CHAPTER 3 SCREENING AND ASSESSMENT OF FUNCTIONAL ABILITIES FOR DRIVING

KEY POINTS

- An assessment of underlying functional abilities important for safe driving (e.g., vision, cognition, motor) should determine the need for further evaluation and subsequent intervention, and/or for a more specialized driving evaluation.
- Significant functional impairment may necessitate cessation of driving and the need for assistance in developing a plan for safe alternative methods of transportation to maintain mobility.
- Older adults with physical and/or visual impairments have a greater potential to benefit from intervention to continuing safe driving than those with cognitive impairment, because adaptive equipment and compensatory strategies are available.
- No single assessment can accurately predict the ability to drive safely; a target set of assessment tools should be used to determine risk in older adults based on functional impairments.
- The Clinical Assessment of Driving Related Skills (CADReS) is a toolbox of evidence-based practical, office-based assessment tools to screen for impairment in the key areas of vision, cognition, and motor/sensory function as they relate to driving.
- Self-report or self-assessment has not been shown to be an adequate measure of fitness-to-drive.

Mr. Phillips *has been accompanied to the clinic by his son, who is in the examination room with him. Mr. Phillips tells you that he is a safe driver. You request and obtain permission to interview the son, who voices his concern. Four months ago, Mr. Phillips was involved in a minor car crash, which was his fault. He has also had several near-crashes in the past 2 years. He has never been lost while driving.*

In discussing Mr. Phillips' transportation options, you learn that driving is Mr. Phillips' main mode of transportation, and he drives almost every day. Although Mr. Phillips is certain—and his son confirms—that family members and neighbors would be willing to drive him wherever he needs to go, he has never asked for rides. "Why should I ask for rides when I can just drive myself? Besides, I don't want to impose on my family or friends."

Increasing longevity in the U.S. population means that, because of comorbid conditions, many older adults may outlive their ability to drive safely. Men are projected to live approximately 6 years and women 10 years longer than their ability to drive.[1] The implication of this projection for clinical practice is the increasing need for an evidence-based "decision" to be made about driving safety, or stopping driving, for independent community-dwelling adults. This chapter focuses on the assessment of functional abilities needed to safely operate a motor vehicle, or "fitness to drive." Fitness to drive is a description of a driver who has an absence of any functional (sensory–perceptual, cognitive, or psychomotor) deficit or medical condition that significantly impairs an individual's ability to fully control the vehicle while conforming to the rules of the road and obeying traffic laws.[2]

Chapter 2 outlined what factors or "red flags" to

observe if driving safety is of concern to the older adult, caregiver, or clinical team member. This chapter goes beyond the initial identification of potential problems to describe the screening and assessment process of older adults who have been recognized as having a possible safety risk and need further exploration of their fitness to drive.

In determining fitness to drive, it is important to distinguish between **screening** and a **comprehensive driving evaluation**. When **screening**, the intention is to identify risk. The screening is typically brief, with the outcome intended to monitor risk over time or refer for further evaluation when appropriate. Further evaluation will identify at-risk drivers who may benefit from intervention strategies or need to cease driving. This more comprehensive evaluation may include referral to occupational therapy or driving rehabilitation to obtain the data necessary to determine a client-centered, individualized plan. The goal is to optimize the ability of older adults to continue to drive safely for as long as possible.

The clinical team may detect problems that (1) allow early intervention and may prevent disability and prolong driving ability, (2) identify impairments that can be remediated, (3) identify strategies to compensate for a medical condition, and/or (4) necessitate plans for the timely transition to alternative means of transportation.

Primary prevention addresses issues to prevent the loss of driving ability. This includes providing strategies to support driving abilities as well as early intervention or "starting the conversation" to introduce the importance of developing a transportation plan that for some may lead to driving retirement. Some transitions are unpredictable and will require an abrupt but supportive approach, such as driving cessation after a severe stroke. Other transitions are more predictable but allow time to build awareness and knowledge in preparation for transition through a transportation plan that shifts the focus to preservation of community mobility as a non-driver. This transition approach is helpful for all older adults, but especially for those facing chronic medical conditions that may eventually affect driving (e.g., diabetes, dementia, Parkinson disease). For example, in addition to explaining how to manage blood sugar levels with older adults with diabetes, it may be helpful to explain how managing blood sugar levels may help to minimize peripheral nerve damage and maintain eye health to prolong fitness to drive. This knowledge may be potentially motivating and important as an incentive to optimize adherence.

Secondary prevention attempts to remediate any loss of functional skills needed for driving. This may include hand controls to compensate for amputation or neuropathy, as well as management of depression, vision loss, or cognitive flexibility to prevent further loss of driving capacity.

Tertiary prevention requires a transportation plan because the loss of driving skills is irreversible and creates known risk to the individual and the community. Recommendation for cessation is not enough, as the older adult needs assistance to maintain community engagement through a transportation plan.

SCREENING VERSUS ASSESSMENT

Screening

The goal of screening is to broadly identify older adult drivers who might be "at risk" of unsafe driving. Screening tools should be brief and easy to administer and must have evidence that supports their value in identifying the possibility of driving risk. In the process of a broad screening, some individuals who are not at risk will also be incorrectly

identified. However, because of the safety risk to individuals and society, over-identification is necessary. With this in mind, a screening must always be followed by an evaluation before fitness-to-drive can be determined.

Assessment

Assessment requires more in-depth evaluation to distinguish between individuals who are truly at risk and those who are not. Screening and assessment tool scores do not by themselves predict crash risk for several reasons, including the low occurrence of crashes, and that older adults tend to drive less and engage in less risk-taking behavior (e.g., speeding, drunk driving). It is the clinical skill, expertise, and reasoning of the health care provider using the screening outcomes of the older adult that allows an educated judgment about probable driving outcome.

Multiple assessment tools are used for screening and assessment of driving.[3] However, there is no single tool that should be used to determine fitness to drive.[4-6] While the on-road assessment is widely accepted as the gold standard, even a "driving evaluation" has different contexts.[7] For example, the driving evaluation completed **for licensure** is more commonly named a "driving test" and typically requires 10-15 minutes to complete. The intention of this test is typically to evaluate knowledge of rules of the road and a checklist of skills required to operate a vehicle. The focus of driving instructors at **driving schools** is on teaching driving competence though lessons or skill building to ensure that drivers adhere to the correct maneuvers for vehicle operation while obeying traffic laws. Thus, their driving evaluations focus on gaps in learning, learning new skills for managing a vehicle, and testing knowledge of roadway rules and laws. Older adults have typically been driving for many decades and are experienced drivers that have developed overlearned skills and abilities. Even a driver with significant cognitive decline that includes episodes of confusion or diminished judgment may be capable of demonstrating retained basic driving skills when the test is structured with each action directed, such as "turn right at the stop sign." In contrast, **a comprehensive driving evaluation** includes a clinical evaluation and an on-road portion to evaluate higher functioning abilities in the executive domains of decision-making, navigation, and problem solving, essential for determining an experienced older driver's fitness to drive.

In response to the complexity of driving terminology, the Transportation Research Board of the National Academies for Science, Engineering and Medicine's Committee for Safe Mobility for Older Persons[2] has developed definitions for screening, assessment, and evaluation (Table 3.1).

While there is an increasing array of computer-based testing tools, clinicians need to carefully consider their use with the older adult population. It is important to consider familiarity and acceptance by an individual who may not use technology frequently. Performance on this type of testing may result in test failure because of lack of familiarity with the technology rather than the tools value in measuring deficits in fitness to drive.

Process of Screening and Referral

As the first step of the process, clinical team members identify driving as the patient's primary mode of transportation and if their medical impairments will affect driving. If both are true, the team members may use the screening/assessment tools described in this chapter to ascertain potential driving risk. Although cut-off scores might be provided, it is important to remember that these assessment tools document only the presence of a potential impairment, not its cause or implications.

Table 3.1 - Screening, Assessment, and Evaluation Terminology

Term	Defintions
Road test	An examination of driving maneuvers and knowledge of rules of the road performed in a motor vehicle on a public highway or street
Driving test	An examination including specified driving maneuvers performed in a motor vehicle
Evaluation	Obtaining and interpreting data to document results and inform an individualized mobility plan
Assessment	Use of specific measurements, tools, or instruments during the evaluation process
Screening	Obtaining and reviewing data to determine the need for evaluation
Self-screening	An individual obtains and reviews his or her own data to determine the need for evaluation; relies on insight and self-reflection
Proxy screening	An individual obtains and reviews data to determine the need for evaluation for another person
Evaluator screening	A professional skilled in a specific screening tool obtains and reviews data to determine the need for evaluation of a specific individual
Driving assessment	Use of an on-road test to measure and qualify driving skills and abilities, which may be triggered by a screening outcome that indicates increased risk of driving impairment or crash involvement
Driving evaluation	Obtaining and interpreting data and documenting results to inform an individualized mobility plan based on an individual's driving abilities and/or potential to be an independent driver, or inform a determination of fitness to drive
Clinical driving evaluation	Obtaining and interpreting data and documenting results to determine fitness to drive through assessment of sensory/perceptual, cognitive, and/or psychomotor functional abilities using specific tools or instruments
Comprehensive driving evaluation	A complete evaluation of an individual's driving knowledge, skills, and abilities that includes (1) medical and driving history; (2) clinical assessment of sensory/perceptual, cognitive, or psychomotor functional abilities; (3) on-road assessment, as appropriate; (4) an outcome summary; and (5) recommendations for an inclusive mobility plan, including transportation options

Using the outcomes of several of the screening tools and the medical history, health care providers are in the best position to determine if the potentially at-risk older adult may benefit from a referral to another health care provider (e.g., ophthalmologist, occupational therapist, clinical neuropsychologist, physical therapist) for evaluation of a specific deficit (e.g., visual acuity, balance problem, instrumental activities of daily living [IADL] issues) before considering a referral for a comprehensive driving evaluation. Clinical team members may also determine, based on the evidence from the medical history and screening outcomes, that further evaluation and/or intervention is not warranted.

Examples include macular degeneration with visual acuity below state standards, progressive dementias, or advanced Parkinson disease. In these cases, recommendations may be for driving cessation and referral to appropriate team members for alternative transportation support. In contrast, when the results of screening indicate no potential problems, education for health and driving promotion should be offered rather than further evaluation.

Finally, when the older adult has a chronic, but stable medical condition and the outcomes from the assessment tools suggest potential impairments, health care providers can then determine whether

to refer the older adult to a driving rehabilitation specialist (DRS) for a comprehensive driving evaluation. In areas where DRSs are limited and/or the history suggests other complex IADLs are compromised, a comprehensive occupational therapy evaluation of IADLs may be warranted. This is further described in Chapter 5.

Clinical team members and health care providers must function within their scope of practice and use clinical judgment regardless of any test scores to make decisions about fitness-to-drive of older adults. All available information, including driving and medical history, should be considered. The specific tools discussed here were selected for their applicability and feasibility in an office setting, along with their correlates with impaired driving outcomes, but they cannot cover every important function needed for driving.

BROACHING THE ISSUE OF A DRIVING SCREENING OR ASSESSMENT WITH THE OLDER ADULT

The primary message should be one of concern and assistance, balancing the older adult's or caregiver's concern about the safety of the older adult and/or the public with the older adult's need for transportation. Care should be taken to avoid an adversarial position, because this may prompt an unproductive reaction of defensiveness. The conversation should begin with a commitment to explore all reasonable options for keeping the older adult mobile in his or her community. Points to emphasize include that screening and assessment are necessary to identify ways to help the older adult continue to drive safely as long as possible and that current technology, roadways, and rehabilitation offer many helpful interventions to do so. If the older adult expresses fear that the clinical team will "take away my driver's license," it may be helpful to offer reassurance that only the state licensing agency has that type of legal authority (see Chapter 7).

"Mr. Phillips, *I'm concerned about how your health condition is affecting your driving. Your son tells me that you were recently in a car crash and that you've had several near-crashes in the past 2 years. Although you have managed your medical conditions, I believe their combined effect may have progressed to the point that it may be affecting your driving skills and ability. I am going to ask you to do a few simple tests that can measure functional abilities needed for safe driving, such as walking down the hall while I time you. This will help us find out if there are areas we need to look into further.*

"Based on your health condition and the results of the tests, we'll do our best to treat or reverse any problems we find. For example, if you're not seeing as well as you should, we'll see what we can do to improve your vision. If you have difficulty turning your head, a referral to a physical therapist may be in order. If there's something we can't improve, then we may consult a driving rehabilitation specialist to explore all possible solutions. This type of specialist, typically an occupational therapist, will offer you further testing and then may go out on the road with you to see how you're driving. The driving rehabilitation specialist can develop a plan that will include, if at all possible and safe, recommendations, strategies, and maybe adaptive equipment for you to consider. Whenever possible, the driving rehabilitation specialist will recommend ways to make your driving safer. Our goal is to keep you on the road for as long as you are safe to drive."

FUNCTIONAL AREAS ASSESSED FOR DRIVING

Three key functional areas are considered as the foundation for determining fitness to drive: vision, cognition, and motor/somatosensory function. Any impairment in these areas has the potential to increase the older adult's risk of being involved in a crash and/or lost. Once these areas are assessed, the health care provider can determine if more information is required in one or all areas or if referral to a specific specialist for further evaluation or intervention is needed (e.g., ophthalmologist, neuropsychologist, occupational therapist, physical therapist, DRS).

Vision

A vision assessment includes assessment of visual acuity, visual fields, and contrast sensitivity.

Vision is the primary sense used in driving and is relied on heavily for successful execution of driving.[8] All states require vision testing to initially obtain a driver's license, although the limits differ. Several states also require vision testing at the time of license renewal. For information on these laws, see Chapter 8.

Visual Acuity: Visual acuity commonly declines with age, although no consensus exists on the rate of decline or decade of onset. Decline in acuity is related to physiologic changes of the eye that occur with age and the increased incidence of conditions such as cataracts, glaucoma, diabetic retinopathy, and age-related macular degeneration (ARMD).[9] Although distance visual acuity appears to be crucial to many driving-related tasks, declines in near visual acuity may be associated with difficulty seeing/reading maps or gauges and controls inside the vehicle.

Most research studies show that visual acuity is not linked to crash risk,[4,8,10-12] which may be because of the variability in visual requirements by state licensing agencies and/or visual acuity testing of stationary targets does not represent the motion-based driving environment.[11] However, there is some evidence that visual screening laws are associated with decreased motor vehicle crash fatality rates.[13] Cataracts are a major concern associated with vision and driving. The gradual development of cataracts results in a slow change in vision, which the older adult may not recognize. Identification and removal of cataracts can effectively improve driving safety.[14-16]

General visual acuity can be easily measured in the office setting using readily available tools such as a Snellen chart (www.provisu.ch/Age/Snellenchart_en.pdf). Near visual acuity can be assessed by the Rosenbaum pocket chart, and there are several free apps available for mobile devices.

Visual Field: Visual fields may decline as a result of natural aging changes such as ptosis, a drooping of the eyelid most commonly found in the older population. Most visual field cuts, however, are the consequence of medical conditions such as glaucoma, optic neuritis, detached retina, and stroke/traumatic brain injury. Drivers with loss of peripheral vision may have trouble noticing traffic signs or cars, vehicles in adjacent lanes, and/or pedestrians on sidewalks or street crossings. However, although studies on driving indicated that drivers who had at least moderate to severe vision impairment were more likely to be involved with crashes, not all studies have shown an association.[11] There are large individual differences when there is field loss and evidence suggests that good drivers are able to compensate for field cuts;[11,17] the science examining the relationship between visual field loss and driving performance is still evolving.[8] Visual fields are measured through confrontation testing and, if deficits are noted, formal visual field

perimetry scanning may be indicated, especially if required by the state licensing authority.

Contrast Sensitivity: Contrast sensitivity decreases as a normal process of aging. While this loss is not an issue during daylight, it becomes more difficult for older adults to see a target against similar background in low light. Thus, older adult drivers may have problems distinguishing cars or pedestrians against the driving background during dawn and dusk hours, in foggy conditions, or during storms. Although research has shown that contrast sensitivity is associated with increased crash risk,[8,18] the impaired contrast sensitivity associated with crash is typically associated with drivers who have cataracts (which improve with surgery) or Parkinson disease.[11] Thus, more research is needed to produce standardized, validated cut-off points for contrast sensitivity and to identify the level at which impairment results in higher crash risk. Education about this normal aging process is important and addressed by offering strategies that include avoiding driving in early morning, dusk, or during fog or storms. Further evaluation for contrast sensitivity may be warranted if the older adult has frequent falls, because the same contrasts in the walking environment are an issue and falls and driving risk are related.[19]

Several other visual functions are important in driving (glare recovery, light adaptation, accommodation, dynamic visual acuity, color perception), but office-based measures for screening and assessment are neither easily available nor linked to crash risk. Therefore, they are not discussed here.

Cognition

Cognitive assessment includes functional assessments of memory, visual perception, processing speed, attention, executive function, language, and insight.

Driving requires timely visual and cognitive processing to make appropriate decisions in a dynamic and complex environment. The best assessment tools integrate several cognitive processes (e.g., divided attention, visual processing, processing speed) to test high-level cognitive processes or executive functioning.[20] At the clinical team level of screening, specific cognitive abilities and skills can be assessed for performance indicative of risk. Because these functions are the building blocks of more complex abilities, if an older adult has a significant issue with any basic cognitive skills, driving will likely be affected.

Attention: Because of the dynamic and changing environment, demands on attention can be significant, especially in areas of high traffic or during rush hour traffic. Drivers must possess sufficient selective attention (i.e., the ability to prioritize stimuli and focus on only the most important) to attend to critical stimuli (e.g., traffic lights, other vehicles, pedestrians, bicyclists, scooters) without being distracted by irrelevant ones (e.g., billboards, city sights). In addition, drivers must possess divided attention to focus on the multiple stimuli required by most driving tasks. For example, the driver must be able to attend to vehicles surrounding him or her while changing lanes for a turn, maintaining a safe speed, and activating the turn signal in the correct direction.

Attentional functioning may decline with age,[21] with divided attention showing more pronounced changes than selective attention.[22] Interestingly, recent studies have suggested that years of experience with driving may enable older drivers to prioritize driving decisions and maximize driving safety (i.e., experience-related compensation).[21] However, regardless of age, driver distraction, including use of cell phones, poses a clear and

significant safety risk to all road users. Older adults should be advised to avoid using cell phones (or other tasks that divide their attention) while driving because of the possibility of decreased working memory, attention reserves, and decreased processing speeds.

Visual Perception/Processing: Visual perception, visuospatial skills, and processing speed are necessary for drivers to organize visual stimuli into recognizable forms and understand where they exist in space. They also need to appropriately respond to incoming information in a timely way. Without these visual-motor skills, drivers would be unable to recognize another vehicle and determine its distance ahead to maintain speed, slow, or stop in relation to that vehicle. In general, processing speed may slow8 and complex visuospatial skills may decline with age, while visual perception remains stable.[23]

Memory: To drive safely, drivers need to remember their destination, how to navigate to the destination, how to operate the vehicle, and to obey traffic rules and regulations.[24] In addition, drivers must be able to retain certain information while simultaneously processing new or unique information (e.g., driving in a school zone or retaining and combining information gathered from scanning right/left), using the skill of working memory. Working memory (and the other cognitive skills to which it contributes) tends to decline with age[25] and depends on the speed of processing, which refers to the speed at which new information can be integrated and retrieved from the memory.[26]

Executive Function: Executive function is an umbrella term that refers to the coordination of several cognitive subprocesses to achieve a particular goal.[27] Executive function includes the ability to initiate a task, problem solve, plan, sequence, and seamlessly shift from one area of focus to another.[28] Executive skills are key determinants of driver strategies, tactics, and safety,[29] such as making the decision to stop at a red light or what to do when the light is green but a pedestrian is still in the path of the vehicle. Although the capacity for this kind of logical analysis tends to decline with age,[26] it is with brain injury that the problems with executive functions become more evident in driving. Because of the overlearned ability of driving, many drivers with executive function deficits can demonstrate the ability to drive familiar routes without a problem. However, if an unexpected event occurs (e.g., a child running onto the street, a familiar road is closed because of construction), older adult drivers with poor executive functioning may not be able to spontaneously modify their expected route or safely alter their driving plan in response to a challenging situation, putting themselves or others at risk. Examples of executive errors may be stopping at a green light or stopping before a highway exit to allow extra time to make the decision to exit.

Insight: Insight is the awareness that a person has about himself or herself, including abilities and limitations. It is important to determine the older adult's understanding of how his or her physical, cognitive, and/or mental limitations may affect fitness to drive. For example, the individual with glaucoma should understand and agree that he or she should refrain from driving at night but may drive without significant risk during daylight and non-rush hours. Individuals with dementia often do not have adequate insight, believing they are fit to drive when they are not.[30]

Motor and Somatosensory Function

Motor and somatosensory function assessment includes functional assessments of functional range of motion, proprioception, and endurance.

Driving requires motor and somatosensory abilities. Because of improvements in technology (e.g., antilock braking systems, power seats, power steering, keyless ignition, traction control systems, backing cameras, cruise control, automatic emergency braking), driving has become much less physically demanding. Thus, even physically frail older adults may have the capacity necessary to continue to operate a motor vehicle. Moreover, DRSs excel at prescribing and training in the use of strategies, devices, or vehicle modifications to compensate for a wide range of physical and somatosensory impairments. Unfortunately, many drivers may be over restricted when advised to stop driving in response to a physical/ somatosensory limitation that may have been addressed through compensation or equipment.

Endurance: Before the act of driving, motor abilities are needed to approach and enter the car safely and fasten the seat belt. The natural process of aging may involve a decline in muscle strength and endurance, flexibility, and joint stability. In addition, osteoarthritis and other musculoskeletal problems are common in older adults. Individuals who suffer pain and limitations from these conditions may not only experience direct effects on their driving ability but also decrease their physical activity, causing further decline in motor function. Fatigue can be an issue for older adults who are driving a long distance, have undiagnosed sleep apnea, are undergoing significant medical treatment (e.g., cancer therapy, kidney dialysis), or have advanced functional loss from severe end organ disease.

Functional Range of Motion: Drivers must be able to manipulate the steering wheel, operate the accelerator and brake pedals, and access the primary and secondary controls of the vehicle (e.g., turn signal, headlights, wipers, climate controls). Range of motion in the neck and shoulder is essential so that the driver can turn his or her head quickly to check the blind spot. However, technology in newer-model vehicles is increasingly compensating for many functional limitations. Examples include backing cameras, fisheye/ panoramic mirrors, and blind-spot warning systems for limited neck range of motion; steering knobs for one-handed driving; low effort steering for limited upper arm mobility; and hand controls for those with lower limb loss or impairment.

Proprioception: Drivers must have the ability to know whether their foot is on the brake or accelerator pedal and be able to sufficiently modulate the amount of pressure needed on the pedal for any given driving situation. While the underlying issues with "pedal confusion" are not clear, for older adult drivers, the problem may possibly be with proprioception. It would be easy for a driver to become confused if he or she had to "look" to see where his or her foot was at to drive. Clearly, older adult drivers with sensory issues such as diabetic neuropathy would benefit from a test of leg and foot sensation and proprioception.

REFUSAL OF ASSESSMENT

Older adult drivers and their caregivers may express fear, resistance, or refusal to participate in screening or assessment of functional abilities. The three most common reasons include the older adult's belief that he or she is a good driver, the fear that an outcome may put the older adult's license at risk, and/or impaired insight of the older adult and/or caregiver. Caregivers may have conflicting priorities when trying to balance their respect for the older driver's wishes, level of risk, and the caregiver burden that cessation of driving can create, including responsibility in time and/or money for transporting the older adult to appointments and activities.

In these situations, it may be helpful to assure

the older adult that the concern and focus is on optimizing fitness to drive and not on removing the ability to drive. Health care providers, considering clinical observations and using best judgment, may decide there is cause for concern but not an immediate risk. In this case, the goal is to initiate a conversation with the older adult and ideally with the caregiver about driving risk. It will be important to discuss, with permission, the medical condition(s) of the older adult and the potential impact these can have on driving risk. The first steps may focus on increasing self-awareness and a shared understanding of driving risk for self and others. In addition, providers should ensure that the older adult understands that the goal is to work together to find solutions for him or her to continue driving, if at all possible.

It is well established that most older adults, regardless of age, intend to continue driving until they decide "I have become an unsafe driver."[31] However, older adults who live in rural communities may realize they are at risk but do not feel they have any other option. Understanding that a transition from driver to non-driver may require time to anticipate and adjust, this early focus on counseling and referral to explore alternative transportation options may allow older adults to also consider the benefits of assessment at a later time. Nevertheless, for some older adults, further evaluation now may be needed to determine fitness to drive, in the best interest of the individual and the community. In these cases, professional ethics should be used to guide the intervention plan. If the clinical team member is significantly concerned about driving risk today, he or she should work with the older adult and/or family to establish an agreement to follow a course of stopping driving now until "we better understand your situation, gain the information required through evaluation, and then determine the appropriate plan of care." This message is about safety and support, both offering the older adult and the family time to consider the consequences and prepare them for next steps. If the older adult appears to have deficits in all domains (i.e., vision, cognition, physical/motor), or primarily cognition, or caregivers report problems in complex tasks (e.g., finances, cooking, shopping), referral to an occupational therapist for an IADL risk assessment may be appropriate. Because rehabilitation services are typically covered by medical insurance plans, an occupational therapy assessment can lead to a plan and interventions that may improve function before (or in preparation for) the next option, which is the specialized comprehensive driving assessment.

In contrast, if the older adult has only physical and motor impairment, a referral to a DRS is prudent (see Chapter 5). The DRS will conduct a comprehensive driving evaluation that includes a complete clinical assessment covering the areas of vision, perception, cognition, and motor abilities, as well as an on-road assessment, if warranted. The DRS will assist the older adult and family with determining if vehicle adaptation and learning will assist in promoting driving safety.

Some older adults will absolutely refuse to consider evaluation and are intent on continuing to drive, while others may agree to the evaluation but ignore any recommendation for cessation.[32] For these individuals, insight into deficits is likely the problem. A discussion with a caregiver may offer more information as well as provide additional support for pursuing an evaluation or strategies for cessation recommendations. Actions should be guided by professional ethics, and it may be necessary to report the older adult to the appropriate driving licensing agency, the agency that is responsible to make licensing decisions and is the only party with the authority to cancel a license (see Chapters 7 and 8).

SELF-ASSESSMENT TOOLS

Many self-screening and caregiver rating tools are available to assist in building awareness of the changes associated with aging as well as the symptoms of conditions that affect driving. Following up with older drivers after use of these tools may improve their willingness to be formally assessed by the clinical team. Regardless, it is important to understand that use of self-assessment tools do not replace screening performed by professionals, because evidence is clear that self-assessment is not associated with determining fitness to drive.[33]

- *Testing Driver Safety* (see Appendix B).
- A 15-question self-rating driving questionnaire, AAA's Drivers 65 Plus: Check Your Performance Self-Rating Tool (see Appendix B).
- The Driving Decisions Workbook, developed by the University of Michigan Transportation Research Institute, is a free self-assessment tool with evidence that the workbook scores are positively correlated with on-road driving scores and several clinical tests of functional ability. Both online and print versions are available. Individualized feedback is provided to respondents based on how they answer questions. The workbook can be downloaded at http://deepblue.lib.umich.edu/bitstream/handle/2027.42/1321/94135.0001.001.pdf?sequence=2&isAllowed=y.
- The Fitness to Drive Screening Measure, developed by the University of Florida, is a free web-based tool for caregivers of older adults to identify at-risk older drivers. The user needs to have driven with the driver in the last 3 months and then rates the driver on 54 driving skills. A rating profile of the driver is available and includes a classification of the driver into one of three categories (at-risk driver, routine driver, or accomplished driver) with recommendations given as follow-up steps. Research has shown that feedback from the website correlates positively with driving risk. This tool is available at http://fitnesstodrive.phhp.ufl.edu/.
- The SAFER Driving Survey, developed at the University of Michigan Transportation Research Institute, is a web-based tool (available at http://um-saferdriving.org) that asks users about the severity of health concerns they are experiencing due to medical conditions and medications. The website then calculates the effects of these health concerns on critical driving skills and gives users individualized feedback on how their driving may be declining, what to do to continue driving safely given these declines, and possible recommendations for more in-depth assessment. Research has shown that feedback from the website correlates positively with on-road driving scores and an assessment from an occupational therapist. Users also report that the site is easy to use, the information is helpful, and that they discovered declines in themselves of which they were not previously aware.[34]

CLINICAL TEAM ASSESSMENT TOOLS

Current assessments used in fitness-to-drive evaluations range from simple paper and pencil tools that are performed by general clinicians in their offices to complex assessments that should only be performed in the scope of practice of a clinical neuropsychologist or DRS (e.g., on-road assessment). In contrast, the Clinical Assessment of Driving Related Skills (CADReS) is offered as a toolbox of practical, office-based functional assessment tools in the major areas of vision, cognition, and motor/sensory function related to driving for the clinical team member who is screening or assessing an older driver. Clinical team members should choose from tools in each

area that best address their patient's needs and document their encounters.

In the case of cognitive screenings, it is not always necessary to do all the tests. Depending on the outcome of the less challenging assessments, it may be unnecessary to progress further. Note: The justification of assessment tool selection and scoring is addressed in Chapter 4.

General

■ **Driving history:** A brief driving history can be useful as an initial screen to identify the older adult's perception of his or her driving, as well as that of a caregiver if available. Recent traffic violations, crashes (including unreported), or near misses are all red flags for concern (see Chapter 2). The Driving Habits Questionnaire is available[35] but is lengthy. A modified version is available in Appendix C.

■ **IADLs questionnaire:** A checklist of other IADLs can also be used as an initial screen to identify if the older adult is having difficulties with other complex tasks of daily living. Driving uses the same underlying functions (e.g., visual processing, executive functioning, memory, processing speed) as other IADLs, similar to those for financial management, shopping, or cooking. If the older adult is having difficulty with any IADL tasks, further evaluation is warranted. A report from a caregiver may also be helpful when the older adult appears to have cognitive impairment. An example is the AD8TM Dementia Screening Interview, an eight-item caregiver questionnaire that differentiates between dementia and normal aging (copyrighted by Washington University) and has preliminary data that suggests it is useful in combination with other tools to determine fitness to drive10 (https://knightadrc.wustl.edu/CDR/ad8.htm).

■ **Medication review:** Certain medications clearly affect driving, and new or changing doses may affect assessment findings, perhaps triggering red flags that are temporary.

Vision

■ **Visual acuity:** Measured by vision charts, visual acuity should be measured because it is the legal criteria for most state licensing agencies. The Snellen chart is described below and provided in Appendix C.

■ **Visual fields:** Using a uniform manner of confrontation testing as described below, visual fields can be assessed.

■ **Contrast sensitivity:** Many charts are commercially available (e.g., Pelli-Robson contrast sensitivity chart) to test the ability to perceive objects in contrast to the environment.

Cognitive

■ **Montreal Cognitive Assessment[36] (MoCA** [https://www.mocatest.org/]**):** The MoCA is a brief cognitive test designed to assist health care professionals in detecting mild cognitive impairment. Although it can be administered by anyone, results should be interpreted only by individuals with expertise in the cognitive field.[37] It rates cognitive performance, is available in multiple languages, and has been validated for adults 55 to 85 years old. It tests memory, attention, language, abstract, recall, orientation, as well as visuospatial skills by incorporating a shorter Trails B and a clock-making task.

■ **Trails A & B:** This test of general cognitive function also specifically assesses working memory, visual processing, visuospatial skills, selective and divided attention, and psychomotor coordination. Numerous studies have demonstrated an association between poor performance on the Trail-Making Test Part A and B and poor driving performance[4,38] (see below for directions and form).

Neuropsychologists often recommend giving the Trails A test (connecting just numbers) before giving the Trails B test. The rationale is two-fold: The Trails A provides an appropriate warm-up to Trails B and allows the older adult some practice on a simpler concept, and, in many of the driving studies that validated Trails B, the Trails A was given first.

■ **Clock-Drawing Test:** This test may assess long-term memory, short-term memory, visual perception, visuospatial skills, selective attention, abstract thinking, and executive skills. Preliminary research indicates an association between specific scoring elements of the clock-drawing test and poor driving performance.[39]

■ **Maze test:** There are several versions of maze testing, including online versions. Depending on the type of test, it assesses visual perception, visuospatial skills, abstract thinking, and executive skills. The Snellgrove maze[40] is a one-page cognitive screen for driving competence that was validated with older adults with mild cognitive impairment or early dementia.

Motor/Sensory

■ **Rapid Pace Walk and Get Up and Go:** These tests are measures of lower limb strength, endurance, range of motion, and balance. The Rapid Pace Walk has been linked with driving outcomes,[41,42] whereas Get Up and Go[43] has been more closely linked with falls and future disability and long-term care placement. Because falls have been associated with poor driving outcomes,[19] either of these tests are appropriate measures for assessing overall motor abilities. For directions, see below.

■ **Range of Motion:** Performing a functional range of motion test is important for examining if and how the motor vehicle can be adapted to meet limitations of the older adult. Mirrors, vehicular technology (e.g., back up cameras, blind side warnings) and education/training can accommodate limitations of the neck. Limitations in any of the extremities can be accommodated by adaptive equipment recommended by a DRS. For directions for a functional range of motion test, see below.

Although anxious, **Mrs. Alvarez** *clearly wants to keep driving. There may be some concern with her confidence, potential change in her medical condition, and effect of medications, because she had an unsteady gait as she walked in the office. You decide to do the CADReS.*

"Mrs. Alvarez, I am going to ask you to do a few simple tests that can measure functional abilities needed for safe driving, such as walking down the hall while I time you, and a couple of paper and pencil tests. These assessments will help us find out if there are any areas we need to look into further. Based on the results of the tests and your health condition, we will do our best to treat or reverse any problems we find."

After scoring Mrs. Alvarez's performance on the CADReS toolbox assessments, you discuss the results with her. You assure her that she scored well on the vision and cognitive tests, but performance on the motor was impaired (Rapid Pace Walk = 11 seconds) and you noticed her unsteady gait as she walked in. When asked about falls, she admitted that she has fallen in her home.

THE EVOLUTION OF COMPUTER-BASED TOOLS

Two computer-based assessment tools are commercially available. The cost of these tools is presently not covered by most insurance providers.

In general, more research is needed on these computer-based assessments before they can be used as tools for making licensing decisions. The use of interactive driving simulators is also being studied, with emerging evidence supportive for their use as a potential assessment and intervention tool.[44,45]

■ **Useful Field of View:** This is the most widely studied instrument for detection of impairment in processing speed, divided attention, and selective attention that has been moderately correlated with crash risk in older adult drivers. The strongest evidence is for the Subtest 2, which tests processing speed,[41,42,46] but not all studies supported the predictive validity of this instrument.[4,10,47] This assessment tool is available for purchase (information is available on the Visual Awareness website (https://www.visualawareness.com/what-is-ufov/).[48] Cost, time, and ability to bill, as well as limited studies in a primary care setting, might be potential barriers to use.

■ **DriveABLE:** This assessment is only of cognitive abilities for driving; it is computer-based and electronically scored (available at https://www.driveable.com/). Based on the performance of the older adult, results are generated from a computer algorithm that returns a score between 1 and 99 and reflects the "Predicted Probability of Failing an On-Road Evaluation," with 1 being least likely and 99 being most likely to fail. The computer program designates upper and lower areas of risk. Although the developers of the program maintain the computer presentation of the tasks enables precision measurements and objectivity and removes testing bias, there is contradictory research evidence to support the claims of predicting driving risk accurately.[49] In addition, DriveABLE's approach does not provide the clinician with information that can be used to identify clinical solutions for potential problems.

ASSESSMENT TOOL PERFORMANCE INSTRUCTIONS

Snellen eye chart

The Snellen chart is used to test far visual acuity. The standard chart measures 9" x 23" and is printed on a durable, tear-resistant latex sheet, with eyelets for easy hanging. Letters are printed on one side, and tumbling "E" symbols are printed on the reverse.

This test is best performed in a hallway with good lighting. Floor tape can be used to mark a distance of 10 or 20 feet (depending on the chart size).

With the chart hanging on a wall, the older adult is instructed to stand 10 or 20 feet away. Wearing his or her usual glasses or contact lenses, the individual reads the smallest line possible with both eyes open. Visual acuity is based on the lowest full row that he or she successfully reads, and the process is repeated for each eye individually. However, if the best the individual can see in either eye is 20/40, then his or her acuity is considered to be 20/40 in both eyes.

Far visual acuity can also be measured using another chart per the clinician's preference, such as the Snellen chart for a 10-foot distance or the Sloan low-vision letter chart for 6 meters (20 feet).[50]

Near visual acuity can be tested with commercially available charts and should be considered whenever an older adult complains of difficulty seeing/reading maps or gauges and controls within the vehicle. This can be checked using a Rosenbaum pocket chart.

Some limitations have been noted in testing using the Snellen chart. These include, but are not limited to, the different number of letters per line, different spacing between lines, the specific use of letters, and the spacing between letters.[51] A trend in the field of eye care has been to use a newer chart called the Early Treatment Diabetic Retinopathy

Study (ETDRS) that in some studies of eye diseases appears to be more accurate.[52] The ETDRS chart improves on the Snellen test by having a similar number of letters per line and standard spacing between the letters.

Visual Fields

The examiner sits or stands 3 feet in front of the patient, at the individual's eye level. The patient is asked to close his or her right eye, while the examiner closes his or her left eye. Each fixes on the other's nose.

The examiner then holds up a hand in each visual field simultaneously, with a random number (usually one or two) of fingers in each of the four quadrants, and asks the patient to state the total number of fingers. With the fingers held slightly closer to the examiner, the patient has a wider field of view than the examiner. Provided that the examiner's visual fields are within functional limits, if the examiner can see the fingers, then the patient should be able to see them unless he or she has a visual field defect.

The process is repeated for the other eye (patient's left eye and examiner's right eye closed). The examiner indicates any visual field defects by shading in the area of defect on a visual field representation.

Rapid Pace Walk

A 10-foot path is marked on the floor with tape. The examiner should first demonstrate the walk and then ask the individual to walk the 10-foot path, turn around, and walk back to the starting point. Then the test begins. The individual is asked to walk the same path as quickly as possible. If the older adult normally walks with a walker or cane, he or she may use it during this test. The total walking distance is 20 feet.

The examiner begins timing the individual when he or she picks up the first foot, and stops timing when the last foot crosses the finish mark. This test is scored by the total number of seconds it takes for the older adult to walk 10 feet and back.[42] In addition, the examiner should indicate on the scoring sheet whether the older adult used a walker or cane. Scores longer than 9 seconds are associated with an increased risk of at-fault motor vehicle tasks.[38]

Get Up and Go

Instructions[43]

Ask the patient to perform the following series of maneuvers.

1. Sit comfortably in a straight-backed chair.
2. Rise from the chair.
3. Stand still momentarily.
4. Walk a short distance (approximately 10 feet/3 meters).
5. Turn around.
6. Walk back to the chair.
7. Turn around.
8. Sit down in the chair.

Scoring

Observe the patient's movements for any deviation from a confident, normal performance. Use the following scale.

1 = Normal

2 = Very slightly abnormal

3 = Mildly abnormal

4 = Moderately abnormal

5 = Severely abnormal

"Normal" indicates that the patient gave no evidence of being at risk of falling during the test or at any other time. "Severely abnormal" indicates

that the patient appeared at risk of falling during the test. Intermediate grades reflect the presence of any of the following as indicators of the possibility of falling: undue slowness, hesitancy, abnormal movements of the trunk or upper limbs, staggering, or stumbling.

A patient with a score of 3 or more on the Get Up and Go Test is at risk of falling.

Functional Strength and Range of Motion

To test the functional range of motion for an older adult, ask him or her to perform the below listed motions bilaterally.

- Neck rotation: "Look over your shoulder like you're backing up or parking. Now do the same thing for the other side."
- Shoulder and elbow flexion: "Pretend you're holding a steering wheel. Now pretend to make a wide right turn, then a wide left turn."
- Finger curl: "Make a fist with both of your hands."
- Ankle plantar flexion: "Pretend you're stepping on the gas pedal. Now do the same for the other foot."
- Ankle dorsiflexion: "Point your toes toward your head"

The test is scored by evaluating the motion as either within functional limits or not within functional limits. The latter means that range of motion is done with excessive hesitation, pain, or very limited range of motion.

Maze Test[40]

The Maze Test was developed as a pencil and paper test of attention, visuoconstructional ability, and executive functions of planning and foresight. Participants complete a simple demonstration (or practice) maze first to establish the rule set, and then complete the Maze Task. Performance is measured in time (in seconds), using a stop watch, and the total number of errors. Errors are determined by the number of times a participant enters a dead end or fails to stay in the lines. Time to administer is 1–4 minutes. The Maze Test is in Appendix C; it should be printed on an 8 × 11" paper with the Maze Test at least 5.5" square and the practice 4.5".

To administer the test, the ***practice maze*** is placed in front of the participant in the correct orientation. The participant is provided with a pen, and the administrator says:

I want you to find the route from the start to the exit of the maze. Put your pen here at the start (point to the start). Here is the exit of the maze (point to the exit). Draw a line representing the route from the start to the exit of the maze. The rules are that you are not to run into dead ends (point to a dead end) or cross solid lines (point to a solid line). Go.

The instructions are repeated, if required, and any rule-breaks should be corrected. The participant is permitted to lift the pen from the page. When the participant has attempted the maze, record whether the task was completed (yes or no), and the number of times the participant required repeating or reminding of the instructions.

Next the Maze Task is placed in front of the participant in the correct orientation. The participant is provided with a pen, and the administrator says:

"Good, now that I know you understand the task, I'm going to time you as you find the route from the start to the exit of the maze. Put your pen here at the start (point to the start). Here is the exit (point to the exit). Draw a line representing the route from the start to the exit of the maze. The same rules apply. Don't run into any dead ends (point to a dead end), or cross any lines (point to a solid line). Are your ready? I'm starting the timer now. Go!"

The instructions are not repeated and rule breaks are not corrected. If questions are asked, the response should be: I can't give you any more help. Do the task as best you can. Stop the timer immediately upon the participant's completion of the task. There is a limit of 3 minutes for the Maze Task. If the maze has not been completed in this time, discontinue. The recording of the test includes whether the Maze Task was completed (yes or no); the time in seconds to complete the Maze Task, and the number of errors (entry into a dead end, and/or failure to stay within the lane).

Montreal Cognitive Assessment (MoCA)[36]

The MoCA is designed as a rapid screening tool that measures attention and concentration, executive functions, memory, language, visuoconstructional skills, conceptual thinking, calculations, and orientation. Time to administer is about 10 minutes.

The highest possible score is 30, with a score of 26 or above considered normal. One point should be added for individuals with 12 years or fewer of formal education. A score of 18 or less should raise concerns about driving safety.

The original version and directions are in Appendix C.

Trail-Making Test for Screening, Part A and B

This test of general cognitive function specifically assesses working memory, visual processing, visuospatial skills, selective and divided attention, processing speed, and psychomotor coordination. In addition, numerous studies have demonstrated an association between poor performance on the Trail-Making Tests and poor driving performance.[4,38,42]

Instructions for Part A. Using the sample of A, the administrator says: *"There are numbers in circles on this page. Please take the pencil and draw a line from one number to the next, in order. Start at 1 [point to the number], then go to 2 [point], then go to 3 [point], and so on. Please try not to lift the pen as you move from one number to the next. Work as quickly and accurately as you can."* If there is an error: *"You were at number 2. What is the next number?" Wait for the individual's response and say, "Please start here and continue."*

Test A: If Sample A is completed correctly, the administrator repeats the above instructions for Trails A. Start timing as soon as the instruction is given to begin. Stop timing when the Trail is completed, or when maximum time is reached (150 seconds = 2.5 min).

Instructions for Part B. Using the sample of B, the administrator says: *"There are numbers and letters in circles on this page. Please take the pen and draw a line, alternating in order between the numbers and letters. Start at number 1 [point], then go to the first letter, A [point], then go to the next number, 2 [point], and then the next letter, B [point], and so on. Please try not to lift the pen as you move from one number or letter to the next. Work as quickly and accurately as you can."* If there is an error: *"You were at number 2. What is the next letter?"* Wait for the individual's response and say, *"Please start here and continue."*

If Sample B is completed correctly, the administrator repeats the above instructions for Trails B. Start timing as soon as the instruction is given to begin. Stop timing when the Trail is completed, or when maximum time is reached (300 seconds = 5 min).

This test is scored by overall time (seconds) required to complete the connections accurately. The examiner points out and corrects mistakes as they occur; the effect of mistakes, then, is to increase the

time required to complete the test. This test usually takes 3–4 minutes to administer, but should be stopped after 5 minutes.

Clock-Drawing Test

In this form of the clock-drawing test, the examiner gives the individual a pencil and a blank sheet of paper and says, *"I would like you to draw a clock on this sheet of paper. Please draw the face of the clock, put in all the numbers, and set the time to ten minutes after eleven."* This is not a timed test, but the individual should be given a reasonable amount of time to complete the drawing. The examiner scores the test by examining the drawing for each of seven specific elements found on the CADReS score sheet (see Appendix C for score sheet).

Test Sequence

Although these tests may be administered in any order, the following sequence is recommended: (Note that the MoCA incorporates elements of the Trail-Making Part B and Clock Drawing).

1. Snellen E Chart
2. Visual fields by confrontation testing
3. Rapid Pace Walk and/or Get Up and Go
4. Functional range of motion
5. Maze Test
6. Montreal Cognitive Assessment (MoCA)
7. Trail-Making Test, Part A and then Part B
8. Clock-Drawing Test

For a discussion of scoring these tests and recommended interventions based on performance, see Chapter 4.

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