

**KEVIN T. FOLEY, MD**

Staff physician, Section of Geriatric Medicine,
Department of General Internal Medicine,
Cleveland Clinic.

STEVEN J. MITCHELL, OTR/L, CDRS

Certified Driver Rehabilitation Specialist,
Department of Occupational Therapy,
Cleveland Clinic.

The elderly driver: What physicians need to know

DRIVING HAS BECOME A SYMBOL of freedom and self-expression, closely linked to our sense of independence and self-esteem. Persons who must give up driving often feel a loss of autonomy, particularly if the decision is involuntary. For some, the psychological impact of losing their driving privileges is devastating—much more damaging than that which might result from the coexistent awareness of restricted physical mobility.

Physicians face a difficult challenge in evaluating the driving competence of their elderly patients. On one hand, it is important that the physician not limit driving privileges without good reason, unnecessarily diminishing the patient's quality of life. On the other hand, physicians must balance concerns for the patient's autonomy with the need to protect society from unsafe drivers.

Although it is a common belief that elderly motorists are hazardous, statistics convincingly argue against this notion. As a group, elderly drivers present far less danger on the road than do younger persons. The relatively few older drivers at greatest risk of crashing appear to be those who lack effective compensatory mechanisms to overcome age- or disease-related impairments that adversely affect driving skills. (Physiologic changes of aging that can limit driving ability include prolonged perception and reaction time and impairments in vision, hearing, dexterity, and coordination.)

Although many elderly drivers are aware of their limitations and purposely stop or limit driving, many older persons underestimate the extent of their impairment, and few have had their impairments diagnosed and evaluated in the context of safe driving.¹

ABSTRACT

Physicians often must decide when an older patient should give up driving. Objective measures of accident risk are lacking, but a simple assessment of function can provide insights. Some medical centers now offer driving evaluation and rehabilitation programs.

KEY POINTS

Elderly persons as a group do not have more automobile accidents than younger persons do, and most elderly patients who should give up driving do so on their own.

A person who has difficulties in basic activities of daily living probably has difficulty driving and should have an evaluation.

Only a few states require physicians to report unsafe drivers to state licensing bureaus, but physicians may be held liable if they do not warn patients who subsequently injure others.

Physicians and licensing bureaus share responsibility for monitoring the safety of older motorists, but it is exceedingly difficult to fulfill this obligation, because we lack readily available, reliable ways to identify unsafe drivers.

In this review, we summarize studies of elderly driver safety, outline our approach to the medical and driving evaluations, and recommend a decision-making strategy.

■ CRASH CHARACTERISTICS

In 1994, there were 175 million drivers, of whom 16 million were age 70 or older.² As the baby-boomer and X-generations age, the number of senior drivers will increase markedly, from 28% in the year 2000 to 39% in 2050.³

The elderly have the smallest absolute number of accidents per annum of all age groups.⁴ Older drivers do have slightly more crashes per mile driven than do middle-aged drivers, possibly because the elderly mostly drive in higher-risk urban areas rather than on freeways. However, elderly drivers have a far lower crash rate than do the youngest drivers.⁴

Elderly drivers differ from younger drivers in the types of traffic violations and accidents they incur. Traffic violations for elderly drivers more commonly result from failure to obey traffic signs or right-of-way rules.⁵ Their accidents tend to occur more often at intersections, during left-turns, and at lower speeds.^{6,7} Compared with younger drivers, more of their accidents involve two or more vehicles, and fewer involve alcohol.^{5,7} Together, these data indicate that the accidents that older drivers have are primarily due to slowed perception and to inattention rather than intentional unsafe behaviors, which are more common among younger drivers.⁷

Consequences worse for elderly

Crashes are very serious for the elderly, who as a group account for 12% to 13% of all driver and passenger deaths² and have the highest rates of vehicular fatality and hospital admissions for trauma.⁸ Motor vehicle-related injury is the leading cause of injury-related death among persons age 65 to 74, and the second-

leading cause (after falls) of injury-related fatality and emergency room visits for trauma for persons age 75 and older.⁹

Yet elderly drivers do not have more serious crashes than younger drivers do. The severity of crashes is remarkably constant across all age groups.⁷ Rather, the higher mortality rate in the elderly is due to their physical frailty.⁷ An older adult is four times more likely to die than a young adult in an accident of similar severity.⁵

■ IMPACT OF HEALTH STATUS ON SAFE DRIVING ABILITY

No solid link to illness or medications

There is no conclusive evidence that having a chronic disease or using any specific prescription drug increases the risk of crashes for elderly persons.¹⁰ One recent population-based case-control study did show a higher risk of injury from motor vehicle accidents in persons age 65 and older with diabetes than in controls.¹¹ This finding requires confirmation in other studies before specific recommendations can be made to drivers with diabetes.

Dementia studies inconclusive

Although dementia has been long considered one of the most important risk factors for crashes among elderly drivers, the data are contradictory.

Several small retrospective studies found higher crash rates for cognitively impaired drivers.¹²⁻¹⁵ Similar findings were reported from two larger studies published in 1993: both found that drivers with dementia had twice as many collisions as matched controls during all of the years of driving after symptom onset.^{14,15}

However, a recent well-designed study by Trobe et al¹⁶ found no difference in the crash and violation rates between a group of 143 subjects with Alzheimer's disease and a group of matched controls. The lack of a difference between the two groups was largely attributed to the fact that the persons with Alzheimer's disease drove proportionately fewer total miles. However, 73% of the drivers with Alzheimer's disease who crashed continued to drive for 12 or more months after the crash.

Studies of road test performance have also not provided definitive results.¹⁷ Hunt¹⁸ eval-

In an accident, an older person is four times more likely to die than a younger adult

uated road driving performance in persons with early Alzheimer's disease, and found that persons with very mild disease achieved passing scores at a rate similar to that of age-matched controls, but performance dropped significantly once impairment had progressed to the mild stage. Similar findings were reported in another study of persons with mild Alzheimer's disease or multi-infarct dementia, compared with controls.¹⁹

Importance of clinical judgment

Despite the promise of such evaluations for the identification of hazardous cognitively impaired drivers, various analyses to date have failed to accurately correlate road test scores with crash risk or frequency in persons with dementia.

The results of screening memory tests (eg, the Folstein mini-mental state examination [MMSE]²⁰) and more involved neuropsychological examinations likewise have failed to reliably estimate crash risk in the mild-to-moderate stages of dementia.^{15,16,21}

In view of the dearth of conclusive findings, the simple diagnosis of dementia cannot provide sufficient information to guide decisions. Since there are no accepted criteria to determine if a person with dementia is truly dangerous on the road (as opposed to potentially dangerous), physicians must rely on clinical intuition to decide when a cognitively impaired patient "is at risk of making errors in judgment likely to affect the ability to drive safely,"²² such that they should limit or discontinue driving, as the American Medical Association stipulates in its guidelines on driving.

MEDICAL EVALUATION

Although most elderly drivers who should curtail their driving do so on their own,^{23,24} the high crash-related mortality rate in the elderly underscores the need for physicians to take an active role in determining their patients' fitness to drive.

Look for difficulty in activities of daily living

Criteria for deciding who should undergo a medical evaluation of driving safety have yet

TABLE 1

KEY FEATURES OF THE DRIVING ASSESSMENT

Oral review of driving record
Survey of medication and alcohol use
Functional assessment
 Special senses: vision and hearing
 Cognition
 Arm and shoulder function
 Hand and finger dexterity
 Balance and gait
Psychosocial interview
Targeted physical examination
Driving evaluation

to be validated. However, driving requires the same integration of multiple body systems (sensory, cognitive, musculoskeletal) that is also essential in carrying out the basic activities of daily living: bathing, feeding, continence, toileting dressing, and transferring. Therefore, if an older person has difficulties in these activities, we consider him or her to be at risk of having impaired driving skills and recommend a medical driving evaluation.

Elements of the medical evaluation

Because functional status is influenced by various psychosocial factors as well as physical health, we recommend a comprehensive approach to the medical driving assessment that uses a modified version of the standard geriatric assessment (TABLE 1).²⁵

A discussion of the patient's driving record begins the evaluation. Family members are included in the interview and often provide information about crashes or traffic violations that the patient may not initially divulge.

A survey of medications and alcohol use helps uncover any pharmacologic effects that could impair driving performance, such as sedation from anxiolytic, antidepressant, or narcotic analgesic drugs.

Family members often offer information that the patient may conceal

**In the end,
the decision
may depend
on clinical
judgment**

A **functional assessment** looks for difficulties in self-care that might suggest coexisting impairment in driving skill. For example, inability to dress independently could result from arm weakness, loss of coordination, or restricted range of motion, any of which could make turning a steering wheel difficult.

A **psychosocial evaluation** screens for cognitive impairment and defines the impact that driving has on the patient's quality of life.

Cognitive function is screened by asking the patient to draw a numbered clock face with the hour and minute hands at a specific time,²⁶ and with the Folstein mini-mental state examination²⁰ (TABLE 2). Both of these simple tests are useful for detecting clinically significant dementia or impaired visuospatial skills. If cognitive deficits are subtle and an underlying dementia is suspected, we order psychometric tests to verify the presence and extent of memory impairment.

Vision and hearing. We screen for defects in visual acuity with a Jaeger card, and assess visual fields by confrontation. We evaluate hearing with the whisper test, in which the examiner stands 2 feet behind the patient and whispers a short string of numbers, which the patient must repeat for each ear.²⁷ These simple, in-office screening tools can detect impairment of the most important sensory functions used during driving and identify patients who might benefit from seeing an ophthalmologist or audiologist.

A **targeted physical examination** concludes the assessment and focuses on the musculoskeletal and nervous systems, to note any evidence of muscle weakness, loss of coordination, or peripheral sensory system dysfunction.

■ THE DRIVING EVALUATION: WHEN AND WHY

We recommend a formal driving evaluation by an occupational therapist for patients with any of the following:

- Uncorrectable vision impairment.
- Nonreversible dementia.
- Residual limitation in the use of the

upper or lower extremities resulting from musculoskeletal or nervous system disease or injury.

Although a driving evaluation cannot

accurately predict crash risk or identify drivers who would benefit the most from driver rehabilitation, it directly measures the effect of specific cognitive or physical deficits on driving skills.

Driving evaluations generally take 2 to 4 hours and entail both clinical and behind-the-wheel assessments. The road test is usually performed in a car equipped with a trainer brake and modified to allow for easy installation and removal of adaptive equipment. The route is usually predetermined to gradually expose the patient to more demanding traffic conditions. Areas commonly assessed include observational skills, control of speed, lane position, turning, ability to accept safe gaps in traffic, parking, and maneuverability.²⁸

After the driving test, we base our recommendations on the patient's performance, estimated level of driving risk, and potential for improvement through instruction in the use of adaptive equipment or compensatory strategies. This information often helps the patient decide whether to continue driving and identifies problems that might be corrected through a driver rehabilitation program.

■ MANAGEMENT TACTICS

Physician follow-up

The physician should follow up to evaluate the effects of treatment on reversible conditions, and also to monitor driving safety if chronic, progressive disorders are diagnosed. Potentially treatable conditions such as decreased visual acuity or hearing, cognitive impairment, and weakness, pain, or limited range of motion from musculoskeletal conditions must be discussed with the patient and prioritized in the management plan.

Occupational therapy

Occupational therapists who perform driving evaluations are usually certified to provide driver rehabilitation services as well and can organize a driver retraining program for patients who need to learn and practice compensatory driving techniques.

Adaptive equipment

Therapists also identify drivers with physical limitations such as hemiparesis, hemianopia,



or peripheral neuropathy for whom vehicle modification is appropriate. Common types of adaptive equipment include hand controls, left-sided accelerator pedals, steering spinner knobs, and special mirrors.

■ THE DECIDING FACTORS

The decision to recommend driving less or stopping altogether is often difficult and may have to be based largely on clinical judgment. Such a recommendation may be indicated if the patient:

- Has a poor performance on a driving evaluation (the best evidence that a person needs to limit his or her driving).
- Meets the indications for a driving evaluation but refuses to undergo one, or cannot because this service is not available locally.
- Has dependency in basic activities of daily living.
 - Abuses alcohol or other substances.
 - Has seizures or syncope.
 - Has had two or more recent crashes or traffic violations.

Restricted driving. Some patients may be able to continue driving, but only for necessary reasons and in light traffic. Both patients and their families should be involved in defining the limits on driving, and alternate means of transportation should be arranged or made available. Social workers can help patients find other transportation and arrange for in-home services to diminish the need for driving.

Cessation of driving is advised if the hazards of driving are serious, such as in cases of advanced dementia or blindness. It is preferable that patients relinquish driving privileges voluntarily, but if they refuse, then it is appropriate to notify the state licensing agency and pursue means to actively prevent their driving again.

All recommendations should be documented in the medical record and a copy given to the patient and his or her family.

■ PHYSICIAN LIABILITY

Only a few states legally require physicians to report unsafe drivers.²⁹ Mandatory reporting statutes tend to be limited to cases in which

TABLE 2

MINI-MENTAL STATE EXAMINATION

Questions	Maximum score	Patient's score
Orientation		
1. Ask the patient what is the:		
Year?	1	()
Season?	1	()
Date?	1	()
Day?	1	()
Month?	1	()
2. Where are we?		
State?	1	()
County?	1	()
Town or city?	1	()
Hospital?	1	()
Floor?	1	()
Registration		
3. Ask the patient to listen while you name three objects, taking 1 second to say each. Then ask the patient to repeat all three after you have said them.	3	()
Attention and calculation		
4. Ask the patient to count backward from 100 by sevens. Give one point for each correct answer. Stop after five answers. Alternate: spell "world" backwards.	5	()
Recall		
5. Ask the patient to recall the three objects named in question 3. Give one point for each correct answer.	3	()
Language		
6. Point to a pencil and a watch. Have the patient name them as you point.	2	()
7. Have the patient repeat the following: "no ifs, ands, or buts."	1	()
8. Have the patient follow a three-stage command: "Take a paper in your right hand. Fold the paper in half. Put the paper on the floor."	3	()
9. Have the patient read and obey the following: "Close your eyes." (Write it in large letters.)	1	()
10. Have the patient write a sentence of his or her choice. (The sentence should contain a subject and a verb and should make sense. Ignore spelling errors when scoring.)	1	()
11. Have the patient copy the design shown here. (Give one point if all sides and angles are preserved and if the intersecting sides form a quadrangle.)	1	()
Total		30*

*A score of 23 or less indicates dementia

SOURCE: FROM FOLSTEIN ET AL, REFERENCE 20



drivers have experienced episodes of abrupt loss of consciousness. Except for California, no states require physicians to report patients with dementia to the driver licensing bureau.

Most states encourage physicians to report patients who in their opinion cannot drive safely, but few do, probably because of concerns about patient confidentiality. Although physicians have a duty to the public as well as to the individual patient, it is not clear, except in extreme cases, when a patient's confidentiality rights must be suspended to protect the safety of other motorists and pedestrians.

Physicians may be liable for a breach in confidentiality if they report patients without their permission to do so.

Complicating matters is an appellate court decision in which a physician was sued and found negligent for failing to warn an ill patient not to drive, who subsequently injured the plaintiff in a crash.³⁰ This ruling implies that physicians are liable for injuries to unknown third parties caused by their patients' actions if they fail to provide adequate warning about the potential dangers of those actions.

REFERENCES

- Carr D, Jackson T, Alquire P. Characteristics of an elderly population referred to a geriatric assessment center. *J Am Geriatr Soc* 1990; 38:1145-1150.
- National Highway Traffic Safety Administration. Traffic safety facts 1994. Washington, DC: National Center for Statistics and Analysis, 1995.
- Malfetti JL, editor. Drivers 55+. Needs and problems of older drivers: survey results and recommendations. Falls Church: AAA Foundation for Traffic Safety, 1985.
- Cerrelli E. Crash data and rates for age-sex groups of drivers, 1994. National Highway Traffic Safety Administration. Research Note. Washington, DC: National Center for Statistics and Analysis, October 1995.
- Cerrelli E. Older drivers: the age factor in traffic safety. National Highway Traffic Safety Administration. Technical Report DOT HS 807 402. Springfield: National Technical Information Service, February 1989.
- Cooper PJ. Differences in accident characteristics among elderly drivers and between elderly and middle-aged drivers. *Accid Anal Prev* 1990; 22:499-508.
- National Highway Traffic Safety Administration. Addressing the safety issues related to younger and older drivers. A report to Congress. DOT HS 807-957. Washington, DC: US Government Printing Office, 1993.
- Fife D, Barancik JI, Chatterjee BF. Northeastern Ohio trauma study II: injury rates by age, sex, and cause. *Am J Public Health* 1984; 74:473-478.
- Waller PF. Preventing injury to the elderly. In: Phillips HT, Gaylord SA, editors. *Aging and public health*. New York: Springer Publishing, 1985:103-146.
- Reuben DB, Silliman RA, Traines M. The aging driver: medicine, policy, and ethics. *J Am Geriatr Soc* 1988; 36:1135-1142.
- Koepsell TD, Wolf ME, McCloskey L, et al. Medical conditions and motor vehicle collision injuries in older adults. *J Am Geriatr Soc* 1994; 42:695-700.
- Lucas-Blaustein MJ, Filipp L, Dungan C, Tune L. Driving in patients with dementia. *J Am Geriatr Soc* 1988; 36:1087-1091.
- Friedland RP, Koss E, Kumar A, et al. Motor vehicle crashes in dementia of the Alzheimer type. *Ann Neurol* 1988; 24:782-786.
- Drachman DA, Swearer JM. Driving and Alzheimer's disease: the risk of crashes. *Neurology* 1993; 43:2448-2456.
- Cooper PJ, Tallman K, Tuokko H, et al. Vehicle crash involvement and cognitive deficit in older drivers. *J Safety Res* 1993; 24:9-17.
- Trobe JD, Waller PF, Cook-Flannagan CA, Teshima SM, Bieliauskas LA. Crashes and violations among drivers with Alzheimer disease. *Arch Neurol* 1996; 53:411-416.
- Carr D, Jackson TW, Madden DJ, Cohen HJ. The effect of age on driving skills. *J Am Geriatr Soc* 1992; 40:567-573.
- Hunt L, Morris JC, Edwards D, Wilson BS. Driving performance in persons with mild senile dementia of the Alzheimer type. *J Am Geriatr Soc* 1993; 41:747-753.
- Fitten LJ, Perryman KM, Wilkinson CJ, et al. Alzheimer and vascular dementias and driving. A prospective road and laboratory study. *JAMA* 1995; 273:1360-1365.
- Folstein MF, Folstein SE, McHugh PR. Mini-mental state: a practical method for grading the cognitive state of patients for the clinician. *J Psychiatr Res* 1975; 12:189-198.
- Odenheimer GL, Beaudet M, Jette AM, Albert MS, Grande L, Minaker KL. Performance-based driving evaluation of the elderly driver: safety, reliability, and validity. *J Gerontol* 1994; 49:M153-M159.
- Doegge TC, Engelberg AL, editors. *Medical conditions affecting drivers*. Chicago: American Medical Association, 1986.
- Persson D. The elderly driver: deciding when to stop. *Gerontologist* 1993; 33:88-91.
- Marottoli RA, Ostfeld AM, Merrill SS, Perlman GD, Foley DJ, Cooney LM Jr. Driving cessation and changes in mileage driven among elderly individuals. *J Gerontol* 1993; 48:S255-S260.
- Foley KT, Palmer RM. Evaluation of the frail elderly: tools for office practice. *Hospital Medicine* 1996; 32:21-30.
- Wolf-Klein GP, Silverstone FA, Levy AP, Brod MS. Screening for Alzheimer's disease by clock drawing. *J Am Geriatr Soc* 1989; 37:730-734.
- Macphee GJA, Crowther JA, McAlpine CH. A simple screening test for hearing impairment in elderly patients. *Age Ageing* 1988; 17:347-351.
- Sivak M, Hill CS, Henson DL, Butler BP, Silber SM, Olson PL. Improved driving performance following perceptual training in persons with brain damage. *Arch Phys Med Rehabil* 1984; 65:163-167.
- Petrucelli E, Malinowski M. Status of medical review in driver licensing: policies, programs, and standards. National Highway Traffic Safety Administration. Final Report DOT HS 807 892. Springfield: National Technical Information Service, March 1992.
- Myers v. Quesenberry, 193 Cal Rptr 733, 1983.

ADDRESS: Kevin T. Foley, MD, Section of Geriatric Medicine, Department of General Internal Medicine, A91, The Cleveland Clinic Foundation, 9500 Euclid Avenue, Cleveland, OH 44195

Document all
recommendations