Should the SIMARD be used as the sole driver screening tool for determining fitness to drive?

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Background

- Older drivers – fastest growing segment
  - Expected to double in the next decade
- Older drivers have higher collision rates/mileage
  - More serious injuries and fatalities (Staplin et al., 2003)
  - Begins around age 70 (Bedard et al., 2001; Dickerson et al., 2007)
- Determining the most effective means to identify, screen and assess medically at-risk drivers has become a major concern

S.I.M.A.R.D - M.D.

Screen for the Identification of the Cognitively Impaired Medically At-Risk Driver A Modification of the DemTect
Dobbs & Schopflocher (2010)

DriveABLE Australia

WORD LIST (Immediate Recall)

"I will now slowly read you a list of 10 words. When I have finished, please repeat as many of these words as possible. The order does not matter."

Apple	Ink	Nail	Bird	Book	Ticket	Tree	Chair	House	Ship
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

"Thank you. Now I will read you the same words again. Again, please repeat as many of these words as possible when I have finished."

Apple	Ink	Nail	Bird	Book	Ticket	Tree	Chair	House	Ship
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

No Points

NUMBER CONVERSION

For this task, turn the page over and say: *"As you can see from this example, we can write the number '5' as the word 'five'. This task is like writing out a cheque. Please write the numbers in words."*

209 = ☐ 4059 = ☐

Score ___ / 2

SUPERMARKET TASK

"Please name as many things as possible that you can buy in a supermarket. You have one minute to do this. Are you ready? ... Please begin."

☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Score ___ / 30

REPEAT OF THE WORD LIST (Delayed Recall)

"At the beginning of this test I read you 10 words. Tell me as many of those words as you can please."

Apple	Ink	Nail	Bird	Book	Ticket	Tree	Chair	House	Ship
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Score ___ / 10

Scoring Guide

> 70 : High passing probability
31-70: Referral for a DriveABLE assessment recommended
≤ 30: Low passing probability

Number conversion	____ x 10 =	_____
Supermarket Task	_____ x 1 =	_____
Repeat of Word List	_____ x 8 =	_____
Total Score (Sum of calculated weighted scores)		(Max 130)

For more information see www.DriveABLE.com.au/SIMARD

Screen for the Identification of Cognitive Impaired Medically At-Risk Drivers (SIMARD)

- Initial study with sample of 146 cognitively impaired seniors found that the SIMARD-MD predicted 86% and 84% to fail and pass a road test, respectively (Dobbs et al. 2010)
- A validation study with 192 cognitively impaired seniors similarly found that the SIMARD-MD predicted 80% and 87% of those predicted to fail and pass a road test, respectively (Dobbs et al. 2010).

Screen for the Identification of Cognitive Impaired Medically At-Risk Drivers (SIMARD)

- Other studies have identified limitations
- One study with a convenience sample of seniors aged 55 and older showed that the SIMARD has a high rate of false-positives and false-negatives and classifies approximately 50% of the patients in the indeterminate range.[20]
  - Sample didn't include persons with MCI/Dementia
  - Didn't assess on-road driving performance

Objective

- The purpose was to determine the SIMARD's sensitivity and specificity for predicting pass/fail on the road test in persons with cognitive impairment and/or dementia

Data Retrieval

- Data was collected from one driving assessment center in South-Western Ontario and in Saskatoon, Saskatchewan, respectively.
- Data was collected retrospectively from 2012-2015 and prospectively from 2015 to January, 2018
- Sample: 383 client records

Variables Collected

- Demographics (age, gender)
- Screen for the Identification of Cognitively Impaired Medically At-Risk Drivers [SIMARD]
- Montreal Cognitive Assessment [MoCA]
- Trails A & B
- Useful Field of View [UFOV]
- On-road pass/fail outcomes

Findings

Sample Characteristics (N=81)	**Mean (SD) or n (%)**
Gender • Male • Female	 62 (76.5%) 19 (23.5%)
Mean Age	75.6±9.9 45 to 94 years
Prior Crashes Prior Citations	10 (12%) 10 (12%)

Findings

Comorbid Diagnoses	N (%)
• Hypertension	18 (21.4%)
• Arthritis	11 (13.1%)
• Diabetes	11 (13.1%)
• Stroke	6 (7.1%)
• Depression	5 (6%)

Findings

- Pass/Fail (n=81)
  - Pass (n=35; 43.2%)
  - Fail (n=46; 56.8%)

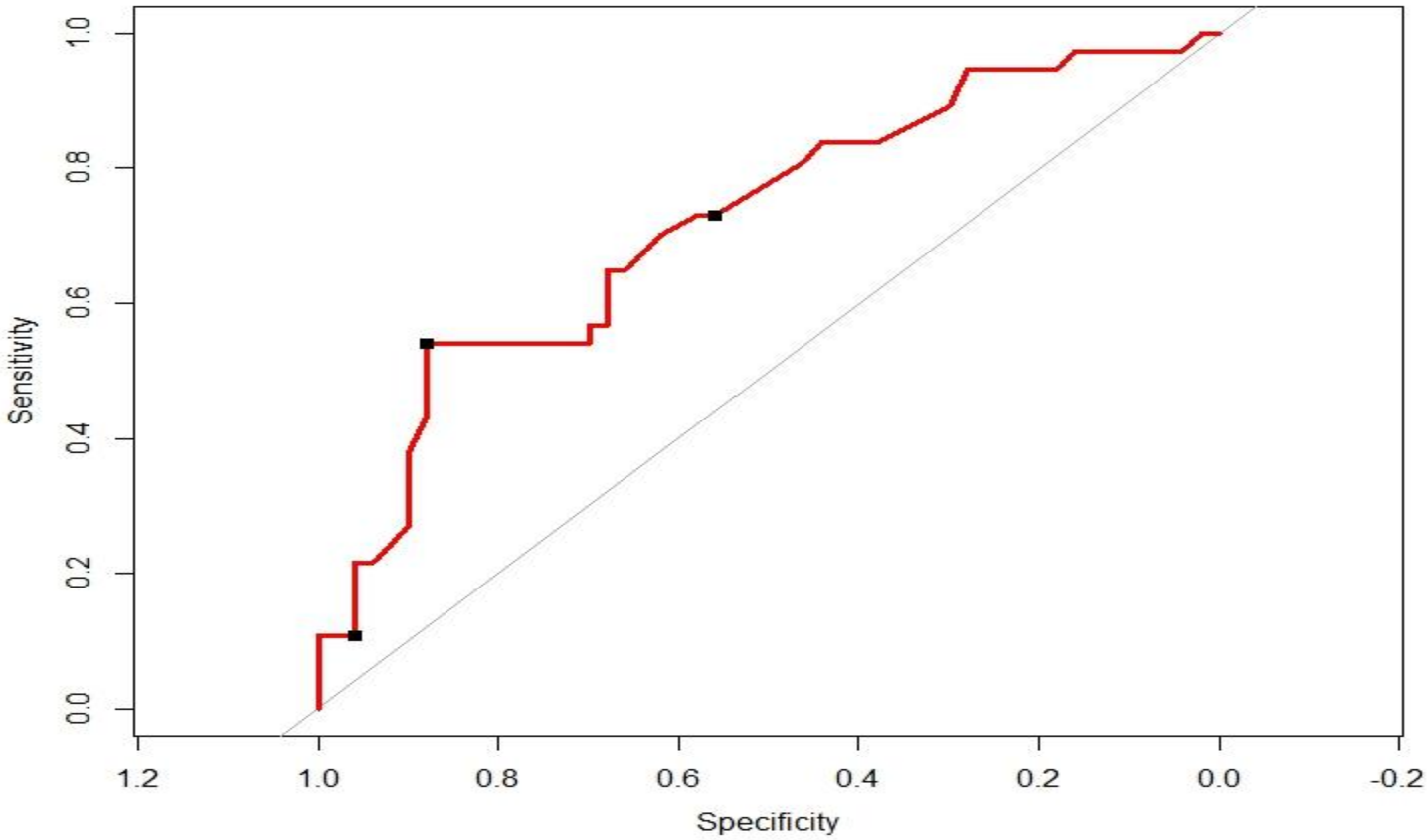
Findings

	Total (N=81)	Pass (n=35)	Fail (n=46)	Significance
Age	75.6±9.9 45 to 94	70.4±10.7 45 to 88	80.0±6.0 60 to 94	t=-5.51, p<.001
Gender	♂ 76.5% ♀ 23.5%	♂ 38.5% ♀ 7.7%	♂ 40.4% ♀ 13.5%	NS
SIMARD Mean	35.7±21.0 2 to 98	40.4±22.1 5 to 98	29.3±18.1 2 to 72	t=-3.357, p=001
SIMARD 30 or less 31 to 70 >70	 33 (40.7%) 41 (50.6%) 6 (7.4%)	 9 (11.1%) 22 (27.1%) 4 (4.9%)	 24 (29.6%) 20 (24.7%) 2 (2.5%)	NS

Regression Model
(N = 81; -2 Log Likelihood = 75.19; Nagelkerke R = .469)

Odds Ratio Estimate						
EFFECTS	**DF**	**B**	**SE**	**Significance ($p < .05$)**	**e^B**	**95% CI**
Age	1	.171	.048	>.001	1.19	1.08-1.30
Gender (male)	1	-.617	.702	.38	.54	.136-2.14
Simard Mean Scores	1	-.043	.018	>.05	.99	.925-.992

AUC=.702; 95% CI: 059-.821



Cutpoint	<30	<46	<70
Sensitivity	.57	.75	.66
Specificity	.74	.70	.58
PPV	.74	.51	.11
NPV	.56	.87	.96
Error	.69	.55	.76

Regression Model
(N = 81; -2 Log Likelihood = 55.45; Nagelkerke R = .56)

Odds Ratio Estimate						
EFFECTS	**DF**	**B**	**SE**	**Significance ($p < .05$)**	**e^B**	**95% CI**
Age	1	.241	.07	<.001	1.28	1.11-1.45
Gender	1	-.120	.82	.88	.887	.176-4.46
Simard						
30-70	2	-.576	4.18	.89	.562	0-2011.04
Less than 30		-2.17	4.21	.61	.114	0.0-433.59

Conclusions

- The findings suggest that the SIMARD should not be used as a screening tool in isolation of other cognitive measures.
- Large number of referrals for road tests for those that fall in the indeterminate range – not sensitive or specific enough
- Higher number of mis-classifications

Limitations

- Did not separate out MCI and Dementia patients
- Small sample size (CI's are wide)

Next Steps

- Merging of other CDE sites (larger database across 3 provinces)
- Re-do the analysis (validation study)

Questions?

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