

Brain Fitness and Driving Risk: A Focus on Solutions

Minnesota Health and Safety Conference
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1

Objectives

- Understand the link between normal changes and driving risk in aging
- Describe the way neurocognitive disorders/ dementia affect driving risk and decision-making regarding driving
- Describe tools and resources for older drivers and their families to increase driving safety and help with driving transition decisions
- Describe some of the challenges to driving safety such as lack of insight and challenges to driving cessation such as alternative access to community.
- Describe professional services and processes that can help assess and counsel medically at risk older drivers with cognitive losses and their families.



2

Introductions

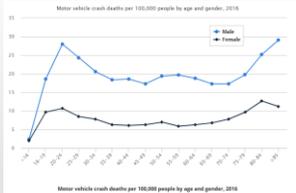
- Introduction to speaker backgrounds and importance of driving
- Introduction of participant backgrounds:
 - Small groups introduce to each other on question of importance of driving: How did your life change after obtained license?
- Important to understand meaning of driving.
 - Empathize with motivation for staying on the road as long as possible
 - Need to have resources to help decide when to stop driving
 - Process also needs to include planning for life after driving
- Importance to understand the shift in demographics: By 2035, senior citizens will make up more than one-fifth of the Minnesota population.



3

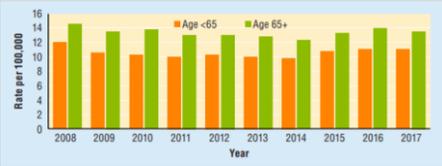
Age and Increased Risk on the Road.

- Graph shows that older drivers aged 80-84 have similar increase in crash death rates per 100,000 people as 25 year olds.
- Women drivers have about half the crash death rate than men
- Source: Insurance Institute of Highway Safety www.iihs.org




4

Figure 1 Motor Vehicle Traffic Fatality Rates by Age Group per 100,000 Population, 2008-2017



Source: Fatality Analysis Reporting System (FARS) 2008-2016 Final File, 2017 Annual Report File (ARF).
 Population: Bureau of the Census.

Source: <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812684>



5

Aging Commercial Drivers

- Commercial vehicle drivers also aging
- There is a big shortage of truck drivers and older adults are being recruited
- Commercial truck accidents involving drivers in their seventies, eighties, and nineties increased by 19% between 2013 and 2015. (source)
- Truck drivers over the age of 70 have collision rates 6.3 times higher than middle aged group (source)



The Oldest Truck Driver in America

Al St. Piquet claims to be the oldest licensed commercial truck driver in the country.



6

Cognitive Demands of Driving

- Many cognitive skills are needed for safety driving. They include
 - Spatial memory - navigation
 - Attention/Information processing – Integrate multiple information
 - Decision-making – Does situation warrant action?
 - Fast reaction time – Initiation of appropriate action following assessment of the situation



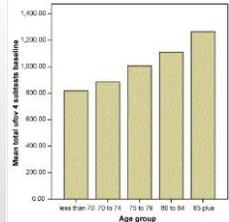
Play demo
<https://www.lifelongdriver.com/html5-test-drive>



7

Normal Age-Related Cognitive Change and Driving

- Ability to process the information that is visually perceived at any given time is called Useful Field of View (UFOV).
- UFOV worsens with advancing age
- Worsening of UFOV is associated with increased crash risk
- People with dementia have severe limitations in UFOV



Archives of Clinical Neuropsychology 21 (2006) 275-286



8

Age-Related Cognitive Change and Driving Risk

- Age-related thinking skills changes include:
 - Slower decision-making
 - Problems with divided attention
 - Slower reaction time
- As a result, more difficulties in:
 - judging gaps and make timely decisions at intersection, merging and lane changes

Most fatal crashes in older adults happen at intersections and ramps

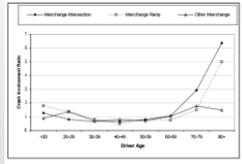


Figure 8. Two-vehicle fatal CRIs by intersection feature.



9

What can be done about those normal age changes ?

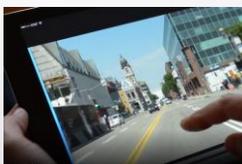
- Self-assessment with screening tool (i.e. [SAFER](#), [AAA 65+](#))
- Defensive driving skills: Take refresher classes and get insurance discount in the process. [DPS list](#)
- Behind the wheel refresher with licensed driving instructor (DriveBest)
- Know medication impact on driving [Rx](#)
- Hit the gym: Driving risk is reduced following exercise training.
- Post purchase adaptation of vehicle ([CarFit](#))
- Choice of car with safety features including new technologies: **videos**
- [Blind spot detection](#), [Lane departure](#), [Smart Features for older drivers](#)




10

Sharpen your Brain

- Training your brain helps thinking skills-related driving safety. ([Hay et al 2016](#))
- Practice specific to driving
 - [DriveFocus](#)
 - [Lifelong Driver](#)
- Practice of general thinking skills
 - [BrainHQ](#)
 - AARP'S [StaySharp](#)



Demo
<https://drivefocus.com/>



11

What can Signal possible Dementia and Driving Risk?

- Memory changes with age are normal.
- What should be cause for concern is when the changes in thinking skills interfere with everyday life
- Many activities we do everyday require complex thinking skills. They include cooking, taking medication, managing money.
- Those more complex daily activities (called IADL) also include driving and community mobility.
- Problems with managing those everyday activities could be an indication that driving may no longer be safe as it may signal possible neurocognitive disorder/ dementia



12

How are Neurocognitive Disorders related to Dementia ?

- Mild Cognitive Impairment (MCI) is a condition that may not worsen and is not dementia
- Mild cognitive problems that include MCI is called Mild Neurocognitive disorder (mNCD)
- Early stage of dementia will have mild symptoms at first but will worsen to mid- and late-stage.
- When dementia progresses it is called a Major Neurocognitive Disorder (MNCD)
- Most people are not diagnosed with dementia until it has progressed to early Mid-stage
- Dementia can be due to Alzheimer's or other diseases causing symptoms of dementia



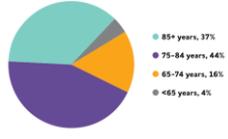
<https://www.nhtsa.gov/road-safety/older-drivers>



13

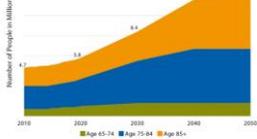
Incidence of Major NCD/Dementia by Age

FIGURE 1
Ages of People with Alzheimer's Disease in the United States, 2018



Created from data from Hebert et al.¹⁰
Percentages do not total 100 because of rounding.
<https://www.alz.org/media/Documents/facts-and-figures-2018-r.pdf>

Projected Number of People Aged 65 or Older With Alzheimer's Disease, by Age Group, United States, 2010-2050



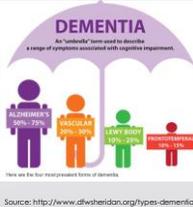
Source Created from data in Hebert L.E, Wilson J, Schur PA, Evans DA, Alzheimer Disease in the United States (2010-2050) estimated using the 2010 Census. Neurology. 2013;80(18):1776-1783.
<https://www.cdc.gov/chronicdisease/resources/publications/aag/alzheimers.htm>



14

Neurocognitive Disorders/Dementia and Driving

- There are several diseases causing dementia
 - **Alzheimer's disease:** Short term memory, navigation, maintaining lane.
 - **Vascular dementia:** "Mini strokes". Driving impact depends on brain area
 - **Lewy-Body diseases, includes Parkinson's Dementia:** Executive function and motor problems such as planning, reaction time
 - **Fronto-temporal dementia:** Impulsivity, may not follow rules of the road, often not aware of disease
- NHTSA video [Driving and Dementia](#)



Source: <http://www.dfiwheridam.org/types-dementia>



15

Accident Risk with Dementia

- Brown and Ott (2004) did a review of the literature and found that:
 - People with dementia are at greater risk for crashes.
 - Overall, 2- to 8-fold greater risk of crashes for older with mild to moderate dementia compared to those without dementia.
 - Study found 47% prevalence rate of crashes among persons with Alzheimer's disease (AD) compared to 10% of age-matched control group
- Meuleners et al. (2016) found that drivers with dementia had a crash risk of almost double than those without dementia in the three years before hospital admission



16

Interactive: Case Studies from audience

- Discuss in small groups:
- Do you know someone who drove longer than they should have?
- What problems have you observed that led you to question their safety?
- Have you or anyone else done anything to address the driving safety issue?
- If so: what has worked (or not)
- What questions or insights would like to share with rest of audience?




17

Most Common Driving Errors with Dementia

- Barco found that individual with dementia who failed the on-road driving test did have:
 - more difficulties driving straight and making left and right turns than during lane changes
 - Most dangerous actions when driving straight (lane positioning and usage) and making left turns at intersections.
 - Other causes for failure included problems stopping vehicle appropriately, paying attention, decision-making and following the rules of the road




18

Mild NCD / MCI and Driving Status

- There is a wide range in driving safety among patients with MCI. (Anstey et al [2017])
- In a study Vaughan et al. (2015) found that 60% of patients with MCI still drove compared to 40% of patients with dementia.
- Carr and Ott (2010) looked found that only few experts recommended cessation at the mild NCD stage Those who did recommend cessation indicated that this was only in the case of deficits in judgment, spatial function or history of at fault motor vehicle crashes.
- Driving status was more closely linked to performance in complex everyday activities (IADL), as reported by proxy, than to formal cognitive tests (Vaughan et al. 2015).



19

Major NCD/ Dementia and Driving Risk

- Most expert agree that people with moderate to severe dementia should stop driving. Carr and Ott (2010)
- The early moderate stage seems to be the stage where professional judgment is the most important, needing driving eval.
- Impact of dementia on driving depends on whether driver has other medical conditions, and on medication side effects (Carr and Ott (2010)
- Inability to perform 2 or more Instrumental Activities of Daily Living important consideration when recommending driving cessation. Lee (2017)
- There is no single cognitive test that can be used to recommend driving cessation. Martin et al. Cochrane review 2013



20

Neurocognitive Disorders/Dementia and Insight

- A problem relevant to driving risk is the variability in awareness of one's own disease in dementia.
- Many people with dementia don't have any awareness of their limitations.
- This condition is called **anosognosia**
- In a group of patients with mild neurocognitive disorder, 42% of patients with early stage Alzheimer's disease had anosognosia, while 3% or less of patients with mild cognitive impairment had the condition. (Orfei et al. 2010)



21

Awareness of Disease and Driving Self-Regulation

- If people experiencing cognitive loss are aware of their limitations they will self-regulate their driving. Video older driver adaptations examples:
 - driving in rush hour traffic
 - Taking unprotected left turns
 - Going on the highway etc.
 - Use alternative transportation at night etc
- Self-regulation is effective for driving safety (Molnar et al.)
- When individuals with dementia are not aware of their disease or their limitations, they will not self-regulate
- It makes it more risky to drive and makes family conversations difficult



22

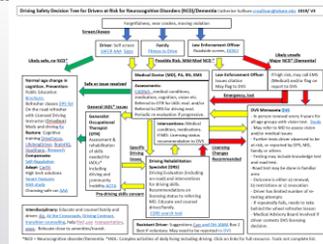
Implications of Insight for Intervention

- | | |
|---|---|
| <p>Mild Cognitive Impairment</p> <ul style="list-style-type: none"> • Insight allows for self assessment • Similar resources and tools as with normal cognitive changes • Watch for Warning Signs • Periodic re-assessment and conversations with family and MD • Multimodal transportation use | <p>Early Stage Dementia</p> <ul style="list-style-type: none"> • Self-assessment unreliable • fitness to drive assessment by family • Driving Contract advanced directives • Conversations with family and MD • Find and use alternate transportation • Get comprehensive driving evaluation by driving rehabilitation specialist AOTA |
|---|---|



23

Role of various professionals for driving safety



24

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25

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26

Thank You!

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27