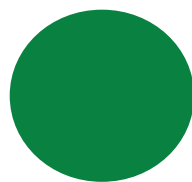
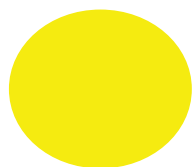


SINGAPORE MEDICAL ASSOCIATION

SECOND EDITION, 2011

**MEDICAL GUIDELINES ON
FITNESS TO DRIVE**



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FOREWORD

It has been ten years since the last guideline on fitness to drive was published, and it is timely that the guidelines have been updated.

This is because of the rapid changes in our society, including the ageing of the population and the onset of an increase in the burden of chronic diseases. This is juxtaposed against the rapid advances in the medical fields and the new developments in the thinking and approach towards diseases.

The new guideline is crafted by an expert committee consisting of doctors from multiple disciplines and representatives from relevant organisations such as the Traffic Police and the Land Transport Authority. They have spent most of the year updating the document and deliberating on some of the more controversial points over numerous meetings. We must acknowledge the vast amount of work spent by the committee and the specialised domain knowledge brought to the table by all parties.

Certification of fitness to drive has legal and statutory ramifications for our society. There are areas of difficulty when it comes to balancing the interests of society against the fiduciary relationship that exists between doctors and their patients. This is viewed with the perspective that driving is a privilege granted to the individual by society at large. Other areas of difficulty include assessing functional ability of the patient to drive and therefore there has been emergence of the Driving Assessment and Rehabilitation Programme (DARP) that seeks to provide objective evidence of a patient's ability to drive.

As always, this is a guideline and serves to help the doctor to decide on areas of difficulty that he may have in certification. We hope that the individual doctors will find this a useful tool in clinical practice, and that society will benefit from the judicious use of this guideline.

DR CHONG YEH WOEI

President, 52nd Council

Singapore Medical Association

MEDICAL GUIDELINES ON FITNESS TO DRIVE

PREFACE

The first edition of the guidelines was published in 1997. Many developments have taken place in the past few years and the Workgroup on Revision of SMA Medical Guidelines on Fitness to Drive was formed to update the Guidelines. Some of the revisions are due to changes in the law, while others take into account developments or advancements in treatment. For instance, epilepsy can now be controlled.

Traffic accidents are a common problem in many countries. They often result in injury or unnecessary loss of life to persons, in addition to damage to property.

There are many causes of traffic accidents. Studies have shown that the human factor is more important than vehicle and road factors in contributing to road traffic accidents. Medical unfitness of drivers contributes towards the human factor. There are a few firm statistics regarding the contribution of disease state or conditions to the causation of accidents. The available evidence suggests that medical conditions of drivers, except for the effects of alcohol, are not a major factor. However, medical conditions can significantly impair the ability to drive.

Efforts in road safety and accident prevention have led to improved design and structure of vehicles and roads, as well as requirements for fitness examinations for certain categories of drivers.

Driving a vehicle may pose a potential threat to the driver as well as to road users.

In the interest of promoting greater road safety and prevention of accidents, it was felt timely that a committee be set up to review existing fitness requirements for drivers, and to draw up guidelines for doctors on the certification of fitness to drive. This committee, under the umbrella of the Singapore Medical Association, comprised a number of doctors from various disciplines, and also included representatives from the Traffic Police and Land Transport Authority.

These guidelines were drawn up with reference to similar guidelines from the UK, Australia, New Zealand and the USA. The draft guidelines were finalised after being sent to various specialist medical societies for comments and suggestions. It is recognised that there is little scientific evidence available that can be used to assess the degree of impairment of driving that results from any specific medical disability. The standards are mainly empirical in nature but represent collective medical opinion.

As with guidelines in other countries, higher standards of fitness are recommended for vocational drivers – those who drive professionally. This is because they drive for longer hours and under more difficult conditions than drivers of private vehicles. In the case of taxi and bus drivers, they are also responsible for the safety of their passengers besides that of other road users. For drivers of heavy goods vehicles, the risk of death or serious injury to other road users in collision with their vehicles is also very high because of their mass and longer braking distance required.

These guidelines are meant to assist doctors in certifying persons fit to drive. They are not comprehensive as it is difficult to provide for every medical condition. As guidelines, they also allow some flexibility to doctors. However, in case of uncertainty, referral to a relevant specialist may be necessary. The guidelines also help doctors to advise their patients who have certain medical conditions on the advisability of driving and the precautions to observe. Doctors do not have a statutory obligation to notify the traffic authorities, but they may do so if they feel that a patient, who continues to drive despite their advice, may be a danger on the road. The Singapore Medical Council has stated that in such situations, medical confidentiality may be breached in the public's interest.

The Committee thanks the various organisations and persons who have provided valuable advice and assistance, and invites comments and suggestions for improvement which will be considered in any revision of these guidelines.

Committee on Medical Guidelines on Fitness to Drive Singapore Medical Association

Note:

In these guidelines, Group 1 includes holders of Class 1, 2 and 3 driving licences. Group 2 includes holders of Class 4 and 5 driving licences and vocational licences (including drivers of taxis and buses). The medical standard for Group 2 drivers is more stringent than that for Group 1 drivers. For example, the visual standard for Group 1 is at least 6/12 in one eye and 6/36 in the other eye, while the visual standard for Group 2 is at least 6/12 in both eyes.

MEDICAL EXAMINATION REQUIREMENTS FOR DRIVERS

INTRODUCTION

The Traffic Police Department is the licensing authority for all classes of driving licenses. The Vehicle & Transit Licensing Group of the Land Transport Authority (LTA) issues additional vocational licences to drivers of public service vehicles (PSV) such as taxis and buses. For example, a person who wants to drive a taxi must possess a valid Class 3 driving licence issued by the Traffic Police Department before he can apply for and be issued with a taxi driver's vocational licence by LTA.

In the interest of road safety, the licensing authorities have to ensure that the person who is granted a licence to drive a particular class of vehicle is physically and mentally fit to drive the vehicle. The medical fitness to drive is generally certified by a registered general practitioner or a specialist doctor if required.

At present, the medical fitness requirement for driving licenses is normally imposed when a person reaches a certain age (65 years and above), except for vocational licence applicants or holders where medical examination is compulsory at the point of application. For renewal of vocational licences, vocational license holders are required to pass a medical examination every 2 years between the ages of 50 years and 64 years, and once every year from age 65 years onwards.

However, for both driving and vocational licence holders, the Road Traffic Act (RTA) also empowers the authorities to require the licensee at any time to undergo a medical examination and submit medical evidence of his continuing fitness to hold a licence. This is especially so when the authorities receive information of a licensee not being fit to drive. An examining doctor may inform the Traffic Police Department or LTA of the medical condition of his patient who, in his opinion, is not fit to drive. The source of such information forwarded will be kept strictly confidential. Write to either:

*Deputy Head, Testing and Licensing Branch
Traffic Police Department
10 Ubi Avenue 3
Singapore 408865
Fax: 65471955*

*Vocational License Services
Bus & Vocational Licensing Division
Land Transport Authority
10 Sin Ming Drive
Singapore 575701
Fax: 6553 5329*

TRAFFIC POLICE DEPARTMENT

Current Medical Requirements for Drivers below 65 years old

At the point of application for a Class 1 to 3 driving licence, the applicant will have to undergo an eyesight test at the respective testing centre. He will also have to declare that he is not suffering from any disability that is likely to cause the driving of a motor vehicle to be a source of danger to the public. No formal medical examination is imposed.

Current Medical Requirements for Elderly Drivers (65 years and above)

Rule 3A of the Road Traffic (Motor Vehicles Driving Licenses) Rules requires drivers of age 65 and above (and every 3 years thereafter) to be certified physically and mentally fit to drive by a registered medical practitioner of his own choice before a license can be granted or renewed.

Therefore, irrespective of the class of vehicle that he is driving/riding, an applicant is only subjected to a compulsory full medical examination when he reaches the age of 65 years. Notwithstanding, if it appears to Traffic Police (by means of self-report or information submitted by member of public) that there is reason to believe that a driver is suffering from a disease or physical disability that is likely to cause him to be a source of danger to the public when he is driving, Traffic Police will subject the driver to a medical examination. Unless he passes the medical examination, his licence will be revoked. [Section 37 of RTA]

For the holder of a Class 4, 4A or 5 driving licence, upon reaching the age of 65 years, he must be certified by a Singapore registered medical practitioner in public service to pass a Proficiency Driving Test before a license is granted or renewed. This is required annually thereafter until the driver reaches 70 years of age where no further renewal is granted.

SUMMARY

Class of Driving Licence (at point of application or renewal)	Age of Driver	Requirement for Elderly Drivers
All classes (at point of application only)	Below 65 years	Eyesight test and declaration of fitness at driving centres. No formal medical examination required.
Class 2, 2A, 2B, 3 & 3A	65 years and above	To be certified physically and mentally fit by a registered medical practitioner. Medical examination required once every 3 years (i.e. 65, 68, 71, etc)
Class 4, 4A & 5 (Renewal not applicable beyond 70 years)	65 to 69 years	To be certified physically and mentally fit by a registered medical practitioner. If fit, the driver is required to pass a Proficiency Driving Test. Annual medical examination required.

LAND TRANSPORT AUTHORITY

At the point of application for a vocational licence to drive public service vehicles, the applicant is required to undergo the prescribed medical examination and chest X-ray by a registered medical practitioner. When the licence holder reaches 50 years of age, he will again be subjected to the prescribed medical examination at regular intervals.

SUMMARY

Age of Driver	Requirement for Vocational Licences
At point of application	Prescribed medical examination and chest X-ray.
50 years to 64 years	Prescribed medical examination every 2 years.
65 years to statutory upper age limit	Prescribed medical examination every year.
For Taxi Driver's Vocational License Holders at 70 years	Assessment on Fitness to Drive.

**TRAFFIC POLICE DEPARTMENT
POLICE FORCE**

**VEHICLE & TRANSIT SINGAPORE
LICENSING DIVISION
LAND TRANSPORT AUTHORITY**

SIMPLE SCREENING INSTRUMENTS FOR CLINIC SETTINGS

The following is a simple assessment battery to assess driver competency and red flags to look out for.

The three key factors for safe driving are:

- Vision
- Cognition and perception
- Sensory and motor function

Impairments in these functions may increase a person's risk for motor accidents. Doctors are able to screen for these factors in their clinics without performing an actual driving assessment using the proposed test battery presented below.

1. TAKING OF DRIVING HISTORY

Ask the patient for his years of driving experience, accidents and near-misses. If the patient is currently not driving, the doctor should ask how long since he stopped driving and the reasons for it.

2. ASSESSMENT OF VISION

Visual acuity (both distant and near) and peripheral vision are important in safe driving. Visual acuity enables a person to take necessary actions for oncoming traffic and hazards, as well as seeing controls inside the vehicle and street signs/directories. Peripheral vision allows one to have a multi-dimensional view of the road and the vehicle to facilitate safe lane changes and the awareness of other vehicles/pedestrians during driving and parking. Doctors are able to assess these aspects of vision using:

- General questions about the patient's eye health e.g. any blurred vision, do they wear prescriptive eyewear, and are they on any follow-up for visual conditions like cataracts
- General observations of the eye for cataracts or any other oculomotor impairment
- Snellen's Chart for Visual Acuity
- Confrontation Test for Peripheral Vision

3. ASSESSMENT OF COGNITION AND PERCEPTION

Driving is a complex activity, which requires higher-order cognitive abilities. These include:

- Short and long-term memory
- Visual perception, visual processing and visuospatial skills
- Selective and divided attention
- Executive reasoning skills

Driving (especially in complex situations) requires one to process increasing amounts of cognitive and perceptual information, which require rapid decision-making and actions/responses. Any issues in this category may lead to increased risks of road traffic accidents.

Registered medical practitioners can include these short screening tools in their clinic assessments:

- **Clock Drawing Test** (Freund Clock Scoring for Driving Competency) to assess visual perception
- Locally validated **Abbreviated Mental Test (AMT)** or **Mini Mental State Examination (MMSE)** or **Chinese Mini Mental State Examination** to assess cognition

These tools are located in **Appendix 1** on page 47.

You may be interested to know that occupational therapy driving assessment and rehabilitation programmes use the AMT and MMSE to screen for cognitive impairment. In addition, the **Colour Trails Test** is used to assess driver competency in the areas of attention. The test does not require the patient to be English-literate and thus is suitable for the local context. Research on the Colour Trails Test (Part B) indicates a correlation between low performance on the test to poor driving performance in on-road assessments. The **Motor Free Visual Perception Test (MVPT)**, **Visual Closure sub-test** has also been shown to be most predictive of “at-fault crash involvement” by drivers and is used during our driving assessments.

4. ASSESSMENT OF SENSORY AND MOTOR FUNCTIONS

Driving is a physical activity that requires neuro-musculoskeletal abilities, such as:

- Range of motion of extremities, trunk and neck
- Muscle strength
- Coordination in hands and legs and eye-hand-foot coordination

Patients who suffer from neuro-musculoskeletal problems may also experience pain along with other limitations, which may directly affect their driving abilities.

Range of Motion

It is suggested that range of motion of the following joint movements are tested in the doctor's clinic:

- Neck rotation
- Trunk rotation
- Shoulder adduction, abduction and flexion
- Elbow and wrist flexion-extension
- Clenching fists
- Hip abduction, adduction, flexion and extension
- Knee extension and flexion
- Ankle dorsi-flexion and plantar flexion

Manual Test of Strength

It is suggested that the patient's motor strength be tested for the following movements bilaterally:

- Shoulder adduction, abduction and flexion
- Elbow and wrist flexion and extension
- Handgrip strength
- Hip abduction, adduction, flexion and extension
- Knee extension and flexion
- Ankle dorsi-flexion and plantar flexion

It is also suggested that doctors note tremors (resting and intentional) or motor planning difficulties during the screening procedure.

In addition to the assessments detailed above, sensation, proprioception, kinesthesia, balance, mobility and transfers are also assessed. Reaction time will be tested using a brake and reaction timer when necessary.

5. RED FLAGS

The following are “red flags” that examining doctors should look out for when assessing fitness to drive:

- Frequently experienced general symptoms like fatigue or weakness
- Diseases affecting vision (for example, cataracts, diabetic retinopathy, macular degeneration, glaucoma, retinitis pigmentosa, visual field, reduced visual acuity)
- ENT-related symptoms like headaches, head trauma, visual changes, vertigo
- Respiratory symptoms like shortness of breath
- Cardiac symptoms like chest pain, dyspnoea on exertion, palpitations, sudden loss of consciousness
- Musculoskeletal changes like muscle weakness and pain, joint weakness and pain, decreased range of motion
- Neurologic symptoms like loss of consciousness, feelings of faintness, seizures, weakness / paralysis, poor coordination, tremors, loss of sensation, numbness and tingling
- Psychiatric symptoms like depression, anxiety, memory loss, confusion, psychosis, mania
- Medications that can cause drowsiness or impair judgment

References:

- 1) *American Medical Association (2003). Physicians' Guide to Assessing and Counselling Older Drivers.*
(<http://www.ama-assn.org/ama/pub/category/10791.html>)
- 2) *Unsworth, C. A., Lovell, R. K., Terrington, N. S., & Thomas, S. A. (2005). Review of tests contributing to the occupational therapy off-road driver assessment. Australian Occupational Therapy Journal, 52(1), 57-74.*

CARDIOVASCULAR DISEASES

Sudden cardiac death while driving is uncommon. Statistics on non-fatal cardiovascular events among drivers are not available but such events probably do contribute to road traffic accidents.

Sudden cardiac deaths are unpredictable. About 50% of cases do not have a history of heart disease. Medical examination of drivers will not totally eliminate this problem but identification of the “high risk group” is important. These “high risk” drivers include those liable to develop myocardial infarction, aortic aneurysmal rupture or dissection, impairment of consciousness due to malignant cardiac arrhythmia or heart block.

Vocational drivers who are eventually certified unfit to drive are usually assessed by a cardiologist after a series of investigations which may include ECG, stress test, echocardiography, Holter monitoring, electrophysiological studies, coronary angiography or cardiac catheterisation.

The guidelines for Group 1 (Class 1, 2 and 3 licences) and for Group 2 (Class 4, 5 and vocational licences) are summarised in a tabulated form on the following page. Guidelines for Group 2 licences are more stringent.

CARDIOVASCULAR DISORDERS	GROUP 1 (CLASS 1, 2 & 3 LICENCES)	GROUP 2 (CLASS 4, 5 & VOCATIONAL LICENCES)
Angina	Not fit until angina is satisfactorily controlled.	Not fit until symptom-free and the person is able to complete the exercise stress test to the required standard*. Annual review required. <i>*(See Exercise Stress Testing.)</i>
Myocardial Infarction Coronary Artery Bypass Graft Any Episodes of Unstable Angina	Not fit for at least one month after episode.	Not fit for at least 2 months. May return to driving only if symptom-free and there are no other disqualifying conditions and patient is able to complete exercise stress test to required standard*. Annual review required. <i>*(See Exercise Stress Testing.)</i>
Coronary Angioplasty	At least 1 week off driving. Resume driving if recovery satisfactory.	Stop driving for at least 2 weeks. Resume only if symptom-free and able to complete exercise stress test to required standard. Those with coronary stents should be observed for at least 2 months and pass an exercise stress test to required standard*. Annual review required. <i>*(See Exercise Stress Testing.)</i>
Hypertension	Driving may continue while blood pressure is being controlled unless medication causes side effects that will affect driving.	Temporarily unfit if casual systolic BP is 200 or more and diastolic BP is 110 or more. Resume driving when BP is stable and controlled and there are no side effects to affect driving.

CARDIOVASCULAR DISORDERS	GROUP 1 (CLASS 1, 2 & 3 LICENCES)	GROUP 2 (CLASS 4, 5 & VOCATIONAL LICENCES)
Cardiac Arrhythmia Significant arrhythmias include: (a) Paroxysmal supraventricular tachycardia including atrial flutter, atrial fibrillation (b) Paroxysmal ventricular tachycardia (c) Heart block AV block -3°, Mobitz Type 2 block (d) Symptomatic sick sinus syndrome	Driving must cease if arrhythmia is liable to cause loss of consciousness. Resume driving only after satisfactory control of symptoms.	Recommend unfit if in the past 2 years arrhythmia had caused impairment of consciousness. If the arrhythmia does not cause such symptoms and there is no documented structural cardiac abnormality and applicant can pass exercise stress test to required standard*, applicant can be issued a licence. <i>*(See Exercise Stress Testing.)</i>
ECG Abnormality Old infarcts Left ventricular hypertrophy Left bundle branch block Right bundle branch block – partial or complete Resting ST-T abnormality Pre-excitation	Fit unless other disqualifying condition is present. Fit unless other disqualifying condition is present. Fit unless other disqualifying condition present. Fit unless other disqualifying condition is present. Fit unless other disqualifying condition is present. Fit unless other disqualifying condition is present.	Must pass exercise stress test to required standard*. <i>*(See Exercise Stress Testing.)</i> Fit unless other disqualifying condition is present. Fit unless other disqualifying condition is present. May be ignored unless associated with presence of disqualifying condition. Must be assessed for cause. Fitness depends on absence of disqualifying condition. May be ignored unless associated with presence of disqualifying condition. <i>(See Cardiac Arrhythmia.)</i>

CARDIOVASCULAR DISORDERS	GROUP 1 (CLASS 1, 2 & 3 LICENCES)	GROUP 2 (CLASS 4, 5 & VOCATIONAL LICENCES)
Congenital Heart Disease	Driving may continue if no other disqualifying condition.	Fit if mild lesions not causing symptoms and there is no other disqualifying condition. Symptomatic congenital heart disease should be assessed for need for surgery. Complex disorders to be considered individually for fitness to drive.
Aortic Aneurysm	Driving may continue after satisfactory control of blood pressure.	Unfit. May resume driving after satisfactory repair and no evidence of myocardial ischaemia is present.
Dissection of Aorta	Unfit. Resume driving after satisfactory recovery from successful surgical repair.	Unfit. May resume driving after satisfactory recovery from successful surgical repair.
Cardiomyopathy (dilated, hypertrophic or restrictive)	May drive if no other disqualifying condition.	Unfit except for mild cases of cardiomyopathy.
Heart or Heart Lung Transplant	May drive if no other disqualifying condition.	Unfit.

CARDIOVASCULAR DISORDERS	GROUP 1 (CLASS 1, 2 & 3 LICENCES)	GROUP 2 (CLASS 4, 5 & VOCATIONAL LICENCES)
Peripheral Vascular Disease	May continue driving.	Fit unless associated with symptomatic coronary artery or cerebrovascular disease.
Pacemaker Insertion	Resume driving if asymptomatic and no disqualifying condition present. Patient should be under regular review.	Recommend permanently unfit. Exception – may be considered fit if simple AV block and not pacemaker dependent.
Simple Syncopal Attack	Fit.	Fit.
Postural Hypotension	Fit.	Fit.
Malignant Vasovagal Syndrome	Assess individually.	Unfit.
Exercise Stress Testing	Not required.	Applicant must safely complete at least 9 minutes of standard Bruce treadmill protocol or achieve at least 85% of maximal predicted heart rate if he can only manage less than 9 minutes of exercise. Applicant must not develop angina or ischaemic ECG response (while off cardioactive drugs for 24 hours).

CARDIOVASCULAR GUIDELINES FOR GROUP 2 LICENCES

1. ISCHAEMIC (CORONARY) HEART DISEASE

1.1 Angina

Persons with angina are not fit to drive.

They can resume driving only when they are free of angina and are able to complete the exercise stress test to the required standard*.

*(See Exercise Stress Testing.)

1.2 Ischaemic ECG Changes

Persons with abnormalities on the ECG such as Q waves or ST-T changes should be investigated for cause and assessed for the risk of myocardial infarction. They must pass an exercise stress test to the required standard*. *(See Exercise Stress Testing.)

1.3 Myocardial Infarction, Coronary Bypass, Unstable Angina

Drivers must stop driving for 2 months. They can return to driving only if symptom-free and are able to complete the exercise stress test to the required standard*. *(See Exercise Stress Testing.)

1.4 Coronary Angioplasty

After a successful angioplasty, persons should stop driving for at least 2 weeks. They may resume driving only if symptom-free and are able to complete the exercise stress test to the required standard*. Those with coronary stents inserted should be observed for at least 2 months before they can resume driving. They should be symptom-free and are able to complete the exercise stress test to the required standard*. *(See Exercise Stress Testing.)

Annual reviews are recommended for 1.1 to 1.4.

2. HYPERTENSION

- 2.1 Persons with severe hypertension of 200/110 mmHg and above should stop driving until hypertension is controlled without any side-effects that can affect driving.
- 2.2 Newly diagnosed hypertensives should be observed for 2 weeks while on medication. Those who have side effects such as postural hypotension, giddiness or drowsiness should be observed for a longer period.

3. HEART FAILURE

Persons with New York Heart Association Functional Class 3 and 4 heart failures should be certified permanently unfit in view of high annual mortality rate. (For those with mild heart failure and are certified fit to drive, annual reviews are essential.) Fitness for Class 1 and 2 heart failures is subject to annual review. (See table below.)

New York Heart Association Functional Classification	
Class I	Patients with cardiac disease, but without resulting in limitation of physical activity. Ordinary physical activity does not cause undue fatigue, palpitation, dyspnoea or anginal pain.
Class II	Patients with cardiac disease resulting in slight limitation of physical activity. They are comfortable at rest. Ordinary activity causes fatigue, palpitation, dyspnoea or anginal pain.
Class III	Patients with marked limitation of physical activity. They are comfortable at rest. Less than ordinary activity causes fatigue, palpitation, dyspnoea or anginal pain.
Class IV	Patients with cardiac disease resulting in inability to carry on any physical activity without discomfort. Symptoms of heart failure or anginal syndrome may be present even at rest. If any physical activity is undertaken, discomfort is increased.

4. VALVULAR HEART DISEASE

- 4.1** Asymptomatic persons with no ECG and chest X-ray abnormalities are fit to drive.
- 4.2** Persons with mitral valve prolapse are fit to drive unless it is associated with severe mitral regurgitation or significant cardiac arrhythmia. (See Cardiac Arrhythmia.)
- 4.3** Persons with symptomatic valvular heart disease or have had heart valve replacement with or without anticoagulant treatment are unfit if in the past 5 years there is a history of:
- Cerebral ischaemia
 - Embolism
 - Significant arrhythmia (see Cardiac Arrhythmia)
 - Heart failure
- Otherwise, they can be certified fit subject to annual review.

5. CARDIAC ARRHYTHMIA

Persons with significant cardiac arrhythmia are unfit to drive. Significant cardiac arrhythmias include the following:

- Paroxysmal ventricular tachycardia
- Untreated complete heart block or Mobitz Type 2 AV block
- Symptomatic sick sinus syndrome unless treated with pacemaker

Persons with paroxysmal supraventricular tachycardia (SVT), atrial flutter or atrial fibrillation are allowed to drive if the arrhythmia is satisfactorily controlled with ablation or drugs and there is no recurrence for at least 3 months.

6. ECG ABNORMALITY

6.1 Pathological Q Waves in 2 Leads or More

Such persons must pass an exercise stress test to the required standard*.

*(See Exercise Stress Testing.)

6.2 Left Ventricular Hypertrophy

Such persons should be assessed for aetiology. Fitness depends on absence of disqualifying condition.

6.3 Left Bundle Branch Block

Investigations are required to determine the aetiology. Fitness to drive depends on the absence of disqualifying condition.

6.4 Right Bundle Branch Block – Partial or Complete

Fitness depends on absence of disqualifying condition.

6.5 Resting ST-T Abnormality

Fitness depends on absence of disqualifying condition.

6.6 Pre-excitation

Wolff-Parkinson-White Syndrome is a disqualification if associated with severe tachyarrhythmia not controlled by definitive therapy.

7. CONGENITAL HEART DISEASE

7.1 Persons with asymptomatic atrial or ventricular septal defects, pulmonary stenosis or other congenital heart disease could be allowed to drive.

7.2 Persons with symptomatic congenital heart disease should be assessed for need for surgical correction. Each case of congenital heart disease has to be assessed individually for fitness to drive.

8. DISEASES OF AORTA

8.1 Aortic Aneurysm

Presence of an aortic aneurysm of diameter greater than 5cm is a disqualification until after satisfactory repair.

8.2 Dissection of Aorta

Unfit to drive until satisfactory recovery from successful surgical repair.

9. CARDIOMYOPATHY – DILATED, HYPERTROPHIC OR RESTRICTIVE

Persons with cardiomyopathies should be certified unfit except for mild cases.

10. PERIPHERAL VASCULAR DISEASE

Fitness depends on absence of associated ischaemic heart disease or cerebrovascular disease.

11. CARDIOMEGALY ON CHEST X-RAY

Drivers with cardiomegaly should be investigated for aetiology. Fitness to drive depends on absence of disqualifying condition.

12. MALIGNANT VASOVAGAL SYNCOPE

Unfit to drive.

13. EXERCISE STRESS TESTING

Vocational and heavy goods vehicle drivers with suspected angina, history of ischaemic heart disease, angioplasty, coronary artery bypass or abnormal resting electrocardiogram suggestive of myocardial ischaemia should undergo an exercise stress test.

Applicant must safely complete at least 9 minutes of standard Bruce treadmill protocol or achieve at least 85% of maximal predicted heart rate if less than 9 minutes of exercise is completed. Applicant must not develop angina or ischaemic ECG response (while off cardioactive drugs for 24 hours).

MUSCULOSKELETAL SYSTEM

GENERAL CONSIDERATIONS

For safe driving, a person must be able to control the vehicle, including in an emergency. In general, he must also be able to carry out visual checks by looking over his shoulder. Higher standards of fitness are required for driving large and heavy vehicles like lorries and buses, and vehicles ferrying members of the public like taxis and ambulances (i.e. Group 2).

The guidelines are summarised in a tabulated form below.

MUSCULOSKELETAL DISORDERS	GROUP 1 (CLASS 1, 2 & 3 LICENCES)	GROUP 2 (CLASS 4, 5 & VOCATIONAL LICENCES)
Upper Limb Disorders	Persons with amputation of either hand or forearm below the elbow are fit if: • An adequate prosthesis is fitted; and • The vehicle is equipped with automatic transmission; and • They are able to drive the vehicle safely (as demonstrated in a driving test). Persons with amputation of the fingers are fit if: • The vehicle is equipped with automatic transmission; and • They are able to drive the vehicle safely. Persons with polyarthritis of the upper limbs are fit if: • The condition is mild; and • They are able to drive the vehicle safely.	Persons must have full painless movement of both arms and hands. Persons with an immobilised left hand should not drive a manual transmission. After removal of the cast or splint, a minimum of 2 weeks is needed to allow adequate return of upper limb function. All amputees should obtain a doctor's clearance before driving. To undergo DARP.

MUSCULOSKELETAL DISORDERS	GROUP 1 (CLASS 1, 2 & 3 LICENCES)	GROUP 2 (CLASS 4, 5 & VOCATIONAL LICENCES)
	Persons with weakness of the upper limbs are fit if: • The vehicle is equipped with automatic transmission; • They have adequate power and grasp to turn the power steering and manipulate the gears; and • They must have adequate sensation. Persons with a plaster cast or splint should not drive until the cast/splint is removed.	
Lower Limb Disorders	Applicants with a below-knee amputation of one leg* are fit if: • An adequate prosthesis is fitted; and • The vehicle is equipped with automatic transmission; and • They are able to drive the vehicle safely (as demonstrated in a driving test). <i>*(If the right leg is amputated, the accelerator pedal will have to be modified for use by the left foot.)</i>	Persons with an immobilised left leg should not drive a manual transmission. After removal of the cast or splint, a minimum of 2 weeks is needed to allow adequate return of lower limb function. Persons with total joint replacement on the right side need a minimum of 4 weeks before resuming driving (automatic transmission).

MUSCULOSKELETAL DISORDERS	GROUP 1 (CLASS 1, 2 & 3 LICENCES)	GROUP 2 (CLASS 4, 5 & VOCATIONAL LICENCES)
	Applicants with amputation of toes are fit if: • They have adequate control of the foot pedals. Applicants with arthritis of the lower limbs are fit if: • The condition is mild; and • They are able to have adequate reach and power. Applicants with weakness of the lower limbs are fit if: • The vehicle is equipped with automatic transmission; • They have adequate power in the lower limbs to manipulate the foot pedals; and • They must have adequate sensation. Drivers with plaster casts and splints should not drive until the cast/splint is removed.	All amputees should obtain a doctor's clearance before driving.

MUSCULOSKELETAL DISORDERS	GROUP 1 (CLASS 1, 2 & 3 LICENCES)	GROUP 2 (CLASS 4, 5 & VOCATIONAL LICENCES)
Spinal Disabilities	Persons wearing a neck brace or cast should not drive until satisfactory recovery and the brace/cast becomes unnecessary. Persons with marked deformity of the spine or painful restriction of movement should not drive. Persons with symptomatic prolapsed lumbar disc should not drive. Persons with chronic lower backache can continue to drive provided: • They are able to drive the vehicle safely; and • The vehicle is equipped with automatic transmission and power-assisted brakes.	Persons with neck brace or cast should not drive until satisfactory recovery and the brace/cast becomes unnecessary. Persons with chronic low backache and prolapsed lumbar disc should not drive. Persons with spinal injuries should obtain a doctor's clearance before driving.

NEUROLOGICAL DISORDERS

Under the current Road Traffic Act, persons suffering from epilepsy are not allowed to drive. Such persons must declare their condition when applying for a driving licence. Should they develop epilepsy after they have obtained their licence, it is their duty to inform the authorities.

At present there is no statutory requirement for doctors to notify the Traffic Police or Land Transport Authority should they come to know that their patients with epilepsy continue to drive. Hospital-based doctors are usually the first to come in contact with such patients. The Singapore Medical Council has stated that there is no breach of medical confidentiality if doctors notify the authorities of the patient's unfitness to drive if their driving will post a definite danger to the public.

The Committee has studied the literature on driving and epilepsy, in particular, the guidelines issued by the Driving and Vehicle Licensing Agency of the United Kingdom, and the Joint International Bureau of Epilepsy and International League Against Epilepsy (IBE/ILAE).

The epilepsy guidelines recommended below cannot be implemented until the Road Traffic Act has been amended and the prohibition on persons with epilepsy has been relaxed to conform to the current opinion of epilepsy experts. The Committee also recommends that persons with a history of epilepsy should be certified fit to drive only by a neurologist.

NEUROLOGICAL DISORDERS	GROUP 1 (CLASS 1, 2 & 3 LICENCES)	GROUP 2 (CLASS 4, 5 & VOCATIONAL LICENCES)
Seizures and Epilepsy	<u>Provoked single seizure</u> Persons with a history of a single seizure or seizure episode but have remained seizure-free for at least 1 year while off anti-epileptic drugs are allowed to drive provided there is no evidence of cerebral abnormality and EEG is normal.	<u>Provoked single seizure</u> When a single seizure, or a single seizure episode in which there are 2 or more seizures during a 24-hour period, occurs for the first time, it is essential to establish the cause. When a clearly identifiable and reversible cause can be found, such persons can resume driving only after a seizure-free period of at least 1 year, and the EEG is normal.

NEUROLOGICAL DISORDERS	GROUP 1 (CLASS 1, 2 & 3 LICENCES)	GROUP 2 (CLASS 4, 5 & VOCATIONAL LICENCES)
	<u>Unprovoked seizure(s)</u> Persons with a history of unprovoked seizure(s) may be allowed to drive if: • The person has been seizure-free for 3 years and off all anti-epileptic drugs for at least 1 year; • There is no structural brain lesion; and • There is no epileptiform abnormality on the EEG. <u>Sleep seizures</u> Persons who only have seizures while asleep or immediately on awakening are allowed to drive provided this pattern has been consistent for at least 2 years.	<u>Unprovoked single seizure & epilepsy (i.e. recurrent unprovoked seizures)</u> Persons with unprovoked single seizure of whatever type with no identifiable or reversible cause will be treated as having epilepsy. Driving is banned until the person is seizure-free for a period of at least 10 years. Driving may resume if the patient is off all anti-epileptic drugs and when the following conditions are met: • There is no structural brain lesion; • There is no epileptiform abnormality on the EEG; and • Neurological examination is normal. <u>History of febrile seizure & benign focal epilepsy of childhood</u> Persons with such history are allowed to drive. <u>Sleep seizures</u> Persons who only have seizures while asleep or immediately on awakening are regarded as having recurrent seizures and the recommendation for recurrent unprovoked seizures will apply.

Cerebro-vascular Diseases	<u>Stroke</u> Patients without any residual disability may resume driving after 1 month. Patients with disabilities such as residual weakness, significant visual field defects, perceptual or mental impairment, in coordination, etc, severe enough to interfere with control of the vehicle should not drive. Patients with mild residual disabilities that may not interfere with control of the vehicle may undergo DARP* >1 month after stroke. They may be allowed to drive if they pass DARP*, after final review by a neurologist. <u>Transient Ischaemic Attack (TIA)</u> Single TIA: Allowed to return to driving once free of TIA for 1 month. Multiple TIA: Allowed to return to driving once free of TIA for 6 months. <u>SAH / AVM / Aneurysms / SDH / EDH</u> Patients can only be allowed to drive if they have no residual deficits and certified fit by a neurosurgeon on a case-by-case basis.	<u>Stroke</u> Able to return to driving if all following conditions are met: • >1 year post-stroke • Stroke is not due to high-risk underlying condition which is left untreated (e.g. high grade carotid stenosis, untreated aneurysm) • Fully recovered • Passed DARP* • Compliant with treatment • Final clearance given by a neurologist <u>Transient Ischaemic Attack (TIA)</u> Able to return to driving if all following conditions are met: • >6 months post-TIA (for single TIA) or >1 year post-TIA (multiple TIAs or brainstem TIA) • TIA is not due to high-risk underlying condition which is left untreated (e.g. high grade carotid stenosis) • Compliant with treatment • Final clearance given by a neurologist <u>SAH / AVM / Aneurysms / SDH / EDH</u> Patients can only be allowed to drive if they have no residual deficits and certified fit by a neurosurgeon on a case-by-case basis.
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Traumatic Brain Injuries (TBI)		<u>Minor or Mild TBI (admission GCS 13-15 with brief loss of consciousness)</u> Able to return to driving only after 1 month, provided fully recovered without residual cognitive, physical or behavioural deficits or seizures. If incomplete recovery, to have review by a neurosurgeon first. <u>Moderate to Severe TBI (admission GCS 3-12)</u> Able to return to driving only after review by a physician or neurosurgeon. Referral to DARP* may be considered if a patient has made full recovery with no residual physical, cognitive or behavioural deficits, dizziness or visual impairment or presence of cognitively impairing medications. <u>History of Alcohol Abuse or Scar Epilepsy</u> Driving is not allowed. <i>NOTE: If in doubt, refer to specialist or DARP*.</i>
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Chronic Neurological Disorders Affecting Coordination & Muscle Control	In this category of disorders are Parkinson's disease, muscular dystrophy, myasthenia gravis, motor-neurone disease, organic brain syndrome, multiple sclerosis, spinal cord disease, post-poliomyelitis, etc. There is a wide range of functional impairment and disabilities. Each case has to be assessed on its own and a driving test may be necessary for applicants. In general, if the applicant has weakness, lack of coordination, involuntary movements or visual impairment of sufficient degree to interfere with safe driving, then he should be assessed unfit to drive.	
Vertigo & Sudden Attack of Disabling Giddiness	In this group are Meniere's disease, labyrinthine disorders, brainstem disorders, etc.	
	Stop driving upon diagnosis until symptom-free for 3 months.	Stop driving until symptom-free for 1 year.
Unexplained Loss of Consciousness	In this group are cases of loss of consciousness where no cause can be found. Excluded are situational fainting, simple vasovagal syncope, cough and micturition syncope and malignant vasovagal syncope.	
	Stop driving until 1 year of freedom from attack.	Stop driving until 1 year of freedom from attack.

**DARP, or the Driving Assessment and Rehabilitation Programme, aims to enable clients with medical conditions to learn or return to driving. For more information, contact the Occupational Therapy Department in Tan Tock Seng Hospital at telephone 6357 8338 or visit <http://www.ttsh.com.sg>*

VISION

Good vision is essential for the proper operation of a motor vehicle. Any marked loss of visual acuity or narrowing of the horizontal visual fields will diminish a person's ability to drive safely.

Visual acuity should be tested with a Snellen's Chart at 6 metres and in good illumination. Spectacles and contact lenses are allowed. (If spectacles and/or contact lenses are needed to improve visual acuity, this should be stated on the licence. E.g. requires prescriptive lens for driving.) If corrective surgery has been done, license needs to be updated.

GROUP 1 LICENCE

Class 1 to 3 driving licence holders (except taxis) should have visual acuity of at least 6/12 in one eye. If the worse eye has a visual acuity of less than 6/36, or if the person has monocular vision, his horizontal field of vision should be tested.

GROUP 2 LICENCE

Drivers of taxis, buses and vehicles like lorries and trucks should have visual acuity of at least 6/12 in each eye.

HORIZONTAL FIELD OF VISION

It is unnecessary to test for this except in the case of a person who is "one-eyed", i.e. with visual acuity less than 6/36 in the worse eye. Such persons must have a horizontal field of at least 120°. They should only drive private vehicles. For Group 2 licence, binocular vision is required.

The horizontal field is tested with both eyes open. If spectacles are needed, they should be worn for the test. The test has to be measured with an instrument, e.g. perimeter or synoptophore, and should preferably be performed by an ophthalmologist.

COLOUR VISION

For all classes of driving, the driver should be able to identify red, green and amber lights.

This can be tested by showing the person the standard red, green and amber colours exhibited one at a time and in a random manner. (*See colour chart on page 2.*)

VISUAL FIELD DEFECTS

Persons with significant visual field defects like homonymous hemianopia or quadrantanopia are unfit to drive.

DIPLOPIA

Paralysis of the extraocular muscles giving rise to double vision would render the person unfit to drive. But strabismus is not a bar to driving unless it is accompanied by double vision.

NIGHT VISION

Night vision defect may cause difficulty with driving at night. But this condition usually occurs only in mild degrees. Marked defect in night vision occurs in disease like retinitis pigmentosa and advanced chorioretinitis and these conditions should be regarded as a bar to driving.

EYE CONDITIONS WHICH REQUIRE ASSESSMENTS AT REGULAR INTERVALS:

- (a) High myopia (above 10.00 dioptres)
- (b) Macular degeneration
- (c) Cataract
- (d) Glaucoma
- (e) Diabetic retinopathy

Drivers with such eye diseases should be referred to an ophthalmologist for treatment and follow-up.

RESPIRATORY DISEASES

There are very few respiratory disorders which will preclude a person from driving permanently. Temporary cessation of driving may be necessary for persons with infectious pulmonary tuberculosis and are driving air-conditioned vehicles ferrying passengers.

Persons in chronic respiratory failure or those with a tendency to develop syncope or clouding of consciousness should not drive.

GROUP 1 LICENCE

See guidelines on items 3 to 6 for Group 2 licence.

GROUP 2 LICENCE

1. PULMONARY TUBERCULOSIS

Applicants whose chest X-ray shows abnormality suggestive of pulmonary tuberculosis should be investigated for activity.

1.1 Inactive Pulmonary Tuberculosis

The chest X-ray may show scarring, calcification or granuloma. Those with a past history of treated pulmonary tuberculosis and have old chest X-rays for comparison may be passed fit if chest X-ray shows no significant change.

1.2 Active Pulmonary Tuberculosis

Persons with chest lesions suggestive of active pulmonary tuberculosis require investigation and treatment. Those who are smear-positive or symptomatic should stop driving as they may infect their passengers especially in air-conditioned taxis, buses and coaches. The majority will be rendered non-infectious after 2 to 3 weeks of adequate doses of anti-tuberculous drugs unless they harbour multi-resistant organisms.

Medical certification for fitness to drive a taxi, bus or coach should be delayed until the person is rendered non-infectious and is not functionally impaired either because of advanced disease or complications in treatment.

After tuberculosis treatment has commenced, it is considered safe to return to work after 3 weeks of treatment.

2. PULMONARY BULLAE

Large bulla besides causing functional respiratory impairment may cause spontaneous pneumothorax. Such persons should be referred to a respiratory physician for assessment and treatment after which they may be assessed fit to drive.

3. SEVERE ASTHMA AND SEVERE CHRONIC OBSTRUCTIVE AIRWAY DISEASE

It is recommended that drivers who are in chronic respiratory distress or have frequent attacks of asthma should not drive. Those who have a history of syncope during an attack are permanently unfit to drive.

4. SLEEP APNOEA SYNDROME

Drivers who suffer from excessive wake-time sleepiness should stop driving and be referred to a physician trained in treating sleep-related breathing disorders for treatment. Review for fitness can be undertaken after the condition is adequately controlled.

5. COUGH SYNCOPE

Cough syncope usually follows a paroxysm of explosive and vigorous coughing often associated with chronic lung disease or bronchitis. Syncope is often brief. Such persons should not drive until attacks have been successfully controlled.

6. CARCINOMA OF LUNG WITH BRAIN METASTASIS

Unfit in view of the possibility of fits. Reassess if treatment is successful and brain scan shows no evidence of intracranial tumour after one year. Annual reviews are advised.

DIABETES MELLITUS & OTHER ENDOCRINE DISEASES

From the viewpoint of driving safely, problems due to diabetes may be classified into two groups:

- (a) Those acute metabolic disturbances that relate directly to control of blood sugar. They may occur early in the course of the disease, particularly during initiation of treatment. Hypoglycaemia is the most important as it may rapidly impair the ability of an otherwise fully competent driver. It is a risk associated with treating diabetic patients with oral anti-diabetic agents (particularly insulin secretagogues) or insulin. The doctor should discuss the prevention and recognition of hypoglycaemia with such patients. The doctor should also discuss the appropriate responses to episodes, which should include cessation of driving, self-treatment, seeking medical help and ensuring that the hypoglycaemia is resolved before driving is resumed. Discussion points should also include:
 - The interaction between food, medication and activity;
 - Having rapidly absorbable carbohydrate foods in the vehicle;
 - Self monitoring of blood glucose where appropriate;
 - Not skipping meals when there is an intention to drive;
 - Ensuring that food is eaten after injections (prandial insulins) and/or medication before driving.
- (b) Those which result from later complications of diabetes, e.g. cataract or retinopathy causing visual impairment, or neuropathy impairing the ability to operate foot pedals. Assessment of the fitness of diabetics with late complications should be based on the system affected.

GROUP 1 LICENCE

An insulin-controlled diabetic who is stabilised on treatment may drive a private vehicle. Those who are unstable in their treatment (for whatever reason) may be unfit.

GROUP 2 LICENCE

Drivers with diabetes should inform the doctor. A diabetic driver should ensure that he is treated, and his condition should be stable before applying or renewing the vocational license.

Doctors providing management should proactively manage the risks of these drivers to help them achieve driving safety. Those who are suffering from serious effects of hypoglycaemia, or are unstable in their treatment (for whatever reason) are unfit.

OTHER ENDOCRINE DISEASES

Marked hyper or hypothyroidism may affect driving either as a direct consequence of the disease or as a result of the complications. Drivers with the disease should be satisfactorily treated before being allowed to drive.

HEARING

GROUP 1 LICENCE

Drivers should be able to hear the sound of car horns in general. An aided threshold of at least 50dB averaged over 250 and 500Hz, is acceptable.

GROUP 2 LICENCE

Bus and taxi drivers must be able to hear a passenger who wishes to speak to them without having to take their eyes off the road by turning their heads. Heavy goods vehicle drivers should be able to hear above the noise of the engine. They should be able to respond to warnings when reversing their vehicles. A driver carrying dangerous goods should be able to communicate, by telephone if necessary, regarding handling of spillages or other emergencies.

For practical purposes, the ability to hear ordinary conversational speech at about 1.5 metres would be acceptable. Hearing aids are allowed. Where an applicant fails this simple screening test, the person may need assessment with an audiometric examination. An aided threshold of at least 50dB averaged over 250 and 500Hz, is acceptable.

COGNITIVE DISORDERS (PROGRESSIVE)

DEMENTIA

Dementia results in a progressive decline in cognitive function that may affect the ability of an afflicted person to drive safely. On the other hand, persons with dementia may still be competent to drive in the earlier stages of disease. Furthermore, driving is an important expression of independence, freedom and mobility for older people. Driving licences should not be revoked therefore by arbitrary decisions based solely on a driver's cognitive ability. A recent longitudinal study reported that persons with mild Alzheimer's Disease (AD) remained safe drivers for an average of 11 months, while those with very mild AD remained safe drivers for an average of 1.7 years.¹ The issue of driving in dementia requires therefore the balancing of individual freedom on one side versus public safety on the other.

The judgement with respect to the ability to drive safely of a person with dementia should only be made after a systematic and comprehensive assessment, including practical testing. (See section on Simple Screening Instruments for Clinic Settings for the Abbreviated Mental Test and Clock Drawing Task.) In general, persons whom the physician is unsure if the diagnosis of cognitive impairment might affect driving safety should be referred for further clinical and driving assessment.

GROUP 1 LICENCE

Persons with *moderate to advanced* dementia should not be allowed to drive¹.

Persons with *mild* dementia should be referred for a formal driving assessment.

- (a) If deemed safe, they should be allowed to drive¹; in some instances, restrictions such as driving only when accompanied, driving only during daytime hours and not driving on expressways, may be recommended.
- (b) They should be reassessed at least every 6 to 12 months depending on the recommendations of the driving assessment. Families and caregivers need to observe for any warning signs that may indicate unsafe driving. Whenever there is a change in status noted, consideration should be given for earlier formal driving assessment or in certain cases, cessation of driving.

GROUP 2 LICENCE

Persons with dementia who exhibit *behavioural disturbances* that may pose a danger to driving (such as aggression, inadequate impulse control, psychosis, e.g. hallucinations, fluctuating consciousness) should be considered unsafe for driving². These persons should not drive vocationally or operate any heavy goods vehicles.

References:

1. Ott BR, Heindel WC, Papandonatos GD, Festa EK, Davis JD, Daiello LA, Morris JC. A longitudinal study of drivers with Alzheimer disease *Neurology* 2008; 70:1171-8.
2. Herrmann N, Rapoport MJ, Sambrook R, Hebert R, McCracken P, Robillard A, for the Canadian Outcomes Study in Dementia (COSID) Investigators. Predictors of driving cessation in mild-to-moderate dementia. *CMAJ* 2006; 175(6):591-5.

PSYCHIATRIC DISEASES

Psychiatric illness per se does not disqualify a person from driving. Persons with psychiatric illness are fit to drive if all the following conditions are met:

- The psychiatric condition is stable, i.e. not in the acute phase.
- Functional cognitive impairment is assessed as minimal.
- The patient is compliant with treatment.
- The maintenance dose of medication does not cause noticeable sedation.
- The patient has insight to self-limit at times of a relapse and knows to seek treatment promptly.
- The family is supportive of the patient driving.
- The patient does not have chronic behaviours which are incompatible with safe driving, e.g. violence, aggression, suicidality.

Acute episodes of mental illness which may render a person temporarily unfit to drive are as follows:

PSYCHOSIS

An acute episode of psychosis poses a substantial risk.

The most common cause of acute psychosis is schizophrenia. In this case, the risks are greater if disordered thinking is related to motoring techniques or to fellow motorists' "interference", or if patients are suicidal or suffer from delusions of persecution.

In acute mania, elation, irritability, distractibility, grandiosity, indiscretion, poor judgement and flight of ideas all pose hazards.

DEPRESSION

Severely depressed patients who are suicidal or have severe psychomotor retardation or agitation or impaired concentration pose a risk.

ANXIETY DISORDERS

Severe, acute anxiety (including panic attacks) may interfere with concentration or cause “freezing”. Symptoms of doubt and indecision (also seen in severe obsessive compulsive disorder) may also involve risk. Driver competency may be adversely affected when in a state of stress or anxiety in excess of individual norms.

SUBSTANCE ABUSE

Misuse of illicit drugs and alcohol is incompatible with safe driving.

ALCOHOL DEPENDENCY

Drinking and driving is one of the most serious of road safety problems, and therefore, the doctor has the responsibility to identify those patients with an alcohol problem who drive, and advise them on their medical fitness to drive.

MEDICATION

Patients who are currently taking medications known to have side effects that can impair their reaction time and/or the ability to drive should be **advised not to drive until their individual response is known or the side effects no longer result in impairment.**

In addition, psychoactive prescription medications **can potentiate the cognitive impairment caused by alcohol** (e.g. alcohol combined with antihistamines or benzodiazepines). **Combinations** of psychoactive medications can **give rise to additive effects** on cognitive impairment and thus reaction time. Patients experiencing a **withdrawal reaction** from psychoactive or psychotropic medications may be temporarily impaired in their driving ability and should be advised to refrain from driving until the acute symptoms have abated.

General guidances on the use of psychoactive medications are as follows:
(Adapted from The ICADTS Working Group on Prescribing and Dispensing Guidelines for Medicinal Drugs affecting Driving Performance 2001)

- i. The use of some psychoactive drugs has been associated with an increased risk of causing an injurious accident. Patients should receive this information and receive the maximum benefit of this knowledge.
- ii. Consider an alternative in the light of experimental research showing large differences between the effects on driving performance of various drugs within the same therapeutic class, e.g. antihistamines – older (sedating) versus newer (non-sedating) generation.
- iii. Start with the lowest doses. Whenever possible, avoid multiple dosing throughout the day.
- iv. Do not reflexively “double the dose” if patients fail to respond to psychoactive medication.
- v. Avoid prescribing different psychoactive medications in combination.
- vi. Do not rely solely upon the manufacturers’ advice for counselling patients about the effects of the drug upon driving.
- vii. Advise patients concerning the ways they can minimise the risk of causing a traffic accident if it is impossible to avoid prescribing an obviously impairing drug or one with unknown impairing potential. Involve patient in a risk-benefit discussion before prescribing medications.
- viii. Monitor the patient’s driving experience with the drug.
- ix. Patients should be warned of the additive effects of psychoactive medications, especially when multiple psychoactive medications are used, with that of alcohol on cognition.

The common classes of medication known to have such effects include, but are not limited to, those in the list below.

1. Sedatives and hypnotics

These drugs impair psychomotor function and mental acuity, motor skills and retards responses or reaction time. In particular, sedatives and hypnotics, including benzodiazepines, are more likely to cause cognitive impairment in individuals more than 65 years of age than in younger individuals. Patients who are more heavily sedated for therapeutic reasons should not drive. Concomitant use of alcohol with sedatives or hypnotics further raises the risk of impairment.

2. Antidepressants and antipsychotics

Careful observation is advised during the initial phase of dose adjustment. Patients should not drive if they experience drowsiness or sedation, impairment in mental acuity or cognition, and/or orthostatic hypotension.

3. Antihistamines and anticholinergics

Drowsiness and dizziness are frequently encountered side effects of the older-generation antihistamines. The newer “non-sedating” antihistamines are considered safer but may still have a sedative effect on some patients. Only Fexofenadine has been shown to have an absence of psychomotor or cognitive function comparable to placebo. A close second alternative is Loratadine.

Anticholinergics may cause sedation and delirium, especially in older individuals. Patients who develop such side effects should not drive.

Patients using any of these medications for the first time must be warned not to drive until it is determined whether they are prone to these side effects.

4. Anticonvulsants

Careful observation is advised during the initial phase of dose adjustment. Anticonvulsant drugs can cause sedation, psychomotor retardation, cognitive impairment and orthostatic hypotension in some patients. In addition, patients should be advised of the risk of seizure activity and the associated driving restrictions.

5. Antihypertensives

Antihypertensives can cause sedation, fatigue and orthostatic hypotension particularly during the start of treatment. Patients using these drugs for the first time must be cautioned regarding driving until treatment is stabilised. Chronic use of antihypertensives should not be a concern.

6. Antiarrhythmics

Class IA antiarrhythmics and Digoxin can cause sedation and drowsiness. Caution is advised if newly-started or dosage has been recently increased. In addition, patients who experience frequent syncope due to arrhythmias should be thoroughly assessed for suitability of pacemaker implantation by a cardiologist.

7. Opioids and Opiates

Euphoria, depression or inability to concentrate may follow with the use of opioids or opiates, including codeine which is one of the constituents commonly found in pain medication and cough syrups. Patients should be warned about the potential sedation.

8. Oral antihyperglycemic agents and Insulins

Patients taking oral antihyperglycaemic agents and/or using any type of insulins should be advised on the risks of potential hypoglycaemic events and how to recognise and react should a hypoglycaemic event occur. Frequent self-testing or monitoring may be warranted to ensure that drivers who spend a long time on the road (e.g. taxi drivers) are not experiencing hypoglycaemic unawareness especially in long-standing diabetes. Patients who have this condition are unable to recognise signs and symptoms of hypoglycaemia or these signs are absent or minimal. Prolonged hypoglycaemia without treatment or intervention, especially if severe, can result in serious sequelae, including loss of consciousness and grand mal seizures.

1. CLOCK DRAWING TEST

The Clock Drawing Test (CDT) assesses a patient's long-term and short-term memory, visual perception, visual-spatial skills, selective attention, and executive skills. Preliminary research indicates an association between specific scoring elements of the clock drawing test and poor driving performance.

Administration

Give the patient a pencil and a blank sheet of paper.

Say this to the patient:

"I would like you to draw a clock on this sheet of paper. Please draw the face of the clock, put in all the numbers, and set the time to ten minutes after eleven."

This is not a timed test, but the patient should be given a reasonable amount of time to complete the drawing. The examiner scores the test by examining the drawing for each of eight specific elements of the Freund Clock Scoring for Driving Competency as follows:

PLEASE TICK "YES" OR "NO" TO THE FOLLOWING:	YES	NO
1) All 12 hours are placed in correct numeric order, starting with 12 at the top.		
2) Only the numbers 1-12 are included (no duplicates, omissions, or foreign marks).		
3) The numbers are drawn inside the clock circle.		
4) The numbers are spaced equally or nearly equally from each other.		
5) The numbers are spaced equally or nearly equally from the edge of the circle.		
6) One clock hand correctly points to two o'clock.		
7) The other hand correctly points to eleven o'clock.		
8) There are only two clock hands.		

Any incorrect element in the Freund Clock Scoring signals a need for intervention. Clock drawing tests have been found to correlate significantly with traditional cognitive measures, and to discriminate healthy older patients from ones with dementia. The Freund Clock Scoring is based on eight “principal components” that were derived by analysing the clock drawings of 88 drivers aged 65 and older against their performance on a driving simulator. Errors on these principal components were found to correlate significantly with specific hazardous driving errors, signaling the need for formal driving evaluation.

If the patient’s performance signals the need for interventions, it is suggested that the physician can perform more detailed cognitive testing as needed, and also to identify the cause of the cognitive decline.

It has been reported that the sensitivity and specificity of CDT is significantly affected by low education. Many normal older persons find such a task to be unfamiliar and culturally alien, thereby affecting the ability of the test to reflect their true cognitive status. The use of CDT as a useful screening test may be limited to older patients with higher literacy rates.

2. ABBREVIATED MENTAL TEST (AMT)

The Abbreviated Mental Test (AMT) is a 10-item cognitive screening instrument designed to identify cognitive impairment. In a validation study in 1991, a cut-off score of 7 and below was found to optimally identify cognitive impairment. This instrument has been validated locally with adjusted cut-offs established for age and education (Sahadevan, Lim, Tan & Chan, 2000).

Administration

Record the patient's education level: _____ years

Say this to the patient:

"Please remember the following phrase "37 Bukit Timah Road". I will be asking you to repeat the phrase to me later."

	Score
1) What is the present year? (western calendar e.g. 20__)	
2) What time is it now? (within 1 hour)	
3) What is your age? (for Chinese, +1 year is acceptable)	
4) What is your date of birth? (western year +/- month and day)	
5) Where are we now?	
6) What is your home address? (block, house, street)	
7) Who is Singapore's present Prime Minister?	
8) Show picture of nurse or doctor and ask "What is his/her job?"	
9) Count backwards from 20 to 1.	
10) Please recall the memory phrase.	
Total	

Scoring:

Dementia may be suspected if:

- Education 0-6 years and AMT score is 0-6
- Education more than 6 years and AMT score 0-8

3. MODIFIED CHINESE MINI MENTAL STATUS EXAMINATION (MMSE)

The Mini Mental State Examination (MMSE) was originally designed to provide a brief, standardised assessment of mental status that would serve to differentiate between organic and functional disorders in psychiatric patients. Over the years, it has become a widely used instrument to detect and track progression of cognitive impairment associated with Alzheimer's Disease and other neurodegenerative disorders. Although the Chinese MMSE is more cumbersome and requires more time to complete, it is believed to be more useful than the AMT when testing patients with more than 12 years of education or greater levels of literacy.

	Maximum Score	Score
1a) What day of the week is it?	1	
1b) What is the date today?	1	
1c) What is the current month?	1	
1d) What is the current year?	1	
2) Where are we now?	1	
3) What floor are we on?	1	
4) In which estate are we?	1	
5) In which country are we?	1	
6) Repeat the following words: "lemon, key, balloon".	3	
7) Subtract \$7 from \$100 and make 5 subtractions.	5	
8) Can you recall the 3 words?	3	
9) What is this? (Show a pencil.)	1	
10) What is this? (Show a watch.)	1	
11) Repeat the following: English: "No ifs, ands or buts" Chinese: "Forty-four stone lions"	1	
12) Follow a 3-stage command: "Take this piece of paper, fold it in half and put it on the floor."	3	
13) Read and carry out the instruction written on this piece of paper: "Raise your hands."	1	
14) Copy this drawing (Overlapping Hexagons) on a piece of paper.	1	
Total	28	

Modified Chinese MMSE: Optimal cut-off values adjusted for age and education

Years of Education	60 - 74 years old	> or = 75 years old
0 - 6 years	20 / 21	18 / 19
> or = 6 years	23 / 24	22 / 23

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Singapore National Eye Centre

Singapore Orthopaedic Association

Singapore Society of Otorhinolaryngology

Singapore Thoracic Society

Traffic Police Department

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