



# Driving with Cognitive Impairment ... and how to deliver the message

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Mark Rapoport, MD, FRCPC

Associate Professor, Dep't of Psychiatry





# With appreciation

## Disclosures

- CIHR
- Alzheimer Society of Canada
- Brain Canada/Chagnon Family
- PSI
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# Learning Objectives

- To understand dementia-related driving risks.
- To discuss a practical approach to disclosure of unfitness to drive.



# Beware of Shared Delusion

**“The one thing that unites all human beings, regardless of age, gender, religion, economic status or ethnic background, is that, deep inside, we ALL believe that we are above average drivers.”**

**Dave Barry**



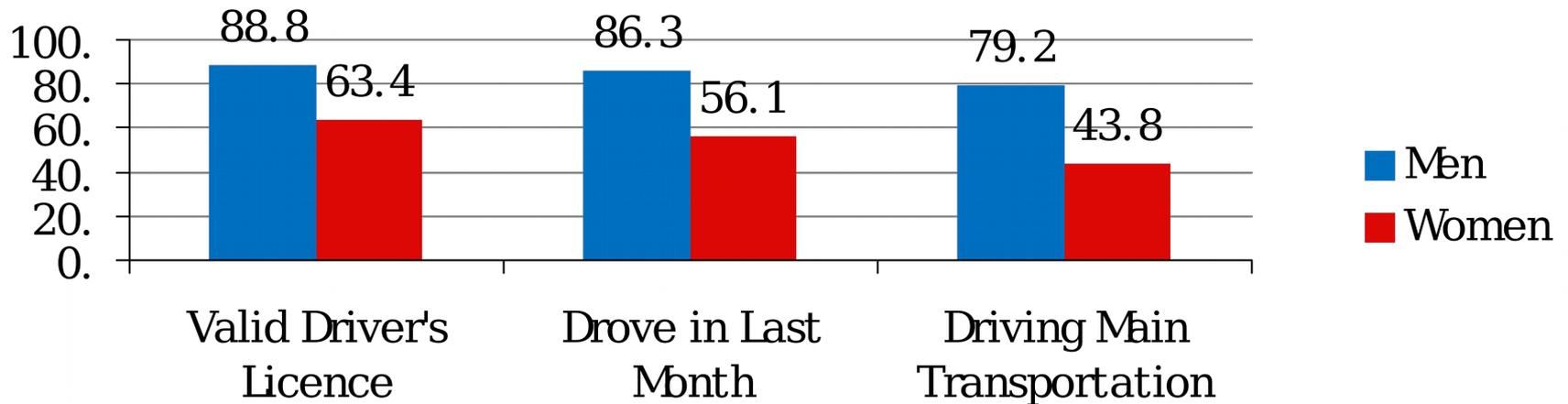
## Older drivers

- Fastest growing segment of licensed population
- Vast majority continue to be safe to drive
- Often unfairly characterized by the media





# 2009 Canada 65+



Turcotte, Profile of seniors' transportation habits. Statistics Canada, 2012



## Crashes

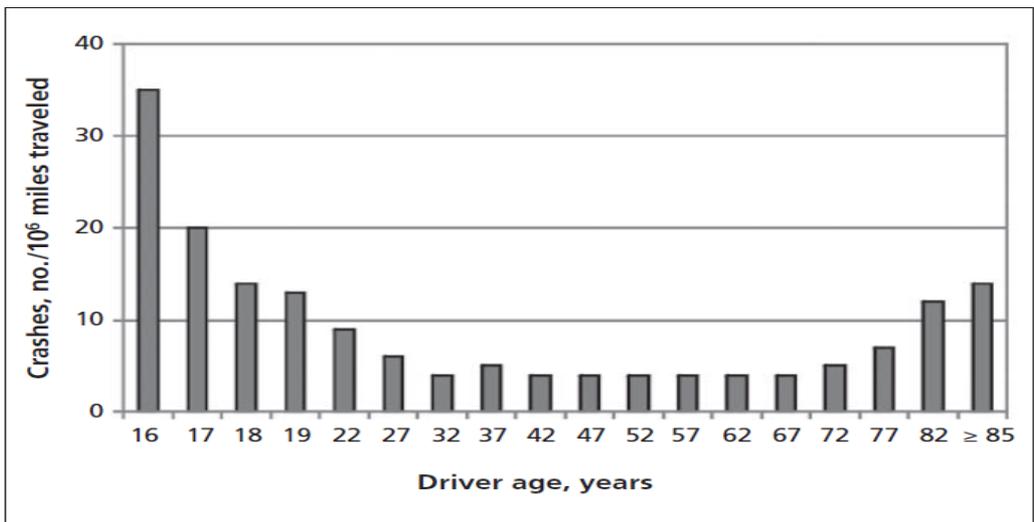


Figure 1: Involvement in crashes per million miles travelled by driver age. Reprinted from: Williams AF. Teenage drivers: patterns of risk. *J Safety Res* 2003;34:5-15, with permission from Elsevier.

## Fatal Crashes

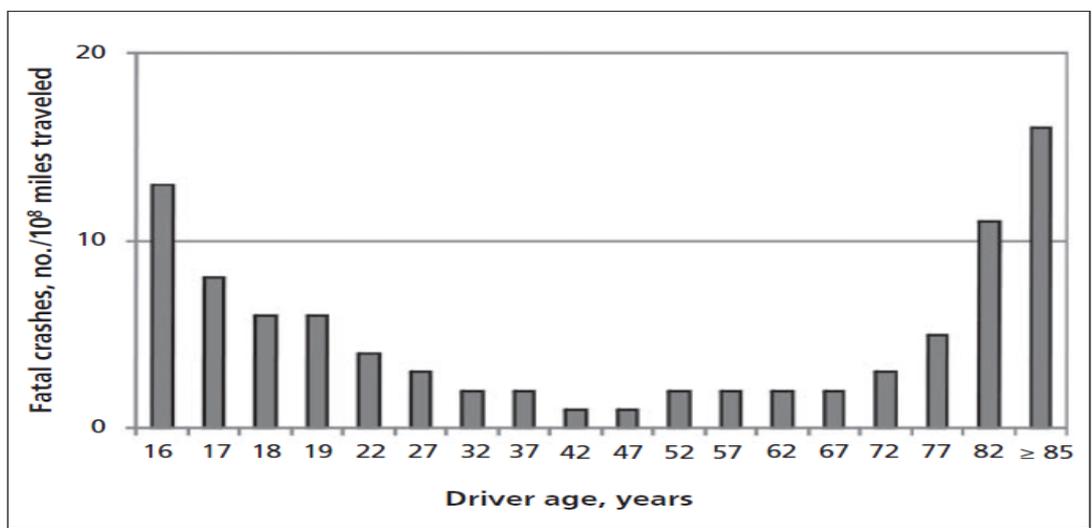


Figure 2: Involvement in fatal crashes per hundred million miles travelled by driver age. Reprinted from: Williams AF. Teenage drivers: patterns of risk. *J Safety Res* 2003;34:5-15, with permission from Elsevier.



- Older drivers
  - high crash rate per miles driven (though not the highest)
  - crash for different reasons than younger persons
  - involved in different types of crashes
  - once involved in a crash - highest mortality and morbidity of any age group





- Why do older persons have relatively high crash rates?
  - not “age” in itself
  - the increasing prevalence of medical and functional conditions that affect driving ability



# Driving and Medical Conditions

- Numerous medical conditions associated with crashes:
  - Sensory and Motor Conditions
    - Vision
    - Movement (e.g. arthritis, pain)
  - Mental Functioning
    - Abrupt changes (e.g. seizure, cardiac, cerebro-vascular)
    - Fluctuating (e.g. diabetes, psychiatric conditions)
    - Progressive (e.g. dementia, respiratory)
- Prevalence of these conditions increases with age



# Studies of crash risk in dementia

- Systematic review 2007
- 6 studies, 2 of highest quality(8/9 on Ottawa-Newcastle)
  - BC: Cooper et al, 1993
    - Drivers with at least one collision 43 (26.1%) dementia vs 19 (11.5%) comparison.
  - Michigan: Trobe et al, 1996;
    - Event Rate/ Driver years 0.08 crashes/driver years in dementia AND comparison

*Man-Son-Hing et al, J Am Geriatr Soc 55:878–884, 2007*

*Cooper et al Journal of Safety Research Vol. 24, 9-17, 1993*

*Trobe et al, Arch Neurol. 1996;53:411-416, 1996*



CRASH RISK OUTCOMES					
Author (Year)	Crash Risk Variable	Comparison Group: Baseline Result	Dementia Group: Baseline Result	Comparison Group: Longitudinal Result	Dementia Group: Longitudinal Result
Davis et al. <sup>32</sup> (2012)	Percentage of persons with MVCs	13.6% (Past 1 Year)	8.5% (Past 1 Year)	Not assessed	Not assessed
	Number of MVCs per year/10,000 miles driven	0.02 (0.04) (Unclear: Past 1-3 Years)	1.4 (7.5) (Unclear: Past 1-3 Years)	Not assessed	Not assessed
Ott et al. <sup>33</sup> (2008)	Percentage of persons with MVCs	11% (Past 3 Years)	18% (Past 3 Years)	<b>11%</b> (Next 1.5 Years)	<b>1%**<sup>a</sup></b> (Next 1.5 Years)
	Number MVCs per 1000 miles driven per week	<b>1.86</b> (Past 3 Years)	<b>8.78 **</b> (Past 3 Years)	5.63 (Next 1.5 Years)	1.85 <sup>a</sup> (Next 1.5 Years)
	MVC rate per driver per year	0.04 (Past 3 Years)	0.06 (Past 3 Years)	0.06 (Past 3 Years)	0.01 <sup>a</sup> (Past 3 Years)
	Total number of MVCs	5 (Past 3 Years)	17 (Past 3 Years)	5 (Past 3 Years)	2 <sup>a</sup> (Past 3 Years)

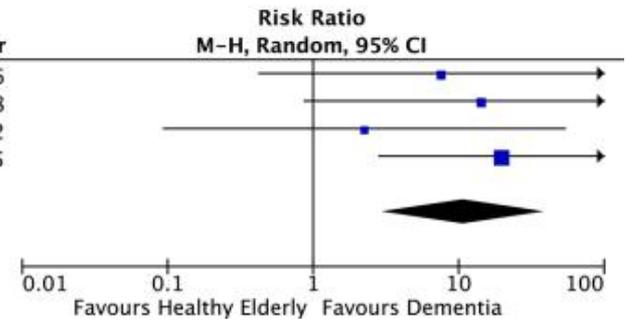
10 years, two studies (proxy/state).  
Retrospective – one negative, one 4x risk



.... In contrast.....

## Meta-Analysis of the Risk of Road Test Failure Associated with Dementia

Study or Subgroup	Dementia		Healthy Elderly		Weight	Risk Ratio M-H, Random, 95% CI	Year
	Events	Total	Events	Total			
Lincoln 2006 (1)	4	37	0	31	19.6%	7.58 [0.42, 135.51]	2006
Ott 2008 (2)	13	84	0	44	20.8%	14.29 [0.87, 234.93]	2008
Davis 2012 (3)	1	59	0	44	16.2%	2.25 [0.09, 53.95]	2012
Barco 2015 (4)	37	60	1	32	43.4%	19.73 [2.84, 137.23]	2015
<b>Total (95% CI)</b>		<b>240</b>		<b>151</b>	<b>100.0%</b>	<b>10.77 [3.00, 38.62]</b>	
Total events	55		1				
Heterogeneity: Tau <sup>2</sup> = 0.00; Chi <sup>2</sup> = 1.50, df = 3 (P = 0.68); I <sup>2</sup> = 0%							
Test for overall effect: Z = 3.65 (P = 0.0003)							





.....and.....

# Driving Performance Outcomes

## Large Effects:

- Aksan et al (2015) – Secondary Driving Task Performance, Landmark identification, Route-following
- Barco et al (2015) – Driving Situation Errors
- Davis et al (2012) – Road Test Error Scores
- Eby et al (2012) – Lost trips, miles belted, miles driven with short headway, miles driven 10mph or more slower than surrounding traffic.
- Whehilan et al (2005) – Road Test Error Scores

## Medium Effects

- Aksan et al (2015) Safety errors, lane observance, turns
- Barco (2015) Errors turning right or driving straight



# Driving Cessation

- Psychosocial consequences
  - Depression
  - Social isolation
  - Loss of self esteem
  - Many report “worse than death”
  - Impact on patient/physician relationship



# How To

- Document re: Driving
- Ask Family.
- Review cognition, behavior, function, hearing, motor, and sensory function.
- Rule out significant dangerous medical conditions (eg. Seizure disorder, sleep apnea, stroke, PD), medications (esp anticholinergic) and substances.
- Decide on referral for specialized testing.
- Give feedback.



# Disclosure

1. Preparatory meeting with family.
  - Set ground rules/educate
  - Put family in a supportive role.
  - Address family resistance
2. Meeting with patient and family
  - Ground rules and educate
  - Give patient positive role.
  - Address patient resistance
3. Post-disclosure
  - Letter
  - Documentation
  - Alternate transportation plans
  - Dealing with difficult situations

Molnar, Byszewski, Rapoport, Dalziel, Geriatrics & Aging, 2009



# Summary

- Not the same as driving in the elderly.
- Many cognitive skills required.
- Dementia increases crash risk, but also decreases exposure. Not enough info.
- Drivers with dementia are persistent.
- Many patients in the early stages may be safe to drive.
- Cognitive testing limited predictive ability. We need better tools.
- Individualized assessment needed. We need to make this practical and affordable.
- Behavioral changes play a significant role, especially psychosis, apathy and depression.
- Legislation - Safety outweighs autonomy, very challenging to balance, and doctors are not reporting.