When Can You Drive After A TIA or Stroke?

The 11th Stroke Update for Physicians

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When Can You Drive After A TIA or Stroke?

- TIA
  - After assessment and investigations completed
- Stroke
  - 1 month
    - No deficits
    - Underlying cause investigated and treated
    - No seizure

Disclosures

- None

Objectives

- Describe issues related to driving post-stroke from the patient, health care professional and Legal perspectives
- Identify the risks of driving and predictors of fitness to drive post-stroke
- Review assessment of driving post-stroke

Overview

- Case Example
- Issues in Driving
- Attributes Required for Driving
- Theories of Driving
- Screening and Assessment
- Management

CASE : Mrs. M.

- 74 year old right-handed hypertensive female, previously well
- Has right total knee replacement
- Sustains stroke affecting primarily motor recovery of right arm
- No apparent cognitive abnormalities
- MRI head; left internal capsule infarct
- Presence of microangiopathic disease

Case: Mrs. M

- Admitted to acute care
- Transferred to Stroke Rehab inpatient program
- Does “well”, walking independently
- Struggling to regain right wrist/hand function
- Doing most tasks primarily left handed

Case: Mrs. M

- She wants to drive
- What would happen if she lived in:
  - Ontario
  - Victoria
  - U.S.
  - U.K.

Case: Mrs. M.

- She does live in Ontario
  - Mandatory reporting
- Letter to Department of Transport sent “should have repeat testing prior to getting on road”
- Driver Evaluation Program tested 6 months post stroke – passes questionnaires and perceptual testing
- Fails driving assessment, doesn’t stop, doesn’t yield, difficulty following instructions
- Unsafe!

Case: Mrs. M.

- The on-road driving assessment demonstrated her lack of safety on the road
- Screening may be utilized to eliminate the severely "at risk" individuals, those who should not even undergo an on-road driving test?
- Need a staged assessment approach

Legal Issues and Driving

- Most Provinces- reporting is mandatory
- Most provinces provide protection for physician who reports patient
- Toronto Family Physician and Neurologist- 40% liable for epileptic patient involved in MVA
- family Physician (20%) and Neurologist (10%) liable for patient with cervical spondylosis involved in MVA

Province	Obligation to Report	Protection
British Columbia	Mandatory	Yes
Alberta	Discretion	Yes
Saskatchewan	Mandatory	Yes
Manitoba	Mandatory	Yes
Ontario	Mandatory	Yes
Quebec	Discretion	Yes
New Brunswick	Mandatory	Yes
Prince Edward Island	Mandatory	Yes
Nova Scotia	Discretion	Yes
Newfoundland	Mandatory	Yes
Yukon Territory	Mandatory	Yes
North West Territory	Mandatory	Yes

Patient Issues

- Is Driving a Right or a Privilege?
  - U.S. Supreme Court Ruling
- Is Driving an Activity of Daily Living?
- "Although it is obvious that health can affect mobility, it may often be overlooked that mobility can also affect health and well-being" (Waller, 1991)

Medical Issues

- "Paucity of basic information with which to develop rational policies for deciding who is or is not qualified for licensure"
- Canadian Medical Association
  - "Where the interests of the individual driver and the safety of the public come into conflict, the latter should take priority"

Physical and Cognitive Requirements for Driving

- Vision: "90% of driving is visual"
  - visual acuity, depth perception, visual scanning, dynamic acuity, visual fields, night vision, glare accommodation
- Hearing
- Motor Skills
  - Power, coordination
- Sensation
- Cognitive Skills
  - Vigilance, Attention, Judgment, Insight, Planning Skills

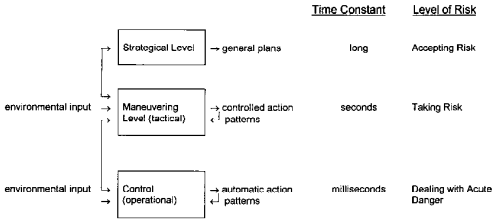
Physical and Cognitive Requirements for Driving Models of Driving

- Many facets involved in driving beyond cognitive skill and physical skills
  - patients may self restrict driving based on decreased abilities
    - drive under only certain conditions (daylight, good weather)
  - Driving is an over-learned skill
    - patients may have many years driving experience that allows them to remain capable even in the face of cognitive and physical impairment

Hierarchical Model of Driving

Factors Involved in Driving

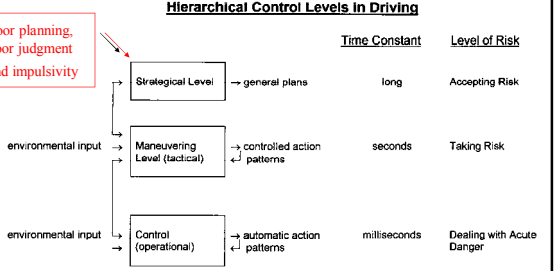
Hierarchical Control Levels in Driving

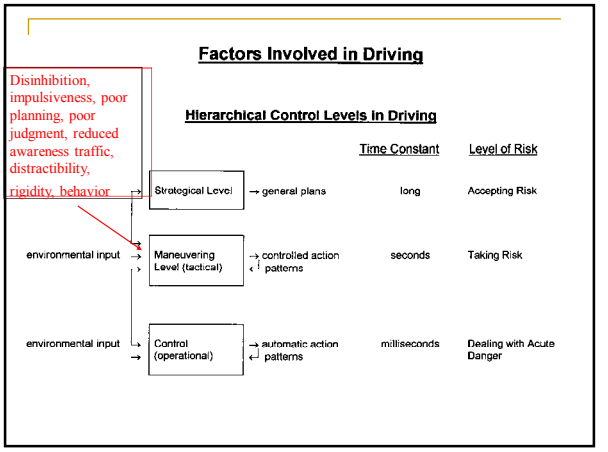


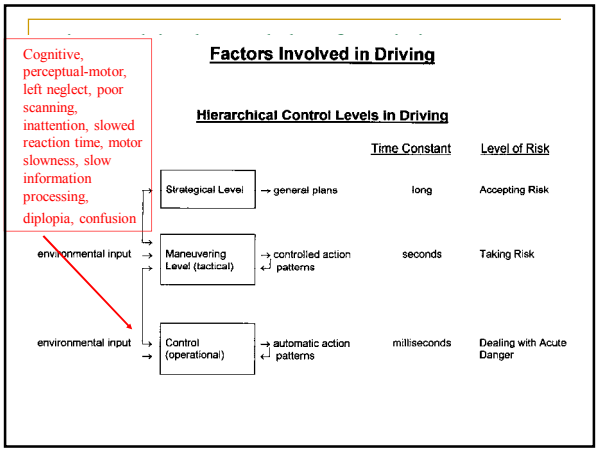
Factors Involved in Driving

Hierarchical Control Levels in Driving

Poor planning, poor judgment and impulsivity







Medical Conditions and Reduced Fitness to Drive

What Medical Conditions Affect Driving Ability?

- Medical Conditions: Acute versus Chronic Effects
- Spectrum of Severity of Medical Conditions
- Specific Medical Conditions
- Multiple Medical Conditions

Medical Conditions: Acute versus Chronic Effects

- Acute Effects: The event is often sporadic and unpredictable
  - e.g. Epileptic seizure or hypoglycemic reaction
  - Decisions regarding driving are based upon estimated or calculated risk
- Chronic Effects: Stable presentation of impairment with measurable effects on driving
  - e.g. Cognitive impairment in dementia or visual field defect following stroke
  - Decisions can be based upon individual evaluation
- Acute and Chronic Effects:
  - Cardiovascular disease or diabetes mellitus

Dobbs B. Medical conditions and driving: A review of the Scientific Literature (1960-2000). DOT HS 809 960.

Spectrum of Severity of Disease

- While relationships may exist for specific medical conditions impacting the ability to drive- there will clearly be an association between disease severity and functional impact on driving
  - E.g. Traumatic brain injury; Diabetes Mellitus; Stroke

Specific Medical Conditions affecting Driving Ability

- Vaa (2003) Impairments, diseases, age and their relative risks of accident involvement: Results from a Meta-analysis. (IMMORTAL Study- Impaired Motorists, Methods of Roadside Testing and Assessment for Licensing)
- Charlton JL, Koppel S, Odell M, Devlin A, Langford J, O'Hare M, Kopinathan C, Andrea D, Smith G, Khodr B, et al. Influence of chronic illness on crash involvement of motor vehicle drivers: 2nd edition. Victoria, Australia: Monash University Accident Research Centre; 2010. Report nr 300
- Dobbs B. Medical conditions and driving: A review of the Scientific Literature (1960-2000). NHTSA Report

What are the Top 5 Medical Conditions with the Highest Relative Risk of Crash??

Top 5 Medical Conditions RR for Crash

Table 1. Crash Risk Associated with Selected Medical Conditions

Diagnosis/Impairment	Vaa (2003) Relative Risk* (and 95% Confidence Interval)	Charlton et al. (2010) Relative Risk* (Untreated)	Dobbs (2005) ("Red Flags")
Alcohol Abuse and Dependence	2.00 (1.89–2.12)	2.1–5.0	Yes
Dementia	1.45 (1.14–1.84)	2.1–5.0	Yes
Epilepsy	1.84 (1.68–2.02)	1.1–5.0+	Yes
Schizophrenia	2.01 (1.60–2.52)	2.1–5.0	Yes
Sleep Apnea	3.71 (2.14–6.40)	2.1–5.0+	Yes

N/A = not available, NS = not significant.
*1.1–2.0 = slightly increased, 2.1–5.0 = moderately increased, 5+ = considerably increased.

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Alcohol Abuse and Dependence	2.00 (1.89–2.12)	2.1–5.0	Yes
Cardiovascular Disease	1.23 (1.09–1.38)	1.1–5.0	Yes
Cerebrovascular Accident/ Traumatic Brain Injury (TBI)	1.35 (1.08–1.67)	Inconclusive (stroke and TBI)	Yes (stroke) N/A (TBI)
Depression	1.67 (1.10–2.45)	Inconclusive	No
Dementia	1.45 (1.14–1.84)	2.1–5.0	Yes
Diabetes Mellitus	1.56 (1.31–1.86)	1.1–2.0	Yes
Epilepsy	1.84 (1.68–2.02)	1.1–5.0+	Yes
Hearing Impairment	1.19 (1.02–1.40)	N/A	No
Medication Use	1.58 (1.45–1.73)	N/A	Yes
Musculoskeletal and Motor Disability	1.17 (1.004–1.36)	1.1–2.0	No
Parkinson's Disease	N/A	Inconclusive	N/A
Renal Disease	0.87 (0.54–1.34)	N/A	Yes
Schizophrenia	2.01 (1.60–2.52)	2.1–5.0	Yes
Sleep Apnea	3.71 (2.14–6.40)	2.1–5.0+	Yes
Vision Disorder	1.09 (1.04–1.15)	1.0–2.0	Yes

N/A = not available, NS = not significant.
*1.1–2.0 = slightly increased, 2.1–5.0 = moderately increased, 5+ = considerably increased.

Prevalence of Chronic Disease for Older Persons- Ireland 2004

- Age 70 or greater
- 86% received 3 or more medications for management of chronic disease
- 2 Chronic conditions- 27%
- 3 Chronic conditions- 19%
- 4 or more Chronic conditions- 14%

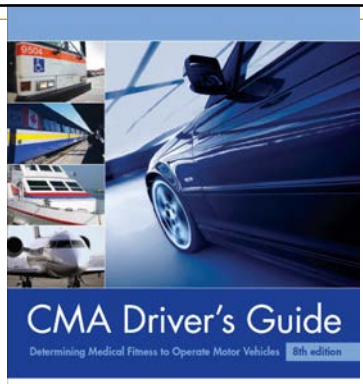
Naughton 2004 Ageing

Multiple Medical Conditions

- Increasing number of medical conditions is associated with increased driving risk
  - Crash
  - Driving Cessation
  - Driving Avoidance
- Confirms what is anticipated

Marshall SC, Man-Son-Hing M. Multiple chronic medical conditions and associated driving risk: A systematic review. Traffic Injury Prevention 2011;12(2):142-148.

Assessing Medical Fitness to Drive



Section 15
Cerebrovascular diseases (including stroke)

Alert box

Patients who have experienced either a single or recurrent transient ischemic attack should not drive a motor vehicle until a medical assessment is completed.

Transient Ischemic Attacks

- 5-6% chance of developing a stroke annually
- Substantial risk for 1st 3 months following TIA
- Should not drive until medical assessment and appropriate investigations completed

Brain Aneurysm

- Symptomatic cerebral aneurysms are a contraindication to driving
- After treatment, if patient symptom free may resume driving after
  - 3 months for private
  - 6 months for commercial

Cerebrovascular Accident (Stroke)

- Should not drive for 1 month following stroke
- May resume driving if:
  - No clinically significant
    - Motor
    - Cognitive
    - Perceptual
    - Vision deficits
  - Underlying cause has been addressed
  - No seizure has occurred in the interim

Cerebrovascular Accident (Stroke)

- Considerations
  - Executive Functions
    - Awareness, insight, decision-making ability
  - Neglect- Hemi-inattention
  - Visual Field Defects
    - Require formal evaluation by optometrist or ophtalmologist
  - Monitoring
    - While stroke is an acute event, possibility of gradual decline due to conditions such as microvascular disease or multi-infarct dementia

Canadian Medical Association Recommendations

- Stroke
  - Should not drive for 1 month post stroke- may resume driving if:
    - No clinically significant motor, physical, cognitive or perceptual deficit
    - No obvious risk of sudden recurrence
    - Underlying cause treated appropriately
    - Has not had post-stroke seizure in the interim

Table 8 Private licensing guidelines for drivers with CVA

Disorder	Canada	Australia	UK	USA	NZ	Sweden
	CMA (2000)	*Austroads (2003)*	*Drivers Medical Group, Swansea (2003)*	*Utah Driver License Division (1992)*	*Land Transport Safety Authority (2002)*	*Swedish National Road Administration (1999)*
Stroke	Desist from driving for 1 month minimum. Driving may resume if: 1. Person has functional ability to drive a vehicle 2. No risk of recurrence found on neurological assessment. 3. Any underlying cause has been treated. Person may be required to undergo a road test if there is any "residual loss of motor powers" (p43). Any changes in personality, alertness or decision-making ability to be taken into consideration by GP. Regular review required.	An unconditional licence may not be held if the person has had a stroke. A conditional licence may be issued upon medical advice taking into consideration completeness of recovery, visual field impairments, risk of recurrence & subject to a driving assessment. Periodic review required.	Desist from driving for 1 month. Driving may resume if there is a satisfactory recovery. DVLA notification required if residual neurological impairment remains 1 month after the stroke, especially visual field & cognitive defects & limb disabilities. Car modifications may be required for severe physical impairments. Epileptic seizures that occur within 24 hours of a stroke are to be treated as provoked of the person has not had a seizure before.	An unrestricted licence may be issued if the person is able to control equipment & has no or minimal neurological impairment. Annual review required for minimal impairment. If the person is able to control equipment despite slight neurological impairment, a road test must first be passed before licensing can occur. Annual review required. A restricted licence with speed &/or area restrictions, may be issued if the person has moderate dexterity impairment. Annual review required.	Desist from driving for 1 month minimum. Licence denied for any of the following sequelae of stroke: Homonymous hemianopia, ataxia, vertigo, diplopia, epilepsy, recurrent ischemic attacks & significant CVA disorders. Resume driving only when recovery is complete & there is no significant disability that will impair safe driving. Car modifications for any residual limb disability may be required.	Fitness to drive is assessed using the same criteria as that set down for CVA disease s.e. licence denial for any CVA disease that results in acute impairment of the cerebral functions involved in safe driving. Stroke assessment is also to make particular note of any transient ischemic attacks or other risk factors eg high blood pressure, high cholesterol, atrial fibrillation or vascular deformity. Other after effects of stroke such as paralysis, visual problems, or cognitive & consciousness disturbances are to be assessed using the standards set down under the appropriate disorder.

Source: Charlton 2010

Assessing Medical Fitness to Drive

- Require
  - Knowledge of reporting requirements in your jurisdiction
  - Knowledge of physical, cognitive and behavioral impairments that may affect driving
  - Ability to assess for impairments that may affect driving

Safe Drive Checklist: Risk Factors for Driving Problems

S afety Record	Obtain a history of driving problems from Department of Motor Vehicles
A ttention Skills	Look for lapses of consciousness or recurrent episodes of confusion
F amily Report	Ask family members about their observations of patient's driving ability
E thanol	Screen for alcohol abuse
D rugs	Conduct a medication review, checking for sedating or anticholinergic drugs
R eaction Time	Check for neurologic /musculoskeletal disorders that may slow reactions
I ntellectual Impairment	Conduct a Mini-Mental State Examinatiom (see Forms F1, F2)
V ision/visuospatial function	Test for visual activity
E xecutive functions	Check ability to plan and sequence activities and self-monitor behaviours

Wiseman EJ, Souder E. The Older Driver: A handy tool to assess competence behind the wheel. Geriatrics 1996;51:36-45

INFORMATION FOR PHYSICIANS

DRIVER'S CHECKLIST

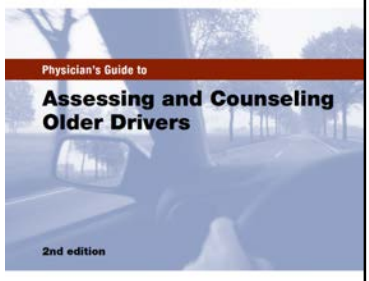
10 QUESTIONS TO ASK THE PATIENT

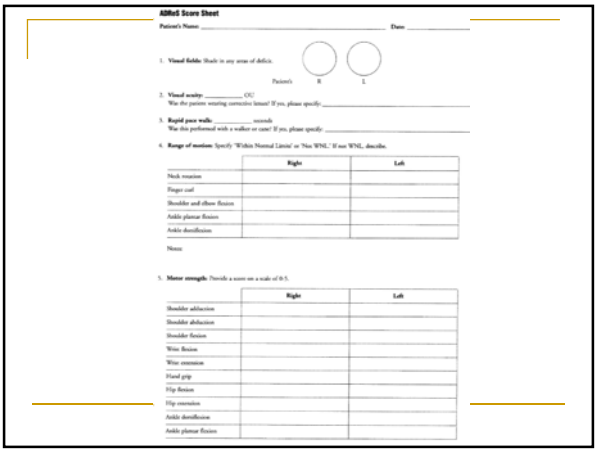
	YES	NO
1. Have you noticed any change in your driving skills?	☐	☐
2. Do others honk at you or show signs of irritation?	☐	☐
3. Have you lost any confidence in your overall driving ability, leading you to drive less often or only in good weather?	☐	☐
4. Have you ever become lost while driving?	☐	☐
5. Have you ever forgotten where you were going?	☐	☐
6. Do you think that at present you are an unsafe driver?	☐	☐
7. Have you had any car accidents in the last year?	☐	☐
8. Any minor fender-benders with other cars in parking lots?	☐	☐
9. Have you received any traffic citations for speeding, going too slow, improper turns, failure to stop, etc.?	☐	☐
10. Have others criticised your driving or refused to drive with you?	☐	☐

Information for Physicians: Driver's Checklist

	Yes	No
10 QUESTIONS TO ASK THE FAMILY		
1. Do you feel uncomfortable in any way driving with the patient?	☐	☐
2. Have you noted any abnormal or unsafe driving behaviour?	☐	☐
3. Has the patient had any recent crashes?	☐	☐
4. Has the patient had near-misses that could be attributed to mental or physical decline?	☐	☐
5. Has the patient received any tickets or traffic violations?	☐	☐
6. Are other drivers forced to drive defensively to accommodate the patient's errors in judgement?	☐	☐
7. Have there been any occasions where the patient has gotten lost or experienced navigational confusion?	☐	☐
8. Does the person need many cues or directions from passengers?	☐	☐
9. Does the patient need a co-pilot to alert them of potentially hazardous events or conditions?	☐	☐
10. Have others commented on the patient's unsafe driving?	☐	☐

AMA Guide




ADMoS Score Sheet

Patient's Name: _____ Date: _____

1. **Visual fields:** Shade in any areas of deficit.

Patient's R L

2. **Visual acuity:** _____ OU
Was the patient wearing corrective lenses? If yes, please specify: _____

3. **Rapid pace walk:** _____ seconds
Was this performed with a walker or cane? If yes, please specify: _____

4. **Range of motion:** Specify "Within Normal Limits" or "Not WNL." If not WNL, describe.

	Right	Left
Neck rotation		
Finger curl		
Shoulder and elbow flexion		
Ankle plantar flexion		
Ankle dorsiflexion		

Notes:

5. **Motor strength:** Provide a score on a scale of 0-5.

	Right	Left
Shoulder adduction		
Shoulder abduction		
Shoulder flexion		
Wrist flexion		
Wrist extension		
Hand grip		
Hip flexion		
Hip extension		
Ankle dorsiflexion		
Ankle plantar flexion		

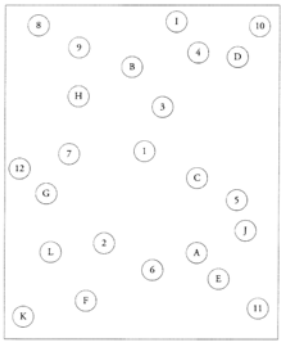
6. **Trail-Making Test, Part B:** _____ seconds

7. **Clock drawing test:** Please check 'yes' or 'no' to the following criteria.

	Yes	No
All 12 hours are placed in correct numeric order, starting with 12 at the top		
Only the numbers 1-12 are included (no duplicates, omissions, or foreign marks)		
The numbers are drawn inside the clock circle		
The numbers are spaced equally or nearly equally from each other		
The numbers are spaced equally or nearly equally from the edge of the circle		
One clock hand correctly points to two o'clock		
The other hand correctly points to eleven o'clock		
There are only two clock hands		

Trail-Making Test, Part B

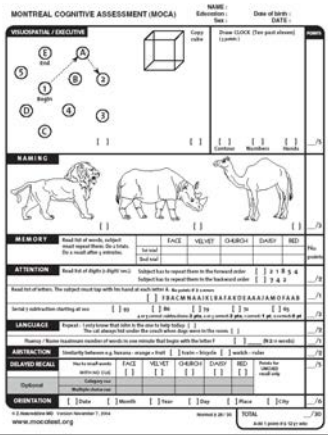
Patient's Name: _____ Date: _____



Trails Test Part B
"3 or 3 Rule"

3 Errors or 3 Minutes to complete

Roy M, Molnar F. Systematic review of the evidence for Trails B cut-off scores in assessing fitness to drive. Can Geriatr J. 2013; 16(3): 120–142



Management

- After Screening there are 3 Possibilities
  - Patient is not fit to drive
  - Patient is fit to drive
  - Patient may be unfit to drive- further assessment required

Patient Not Fit to Drive

- Discuss concerns with patient and family
  - remain firm in instructions not to drive
  - communicate in writing your legal obligations and intent to notify government authority
  - Explain concern of safety for patient and others
  - Explore other transportation options
  - Encourage family to remove opportunity to drive if non-compliant
  - Do not argue - may have limited insight

Patient Medically Fit to Drive

- Consider compensatory driving strategies- if appropriate
  - Driving only familiar routes
  - Driving slowly
  - Not driving at night
  - Not using the radio in the vehicle (distraction)
  - Avoid busy intersections
  - 55 Alive course
  - Avoid expressways
  - Avoid rush hour traffic
  - Avoid poor weather conditions

Further Assessment Required

- Referral for Specialized Driving Assessment
- Notify jurisdictional authorities as per provincial reporting requirements

Specialized Driving Assessment

- Cognitive and Visuo-spatial Screening tests
  - can rule out the more obviously impaired
- Driving Simulator Evaluation
  - Not acceptable for ultimately determining fitness to drive, but can give insight to the evaluator for the on-road assessment
- On-Road Assessment OT and Driving Instructor
  - Gold Standard

Outcomes of Assessment

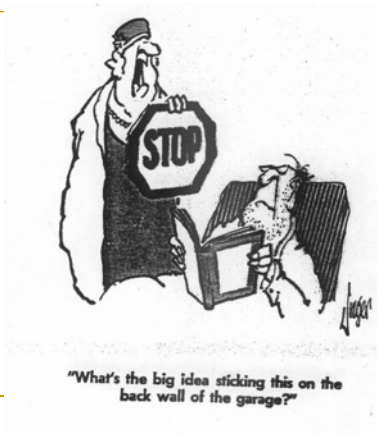
- Pass/ Fail
- Further Training Recommended
- Follow-up required for chronic degenerative conditions in addition to stroke
- Require physical modifications to vehicle
  - eg. hand controls, steering knob
- Restricted License
  - available in some provinces
  - Not Ontario

Summary

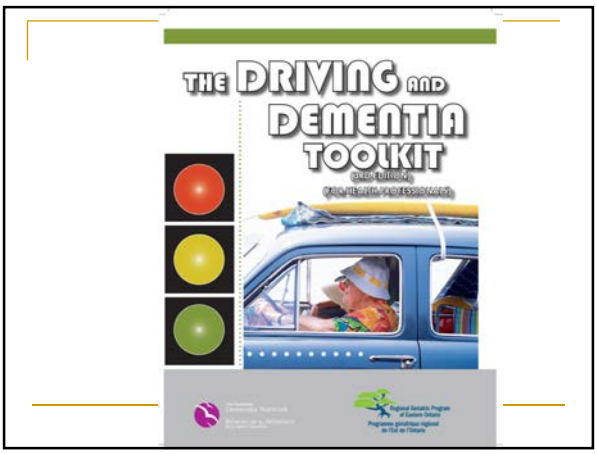
- Medical conditions can affect the ability to drive
- Driving Assessment must be approached from a functional perspective
- Driving is important for all patients

Resources

- Driving and Dementia Tool Kit for Family Physicians (Dementia Network of Ottawa-Carleton) http://www.champlaindementianetwork.org/uploads/Resources/kitjune09.pdf
- CanDRIVE www.candrive.ca
- Canadian Medical Association. (2012); CMA Driver's Guide: Determining Medical Fitness to Operate Motor Vehicles, 8th ed. http://www.cma.ca/multimedia/CMA/pdf/CMA-Drivers-Guide-8th-edition-e.pdf
- American Medical Association Guide www.nhtsa.gov/staticfiles/nti/older_drivers/pdf/811298.pdf
- Charlton JL, Koppel S, Odell M, Devlin A, Langford J, O'Hare M, Kopinathan C, Andrea D, Smith G, Khodr B, et al. Influence of chronic illness on crash involvement of motor vehicle drivers: 2nd edition. Victoria, Australia: Monash University Accident Research Centre; 2010. Report nr 300 http://test-www.monash.edu/miri/research/reports/muarc300.pdf



"What's the big idea sticking this on the back wall of the garage?"


THE DRIVING AND DEMENTIA TOOLKIT