

Navigating Post-Stroke Driving: Assessments, Timelines, and Recommendations

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Conflicts of Interest

- No conflicts of interest to declare



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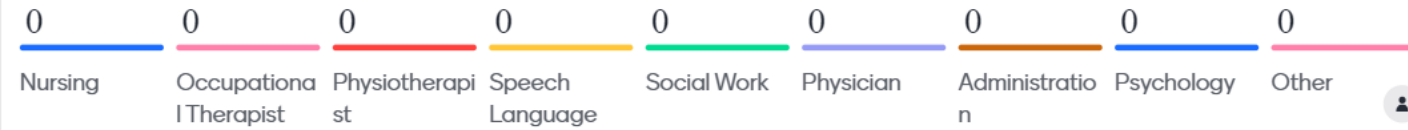
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What is your profession



Objectives

- ▶ At the end of this session you will be able to:
 1. Review current stroke best practice guidelines related to driving following a stroke.
 2. Review the factors influencing driving ability post-stroke, including physical, cognitive, and visual impairments and medication side effects.
 3. Discuss strategies for communicating sensitive information about driving restrictions or cessation to persons with stroke and their families, emphasizing empathy, support, and alternative transportation options.

Driving After Stroke

- ▶ [Driving After a Stroke \(youtube.com\)](#)

Physical and Cognitive Requirements for Driving

- ▶ Vision:
 - ▶ 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

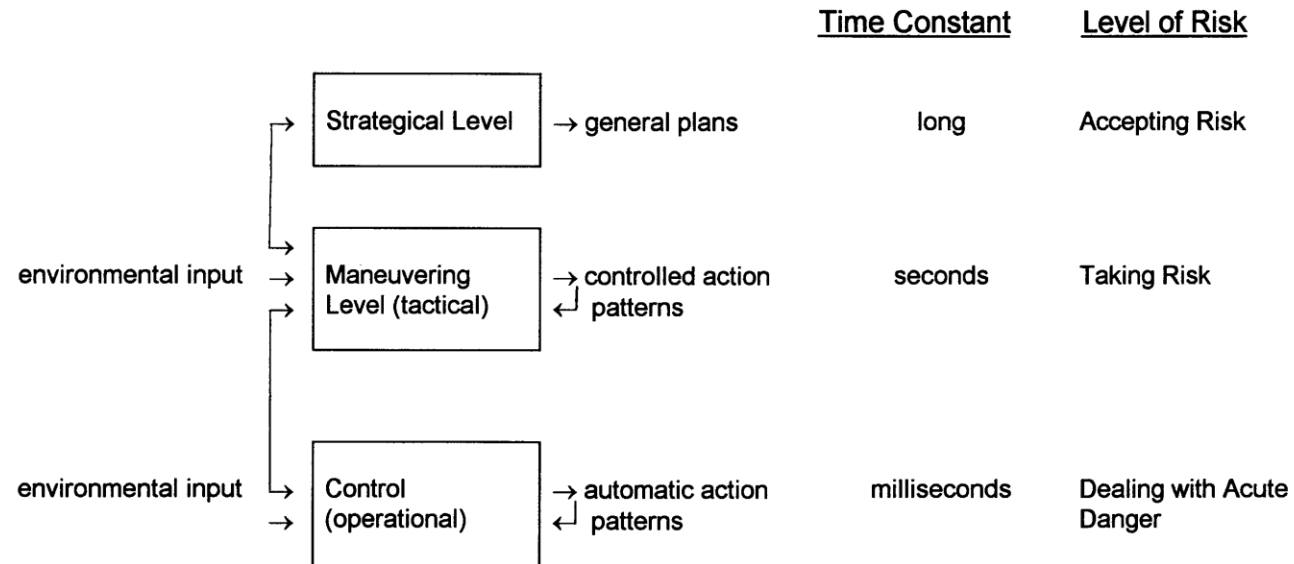
Physical and Cognitive Requirements for Driving

- ▶ 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



How Do Medical Conditions Affect Driving Ability?

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

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

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What medical condition has the highest risk for driving?



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.

Driving Risk Post Stroke

- ▶ A systematic review of the risk of motor vehicle collision after stroke or transient ischemic attack
 - ▶ 3 case-control studies showed an association between stroke and MVC (OR 1.9, 95% CI 1.0-3.9)
 - ▶ Of five cohort reports, only one study, limited to self-report, found an increased risk of MVC associated with stroke or TIA (RR 2.71, 95% CI 1.11-6.61)
 - ▶ Two of four cross-sectional studies using computerized driving simulators identified a more than two-fold risk of MVCs among participants with stroke compared with controls

Rapoport MJ, Plonka SC, Finestone H, Bayley M, Chee JN, Vrkljan B, Koppel S, Linkewich E, Charlton JL, Marshall S, delCampo M, Boulos MI, Swartz RH, Bhangu J, Saposnik G, Comay J, Dow J, Ayotte D, O'Neill D. [A systematic review of the risk of motor vehicle collision after stroke or transient ischemic attack.] TOP. STROKE REHABIL. [Internet]. 2019

Driving Risk Post Stroke

- ▶ Lodha N, Patel P, Shad JM, Casamento-Moran A, Christou EA. Cognitive and motor deficits contribute to longer braking time in stroke. J Neuroeng Rehabil. 2021 Jan 13;18(1):7. doi: 10.1186/s12984-020-00802-2. PMID: 33436005; PMCID: PMC7805062.
- ▶ Groeger JA, Murphy G. Driving and cognitive function in people with stroke and healthy age-matched controls. Neuropsychol Rehabil. 2022 Jul;32(6):1075-1098. doi: 10.1080/09602011.2020.1869566. Epub 2
- ▶ Marshall1997AttentionalDI, title={Attentional deficits in stroke patients: a visual dual task experiment.}, author={Shawn Marshall and Diana Grinnell and Brian Heisel and Anthony Newall and Lynn Hunt}, journal={Archives of physical medicine and rehabilitation}, year={1997}, volume={78 1}, pages={ 7-12 }

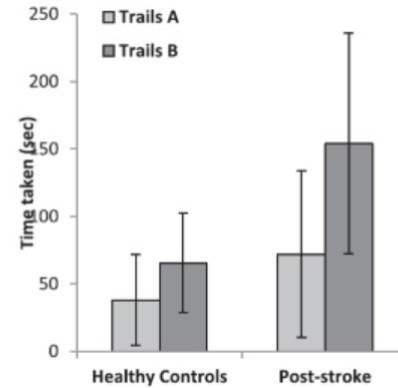


Figure 2. Mean (SD) time taken to complete Trails A and B in post-stroke drivers and healthy controls.

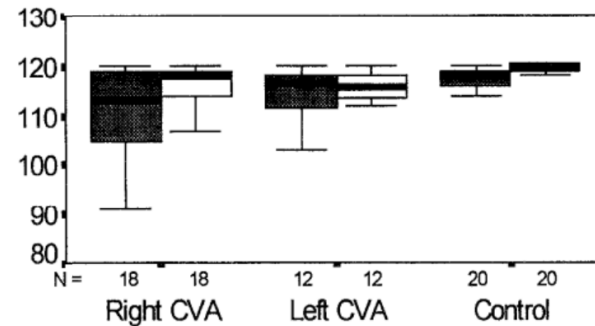


Fig 3. Comparison of dual (■) and single (□) task total correct response by group.



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.

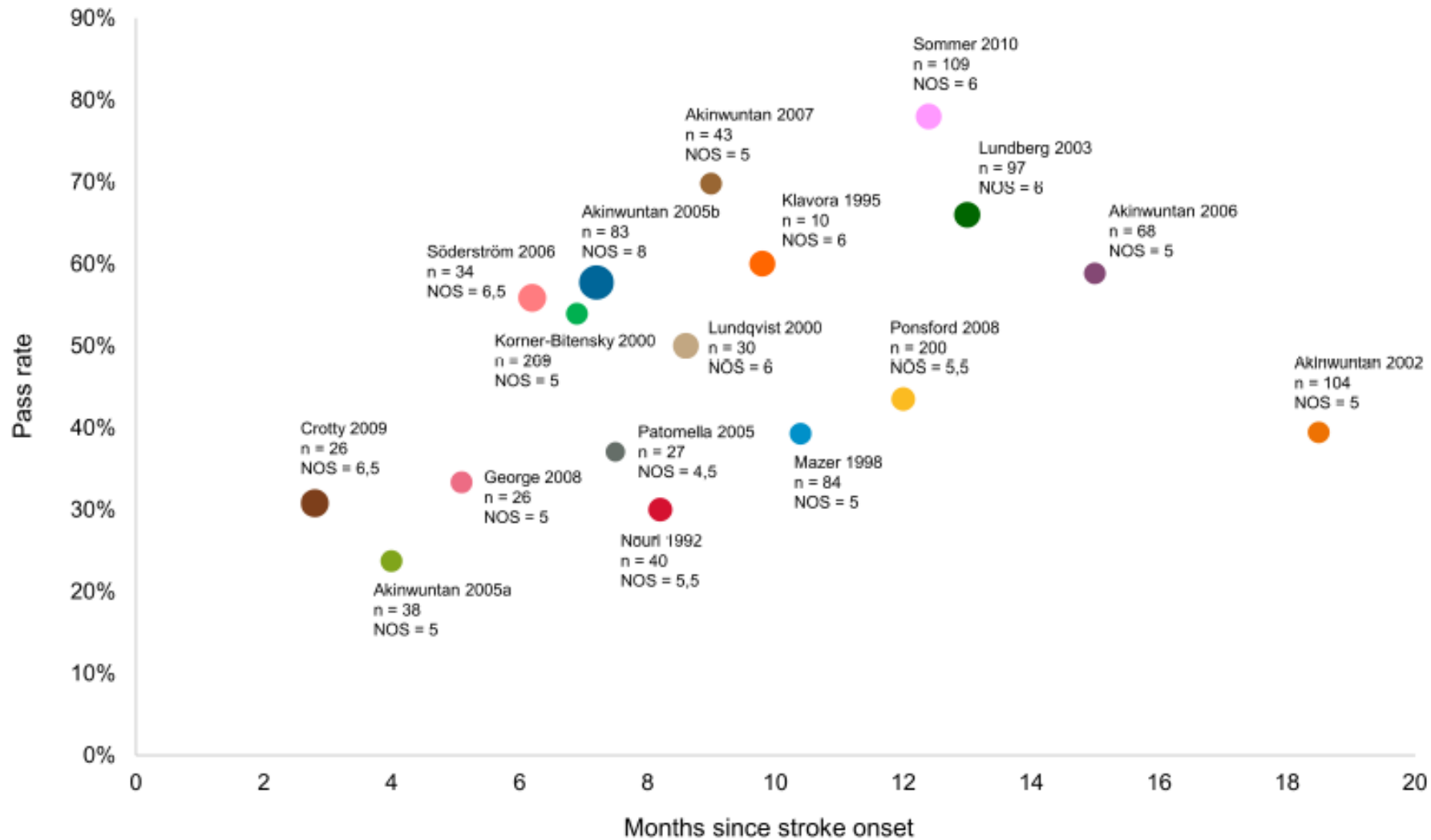
Return to Driving Post Stroke

TABLE 1 Sample characteristics of the 17 studies that were included in reanalysis (compare Devos et al., 2011). In empty fields, the respective information was not available

First Author	Year	N	Sex (f/m)	Age (M)	Age (SD)	Age range	Time since stroke (months)	Pass rate (%)	Fail rate (%)	Quality (NOS)
Sommer	2010	109	21/88	51.4	8.9	24–68	12.4	78.0	22.0	6,0
Crotty	2009	26	2/24	65.6	13.1		2.8	30.8	69.2	6,5
George	2008	26	2/24	65.6	13.2		5.1	33.3	66.7	5,0
Ponsford	2008	200	48/152	62.0		16–85	12.0	43.5	56.5	5,5
Akinwuntan	2007	43	4/39	55.0	12.0		9.0	69.8	30.2	5,0
Akinwuntan	2006	68	11/57	53.0	13.0		15.0	58.8	41.2	5,0
Söderström	2006	34	2/32	54.0	8.8	28–67	6.2	55.9	44.1	6,5
Akinwuntan	2005b	83	18/65	54.0	12.0		7.2	57.7	42.3	8,0
Akinwuntan	2005a	38	7/31	53.9	128.0	24–73	4.0	23.7	76.3	5,0
Patomella	2005	27	3/24	57.5	8.0	30–70	7.5	37.0	63.0	4,5
Lundberg	2003	97	10/87	63.0	12.5	29–85	13.0	66.0	34.0	6,0
Akinwuntan	2002	104	22/82	56.8	11.9	30–79	18.5	39.4	60.6	5,0
Korner-Bitensky	2000	269	54/215	63.6	12.5		6.9	53.9	46.1	5,0
Lundquist	2000	30	9/21	68.3	4.8	60–75	8.6	50.0	50.0	6,0
Mazer	1998	84	21/63	60.8	11.9	27–84	10.4	39.3	60.7	5,0
Klavora	1995	10	2/8	63.1	8.9	46–73	9.8	60.0	40.0	6,0
Nouri	1992	40	4/36	61.1	141.0	37–79	8.2	30.0	70.0	5,5

Abbreviations: f, female; M, mean; m, male; N, number of participants; NOS, Newcastle-Ottawa Scale (range 0–9 with 9 representing the highest quality); SD, standard deviation.

Return to Driving Post Stroke



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When is it recommended to return to driving Post Stroke in Canada?



Table 7 Private licensing guidelines for drivers with CVA

Disorder	Canada	Australia	U K	USA	NZ	Sweden
	<i>CCMTA (2009)</i>	<i>Austroroads (2006)</i>	<i>Drivers Medical Group, Swansea (2008)</i>	<i>Utah Driver License Division (2006)</i>	<i>Land Transport Safety Authority (2002)</i>	<i>Swedish Road Administration (1999)</i>
Stroke	<p>Desist from driving for 1 month minimum.</p> <p>Driving may resume if:</p> <ol style="list-style-type: none"> 1. Person has functional ability to drive a vehicle (no clinically significant motor, cognitive, perceptual or visual deficits); 2. No risk of recurrence found in neurological assessment and post stroke seizure has not occurred in interim; 3. Any underlying cause has been treated. <p>Person may be required to undergo a road test if there is any "residual loss of motor power" (p43).</p> <p>Any changes in personality, alertness or decision-making</p>	<p>An unconditional licence may not be held if the person has had a stroke.</p> <p>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.</p> <p>Periodic review required.</p>	<p>Desist from driving for 1 month.</p> <p>Driving may resume if there is a satisfactory recovery.</p> <p>DVLA notification required if residual neurological impairment remains 1 month after the stroke, especially visual field & cognitive defects & limb disabilities.</p> <p>Car modifications may be required for severe physical impairments.</p> <p>A driver experiencing multiple TIAs may require at least a period of 3 months without attacks before driving.</p> <p>Epileptic seizures that occur within 24 hours of a stroke are</p>	<p>An unrestricted licence may be issued if the person is able to control equipment & has no, minimal or slight neurological impairment.</p> <p>A medical report and regular review is required for minimal to slight impairment.</p> <p>If the person has moderate impairment of dexterity, a road and driving skills test must first be passed before licensing can occur. Annual review is required.</p> <p>Greater restrictions (speed/area/time of day/must be accompanied by licensed driver) are imposed if there is <i>temporary</i> significant neurological impairment.</p>	<p>Desist from driving for 1 month minimum.</p> <p>Licence denial for any of the following sequelae of stroke:</p> <p>Homonymous hemianopia, ataxia, vertigo, diplopia, epilepsy, recurrent ischaemic attacks & significant CVA disorders.</p> <p>Resume driving only when recovery is complete & there is no significant disability that will impair safe driving.</p> <p>Car modifications for any residual limb disability may be</p>	<p>Fitness to drive is assessed using the same criteria as that set down for CVA disease i.e. licence denial for any CVA disease that results in acute impairment of the cerebral functions involved in safe driving.</p> <p>Stroke assessment is also to make particular note of any transient ischaemic attacks or other risk factors eg high blood pressure, high cholesterol, atrial fibrillation or vascular deformity.</p> <p>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.</p>

Health Care Provider Knowledge

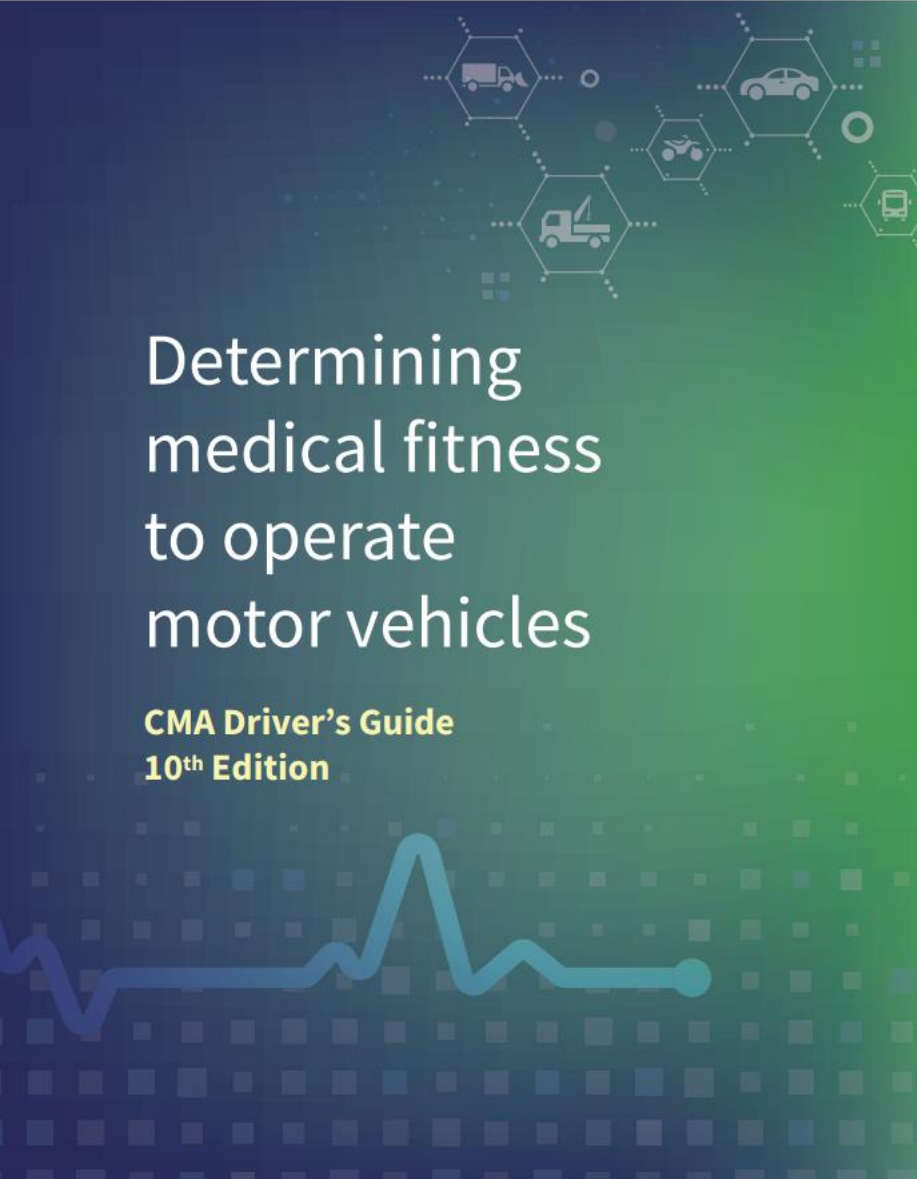
- ▶ Australian study (Frith et al)
 - ▶ 22% of health professionals correctly identified timeline for return to driving post stroke (45 %OT respondents)
- ▶ Physician prediction of driving ability post stroke vs on road assessment
 - ▶ Physicians over predicted ability- agreement of 73 %
- ▶ Sweden (Mårdh et al)
 - ▶ 81% of stroke patient records have no documentation in relation to driving
- ▶ Australia return to driving post stroke
 - ▶ 1 in 4 drivers age 18-65 return to driving post stroke with in 1 month (not allowed)

Frith J, James C, Hubbard I, Warren-Forward H. Australian health professionals' perceptions about the management of return to driving early after stroke: A mixed methods study. *Topics in Stroke Rehabilitation*. 2021 Apr;28(3):198-206. DOI: 10.1080/10749357.2020.1803570. PMID: 32787668.

Ranchet M, Akinwuntan AE, Tant M, Salch A, Neal E, Devos H. Fitness-to-drive agreements after stroke: medical versus practical recommendations. *Eur J Neurol*. 2016 Sep;23(9):1408-14. doi: 10.1111/ene.13050. Epub 2016 May 21. PMID: 27207381.

Mårdh S, Mårdh P, Anund A. Driving restrictions post-stroke: Physicians' compliance with regulations. *Traffic Inj Prev*. 2017 Jul 4;18(5):477-480. doi: 10.1080/15389588.2016.1265954. Epub 2016 Nov 30. PMID: 27901591.

Yu S, Muhunthan J, Lindley R, Glozier N, Jan S, Anderson C, Li Q, Hackett ML. Driving in stroke survivors aged 18-65 years: The Psychosocial Outcomes In Stroke (POISE) Cohort Study. *Int J Stroke*. 2016 Oct;11(7):799-806. doi: 10.1177/1747493016641952. Epub 2016 Mar 25. PMID: 27016514.



Determining medical fitness to operate motor vehicles

CMA Driver's Guide
10th Edition

[CMA-Drivers-Guide-10th-
edition-English-2.pdf](#)
[\(driversguide.ca\)](#)

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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 ophthalmologist
 - ▶ Monitoring
 - ▶ While stroke is an acute event, possibility of gradual decline due to conditions such as microvascular disease or multi-infarct dementia

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What screening test is the best predictor for return to driving post stroke?

transpiration
leader
bold
creative
focus
fast
inspiration



Return to Driving Post Stroke- Predictors

- ▶ Systematic Review predictors for return to driving (Marshall et al 2007)
 - ▶ Trails A and B
 - ▶ Rey-Ostereith Complex Figure
 - ▶ Useful Field of View
- ▶ Devos Meta-analysis (2011) predictors
 - ▶ Road Sign Recognition Test (84%)
 - ▶ Compass test (85%)
 - ▶ Trail Making Test Part B (80%)
 - ▶ Cut point 90 seconds
- ▶ Predictors of Return to Driving After Stroke(Aufman 2013)
 - ▶ Less likely to return if:
 - ▶ Lower FIM cognition scores at Admission to Rehab
 - ▶ Lower Extremity Motricity index scores

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.

Devos H, Akinwuntan AE, Nieuwboer A, Truijen S, Tant M, De Weerd W. Screening for fitness to drive after stroke: a systematic review and meta-analysis. *Neurology*. 2011 Feb 22;76(8):747-56. doi: 10.1212/WNL.0b013e31820d6300. PMID: 21339502.

Aufman EL, Bland MD, Barco PP, Carr DB, Lang CE. Predictors of return to driving after stroke. *Am J Phys Med Rehabil*. 2013 Jul;92(7):627-34. doi: 10.1097/PHM.0b013e318282bc0d. PMID: 23370577; PMCID: PMC3689872.

Return to Driving Post Stroke

- ▶ Simulator vs cognitive training RCT post stroke
 - ▶ Higher return to driving in simulator group
- ▶ Rehabilitation for Improving Automobile Driving After Stroke (Cochrane Review Crotty 2014)
 - ▶ Insufficient evidence to reach conclusions about the use of rehabilitation to improve on-road driving skills after stroke
 - ▶ Limited evidence driving simulator may assist in improving visuocognitive abilities

Devos H, Akinwuntan AE, Nieuwboer A, Ringoot I, Van Berghen K, Tant M, Kiekens C, De Weerd W. Effect of simulator training on fitness-to-drive after stroke: a 5-year follow-up of a randomized controlled trial. *Neurorehabil Neural Repair*. 2010 Nov-Dec;24(9):843-50. doi: 10.1177/1545968310368687. Epub 2010 Jul 23. PMID: 20656965.

George S, Crotty M, Gelinis I, Devos H. Rehabilitation for improving automobile driving after stroke. *Cochrane Database Syst Rev*. 2014 Feb 25;2014(2):CD008357. doi: 10.1002/14651858.CD008357.pub2. PMID: 24567028; PMCID: PMC6464773.

Assessing Medical Fitness to Drive Post Stroke

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

Table 2. SAFE DRIVE checklist: *If concerns are noted in any of these areas, referral to a specialized centre is recommended.*

S AFETY RECORD	History of driving problems: obtain 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 observations of 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 or musculoskeletal disorders that could slow reactions
I NTELLECTUAL IMPAIRMENT	Conduct a Mini-Mental State Examination
V ISION AND VISUOSPATIAL FUNCTION	Test for visual acuity
E XECUTIVE FUNCTIONS	Check ability to plan and sequence activities and self-monitor behaviours

Adapted with permission from Wiseman and Souder.²³

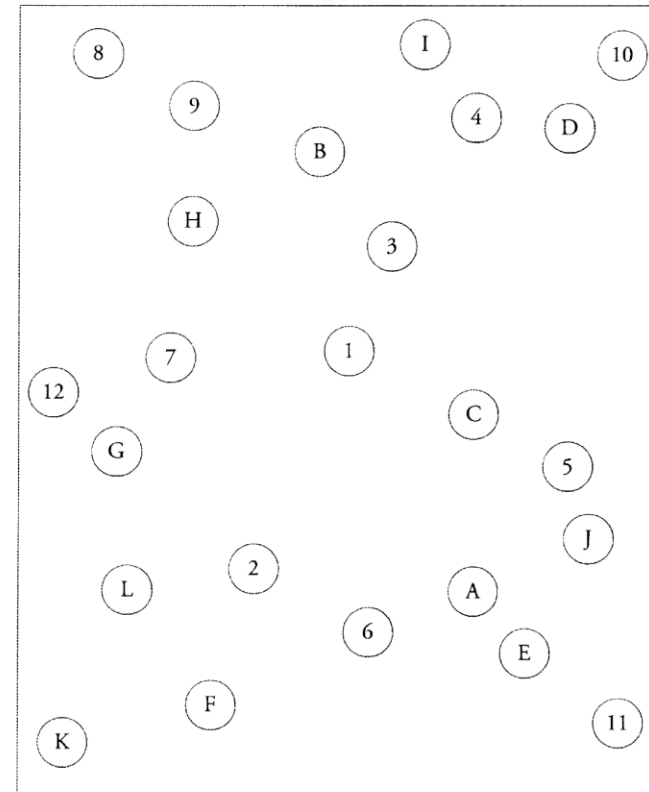
Trail Making Test Part B

Table 2. Results from UFOV subtests and total score, TMT a and TMT B by age groups (mean, SD, median, percentiles).

	Age groups				P	H
	20-39 years (n = 107)	40-59 years (n = 139)	60-69 years (n = 89)	≥70 years (n = 75)		
UFOV 1					0.001	14.4
Mean	15.69	15.88	15.88	25.27		
SD	2.73	2.8	2.02	24.73		
Median	14.8	14.8	15.7	16		
10%-90%	14-18.2	14-19	14.8-17	14.8-50		
UFOV 2					<0.001	37.6
Mean	17.45	20.72	35.62	95.06		
SD	9.24	20.28	46.37	95.48		
Median	14.9	15	18.3	61.5		
10%-90%	14-23	14-27	14.8-66	16-248		
UFOV 3					<0.001	119.4
Mean	40.25	64.16	124.67	238		
SD	30.04	35.56	78.17	120.15		
Median	31.8	55	103	220		
10%-90%	15-63	24-112	51-220	96-399		
UFOV, total					<0.001	120.7
Mean	73.35	100.77	177.39	358.33		
SD	35.08	48.63	104.84	205.04		
Median	64.5	92.4	138.4	305		
10%-90%	44.5-107.2	56-151	80-299	140.7-701		
TMT A, time					<0.001	37.3
Mean	23	26.4	32.3	39.6		
SD	6.5	8.6	11.4	12.8		
Median	22	25	29	37		
10%-90%	15.4-32	17-37	21.6-50	26-60		
TMT B, time					<0.001	32.2
Mean	55.2	57	75.1	97.9		
SD	21.6	21.1	29.5	41.6		
Median	52	55	70	90		
10%-90%	35-82	36-85	45.5-118	53-141		
NorSDSA, total score					<0.001	39.1
Mean	3.11	3.09	2.51	1.59		
SD	0.74	0.62	0.76	1.09		
Median	3.26	3.15	2.65	1.56		
10%-90%	2.2-3.8	2.25-3.77	1.53-3.46	0.32-2.81		

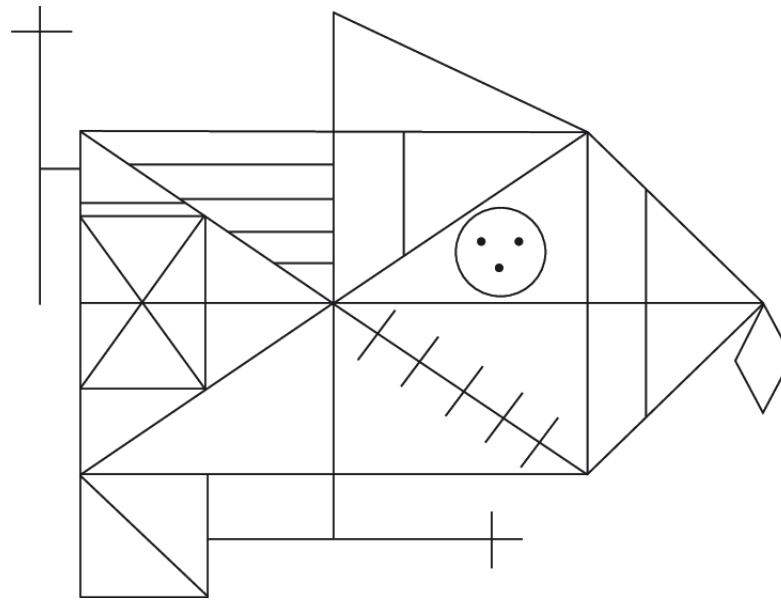
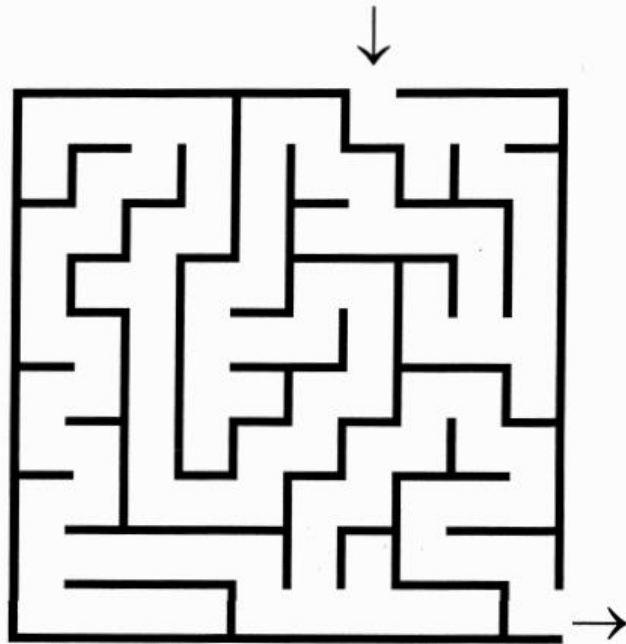
Trail-Making Test, Part B

Patient's Name: _____ Date: _____



Maze Test; Rey Osterieith Complex Figure

MAZE TASK[®]



Date: _____
Patient name: _____
Task completed: _____ (yes / no)
Time to complete task: _____ (seconds)
Number of errors: _____

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
- ▶ Require physical modifications to vehicle
 - ▶ eg. hand controls, steering knob
- ▶ Restricted License
 - ▶ available in some provinces

Patient Resources

Driving After a Stroke in Ontario Information for me and my family



Driving is a means of independence that is important to many people. A stroke can cause changes that make it unsafe to drive. About half of those who have had a stroke will return to driving¹. People recover from a stroke at different rates.

Key points

I am not to drive for at least one month after my stroke **and** I need to wait until my doctor/nurse practitioner says I am safe.

I need to discuss driving with my doctor/nurse practitioner **before** resuming driving to make sure that it is safe for me to drive.

After one month I **may** be able to drive again, as long as my doctor/nurse practitioner agrees it is safe for me to do so.

Can I drive one month after having a stroke in Ontario?

In Ontario, my doctor/nurse practitioner **may** report to the Ministry of Transportation (MTO) that I have had a stroke. This is because it might be dangerous for me to drive a vehicle (such as a car, truck, tractor, etc.).

The rules in Ontario are:

- My doctor/nurse practitioner must assess my readiness to drive.
- My readiness to drive must be re-evaluated after the one month period.

If the doctor/nurse practitioner is unsure whether I am ready to drive, he or she may tell me to go to a special driving centre for more tests.

It is illegal to drive with a suspended licence

1. Devos, H, Akinwuntan, A E, Nieuwboer, A, Truijten, S, Tent, M, De Waardt, W (2011). Screening for fitness to drive after stroke: a systematic review and meta-analysis. *Neurology*, 76(8).



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ORGANIZATION NEWS

Information/Education Page

Driving After Mild Stroke



In the U.S., over 305,000 people have a mild stroke each year.¹ Even mild stroke may lead to difficulties with physical function, thinking, and vision.² Because of these challenges, people with mild stroke can complete basic tasks fairly easily, but may have difficulty returning to complex tasks like driving.² Approximately 1 out of every 5 adults with mild stroke report difficulty with driving.³

This handout provides a checklist, which will help someone who has had a mild stroke and wishes to resume driving do so safely. This handout can also provide guidance on what to do to address concerns about safe driving.

- Do you have difficulty pushing the gas and brake pedal?
- Do you stop too quickly?
- Do you have difficulty shifting the gear in a car with manual transmission?

When can I return to driving after a mild stroke?

- Each state has its own requirements for returning to driving after a stroke that involves considerations of vision, seizures, and retesting standards.
- You should not drive for 1 month following your stroke.⁴
- You should talk to your doctor about driving after a mild stroke.
- Your doctor may refer you to other health care providers for a driving evaluation.

How do I know if I can drive safely?

Review the checklist below. If you answer yes to any of the following questions you may be unsafe to drive.

Medical issues

- Has it been less than 1 month since your stroke?
- Have you had a seizure in the past 6 months?
- Do you take any single or combination of pills that can cause drowsiness?
- Are your physician, family, or friends concerned about your driving?

Difficulty moving arms or legs

- Do you have difficulty turning the steering wheel?
- Do you veer out of your lane?

Disclosure: none

Difficulty thinking

- Do you have difficulty making quick decisions?
- Do you have difficulty multitasking or doing more than one thing at a time?
- Do you have difficulty driving while talking to other people in the car or listening to the radio?
- Do you drive too fast or too slow?
- Do you have difficulty turning or changing lanes?
- Do you forget where you are going?
- Do you notice changes in the route at the last minute?
- Do you have difficulty following GPS directions?
- Do you get lost along familiar routes?

Difficulty seeing

- Do you have blurred vision or difficulty reading street signs while driving?
- Do you have double vision while driving?
- Do you sometimes miss road signs and traffic lights?
- Do other cars seem to come out of nowhere?
- Do you have difficulty judging the distance between you and another car?
- Do you have difficulty driving at night?
- Do you have difficulty seeing the lines on the road or noticing curbs?
- Do you get dizzy when you move your head to check blind spots?
- Do you have difficulty focusing on something near (checking speed) and then focusing on something in the distance (checking road signs)?
- Does glare from the hood or headlights bother you when driving?

Authorship

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Summary

- ▶ Stroke does affect the ability to drive
- ▶ Driving Assessment post stroke must be approached from a functional perspective
- ▶ Driving is important for all patients and assessment should be aimed at facilitating return to driving if possible.

Questions? Thank you

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Questions?

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References

- ▶ Rapoport MJ, Plonka SC, Finestone H, Bayley M, Chee JN, Vrkljan B, Koppel S, Linkewich E, Charlton JL, Marshall S, delCampo M, Boulos MI, Swartz RH, Bhangu J, Saposnik G, Comay J, Dow J, Ayotte D, O'Neill D. [A systematic review of the risk of motor vehicle collision after stroke or transient ischemic attack.] TOP. STROKE REHABIL. [Internet]. 2019
- ▶ 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.
- ▶ Devos H, Akinwuntan AE, Nieuwboer A, Truijzen S, Tant M, De Weerd W. Screening for fitness to drive after stroke: a systematic review and meta-analysis. Neurology. 2011 Feb 22;76(8):747-56. doi: 10.1212/WNL.0b013e31820d6300. PMID: 21339502.
- ▶ Aufman EL, Bland MD, Barco PP, Carr DB, Lang CE. Predictors of return to driving after stroke. Am J Phys Med Rehabil. 2013 Jul;92(7):627-34. doi: 10.1097/PHM.0b013e318282bc0d. PMID: 23370577; PMCID: PMC3689872.
- ▶ Lodha N, Patel P, Shad JM, Casamento-Moran A, Christou EA. Cognitive and motor deficits contribute to longer braking time in stroke. J Neuroeng Rehabil. 2021 Jan 13;18(1):7. doi: 10.1186/s12984-020-00802-2. PMID: 33436005; PMCID: PMC7805062.
- ▶ Groeger JA, Murphy G. Driving and cognitive function in people with stroke and healthy age-matched controls. Neuropsychol Rehabil. 2022 Jul;32(6):1075-1098. doi: 10.1080/09602011.2020.1869566. Epub 2
- ▶ Marshall1997AttentionalDI, title={Attentional deficits in stroke patients: a visual dual task experiment.}, author={Shawn Marshall and Diana Grinnell and Brian Heisel and Anthony Newall and Lynn Hunt}, journal={Archives of physical medicine and rehabilitation}, year={1997}, volume={78 1}, pages={ 7-12 }
- ▶ Schulz, P., Schaebitz, W.-R., Driessen, M., Beblo, T. and Toepper, M. (2022), Recovery of driving fitness after stroke: A matter of time?. J Am Geriatr Soc, 70: 1578-1580. <https://doi.org/10.1111/jgs.17681>
- ▶ Frith J, James C, Hubbard I, Warren-Forward H. Australian health professionals' perceptions about the management of return to driving early after stroke: A mixed methods study. Topics in Stroke Rehabilitation. 2021 Apr;28(3):198-206. DOI: 10.1080/10749357.2020.1803570. PMID: 32787668.
- ▶ Ranchet M, Akinwuntan AE, Tant M, Salch A, Neal E, Devos H. Fitness-to-drive agreements after stroke: medical versus practical recommendations. Eur J Neurol. 2016 Sep;23(9):1408-14. doi: 10.1111/ene.13050. Epub 2016 May 21. PMID: 27207381.
- ▶ Mårdh S, Mårdh P, Anund A. Driving restrictions post-stroke: Physicians' compliance with regulations. Traffic Inj Prev. 2017 Jul 4;18(5):477-480. doi: 10.1080/15389588.2016.1265954. Epub 2016 Nov 30. PMID: 27901591.
- ▶ Yu S, Muhunthan J, Lindley R, Glozier N, Jan S, Anderson C, Li Q, Hackett ML. Driving in stroke survivors aged 18-65 years: The Psychosocial Outcomes In Stroke (POISE) Cohort Study. Int J Stroke. 2016 Oct;11(7):799-806. doi: 10.1177/1747493016641952. Epub 2016 Mar 25. PMID: 27016514.
- ▶ [CMA-Drivers-Guide-10th-edition-English-2.pdf \(driversguide.ca\)](#)

References

- ▶ Devos H, Akinwuntan AE, Nieuwboer A, Ringoot I, Van Berghen K, Tant M, Kiekens C, De Weerdt W. Effect of simulator training on fitness-to-drive after stroke: a 5-year follow-up of a randomized controlled trial. *Neurorehabil Neural Repair*. 2010 Nov-Dec;24(9):843-50. doi: 10.1177/1545968310368687. Epub 2010 Jul 23. PMID: 20656965.
- ▶ George S, Crotty M, Gelinas I, Devos H. Rehabilitation for improving automobile driving after stroke. *Cochrane Database Syst Rev*. 2014 Feb 25;2014(2):CD008357. doi: 10.1002/14651858.CD008357.pub2. PMID: 24567028; PMCID: PMC6464773.
- ▶ Driving After Mild Stroke. Devos H, Hong I, Frias A, Burns S, Schwartz J, Akinwuntan A *Archives of Physical Medicine & Rehabilitation*. 99(9):1935-1937, 2018 09. [Journal Article] UI: 30029768 Version ID
- ▶ [Driving_after_Stroke_Eng_2019.pdf \(crsn.ca\)](#)