaired level of consciousness, and • OSMV determines that they are fit to drive.

Sinus node dysfunction

Sinus node dysfunction
All licence classes
Individuals who have sinus node dysfunction with no associated symptoms may drive. Where there are associated symptoms, individual may drive if • the sinus node dysfunction has been successfully treated with a pacemaker and the individual meets the guidelines for that treatment, and • OSMV determines that they are fit to drive.

Atrioventricular (AV) and Intraventricular Block

Atrioventricular (AV) and Intraventricular Block
All licence classes
Isolated first degree AV block **Isolated right bundle branch block (RBBB)** **Isolated left anterior or posterior fascicular block** No restrictions

Private Vehicles
Left bundle branch block (LBBB) **Bifascicular block** **Second degree AV block/Mobitz I** **First degree AV block + bifascicular block** Individuals may drive if • they have had no associated impaired level of consciousness, and • OSMV determines that they are fit to drive. **Second degree AV block; Mobitz II (distal AV block)** **Alternating LBBB and RBBB** **Acquired third degree AV block** May not drive **Congenital third degree AV block** Individuals may drive if • they have had no associated impaired level of consciousness, and • OSMV determines that they are fit to drive.
Commercial Vehicles
Left bundle branch block (LBBB) **Bifascicular block** **Second degree AV block/Mobitz I** **First degree AV block + bifascicular block** Individuals may drive if • they have had no associated impaired level of consciousness • they have an annual Holter showing no higher grade AV block, and • OSMV determines that they are fit to drive. **Second degree AV block; Mobitz II (distal AV block)** **Alternating LBBB and RBBB** **Acquired third degree AV block** May not drive **Congenital third degree AV block** Individuals may drive if • they have had no associated impaired level of consciousness • they have a QRS duration $\leq$ 110 msec • the have an annual Holter showing no documented pauses $\geq$ 3 seconds , and • OSMV determines that they are fit to drive.

Permanent Pacemakers

Permanent Pacemakers
Private vehicles
Individuals with a permanent pacemaker may drive if • it has been at least 1 week since pacemaker implant • they have not experienced any episodes of impaired level of consciousness since the implant • they show normal sensing and capture on a post-implant ECG • they have their pacemaker checked regularly at a pacemaker clinic and the checks reveal no pacemaker malfunction, and • OSMV determines they are fit to drive.
Commercial Vehicles
Individuals with a permanent pacemaker may drive if • it has been at least 1 month since pacemaker implant • they have not experienced any episodes of impaired level of consciousness since the implant • they show normal sensing and capture on a post-implant ECG • they have their pacemaker checked regularly at a pacemaker clinic and the checks reveal no pacemaker malfunction , and • OSMV determines they are fit to drive.

Implantable Cardioverter Defibrillators (ICDs)

Implantable Cardioverter Defibrillators (ICDs)
Private vehicles

Where ICD implanted as a primary prophylaxis or recommended as primary prophylaxis but declined by the driver

Individuals who have had an ICD implanted as a primary prophylaxis or who have declined an ICD recommended as a primary prophylaxis may drive if

- they are assessed as NYHA Class I, II or III
- it has been at least 4 weeks since ICD implant (if applicable)
- they have their ICD checked regularly at a device clinic and the checks reveal no ICD malfunction, and
- OSMV determines that they are fit to drive.

Where ICD implanted as a secondary prophylaxis for sustained VT with no associated impaired level of consciousness

Individuals who have had an ICD implanted as a secondary prophylaxis for sustained VT with no associated impaired level of consciousness may drive if

- they are assessed as NYHA Class I, II or III
- it has been at least 1 week since ICD implant
- it has been 3 months or more since their last episode of sustained VT,
- they have their ICD checked regularly at an ICD clinic and the checks reveal no ICD malfunction, and
- OSMV determines that they are fit to drive.

Where ICD implanted as a secondary prophylaxis for VF or VT with an impaired level of consciousness

Individuals who have had an ICD implanted as a secondary prophylaxis for VF or VT with an impaired level of consciousness may drive if

- it has been at least 6 months since their last episode of sustained symptomatic VT or syncope judged to be likely due to VT or cardiac arrest, and
- OSMV determines that they are fit to drive.

Where ICD therapy (shock or ATP) has been delivered and there is an associated impaired level of consciousness, or the therapy delivered by the device was disabling

Individuals may drive if

- it has been at least 6 months since the event, and
- OSMV determines that they are fit to drive.

Commercial Vehicles
Individuals who have had an ICD implanted or who have declined an ICD recommended as a primary prophylaxis generally may not drive. However, an ICD may sometimes be implanted in an individual with a low risk of sudden incapacitation. Where this is the case, individuals may drive if • an assessment by a cardiologist has indicated that the annual risk of sudden incapacitation is 1% or less, and • OSMV determines that they are fit to drive.
Notes: • Individuals whose ICD also regulates pacing for bradycardia must meet the guidelines for permanent pacemakers as well. **Primary prophylaxis:** ICD is implanted to prevent sudden cardiac death in individuals considered to be at high risk but who have not had an episode of ventricular arrhythmia. **Secondary prophylaxis**: ICD is implanted to prevent sudden cardiac death in individuals who have survived a cardiac arrest or who suffer from malignant arrhythmias that do not respond readily to medical treatment **NYHA**: New York Heart Association Functional Classification **Sustained VT**: VT having a cycle length of 500 msec or less and lasting 30 seconds or more or causing hemodynamic collapse **ATP**: antitachycardia pacing

Brugada's Syndrome, Long QT Syndrome, Arrhythmogenic Right Ventricular Cardiomyopathy (AVRC)

Brugada's Syndrome, Long QT Syndrome, Arrhythmogenic Right Ventricular Cardiomyopathy (AVRC)
Private vehicles
Individuals who have had Brugada's Syndrome, Long QT Syndrome, or arrhythmogenic right ventricular cardiomyopathy (AVRC) may drive if • their condition has been investigated and treated by a cardiologist • it has been at least 6 months since they have experienced any event causing an impaired level of consciousness, and • OSMV determines that they are fit to drive.

Commercial Vehicles
Individuals who have had Brugada's Syndrome, Long QT Syndrome, or arrhythmogenic right ventricular cardiomyopathy (AVRC) generally may not drive. However, inherited heart diseases may sometimes pose a very low risk of sudden incapacitation. Where this is the case, individuals may drive if • a medical assessment has indicated that the annual risk of sudden incapacitation is 1% or less, and • OSMV has determined that they are fit to drive.

D. Valvular Heart Disease

Medically treated valvular heart disease
Private vehicles
Aortic stenosis **Aortic regurgitation, mitral stenosis and mitral regurgitation** Individuals with medically treated aortic stenosis, aortic regurgitation, mitral stenosis or mitral regurgitation may drive if • they are assessed as NYHA Class I or II • they have had no episodes of impaired level of consciousness, and • OSMV determines that they are fit to drive.
Commercial Vehicles
Aortic stenosis and sclerosis Individuals with medically treated aortic stenosis may drive if • they are assessed as NYHA Class I • their condition is asymptomatic • they have an AVA $\geq$ 1.0 cm^2 • they have an LVEF $\geq$ 35% • they have had a detailed assessment by a cardiologist, including an assessment for risk of syncope • they have an annual reassessment, and • OSMV determines that they are fit to drive.

Aortic regurgitation, mitral stenosis and mitral regurgitation

Individuals with medically treated aortic regurgitation, mitral stenosis or mitral regurgitation may drive if

- they are assessed as NYHA Class I
- they have an LVEF $\geq$ 35%
- they have had no episodes of impaired level of consciousness, and
- OSMV determines that they are fit to drive.

Notes:

AVA: Aortic valve area

LVEF: Left ventricle ejection fraction

NYHA: New York Heart Association Functional Classification

Surgically treated valvular heart disease

Private vehicles

Mechanical prostheses

Mitral bioprostheses with non-sinus rhythm

Mitral valve repair with non-sinus rhythm

Individuals with mechanical prostheses, mitral bioprostheses with non-sinus rhythm or mitral valve repair with non-sinus rhythm may drive if

- it has been at least 6 weeks since their discharge following treatment
- they have no thromboembolic complications
- they are on anti-coagulant therapy, and
- OSMV determines that they are fit to drive.

Aortic bioprostheses

Mitral bioprostheses with sinus rhythm

Mitral valve repair with sinus rhythm

Individuals with aortic bioprostheses, mitral bioprostheses with sinus rhythm or mitral valve repair with sinus rhythm may drive if

- it has been at least 6 weeks since their discharge following treatment
- they have no thromboembolic complications, and
- OSMV determines that they are fit to drive.

Commercial Vehicles
Mechanical prostheses **Mitral bioprostheses with non-sinus rhythm** **Mitral valve repair with non-sinus rhythm** Individuals with mechanical prostheses, mitral bioprostheses with non-sinus rhythm or mitral valve repair with non-sinus rhythm may drive if • it has been at least 3 months since their discharge following treatment • they have no thromboembolic complications • they are on anti-coagulant therapy • they are assessed as NYHA Class I • they have an LVEF $\geq$ 35%, and • OSMV determines that they are fit to drive. **Aortic bioprostheses** **Mitral bioprostheses with sinus rhythm** **Mitral valve repair with sinus rhythm** Individuals with aortic bioprostheses, mitral bioprostheses with sinus rhythm or mitral valve repair with sinus rhythm may drive if • it has been at least 3 months since their discharge following treatment • they have no thromboembolic complications • they are assessed as NYHA Class I • they have an LVEF $\geq$ 35%, and • OSMV determines that they are fit to drive.
Notes: **LVEF**: Left ventricle ejection fraction **NYHA**: New York Heart Association Functional Classification

Mitral valve prolapse
Private vehicles
No restrictions
Commercial Vehicles
Individuals with mitral valve prolapse may drive if they are asymptomatic. If they are symptomatic, they may drive if • they have been assessed for arrhythmia with a Holter • they meet any applicable guidelines related to arrhythmias , and • OSMV determines that they are fit to drive.

E. Congestive heart failure, left ventricular dysfunction, cardiomyopathy, transplantation

Congestive heart failure, left ventricular dysfunction, cardiomyopathy
Private vehicles
Individuals with congestive heart failure, left ventricular dysfunction, or cardiomyopathy may drive if • they are assessed as NYHA Class I, II, or III • they are not receiving intermittent inotropes • they are not using a left ventricle assist device • if they have congestive heart failure, they have sufficient cognitive function to drive, and • OSMV determines that they are fit to drive.
Commercial Vehicles
Individuals with congestive heart failure, left ventricular dysfunction, or cardiomyopathy may drive if • they are assessed as NYHA Class I or II • they have an LVEF $\geq$ 35% • they are not receiving intermittent inotropes • they are not using a left ventricle assist device • if they have congestive heart failure, they have sufficient cognitive function to drive, and • OSMV determines that they are fit to drive.

Notes:

Inotrope: treatment that affects the force with which the heart muscle contracts

Left ventricle assist device: a battery-operated, mechanical pump-type device that is surgically implanted, and is used to maintain the pumping ability of a heart that can't effectively work on its own.

LVEF: Left ventricle ejection fraction

NYHA: New York Heart Association Functional Classification

Heart transplant
Private vehicles
Individuals who have had a heart transplant may drive if • it has been at least 6 weeks since their discharge following transplant • they are assessed as NYHA Class I or II • they are on stable immunotherapy • they have an annual reassessment, and • OSMV determines that they are fit to drive.
Commercial Vehicles
Individuals who have had a heart transplant may drive if • it has been at least 6 months since their discharge following transplant • they are assessed as NYHA Class I • they have an LVEF $\geq$ 35% • they are on stable immunotherapy • they have an annual reassessment, which includes a non-invasive test of ischemic burden showing no evidence of active ischemia, and • OSMV determines that they are fit to drive.
Notes: **Stable immunotherapy**: the treating cardiologist is satisfied that the clinical course is stable **LVEF**: Left ventricle ejection fraction **NYHA**: New York Heart Association Functional Classification

F. Hypertrophic cardiomyopathy

Hypertrophic cardiomyopathy
Private vehicles
Individuals with hypertrophic cardiomyopathy may drive if • they have had no episodes of impaired level of consciousness, and • OSMV determines that they are fit to drive.
Commercial Vehicles
Individuals with hypertrophic cardiomyopathy may drive if • they have had no episodes of impaired level of consciousness • they have no family history of sudden death at a young age • they have LV wall thickness of < 30 mm • they show no increase in blood pressure with exercise • they have an annual Holter showing no NVST, and • OSMV determines that they are fit to drive.
Notes: **LV**: Left ventricle **NVST**: Nonsustained ventricular tachycardia

G. Syncope

Note: These guidelines consider both syncope caused by cardiovascular disease and other common causes of syncope.

Syncope
All licence classes
Single episode of typical vasovagal syncope No restrictions **Syncope with a reversible cause** Individuals who experience syncope with a reversible cause may drive if • the cause has been successfully treated, and • OSMV determines that they are fit to drive. **Recurrent situational syncope with an avoidable trigger (e.g. micturition syncope, defecation syncope)** Individuals who experience recurrent situational syncope with an avoidable trigger may drive if • it has been at least 1 week since their last episode of syncope, and • OSMV determines that they are fit to drive. **Syncope due to documented tachyarrhythmia or inducible tachyarrhythmia at EPS** Refer to guidelines on disturbances of cardiac rhythm above.
Private vehicles
Syncope with a diagnosed and treated cause (e.g. pacemaker for bradycardia) Individuals with syncope where the cause has been diagnosed and treated may drive if • it has been at least 1 week since successful treatment, and • OSMV determines that they are fit to drive. **Unexplained syncope – single episode** **Atypical vasovagal syncope – single episode** **Typical vasovagal syncope - recurrent (within 12 months)** Individuals who have a single episode of unexplained syncope or recurrent episodes of vasovagal syncope may drive if

- it has been at least 1 week since their last episode of syncope, and
- OSMV determines that they are fit to drive.

Unexplained syncope – recurrent (within 12 months)

Atypical vasovagal syncope – recurrent (within 12 months)

Individuals who have a single episode of unexplained syncope or recurrent episodes of vasovagal syncope may drive if

- it has been at least 3 months since their last episode of syncope, and
- OSMV determines that they are fit to drive.

Commercial Vehicles

Syncope with a diagnosed and treated cause (e.g. pacemaker for bradycardia)

Individuals with syncope where the cause has been diagnosed and treated may drive if

- it has been at least 1 month since successful treatment, and
- OSMV determines that they are fit to drive.

Unexplained syncope – single or recurrent (within 12 months) episodes

Atypical vasovagal syncope – single or recurrent (within 12 months) episodes

Typical vasovagal syncope – recurrent (within 12 months)

Individuals who have a single or recurrent episodes of unexplained syncope or recurrent episodes of vasovagal syncope may drive if

- it has been at least 12 months since their last episode of syncope, and
- OSMV determines that they are fit to drive.

Notes:

Typical vasovagal syncope: vasovagal syncope that occurs when standing and is preceded by warning signs that are sufficient to allow the driver to pull off the road before losing consciousness.

Atypical vasovagal syncope: vasovagal syncope that occurs in the sitting position or is not preceded by warning signs that are sufficient to allow the driver to pull off the road before losing consciousness.

EPS: electrophysiology study

H. Hypertension

Hypertension
All Licence Classes
No restrictions if sustained blood pressure is less than 170/110 mmHg. Individuals with persistent blood pressure of 170/110 mmHg or higher may drive if • a medical assessment indicates that they have no co-morbid conditions that impair their functional ability to drive, and • OSMV determines that they are fit to drive.

5. REASSESSMENT INTERVAL

The reassessment intervals for cardiovascular diseases are as identified in the guidelines for specific conditions. Where there is no reassessment recommendation in the guidelines, the general approach is as follows:

Condition	Reassessment approach
New condition	• initial reassessment in one year • subsequent reassessment intervals determined on an individual basis with the advice of the treating physician.
Unstable condition	• annual reassessment until condition is stable
Stable condition	• determined on an individual basis with the advice of the treating physician.
Notes: **New condition**: means a condition that has been present for less than one year. **Stable condition**: means a condition that has been present for at least one year with negligible change and which has a small likelihood of sudden deterioration.	

Appendix

CCS Recommendations Regarding Transient Conditions

Waiting periods

The waiting periods in these recommendations refer to the time interval following onset of the referenced cardiac condition or event during which it is recommended that an individual does not drive. These recommendations are intended to mitigate the risk of an episodic impairment of functional ability to drive.

- Recurrence of the referenced cardiac condition or event during a waiting period resets the waiting period.
- If more than one waiting period applies (because of multiple conditions/events) the longer waiting period should be applied, unless otherwise stated.

A. Coronary artery disease

Acute coronary syndromes – waiting periods

	Private	Commercial
ST elevation MI	• 1 month after discharge	• 3 months after discharge
Non-ST elevation MI with significant LV damage		
Non-ST elevation MI with minor LV damage		
If PCI performed during initial hospital stay	• 48 hours after PCI	• 7 days after PCI
If PCI not performed during initial hospital stay	• 7 days after discharge	• 30 days after discharge
Acute coronary syndrome without MI (unstable angina)		
If PCI performed during initial hospital stay	• 48 hours after PCI	• 7 days after PCI
If PCI not performed during initial hospital stay	• 7 days after discharge	• 30 days after discharge

Notes:

ST elevation: refers to the appearance of the ST segment of an electrocardiogram (ECG or EKG)

MI: Myocardial infarction (heart attack)

LV: left ventricle

Significant LV damage: any MI which is not classified as minor Minor LV damage: an MI defined only by elevated troponin ± ECG changes and in the absence of a new wall motion abnormality.

Stable coronary syndromes – waiting periods

	Private	Commercial
Stable angina Asymptomatic coronary artery disease	• No restrictions	
PCI	• 48 hours after PCI	• 7 days after PCI
Notes: PCI: Percutaneous coronary intervention (angioplasty)		

Cardiac surgery for coronary artery disease – waiting periods

	Private	Commercial
Coronary artery bypass graft	• 1 month after discharge	• 3 months after discharge

B. Disturbances of cardiac rhythm, arrhythmia devices and procedures

Catheter ablation and EPS

	Private	Commercial
Catheter ablation procedure EPS with no inducible sustained ventricular arrhythmias	• 48 hours after discharge	• 1 week after discharge
Notes: EPS: electrophysiology		

C. Disturbances of cardiac rhythm and arrhythmia devices

Ventricular arrhythmias

	Private	Commercial
VF with a reversible cause	No driving until/unless successful treatment of underlying condition	
Notes: VF: ventricular fibrillation Examples of reversible causes of VF: • VF within 24 hours of myocardial infarction • VF during coronary angiography • VF with electrocution • VF secondary to drug toxicity		