# Table 5: Canadian Stroke Best Practice Recommendations Suggested Assessment Tools for Pre-Driving Screening

***Developed by the Toronto Rehabilitation Institute,UHN Driving best Practice Group and updated by D. Hebert, 2015 (D. Hebert et al, 2015)***

| Assessment/ Domain | Cut-Off Scores Correlated with Driving Risk/Return to Driving and Patient Populations | References |
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| **Dynavision**<br><br>Domain:<br>visual scanning, peripheral visual awareness, visual attention, visuomotor reaction time, execution of visuomotor response sequence, basic cognitive skills (short term memory), and physical and mental endurance | ○ There has been some evidence that visual-motor training using this tool can result in improvement of a client's on-road driving performance with the stroke population.<br>○ Limited data results indicate that safe drivers achieve approximately 52 or more hits on a 1 minute self-paced button Mode A task; 42 or more hits on a 60-second apparatus paced task; 200 or more hits on the 4-minute self-paced endurance (continuous) task; and 35 or more hits on the 1-minute apparatus-paced with 1-digit task.<br>○ A 4 minute endurance subtest with a cutoff of 195 correct responses over the 4 minute period from the Dynavision was superior to the CBDI in predicting success/failure in the on-road driving test (75%). | Klavora P, Gaskovski P, Martin K et al. The Effects of Dynavision Rehabilitation on Behind-the-Wheel Driving Ability and Selected Psychomotor Abilities of Persons After Stroke. *American Journal of Occupational Therapy*. 1995;49(6):534-542.<br><br>Klavora P, Gaskovsh P, Forsyth R. Test-Retest Reliability of Three Dynavision Tasks. *Perceptual and Motor Skills*. 1995;80(2):607-610.<br><br>Klavora P, Heslegrave R, Young M. Driving skills in elderly persons with stroke: Comparison of two new assessment options. *Archives of Physical Medicine and Rehabilitation*. 2000;81(6):701-705. |
| **Motor Free Visual Perceptual Test**<br><br>Domain:<br>overall visual perceptual ability-spatial relationships, visual discrimination, figure ground, visual closure, and visual memory. | The MVPT was designed and standardized for adults for the normal population and the brain-injured population.<br><br>It has norms for people aged 18-80.<br><br>This test provides a profile of basic visual perceptual skills needed to drive, as well as an indication of a client's speed of processing visual information, and has been correlated to driving performance for the stroke population.<br><br>Mazer, Korner-Bitensky & Sofer (1998)<br>○ MVPT (cut off, 30), positive predictive value 86.1%, negative predictive value 53.3%<br>○ MVPT and Trail Making B, poor performance on both tests 22 | Korner-Bitensky N, Mazer B, Sofer S et al. Visual Testing for Readiness to Drive After Stroke. *American Journal of Physical Medicine & Rehabilitation*. 2000;79(3):253-259.<br><br>Mazer B, Korner-Bitensky N, Sofer S. Predicting ability to drive after stroke. *Archives of Physical Medicine and Rehabilitation*. 1998;79(7):743-750. |

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| | times more likely to fail on-road evaluation<br>○ Predictive values varied by side of lesion, MVPT higher for right lesion, and Trail Making B higher for left lesion<br><br>Korner-Bitensky et al. (2000)<br>○ Lower predictive values for MVPT in multi-centre site, concluding it should not be used on own<br>○ Older, right hemisphere lesion and lower MVPT scores more likely to fail on-road test (regression analysis) | |
| **Trail Making Test**<br><br>Domain: Tests of visual conceptual and visuomotor tracking. | This test has been highly correlated with driving performance. Norms are available for persons aged 18-89 years, and it has been noted that scores decrease for individuals with advanced age or lower education levels.<br>Mazer, Korner-Bitensky & Sofer (1998)<br>○ Trail Making B (cut off, 3 errors or more), positive predictive value 85.2%, and negative value 48.1%<br>○ MVPT and Trail Making B, poor performance on both tests 22 times more likely to fail on-road evaluation<br>○ Predictive values varied by side of lesion, MVPT higher for right lesion, and Trail Making B higher for left lesion<br><br>Barco et al (2014) found Trail Making Test Part A and the Snellgrove Maze Task could predict the on-road performance of stroke clients.Alsaksen et al. found that Trailmaking Test Part A, CalCap Simple Reaction tie and the Grooved Pegboard were predictors of on-road performance with an overall classification accuracy of 82.1%. Cut of scores were Trail Making Test A, 46 s; CalCap, 395 ms; Grooved Pegboard, 97.5 s.<br><br>A U.S. government study suggested that a timed score of 100 seconds on the Trails B subtest would indicate a need for further testing of driving performance because it correlated with increased | Hopewell C. Driving Assessment Issues for Practicing Clinicians. *Journal of Head Trauma Rehabilitation*. 2002;17(1):48-61.<br><br>Tombaugh T. Trail Making Test A and B: Normative data stratified by age and education. *Archives of Clinical Neuropsychology*. 2004;19(2):203-214.<br><br>Mazer B, Korner-Bitensky N, Sofer S. Predicting ability to drive after stroke. *Archives of Physical Medicine and Rehabilitation*. 1998;79(7):743-750. (Please see this article for details regarding administering the Trail Making Test for Driving Ax purposes.)<br><br>Barco P, Wallendorf M, Snellgrove C, Ott B, Carr D. Predicting Road Test Performance in Drivers With Stroke. *American Journal of Occupational Therapy*. 2014;68(2):221-229.<br><br>Aslaksen P, Ørbo M, Elvestad R, Schäfer C, Anke A. Prediction of on-road driving ability after traumatic brain injury and stroke. *European Journal of Neurology*. 2013;20(9):1227-1233.<br><br>Pellerito J. *Driver Rehabilitation And Community* |

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| | crash risk. | *Mobility*. St. Louis, Mo.: Elsevier Mosby; 2006.<br><br>National Highway Traffic Safety Administration: model driver screening and evaluation program: final technical report. Volume 1: Project summary and model program recommendations (DOT HS 809 582), Washington, DC, 2003, U.S. Department of Transportation. |
| **Colour Trails Test** | Color Trails Test comparable to test above | Elkinfrankston S, Lebowitz B, Kapust L, Hollis A, Oconnor M. The use of the Color Trails Test in the assessment of driver competence: Preliminary report of a culture-fair instrument. *Archives of Clinical Neuropsychology*. 2007;22(5):631-635. |
| **Clock Drawing Test**<br><br>Domain:<br>Executive Function (planning/organization), memory, visual perceptual skills, visuo-spatial skills | Methods of administration and scoring of Clock Drawing Test can vary. See *AMA Physician's Guide to Assessing and Counseling Older Drivers* found in the Candrive website for 1 method (Freund Clock Scoring) of administering and scoring The Clock Drawing Test:<br><br>http://www.ama-assn.org/ama1/pub/upload/mm/433/phyguidechap3.pdf<br><br>Preliminary research indicates an association between specific scoring elements of the clock drawing test and poor driving performance. | American Medical Association. *AMA physician's guide to assessing and counseling older drivers.*<br><br>http://www.ama-assn.org/ama/pub/physician-resources/public-health/promoting-healthy-lifestyles/geriatric-health/older-driver-safety/assessing-counseling-older-drivers.shtml |
| **Snellen Eye Chart BIVABA**<br><br>Domain:<br>Visual Acuity, Visual Field, Visual Attention | **Ministry of Transportation of Ontario Standards**<br><br>**Visual Acuity –** Effective May 29/05<br><br>Class of License:<br><br>G and H – a vision acuity not poorer than 20/50 with both eyes open and examined together<br><br>Class of License: A,B,C,D,E, F – a visual acuity not poorer than 20/30 with both eyes open and examined together, with the worse eye no poorer than 20/100 | On May 29, 2005 Regulation 340/94 of the Highway Traffic Act relating to the vision standards for driver licensing was amended to reflect:<br><br>Changes to the vision standards for all classes of license<br><br>o Lower the visual acuity<br><br>o Provide a specific definition for the horizontal |

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| | **Horizontal Visual Field**- Effective May 29/05<br><br>Class of License: G and H – a horizontal visual field of 120 continuous degrees along the horizontal meridian and 15 continuous degrees above and below fixation with both eyes open and examined together<br><br>Class of License: A,B,C,D,E, F – a horizontal visual field of 150 continuous degrees along the horizontal meridian and 20 continuous degrees above and below fixation with both eyes open and examined together<br><br>Vision Waiver program only applies to the visual field of G1, G2, and G drivers. There is currently no waiver program for visual acuity. | visual field<br><br>Vision waiver program was created for drivers of passenger vehicles (class G, G1 or G2) who do not meet the horizontal visual field standards. Prior to applying to this program one must first meet the entry criteria: visual acuity of 20/50 with both eyes, and horizontal visual field loss which occurred more than 3 months ago.<br><br>Driver Improvement Office, Medical Review Section of the MTO 1-800-268-1481 or 416-235-1773. |
| **UFOV – Useful Field of View Test**<br><br>Domain:<br>Tests visual memory, visual attention, and divided attention with structured and unstructured components. The concept of "useful field of view" refers to the brain's ability to comprehend visual info with the head and eyes in a stationary position. This test is administered on a computer.<br><br>UFOV also includes a training component. | The UFOV has been shown to be a strong predictor of crash risk in older drivers.<br><br>It is recommended for people who are age 55 years old order, who have suffered health problems that cause deficits in thinking skills, who are concerned about their driving ability, and who have had multiple vehicle crashes.<br><br>In one study of 294 drivers aged 55-90years, UFOV displayed high sensitivity (89%) and specificity (81%) for predicting which older drivers had a history of crash problems. | Owsley C. Visual Processing Impairment and Risk of Motor Vehicle Crash Among Older Adults. *JAMA*. 1998;279(14):1083..<br><br>Ball K, Owsley C, Sloane M, Roenker D, Bruni J. Visual attention problems as a predictor of vehicle crashes in older drivers. *Investigative Ophthalmology And Visual Science.* 1993;34(11):3110-3123.<br><br>Ball K, Owsley C. The useful field of view test: a new technique for evaluating age-related declines in visual function. *Journal Of The American Optometric Association*. 1993;64(1):71-79.<br><br>Owsley C, Ball K. Assessing visual function in the older driver. *Clinics In Geriatric Medicine* [serial online]. May 1993;9(2):389-401.<br><br>Ball K, Rebok G. Evaluating the Driving Ability of Older Adults. *Journal of Applied Gerontology*. 1994;13(1):20-38. |

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| **DriveABLE** | Positive predictive validity of the DriveAble in identifying those who would fail the Road Test was 97% (n= 32 of 33).<br><br>Negative predictive validity was 47%.<br><br>Sensitivity was 76%<br><br>Corresponding specificity of 90%. | Korner-Bitensky N, Sofer S. The DriveABLE Competence Screen as a predictor of on-road driving in a clinical sample. *Australian Occupational Therapy Journal*. 2009;56(3):200-205. |
| **Executive Function** | Asimakopoulos, et al. Most predictive executive function test depends on patient. Refer to reference.<br><br>Motta K; Lee H; Falkmer T. found association between the scores of the Trail Making Test Part B (Rho=0.34, p=0.034) and the Key Search Test of the BADS (Rho=-0.61, p=0.005), and the driving assessment scores on the STISM driving simulator. | Asimakopulos J, Boychuck Z, Sondergaard D, Poulin V, Ménard I, Korner-Bitensky N. Assessing executive function in relation to fitness to drive: A review of tools and their ability to predict safe driving. *Australian Occupational Therapy Journal*. 2011;59(6):402-427.<br><br>Motta K, Lee H, Falkmer T. Post-stroke driving: Examining the effect of executive dysfunction. *Journal of Safety Research*. 2014;49:33.e1-38. |
| **Fitness-to-Drive Screening Measure**<br><br>Measure utilizes caregiver or occupational therapist perspective on fitness to drive. The test examines 54 driving skills. The examinee is then classified into one of three categories – at-risk driver, routine driver or accomplished driver<br><br>Available online free: http://fitnesstodrive.phhp.ufl.edu/ | Test has strong psychometric properties<br><br>Currently test is being examined in the Canadian Context. | Classen S, Wang Y, Winter S, Velozo C, Lanford D, Bedard M. Concurrent Criterion Validity of the Safe Driving Behavior Measure: A Predictor of On-Road Driving Outcomes. *American Journal of Occupational Therapy*. 2012;67(1):108-116.<br><br>Classen S, Wen P, Velozo C et al. Psychometrics of the Self-Report Safe Driving Behavior Measure for Older Adults. *American Journal of Occupational Therapy*. 2012;66(2):233-241.<br><br>Classen S, Wen P, Velozo C et al. Rater Reliability and Rater Effects of the Safe Driving Behavior Measure. *American Journal of Occupational Therapy*. 2011;66(1):69-77.<br><br>Classen S, Winter S, Velozo C, Hannold E, Rogers J. Stakeholder Recommendations to |

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| | | Refine the Fitness-to-Drive Screening Measure. *The Open Journal of Occupational Therapy*. 2013;1(4). doi:10.15453/2168-6408.1054.Classen S, Winter S, Velozo C, Hannold E, Rogers J. Stakeholder Recommendations to Refine the Fitness-to-Drive Screening Measure. *The Open Journal of Occupational Therapy*. 2013;1(4). |