

Interprofessional Geriatrics Training Program

Driving Safety of the Older Adult



HHS GERIATRIC WORKFORCE ENHANCEMENT FUNDED PROGRAM Grant #1JQHP070

EngageIL.com  

Acknowledgements

Authors: Peggy Barco, OTD, OTR/L, SCDM, CDRS
Valerie Gruss, PhD, CNP-BC

Editor: Memoona Hasnain, MD, MHPE, PhD



Learning Objectives

Upon completion of this module, learners will be able to:

1. Identify common reasons that warrant a recommendation for a comprehensive driving evaluation
2. Review evidence-based screening and assessments that identify impairments which can put older adults at risk for unsafe driving
3. Discuss interventions and remediation available for older adults to enhance their driving safety
4. Recognize evidence-based recommendations to ease the transition to driving retirement



Traffic Fatalities and Injuries

- The 43.1 million Americans who were 65 or older in 2012 are 14% of the population, but 17% of traffic fatalities and 9% of all people injured in traffic crashes (National Highway Traffic Safety Administration, 2013a)
- Traffic fatalities
 - 35,200 in 2015 (National Highway Traffic Safety Administration, 2016)
 - Up from 32,675 in 2014 (National Highway Traffic Safety Administration, 2016)
- Traffic fatalities among older adults (age 65 and older) in 2012:
 - 5,560 killed
 - 214,000 injured (National Highway Traffic Safety Administration, 2013a)



Traffic Fatalities and Injuries

- The number of older adults is increasing
 - They are driving longer distances
 - Increased comorbidities and frailty make it more difficult for the older adult to survive a crash
 - Motor vehicle injuries are more harmful as older adults get older



(National Highway Traffic Safety Administration, 2013a)

Top 5 Crash Types for Older Drivers

- Turning left at an intersection with a stop sign
- Turning left at an intersection on a green light without a dedicated green turn arrow
- Turning right at a yield sign to merge with traffic at speeds of 40-45 mph
- Merging onto a highway from a ramp that has a yield sign
- Changing lanes on a road that has four or more lanes



(National Highway Traffic Safety Administration, 2013a)

Older Driver Facts

- The number of accidents involving older drivers actually has been shown to decrease as age increases
- Self-imposed limitations when driving by older adults have contributed to accident decline when driving



(Baldock et al., 2006)

Older Driver Facts

- Healthy older drivers tend to restrict or self-impose limitations on their driving to improve safety
- These simple, self-imposed restrictions might include:
 - Not driving during the night
 - Driving during less busy times of day
 - Avoiding driving in bad weather



(Baldock et al., 2006)

Individuals Age Differently

- Associated with age are “normal” declines in sensory systems (e.g., vision, hearing), motor skills, and cognition
- Onset of medical conditions/diseases during aging can cause impairments in daily life functioning
- Not all changes that occur with age indicate an individual is not able to drive
- When determining ability to drive, consider the person’s functional abilities rather than age



(Wood et al., 2009)

Driving Errors and Age

- Common driving errors that occur in older drivers include the following:
 - Failure to maintain lane positioning
 - Blind spot errors
 - Inappropriate brake/accelerator use
 - Errors in observation
 - Errors in gap selection (e.g., spacing between vehicles)
- It is important to note that not all driving errors result in a “crash” (accident) in older drivers



(Wood et al., 2009)

Assessment Question 1

Which of the following were cited in the top 5 reasons for crashes caused by older drivers? (More than one answer may be correct)

- a) Turning left at an intersection with a stop sign
- b) Stopping at a green light at an intersection in a city environment
- c) Turning right at a yield sign to merge with traffic traveling at 40 mph
- d) Passing vehicles on roads with two lanes
- e) Merging onto a highway from a ramp (with a yield sign)



Assessment Question 1: Answer

Which of the following were cited in the top 5 reasons for crashes caused by older drivers? (More than one answer may be correct)

- a) Turning left at an intersection with a stop sign (Correct Answer)**
- b) Stopping at a green light at an intersection in a city environment
- c) Turning right at a yield sign to merge with traffic traveling at 40 mph (Correct Answer)**
- d) Passing vehicles on roads with two lanes
- e) Merging onto a highway from a ramp (with a yield sign) (Correct Answer)**



Driving and Cognitive Impairment



Driving Errors and Dementia

- When assessing a patient's driving safety, it is important to consider dementia as a factor
- While cognitively intact older drivers made considerably fewer driving errors than those with dementia, they did make errors across all driving situations, such as turn position errors, positioning errors, and over-cautiousness
- Active drivers with dementia were found to make many more hazardous errors than healthy elders



(Barco et al., 2015)

Driving Errors and Dementia

- Most often, the dangerous actions in persons with dementia occurred while driving straight on roads (e.g., driving too close to lane markings, driving on the shoulder)
- This was a novel finding, as straightaway conditions typically were not found to be hazardous



(Barco et al., 2015)

**Driving Errors:
Parkinson's Disease (PD) and Alzheimer's Disease (AD)**

<p>Operational</p> <ul style="list-style-type: none"> • Errors related to timing of reactions <p>Strategic</p> <ul style="list-style-type: none"> • Errors related to attention, reasoning, and judgment <p>Tactical</p> <ul style="list-style-type: none"> • Errors related to driving maneuvers 	<ul style="list-style-type: none"> • The PD group made tactical errors, such as not scanning for lane changes, but few strategic or operational errors • The AD group committed errors in all three categories, with notable difficulties in lane changes, checking the blind spot, making left turns, and pulling over to the curb appropriately • The elderly control group made relatively few errors in any category
---	---

 (Grace et al., 2005)

Driving and Cognitive Decline

- Some medical conditions (Alzheimer's Disease/related dementias) are associated with limited personal insight into cognitive decline and corresponding impact on functioning related to driving (Andrew et al., 2015)
 - With the limited insight into any changes, the older driver with cognitive impairment will not likely self-impose driving limitations willingly (Andrew et al., 2015)



Driving and Cognitive Decline

- The relationship between cognitive impairment and driving risk generalizes across outcome measures, including simulated car crashes and in driving simulators (Pittelli et al., 2009; Jones Ross et al., 2015)
- The risk of collision is greater (2.5 to 4.7 times more likely) in drivers who have cognitive impairment compared to healthy, age-matched controls (Rieger et al., 2004)



“Fitness to Drive” Studies in Older Adults with Dementia

Not in Film

- Numerous studies are finding that adults with mild AD may be safe to drive, at least for a while
- Fitness to drive studies indicate that 90% of older adults with dementia can pass an on-road test, especially when they are in the early phases
- As the disease progresses, they become less likely to pass the on-road driving test



(National Highway Traffic Safety Administration, 2013a)

State Laws



Key Provisions of State Laws Pertaining to Older Driver Licensing Requirements

State	“Older Driver” Age	Restrictions on Licensing Renewal	Accelerated Renewal and Term (If Applicable)
Illinois	<ul style="list-style-type: none"> • Age 75 for some restrictions and 81 for other restrictions • At age 75, the driver has testing mandates (vision test and driving test) • 625 ILCS 5/6- 109 • 5/6-115 	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • Yes, every 2 years for drivers age 81-86 • 12 months for drivers age ≥ 87 • Standard renewal every 4 years • 625 ILCS 5/6-115



(National Highway Traffic Safety Administration, 2014)

**Key Provisions of State Laws Pertaining to
Older Driver Licensing Requirements**

Testing Mandates	State DMV, Suspension Authority for Failure to Submit to Examination	Medical Advisory Boards
<ul style="list-style-type: none"> • Vision test and actual demonstration of ability to exercise ordinary and reasonable control of the motor vehicle for drivers aged ≥ 75 • 625 ILCS 5/6-109 	<ul style="list-style-type: none"> • Yes • An examination may include a physical examination, vision test, written driver's test, or submission of medical reports from licensed physicians • 625 ILCS 5/6-907 	<ul style="list-style-type: none"> • Yes • 625 ILCS 5/6-902



(National Highway Traffic Safety Administration, 2014)

**Key Provisions of State Laws Pertaining to
Older Driver Licensing Requirements**

Other Information

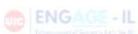
- Every driver shall report to the Secretary of State any medical condition that is likely to cause loss of consciousness or any loss of ability to safely operate a motor vehicle within 10 days of the driver becoming aware of the condition
- 625 ILCS 5/6-116.5



(National Highway Traffic Safety Administration, 2014)

**Key Provisions of State Laws Pertaining to
Older Driver Licensing Requirements**

- Find your state at (continued):
 - www.nhtsa.gov/staticfiles/nti/older_drivers/pdf/KeyProvisionsOlderDrivers.pdf



Plan for Older Drivers' Safety (PODS)

- Step 1: **Screen** for red flags that may impair driving safety
- Step 2: **Assess** driving and related functional skills
 - Use the Clinical Assessment of Driving Related Skills (CADReS) screening tool
- Step 3: **Evaluate and Manage/Treat** causes of functional decline
- Step 4: Use driving deficit results to:
 - **Counsel** patients on safe driving and options
 - **Perform** interval re-evaluations
 - **Follow-up** with patient



(American Geriatrics Society & Pomidor, 2015; Carr et al., 2010)

Screening: Driving History

- When obtaining the driving history, it is important to ask for information from the older person and from family, friends, and caregivers
- It is possible there may be conflicting information
- Inquire about:
 - History of crashes, traffic citations
 - Reduced driving mileage
 - Aggressive or impulsive personality
 - Family/friends' reports of driving ability as marginal or unsafe



(Syed & Wilson Holland Jr., 2016)

Driving History: Unsafe Signs Observed by Families

- The Alzheimer's Association suggests screening for the following common unsafe driving signs:
 - Forgetting how to locate familiar places
 - Failing to observe traffic signs
 - Making slow or poor decisions in traffic
 - Driving at an inappropriate speed
 - Becoming angry or confused while driving
 - Hitting curbs



(Alzheimer's Association, 2017)

Driving History: Unsafe Signs Observed by Families

- The Alzheimer's Association suggests screening for the following common unsafe driving signs (continued):
 - Using poor lane control
 - Making errors at intersections
 - Confusing the brake and gas pedals
 - Returning from a routine drive later than usual
 - Forgetting the destination you are driving to during the trip



(Alzheimer's Association, 2017)

Assessment Question 2

What is considered a main contributor to decline in driving safety in older adults?

- a) Family pressure to discontinue driving
- b) State laws that emphasize older driver screening
- c) Declines in memory, attention, and/or executive function
- d) Limited insight into current health-related declines
- e) Both c and d



Assessment Question 2: Answer

What is considered a main contributor to decline in driving safety in older adults?

- a) Family pressure to discontinue driving
- b) State laws that emphasize older driver screening
- c) Declines in memory, attention, and/or executive function
- d) Limited insight into current health-related declines
- e) Both c and d (Correct Answer)**



Screening



Screening: Medical History

Health Care Providers Screen For

- Chronic medical conditions:
 - Neurocognitive Disorders: Alzheimer’s disease and related dementias
 - Visual Impairment: Macular degeneration, glaucoma, retinopathy, cataracts
 - Hearing Impairment: Hearing loss
 - Behavioral/Mental Health Conditions: Depression, psychosis
 - Mobility Conditions: Arthritis, Parkinson’s disease, falls, poor range of motion
 - Other: COPD, asthma, sleep disturbance, diabetes, fatigue, cardiovascular disease, epilepsy



(Syed & Wilson Holland Jr., 2016)

Screening: Medical History

Health Care Providers Screen For (Continued)

- Acute medical conditions:
 - Dizziness/syncope related to vestibular disorder
 - Hypotension
 - Hypoglycemia
 - Seizures
 - Recent injury or surgery



(Carr et al., 2010)

Screening: Medications

- Because older adults typically take more medications and are more vulnerable to adverse effects, providers must also examine the current list of medications and look for any medications that may impair driving



(Syed & Wilson Holland Jr., 2016)

Screening: Medications

- Medications that may impair driving:
 - Antipsychotics
 - Decongestants, antihistamines
 - Hypnotics, sleep medications
 - Narcotic pain medications
 - Tranquilizers, muscle relaxants
 - Some antidepressants



(Orriols et al., 2010; Syed & Wilson Holland Jr., 2016)

Screening: Medications

- Roadwise Rx is a free online tool developed by the American Automobile Association Foundation for Traffic Safety
- It allows anyone to enter the names of medicines and check if a medication can affect driving
 - <http://www.roadwiserx.com> (COPYRIGHT 2016 Lexi-Comp, Inc. and/or Cerner Multum, Inc.)



(AAA Foundation for Traffic Safety n.d.-b; Syed & Wilson Holland Jr., 2016)

Screening: Medications

- The American Society of Consultant Pharmacists finds that, on average, individuals 65-69 years old take nearly 14 prescriptions per year
- Individuals aged 80-84 take an average of 18 prescriptions per year
- 15-20% of drug use in seniors is considered unnecessary or otherwise inappropriate
- *Referral Cue: Remember that pharmacists are experts in medication management*



(American Society of Consulting Pharmacists, 2015)

Screening: Medications

- Pharmacists should:
 - Obtain a thorough medication history
 - Assess adherence to medication regimens
 - Assess potential adverse medication effects that affect driving ability, and offer substitutions



(American Society of Consulting Pharmacists, 2015)

Screening: Cognition

- Driving is a complicated activity that involves many areas of perception, cognition, sensory, and motor systems
- It has not been possible to predict fitness to drive (FTD) with just one test
- The issues of cognitive impairment could affect split-second decisions due to unusual traffic circumstances, responding to heavy or fast traffic, route-finding problems in new geographic areas, and sometimes in familiar areas, in the later stages of dementia
- Therefore, it is important to screen for cognitive impairment



(Bennett et al., 2016)

Screening: Cognition

- Studies indicate the Mini-Mental Status Examination (MMSE) can determine persons with moderate or severe dementia who should not be driving (those with MMSE scores of 18 and below)
- However, higher MMSE scores of persons with early or mild dementia does not correlate with on-road performance
- Persons with mild or early dementia are usually able to pass on-road tests



(Bennett et al., 2016)

Screening: Cognition

- How do we screen for early and mild cognitive impairment?
- Does it indicate that the person is “unsafe” to drive?
- The best approach is for driving rehabilitation specialists or occupational therapists to evaluate competency by having the person perform the task under simulated real-life conditions, and assess the person’s ability to perform more safely and to avoid risk
- Single tests are not reliable, and a composite computerized battery of tests is recommended



(Bennett et al., 2016)

Screening with a Combination of Psychometric Tests

- Evidence is leaning toward using a combination of psychometric tests to predict ability to perform well on a road test [not in narration]
- Some of the psychometric tests available to predict ability to perform well on a road test include:
 - Clinical Assessment of Driving Related Skills (CADReS)
(National Highway Traffic Safety Administration, 2013a)
 - http://www.nhtsa.gov/staticfiles/nti/older_drivers/pdf/812228_CliniciansGuideToOlderDrivers.pdf
 - Driving Health Inventory (Skupin & Dinb-Zarr, 2006)
 - <http://drivinghealth.com/screeningassessment.html>



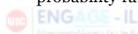
Screening with a Combination of Psychometric Tests

- Some of the psychometric tests available to predict ability to perform well on a road test include (continued):
 - DriveABLE (Dobbs, 2013)
 - <http://driveable.com/>
 - Rockwood Driving Battery (Rees et al., 2008)
 - <http://www.ncbi.nlm.nih.gov/pubmed/17723157>
 - Probability Calculator (Carr et al., 2011)
 - <https://www.ncbi.nlm.nih.gov/pubmed/22092020>



Screening Battery Example: Probability Calculator Model

- Based on a sample of older adults with dementia, a screening battery of three tests performed in less than 10 minutes was able to predict who would fail a road test with 84% accuracy (Receiver Operating Characteristic [ROC] curve)
- The “probability calculator” weighs the following tests:
 - Trail Making Test A (TMT-A)
 - Clock Drawing Test
 - The Alzheimer’s Detection 8 (AD8): A brief informant interview to detect dementia
- After entering individual scores on the above screens, the calculator formulates a “probability rate” of failure on a road test



(Carr et al., 2011)

The Plan for Older Drivers’ Safety (PODS) Algorithm

- Clinicians can follow this algorithm for screening, evaluation, and interpreting results
- Use screening and the CADReS tool to identify impairments
- Seek remediation using the analysis of the screen, CADReS, and driving deficit results
- Link to complete algorithm:
 - <http://www.usafp.org/wp-content/uploads/2016/03/Salinas-Driver-Elder-Safety-Final-post.pdf> (Salinas, 2016)



(American Geriatrics Society & Pomidor, 2015)

Screening Tool for At-Risk Drivers: The 4 Cs

- Older drivers are rated on a scale of 1 to 4 in each of the following areas:
 - Crashes/Citations
 - Concern (Family Report)
 - Clinical Status (Medical History)
 - Cognition
- Total scores range from 4 to 16
- Higher scores indicate a high risk of unsafe driving
- A score of 9 or above was able to identify 84% of unsafe drivers from a road test



(O'Connor et al., 2010)

Assessment Question 3

The Clinical Dementia Rating (CDR) levels are 0 to 3. What level would you suspect most driving evaluations would be performed at?

- a) 0 – No Impairment
- b) 0.5 – 1 Questionable Impairment to Mild Impairment
- c) 2 – Moderate Impairment
- d) 3 – Severe Impairment



Assessment Question 3: Answer

The Clinical Dementia Rating (CDR) levels are 0 to 3. What level would you suspect most driving evaluations would be performed at?

- a) 0 – No Impairment
- b) 0.5 – 1 Questionable Impairment to Mild Impairment**
- c) 2 – Moderate Impairment
- d) 3 – Severe Impairment



Assessment



Assessment of Functional Ability

- An assessment of underlying functional abilities is important for safe driving
- Medical, vision, cognitive, and motor assessments should determine the need for further evaluation and subsequent intervention and/or a more specialized driving evaluation




Assessment of Functional Ability

- Significant functional impairment may necessitate cessation of driving, with assistance in developing a plan for alternative methods of transportation
- Older adults with visual and/or physical impairments have a greater potential for continuing safe driving than those with cognitive impairment because adaptive equipment and compensatory strategies are available



Assessment: Medical
Common Medical Conditions That Impact Driving

- Endocrine Disorders: Diabetes
- Neurological Disorders: Parkinson's disease, Alzheimer's disease and other types of dementia, stroke
- Visual Disorders: Glaucoma, macular degeneration, cataracts
- Psychiatric Conditions: Anxiety, severe depression
- Musculoskeletal Disorders: Arthritis
- Any existing pain
- Review medications and driving interactions



Examples of Common Assessment Tools for Vision

Far Visual Acuity

- Early Treatment Diabetic Retinopathy Study (ETDRS)
- Snellen Chart
 - https://www.provisu.ch/images/PDF/Snellenchart_en.pdf

Contrast Sensitivity

- Pelli-Robson Contrast Sensitivity Chart
 - <http://www.psych.nyu.edu/pelli/pellirobson/>



Examples of Common Assessment Tools for Vision

Visual Fields

- Humphrey Visual Field Analyzer: Most common visual field test in the U.S., which consists of a center fixation light and blinking test lights in the patient's side vision
- Optec Functional Vision Analyzer: Can test patients' visual acuity and contrast sensitivity
- Assessment using specialized tests of vision provides comprehensive evaluation
- Examples: Depth perception, color vision (Optec Functional Vision Analyzer)



(Glaucoma Research Foundation, 2017)

Examples of Common Assessment Tools for Vision

*For a comprehensive training module on vision assessments,
see the ENGAGE-IL module
"The Older Adult with Visual, Hearing, and Cognitive Impairment" at
engageil.com*



Contrast Sensitivity

- Contrast sensitivity in vision measures the ability to distinguish between finer and darker increments of contrasting light
- This is an important measure of visual function in activities such as driving
- Particular driving conditions which challenge contrast sensitivity include driving in fog, low light, glare, or nighttime



Be Familiar With Your State Guidelines for Vision

- Know:
 - Your state guidelines for visual acuity
 - Your state guidelines for peripheral vision
 - When restrictions related to vision apply
 - What are the specific restrictions related to vision
 - Does your state allow bioptic driving
 - Look up your state's vision requirements:
 - <http://lpp.seniordrivers.org/lpp/index.cfm?selection=visionreqs&orderby=vision1>



(AAA Foundation for Traffic Safety, 2016)

Examples of Common Assessment Tools for Motor Skills and Sensation

Strength and Range of Motion (ROM) Tests

- Range of motion tests (upper and lower extremities and neck)
- Muscle testing (upper and lower extremities)
- Hand grip strength

Sensation

- Sensation of feet
- Proprioception of feet



(Reiman & Mamske, 2011)

Examples of Common Assessment Tools for Motor Skills and Sensation

Individual Functional Movement and Coordination

- Rapid Pace Walk (Marottoli et al., 1994)
 - <https://one.nhtsa.gov/people/injury/olddrive/safe/o2c.htm>
- Rapid Alternating Movements of Feet

Driving Evaluation

- Comprehensive driving evaluations can include specific tests of reaction time
 - Brake reaction tests, which can be performed on special equipment or simulators



Clinical Assessment of Driving-Related Skills

- Clinical Assessment of Driving-Related Skills (CADReS)
- A “toolbox” which consists of evidence-based tools for assessing vision, cognition, and motor/sensory function related to driving
 - http://www.nhtsa.gov/staticfiles/nti/older_drivers/pdf/812228_CliniciansGuideToOlderDrivers.pdf



(American Geriatrics Society & Pomidor, 2015)

Comprehensive Driving Evaluations

- A complete evaluation of an individual's driving knowledge, skills, and abilities
 - Medical and driving history
 - Clinical assessment of sensory-perceptual, cognitive, and psychomotor functional abilities
 - On-road assessment, as appropriate
 - An outcome summary
 - Recommendations for an inclusive mobility plan including transportation options
 - Usually provided by a certified driving rehabilitation specialist (who may also be an occupational therapist)



(Transportation Research Board, 2016)

Examples of Common Assessment Tools for Cognitive/Perceptual Skills

Not in Film: Memory

Assessment Tool	Website
Short Blessed Test <small>(Katzman et al., 1983)</small>	http://alzheimer.wustl.edu/adrc2/Images/SBT.pdf
Mini-Mental State Examination* <small>(Folstein et al., 1975)</small>	http://www4.parinc.com/products/product.aspx?Productid=MMSE COPYRIGHTED: <ul style="list-style-type: none"> • The MMSE was originally distributed free, but the current copyright holders are Psychological Assessment Resources (PAR) who "will not grant permission to include or reproduce an entire test or scale in any publication (including dissertations and theses) or on any website" • All users will need to purchase the tests from PAR

Examples of Common Assessment Tools for Cognitive/Perceptual Skills

Not in Film: Generalized Cognitive Function

Assessment Tool	Website
Montreal Cognitive Assessment (MoCA) <small>(Nasreddine et al., 2005)</small>	http://www.mocatest.org/ COPYRIGHTED (See http://www.mocatest.org/permission/)
Clock Drawing Test <small>(Freund et al., 2005)</small>	http://www.strokengine.ca/assess/cdt/



Examples of Common Assessment Tools for Cognitive/Perceptual Skills

Not in Film: Visual Scanning

Assessment Tool	Website
Trail Making Test A and B <small>(Taravneh et al., 1993; Vaucher, 2014)</small>	http://www.strokingengine.ca/assess/tmt/

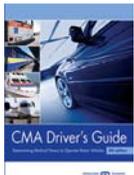
Executive Function

Assessment Tool	Website
Maze Tests (e.g., Snellgrove Maze) <small>(Snellgrove, 2000; Barco et al., 2011; Barco et al., 2014)</small>	http://www.snellgrovemazetask.com/the-snellgrove-maze-task.html COPYRIGHTED



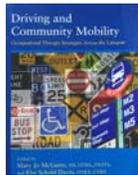
Evidence-Based Resources on Assessing Driving

Not in Film:



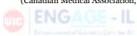
<http://ammac.org/Residents/CMA-Drivers-Guide-8th-edition-e.pdf>

(Canadian Medical Association, 2012 COPYRIGHT)



https://myaota.aota.org/shop_aota/pr odview.aspx?Type=D&SKU=1264

(American Occupational Therapy Association, 2012)



Evidence-Based Resources on Assessing Driving

Not in Film (Continued):



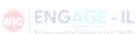
<http://geriatricscareonline.org/ProductAbstract/clinicians-guide-to-assessing-and-counseling-older-drivers-3rd-edition/Bo22/?param2=search>

(American Geriatrics Society & Pomidor, 2015)



<http://www.austroads.com.au/drivers-vehicles/assessing-fitness-to-drive>

(Austroads, 2016, COPYRIGHT)



Finally: Know When to Refer to a Driving Rehabilitation Specialist



Driving and Older Adults
Often Involves a Team Working Together

- Families or caregivers are often the first to become aware of a potential driving concern with an older driver
- The older driver may have had a citation or accident which involved law enforcement
- They may have been reported to the state, and some states may suspend the older adult driver's license until they are medically evaluated
- The Goal: To keep an older adult mobile in the community (which often includes driving) for as long as *safely* possible



(Transportation Research Board, 2016)

Driving and Older Adults
Often Involves a Team Working Together

- Physicians
- Nurses
- Driving rehabilitation specialists
- Hospital rehabilitation centers
- State licensing authorities
(Department of Motor Vehicles,
Department of Revenue)
- University driving programs
(simulator laboratories)
- Social workers
- Family/caregivers
- More!



(Transportation Research Board, 2016)

Health Care Provider: Physician, Nurse Practitioner

- The provider often will see the older adult and notice changes that may indicate potential driving concerns
- The older adult may bring in a notice from the state indicating the need for medical release to continue driving due to a recent accident or citation
- The family may contact the provider with driving concerns related to medical issues
- The provider will need to address the medical concerns and make a determination of fitness to drive for the older adult
- The provider may need to help the older adult and significant other connect with resources to assist in determination and/or driving retirement resources



(Transportation Research Board, 2016)

Social Worker

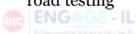
- Social workers are needed to assess wellbeing and transportation needs, evaluate the level of caregiver support available, and help access affordable training and transportation options
- Social workers help identify resources to overcome barriers to changing driving patterns or eventual driving retirement (such as financial support or peer support groups)



(Transportation Research Board, 2016)

Occupational Therapists

- Occupational therapists assess the older adult's functional abilities and the visual, cognitive, perceptual, and physical capacities for those abilities
- Occupational therapists provide interventions for identified impairments to support mobility in the environment, including driving, and may recommend strategies, therapies, and assistive devices for rehabilitation
- Occupational therapists often seek additional training to become driving rehabilitation specialists, who can perform expert special assessments and therapeutic interventions specifically regarding fitness to drive, including on-road testing



(Transportation Research Board, 2016)

Certifications in Driving Rehabilitation

Specialty Certification in Driving and Community Mobility (SCDCM)

- Available only to occupational therapists and provided by the American Occupational Therapy Association (AOTA)
- Reflects expertise in driving/community mobility, approval of an extensive portfolio, dedicated hours as a therapist (2,000 hours), and an additional 600 hours delivering services in driving/community mobility



(American Occupational Therapy Association, 2017)

Certifications in Driving Rehabilitation

Certified Driver Rehabilitation Specialist (CDRS™)

- Can have a health professional background or not; does not need a college degree
- Provided by the Association for Driver Rehabilitation Specialists (ADED)
- Hours of experience in driver rehabilitation services dependent upon educational degree
- All must pass a comprehensive certification exam



(Association for Driver Rehabilitation Specialists, 2017)

Assessment Question 4

A Certified Driver Rehabilitation Specialist (CDRS™):

- Must have a professional medical degree
- Has expertise in driving/community mobility, must pass a comprehensive certification exam, and is certified through the Association for Driver Rehabilitation Specialists (ADED)
- Is certified through the local Department of Motor Vehicles (DMV)
- All of the above



Assessment Question 4: Answer

A Certified Driver Rehabilitation Specialist (CDRS™):

- a) Must have a professional medical degree
- b) Has expertise in driving/community mobility, must pass a comprehensive certification exam, and is certified through the Association for Driver Rehabilitation Specialists (ADED) (Correct Answer)**
- c) Is certified through the local Department of Motor Vehicles (DMV)
- d) All of the above



Management: Enhancing Driving Safety



Enhancing Safety: Provider Recommendations for Older Drivers

- As the goal is to keep older adults safely in their community as long as possible, we must also consider ways to enhance driving safety
- Encourage older driver patients to see their doctor regularly, particularly if there are concerns
- Recommend older drivers drive cars with automatic transmission, power steering, back up mirror, large mirrors
- Recommend routine vision checks
- If they report trouble seeing in the dark, recommend no nighttime driving



(National Institute on Aging, 2016)

Enhancing Safety: Provider Recommendations for Older Drivers

- Review safe driving tips (e.g., avoid high-traffic areas, leave more space between their car and the car in front, drive in the right-hand lane on highways, avoid driving in bad weather)
- Warn about medications that may impact driving and encourage them to always read medication labels
- Encourage refresher courses in driving



(National Institute on Aging, 2016)

Older Drivers: Enhancing Driving Safety

- Encourage older drivers to stay physically active and exercise
- AARP Driving Resource Center:
 - <http://www.aarp.org/home-family/getting-around/driving-resource-center/driving-welcome/>
(American Association for Retired Persons, 2015a)
- Exercise for Safety Behind the Wheel video:
 - <http://www.aarp.org/home-family/getting-around/driving-resource-center/info-08-2013/exercise-for-safety.html>
(American Association for Retired Persons, 2013)



Resources for Older Drivers to Enhance Driving

- AAA: Evaluate Your Driving Ability
 - <http://www.seniordriving.aaa.com/evaluate-your-driving-ability>
(AAA Foundation for Traffic Safety, n.d.-a)
- Hartford Brain Fitness Exercises: To help older drivers cut accident risk
 - <https://newsroom.thehartford.com/releases/brain-fitness-exercises-help-older-drivers-cut-accident-risk-in-half-but-do-they-believe-it-s-true>
(Hartford Foundation, 2010)
- AARP Driving Resource Center: Interactive tools, games, traffic laws in your state, exercise programs (not in narration)
 - http://www.aarp.org/home-garden/transportation/driver_safety/
(American Association for Retired Persons, 2015b)



Ease the Transition to Driving Retirement



Decision to Stop Driving

- The decision to stop driving can happen in a variety of ways:
 - Family decision
 - Physician/health professional decision
 - Law enforcement decision
 - The older driver may make the decision
 - A combination of the above



(National Highway Traffic Safety Administration, 2013a)

How to Discuss Driving with an Older Driver

Collect Information

- Driving observations
- Non-driving observations, such as how they are doing at home, general health
- Have the older driver perform a self-assessment
- Does the older driver need a comprehensive driving evaluation?

Develop a Plan of Action

- Talk to the older driver about concerns
- Are the problems correctable?
- Identify alternative transportation
- Consider referrals, as needed (not in narration)



(National Highway Traffic Safety Administration, 2013b)

How to Discuss Driving with an Older Driver

Follow Through with the Plan

- Follow through with a plan that could include driving cessation, limited driving, or planning for driving retirement
- Involve the older adult in the plan
- Be sensitive and respectful
- Review the plan periodically



(National Highway Traffic Safety Administration, 2013b)

Ease the Transition to Stop Driving: Mobility Action Plan

Mobility Action Plan

- Goal: Keeping the “retired driver” busy and active in their community activities
- Create a schedule and involve the retired driver
 - What are the important activities he/she wants to go to?
 - How will he/she get there?
- Adhere to the schedule and help with revisions as needed

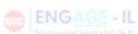


(National Highway Traffic Safety Administration, 2013b)

Easing the Transition from Driving: Be Creative and Individualize the Plan

Mobility Action Plan (Continued)

- Assign a “chauffeur” driver (e.g., family, friends, neighbors)
 - Rotate drivers among family members (i.e., each has a set day/time)
- Involve volunteer drivers (e.g., senior volunteers, church volunteers, students)
- Have groceries and prescriptions delivered to the seniors’ home
- Rehearse how to use public transportation, the senior bus service, and/or senior cab passes/discounts



(National Highway Traffic Safety Administration, 2013b)

Resources in the Community and Transportation Alternatives

- Area Agency on Aging (AAA) Eldercare Locator
 - www.eldercare.gov
- Community Transportation Association (CTAA)
 - www.ctaa.org/ntrc/
- Easter Seals
 - http://es.easterseals.com/site/DocServer/Transportation_Solutions.pdf?docID=2081
- National Center for Senior Transportation
 - <https://www.disability.gov/resource/national-center-on-senior-transportation/>



Resources

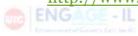
- Clearinghouse for Older Road User Safety (ChORUS) provides:
 - Technical manuals for highway engineers
 - Licensing policies by state for motor vehicle administrators
 - The latest research for medical professionals
 - Self-assessments and tips for older drivers
 - Online supportive community for family and caregivers
 - <https://www.roadsafeseniors.org>



(National Highway Traffic Safety Administration, 2013b)

Resources

- AARP: Driving Simulations, "My Driving Plan"
 - <http://www.aarp.org/home-family/getting-around/driving-resource-center/info-08-2013/my-driving-plan.html>
- **Not Repeated in Film**
- CADReS
 - http://www.nhtsa.gov/staticfiles/nti/older_drivers/pdf/812228_CliniciansGuideToOlderDrivers.pdf
- Clinical Dementia Rating (CDR)
 - <http://dementiakit.com.au/doms/domains/staging/cdr/>
- Driving When You Are Taking Medications
 - <http://www.nhtsa.gov/people/injury/olddrive/Medications/index.htm>



Assessment Question 5

A plan to enhance driver safety with an older adult should include a recommendation to:

- a) Have them review safe driving tips such as “avoid driving in bad weather”
- b) Drive at night when there is less traffic
- c) Take their sedating medications before driving so they are more relaxed
- d) Drive close to the car in front of them to assist in navigating the road



Assessment Question 5: Answer

A plan to enhance driver safety with an older adult should include a recommendation to:

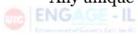
- a) Have them review safe driving tips such as “avoid driving in bad weather” (Correct Answer)**
- b) Drive at night when there is less traffic
- c) Take their sedating medications before driving so they are more relaxed
- d) Drive close to the car in front of them to assist in navigating the road



Resources: Driving Retirement Does Not Mean an Individual Cannot Live Alone

Not in Film

- If an older adult needs to retire from driving, this does not necessarily mean he/she needs to move into assisted living; however, it is important to assist the family in moving toward planning for the future
- This is an individual situation that needs to be addressed and carefully explored with considerations in the following areas:
 - Level of medical impairment and medical prognosis
 - Level of support needed
 - Level of support available
 - Any unique situation involving the older adult



(National Highway Traffic Safety Administration, 2013b)

Resources: The Dementia Rating

Not in Film

- A common way that clinicians describe level of impairment is with the Clinical Dementia Rating (CDR)
- The CDR tool describes level of impairment and uses a scale of 0 to 3 to describe the level of dementia
- Impairment begins at the 0.5 level, which indicates “questionable,” and the level 1 level, which indicates impairment

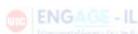


(Morris, 1993)

Resources: The Dementia Rating

Not in Film (Continued)

- Most individuals with Alzheimer’s disease seek comprehensive driving evaluations in the “questionable” to “mild” impairment level of Alzheimer’s
- Publicly available training in the CDR is available online at:
 - <http://knightadrc.wustl.edu>



(Morris, 1993)

Summary

- The ability to drive signifies independence and responsibility
- The decision to retire from driving should be treated delicately and respectfully
- By assessing and considering all the factors, and using all the tools available to maintain driving safety, older adults may be able to stay in the driver’s seat longer, or remain very active in their community through the use of transportation support and resources



(National Highway Traffic Safety Administration, 2013b)

Resources

<http://www.ahel.net/>, Accessed March 30, 2017
<https://dhhpines.wash.edu/pdf/images/88T.pdf>, Accessed March 31, 2017
<http://www.aapt.org/Education/Careers/Advance-Career-Board-Specialty-Certifications/SpecialtyCert.aspx>, Accessed March 30, 2017
<http://www.aarp.org/home-family/getting-around/driving-resource-center/driving-welcome/>, Accessed March 30, 2017
<http://www.aarp.org/home-family/getting-around/driving-resource-center/info-08-2013/exercise-for-safety.htm>, Accessed March 30, 2017
<http://www.aarp.org/home-family/getting-around/driving-resource-center/info-08-2013/my-driving-plan.htm>, Accessed March 30, 2017
http://www.aarp.org/home-garden/transportation/driver_safety/, Accessed March 30, 2017
<http://amman.org/Residents/CMA-Drivers-Guide-8th-edition-c.pdf>, Accessed March 30, 2017
<http://www.auntwatts.com.au/drivers-vehicles/assessing-fitness-to-drive>, Accessed March 30, 2017
<http://www.cma.ca/driversguide>, Accessed March 30, 2017
<http://www.ctaa.org/ntr/>, Accessed March 1, 2017
<http://dementiak.com.au/doms/domains/staging/cdr/>, Accessed March 30, 2017
<https://www.disability.gov/resource/national-center-on-senior-transportation/>, Accessed March 1, 2017
<http://drivinghealth.com/>, Accessed March 30, 2017
<http://drivinghealth.com/screeningassessment.html>, Accessed March 30, 2017
http://es.casternews.com/site/DocServer/Transportation_Solutions.pdf?docID=2084, Accessed March 30, 2017



Resources

www.eldercare.org, Accessed March 30, 2017
<http://geriatriccareonline.org>, Accessed March 30, 2017
<http://informatics.med.nyu.edu/modules/pub/neurorecovery/coordination.html>, Accessed March 30, 2017
<http://inightadr.wisc.edu>, Accessed March 30, 2017
http://inightadr.wisc.edu/cdr/PDFs/CWR_Table.pdf, Accessed March 30, 2017
<http://ipp.ac.uk/olderdrivers.org/ipp/index.cfm?section=visionreq&orderby=vision1>, Accessed March 30, 2017
<http://www.mmausa.org/>, Accessed March 30, 2017
https://mywatts.auntwatts.com/dhrp_2014/psychology.aspx?Type=DR&SKU=1064, Accessed March 1, 2017
<http://www.ncbi.nlm.nih.gov/pubmed/1772112>, Accessed March 30, 2017
<https://www.ncbi.nlm.nih.gov/pubmed/22092020>, Accessed March 30, 2017
http://www.nhtsa.gov/statistics/nhts/older_drivers/pdf/812228_CliniciansGuideToOlderDrivers.pdf, Accessed March 1, 2017
<https://www.nia.nih.gov/health/publication/older-drivers>, Accessed March 1, 2017
<http://www.nhtsa.gov/people/injury/olderdrivers/Medications/index.htm>, Accessed March 1, 2017
<http://www.nhtsa.gov/people/injury/olderdrivers/UnderstandOlderDrivers>, Accessed March 1, 2017
www.nhtsa.gov/statistics/nhts/older_drivers/pdf/KeyProvisionsOlderDrivers.pdf, Accessed March 30, 2017
http://www.nhtsa.gov/statistics/nhts/older_drivers/pdf/812228_CliniciansGuideToOlderDrivers.pdf, Accessed March 30, 2017
<https://one.nhtsa.gov/people/injury/olderdrivers/OlderDriversBook/pages/Comments.html>, Accessed March 30, 2017



Resources

<https://one.nhtsa.gov/people/injury/olderdrivers/safe/09c.htm>, Accessed May 15, 2017
https://www.provision.ch/images/PDF/Snellenschart_en.pdf, Accessed May 15, 2017
<http://www.psych.nyu.edu/pelli/pelli-06/irobagan/>, Accessed May 15, 2017
http://www.roadwise.org, Accessed March 30, 2017
<http://www.roadwise.org/>, Accessed March 1, 2017
<http://www.seniorliving.usa.com/evaluate-your-driving-ability>, Accessed March 30, 2017
<http://www.snclgovernmentsask.com/the-snellens-test-task.html>, Accessed March 31, 2017
<http://www.strokenine.ca/assess.html>, Accessed March 31, 2017
<http://www.strokenine.ca/assess.html>, Accessed March 31, 2017
<https://www.thehartford.com/resources/realtime-ma-fact-excellence>, Accessed March 1, 2017
<http://www.uscifi.org/wp-content/uploads/2016/09/Sullivan-Driving-Elder-Safety-Final-report.pdf>, Accessed March 30, 2017
<http://www4.parson.com/products/product.aspx?ProductID=MMSE>, Accessed March 31, 2017



References

- AAA Foundation for Traffic Safety. (2016). *Driver Licensing Policies and Practices*. Retrieved from <http://ftp.aaa.org/drivers/02/>. Accessed May 12, 2017
- AAA Foundation for Traffic Safety. (n.d.a.). *Evaluate your driving ability: self-rating tool. drivers 65 plus*. Retrieved from <http://jeenordriving.aaa.com/wp-content/uploads/2016/08/Driver652.pdf>. Accessed March 30, 2017
- AAA Foundation for Traffic Safety. (n.d.b.). *Roadwise RX*. Retrieved from <http://seniorliving.aaa.com/understanding-mind-body-changes/medical-conditions-medications/roadwise-rx/>. Accessed March 30, 2017
- Alzheimer's Association. (2017). *Dementia & driving resource center*. Retrieved from <http://www.alz.org/care/alzheimers-dementia-and-driving.aspx?qtzGH3b6k4H>. Accessed September 12, 2016.
- American Association for Retired Persons. (2012). *Exercise for safety behind the wheel: simple exercises contribute to a more positive driving experience and help you stay safe on the road*. Retrieved from <http://www.aarp.org/home-family/getting-around/driving-resource-center/info-08-2013/exercise-for-safety.html>. Accessed March 30, 2017
- American Association for Retired Persons. (2012a). *Driving resource center*. Retrieved from <http://www.aarp.org/home-family/getting-around/driving-resource-center/driving-welcome/>. Accessed March 30, 2017
- American Association for Retired Persons. (2012b). *Driving safety program*. Retrieved from <http://www.aarp.org/home-garden/transportation/driver-safety/>. Accessed March 30, 2017
- American Geriatrics Society & Pomidor A. (2015). *Clinician's guide to assessing and counseling older drivers* (DOT HS 812 228). Retrieved from: <http://geriatricsonline.org/ProductAbstract/clinician's-guide-to-assessing-and-counseling-older-drivers/Bozz>. Accessed March 30, 2017.
- American Occupational Therapy Association. (2012). *Driving and community mobility: occupational therapy strategies across the lifespan* (M. McGuire & E. Schold Davis Eds.). Bethesda, MD: Author.
- American Society of Consulting Pharmacists. (2015). *ASCP fact sheet*. Retrieved from <http://www.ascp.com/articles/about-ascp/ascp-fact-sheet>. Accessed on May 12, 2017.
- Andrew C, Traynor V, & Iverson D. (2015). An integrative review: understanding driving retirement decisions for individuals living with a dementia. *J Adv Nurs*, 57(4), 2708-2740. doi:10.1111/jan.12727
- Association for Driver Rehabilitation Specialists. (2017). *Learn about: Certified Driver Rehabilitation Specialist CDRES™*. Retrieved from <http://www.adred.net/?page=210>. Accessed on March 30, 2017.



References

- Baldock M, Mathias J, McLean A, & Berndt A. (2006). Self-regulation of driving and its relationship to driving ability among older adults. *Accid Anal Prev*, 38(3), 1038-1045.
- Baro P, Baum C, Ott B, Lee S, Johnson A, Wallendorf M, & Carr D. (2013). Driving errors in persons with dementia. *Am Geriatric Soc*, 63(7), 1372-1380. doi:10.1111/jgs.13508
- Baro PP, Wallendorf MJ, Snellgrove CA, Ott BR, & Carr DB. (2014). Predicting road test performance in drivers with stroke. *Am J Occup Ther*, 68(2), 221-229. doi:10.5014/ajot.2014.008938
- Bennett J, Chehalak E, & Batchelor J. (2016). Cognitive tests and determining fitness to drive in dementia: A systematic review. *J Am Geriatr Soc*. doi:10.1111/jgs.14180
- Canadian Medical Association. (2012). *CMA driver's guide: determining medical fitness to operate motor vehicles*, 8th Ed. Retrieved from <http://ammcac.org/Residents/CMA-Drivers-Guide-8th-edition-e.pdf>. Accessed March 30, 2017
- Carr D, Baro P, Wallendorf M, Snellgrove C, & Ott B. (2011). Predicting road test performance in drivers with dementia. *J Am Geriatr Soc*, 59(1), 212-221. doi:10.1111/j.1532-2415.2011.03857.x
- Carr DB, Schwartzberg JG, Manning L, & Sempak J. (2010). *Physician's Guide to Assessing and Counseling Older Drivers* (2nd ed.). Washington, DC: National Highway Traffic Safety Administration. Retrieved from <https://www.nhtsa.gov/people/injury/olderdrivers/olderdriversbook/pages/Contents.html>. Accessed March 30, 2017
- Dobbs A. (2013). Accuracy of the DriveABLE cognitive assessment to determine cognitive fitness to drive. *Can Fam Physician*, 58(3), 156-161.
- Folstein MF, Folstein SE, & McHugh PR. (1975). "Mini-mental state": A practical method for grading the clinician. *J Psychiatr Res*, 12(3), 189-198. doi:10.1016/0278-3962(75)90026-6 [pii]
- Freund B, Gravenstein S, Ferris R, Burke B, & Shabene E. (2005). Drawing clocks and driving cars: use of brief tests of cognition to screen driving competency in older adults. *J Gen Intern Med*, 20(3), 240-244.
- Fittelli C, Borgiotti D, Indrie G, Bonanni E, Mantri M, Tognoni G, Pasquali L, & Indrie A. (2009). Effects of Alzheimer's disease and mild cognitive impairment on driving ability: a controlled clinical study by simulated driving test. *Int J Geriatr Psychiatry*, 24(3), 232-238. doi:10.1002/gps.2095



References

- Grace J, Amick M, D'Abreu A, Festa E, Heindel W, & Ott BR. (2002). Neuropsychological deficits associated with driving performance in Parkinson's and Alzheimer's disease. *J Int Neuropsychol Soc*, 10(6), 756-775.
- Glaucoma Research Foundation. (2017). *What is a Visual Field Test?* Retrieved on March, 30, 2017. <http://www.glaucoma.org/treatment/what-is-a-visual-field-test.aspx>
- Hartford Foundation. (2016). *Brain fitness exercises help older drivers cut accident risk in half - but do they believe it's true?* Retrieved from <https://newsroom.thehartford.com/releases/brain-fitness-exercises-help-older-drivers-cut-accident-risk-in-half-but-do-they-believe-it-s-true>. Accessed March 30, 2017
- Katzman R, Brown T, Fuld P, Peck A, Schechter R, & Schimmel H. (1982). Validation of a short orientation-memory-concentration test of cognitive impairment. *Am J Psychiatry*, 140(6), 734-739. doi:10.1176/ajp.140.6.734
- Jones Ross R, Scialia C, & Conlazzo S. (2015). Predicting on-road driving performance and safety in cognitively impaired older adults. *J Am Geriatr Soc*, 63(11), 2386-2396. doi:10.1111/jgs.13742
- Marshall R, Coomes Jr, L, Wagner R, Dossett J, & Tinetti M. (1994). Predictors of automobile crashes and moving violations among elderly drivers. *Ann Intern Med*, 121(1), 842-846.
- Morris JC. (1993). The Clinical Dementia Rating (CDR): current version and scoring rules. *Neurology*, 43(11), 2412-2414.
- Nasreddine ZS, Phillips NA, Bedirian V, Charbonneau S, Whitehead V, Collin I, Cummings JL, & Chertkow H. (2005). The Montreal Cognitive Assessment, MoCA: a brief screening tool for mild cognitive impairment. *J Am Geriatr Soc*, 53(4), 693-699. doi:10.1111/j.1532-5415.2005.03221.x
- National Highway Traffic Safety Administration. (2013a). *How to understand and influence older drivers*. Retrieved from <http://www.nhtsa.gov/people/injury/olderdrivers/UnderstandOlderDrivers/>. Accessed March 30, 2017.
- National Highway Traffic Safety Administration. (2013b). When it comes to crashes, older drivers are more likely to be killed or injured. *Safety in Numbers*, 1(8), 1-4. www.nhtsa.gov/statistics/numbers/Safety_In_Numbers_Older_Drivers_S11864.pdf. Accessed March 30, 2017.
- National Highway Traffic Safety Administration. (2014). *Key Provisions of State Laws Pertaining to Older Driver Licensing Requirements*. Retrieved from http://www.nhtsa.gov/statistics/ni/older_drivers/pdf/KeyProvisionsOlderDrivers.pdf. Accessed March 30, 2017.



References

- National Highway Traffic Safety Administration. (2016). NHTSA data shows traffic deaths up 7.7 percent in 2015 [Press release]. Retrieved from <https://www.nhtsa.gov/press-releases/nhtsa-data-shows-traffic-deaths-77-percent-2015>. Accessed March 30, 2017.
- National Institute on Aging. (2016). *Health & aging: older drivers*. Retrieved from <https://www.nia.nih.gov/health/publication/older-drivers>. Accessed March 30, 2017.
- O'Connor M, Kaput L, Lin B, Hollis A, & Jones R. (2010). The 4Cs (crash history, family concerns, clinical condition, and cognitive functions): a screening tool for the evaluation of the at-risk driver. *J Am Geriatr Soc*, 58(6), 1104-1108. doi:10.1111/j.1532-5415.2010.02835.x
- Orioli L, Dohome B, Gulegheska B, Tricotel A, Contrand B, Laumon B, Salni LR, & Lagarde E. (2010). Prescription medicines and the risk of road traffic crashes: a French registry-based study. *PLoS Med*, 7(11), e1000966. doi:10.1371/journal.pmed.1000966
- Rees J, McKenna P, Bell V, Skuseck E, Nichols E, & Fisher P. (2008). The Rookwood Driving Battery: normative older adult performance. *Br J Clin Psychol*, 47(Pt 2), 139-151. doi:10.1111/j.1469-7629.2008.01642.x
- Roger M, Welch R, Watson G, Choleton B, Baker L, & Craft S. (2004). The relationship between neuropsychological functioning and driving ability in dementia: a meta-analysis. *Neuropsychology*, 18(1), 83-93.
- Reiman P & Manske M. (2011). The assessment of function: How is it measured? A clinical perspective. *J Man Manip Ther*, 19(2): 91-99.
- Sullivan RD. (2016). *Giving up the keys: assessing and counseling older drivers*. Retrieved from <http://www.usafp.org/wp-content/uploads/2016/03/Sullivan-Driving-Elder-Safety-Final-post.pdf>. Accessed March 30, 2017.
- Snellgrove C. (2009). *Cognitive screening for the safe driving competence of older people with mild cognitive impairment or early dementia*. Retrieved from https://infrastructure.gov.au/roads/safety/publications/2009/pdf/cog_screen_older.pdf. Accessed March 31, 2017.
- Staplin L, & Duh-Zarr T. (2006). Promoting rehabilitation of safe driving abilities through computer-based clinical and personal screening techniques. *Topics in Geriatric Rehabilitation*, 22, 129-138.
- Syed Q, & Wilson Holland Jr. N. (2016). Should your older adult patient be driving? In L. A. Lindquist (Ed.), *New Directions in Geriatric Medicine* (pp. 91-104). Geneva: Springer.
- Tarawneh M, McCoy P, Bishu R, & Ballard J. (1993). Factors associated with driving performance of older adults. *Transport Res Rec*, 1405, 64-71.



References

- Transportation Research Board. (2016). *Taxonomy and terms for stakeholders in senior mobility* (Transportation Research Circular E-C211). Retrieved from <http://onlinepubs.trb.org/Onlinepubs/circulars/ec211.pdf>. Accessed March 30, 2017.
- Vaucher P, Hering D, Cardoso I, Hering MH, Mangin P, & Favrat B. (2014). The trail making test as a screening instrument for driving performance in older drivers: a transitional research. *BMC Geriatr*, 14, 122. doi:10.1186/1471-2318-14-122
- Wood J, Anstey K, Lacherez P, Kerr G, Mallon K, & Lord S. (2009). The on-road difficulties of older drivers and their relationship with self-reported motor vehicle crashes. *J Am Geriatric Soc*, 57(11), 2062-2069. doi:10.1111/j.1532-5415.2009.02498.x

