

Senior Drivers: Assessment & Management

Goals & Objectives

Course Description

Senior Drivers: Assessment & Management is an asynchronous online continuing education program for physical therapists and physical therapist assistants. The course focuses on the challenges faced by older drivers and the role physical therapists and physical therapist assistants can play in assessing and managing physical abilities required for safe operation of a vehicle. The course includes sections about risk determination, patient communication, physical assessment, intervention, and Driver Rehabilitation Specialists.

Course Rationale

This course is designed to educate physical therapists and physical therapist assistants about their role in assessing and managing physical and/or cognitive challenges commonly experienced by geriatric drivers.

Course Goals & Objectives

At the end of this course, the participants will be able to:

1. define the scope, magnitude, and significance of geriatric drivers
2. list the steps for identifying risk factors for unsafe driving
3. list the “red flags” that require further assessment
4. identify effective ways to communicate with individuals who may be unsafe drivers
5. identify components of effective provider-patient communication
6. recognize the components of the Assessment of Driving-Related Skills
7. identify effective intervention and accommodation strategies
8. define the role and abilities of a Driver Rehabilitation Specialist
9. identify effective strategies for terminating driving privileges
10. identify how specific medical conditions effect driving abilities.

Course Provider – Innovative Educational Services

Course Instructor - Michael Niss, DPT

Target Audience – physical therapists and physical therapist assistants.

Course Educational Level – Introductory / intermediate

Course Prerequisites – None

Method of Instruction/Availability – Online text-based course available continuously.

Criteria for Issuance of CE Credits - A score of 70% or greater on the course post-test

Continuing Education Credits – 4 hours

Determination of Credits - Mergener Formula: $.9 \times [-22.3 + (0.00209 \times 89,152) + (2.78 \times 20) + (15.5 \times 3)] = 240 \text{ minutes} = 4.0 \text{ hours}$

Fees - \$39.95

Conflict of Interest – No conflict of interest exists for the presenter or provider of this course.

Refund Policy - Unrestricted 100% refund upon request. The request for a refund by the learner shall be honored in full without penalty or other consideration of any kind. The request for a refund may be made by the learner at any time without limitations before, during, or after course participation.

Senior Drivers: Assessment & Management

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Overview

Buoyed by the large ranks of “baby boomers” and increased life expectancy, the U.S. older adult population is growing nearly twice as fast as the total population. Within this population of older adults, an increasing proportion will be licensed to drive, and it is expected that these license-holders will drive more miles than older drivers do today.

As the number of older drivers with medical conditions expands, patients and their families will increasingly turn to therapists for guidance on safe driving. Therapists will have the challenge of balancing their patients’ safety against their transportation needs and the safety of society.

Demographics

Life expectancy is at an all-time high and the older population is rapidly increasing. By the year 2030, the population of adults older than 65 will more than double to approximately 70 million, making up 20 percent of the total U.S. population. In many States, including Florida and California, the population of those over age 65 may reach 20 percent in this decade. The fastest growing segment of the population is the 80-and-older group, which is anticipated to increase from about 3 million this year to 8 to 10 million over the next 30 years.

Over the next few decades, it is anticipated that 40 million drivers 65 years and older will be on the roadways. The increase in the number of older drivers is due to many factors. In addition to the general aging of the population that is occurring in all developed countries, many more female drivers are driving into advanced age. In addition, the United States has become a highly mobile society, and older adults are using automobiles for volunteer activities and gainful employment, social and recreational needs, and cross-country travel.

Significance

Driving can be crucial for performing necessary chores and maintaining social connectedness, with the latter having strong correlates with mental and physical health. Many older adults continue to work past retirement age or engage in volunteer work or other organized activities. In most cases, driving is the preferred means of transportation. In some rural or suburban areas, driving may be the sole means of transportation. Just as the driver’s license is a symbol of independence for adolescents, the ability to continue driving may mean continued mobility and independence for older drivers, with great effects on their quality of life and self-esteem.

86 percent of older adults report that driving is their usual mode of transportation. Within this group, driving is the usual method of transportation for 85 percent of participants 75 to 79, 78 percent of participants 80 to 84, and 60 percent of

participant's 85 and older. This data also indicates that the probability of losing the ability to drive increases with advanced age. It is estimated that the average male will have 6 years without the functional ability to drive a car and the average female will have 10 years. However, our society has not prepared the public for driving cessation, and patients and physicians are often ill-prepared when that time comes.

Driving cessation often leads to increased social isolation, decreased out-of-home activities, and an increase in depressive symptoms. These outcomes have been well documented and represent some of the negative consequences of driving cessation. It is important for health care providers to use the available resources and professionals who can assist with transportation to allow their patients to maintain independence.

Self-Regulation

As drivers age, they may begin to feel limited by slower reaction times, chronic health problems, and effects from medications. Although transportation surveys over the years document that the current population of older drivers is driving farther, in later life many reduce their mileage or stop driving altogether because they feel unsafe or lose confidence.

Older drivers are more likely to wear seat belts and are less likely to drive at night, speed, tailgate, consume alcohol prior to driving, and engage in other risky behaviors.

Older drivers not only drive substantially less, but also tend to modify when and how they drive. When they recognize loss of ability to see well after dark, many stop driving at night. There are data that suggest older women are more likely to self-regulate than men. Others who understand the complex demands of left turns at uncontrolled intersections and their own diminished capacity forgo left-hand turns, and make a series of right turns instead. Self-regulating in response to impairments is simply a continuation of the strategy we all employ daily in navigating this dangerous environment—driving. Each of us, throughout life, is expected to use our best judgment and not operate a car when we are impaired, whether by fatigue, emotional distress, physical illness, or alcohol. Thus, self-awareness, knowledge of useful strategies, and encouragement to use them may be sufficient among cognitively intact older adults; however, this remains an important area for further study.

Older drivers may reduce their mileage by eliminating long highway trips. However, local roads often have more hazards in the form of signs, signals, traffic congestion, and confusing intersections. Decreasing mileage, then, may not always proportionately decrease safety risks. In fact, the “low mileage” drivers (e.g., less than 3,000 miles per year) may actually be the group that is most “at-risk.” Despite all these self-regulating measures, motor vehicle crash rates per

mile driven begin to increase at age 65. On a case-by-case level, the risk of a crash depends on whether each individual driver's decreased mileage and behavior modifications are sufficient to counterbalance any decline in driving ability. In some cases, decline in abilities (peripheral vision loss, for example) may occur so insidiously that the driver is not aware of it until he/she experiences a crash. In fact, some older adults do not restrict their driving despite having significant visual deficits. Reliance on driving as the sole available means of transportation can result in an unfortunate choice between poor options. In the case of dementia, drivers may lack the insight to realize they are unsafe to drive.

Crash Rates

Compared with younger drivers whose car crashes are often due to inexperience or risky behaviors, older driver crashes are most frequently related to inattention or slowed speed of visual processing. Older driver crashes are often multiple-vehicle events that occur at intersections and involve left-hand turns. The crash is usually caused by the older driver's failure to heed signs and grant the right-of-way. At intersections with traffic signals, left hand turns are a particular problem for the older driver. At stop-sign-controlled intersections, older drivers may not know when to turn.

These driving behaviors indicate that visual, cognitive, and/or motor factors may affect the ability to drive in older adults. Research has not yet determined what percentage of older adult crashes are due to driving errors that are also common among middle-aged drivers, what proportion are due to age-related changes in cognition (such as delayed reaction time), or how many could be attributed to age-related medical illnesses. However, it is believed that further improvements in traffic safety will likely result from improving driving performance or modifying driving behavior. The identification and management of diseases has a potential to maintain or improve driving abilities and road safety.

Public Health Issue

Older drivers are the safest drivers as an age group when using the absolute number of crashes per 100 licensed drivers per year. However, the crash rate per miles driven reveals an increase at about age 65 to 70 in comparison to middle-aged drivers. Accidental injuries are the seventh leading cause of death among older people and motor vehicle crashes are not an uncommon cause. As the number of older drivers continues to grow, drivers 65 and older are expected to account for 16 percent of all crashes and 25 percent of all fatal crashes.

Motor vehicle injuries are the leading cause of injury-related deaths among 65-to-74-year-olds and are the second leading cause (after falls) among 75 to 84 year-olds. Compared to other drivers, older drivers have the second highest fatality rate per mile driven (Drivers under 25 have the highest rate). On the basis of estimated annual travel, the fatality rate for drivers 85 and older is 9

times higher than the rate for drivers 25 to 69. By age 80, male and female drivers are 4 and 3.1 times more likely, respectively, than 20-year-olds to die as a result of a motor vehicle crash. There is a disproportionately higher rate of poor outcomes in older drivers, due in part to chest and head injuries.

There may be several reasons for this excess in fatalities. First, some older drivers are considerably more fragile. For example, the increased incidence of osteoporosis, which can lead to fractures, and/or atherosclerosis of the aorta which can predispose individuals to rupture with chest trauma from an airbag or steering wheel. Fragility begins to increase at age 60 to 64 and increases steadily with advancing age.

Determining Risk for Unsafe Driving

Observation

Careful observation is often an important step in diagnosis. Therapists should observe the patient and be alert to:

- Impaired personal care such as poor hygiene and grooming;
- Impaired ambulation such as difficulty walking or getting into and out of chairs
- Difficulty with visual tasks; and
- Impaired attention, memory, language expression or comprehension.

Medical History

When taking the patient's history, therapists should be alert to "red flags," that is, any medical condition, medication or symptom that can affect driving skills, either through acute effects or chronic functional deficits.

Most older adults have at least one chronic medical condition and many have multiple conditions. The most common medical conditions in older adults include arthritis, hypertension, hearing impairments, heart disease, cataracts, dizziness, orthopedic impairments, and diabetes. Some of these conditions have been associated with driving impairment. Additionally, keep in mind that many prescription and nonprescription medications have the potential to impair driving skills, either by themselves or in combination with other drugs. Older patients generally take more medications than their younger counterparts and are more susceptible to their central nervous system effects. Concern may be heightened if there are documented difficulties in attention or visuospatial processing speed.

At times, patients themselves or family members may raise concerns. If the family of a patient asks, "Is he or she safe to drive?", identify the reason for the concern. Has the patient had any recent crashes or near-crashes, or is he/she

losing confidence due to declining functional abilities? Inquiring about specific driving behaviors may be more useful than asking global questions about safety.

Therapists can request family members or spouses to monitor and observe skills in traffic with full disclosure and permission from the patient. Another tactic might be identifying a family member who refuses to allow other family members such as the grandchildren to ride with the patient due to traffic safety concerns.

Review of Systems

The review of systems can reveal symptoms that may interfere with the patient's driving ability.

- **General:** fatigue, weakness;
- **Head ears eyes nose throat (HEENT):** headache, head trauma, double vision, visual changes, vertigo;
- **Respiratory:** shortness of breath, use of oxygen;
- **Cardiac:** chest pain, dyspnea on exertion, palpitations, sudden loss of consciousness;
- **Musculoskeletal:** muscle weakness, muscle pain, joint stiffness or pain, decreased range of motion;
- **Neurologic:** loss of consciousness, feelings of faintness, seizures, weakness/paralysis, tremors, loss of sensation, numbness, tingling; and
- **Psychiatric:** depression, anxiety, memory loss, confusion, psychosis, mania.

Social History/Health Risk Assessment

If a patient's presentation and/or the presence of red flags indicate that he/she may be potentially at risk for unsafe driving, the next step is to ask whether he/she drives. You can do this by incorporating the following questions into the social history or health risk assessment.

- "How did you get here today?" or "Do you drive?"
- "Are you having any problems while operating a motor vehicle?"
- "Have others expressed concern about your driving?"
- "What would you do if you had to stop driving?"

If the patient drives, then his/her driving safety should be addressed. For acute illness, this generally involves counseling the patient. For chronic conditions, on the other hand, driving safety is addressed by formally assessing the functions that are important for driving.

Please note that some chronic medical conditions may have both chronic and acute effects. For example, a patient with insulin-dependent diabetes may experience acute episodes of hypoglycemia, in addition to having chronic

complications such as diabetic retinopathy and/or peripheral neuropathy. In this case, the therapist should counsel the patient to avoid driving until acute episodes of hypoglycemia are under control.

If your patient does not drive, you may wish to ask if he/she ever drove, and if so, what the reason was for stopping. If your patient voluntarily stopped driving due to medical reasons that are potentially treatable, you may be able to help her or him return to safe driving. In this case, formal assessment of specific areas of concern can serve as a baseline to monitor the patient's improvement with treatment.

Additional Information

To gain a better sense of your patient as a driver, ask questions specific to driving. The answers can help you determine the level of intervention needed. If a collateral source such as a family member is available at the appointment or bedside, consider addressing your questions to both the patient and the collateral source with the patient's permission. If this individual has had the opportunity to observe the patient's driving, his/her feedback may be valuable.

Questions to ask the patient and/or family member:

- "How much do you drive?" (or "How much does the patient drive?")
- "Do you have any problems when you drive?" (Ask specifically about day and night vision, ease of operating the steering wheel and foot pedals, confusion, and delayed reaction to traffic signs and situations.)
- "Do you think you are a safe driver?"
- "Do you ever get lost while driving?"
- "Have you received any traffic violations or warnings in the past two years?"
- "Have you had any near-crashes or crashes in the past two years?"

Red Flags Requiring Further Assessment

Please note that age alone is not a red flag. While many people experience a decline in vision, cognition, or motor skills as they get older, people age at different rates and experience functional changes to different degrees. The focus should be on functional abilities and medical fitness-to-drive and not on age per se. Loss of consciousness, confusion, falling asleep while driving, feelings of faintness, memory loss, visual impairment, and muscle weakness all are red flags that have the potential to endanger the driver.

Acute Events

Patients identified as having any of the following acute conditions should be counseled regarding temporary driving cessation (and additional assessment, if warranted) prior to hospital or emergency department discharge.

- Acute myocardial infarction;
- Acute stroke and other traumatic brain injury;
- Arrhythmia;
- Lightheadedness and pre-syncope;
- Syncope and vertigo;
- Seizure;
- Surgery;
- Delirium from any cause; and
- New sedating medications.

Chronic Medical Conditions

Patients may require formal assessment to determine the impact of these conditions on their level of function:

- ***Diseases affecting vision*** - including cataracts, diabetic retinopathy, macular degeneration, glaucoma, retinitis pigmentosa, field cuts, and low visual acuity even after correction;
- ***Cardiovascular disease*** - especially when associated with pre-syncope, syncope or cognitive deficits, including unstable coronary syndrome, arrhythmias, palpitations, congestive heart failure, hypertrophic obstructive cardiomyopathy, and valvular disease;
- ***Neurologic disease*** - including dementia, multiple sclerosis, Parkinson's disease, peripheral neuropathy, brain injury, spinal cord injury, and residual deficits from stroke;
- ***Psychiatric disease*** - including mood disorders, depression, anxiety disorders, psychotic illness, personality disorders, and alcohol or other substance abuse;
- ***Metabolic disease*** - including type 1 and type 2 diabetes mellitus especially with hypoglycemic attacks or severe swings in blood sugars, and hypothyroidism;
- ***Musculoskeletal disabilities*** - including arthritis and foot abnormalities;
- ***Respiratory disease*** - including chronic obstructive pulmonary disease and obstructive sleep apnea.

Other Medical Conditions

The patient should be counseled not to drive during any of the following acute events until they have discussed this issue with their physician:

- Pre-syncope or syncope; Angina;
- Seizure;
- Transient ischemic attacks;
- Hypoglycemic attacks;
- Vertigo;
- Alcoholism and hospitalization for detoxification; or
- Sleep attacks or cataplexy.

Medications

Many nonprescription and prescription medications have the potential to impair driving ability, either by themselves or in combination with other drugs. Combinations of drugs (polypharmacy) may affect drug metabolism and excretion, and dosages may need to be adjusted accordingly. Medications with strong potential to affect the patient's driving ability include:

- Anticholinergics
- Anticonvulsants
- Antidepressants
- Antiemetics
- Antihistamines
- Antihypertensives
- Antiparkinsonians
- Antipsychotics
- Benzodiazepines and other sedatives/anxiolytics
- Muscle relaxants
- Narcotic analgesics

Communication

Initiating Patient Discussion

Patients often feel defensive about being assessed and may even refuse assessment for fear of being told that they can no longer drive. After all, driving is not only the primary form of transportation for most Americans, it also represents freedom and independence.

In suggesting assessment to your patient, it is best to use a direct but non-confrontational approach. Reassure the patient that you have his/her safety in mind and emphasize that you would like to assist him/her to drive safely for as long as possible. If the individual expresses fear that you will "take away my

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driver's license," it is often helpful to offer reassurance that therapists do not have that type of legal authority. Explain that you may advise evaluation of driving if needed and/or refer him/her to a driver rehabilitation specialist or the Department of Motor Vehicles (DMV).

Patient Refusal

Despite best efforts, some patients may still refuse to have their functional driving-associated abilities assessed. If this occurs, several options should be pursued:

- Encourage the patient to complete the self-screening tool "*Am I a Safe Driver?*" (Page 53). This may help raise the patient's level of awareness and make him/her more open to assessment.
- Counsel the patient about the information found in "*Tips for Safe Driving*", (Page 54). These may raise the patient's level of awareness and encourage safe driving habits.
- Suggest the patient enroll in a driving course designed to improve traffic safety. Some suggestions are:
 1. A Traffic Safety Course offered by AARP or AAA.
 2. The University of Michigan Transportation Research Institute, this is a paper-and-pencil workbook that provides users with individualized feedback based on how they answer questions. The workbook can be downloaded free of charge at:
<http://deepblue.lib.umich.edu/bitstream/2027.42/1321/2/94135.0001.001.pdf>.
 3. The SAFER Driving survey. Also developed at the University of Michigan Transportation Research Institute, this is a Web-based tool (available at um-saferdriving.org) that requires users to answer questions about the severity of health concerns they are experiencing due to medical conditions and medications. The Web site 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, if appropriate, recommendations for more in-depth assessment.

In the patient's chart, document your concern regarding his/her driving ability, and support this with relevant information from the patient's presentation, medical history, medications, and reported driving history. Document the patient's refusal for further assessment, along with any counseling you have provided. Not only will this remind you to follow-up at the next visit, but it could potentially protect you in the event of a lawsuit. In cases where the risk is very high and the patient drives despite your recommendations, you might consider referral of the patient to the DMV for further testing.

Assessment of Driving-Related Skills (ADReS)

The three key functions for safe driving are (1) vision, (2) cognition, and (3) motor/somatosensory function. The Assessment of Driving-Related Skills (ADReS) assesses some aspects of these three important functions to help you identify specific areas of concern. Please note that ADReS does not predict crash risk. However, until therapists are able to test their patients directly for crash risk, they can test them indirectly by assessing the functions that are necessary for safe driving. Any impairment in these functions has the potential to increase the patient's risk for crash. Once they are identified, the therapist is in a good position to determine if the patient requires referral to a specific subspecialist (e.g., ophthalmologist).

Although cut-off scores are provided for these tests, the ADReS is a tool for identifying areas of concern that may require additional evaluation. The therapist should use his/her clinical judgment regardless of the scores by utilizing all available information (driving history, medical history, and functional assessment). In addition, not all important functions are tested on the ADReS battery; rather specific items were chosen for their applicability and feasibility in the office setting, along with their correlates with impaired driving outcomes. The tests in ADReS were selected by a consensus panel of driving safety experts who worked with the AMA, and were chosen from among the many available functional tests based on their ease of use, availability, amount of time required for completion, and quality of information provided by the patient's test performance.

The individual tests in ADReS have been validated as measures of their particular function and in some cases have been studied with relation to driving. Although we are still awaiting more evidenced-based medical studies to link these tests with crash risk, these screens can detect new-onset visual, cognitive, or motor problems that may be amenable to an intervention.

The tests are presented below by function, following a discussion of the function and how it relates to driving.

Vision

Vision is the primary sense utilized in driving in comparison to other modalities like hearing and proprioception, and it is responsible for the majority of driving-related sensory input. In most States, candidates are required to undergo vision testing to obtain a driver's license. Several States also require vision testing at the time of license renewal.

Aspects of vision that are important for safe driving and can be readily assessed include: visual acuity, and visual fields.

Visual acuity declines between early and late adulthood, 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 diseases such as cataracts, glaucoma, and macular degeneration. While far visual acuity is crucial to many driving-related tasks, declines in near visual acuity may be associated with difficulty seeing or reading maps, or gauges and controls inside the vehicle. In ADReS, far visual acuity is measured with a Snellen chart.

Visual fields may decline as a result of the natural aging process and medical conditions such as glaucoma, retinitis pigmentosa, and stroke. In addition, upper visual fields may be obstructed by ptosis, which is more common in the older population. Drivers with loss of peripheral vision (e.g., glaucoma) may have trouble noticing traffic signs or cars and pedestrians that are about to cross their path.

Snellen E 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.

With the chart hanging on a wall, the patient is instructed to stand 20 feet away. Wearing his/her usual glasses or contact lenses, the patient reads the smallest line possible with both eyes open. The patient's visual acuity is based on the lowest full row that he/she successfully reads. For example, if the best the patient can see is 20/40, then his/her acuity is 20/40 OU (oculus uterque). This process is repeated for each eye individually (right eye: OD or oculus dexter; left eye: OS or oculus sinister).

This test is best performed in a hallway with good lighting. Tape can be used to mark a distance of 20 feet.

Near visual acuity can also be tested with commercially available charts, and should be considered whenever a patient complains of difficulty seeing or reading maps, or gauges and controls within the vehicle. Although not part of the ADReS battery, many clinicians will check near vision 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. A trend in the field of eye care has been to use a newer chart called the ETDRS (Early Treatment Diabetic Retinopathy Study). The ETDRS chart improves on the Snellen test by having a similar number of letters per line and standard spacing between the letters. Although it has not yet become the

standard, it is possible that eye clinics will eventually migrate toward this eye chart.

Visual fields

In ADReS, visual fields are measured through confrontation testing. The examiner sits or stands three feet in front of the patient, at the patient's eye level. The patient is asked to close his/her right eye, while the examiner closes his/ 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 normal limits, if the examiner can see the fingers, then the patient should be able to see them unless he/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.

Important aspects of vision that are not included in ADReS

Contrast sensitivity - Older adults require about three times more contrast than young adults to distinguish targets against their background. This deficit in contrast sensitivity is further exacerbated by low light levels. Thus, older drivers may have problems distinguishing cars or pedestrians against background scenery, and this may be much worse at night or during storms. While contrast sensitivity has been found to be a valid predictor of crash risk among older drivers, most vision care specialists are not familiar with measures of contrast sensitivity, nor is it routinely measured in eye examinations. Further research must be performed to produce standardized, validated cut-off points for contrast sensitivity, and further work must be done to introduce this concept to professionals in eye care centers.

Accommodation and adaptation - Accommodation is the change in the shape of the lens that assists with bringing objects into focus. This is an important skill for reading the instrument panel in a car or viewing objects in the mirror. Adaptation is the ability to perceive objects when levels of illumination are changing, as might occur during nighttime driving or in parking garages. Older adults require more time than young adults to adjust to abrupt changes in light or darkness. As a result, older drivers often report difficulties dealing with the sudden onset of bright lights, such as the headlights of an oncoming car. Glare may also play a role in their visual difficulties.

Angular movement, dynamic visual acuity, and depth perception -

Older adults must be able to detect objects in motion such as judging the speed of cars coming across their path during left hand turns. This ties in with the concept of dynamic visual acuity, which may also require the detection of letters or images (such as reading traffic signs) while in motion. Depth perception is important for near objects, but apparently becomes less of an issue at further distances. A more pertinent task is the ability to detect changes in visual image size, such as judging the speed of approaching vehicles.

Color - Many reviews on visual abilities that are necessary for driving tend to downplay the importance of color detection, based on the current level of evidence. Traffic lights in the United States typically have mixed colors embedded in the lights to compensate for the small percentage of the population that is red-green color blind. However, the ability to recognize traffic signs, which are given specific colors based on a specific regulatory area, is important. In addition, vehicle color may enhance or diminish detection under certain traffic conditions (e.g., a white car in snowy weather, or a grey car in rainy or foggy conditions).

Cognition

Driving is a complex activity that requires a variety of high-level cognitive skills. Among the cognitive skills that are useful for driving are:

- Memory—short-term, long-term, and working memory;
- Visual perception, visual processing, visual search, and visuospatial skills;
- Selective and divided attention;
- Executive skills (sequencing, planning, judgment, decision making);
- Language; and
- Vigilance.

Both crystallized memory and working memory are necessary for driving. Not only must drivers remember how to operate their vehicle and what signs and signals mean, they must also remember their current destination and how to get there. In addition, drivers must be able to retain certain information while simultaneously processing other information—a skill called working memory. Working memory (and the other cognitive skills to which it contributes) tends to decline with age, while crystallized memory remains relatively intact across the life span. It is unclear at present whether age-related memory impairments reflect only preclinical forms of age-related diseases or whether these occur independent of disease processes. Visual perception, visual processing, and visuospatial skills are necessary for the driver to organize visual stimuli into recognizable forms and know where they exist in space. Without these skills, the

driver would be unable to recognize a stop sign and determine its distance from the car. In general, visual processing may slow and complex visuospatial skills may decline with age, while visual perception remains stable.

During driving, many demands are made on attention. In particular, drivers must possess selective attention—the ability to prioritize stimuli and focus on only the most important—in order to attend to urgent stimuli (such as traffic signs) while not being distracted by irrelevant ones (such as roadside ads). In addition, drivers must possess divided attention in order to focus on the multiple stimuli required by most driving tasks.

Attentional functioning may decline with age, with divided attention showing more pronounced changes than selective attention. The most widely studied instrument for detection of impairment in divided attention and selective attention that has been correlated with crash risk in older adult drivers has been the Useful Field of View (UFOV). This test is available for purchase and information is available on the Visual Awareness Web site.

Another computerized set of tests that assesses key functional abilities for driving is the Driving Health Inventory (DHI). Similar to the ADReS battery, the program has not yet been validated in a large cohort of older adult drivers, but the subcomponents have been found to correlate with at-fault crash risk. Furthermore, the DHI did appear to discriminate drivers with a history of a crash from those without crashes in a small cohort of drivers. In addition, this battery of tests appears feasible and acceptable to older drivers as a screen for functional impairments.

Additional cognitive domains that have been linked with driving impairment include vigilance or sustained attention. Although many older drivers may make only short trips, some illnesses such as untreated obstructive sleep apnea cause persistent sleepiness or impaired attention. This risk would be present in this example regardless of the duration of the driving episode. In addition, many older adults travel long distances for vacations and to visit relatives, making the ability to sustain attention over time critical.

Language skills are necessary to read traffic signs and are critical in knowing the speed limit, identifying construction zones, and comprehending other important informational cues along the roadway. Geographic orientation refers to the skill of finding unfamiliar routes (e.g., map reading or using MapQuest) or knowing the way to familiar places. This skill likely involves executive function, short- and long-term memory, and language abilities. Impairment in these cognitive domains have not been well studied in regard to driving outcomes, but could play a role in accident causation in selected groups of medically impaired drivers.

Executive skills are required to analyze driving-related stimuli and formulate appropriate driving decisions. Executive skills allow a driver to appropriately

make the decision to stop at a red light or at a green light if a pedestrian is in the path of the vehicle. The capacity for this kind of logical analysis tends to decline with age.

Dementia and some medications' side effects in the older population may impact cognition. The fact that crashes involving older drivers commonly occur in complex situations in which task demand exceeds performance suggests that cognitive limitations may play a significant role in crash causation.

In the ADReS battery, cognition is measured through the Trail-Making Test, Part B, and the Clock Drawing Test using Freund Scoring Criteria.

Trail-making test, part B

This test of general cognitive function also specifically assesses working memory, visual processing, visuospatial skills, selective and divided attention, and psycho-motor coordination. In addition, there is an association between poor performance on the Trail-Making Test, Part B, and poor driving performance.

Part B involves connecting, in alternating order, encircled numbers (1–13) and encircled letters (A–L) randomly arranged on a page. 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 to 4 minutes to administer.

The examiner administers the test to the patient, stating, "Now I will give you a paper and pencil. On the paper are the numbers 1 through 13 and the letters A through L, scattered across the page. Starting with 1, draw a line to A, then to 2, then to B, and so on, alternating back and forth between numbers and letters until you finish with the number 13. I'll time how fast you can do this. Are you ready? Go." The examiner records time-to-complete.

Although not recommended in the previous version of the ADReS battery, many neuropsychologists recommend giving the Trails A test (connecting just numbers) prior to giving the Trails B test. The rationale is at least twofold: (1) Trails A provides an appropriate warm-up to Trails B, and allows the older adult some practice on a simpler concept; and (2) in many of the driving studies that validated Trails B, Trails A was given first.

Clock Drawing Test

Depending on the method of administration and scoring, the clock drawing test (CDT) may assess a patient's 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.

In this form of the CDT, the examiner gives the patient 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 patient 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 ADReS score sheet.

Motor and Somatosensory Function

Driving is a physical activity that requires motor and somatosensory abilities such as:

- Muscle strength and endurance;
- Range of motion of the extremities, trunk, and neck; and
- Proprioception.

Motor abilities are necessary for operating vehicle controls appropriately and consistently and turning to view traffic. Even before driving, motor abilities are needed to enter the car safely and fasten the seat belt. The natural process of aging may involve a decline in muscle strength, muscle endurance, flexibility, and joint stability. Furthermore, osteoarthritis and other musculoskeletal problems are common in the elderly. Patients 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.

Most of the difficulty in driving an automobile for patients with muscle or arthritic disorders involves difficulties with the use of seat belts and keys, adjusting seats and mirrors, using the pedals, steering, and transferring in and out of the car.

Several efforts have been made to correlate functional abilities, such as range of motion and muscle function, with driving. Driving impairment has been associated with the inability to reach above the shoulder. Older adults with physical frailty may be at increased risk for a motor vehicle crash, and studies have indicated they appear to be more vulnerable to injury. Walking less than one block a day, impaired left knee flexion, and foot abnormalities have been associated with an adverse driving event.

In ADReS, motor function is measured through the Rapid Pace Walk, Manual Test of Range of Motion, and Manual Test of Motor Strength measures.

Rapid Pace Walk

This is a measure of lower limb strength, endurance, range of motion, and balance. A 10-foot path is marked on the floor with tape. The subject is asked to walk the 10-foot path, turn around, and walk back to the starting point as quickly

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as possible. If the patient normally walks with a walker or cane, he/she may use it during this test. The total walking distance is 20 feet.

The examiner begins timing the patient when he/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 patient to walk 10 feet and back. In addition, the examiner should indicate on the scoring sheet whether the patient used a walker or cane. Scores greater than 9 seconds are associated with an increased risk of at-fault motor vehicle tasks.

Range of Motion

The examiner tests the patient's range of motion by asking him/her to perform the requested 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 towards your body."

The examiner scores the test by choosing the appropriate description of test performance: (1) Within normal limits; or (2) not within normal limits: good range of motion with excessive hesitation/pain or very limited range of motion.

Manual Muscle Testing

The examiner should test bilateral:

- Shoulder adduction, abduction and flexion;
- Wrist flexion and extension;
- Hand-grip strength;
- Hip flexion and extension; and
- Ankle dorsiflexion and plantar flexion.

ADReS Score Sheet

When administering the ADReS battery, you may find it helpful to use the ADReS Score Sheet. (Page 21) The ADReS Score Sheet presents the tests in the simplest order of administration and provides space for recording test results.

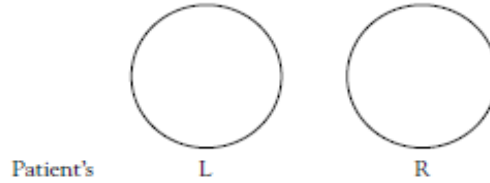
Although the tests may be administered in any order, the following sequence is recommended:

- Visual Fields by Confrontation Testing;
- Snellen E Chart - If your office has a long hallway, hang the chart at the end of the hallway and mark a 20-foot distance on the floor with tape. Have the patient stand at the tape.
- Rapid Pace Walk - Mark a 10-foot distance on the floor. With the patient already standing at the 20-foot mark, have him/her walk to the 10-foot mark, then back.
- Manual Test of Range of Motion - This is performed when the patient has returned to the examination room.
- Manual Test of Motor Strength
- Clock Drawing Test - Ask the patient to turn over the Trail Making Test sheet and draw a clock on the blank side.
- Trail Making Test, Part B.

Assessing Driving Related Skills (ADReS) Score Sheet

Patient's name: _____ Date: _____

1. **Visual fields:** Shade in any areas of deficit.



2. **Visual acuity:** _____ OU _____ OS _____ OU
 Was the patient wearing corrective lenses? If yes, please specify: _____
 If either eye acuity worse than 20/40, consider referral to ophthalmologist.
3. **Rapid pace walk:** _____ seconds
 (>9 secs, abnormal and consider referral for driving evaluation and/or evaluation of gait disorder) Was this performed with a walker or cane? If yes, please specify: _____
4. **Range of motion:** Specify 'Within Normal Limits' or 'Not WNL.' If not WNL, describe.

	Right	Left
Neck rotation		
Finger curl		
Shoulder and elbow flexion		
Ankle plantar flexion		
Ankle dorsiflexion		

Plan for any deficiencies (consider referral to OT/PT, address pain management, if indicated, and/or referral to driving clinic for vehicle modification)

5. **Motor strength:** Provide a score on a scale of 0–5.

	Right	Left
Shoulder adduction		
Shoulder abduction		
Shoulder flexion		
Wrist flexion		
Wrist extension		
Hand grip		
Hip flexion		
Hip extension		
Ankle dorsiflexion		
Ankle plantar flexion		

Plan for any deficiencies: (consider referral to OT/PT or driving clinic for vehicle modification)

ADReS Score Sheet (continued)

Patient's name: _____ Date: _____

6. Trail-Making Test, Part B: _____ seconds
(score greater than 180 secs abnormal, consider referral to driving evaluation clinic and/or work-up for cognitive/visual/motor impairment)
7. Clock drawing test: Please check 'yes' or 'no' to the following criteria

	Yes	No
Only the numbers 1-12 are included (no duplicates or omissions)		
The numbers are drawn inside the clock circle		
The numbers are spaced equally or nearly equally from each other		
The numbers are spaced equally or nearly equally from the edge of the circle		
One clock hand correctly points to 2		
There are only two clock hands		
There are no intrusive marks, writing or hands indicating incorrect time		

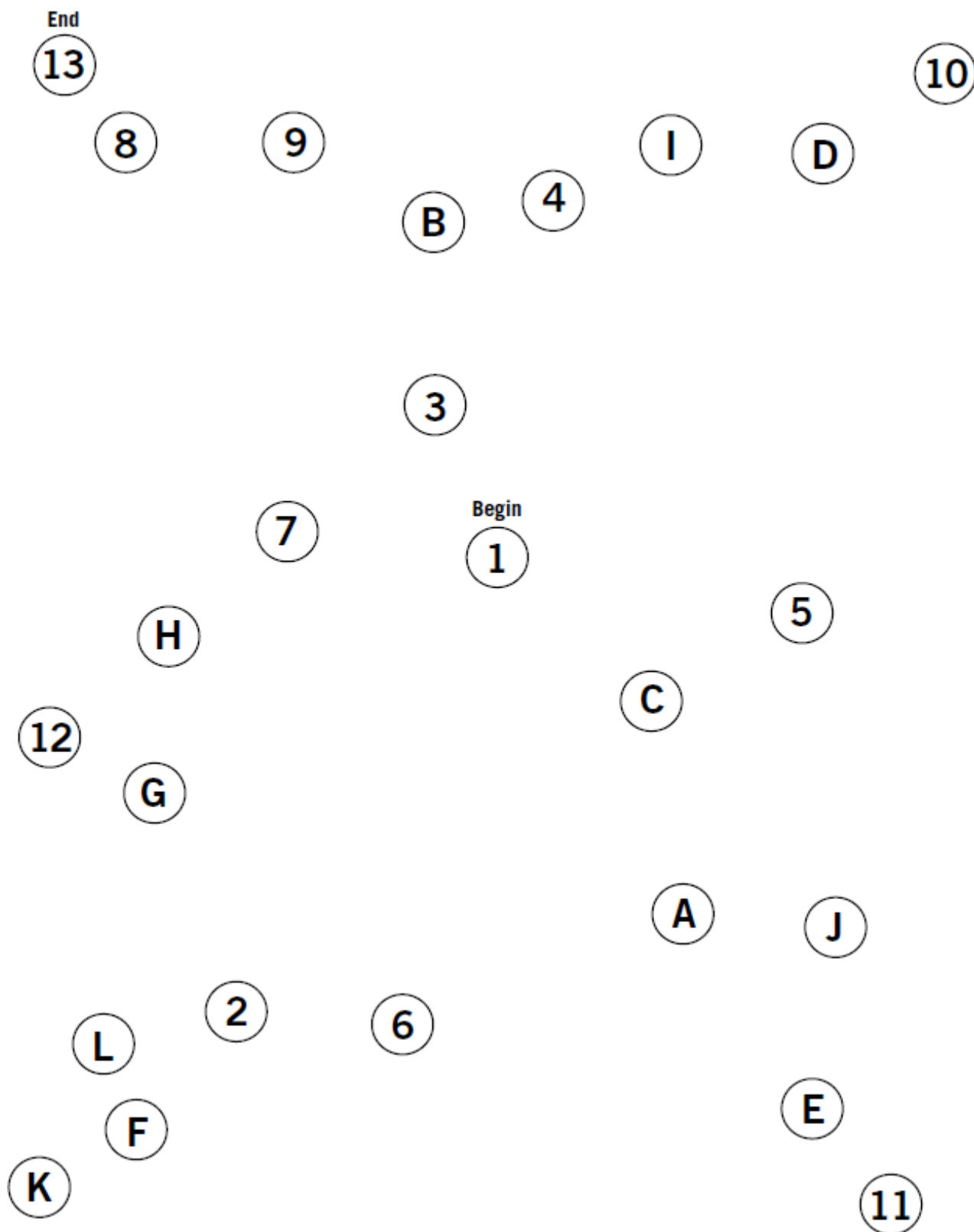
(any abnormal elements consider referral to driving evaluation clinic and/or work-up for cognitive/visual/motor impairment)

Assessment/Plan:

[illegible]

Trail-Making Test, Part B

Patient's name: _____ Date: _____



ADReS Results and Interventions

The goal of the evaluation is to identify, correct, or stabilize any functional deficits that may impair the patient's driving performance and refer to a Driver Rehabilitation Specialist (DRS), if appropriate.

Visual Acuity

Although many States currently require far visual acuity of 20/40 for an unrestricted license, there is a paucity of evidence that links static visual acuity to crash risk.

Visual acuity greater than 20/40 (e.g., more impaired):

- Ensure that the underlying cause of vision loss is adequately treated, if treatment is possible. If the patient is not currently under the care of an ophthalmologist or optometrist, referral is recommended.
- Recommend that the patient has and uses the appropriate glasses or contact lenses. Again, if the patient is not currently under the care of a specialist, referral is recommended.
- Recommend that the patient reduce the impact of decreased visual acuity by restricting travel to low risk areas and conditions (e.g., familiar surroundings, non-rush hour traffic, low speed areas, daytime, and good weather conditions).
- Be aware that the patient may require more frequent (e.g., yearly) assessment of visual acuity to detect further visual decline caused by chronic, progressive diseases.

Visual acuity less than 20/70 (e.g., more impaired):

- Follow the recommendations stated above, and
- Recommend an on-road assessment performed by a DRS to evaluate the patient's performance in the actual driving task, where permitted and available.

Visual acuity less than 20/100 (e.g., more impaired):

- Follow the recommendations stated above, and
- Recommend that the patient not drive unless safe driving ability can be demonstrated in an on-road assessment performed by a DRS, where permitted and available.

Visual Fields

While it is known that adequate visual field is important for safe driving, there is no conclusive evidence to define what is meant by "adequate." Most likely, this varies widely from patient to patient and may depend on the presence of other co-morbidities. For example, a driver with a restricted visual field but excellent

scanning ability may drive as safely as a driver with an unrestricted visual field but poor neck rotation.

General recommendations on visual field and driving are stated below. Therapists should be aware of their States' specific visual field requirements, if any, and adhere to them.

Visual field defects noted on clinical examination

- Ensure that the underlying cause of visual field loss is adequately treated, if treatment is possible. If the patient is not currently under the care of an ophthalmologist or optometrist, referral is recommended.
- Automated visual field testing may help define the extent of the defect, and ophthalmologists have a number of useful instruments for measuring visual fields.
- For binocular visual field of questionable adequacy (as deemed by clinical judgment), an on-road assessment performed by a DRS is strongly recommended. In addition, the DRS may prescribe enlarged side- and rear-view mirrors as needed and train the patient in their use.
- Be aware that the patient may require re-testing of visual fields in the future for visual field defects caused by chronic, progressive diseases.

Cognition

Although the following cognitive tests are scored separately, interventions are recommended if the patient reaches designated cut-off values (as described below) on either of them.

Trail-Making Test, Part B

A time for completion of greater than 3 minutes (180 seconds) signals a need for intervention, such as a review of causes for the abnormal result (e.g., dementia, sedating medication) and/or referral to a DRS.

Numerous studies have demonstrated an association between performance on the Trail-Making Test, Part B (TMT-B), and cognitive function and/or driving performance. In a study of 1,700 drivers 65 and older who were applying for renewal of their North Carolina driver's license, TMT-B test results were strongly associated with recent prior crash involvement. (Staplin, 2003) A study of 105 drivers in Nebraska 65 to 88 years old showed that on-road driving performance significantly correlated to TMT-B performance. (Stutz, 1998) Most recently, data from the Maryland Pilot Older Driver Study demonstrated a significant correlation between TMTB performance and future at-fault crash in the license renewal sample. (Ball, 2006)

Clock Drawing Test

Any incorrect or missing element on the Freund Clock Scoring Criteria signals a need for intervention, such as a review of causes for the abnormal result (e.g., dementia) and/or referral to a DRS.

Clock Drawing Tests (CDT) have been found to correlate significantly with traditional cognitive measures, and to discriminate healthy individuals from those with dementia. Of all the measures that have correlated with impaired driving performance in older adults with dementia, tests of visuospatial skill ability have had the highest level of prediction. Several versions of the CDT are available, each varying slightly in the method of administration and scoring. The Freund Clock Scoring is based on seven “principal components” (as outlined on the ADRoS Score Sheet), which were derived by analyzing the clock drawings of 88 drivers 65 and older against their performance on a driving simulator. (Freund, 2005) Errors on these principal components correlated significantly with specific hazardous driving errors, signaling the need for formal driving evaluation.

It is again emphasized that these tests should not be the sole determinant as to whether an older adult should drive. However, impairments on these tests are associated with increased risk, and referral for further evaluation, such as performance-based road testing, should be considered. In addition, it is unlikely that future fitness-to-drive evaluations will rely on one test but likely will employ a battery of tests.

If the patient’s performance warrants interventions, the therapist should:

- Gather (or refer for) more information to include detailed history and examination of cognitive and functional abilities, as needed;
- Identify or interview a reliable informant (e.g., family member or caregiver) who can assist with the evaluation;
- Identify the cause of the cognitive decline;
- Check for reversible causes of cognitive decline;
- Screen for depression;
- Review the patient’s medication regimen and the side effects of the medications, and question the patient about the onset of cognitive decline in conjunction with new medications or dosage changes. Your patients may be unaware of the potential effects of polypharmacy on cognitive ability and driving.
- Refer the patient to a physician (neurologist, psychiatrist, neuropsychologist, etc.) for diagnosis or treatment as needed.
- Recommend an on-road assessment performed by a DRS to assess the patient’s performance in the actual driving task. An initial comprehensive on-road assessment with retesting at regular intervals is particularly useful for progressive dementing illnesses.
- Strongly recommend that the patient begin exploring alternative forms of transportation now, and encourage him/her to involve family members/ caregivers in these discussions.

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Motor Ability

Although the following tests are scored separately, interventions are recommended if the patient reaches designated cut-off values (as described below) on any of the individual tests.

Rapid Pace Walk

A time for completion of greater than 9 seconds signals a need for intervention, such as determination of the cause for slowed gait speed (e.g., Parkinson's disease) and/or referral to a DRS.

The Rapid Pace Walk assesses lower limb mobility, trunk stability, and balance. In a prospective cohort study of 283 drivers 72 and older, subjects who took longer than 7 seconds to complete the test were twice as likely to experience an adverse traffic event (crash, violation, or being stopped by the police) in the year following the test. (Marottoli, 1994) More recently, data from the Maryland Pilot Older Driver Study—a study of almost 2,000 drivers over age 55 who were license renewal applicants—demonstrated a correlation between performance on the Rapid Pace Walk and future at-fault crash in the license renewal sample (odds ratio 1.70).

Manual Muscle Testing

Less than grade 4/5 strength in either upper extremity or the right lower extremity signals a need for intervention, such as vehicle modification.

The manual test of motor strength evaluates separate muscle groups in both the upper and lower limbs. The U.S. Public Health Service guidelines on musculoskeletal ability and driving state that a driver should have at least grade 4/5 strength in the right lower extremity and both upper extremities. The therapist should also be aware that the amount of strength required for safe driving may depend on the vehicle driven by the patient. For example, a patient who drives an older car that does not have power steering or operates a large vehicle (e.g., a school bus, which is not uncommon for retirees) may require greater strength to safely drive the vehicle.

Range of Motion

If the patient's range of motion is not within normal limits (i.e., if the patient has a good range of motion with excessive hesitation/pain or a very limited range of motion), this signals the need for intervention.

Scoring for range of motion is based on simple dichotomous outcomes (normal vs. impaired), and this is due to several reasons: (1) range of motion requirements vary with automobile design, and thus it is difficult to specify exact requirements; (2) as discussed in the visual fields section, the impact of limited range of motion on driving safety also depends on other functions; and (3) as with all the other tests in the ADReS battery, a patient's poor performance should

be a stimulus for optimization of function, rather than for immediate driving restrictions.

If the patient's performance on this test is not within normal limits, the therapist should be certain to elicit the reason: Do these movements cause muscle or joint pain? Does the patient complain of tight muscles or stiff joints? Do these movements cause a loss of balance? Patients with a history of falls have been noted to be at increased risk of motor vehicle crashes. Knowing the answers to these questions will help in the management of the patient's physical limitations.

If the patient's performance warrants interventions, the therapist should:

- Encourage the patient to drive a vehicle with power steering and automatic transmission, if he/she does not already do so.
- Recommend that the patient maintain or commence a consistent regimen of physical activity, including cardiovascular exercise, strengthening exercises, and stretching.
- Refer the patient to a specialist for management of any joint disease, podiatry issues, or neuromuscular problems. Post-stroke patients with residual deficits that interfere with the patient's handling of car controls should also be referred.
- Recommend an on-road assessment, performed by a DRS, to assess the patient's performance in the actual driving task. A comprehensive on-road assessment is particularly useful for assessing the impact of physical fatigue on the patient's driving skills.
- The DRS may prescribe adaptive devices as needed (e.g., a spinner knob on the steering wheel to compensate for poor hand grip or an extended gear shift lever to compensate for reduced reach), and train the patient in their use.

The ADReS battery is useful as an in-office assessment, but it does not evaluate the patient's performance in the actual driving task, and the results even if abnormal are not sufficient to recommend driving cessation. For this, an on-road assessment performed by a DRS is needed. The DRS can more specifically determine the patient's level of driving safety and correct his/ her functional impairments, if possible, through adaptive techniques or devices.

The Driver Rehabilitation Specialist

A Driving Rehabilitation Specialist (DRS) is one who "plans, develops, coordinates and implements driving services for individuals with disabilities." DRSs are most often therapists who undergo additional training in driver rehabilitation.

DRSs receive certification from the Association for Driver Rehabilitation Specialists (ADED) by fulfilling education and experience qualifications and

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passing a certification examination. Certified Driver Rehabilitation Specialists renew their certification every three years by fulfilling a minimum amount of contact hours. While many DRSs either hold certification or are in the process of obtaining the necessary education and experience to sit for the examination, certification is not required to practice driver rehabilitation nor for ADED membership.

A DRS evaluates the client's driving skills, recommends rehabilitation as needed, and can suggest vehicle and/or route modifications (e.g., such as avoiding left hand turns) to enable the person to resume or continue driving safely. Although driver rehabilitation programs vary, most typically include the following elements in their evaluation:

Driver Evaluation

- Clinical assessment, including review of driving history, driving needs, and license status; review of medical history and medications; visual/perceptual assessment; assessment of range of motion, motor strength, coordination, sensation, and reaction time; and cognitive assessment.
- Functional (on-road) assessment, including assessment of vehicle ingress/ egress, mobility aid management (e.g., ability to transport a wheelchair or scooter), vehicle preparation, vehicle control, adherence to traffic rules and regulations, environmental awareness and interpretation, and consistent use of compensatory strategies for visual, cognitive, physical, and behavioral impairments.
- Communication of assessment results and recommendations to the client:
 1. Return to driving, with or without adaptive driving equipment.
 2. Limit driving with restrictions placed on either the geographic areas or conditions in which the client drives.
 3. Attend a remedial driving course to establish/maintain defensive driving skills.
 4. Receive adaptive driving instruction or driver retraining using a vehicle matched to the client's individual needs.
 5. Stop driving. This is advised when a client does not demonstrate the necessary skills to resume driving, and the potential for improvement with retraining is poor. In these cases, alternative transportation options are reviewed with the client.
 6. Re-evaluation. This option is indicated if a client's function is expected to improve, or if a client demonstrates adequate skills to drive at present but has a progressive disorder that may cause future decline.

Passenger Vehicle Evaluation

- Assessment of vehicle, vehicle modifications, and equipment needed for the client's safe transport as a passenger.
- Consideration of the needs of the patient's family (for example, certain lifts or tie-down systems may be recommended due to an assisting family member's physical limitations)

Treatment and Intervention

- Adaptive driving instruction or driver retraining, with or without vehicle modifications.
- Coordination of vehicle modifications:
 1. Vehicle consultation: The DRS serves as a consultant to clients who are purchasing a new vehicle to ensure that the vehicle will accommodate the necessary adaptive equipment.
 2. Vehicle modification recommendations: The DRS provides written recommendations for all vehicle/ equipment needs to the client, third party payer, and vehicle/ equipment dealer.
 3. Vehicle inspection: The DRS is involved with the client and adaptive equipment dealer in a final fitting to ensure optimal functioning of the recommended vehicle/ equipment.

An initial driver evaluation can last one to four hours, depending on the client's presenting disabilities and driving needs. Following the clinical assessment, clients undergo an on-road assessment if they meet the minimum State standards for health and vision, and the client holds a valid driver's license or permit. The on-road assessment is performed in a driver rehabilitation vehicle equipped with dual brakes, a rear-view mirror and eye-check mirror for the DRS, and any necessary adaptive equipment.

Please note that clients who perform poorly on the clinical assessment may still undergo on-road assessment. In these cases, the DRS may recommend on-road assessment for one of two reasons: (1) clients who perform poorly on individual components of the clinical assessment may still demonstrate safe driving due to over-learning the driving task; and (2) clients and family members may need concrete evidence of unsafe driving, which can only be documented through observation of behind-the-wheel performance.

Locating a Driver Rehabilitation Specialist

Driver rehabilitation programs and DRSs are still fairly rare, but in private practice they are often affiliated with hospitals, rehabilitation centers, driving schools, and State departments of motor vehicles. DRS services may also be found through area agencies on aging, universities, and area departments of education. Before referring patients to driving schools for driver assessment and rehabilitation,

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therapists are urged to determine that the staff has training and experience in driver rehabilitation. A background in driver education alone may be insufficient for appropriate assessment of medically impaired drivers and correct interpretation of the assessment.

To locate a DRS in your area, you may wish to start by calling the occupational therapy departments in your local hospitals or rehabilitation centers. The ADED's online directory is another good source of information.

No Longer Safe to Drive

For most of us, driving is a symbol of independence and a source of self-esteem. When an individual retires from driving, he/she not only loses a form of transportation, but all the emotional and social benefits derived from driving. For various reasons, therapists may be reluctant to discuss driving cessation with their patients. Therapists may fear delivering bad news or be concerned that the patient will lose mobility and all its benefits. Therapists may avoid discussions of driving altogether because they believe that a patient will not heed their advice or become angry. The therapist may also be concerned about losing a patient to another practice.

These concerns are all valid. However, therapists have an ethical responsibility to protect their patients' safety through assessment of driving-related functions, exploration of medical and rehabilitation options to improve their patients' driving safety, and—when all other options have been exhausted—recommendations for driving restriction or driving cessation. Health care professionals are influential in a patient's decision to stop driving; in fact, advice from a healthcare professional is the most frequently cited reason that an individual stops driving.

When counseling a patient to stop driving, the following steps may be useful:

1. Explain to the patient why it is important to stop driving.

If your patient has undergone the ADReS battery or assessment by a driver rehabilitation specialist, explain the results of the assessment in simple language. Clearly explain what the results reveal about his/her level of function, and then explain why this function is important for driving. State the potential risks of driving, and end with the recommendation that your patient stop driving. This might be a good time to discuss the patient's thoughts or feelings, especially if he/she did cause a crash. If the patient should not drive, you might discuss issues related to injury, public safety, and/ or liability. This discussion should be put in writing and if the patient lacks decision-making capacity, involve a family member or caregiver.

For example, you could say:

“The results of your eye exam show that your vision isn’t as good as it used to be. Good vision is important for driving, because you need to be able to see the road, other cars, pedestrians, and traffic signs. With your impaired vision due to underlying eye disease and now a stroke, I’m concerned that you’ll get into a car crash. Since your vision cannot be corrected to a level safe for driving, for your own safety and the safety of others, it’s time for you to retire from driving. In addition, there are legal requirements for vision and you do not meet those any longer. “

The patient may become upset or angry at your recommendation to stop driving. Acknowledge your patient’s feelings and be empathetic to any emotional responses. While you should be sensitive to the practical and emotional implications of driving cessation, it is also necessary to be firm with your recommendation. At this time, it is best to avoid engaging in disputes or long explanations. Rather, you should focus on making certain your patient understands your recommendation and understands that this recommendation was made for his/her safety. If the patient is competent but will allow the presence of a spouse or family member, having this person present may be helpful when communicating this sensitive information. All discussions should be documented in the chart.

2. Discuss transportation options.

Once you have recommended that your patient stop driving, you need to explore possible transportation alternatives. Unfortunately, driving cessation has been associated with a decrease in social integration. Discuss with your patient the fact that there may be alternative ways to reach destinations.

Encourage your patient to take control of his/her future by creating a transportation plan. Give your patient resources to explore options. By providing this information, you empower your patient to formulate a personal plan for transportation.

This process will help your patient preserve a sense of self-determination and drivers usually prefer rides from friends and family, they are often uncomfortable with the accompanying feelings of dependency. Using alternative transportation options such as buses, trains, cabs, or even walking, offers patients independence from having to rely on others. However, these may not be a reasonable alternative for those with physical frailty and/or dementia.

To begin a discussion on driving alternatives, ask if your patient has made plans to stop driving or how he/she currently finds rides when driving is not an option. Offer alternative transportation methods for your patient to use. Explore any barriers your patient foresees to these methods (i.e., financial constraints, limited service and destinations, and required physical skills for accessibility).

Help your patient identify his/her most feasible transportation options, as there often are necessary cognitive and physical skills required to access certain transportation alternatives.

Stress the importance of planning ahead for social activities—which contribute to quality of life. Your patients can contact their Area Agency on Aging and/or Alzheimer's Association for information on local resources such as taxis, public transportation services, and senior-specific transportation services. To find contact information for your local area, call the nationwide Eldercare Locator at 800-677-1116. This might be a good time to refer to a social worker or a gerontological care manager who may be aware of alternate modes of transportation and/or can deal with the patient's feelings of social isolation or depression.

Encourage your patient to involve family members in creating a transportation plan. Obtain the patient's permission when involving family or caregivers, and encourage them to offer rides and formulate a weekly schedule for running errands. They can also help arrange for delivery of prescriptions, newspapers, groceries and other services. However, do not ignore your patient while including the caregiver in the discussion.

3. Reinforce driving cessation.

The message to cease driving is essential to ensure your patient's safety, yet also presents a significant demand on your patient to change his/her current behavior. Therefore, you will need to ensure that your patient understands the reasons (legal, health and safety) why you have recommended driving discontinuation. Your patient may become argumentative or emotional during the office visit. He/she may not fully comprehend your recommendations and may not remember all the information you provide. To help re-enforce your message:

- Ask your patient if he/she has any questions regarding the assessment and your recommendation. Reassure your patient that you are available should he/she have questions or need further assistance.
- Ask your patient to reiterate to you, why he/she must not drive. Stress this recommendation is for personal safety and the safety of others on the road.

The Resistant Patient

If a patient is belligerent or refuses to stop driving, it is important for the therapist to understand why. The following steps should be utilized when dealing with a resistant patient:

1. Listen to the patient

Use supportive statements when addressing a patient's concerns. Let the patient know you are there as an advocate for his/her health and safety.

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Therapist: *Mr. Adams, I understand you drove yourself to the appointment today. This worries me. At our last visit, I recommended that you retire from driving. I am wondering why you chose to drive yourself here today?*

Mr. Adams: *Well, I don't understand it. I've never gotten into an accident. My driving is fine and frankly, I don't think you have any right to tell me not to drive.*

Therapist: *It sounds like you are frustrated and I can't imagine how difficult it must be for you to adjust to a life without driving. It's not an easy choice to make; however, it's the best choice for your health and safety, and as your physician, that is my primary concern. I want to help make this easier for you. Let's talk about some of your concerns regarding retiring from driving.*

Therapist: *Mr. Adams, when do you think it's an appropriate time for a person to stop driving?*

Mr. Adams: *I suppose when they drive unsafely or are a threat to others on the road.*

Therapist: *That is an excellent observation; and I would agree with you.*

Mr. Adams: *Well, a friend of mine doesn't drive very well. He drives all over the road and runs red lights. I won't get in the car with him anymore because I worry about what may happen.*

Therapist: *That can be a scary situation for your friend and others on the road as well. It's great that you are aware of the potential danger and that you know how to ensure your own safety. I am wondering, is there someone whom you trust, and who would tell you when they thought it was unsafe for you to continue driving?*

Remember driving cessation can have severe emotional and practical implications for your patients, and they may have a difficult time adjusting.

2. Have the patient define when a person would be unfit to drive.

This will better help the patient recognize impairment in his/her own driving capabilities and will help you assess the patient's judgment and insight. In addition, it might open up discussion where you can each reach some common ground.

Many older drivers are able to identify peers whose driving they consider unsafe, yet may not have the insight to recognize their own unsafe driving habits. Ask your patients if they have friends with whom they are afraid to drive and why. It's important to have your patients begin to think about what they can expect when their driving abilities begin to decline. Let your patients know they are not alone

and that many people make the decision to restrict or cease driving when safety becomes a concern. Encourage your patients to obtain a second opinion if they feel additional consultation is necessary.

3. Have the patient identify support systems.

Ask your patient to list family members, church groups, neighbors, etc. who are able and willing to help with transportation decisions. This will help your patient become aware of a supportive network and feel more at ease when searching for alternative transportation.

4. Help the patient view the positives of this decision.

An opportunity to assert control over a limitation. Often, discussion of relinquishing driving privileges tends to focus on the negative aspects of driving cessation; i.e., “losing independence” or “giving up freedom.” Help your patients view this as a step in health promotion and safety for themselves and others. Use phrases such as “it’s time to retire from driving” and point out that he/ she may still request rides from family and utilize community services, and will have lower costs and responsibility for maintaining an automobile.

5. Refer the patient to social worker.

Your patient may need additional help in securing resources and transitioning to a life without driving. Social workers can provide supportive counseling to patients and families, assess your patient’s psychosocial needs, assist in locating and coordinating community services and transportation, and enable your patient to maintain independence and safety, while preserving quality of life. The National Association of Social Workers Register of Clinical Social Workers is a valuable resource for finding social workers in your area who have met national verified professional standards for education, experience and supervision. Order information or access the on-line Register at www.socialworkers.org. Another resource for social workers may be your local hospital and a referral source may be the Area Agency on Aging or the Alzheimer’s Association.

Specific Medical Conditions and Medications

Vision

Vision is the primary sense employed in driving when compared to hearing and proprioception, and is responsible for 95 percent of driving-related sensory inputs. Age- and disease-related changes of the eye and brain may affect visual acuity, visual fields, night vision, contrast sensitivity, and other aspects of vision. External obstruction of view (e.g., blepharoptosis) should not be overlooked, as it may significantly limit visual fields. Driving impairment is frequently caused by impairment in contrast sensitivity, visual fields, or visual processing speed. Whenever possible, vision deficits should be managed and corrected. Intervention with current treatments for common eye diseases such as age-

related macular degeneration, glaucoma, and cataracts, have the potential to improve or stabilize the condition, and in some cases these interventions have been noted to reduce crash risk. Patients with persistent vision deficits may reduce their impact on driving safety by restricting travel to low-risk areas and conditions, such as familiar surroundings, low speed areas, non-rush hour traffic, daytime, and good weather conditions. This has been noted for certain eye diseases, especially glaucoma.

Visual Acuity

Patients with decreased far visual acuity may lessen its impact on driving safety by restricting driving to low-risk areas and conditions (e.g., familiar surroundings, non-rush hour traffic, low speed areas, daytime, and good weather conditions).

For best-corrected far visual acuity less than 20/70, an on-road assessment performed by a driver rehabilitation specialist (where it is permitted and available) is recommended to evaluate the patient's performance in the actual driving task.

For best-corrected far visual acuity less than 20/100, the patient should not drive unless safe driving ability can be demonstrated in an on-road assessment.

Cataracts - No restrictions if standards for visual acuity and visual fields are met, either with or without cataract removal. Individuals who require increased illumination or who experience difficulty with glare recovery should avoid driving at night and under low-light conditions, such as adverse weather conditions.

Diabetic or Hypertensive Retinopathy - No restrictions if standards for visual acuity and visual fields are met. It is recommended that diabetic patients have annual eye examinations.

Keratoconus - Patients with severe keratoconus correctable with hard contact lenses should drive only when the lenses are in place. If lenses cannot be tolerated, patients with severe keratoconus should not drive even if they meet standards for visual acuity, as their acuity dramatically declines outside their foveal vision, rendering their peripheral vision useless.

Macular Degeneration - No restrictions if standards for visual acuity and visual fields are met. Patients who experience difficulty with glare recovery should avoid driving at night. Patients with the neovascular "wet" form of the disease may require frequent assessment due to the rapid progression of the disease.

Telescopic Lens - A bioptic telescope is an optical telescope mounted on the lens of eyeglasses. During normal use, the wearer can view the environment through the regular lens. When extra magnification is

needed, a slight downward tilt of the head brings the object of interest into the view of the telescope. The specialist who prescribes a telescopic lens should ensure that the patient is properly trained in its use.

It has not been established whether telescopes enhance the safety of low-vision drivers. As stated in the American Academy of Ophthalmology's Policy Statement, Vision Requirements for Driving:

"More than half the States allow drivers to use bioptic telescopes mounted on glasses, through which they spot traffic lights and highway signs. It has not yet been demonstrated whether the estimated 2,500 bioptic drivers in the United States drive more safely with their telescopes than they would without them. The ability to drive safely using bioptic telescopes should be demonstrated in a road test in all cases."

Please note that the statement above is subject to your particular State's licensing requirements. A road test should be administered only in those States that permit the use of bioptic telescopes in driving.

Visual Field

While it is acknowledged that an adequate visual field is important for safe driving, there is no conclusive definition of what is meant by "adequate" or any consistent standard as to how visual fields are tested. Visual field requirements vary between States, with many States requiring a visual field of 100 degrees or more along the horizontal plane, and other States having a lesser requirement or none at all.

If the clinician has any reason to suspect a visual field defect (e.g., through patient report, medical history, or confrontation testing), he/she should refer the patient to an ophthalmologist or optometrist for further evaluation.

For binocular visual field at or near the State minimum requirement or of questionable adequacy (as deemed by clinical judgment), a driver evaluation (including on-road assessment) performed by a driver rehabilitation specialist is strongly recommended. Through driving rehabilitation, the patient may learn how to compensate for decreased visual fields, although not hemi-neglect. In addition, the driver rehabilitation specialist may prescribe enlarged side and rear view mirrors as needed and train the patient in their use.

Glaucoma - No restrictions if standards for visual acuity and visual fields are met. Continued follow-up with an ophthalmologist and monitoring of visual fields and intraocular pressure are recommended.

Hemianopia/Quadrantanopia - The clinician may choose to refer the patient to a driver rehabilitation specialist for assessment and rehabilitation. With or without rehabilitation, the patient should drive only if

he/she demonstrates safe driving ability in an on-road assessment performed by a driver rehabilitation specialist. (Subject to the particular State's licensing restrictions, if any, for hemianopia and quadrantanopia.)

Monocular Vision - Patients with acquired monocularity may need time to adjust to the lack of depth perception and reduction in total visual field. This period of adjustment varies among individuals, but it is reasonable to recommend temporary driving cessation for several weeks. Following this period, there are no restrictions if standards for visual acuity and visual fields are met. Upon resumption of driving, patients should be advised to assess their comfort level by driving in familiar, traffic-free areas before advancing to heavy traffic. Again, use of larger mirrors and evaluation and training by a driver rehabilitation specialist is encouraged.

Ptosis or Blepharospasm - Individuals with fixed ptosis or lid redundancy may drive without restrictions if their eyelids do not obscure the visual axis of either eye, and they are able to meet standards for visual acuity and visual fields without holding their head in an extreme position. Blepharospasms should be controlled so there is no interference with vision.

Contrast Sensitivity

Contrast sensitivity is a measure of an individual's ability to perceive visual stimuli that differ in contrast and spatial frequency. Contrast sensitivity tends to decline with age; accordingly, deficits in contrast sensitivity are much greater in older individuals compared to their younger counterparts. Among older drivers, binocular measures of contrast sensitivity have been found to be a valid predictor of crash risk in patients with cataracts. However, there are presently no standardized cut-off points for contrast sensitivity and safe driving, and it is not routinely measured in eye examinations.

Defective Color Vision

No restrictions if standards for visual acuity and visual fields are met. Deficits in color vision are common (especially in the male population) and usually mild. There appears to be no correlation between defective color vision and crash rates. Only 19 States require prospective drivers to undergo color vision screening, and most of these States require screening for commercial drivers only.

Despite reported difficulties with color vision discrimination while driving (difficulty distinguishing the color of traffic signals, confusing traffic lights with street lights, and difficulty detecting brake lights), it is unlikely that color vision impairments represent a significant driving hazard. With the standardization of traffic signal positions, color blind individuals are able to interpret traffic signals correctly because they can identify the traffic signal by its position.

Poor Night Vision

If the patient reports poor visibility at night, the clinician should recommend optometric and/or ophthalmologic evaluation. If the evaluation does not reveal a treatable cause for poor night vision, the clinician should recommend that the patient not drive at night or under other low-light conditions, such as during storms or at dusk.

Diplopia

Patients with double vision in the central aspect of vision (20 degrees above and below, left and right of fixation) should not drive. Patients with uncorrected diplopia should be referred to an ophthalmologist or optometrist for further assessment to determine if the defect can be corrected with prisms or a patch and meet standards for driving. There should be a three-month adjustment period, after which specialists can determine if adequate adjustment has occurred.

Hearing Loss

No restrictions. Relatively few studies have examined the relationship between hearing impairment and risk of motor vehicle crash. Of these, none have shown a significant relationship between hearing impairment and risk of crash.

Cardiovascular Diseases

There is a modest increase in total crash risk and at-fault risk for older adults with cardiac disease. For the patient with known cardiac disease, the clinician should strongly and repeatedly caution the individual to seek help immediately upon experiencing any symptoms—including prolonged chest discomfort, acute shortness of breath, syncope, pre-syncope, palpitations, lightheadedness—that may indicate an unstable cardiac situation. Under no circumstances should the patient drive to seek help.

Unstable Coronary Syndrome (unstable angina or myocardial infarction)

Patients should not drive if they experience symptoms at rest or at the wheel. Patients may resume driving when they have been stable and asymptomatic for one to four weeks, as determined by a cardiologist, following treatment of the underlying coronary disease. Driving may usually resume within one week after successful revascularization by percutaneous transluminal coronary angioplasty (PTCA) and by four weeks after coronary artery bypass grafting.

Arrhythmias

A main consideration in determining medical fitness to drive for patients with cardiac conditions is the risk of pre-syncope or syncope due to a brady- or tachyarrhythmia. For the patient with a known arrhythmia, the clinician should recommend temporary driving cessation until the cause of the arrhythmia has been identified and treated.

Paroxysmal supraventricular tachycardia (PSVT) - No restrictions if the patient is asymptomatic during documented episodes. Patients with a history of symptomatic tachycardia may resume driving after they have been asymptomatic for six months on antiarrhythmic therapy. Patients who undergo radio frequency ablation may resume driving after six months if there is no recurrence of symptoms, or sooner if no pre-excitation or arrhythmias are induced at repeat electrophysiologic testing.

Prolonged, nonsustained ventricular tachycardia (VT) - No restrictions if the patient is asymptomatic during documented episodes. Patients with symptomatic VT may resume driving after three months if they are on antiarrhythmic therapy guided by invasive electrophysiologic (EP) testing, and VT is noninducible at repeat EP testing. They may resume driving after six months without arrhythmia events if they are on empiric antiarrhythmic therapy or have an ICD alone without additional antiarrhythmic therapy.

Sustained ventricular tachycardia (VT) - Patients may resume driving after three months if they are on antiarrhythmic therapy guided by invasive electrophysiologic (EP) testing, and VT is noninducible at repeat EP testing. Patients may resume driving after six months without arrhythmia events if they are on empiric antiarrhythmic therapy, or have an ICD alone without additional antiarrhythmic therapy.

Cardiac Arrest

If clinically significant cognitive changes persist following the patient's physical recovery, cognitive testing is recommended before the patient is permitted to resume driving. In addition, on-road testing performed by a driver rehabilitation specialist may be useful in assessing the patient's fitness to drive.

High Grade Atrio-Ventricular (AV) block

For symptomatic block corrected without a pacemaker (e.g., by withdrawal of medications that caused the block), the patient may resume driving after he/she has been asymptomatic for four weeks and EKG documentation shows resolution of the block.

Cardiac disease resulting from structural or functional abnormalities

A main consideration in determining medical fitness to drive for patients with abnormalities of cardiac structure or function is the risk of pre-syncope or syncope due to low cardiac output, and of cognitive deficits due to chronic cerebral ischemia. Patients who experience pre-syncope, syncope, extreme fatigue, or dyspnea at rest or at the wheel should cease driving.

Cardiac Procedures

Driving restrictions for the following cardiac procedures are based on the patient's recovery from the procedure itself and from the underlying disease for which the procedure was performed.

Percutaneous transluminal coronary angioplasty (PTCA) - The patient may resume driving 48 hours to one week after successful PTCA and/or stenting procedures, depending on the patient's baseline condition and course of recovery from the procedure and underlying coronary disease.

Pacemaker insertion or revision - The patient may resume driving one week after pacemaker implantation if:

1. The patient no longer experiences pre-syncope or syncope
2. EKG shows normal sensing and capture; and
3. Pacemaker performs within manufacturer's specifications.

Cardiac surgery involving median sternotomy - Driving may usually resume four weeks following coronary artery bypass grafting (CABG) and/or valve replacement surgery, and within eight weeks following heart transplant, depending on resolution of cardiac symptoms and the patient's course of recovery. In the absence of surgical or post-surgical complications, the main limitation to driving is the risk of sternal disruption following median sternotomy.

Cerebrovascular Disorders

Strokes and other insults to the cerebral vascular system may cause a wide variety of symptoms, including sensory deficits (e.g., numbness or loss of sensation), motor deficits (e.g., weakness), and cognitive impairment (e.g., memory, hemispatial inattention). These symptoms range from mild to severe and may resolve almost immediately or persist for years. Because each patient is affected uniquely, the clinician must take into account the individual patient's constellation of symptoms, severity of symptoms, course of recovery, and baseline function when making recommendations concerning driving. Studies have indicated that a significant number (>40%) of community dwelling stroke patients continue to drive a car. However, the majority of stroke patients (87 %) may not receive any type of formal driving evaluation, but simply resume the operation of a motor vehicle.

Driving should always be discussed prior to the patient's discharge from the hospital or rehabilitation center. Patients with residual deficits who wish to resume driving should be referred to a driver rehabilitation specialist whenever possible. Although the time frame for this evaluation will depend on the severity and extent of the deficits, many evaluations for cognitive and motor defects will occur somewhere between three to six months. Upon stabilization of symptoms, the DRS assesses the patient for fitness-to-drive through clinical and on-road

evaluations. After assessment, the DRS may recommend adaptive techniques or adaptive devices (e.g., wide rear view mirror, spinner knob for the steering wheel, left foot accelerator) and provide training for their proper use.

Even patients with mild deficits should undergo driver evaluation prior to resuming driving, if possible. Post-stroke determination of driving safety made on a medical basis alone may be inadequate.

For the patient whose symptoms clearly preclude driving, it should not be assumed that the patient is aware that he/she should not drive. In such cases, the clinician should counsel the patient on driving cessation.

Stroke

Patients with acute, severe motor, sensory, or cognitive deficits should refrain from driving. Depending on the severity of residual symptoms and the degree of recovery, this restriction may be permanent or temporary.

Upon the patient's discharge from the hospital or rehabilitation center, the clinician may recommend temporary driving cessation until further neurological recovery has occurred. Once neurological symptoms have stabilized, clinicians should refer appropriate patients with residual sensory loss, cognitive impairment, visual field defects, and/or motor deficits to a driver rehabilitation specialist for driver assessment and rehabilitation. The specialist may prescribe vehicle adaptive devices and train the patient in their use.

Patients with neglect or inattention should be counseled not to drive until symptoms have resolved and safe driving ability has been demonstrated through assessment by a driver rehabilitation specialist.

All patients with moderate to severe residual hemiparesis should undergo driver assessment before resumption of driving. Even if symptoms improve to the extent that they are mild or completely resolved, patients should still undergo driver assessment, if available, as reaction time may continue to be affected and other comorbid conditions could further increase risk.

Patients with aphasia who demonstrate safe driving ability may fail in their efforts to renew their license due to difficulties with the written examination. In these cases, the licensing authority may make reasonable accommodations for the patient's language deficit. A driving rehabilitation specialist may be able to determine whether the deficit is expressive in nature and thus may allow for interpretation of written (e.g., traffic signs) stimuli. However, traffic signs may still be interpreted based on color, shape, and symbol recognition.

Vascular Malformation

Following the detection of a brain aneurysm or arterio-venous (AV) malformation, the patient should not drive until he/she has been assessed by a neurosurgeon.

The patient may resume driving if the risk of a bleed is small; an embolization procedure has been successfully completed; and/or the patient is free of other medical contraindications to driving, such as uncontrolled seizures or significant perceptual or cognitive impairments.

Syncope

Driving restrictions for neurally mediated syncope should be based on the severity of the presenting event and the anticipant likelihood of recurrence. No driving restrictions are necessary for infrequent syncope that occurs with warning and with clear precipitating causes. Patients with severe syncope may resume driving after adequate control of the arrhythmia has been documented and/or pacemaker follow-up criteria have been met. For patients who continue to experience unpredictable symptoms after treatment with medications and pacemaker insertion, driving cessation is recommended.

Neurologic Disorders

Dementia deserves special emphasis in this section because it presents a significant challenge to driving safety. With progressive dementia, patients ultimately lose the ability to drive safely and lack insight. Therefore, dementia patients may be more likely than drivers with visual or motor deficits (who tend to self-restrict their driving to accommodate their declining abilities) to drive even when it is highly unsafe for them to be on the road. It becomes the responsibility of family members and other caregivers to protect the safety of these patients by enforcing driving cessation.

Fitness-to-drive studies in patients with dementia indicate that 90 percent may be able to pass a road test in the very mild stages of the disease, whereas 40 percent may fail at a mild level of cognitive impairment. Furthermore, most patients with Alzheimer's disease will eventually fail subsequent road tests when followed longitudinally, indicating that repeat testing at six to twelve months should be strongly considered.

While it is optimal to initiate discussions of driving safety with the patient and family members before driving becomes unsafe, dementia may be undetected and undiagnosed until late in the course of the disease. Initially, family members and health care professionals may assume that the patient's decline in cognitive function is a part of the "normal" aging process. Physicians may also hesitate to screen for and diagnose dementia because they feel that it is futile—in other words, that nothing can be done to improve the patient's situation or slow disease progression. However, some patients are able to achieve cognitive stability, at least for a period of time, with cholinesterase inhibitors or N-methyl d-aspartate (NMDA) receptor blockers. In addition, patients are now being diagnosed on the "cusp" of the disease in the very early stages. A diagnosis of dementia by itself should not preclude driving.

Reluctance to screen for dementia is unfortunate because early diagnosis is the first step in promoting the driving safety of these patients. The second step is intervention, which includes medications to slow or stabilize the course of the disease, counseling to prepare the patient and family for eventual driving cessation and serial assessment of the patient's driving abilities. When assessment shows that driving may pose a significant safety risk to the patient, driving cessation is a necessary third step. With early planning, patients and their families can make a more seamless transition from driving to non-driving status.

Brain Tumor

Driving recommendations should be based on the type of tumor; location; rate of growth; type of treatment; presence of seizures; and presence of cognitive or perceptual impairments. Due to the progressive nature of some tumors, the patient's fitness to drive needs to be assessed serially.

Closed Head Injury

Patients should not drive until symptoms or signs have stabilized or resolved. For patients whose symptoms or signs resolve, driving may resume following medical assessment and, if deemed necessary by the physician, driver evaluation (including on-road assessment) performed by a driver rehabilitation specialist.

Dementia

The following recommendations are adapted from the Canadian Consensus Conference on Dementia and the Alzheimer's Association Policy Statement on Driving and Dementia:

A diagnosis of dementia is not, on its own, a sufficient reason to withdraw driving privileges. A significant number of drivers with dementia are found to be competent to drive in the early stages of their illness. Therefore, the determining factor in withdrawing driving privileges should be the individual's driving ability. When the individual poses a heightened risk to self or others, driving privileges must be withheld.

Clinicians should consider the risks associated with driving for all of their patients with dementia, and they are encouraged to address the issue of driving safety with these patients and their families. When appropriate, patients should be included in decisions about current or future driving restrictions and cessation; otherwise, clinicians and families must decide in the best interests of the patient whose decision-making capacity is impaired.

Health care professionals should be aware that patients with a progressive dementia who are initially believed to be safe to drive will require serial assessment, and they should familiarize themselves with their State reporting laws and procedures for dementia (if any).

If concern exists that an individual with dementia has impaired driving ability, and the individual would like to continue driving, a formal assessment of driving skills should be administered. An on-road driving assessment performed by a driver rehabilitation specialist is recommended.

Migraines

Patients with recurrent severe headaches should be cautioned against driving when experiencing neurologic manifestations (e.g., visual disturbances or dizziness); when distracted by pain; and while on any barbiturate, narcotic, or narcotic-like analgesic.

Parkinson's Disease

Patients with advanced Parkinson's disease may be at increased risk for motor vehicle crashes due to both motor and cognitive dysfunction. Driving recommendations should be based on the level of both motor and cognitive symptom involvement, patient's response to treatment, and presence and extent of any medication side effects. Serial physical and cognitive evaluations are recommended every six to twelve months due to the progressive nature of the disease.

If dementia and/or motor impairments may affect the patient's driving skills, a driver evaluation (including on-road assessment) performed by a driver rehabilitation specialist may be useful in determining the patient's fitness to drive. Lower extremity deficits in sensation and proprioception may be exceedingly dangerous for driving, as the driver may be unable to control the foot pedals.

Peripheral Neuropathy

If deficits in sensation and proprioception are identified, referral to a driver rehabilitation specialist is recommended. The specialist may prescribe vehicle adaptive devices (e.g., hand controls in place of the foot pedals) and train the patient in their use.

Seizure Disorder

The Statements on Driver Licensing in Epilepsy was crafted and agreed upon by the American Academy of Neurology, American Epilepsy Society, and Epilepsy Foundation of America in March 1992. Please note that these recommendations are subject to each particular State's licensing requirements and reporting laws. A patient with seizure disorder should not drive until he/she has been seizure-free for three months. This three-month interval may be lengthened or shortened based on the following favorable and unfavorable modifiers:

Favorable modifiers

- Seizures occurred during medically directed medication changes
- Patient experiences only simple partial seizures that do not interfere with consciousness and/or motor control

- Seizures have consistent and prolonged aura, giving enough warning to refrain from driving
- There is an established pattern of purely nocturnal seizures
- Seizures are secondary to acute metabolic or toxic states that are not likely to recur
- Seizures were caused by sleep deprivation, and sleep deprivation is unlikely to recur
- Seizures are related to reversible acute illness

Unfavorable modifiers:

- Noncompliance with medication or medical visits and/or lack of credibility
- Alcohol and/or drug abuse in the past three months
- Increased number of seizures in the past year
- Impaired driving record
- Structural brain lesion
- Noncorrectable brain functional or metabolic condition
- Frequent seizures after seizure-free interval
- Prior crashes due to seizures in the past five years
- Single unprovoked seizure

Psychiatric Disorders

Patients in the acute phase of a psychiatric illness need to be aware that driving skills could be affected. In general, driving is safe when the condition is stable, although side effects from medications and compliance with the medication regimen may need to be taken into consideration.

Metabolic Disorders

Individuals in the acute phase of a metabolic disorder (e.g., diabetes, Cushing's disease, Addison's disease, hyperfunction of the adrenal medulla, and thyroid disorders) may experience signs and symptoms that are incompatible with safe driving. These individuals should refrain from driving (including driving to seek medical attention) until the symptoms have abated.

Diabetes Mellitus

Insulin dependent diabetes mellitus - No restrictions exist if the patient demonstrates satisfactory control of his/her diabetes, recognizes the warning symptoms of hypoglycemia, and meets required visual standards.

The major concerns with insulin dependent diabetics are hypoglycemia unawareness. Diabetic patients who use insulin should be evaluated for hypoglycemia and should consider checking their blood sugar before driving or on prolonged trips. This is especially the case for individuals

who have exhibited hypoglycemia unawareness (e.g., documented blood sugars below 60 mg/dL without symptoms).

Patients should be counseled not to drive during acute hypoglycemic or hyperglycemic episodes. In addition, patients are advised to keep candy or glucose tablets within reach in their car at all times, in the event of a hypoglycemic attack.

Non-insulin Dependent Diabetes Mellitus - Patients who are managed by lifestyle changes and/or oral medications have no restrictions unless they develop relevant disabilities (e.g., diabetic retinopathy).

Hypothyroidism

Patients who experience symptoms (e.g., cognitive impairment, drowsiness, and fatigue) that may compromise safe driving should be counseled not to drive until their hypothyroidism has been satisfactorily treated. If residual cognitive deficits are apparent despite treatment, a driver evaluation (including on-road assessment) performed by a driver rehabilitation specialist may be useful in determining the patient's ability to drive safely.

Hyperthyroidism

Patients who experience symptoms (e.g., anxiety, tachycardia, palpitations, etc.) should be counseled not to drive until their hyperthyroidism has been satisfactorily treated and symptoms have resolved.

Musculoskeletal Dysfunction

The pain, decrease in motor strength, and compromised range of motion associated with musculoskeletal disabilities can affect an individual's ability to drive.

Patients with musculoskeletal disorders, typically have problems with seat belt and ignition key use, adjusting mirrors and seats, in steering, in transferring in and out of the car, in driving in reverse, and in using the controls like the foot pedal. Driving impairment has been correlated with the inability to reach above the shoulder. Older adults with physical frailty or disabilities may be at increased risk for a crash, and are more likely to be injured. The presence of foot abnormalities, walking less than one block a day, and impaired left knee flexion have been associated with adverse driving events.

Diminished cervical range of motion and a slowed rapid pace walk have also been recently associated with an increased crash risk.

Thus, clinicians can play a role in assessing, managing, and referring their patients with musculoskeletal disorders and, ideally, play a role in maintaining driving privileges and improving traffic safety.

Arthritis

If symptoms of arthritis compromise the patient's driving safety, assessment and treatment by a physical or occupational therapist is appropriate. In addition, a referral to a driver rehabilitation specialist for driver evaluation (including on-road assessment) is recommended. The specialist may prescribe vehicle adaptive devices and train the patient in their use.

Foot Abnormalities

Foot abnormalities (e.g., bunions, hammer toes, long toe nails, and calluses) that affect the patient's dorsiflexion, plantar flexion and/or contact with vehicle foot pedals should be addressed and treated, if possible. Consideration should be given to referral to a podiatrist. A referral to a driver rehabilitation specialist, who can prescribe vehicle adaptive devices and train the patient in their use, may also be beneficial.

Limitation of Cervical ROM

Some loss of head and neck movement is acceptable if the patient has sufficient combined rotation and peripheral vision to accomplish driving tasks (e.g., turning, crossing intersections, parking, backing up) safely. Assessment and treatment by a physical or occupational therapist is appropriate. In addition, a referral to a driver rehabilitation specialist who can prescribe wide-angled mirrors and train the patient in their use is recommended.

Limitation of Thoracic or Lumbar ROM

Patients with marked deformity, who wear braces or body casts, or who have painfully restricted motion in their thoracic or lumbar regions should be referred to a driver rehabilitation specialist. The specialist can prescribe vehicle adaptive devices such as raised seats and wide-angled mirrors, and train the patient in their use. The specialist can also prescribe seat belt adaptations as needed to improve the patient's safety and comfort, and ensure that the patient is seated at least 10 inches from the vehicle air bags.

Patients with acute spinal fractures, including compression fractures, should not drive until the fracture has been stabilized and painful symptoms cease to interfere with control of the motor vehicle. These types of fractures can be extremely painful and require large doses of narcotics for control of pain, which also can increase risk.

Loss of Extremities or Loss of Use of Extremities

For patients who have lost (or lost the use) of one or more extremities, referral to a driver rehabilitation specialist is highly recommended. These specialists can prescribe vehicle adaptive devices and/or adaptations to limb prostheses, and train the patient in their use.

Note that the use of artificial limbs on vehicle foot pedals is unsafe because there is no sensory feedback (i.e., pressure and proprioception). For these patients, specialized hand controls in place of pedals are required.

Orthopedic Procedures/Surgeries

Rotator Cuff Repair (Open or Arthroscopic) - Individuals should not drive for four to six weeks following rotator cuff repair.

Total Hip Replacement - Patients should not drive for at least four weeks following right total hip replacement. If the patient drives a vehicle with manual transmission, he/she should not drive for at least four weeks following right or left total hip replacement.

Patients must take special care when transferring into vehicles and positioning themselves in bucket seats and/or low vehicles, either of which may result in hip flexion greater than 90 degrees.

Reaction time may not return to baseline until eight weeks after the surgery, and patients should exercise extra caution while driving during this period.

Total Knee Arthroplasty - Patients should not drive for three to four weeks following right TKA. If the patient drives a vehicle with manual transmission, he/she should not drive for three to four weeks following right or left TKA.

Reaction time may not return to baseline until eight weeks after the surgery, and that patients should exercise extra caution while driving during this period.

Respiratory Diseases

Chronic Obstructive Pulmonary Disease (COPD)

No restrictions if symptoms are well controlled, and the patient does not experience any significant side effects from the condition or the medication. The patient should not drive if he/she suffers dyspnea at rest or at the wheel (even with the use of supplemental oxygen), excessive fatigue, or significant cognitive impairment. If the patient requires supplemental oxygen to maintain a hemoglobin saturation of 90 percent or greater, he/she should be counseled to use the oxygen at all times while driving. Due to the often tenuous oxygenation status of these patients, they should also be counseled to avoid driving when they have other respiratory symptoms that may indicate concomitant illness or exacerbation of COPD (e.g., new cough, increased sputum production, changes in sputum color, fever). Because COPD is often progressive, periodic reevaluation for symptoms and oxygenation status is recommended.

Sleep Apnea

Patients with excessive daytime sleepiness, loud snoring (particularly if accompanied by witnessed apneic events), large neck circumference (≥ 16 inches in women, ≥ 17 inches in men), elevated body mass index (above 35 kg/m²), and/or hypertension that requires two or more medications should be considered at risk for obstructive sleep apnea, and formal sleep study evaluation should be considered, especially in any patient who reports having fallen asleep while driving a vehicle. A patient diagnosed with sleep apnea (apnea/hypopnea index of 5 or greater) who has fallen asleep while driving, or a patient with severe obstructive sleep apnea (apnea/hypopnea index of 30 or greater) should be counseled to refrain from driving until he/ she is receiving effective treatment (via a positive airway pressure device) following a formal sleep study to confirm the diagnosis. If these patients undergo other treatments (surgery, oral appliances), they should be advised to have a post-treatment sleep study to confirm effectiveness.

Medications

Many commonly used prescription and over-the-counter medications can impair driving performance. In general, any drug with a prominent central nervous system (CNS) effect has the potential to impair an individual's ability to operate a motor vehicle. The level of impairment varies from patient to patient, between different medications within the same therapeutic class, and in combination with other medications or alcohol.

Many classes of medication have been associated with increased crash risk or impaired driving skills when assessed by simulators or road tests. These include, but are not limited to hypnotics, alcohol, antiepileptic agents, anti-emetic agents, narcotics, barbiturates, benzodiazepines, antihistamines, antidepressants, antipsychotics, and muscle relaxants. Some of the highest crash rates have been noted with long-acting benzodiazepines when prescribed to older adults.

Potential driving impairing (PDI) medications is a relatively new term that identifies medications that have been associated with increased crash risk. Crash risk does increase when multiple PDI drugs are prescribed. Mechanisms whereby drugs may impair driving are myriad and include: sleepiness, fatigue, or sedation; lightheadedness, dizziness, or low blood pressure; blackouts or syncope; or impaired judgment coordination. Medications can affect eyesight in numerous ways, including blurred vision, impaired visual fields, and nighttime vision.

Medication side effects that can affect driving performance include drowsiness, dizziness, blurred vision, unsteadiness, fainting, slowed reaction time, and extrapyramidal side effects. In many cases, these side effects are dose-dependent and may attenuate with time.

Whenever possible, the physician should prescribe non-impairing medications. If the physician must prescribe or change the dosage of a medication that can potentially impair driving performance, he/she should counsel the patient about the side effects. The physician should also recommend that the patient take the first few doses in a safe environment to determine the presence and extent of any side effects, and that he/she temporarily cease driving as needed until the body has adjusted to the medication.

In addition to being alert to potential side effects, the patient, caregivers, and clinicians should also understand that with certain medications, subjective effects do not always correlate with impairment. Medications that cause drowsiness, euphoria, and/or anterograde amnesia may also diminish insight, and the patient may experience impairment without being aware of it.

Anticholinergics

Anticholinergic effects that can impair driving performance include blurred vision, sedation, confusion, ataxia, tremulousness, and myoclonic jerking. Patients should be aware of these symptoms and should alert their physicians immediately if they occur. Patients should also be advised that psychomotor and cognitive impairment might be present even in the absence of subjective symptoms (this has been well documented for antihistamines).

Subtle deficits in attention, memory, and reasoning may occur with therapeutic dosages of anticholinergic drugs without signs of frank toxicity. These deficits have often been mistaken for symptoms of early dementia in elderly patients.

Anticonvulsants

The patient should temporarily cease driving during the time of medication initiation, withdrawal, or dosage change due to the risk of recurrent seizure and/or potential medication side effects that may impair driving performance. If there is significant risk of recurrent seizure during medication withdrawal or change, the patient should cease driving during this time and for at least three months thereafter.

Note that many anticonvulsants (e.g., valproic acid, carbamazepine, gabapentin, lamotrigine and topiramate) are also being used as mood stabilizers for treatment of bipolar disorder, for agitation in dementia, and as sedating agents for anxiety. These agents are typically an adjunct to antidepressants, antipsychotics and/or anxiolytics. By themselves, anticonvulsants may be mildly impairing, but the combined medication effects on psychomotor performance tend to enhance their effects.

Antidepressants

Impairing side effects vary among the different classes of antidepressants, and even within certain classes of antidepressants. (In general, antidepressants that possess antagonistic activity at cholinergic, alpha-1-adrenergic, and histaminergic receptors are the most impairing.)

Patients should not drive during the initial phase of antidepressant dosage adjustment(s) if they experience drowsiness, lightheadedness, or other side effects that may impair driving performance. Patients should also be aware that they might experience impairment in the absence of any subjective symptoms.

Antiemetics

Numerous classes of drugs—including anticholinergics, antihistamines, antipsychotics, cannabinoids, benzodiazepines, 5HT antagonists, and glucocorticoids—are used for their antiemetic effect. Side effects of antiemetics that may impair driving performance include sedation, blurred vision, headache, confusion, and dystonias. Significant impairment may be present even in the absence of subjective symptoms; this has been well documented for many benzodiazepines and over-the-counter antihistamines. Patients should be counseled about side effects and their potential to impair driving performance, and should be advised that they may experience impairment even in the absence of subjective symptoms.

Antihistamines

In many patients, the first generation antihistamines (such as diphenhydramine and chlorpheniramine) have pronounced CNS effects. Furthermore, subjects may experience impairment even in the absence of subjective symptoms of impairment.

Patients who take sedating antihistamines should not drive while on the medications. If these patients wish to continue driving, they should be prescribed a non-sedating antihistamine.

Antihypertensives

With their hypotensive properties, common side effects of antihypertensives that may impair driving performance include lightheadedness, dizziness, and fatigue. In addition, antihypertensives with a prominent CNS effect, including beta-blockers and the sympatholytic drugs clonidine, guanfacine and methyldopa, may cause sedation, confusion, insomnia, and nervousness.

These side effects have the potential to impair driving performance. In addition, patients taking antihypertensives may potentially experience electrolyte imbalance (i.e., diuretics) which may also impair driving performance.

Antiparkinsonians

Several medications and classes of medications, including levodopa, antimuscarinics (anticholinergics), amantadine, and dopamine agonists, may be

used in the treatment of Parkinson's disease symptoms. Common side effects of antiparkinsonian drugs that may impair driving performance include excessive daytime sleepiness, lightheadedness, dizziness, blurred vision, dyskinesias, on-off phenomenon, hallucinations, and confusion. Patients should not drive if they experience side effects.

Antipsychotics

Most—if not all—antipsychotic medications have a strong potential to impair driving performance through various CNS effects. Some of the original or “classic” antipsychotics are heavily sedating, and all produce extrapyramidal side effects (EPS). Although the modern or “atypical” drugs have a lower tendency to cause EPS, they, too, are sedating. Patients should not to drive if they experience side effects severe enough to impair driving performance.

Benzodiazepines and other sedatives / anxiolytics

Impairments in vision, attention, motor coordination, and driving performance are common with benzodiazepine use. Evening doses of long-acting benzodiazepines have been shown to markedly impair psychomotor function the following day, while comparable doses of short-acting compounds produce a lesser impairment.

Patients who take longer-acting compounds or daytime doses of any hypnotic have the potential for impairment, even in the absence of subjective symptoms. These patients should avoid driving, particularly during the initial phase of dosage adjustment(s).

Muscle Relaxants

Most skeletal muscle relaxants (e.g., carisoprodol and cyclobenzaprine) have significant CNS effects. Patients should not drive during the initial phase of dosage adjustment(s) if they experience side effects severe enough to affect safe driving performance.

Narcotic Analgesics

Narcotic analgesics can cause impairment even in the absence of subjective symptoms. Patients should not drive while on these medications.

Stimulants

Common side effects of traditional stimulants (such as amphetamines and methylphenidate) that may impair driving performance include euphoria, overconfidence, nervousness, irritability, anxiety, insomnia, headache, and rebound effects as the stimulant wears off. Patients should not drive during the initial phase of dosage adjustment(s) if they experience side effects severe enough to impair driving performance.

Am I a Safe Driver?

Check the statement if it applies to you.

- ☐ I get lost while driving.
- ☐ My friends or family members say they are worried about my driving.
- ☐ Other cars seem to appear from nowhere.
- ☐ I have trouble finding and reading signs in time to respond to them.
- ☐ Other drivers drive too fast.
- ☐ Other drivers often honk at me.
- ☐ Driving stresses me out.
- ☐ After driving, I feel tired.
- ☐ I feel sleepy when I drive.
- ☐ I have had more “near-misses” lately.
- ☐ Busy intersections bother me.
- ☐ Left-hand turns make me nervous.
- ☐ The glare from oncoming headlights bothers me.
- ☐ My medication makes me dizzy or drowsy.
- ☐ I have trouble turning the steering wheel.
- ☐ I have trouble pushing down the foot pedal.
- ☐ I have trouble looking over my shoulder when I back up.
- ☐ I have been stopped by the police for my driving.
- ☐ People no longer will accept rides from me.
- ☐ I have difficulty backing up.
- ☐ I have had accidents that were my fault in the past year.
- ☐ I am too cautious when driving.
- ☐ I sometimes forget to use my mirrors or signals.
- ☐ I sometimes forget to check for oncoming traffic.
- ☐ I have more trouble parking lately.

If you have checked any of the statements, your safety may be a risk when you drive.

Talk to your doctor or therapist about ways to improve your safety when you drive.

Tips for Safe Driving

Tip #1: Drive with Care

Always

- Plan your trips ahead of time. Decide what time to leave and which roads to take. Try to avoid heavy traffic, poor weather and high-speed areas.
- Wear your safety belt—and wear it correctly. (It should go over your shoulder and across your lap.)
- Drive at the speed limit. It's unsafe to drive too fast or too slow.
- Be alert! Pay attention to traffic at all times.
- Keep enough distance between you and the car in front of you.
- Be extra careful at intersections. Use your turn signals and remember to look around you for people and other cars.
- Check your blind spot when changing lanes or backing up.
- Be extra careful at train tracks. Remember to look both ways for trains.
- When you take a new medicine, ask your doctor or pharmacist about side effects.

Never

- Never drink and drive.
- Never drive when you feel angry or tired. If you start to feel tired, stop your car somewhere safe. Take a break until you feel more alert.
- Never eat, drink or use a cell phone while driving.

IF

- If you don't see well in the dark, try not to drive at night or during storms.
- If you have trouble making left turns at an intersection, make three right turns instead of one left turn.
- If you can, avoid driving in bad weather, such as during rain, sleet or snow.

Tip #2: Take care of your car.

- Make sure you have plenty of gas in your car.
- Have your car tuned up regularly.
- Keep your windshields and mirrors clean.
- Keep a cloth in your car for cleaning windows.
- Replace your windshield wiper blades when they become worn out.
- Consider using Rain-X® or a similar product to keep your windows clear.
- If you are shopping for a new car, look for a car with power steering and automatic transmission.

Tip #3: Know where you can find a ride.

How do you get around when your car is in the shop? If you don't know the answer to this question, it's time for you to put together a "transportation plan." A transportation plan is a list of all the ways that you can get around. Use this list when your car is in the shop or when you don't feel safe driving. Your transportation plan might include: rides from friends or family, taxi, bus, train, or senior shuttle.

Tip # 4: Take a Driver Safety Class

To learn how to drive more safely, try taking a class. In a driver safety class, the instructor teaches you skills that you can use when you are driving. These classes usually last several hours. They don't cost much—some are even free. As an added bonus, you might receive a discount on your auto insurance after taking one of these classes. Talk to your insurance company to see if it offers a discount.

Supplemental Information

[Brain activity during driving with distraction: an immersive fMRI study](#)

Schweizer, T. A., Kan, K., Hung, Y., Tam, F., Naglie, G., & Graham, S. J. (2013). Brain activity during driving with distraction: an immersive fMRI study. *Front Hum Neurosci*, 7, 53. CC BY

[Effects of different types of cognitive training on cognitive function, brain structure, and driving safety in senior daily drivers: a pilot study](#)

Nozawa, T., Taki, Y., Kanno, A., Akimoto, Y., Ihara, M., Yokoyama, R., ... & Miyauchi, C. M. (2015). Effects of different types of cognitive training on cognitive function, brain structure, and driving safety in senior daily drivers: a pilot study. *Behavioural neurology*, 2015. CC BY 3.0

[Effects of cerebral diseases on driver distraction](#)

Pavlou, D., Beratis, I., Liozidou, A., Andronas, N., Yannis, G., Economou, A., ... & Papageorgiou, S. G. (2013). Effects of cerebral diseases on driver distraction. In *Proc. of the 3rd International Conference on Driver Distraction and Inattention*. CC BY

[Driving Competence in Mild Dementia with Lewy Bodies: In Search of Cognitive Predictors Using Driving Simulation](#)

Yamin, S., Stinchcombe, A., & Gagnon, S. (2015). Driving Competence in Mild Dementia with Lewy Bodies: In Search of Cognitive Predictors Using Driving Simulation. *International Journal of Alzheimer's Disease*, 2015. CC BY 4.0

[Evaluating Adult's Competency: Application of the Competency Assessment Process](#)

Giroux, D., Tétreault, S., & Landry, M. P. (2015). Evaluating Adult's Competency: Application of the Competency Assessment Process. *International Journal of Alzheimer's Disease*, 2015. CC BY 3.0

[Medication use and the risk of motor vehicle collision in West Virginia drivers 65 years of age and older: a case-crossover study](#)

Rudisill, T. M., Zhu, M., Davidov, D., Long, D. L., Sambamoorthi, U., Abate, M., & Delagarza, V. (2016). Medication use and the risk of motor vehicle collision in West Virginia drivers 65 years of age and older: a case-crossover study. *BMC research notes*, 9(1), 1. CC BY 4.0

[Behind the wheel: community consultation informs adaptation of safe-transport program for older drivers](#)

Coxon, K., & Keay, L. (2015). Behind the wheel: community consultation informs adaptation of safe-transport program for older drivers. *BMC research notes*, 8(1), 764. CC BY 4.0

[Comorbidities and crash involvement among younger and older drivers](#)

Papa, M., Boccardi, V., Prestano, R., Angellotti, E., Desiderio, M., Marano, L., ... & Paolisso, G. (2014). Comorbidities and crash involvement among younger and older drivers. *PloS one*, 9(4). CC BY 4.0

[The drive-wise project: driving simulator training increases real driving performance in healthy older drivers](#)

Casutt, G., Theill, N., Martin, M., Keller, M., & Jäncke, L. (2014). The drive-wise project: driving simulator training increases real driving performance in healthy older drivers. *Front Aging Neurosci*, 6, 85. CC BY

[The trail making test as a screening instrument for driving performance in older drivers: a translational research](#)

Vaucher, P., Herzig, D., Cardoso, I., Herzog, M. H., Mangin, P., & Favrat, B. (2014). The trail making test as a screening instrument for driving performance in older drivers; a translational research. *BMC geriatrics*, 14(1), 1. CC BY 4.0

[Active training and driving-specific feedback improve older drivers' visual search prior to lane changes](#)

Lavallière, M., Simoneau, M., Tremblay, M., Laurendeau, D., & Teasdale, N. (2012). Active training and driving-specific feedback improve older drivers' visual search prior to lane changes. *BMC geriatrics*, 12(1), 1. CC BY 2.0

[Geriatric screening tools are of limited value to predict decline in functional status and quality of life: results of a cohort study](#)

Deckx, L., van den Akker, M., Daniels, L., De Jonge, E. T., Bulens, P., Tjan-Heijnen, V. C., ... & Buntinx, F. (2015). Geriatric screening tools are of limited value to predict decline in functional status and quality of life: results of a cohort study. *BMC family practice*, 16(1), 1. CC BY 4.0

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Senior Drivers: Assessment & Management

Post-Test

1. Older driver crashes are most frequently related to inattention or slowed speed of visual processing. (p. 5) A. True B. False
2. Older drivers have the highest fatality rate per mile drive. (p. 5) A. True B. False
3. Which of the following is NOT individually considered a red flag for unsafe driving? (p. 8)
 - A. Advanced age (85 years +)
 - B. Memory loss
 - C. Visual impairment
 - D. Muscle weakness
4. Which of the following medications have the potential to impair driving ability? (p. 10)
 - A. Anticonvulsants
 - B. Antiemetics
 - C. Antihistamines
 - D. All of the above
5. What should a clinician do if a patient is suspected of unsafe driving and they refuse to have their functional driving-related abilities assessed? (p.11)
 - A. Contact the police and request that they take away the person's driver's license.
 - B. Discuss the situation with the patient's family.
 - C. Encourage the patient to complete a self-screening tool and to attend a driver safety course.
 - D. Send a copy of your recommendations and the patient's refusal to the State's Department of Motor Vehicles.
6. The Assessment of Driving-Related Skills (ADReS) is _____. (p. 12)
 - A. A battery of tests used for identifying areas of concern that may require additional evaluation
 - B. An evaluation used to help predict crash risk
 - C. The test given by the Department of Motor Vehicles to determine whether an individual may retain their driver's license
 - D. None of the above
7. In ADReS, visual fields are measured using _____. (p. 14)
 - A. Snellen E Chart
 - B. Confrontation Testing
 - C. Contrast Sensitivity
 - D. Useful Field of View (UFOV)
8. Regarding contrast sensitivity, older adults require about three times more contrast than young adults to distinguish targets against their background. (p. 14) A. True B. False
9. Crystallized memory tends to decline with age, while working memory remains relatively intact across the life span. (p. 15) A. True B. False
10. The Trail Marking Test, Part B is utilized to assess _____. (p. 17)
 - A. Angular movement
 - B. Cognition

- C. Balance
 - D. Muscle strength and endurance
11. Which of the following is NOT one of the motor function assessments included in the ADReS? (p. 18)
- A. Rapid Pace Walk
 - B. Manual Test of Range of Motion
 - C. Manual Test of Strength
 - D. Romberg Test
12. The Rapid Pace Walk is a measure of _____. (p. 18)
- A. lower limb strength
 - B. endurance
 - C. range of motion
 - D. All of the above
13. If an individual has visual acuity of less than 20/70 the clinician should recommend an on-road assessment by a DRS to evaluate the patient's driving performance. (p. 24) A. True B. False
14. A time for completion of greater than ____ minutes on the Trail-Making Test, Part B signals a need for intervention. (P. 25)
- A. 2
 - B. 3
 - C. 4
 - D. 5
15. Clock Drawing Tests have been found to correlate significantly with traditional cognitive measures, and to discriminate healthy individuals from those with dementia. (p. 26) A. True B. False
16. A Driver Rehabilitation Specialist (DRS) _____. (p. 30)
- A. performs on-road assessments in a specially equipped driver rehabilitation vehicle
 - B. issues the individual a new driver's license that includes appropriate limitations and restrictions
 - C. supplies and installs all recommended adaptive equipment into the patient's vehicle
 - D. sends a letter to the Department of Motor Vehicles outlining their findings and recommendations
17. What is the most frequently cited reason an individual stops driving? (p. 31)
- A. They were responsible for causing a serious car accident.
 - B. A healthcare professional advised them to stop driving.
 - C. Family and friends held an intervention to have them stop driving.
 - D. The Department of Motor Vehicles refused to renew their license.
18. What should a therapist do if their patient needs additional help in securing resources and transitioning to a life without driving. (p. 35)
- A. Assure the patient they will be ok.
 - B. Give the patient a list of taxi companies.
 - C. Refer the patient to a social worker.
 - D. Tell the patient to talk to their friends about their issues.

19. A patient with seizure disorder should not drive until he/she has been seizure-free for _____. (p. 45)
- A. 3 days
 - B. 3 weeks
 - C. 3 months
 - D. 3 years
20. Some of the highest crash rates have been noted with long-acting benzodiazepines when prescribed to older adults. (P. 50) A. True B. False

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