Table 5.11

Stroke Rehabilitation Assessment Tools For Pre-Driving Screening

*Canadian Best Practice Recommendations for Stroke Care 2011-2013 Update*

Last Updated: June 19, 2013
## Assessment Tools for Pre-Driving Screening

**Developed by the Toronto Rehabilitation Institute Driving best Practice Group (D. Hebert et al, 2013)**

<table>
<thead>
<tr>
<th>Assessment/ Domain</th>
<th>Cut-Off Scores Correlated with Driving Risk/ Return to Driving and Patient Populations</th>
<th>References</th>
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</thead>
</table>
| **Dynavision**     | o 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.  
|                    | o 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.  
|                    | o 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., Forsyth, R.D., Heslegrave, R. J., Young, M., et al. (1995). The effects of Dynavision rehabilitation on behind-the-wheel driving ability and selected psychomotor abilities of persons after stroke. The American Journal of Occupational Therapy, 49, 534-542.  
Motor Free Visual Perceptual Test

Domain:
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. It has norms for people aged 18-80.

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.

- Mazer, Kommer-Bitensky & Sofer (1998)
- MVPT (cut off, 30), positive predictive value 86.1%, negative predictive value 53.3%
- MVPT and Trail Making B, poor performance on both tests 22 times more likely to fail on-road evaluation
- Predictive values varied by side of lesion, MVPT higher for right lesion, and Trail Making B higher for left lesion
- Kommer-Bitensky et al. (2000)
- Lower predictive values for MVPT in multi-centre site, concluding it should not be used on own
- Older, right hemisphere lesion and lower MVPT scores more likely to fail on-road test (regression analysis)

Trail Making Test

Domain: Tests of visual conceptual and visuomotor

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

tracking.

age or lower education levels.

- Mazer, Komer-Bitensky & Sofer (1998)
- Trail Making B (cut off, 3 errors or more), positive predictive value 85.2%, and negative value 48.1%
- MVPT and Trail Making B, poor performance on both tests 22 times more likely to fail on-road evaluation
- Predictive values varied by side of lesion, MVPT higher for right lesion, and Trail Making B higher for left lesion

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 crash risk.


Please see this article for details regarding administering the Trail Making Test for Driving Ax purposes


<table>
<thead>
<tr>
<th><strong>Colour Trails Test</strong></th>
<th>Color Trails Test comparable to test above</th>
<th>Elkin- Frankston, Lebowitz, B. K., Kapust, L. R. Hollis, A. M., and O’Connor, M. G. (2007), The use of the Color Trails Test in the assessment of driver competence: Preliminary report of a culture-fair instrument pg. Archives of Clinical Neuropsychology, 22 (5), pg. 631-635</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Domain:</strong> Executive Function (planning/organization), memory, visual perceptual skills, visuo-spatial skills</td>
<td>Preliminary research indicates an association between specific scoring elements of the clock drawing test and poor driving performance.</td>
<td></td>
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<td>Snellen Eye Chart BIVABA</td>
<td>Ministry of Transportation of Ontario Standards</td>
<td>On May 29, 2005 Regulation 340/94 of the Highway Traffic Act relating to the vision standards for driver licensing was amended to reflect:</td>
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<tr>
<td>Domain: Visual Acuity, Visual Field, Visual Attention,</td>
<td><strong>Visual Acuity</strong> - Effective May 29/05</td>
<td>Changes to the vision standards for all classes of license</td>
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<td></td>
<td>Class of License: G and H - a vision acuity not poorer than 20/50 with both eyes open and examined together</td>
<td>o Lower the visual acuity</td>
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<td>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</td>
<td>o Provide a specific definition for the horizontal visual field</td>
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<td><strong>Horizontal Visual Field</strong> - Effective May 29/05</td>
<td>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.</td>
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<td>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</td>
<td>Driver Improvement Office, Medical Review Section of the MTO 1-800-268-1481 or 416-235-1773.</td>
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<tr>
<td></td>
<td>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</td>
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<tr>
<td>UFOV - Useful Field of View Test</td>
<td>Vision Waiver program only applies to the visual field of G1, G2, and G drivers. There is currently no waiver program for visual acuity.</td>
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<tr>
<td>Domain:</td>
<td>The UFOV has been shown to be a strong predictor of crash risk in older drivers.</td>
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<td>It is recommended for people who are age 55 years old, 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.</td>
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<td>In one study of 294 drivers aged 55-90 years, UFOV displayed high sensitivity (89%) and specificity (81%) for predicting which older drivers had a history of crash problems.</td>
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UFOV also includes a training component.


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<tr>
<th>Test Type</th>
<th>Details</th>
<th>Reference</th>
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</table>
| DriveABLE              | Positive predictive validity of the DriveABLE in identifying those who would fail the Road Test was 97% (n=32 of 33).
|                        | Negative predictive validity was 47%                                    | Korner-Bitensky, N. and Sofer, S (2009) The DriveABLE competence screen as a predictor of on-road driving in a clinical sample. 56(3). |
| Elemental Driving simulator | There are three testing phases of the EDS:  
Phase 2: Added requirement of responding to “Fred” (a small face symbol) with the turn signal.
Phase 3: Added requirement of decision-making. Patient must respond to constant faces by turning the signal towards the face, and respond to flashing faces by turning the signal away from the flashing face.

Validation of the EDS shows good agreement with decisions based on a comprehensive on-and-off-road driving assessment, large differences between old and young drivers, and a statistically significant correlation with at-fault accidents.

A summary of results is provided on page 2 of the EDS report. Patient’s performance can be scored as “high”, “average”, “fair”, or “unsafe”. A standard score of 100 represents the average, and a score less than 70 is considered unsafe.

Patients are scored according to 6 categories. Patients need to ‘pass’ 4 out of the 6 categories in order to ‘pass’ the overall assessment.

1) Steering Control
Information regarding this measure is provided on both pages 1 and 2 of the EDS report.

Mean score – Reflects a general tendency to stay towards the left (negative value) or right (positive value) of the road.
Standard Deviation - This is the variability in deviation of the car from the center of the road.
Wobble – Measures “jiggle”, or moment-to-moment variation. According to the EDS manual, standard deviation has proved to be a more valid measurement than wobble.

2) Speed of Reaction

If there is a big difference between the mean and median values, this suggests lapses or irregularities in performance. We can determine whether there is a difference between reaction time to left and right-sided stimuli. A higher value reflects a bigger difference between left and right-sided...
**Response Times**
- Positive difference – slower to respond to right-sided stimuli
- Negative difference – slower to respond to left-sided stimuli

By comparing reaction time across phases 2 and 3, we can see the difference between simple and complex (i.e. involving decision making) reaction time.

**Page 2**

The score for Reaction Time reflects the median reaction time for phase 2.

3) **Field of Vision**

Page 2

The score for Field of Vision reflects the absolute difference between left and right median reaction times for phases 2 and 3 combined. The reaction speed scores on page 1 provide more detail on the side of lateralization.

4) **Adjusting**

Page 2

The score for Adjusting reflects the median reaction time for phase 3 only. Therefore, this is a measure of complex reaction time, involving a decision-making component.

5) **Self Control**

Page 2

The score for Self Control reflects percent response errors in phase 3. This could represent a person’s ability to resist the urge to act quickly when more thought is required.

6) **Consistency**

Page 2

The score for Consistency measures the difference between mean and median reaction time for phases 2 and 3 combined. The intention of this measure is to record lapses in performance – a lapse in reaction time would be reflected in the median score but not the mean score.

Self-Appraisal
Performance Self-Appraisal Index (PSA) – This score is
A score of less than 100 reflects over-confidence in ability.

Driver Self-Report (DSR) - Reports “when” items (e.g., patient rates whether they drive as often as others on highways, in the rain, in snow, at night, in high traffic areas, unfamiliar roads, and trips longer than 1 hour). The EDS manual suggests that the DSR is more likely to reflect a person’s intentions and behaviours, while the PSA reflects feelings of competence and confidence.

For Multiple Administrations of the EDS:
What represents clinically meaningful change?
According to Rosamund Gianutsos (the EDS developer), improvement from an unsafe to a safe designation is clinically meaningful.

How many times is it recommended to administer the EDS in total?
Rosamund Gianutsos adopts a “3 times and you’re out” stance – i.e., if after a maximum of 3 tests on EDS with unsuccessful scores, the person is not permitted to retry.

How far apart can you administer repeat trials?
There is no set time interval. Gianutsos recommends 3 months between repeat administrations, although this is not based on psychometrics.

Other Considerations:
When interpreting EDS results, also consider the patient’s physical limitations, vision (including visual field width), visual perception, attention skills, and other medical conditions (e.g., seizures, cardiac conditions) or medications that could affect driving.
Refer to the EDS Manual for a more in depth discussion of results interpretation.

For more information, contact Rosamund Gianutsos directly at June 19th, 2013.
| cogrehab@pipeline.com |  

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**June 19th, 2013**