

THE OLDER ADULT DRIVER

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OBJECTIVES

UPON COMPLETION OF THIS CHAPTER, THE READER WILL BE ABLE TO:

- Describe the epidemiology and predictors of driving mishaps involving older adults.
- Discuss current and proposed techniques for assessing motor vehicle crash risk.
- Review the role of the physician in driving competency evaluations.

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PRETEST

1. What factor contributes most to the increased number of crashes involving older drivers?
 - a. The lack of available alternative transportation
 - b. The rapid absolute and relative growth of older age cohorts
 - c. The suboptimal driving skills of even healthy older adults
 - d. Reductions in driving exposure by elders who are aware of their impairments
2. Which of the following abilities is the most crucial for safe driving?
 - a. Vision
 - b. Cognition
 - c. Balance
 - d. Hearing
 - e. Upper and lower extremity flexibility
3. Which one of the following driving maneuvers is most hazardous for older drivers?
 - a. Turning left across traffic at an intersection
 - b. Driving at night
 - c. Merging into traffic on an interstate highway
 - d. Driving on rural roads

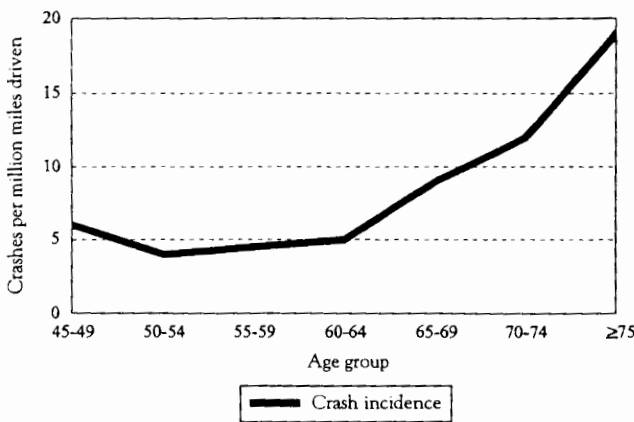


FIG. 26-1. Motor vehicle crash involvement in older drivers. (From Williams AF, Carsten O: *Am J Public Health* 79:326, 1989.)

BACKGROUND

Although seniors drive fewer total miles than younger drivers, they suffer higher motor vehicle crash rates and crash-related mortality rates per mile driven, as illustrated in Fig. 26-1. Although accident rates for the overall population have declined 8.4% since 1980, they have increased 43% for drivers 65 years old and older.¹ Crashes are also the leading cause of death caused by injury for persons 65 to 74 years of age; for even older individuals, crashes are the second-leading cause of death after falls. The rapid growth of older-age cohorts, combined with the observation that the majority of seniors depend upon automobiles to maintain mobility, predicts that in future, increasing numbers of older adults will be driving. From a public health point of view and that of individual seniors, the identification of potentially crash-prone drivers, many of whom may be eligible for remediation, will be an important priority in the coming decades.

EFFECTS OF AGING AND FUNCTIONAL IMPAIRMENTS ON DRIVING ABILITIES

Sooner or later, all older adults have declines in sensory, perceptual, cognitive, and physical function that challenge their independence and mobility. On-road driving studies suggest that healthy older adults possess equivalent or superior driving abilities compared with younger participants; impaired individuals account for the majority of the morbidity and mortality associated with older driver crashes, which typically occur when the driver is turning left against traffic at intersections, during daylight hours and under good road conditions.²

Driving is a complex task requiring intact function in several domains, including the cognitive, visual, auditory, and musculoskeletal systems.³ Older individuals with age-associated medical conditions such as diabetes, heart disease, stroke, epilepsy, dementia, and cataracts are disproportionately represented in crash statistics.⁴⁻¹¹ However, because medical diagnoses have proven to be insensitive indicators of vehicle crash risk, emphasis has shifted in recent years to the functional implications of these conditions and to those caused, for example by the effects of medications such as long-acting benzodiazepines, sedating antihistamines, and alcohol.^{6,8-10,12-18} Along these lines, Foley and colleagues report that continued driving among older men was inversely proportional to the degree of impairment in dementia patients. Whereas 78% percent of those with normal cognitive function continued to drive, 46% and 22% with very mild (Clinical Dementia Rating [CDR] scale score = 0.5) and mild (CDR score = 1.0) dementia, respectively, did so.¹⁹ Thus the functional consequences of dementia, rather than the diagnosis of dementia *per se*, should guide recommendations regarding driving cessation.^{6,10,19} This approach, while considering age and medical diagnoses, emphasizes the identification and, when possible, the amelioration of all variables affecting the overall functional state of the older person. Preliminary evidence indicating associations of

DEFICITS ASSOCIATED WITH OLDER DRIVER CRASHES **Box 26-1**

Visual-cognitive: cataracts, glaucoma, decreased contrast sensitivity and visual acuity, useful field of view $\geq 40\%$ reduction (impaired visual processing speed), difficulty with copying tasks, cognitive impairment

Musculoskeletal: low back pain, more than three foot abnormalities, arthritis, bursitis

Medication-related: long-acting benzodiazepines and other hypnotics, narcotics, tricyclic antidepressants, alcohol, sedating antihistamines

Psychiatric: depression, psychosis

Physical function: difficulty walking $1/4$ mile, walking outdoors, or opening a jar; few blocks walked; falls

Medical diagnosis: cardiopulmonary disease, diabetes, seizures, Alzheimer's disease, stroke, sleep apnea

adverse driving events with other mobility-related limitations, such as falling and walking less, further attests to the degree to which these patients are impaired.^{9,13}

Motor vehicle crash involvement appears to be caused by the effects of one or more interacting variables, some of which may be remediable and some not. The factors outlined in Box 26-1 appear to be associated with susceptibility to driving mishaps (e.g., being stopped by police, a moving violation, a motor vehicle crash, or driver license revocation) in this population.^{4,11,13-19} For example, even mild cognitive deficits have been shown to limit the ability of affected individuals to manage emergency maneuvers and to perform successfully on on-road and simulated driving tests.^{6,10} Thus a senior with moderately advanced dementia with the resulting visual and cognitive impairments would be identified as crash prone, and counseled to stop driving, given the progressive nature of this disorder. The same might be said about another older adult, who is visually impaired, taking long-acting benzodiazepines (e.g., diazepam), and clinically depressed. However, in this instance the patient's susceptibility to motor vehicle crash involvement could be reduced through surgical removal of the cataracts, a cessation of the benzodiazepine or the substitution of a short-acting agent with no active metabolites (e.g., oxazepam) or a nonsedating anxiolytic (e.g., buspirone), and treatment of the depression; this would allow continued driving.

Among the several factors in Box 26-1, intact visual and cognitive function is of critical importance to safe driving, and it is likely that many of the other medical factors have their major effect by adversely affecting these domains (e.g., central nervous system-active medications, cataracts, stroke, and dementia). For example, impaired performance on simple cognitive tests such as the 5-item recall, the Folstein Mini-Mental Status Examination, and design copying has been associated with senior driver mishaps.^{7,13,15} However, current driver screening practices, including static visual acuity measurements and traditional

medical evaluations, do not reliably distinguish between safe and unsafe older drivers.^{12,20,21} For example, in an analysis of state policies on driver license renewal, Levy and associates reported that mandatory tests of visual acuity every 4 years for drivers aged 70 years and older reduced their risk for fatal vehicle crashes by only 7%.²⁰ The addition of knowledge tests and on-road driving assessments did not improve the reduction in crash risk associated with vision testing alone.

SCREENING FOR DRIVING COMPETENCE USING THE USEFUL FIELD OF VIEW

The Useful Field of View (UFOV) test, a new measure of visual processing speed and attention, predicts driving competence, as well as falls and some other measures of speed of processing. The test demonstrates high sensitivity (86.3%) and specificity (84.3%) in detecting older adult drivers who sustained state-recorded, at-fault vehicle crashes in the prior 5 years.^{16,22-24} The test also appears to be the best predictor of crash incidence, and older drivers with at least a 40% reduction in the UFOV were 2.2 times (95% confidence interval of 1.2 to 4.1) more likely to be involved in a crash during 3 years follow-up.²² This promising screen is currently undergoing feasibility testing in two state Departments of Motor Vehicles (Maryland and Florida).

Researchers are also attempting to determine if additional questionnaire data on physical function, affect, life space, self-care activities of daily living, and higher-order instrumental activities of daily living and physical performance variables add to the predictive ability of the UFOV test. For example, Marottoli and colleagues²⁵ suggest that a simple battery of tests examining contrast sensitivity, visual memory, and manual dexterity were highly related to the occurrence of a subsequent adverse driving event (e.g., reporting a crash, being stopped by police, or receiving a citation) in a cohort of community-based drivers aged 77 years and older.

ROLE OF THE PHYSICIAN

How should the health care provider determine when and if an older patient should be counseled to stop driving?

First of all, the physician should be familiar with regulatory requirements. Policies vary by state regarding the renewal of driver's licenses for adults at least 70 years of age and whether health care providers are required to report impaired drivers.

The physician should also be aware that most elders do not require intervention, because they voluntarily reduce or stop driving when they become physically impaired. Thus senior drivers with sensory, motor, or cognitive limitations often compensate by reducing the number of miles driven, their average speed, and exposure to potentially hazardous driving conditions, or by stopping driving alto-

gether. For example, older men performing in the lowest quartile of a cognitive function test battery were six times more likely to report driving less than 3000 miles annually than subjects scoring in the highest quartile.²⁶ Female gender, low educational level, poor general health, visual and neurologic impairments, arthritis, heart disease, and functional disabilities also correlate with driving cessation.^{27,28} Thus many older drivers attempt to balance declining abilities by reducing, and in some cases eliminating, driving exposure. A laissez-faire strategy on the part of the physician, however, is only partially successful, since seniors still experience three times the crash rate and crash-related mortality of middle-aged adults.

In many instances, the decision to counsel a senior to stop driving will be clear cut, as in the case of an individual with moderately advanced dementia or of anyone with poorly controlled seizures, frequent hypoglycemia, active alcoholism, or legal blindness (i.e., binocular visual acuity at least 20/70). Alternatively, healthy or medically stable older adults who are functionally competent should be encouraged to continue driving for as long as they feel comfortable and capable of doing so. The difficulty for

most practitioners is the elder whose crash risk is not obvious. This individual (or a family member) may complain of possibly unsafe driving practices or a recent at-fault vehicle crash. Referrals to hospital- or community-based, older driver programs, which provide objective assessments of driving competence and confidential feedback, can be very helpful in these cases (Table 26-1).

What should a health care provider do about the unsafe elder who refuses to stop driving? For the cognitively intact individual, the health care provider can appeal to reason and counsel the elder to avoid potentially hazardous situations (e.g., driving at night or during rush hour) and about alternative transportation options. Patience and sensitivity to concerns regarding isolation and loss of independence will serve to enhance eventual compliance with these recommendations. Demented individuals lacking intact decision making capacity should be treated in similar fashion but may require intervention by caregivers (e.g., disabling the automobile), the courts, and state departments of motor vehicles. In either case, it behooves the care provider to be aware of particular state reporting requirements regarding potentially impaired drivers.

SELECTED PROGRAMS FOR OLDER DRIVERS			Table 26-1
Getting in Gear	Florida	Mini-mental state examination (MMSE); Automated Psychophysical Test; Useful Field of View (UFOV); on-road driving test	NSC Defensive Driving Course; UFOV training, referral to social programs
Older Driver Evaluation Program*	Ohio	Self-report questionnaire data; MMSE; vision screen; medicine review; hearing test; Trails A and B; reaction time (RT); range of motion; balance; endurance; strength; simulated and on-road driving	
University of Alabama-Birmingham Driving Assessment Clinic	Alabama	Clinical Dementia Rating Scale; visual acuity, contrast sensitivity and peripheral fields; Trails A and B; WMS-III Spatial Scan; UFOV; Driving Habits Questionnaire; general health review; possible on-road driving test	Referral to certified driving rehabilitation specialist; information on alternative transportation
Older Driver Safety Project†	New York	Visual acuity; RT; cognitive and hearing tests; road knowledge test; on-road driving	
Mature Driver Retraining Workshops‡	Michigan	RT; visual acuity and depth perception; UFOV; on-road test	Classroom review using AAA Workshop Material; UFOV training (added)
Senior Health Center at St. Mary's Hospital§	Virginia	Driving record; medical record review; MMSE; clock drawing; geriatric depression screen, tests of mobility, gait and coordination; set test; possible neuropsychology referral	Counseling and referrals for on-road driving and knowledge tests

*Ohio State University Medicinal Center Office of Geriatrics and Gerontology.

†DeGraff Memorial Hospital and Rochester Rehabilitation Center.

‡Oakland County, Michigan.

§Richmond, Virginia.

NSC, National Safety Council; WMS-III, Wechsler Memory Scale III.

MODEL PROGRAMS FOR HIGH-RISK OLDER DRIVERS

Some agencies have initiated multicomponent pilot programs to assess, counsel, and potentially retrain older drivers, who either self-refer or are referred by their families, health care providers, the courts, or state departments of motor vehicles. Most such programs provide confidential evaluations, guidance about whether the senior is capable of continued driving, and options for retraining. Table 26-1 provides a few examples of these programs. In instances in which individuals are advised to stop driving, counseling about transportation alternatives and other psychosocial issues is usually provided.

In contrast to some other programs, participation in the "Getting in Gear" (GIG) program in Florida is entirely voluntary.²⁹ Older drivers enrolled in GIG undergo a detailed assessment, including the mini-mental state examination (MMSE), the Automated Psychophysical Test, the UFOV, and an on-road driving test (see Table 26-1). GIG participants then enroll in "Coaching the Mature Driver," a 6-hour defensive driving course that provides a factual review of the effect of aging on driving abilities and recommends potential compensatory strategies. In addition, a recent innovation to improve visual processing speed and attention (i.e., to expand the size of UFOV) has been shown to improve driving practices in impaired elders, and his training is now offered by GIG for those with poor JFOV performance.²² The coupling of driving assessment with new and innovative rehabilitation options offers much promise for helping older adults retain mobility and driving competence for as long as possible. If as a result of the GIG program, an older driver decides, or is counseled, to stop or reduce driving, case managers assist by referring the individual to appropriate social programs for guidance in alternative transportation; assistance with shopping, meals, and housekeeping; and referrals for adult day care.²⁹ The physical and social isolation of seniors who stop driving and the resulting depression many suffer are active concerns of GIG case managers.

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POSTTEST

1. Which test has demonstrated very good sensitivity and specificity in distinguishing safe from crash-prone older drivers?

- a. Static visual acuity tests
- b. Knowledge tests
- c. Medical history and physical examinations
- d. Uscm field of view

2. Which medication class is not associated with simulated on-road crash involvement?

- a. Alcohol
- b. Sedating antihistamines
- c. Narcotics

d. Short-acting benzodiazepines

e. Tricyclic antidepressants

3. Which approach should the clinician take in counseling an older driver, who may be worried about continued driving?

- a. Advise the patient to stop driving
- b. Refer the individual to a local program designed to assess and counsel older adult drivers.
- c. Suggest that the patient reduce his or her exposure to unsafe conditions (e.g., driving at night).
- d. Perform a medical history and physical examination.

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Pretest Answers	Posttest Answers
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2. b	2. d
3. a	3. b

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